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THE SPREAD OF THE CAPITAL MARKETS'S GLOBAL CRISIS: DOES THE COUNTRIES' INDUSTRIAL PROFILE MATTER?

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Abstract:
The causes of 2007's financial perturbations and mainly of the subprime crisis are well known at the beginning of 2008. Nevertheless, the specialists pay little attention to capital markets global crisis and to its consequences. In this study, we demonstrate using Infinancials data, that we are experiencing a global capital markets crisis, where the European financial markets are the most affected. The impact of the crisis upon the 45 analysed countries differs depending on their industrial structure. Among the other factors which led to a different impact of the global crisis we can range the capital markets development and the correction of the assets prices boom. The effects of this crisis on the real economy are less obvious at the beginning of 2008, especially at European level, but the economic growth forecasts became pessimistic. The credit activity is negatively influenced and the foreign exchange market crosses over a turbulent period. The financial crisis consequences in respect of the real economy will depend on the recovery capacity of the United States economy.

Key words: capital markets contagion, global financial crisis, subprime crisis, stock prices, industrial profile

JEL Classification: E3, G1

1. Introduction

The United States subprime crisis was largely analysed in the economic literature, but little attention is paid to the financial markets global crisis. We are crossing a period with severe financial turbulences around the world. At the beginning of 2008 almost all the countries were severely touched by the crisis, but the effect of the shock upon the stock prices differed between capital markets.

In a recent study [Albulescu, (2008)], we have tried to identify the factors which contributed to a different impact upon the 45 analysed countries. Analysing the evolution of the European capital markets stock prices we discovered that there is no relation between the recent financial results of the companies and the drop of the stock prices. In addition, the importance of the degradation of macroeconomic fundamentals is not obviously related to the crisis effect. That is why we have concluded that the different impact was rather correlated with the stock price correction, but those results were not satisfactory.

In this study we test the correlation between the industrial profile of the countries and the impact of the global crisis. The analysed companies were grouped in 18th industrial sectors in order to identify which sectors are more exposed. This method allowed us to demonstrate the correlation between the countries' industrial profile and the crisis' impact upon the capital markets.

The structure of the article is the following: the first part presents the subprime crisis and its repercussions and the second part presents the results related to the industrial profile of the analysed countries. Finally, we point out the conclusions.

2. The subprime crisis and the turbulences on the international capital markets

In the capitalist financial systems, especially in the market–based ones, there is a continuous process of capital accumulation. If this process stops, the entire financial and economic system enters into collapse. This was also the case of the 2007 subprime crisis.

A financial crisis can be defined in several ways and can take different forms (banking crisis, foreign exchange crisis, debt crisis, etc.). A financial crisis can also be defined as a crisis which affects the stock exchange markets and the credit markets in a country or in a group of countries. If the financial crisis will continue, it can emerge and affect the real economy, leading even to a recession.

In respect of asset prices, real growth and public debt, Reinhart and Rogoff (2008) affirmed that there is a strong resemblance between 2007 subprime crisis and the other financial crisis. We consider that there are also some particular aspects which characterize the actual crisis, like the increased role of financial innovations (the securitisation and credit derivatives) and a very important contagion

phenomenon which began within the American economy and spread over the global financial markets, deteriorating the investors' confidence.

The shock on the American real estate market has been a starting point for the financial turbulences at international scale. At the end of 2006, an important number of clues have already announced the international financial markets crisis: depreciation of dollar denominated assets, degradation of banks financial indicators, reserves reduction and mortgage credit problems. Between 1997 and 2006, the houses prices increased with about 124% in the United States [The Economist, (2007)].

The financial turbulences have begun before the subprime crisis. A first contagion phenomenon related to stock prices drop was signalled in emerging markets in May 2006 [Mauro, and Yafeh, (2007)]. A second event of financial turbulences was represented by the Chinese capital market disorder in February 2007. The credit mortgage crisis in the United Stated followed.

In the United States, during the '90, many mortgage loans were granted to debtors with a doubtful repayment history. Thereby, in 2006 these subprime loans represented 600 billion dollars, reaching about 20% of the total mortgage loans. The default rate increased to 42% in 2006 as compared with 2005 [Lasserre, (2007)]. In 2007, the volume of subprime loans represented 13% of total loans amount (about 1300 billion dollars) and the delinquency rate increased to 15% in 2007 as compared with 10% in 2005 [Banque de France, (2007)].

These doubtful loans were known as "2/28" and "3/27" and the most part of these loans were *adjustable rate mortgages loans* (ARM), granted without assessing the repayment capacity of their beneficiaries [Schumer, and Maloney, (2007)]. For example, a hybrid ARM "2/28" is characterized by a fix interest rate, adjusted every six months, depending on a reference rate. In 2007, the adjustment of the ARM caused a 30% increase of the payments amount, and an important part of the borrowers were no longer able to pay.

This situation was well known a few years ago, but a considerable number of specialists argued that the exponential increase of real estate prices is justified by the financial innovation and the Asiatic capital flow towards the United States. The US wealth contraction in 2007, the credit spread growth and the malfunctioning of credit market contradicted their theory.

Equally, the international macroeconomic climate deteriorates. The previous period was called by the specialists – "*The Great Moderation*". This period is characterised by a low inflation and an ongoing increase of the real GDP[1]. However, in the last years, several events occurred and contributed to the economic climate deterioration. The surplus of savings in countries like China and the interest of the petroleum exporting countries to limit the appreciation of their currencies toward the American dollar contributed to the economic deterioration of the US The financial inflation was also considerable before the start of the crisis and the FED and ECB contributed to its amplification, by maintaining a liquidity excess in the market.

But the most important factors which contributed to the crisis appearance were the financial innovations (represented by the securitization activity and the credit derivatives), combined with the imperfections of the regulatory and surveillance activities.

The securitization process is described by Durand (2007). The banks set up the so called "package" of mortgage loans (repackaging process), with different risk profiles (the subprime loans are the most likely to make default), and declined the property of this loans to investors which assumed the risk (especially to the hedge funds). The risk transfer is possible under the form of securities which can be negotiated on the market (asset–backed securities – ABS). If the loans are mortgage loans, we speak about "mortgage backed securities".

The credit derivatives also give to banks the possibility to take an important part of their credit portfolio off from the balance sheet. Several reasons are in favour of this option. The first one is represented by a better financial situation of the balance sheet which increases the investors' confidence in the bank. Another reason is the interest rate arbitrage which gives to the banks the possibility to take profit on the difference between the interest obtained by the intermediary entities who invested in the outstanding debt of the bank (the Special Purpose Vehicle – SPV) and the interest which must be paid to investors, indirectly, by means of the same SPV [Léonard, (2008)].

[1] Some authors considered that this period was favourable to risk construction [Buiter, (2007)].

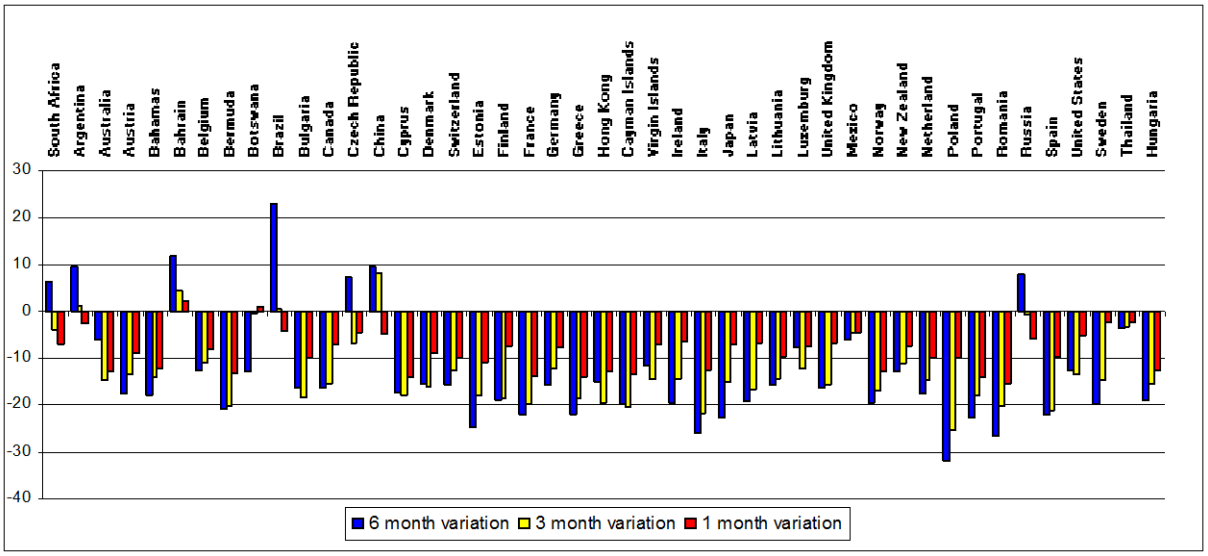
The regulation process deficiencies also represent an important factor of the recent crisis. The Basel I implementation pushed the financial firms to avoid the capital constraints and to sell a part of the granted loans. The new Agreement – Basel II – is less rigid, but it still does not use the loss distribution. The stress–test methodology takes indeed into account the extreme loss distribution, but it was not often used in practice.

The subprime crisis extended at international level, following two main directions: the credit crunch and the capital markets turmoil. In our study we analyse the contagion phenomenon on the stock markets, trying to find out the reason for which the stock markets were differently affected around the world. Our analysis is similar to the Balit Moussalli's (2007) who studied the different impact of the Asian crisis.

Up to now, the impact of the crisis on the real economy is not so evident. That is why the specialists speak about a paradox of the actual crisis [Riskbank, (2007); Landau, (2007); Noyer, (2007)]. Any employed indicator (spread or volatility) shows that the shock on the credit markets and on the stock exchange is important and the losses are considerable. However, these spectacularly losses incurred by some companies, do not appear like a major threat to financial stability.

The international financial crisis was amplified by the loss of investors' confidence and by the speculation process. We consider that the financial system learned to respond to the financial turbulences and the effects of the crisis are delayed. The losses incurred will have an important impact upon the real economy, but it is difficult to forecast when the end of the crisis occurs.

Before we proceed to the analysis of the factors which contribute to a different propagation of the crisis in the stock markets, we will show that we are crossing a global financial crisis. The analysis is made in February 2008, six month after the start of the subprime crisis. For demonstrating that the stock market crisis has an international extension, we have used *Infinancials* data for 45 countries (more than 20.000 listed companies, grouped in 18 industrial sectors). The stock price at 6 months drops for the large majority of the countries, except for several emerging economies. However, at the beginning of 2008, only the stock market in Bahrain knew a slight increase. In all the other markets, the stock prices decreased. In order to obtain a robust analysis, we have worked with the average stock prices variation, for all the companies listed, but also for the 10 largest companies. We also performed the analysis for the stock market representative index. The results of the two last analyses are similar to the first one. That is why we present in the following graph the stock prices evolution for all the listed companies (Figure 1).



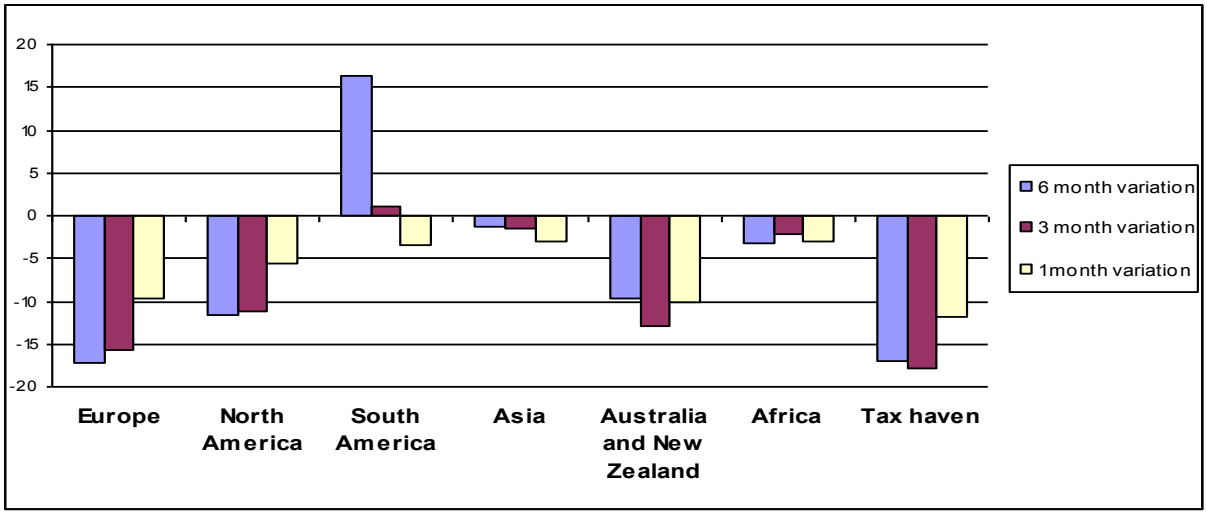
Source: INFINANCIALS database

Figure 1: Average stock prices evolution for all the listed companies

Figure 1 shows that only five emerging countries (Brazil, Argentine, China, Russia and South Africa) recorded a positive evolution of the stock prices at six months. Czech Republic joins this group, being the single European country which was not severely affected by the contagion

phenomenon (the investors' anticipations had an important role in this case). However, in 2008 all this countries were touched by the crisis.

Analysing Figure 1 we can see that the impact of the crisis in not similar among the countries taken into account. In order to identify the geographic zones which were more affected, we grouped the countries by continent (the tax heaven formed a distinctive group).



Source: INFINANCIALS database

Figure 2: Average stock prices evolution by continent

Up to now, we showed that the international capital markets experience a severe crisis. In the rest of the paper we try to identify the factors which led to a different propagation of the crisis, taking into account the countries' industrial profile.

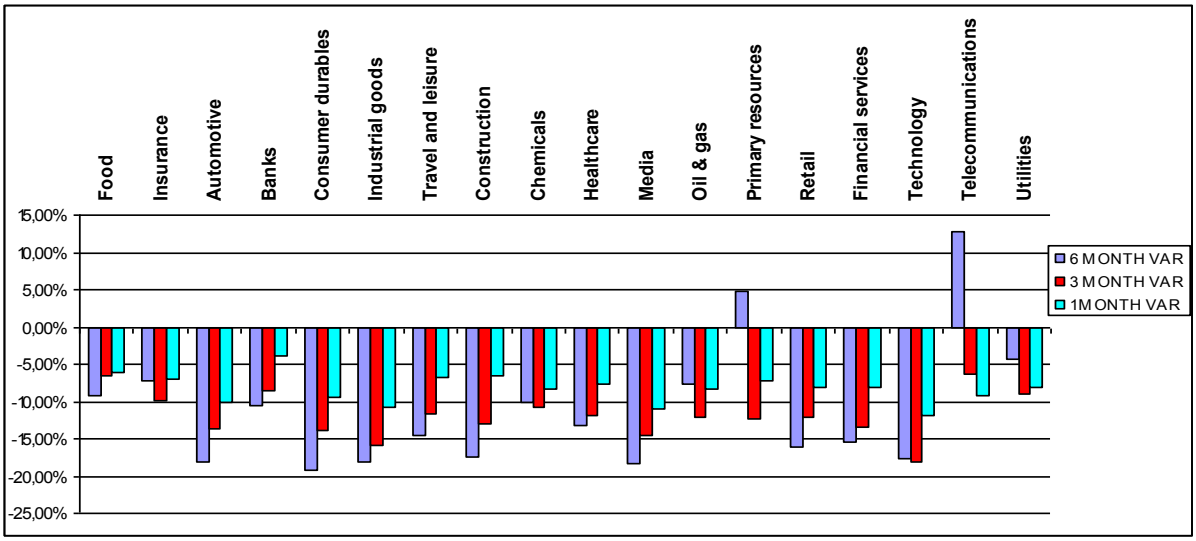
3. The industrial profile and the crisis impact

In our previous paper [Albulescu, (2008)], we focused on the relation between the evolution of the companies' financial situation and the evolution of the stock prices, in the context of the capital markets global crisis. We found out that there is no relation between these two variables. Apparently, it seems that the evolution of the macroeconomic context of the countries does not represent either a viable response (i.e. Poland and Romania were strongly affected by the capital market crisis but their economic situation improved during the last years). It appears that a strong price correction took place on the stock exchange which recorded a price increased above the average.

These explanations are not completely satisfactory; that is why we proceed to a supplementary analysis – we investigate the stock price evolution by industrial sector in order to make a comparison with the industrial profile of the analysed countries[2]. The 18 industrial sectors are: food, insurances, automotive, banks, consumer durables goods, industrial goods, travel & leisure, construction, chemicals, healthcare, media, oil & gas, primary resources, retail, financial services, technology, telecommunications, utilities.

If we inspect the stock price evolution by sectors (Figure 3), we can observe that for all the sectors the average stock prices recorded negative evolutions at 3 months, respectively at 1 month (corresponding to 2008). The actual level of the stock prices, as compared with the prices level from 6 months ago, shows that the trend was favourable only for two sectors (primary resources and telecommunications). The industries of automobiles, consumer durables and industrial goods, media and technology, were the most affected. Taking into consideration the fact that the crisis initially emerged in the financial sectors (banks, financial services and insurances), we expected that these industries will be the most touched by the stock market crisis.

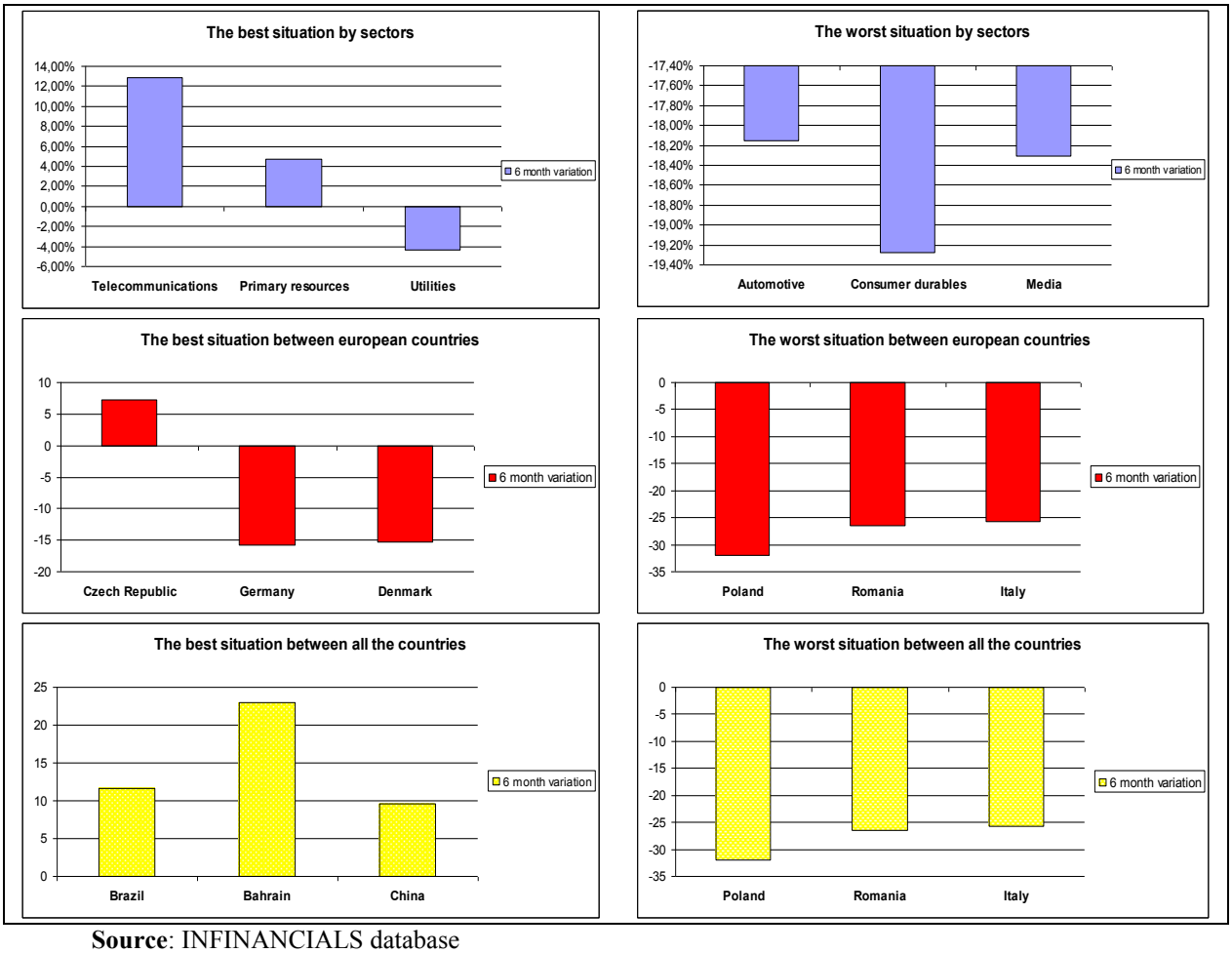
[2] In *Global Europe Anticipation Bulletin* [GEAB, (2006)], the specialists estimated the sectors which will be the most affected by the crisis: international trade, exchange market, financial sector and energetic sector.



Source: INFINANCIALS database

Figure 3: Average stock prices evolution by industrial sectors

We proceed now to a comparison between the countries and the sectors that were the most affected, and those that were less influenced by the crisis. In order to do that, we have built Figure 4.



Source: INFINANCIALS database

Figure 4: Comparison between the impact of the crisis at country level and at sectoral level

Because the 6 month variation is the most representative to monitor the stock price dynamics, we present only these data. Several findings can be highlighted after analysing Figure 4. Firstly, the financial sectors are not the most exposed to the stock market crisis. The most affected industrial sectors are the consumer durable goods, automotive sector and media. On the contrary, the less affected sectors are the telecommunications and the primary resources. Secondly, if we look now to the countries that were the most affected by the crisis, these are the three European countries: Poland, Romania and Italy. The less affected between all the analysed countries is Bahrain (a tax heaven country[3]), Brazil and China (two emerging countries). In Europe, Denmark and Germany stock exchanges suffered the smallest losses, which were, however, significant (–15% of the market capitalisation at 6 months). The Czech Republic is the single European country which was not touched by the crisis at the beginning of 2008.

Analysing the industrial profile of these countries, we reach two conclusions. The primary resources sector is important in the emerging countries, and the telecommunication industry develops quickly. Taking into consideration the fact that these two sectors were less affected by the crisis, we may find an explanation related to its impact. But if we look only to the European countries, the reasoning fails. The automotive sectors and media (the most affected by the stock market crisis) are well developed in the European industrialised countries like Germany and Denmark. The automobile industry is well developed in Czech Republic also. If we look at Romania and Poland we see that the primary resources sector has a significant presence in these countries. Moreover, the durable goods sector is also strong because the transition imposed a "catching–up" process related to life quality in these countries.

These findings show that there is a connection between the industrial profile and the crisis impact on the capital market, but this relation does not apply for the European countries. It is difficult to defend the idea that the industrial profile of the country is responsible for the different impact of the global capital market crisis in all the countries. The development of the capital markets and the previous sharp increase of the stock prices seem the most plausible elements to explain the different impact of the crisis.

4. Conclusion

The first financial crisis of the 21st century is characterized by esoteric instruments, unaware regulators and skittish investors [Reinhart, and Rogoff, (2008)]. The authorities accepted the severity of the crisis too late and their intervention was hesitant. The recent turmoil highlighted the phenomena of spillover between countries and financial markets [de Rato, (2007)].

The subprime crisis represented the starting point for the global credit crisis and international capital market crisis. In this study we have analysed the stock market crisis and the factors which contributed to a different impact of the crisis upon the stock exchange markets all over the world. In a recent study we have showed that there is no relation between the financial situation of listed companies and the evolution of the stock prices. In this paper we investigate the relation between the countries' industrial profile and the stock prices drop.

The first conclusion is that all the countries and all the sectors were affected by the international capital market crisis. Another conclusion is that the European countries recorded important falls of the stock prices. A third conclusion is related to the most and to the less affected sectors: the consumer durable goods, the automotive sector and media experienced a severe correction of the stock prices, whereas the telecommunications and the primary resources sectors were less affected (see Figure 4 which presents the stock price variation at 6 months). The most important conclusion is that the industrial profile of the countries led to a different impact of the crisis, but this assertion is not valid for the European countries as an individual group. The correction of the sharp increase of the stock prices explains better the crisis different effects.

The economic consequences of the crisis are not well known at present. The first estimation related to the subprime crisis was optimistic: "*The fundamentals remain robust, the profits of the companies, banks, and financial institutions are high and the economic growth prospect is good*" [Banque de France, (2007)]. Likewise, Buiter (2007) observes a sign of economic stabilization

[3] Figure 2 shows that the tax heaven countries were severely affected by the stock prices crisis. Bahrain represents an exception.

towards the second half of 2008. These signs are represented by the action of major banks related to the inclusion of the off balance sheet elements into their balance sheet. Besides, the liquidities of high savings countries like the countries of the Gulf Region, China and Russia were oriented towards the financial markets severely affected by the crisis. Many American banks were rescued by the sovereign funds from the emerging markets. This situation also leads to a change in the diplomatic and political relationship at international level.

But, at the end of 2007, the financial indicators deteriorated and the investor's confidence consequently declined. The specialists of Riksbank (2007) consider that the main threat to the economic development is represented by the real estate situation in the United States. GEAB (2008) foresaw that the American economy will enter into recession.

We consider that the international financial crisis will continue. The financial market crisis has already been followed by important frictions on the foreign exchange market. The real estate market is also fragile in many countries. If the United States economy enters into recession, the impact of the crisis amplifies at global level. Taking into account the fact that the main central banks proceeded to a monetary tightening, the probability of a global recession is considerably high.

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FISCAL ASPECTS REGARDING TAXING THE INCOMES OF NON–RESIDENTS IN ROMANIA

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Abstract:
The tax on the non–residents incomes has become a more present issue, because the new economical and political conjuncture, and especially because of the European one, the foreign companies intending to invest more in Romania. Through Romania's adhering to the European Union the volume of foreign investments in Romania knew an important increase, and, implicitly, the incomes obtained by non–residents from the activities unfolded in Romania, having as consequence the increase of the tax volumes cashed from this sector. This under the conditions of a favorable fiscal treatment applied to the investors from the European Union compared to the non–residents from the extra–communitarian area. The problem of the tax applied to the incomes of the non–residents knows a few important changes, brought by Romania's adhering to the European Union, such as, for example, those regarding the tax levels and tax exemption, the new Fiscal Code basing on protecting the residents from the states members of the European Union and on avoiding double international taxing. The specialized international organisms reached to the conclusion that the optimal solution for avoiding double taxing is represented by concluding bilateral or multilateral conventions between states, their disposals having the role to clarify the status of the residents involved in different economical activities in other states We present below the approached problems together with the new changes in force starting with January 1st 2009.

Key words: non–resident, incomes, tax, double taxing, residence

JEL Classification: H30, K34

1. Application field. The notion of non–resident

Non–resident means any foreign juridical person, any non–resident individual and any other foreign entities, including collective assets placing organisms, not registered in Romania, according to the law. The foreign juridical person is any juridical person not established according to Romanian legislation or that does not have Romania as effective leading place. The non–resident individual is, according to legislation, any individual that is not a resident individual. An individual is a resident if fulfills at least one of the following conditions:

- Has the domicile in Romania;
- The center of the person's vital interests is placed in Romania;
- Is present in Romania for a period of time or a few periods of time that overcome 183 days, during 12 consecutive months, that ends in the vized calendar year;
- Is a Romania citizen that works abroad, as officer or Romania's employee in a foreign state.

2. Incomes categories liable to taxing

According to law, liable to taxing are the following incomes categories:

Dividends

In Romania are liable to taxing the dividends received from a Romanian juridical entity, no matter they are received in Romania or abroad. Dividend means a distribution in money or nature, made by a juridical entity to a participant to that juridical entity. There are not considered dividends the following:

- A supplementary participation title distribution that does not modify the participation titles percentage of any participant to a juridical entity;

- A distribution in money or nature made connected to a compensation of the participation titles to the juridical entity, other than that making part from the compensation, that does not modify the percentage of participation titles of any participant to the juridical entity;
- A distribution in money or nature, made connected to the liquidation of a juridical entity;
- A distribution in money or nature, having as reason the decrease of the share capital effectively constituted by the participants;

The law also considers a dividend receiving by a shareholder/associate the value of some goods or services delivered to the juridical entity, if the paid amount overcomes the market's price for these kind of goods or services; the difference is treated as dividend. Also, if the paid amount by a juridical entity for the goods or supplied services in favor of a shareholder or an associate of that juridical entity is made for the personal purpose of these, then the respective amount is treated as a dividend.

Interests

The interest represents any amount that has to be paid or received for the use of money, no matter if it has to be paid or received within a debt, a deposit or a financial leasing contract, instalments payment sale or any sale with postponed payment. There are taxed the incomes obtained in Romania, no matter if they received in Romania or abroad, meaning the interests from a resident or from a non–resident person that has a permanent headquarters in Romania, if the interest is an expense of the permanent headquarters.

Due

Due means any amount that has to be paid in money or nature for the use or the usage right of any of the following:

- Author right over a literary, artistic or scientific work, including over movies, tapes radio or TV shows, and performing of audio or video registering;
- Any license, invention, innovation, commerce or factory mark, project, drawing, model, plan, sketch, secret formula or fabrication procedure or software;
- Any transmission, including to public, direct or indirect, through cable, satellite, optical fiber, or similar technologies;
- Any industrial, commercial or scientific equipment, any transportation mean or container;
- Any know–how;
- Numbers or image of any individual or other similar rights referring to an individual.

Due also comprises any other amount that has to be paid in money or nature for the right to register or broadcast any form of spectacle, show, sport event or similar activities.

There are taxed the dues obtained in Romania, no matter if they are received in Romania or abroad, meaning the dues from a resident or from a non–resident person that has a permanent headquarters in Romania, if the due is an expense of the permanent headquarters.

Fees

Fee means any payment in money or nature made by a broker, a fee agent, a general fee agent or any other person assimilated to a broker or a general fee agent, for the intermediary services performed connected to a commercial operation.

There are taxed the fees obtained in Romania, no matter if they are received in Romania or abroad, meaning the fees from a resident or from a non–resident person that has a permanent headquarters in Romania, if the fee is an expense of the permanent headquarters.

Incomes from sport and entertaining activities

According to law, there are taxed the incomes from sport or entertainment activities developed in Romania, no matter if the incomes are received by the persons that effectively take place to these activities or by any other person. All these incomes are considered as being obtained in Romania, no matter if they are received in Romania or abroad.

Incomes from management or counseling services

Incomes from management or counseling services in any field are considered as obtained in Romania, no matter if they are received in Romania or abroad, if these incomes are obtained from a resident or if the fee is an expense of the permanent headquarters.

The incomes obtained from Romania from management or counseling services in any field, that are not performed in Romania, or the incomes that are expenses made for a permanent headquarters in Romania of a non–resident are liable to tax if there are conventions concluded for avoiding double taxing in Romania and the residence state of the income beneficiary or when the income beneficiary does not present the documents regarding the fiscal residence.

Incomes from remunerations

It concerns the remunerations received by non–residents that have the quality of administrators, founder or member in the Board of Directors of a Romanian juridical entity. The remuneration can be established, according to law, through the constitutive deed of the Romanian juridical entity or the decision of the General Meeting. There must be mentioned that, according to Romanian law concerning commercial companies, the quality of shareholder/associate can be assigned to an individual or a juridical entity.

Incomes from services performed in Romania

It concerns the incomes obtained from any type of services performed in Romania, not matter their nature, less the incomes obtained from international transportation and performed services accessories to this kind of transportation.

Incomes from independent professions

It concerns the incomes from independent professions unfolded in Romania as: doctor, lawyer, engineer, dentist, architect, auditor and other similar professions. There are liable to taxes only the incomes obtained in other conditions than through a permanent headquarters or in a period of time or some periods of time that do not overcome a total of 183 days during 12 consecutive months that close in the vised calendaristic year.

Incomes from pensions

There are liable to tax the incomes from pensions received from the social insurances budget or state budget, if the monthly pension overcomes the limit of 1.000 lei.

Incomes from prizes

This category includes and concerns taxing of all the incomes from prizes granted at contests organized in Romania, no matter their nature, less the prizes obtained by non–residents at artistic, cultural and sport contests, financed by public funds and awards granted to non–residents students at contests financed by public funds.

Incomes from gambling

It concerns any income from gambling practiced in Romania. The incomes are considered as taxing base at every gambling, if they are obtained from the same organizer in a single day.

Incomes from liquidation or dissolving without liquidation

It concerns any income from liquidation or dissolving without liquidation of a Romanian juridical entity. The gross profit achieved from liquidation or dissolving without liquidation of a Romanian juridical entity represents the sum of the exceeding distribution in money or nature that overcomes the contribution at the share capital of the beneficiary juridical entity/individual.

3. Tax share

The tax on the non–residents incomes is of 16 %, except the following:

- 10% for the incomes from interests and dues, if the effective beneficiary of these incomes is a resident juridical entity from a state member of the European Union or one of the states from the Free Exchange European Association, respectively Island, Liechtenstein and the Kingdom of Norway, or a permanent headquarters of a company from any of these states. This taxing share applies in the transition period, from the date of the Romania's adhering to the European Union until the 31st of December 2010, under the condition that the effective beneficiary of the interests or dues owns minimum 25% from the value/number of participation titles at the Romanian juridical entity, for an uninterrupted period of at least 2 years, that closes at the payment date of interests or dues.
- 10% for the dividends paid by a company, Romanian juridical entity, to a juridical entity resident in a member state of the European Union, or one of the states from the Free Exchange

European Association, respectively Island, Liechtenstein and the Kingdom of Norway, or a permanent headquarters of a company from any of these states;

- 20 % for the incomes obtained from gambling practiced in Romania.

As a transitory disposal, in case of the incomes obtained from term deposits, constituted current accounts, deposit certificates, and saving instruments, obtained before the 1st of January 2007, the tax share is applied from the constituting – achieving date.

The incomes from term deposits, deposit certificates, and other saving instruments, at banks and other authorized credit in Romania, constituted /achieved between 4th of June and 31st of December 2005 inclusive, are taxed with 10% from their amounts. The incomes from interests at term deposits, deposit certificates, saving instruments, at banks and other authorized credit in Romania, constituted /achieved starting with January 1st 2006, are taxed with16% .

Starting with 1st of January 2007, the interests at constituted deposits and current accounts are not taxed, no matter the inter–banking interests' rates at one month deposits.

The incomes that represent remunerations received by non–residents that have the quality of administrator, fonder or member of the Board of Directors of a Romanian juridical entity are assimilated to salaries and are taxed according to the regulations of the IIIrd Title of the Fiscal Code.

4. Tax free and tax exempt incomes

Starting with the 1st of January 2009 are considered tax free the followings:

- incomes obtained by the collective placing organisms without juridical entity, non–resident, from value titles transfer, respectively of the participation titles owned directly or indirectly in a Romanian juridical entity;
- incomes obtained in Romania by non–residents from derivate financial instruments transfer;
- incomes obtained by non–residents on foreign capital markets from transfers of participation titles, owned at a Romanian juridical entity, and from the transfer of value titles issued by Romanian residents.

There are tax exempt the followings:

- interests to deposits/current accounts;
- interest afferent to public debts instruments in Ron or foreign currency and incomes obtained from transactions of state titles and bonds issued by the administrative–territorial units in Ron or foreign currency on internal and/or international financial markets, and also the interest afferent to instruments issued by the national Bank of Romania, for achieving the monetary policy objectives, and incomes obtained from transactions of movables issued by the National Bank of Romania;
- interest to instruments/receivable titles issued by Romanian commercial companies, established according to Romanian law, if the instruments/receivable titles are transactioned on a movables market regulated by the state authority where this market is placed and interest is paid to a person who is not affiliated to the issuer of the instruments/receivable titles;
- prizes of a non–resident individual obtained in Romania, as a consequence of a participation to artistic, cultural and sport national and international festivals financed from public funds;
- prizes granted non–resident students to contests financed from public funds;
- incomes obtained from non–residents in Romania, that supply counseling services, technical assistance and other similar services in any field, within contracts financed through loans, credit, or other financial agreement concluded between international financial organisms, and the Romanian state or Romanian juridical entity, including public authorities, having the guarantee of the Romanian state, and also within contracts financed through loan agreements concluded by the Romanian state with other financial organisms, if the perceived interest is under the level of 3% per year;
- incomes of the foreign juridical entities unfolding in Romania consultancy activities within free financing agreements, concluded by the Romanian Government/public authorities with other governments/public authorities or governmental or non–governmental international organizations;
- dividends paid by a company, Romanian juridical entity, to a resident juridical entity in another state member of the European Union, or in one of the states of the Free Exchange Association or to a permanent headquarters of a company in one of these states, placed in another state member of the European Union or of the European Association of Free Exchange, if the beneficiary of the dividends owns minimum 15% from the participation titles to a company Romanian juridical entity,

for an uninterrupted period of at least 2 years, that closes at the dividend payment date. The minimum owning condition will be of 10%, starting with 2009;

- incomes from savings under the form of interest payment, obtained in Romania by resident individuals in state members of the European Union;
- the incomes from interests and dues obtained in Romania by resident juridical entities in states members of the European Union or European Association of Free Exchange, starting with January 1st 2011, if the effective beneficiary of the interests and dues owns minimum 25% form the value/number of the participation titles to a Romanian juridical entity, for an uninterrupted period of at least 2 years, that closes at the payment date of interests and dues;

5. Tax payment

The tax due by non–residents for the taxable incomes obtained in Romania is calculated and retained when the payment is made at the state budget by the income payers until the 25th day of the following month inclusively. The interest is calculated, retained and paid in Ron, at the state budget, at the exchange rate of the market, communicated by the National Bank of Romania, valid for the day when the tax is retained for non–residents.

In case of distributed dividends, not paid to shareholders or associates by the end of the year for which were approved the annual financial statements, the tax on dividends is declared and paid until the 31st of December of the respective year.

For the incomes representing interests to term deposits, deposit certificates and other saving instruments at banks and other credit institutions authorized and located in Romania, the tax is calculated and retained by the payers of this kind of incomes at the moment of registration in the deposit account of the holder, respectively at the paying off moment, in the case deposit certificates and saving instruments. Taxing for the incomes from interests is made monthly, until the 25 inclusively of the following moth of registration/paying off.

The contributors have the obligation to present an informal declaration regarding the retained tax and paid during the year, on income beneficiaries, to the appropriate fiscal authority, until the 28th, respectively 29th of February of the following year. The declaration will contain the payments and payment arrangements to non–resident persons, purpose and amount of each payment, name and address of the beneficiary. The declaration does not contain the engaged or paid amounts for imported goods or for international transportation.

Income payers under the form of interests have the obligation to present an informative declaration regarding the payments of this kind of incomes made to individuals resident in states members of the European Union. The declaration is presented until the last day of February of the current year, concerning the information referring to interests payments made during the previous year.

The income payers that have the obligation retain taxes from the incomes obtained by contributors in Romania must supply the contributor written information regarding the nature and amount of the taxable incomes, and also the retained tax in the contributor's name. The information is sent to each contributor until the last day of February of the following year to that for which the tax is paid.

6. Avoiding international double taxing

If a contributor is a resident of a country that has concluded a convention with Romania for avoiding double taxing regarding tax on income and capital, the tax share that applies to the taxable income obtained by that contributor from Romania can not overcome the tax share regarded by the convention, that applies to that income. If the tax shares from internal legislation are more favorable than those from the conventions regarding avoiding double taxing, then the more favorable tax share apply.

In order to apply the stipulations of avoiding double taxing convention, the non–resident has the obligation to present to the income payer, when the income is achieved, the fiscal residence certificate issued by the appropriate authority from his/her residence state. If the residence fiscal certificate is not presented in due time, there applies the stipulations of the Romanian legislation. When the residence fiscal certificate is presented, there applies the stipulations of the convention regarding avoiding double taxing and is also made the tax regularization within legal prescription term, if the residence

fiscal certificate mentions that the beneficiary of the income had, within prescription term, fiscal residence in the contracting state for the period the incomes where achieved in Romania.

The fiscal residence certificate presented during the year for which the payments are made is also valid in the first 60 days of the following year, if the residence conditions do not change.

In order to prove the residence, there can also be presented another document issued by another authority than the fiscal one that has attributions residence certification field, according to the legislation of that state. The non–residents that are beneficiaries of the incomes from Romania will present to the income payer the original document or a copy of the fiscal residence certificate or the translated and authenticated document.

A non–resident can be considered resident of a state also as a consequence of the information received on basis of the information exchange initiated/amiable procedure initiated by a avoiding double taxing convention partner country.

7. Conclusions

The new fiscal regulations continue the previous principles, protecting the investments developed in Romania by residents from European Union, that have a fiscal organization more favorable in what concerns the tax on income than the non–residents from the extra–European area.

It is important to mention that, from the total of 164 countries, Romania has conclude conventions of avoiding double taxing with 82 countries, meaning that the non–residents from the other countries will be taxed for the incomes obtained in Romania according to Romania law.

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THE OPENING OF ACCOUNTING TO THE PRESENT VALUE IN THE CONTEXT OF PASSING FROM THE ACCRUALS TO CASH

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Abstract:

Passing through the globalization period, we are witnesses of a larger gateway to the values general accepted in the developed and developing countries. Part of this process is represented by the accounting craft. So, after the period when accounting was representing a static image and then a dynamic one, now it seems to be in accordance with this continuing evolution.

As long as more companies are using the IFRS and the evaluation of assets and debts is based on the fair or present value it is talking about as it is named an actuarial accounting. According to the development of an economy, the actual (present) value means an estimation of future cash flow by a rate.

Practically seems to be an inclination towards the engagement accounting as long as the events are recognized & reported when arise not when cash is collect or paid. In spite of this, for a company a good profit and loss account doesn't mean a strong treasury situation too.

Even if, there is a convention of using the accrual accounting I try to develop o strategy regarding the cash flow information – based on the cash accounting as an exception of this, for a correct evaluation of liquidity, knowing the strong influence for economic decisions. So, the cash foresees are used for the financial security of company through an adjustment of unjustified payments.

Regarding to all of those reasons, a joining of accruals with cash may be an important factor for a correct evaluation financial statements.

Key words: accrual – engagement accounting, cash – treasury accounting, liquidities, present – actual value, IAS

JEL Classification: M4

1. Introduction

If we start from the premise that every economic transaction (goods acquisitions, services or investment / financial activity, or creating a debt) is generating a plus or minus value for a period, we must express it correctly from liquidity point of view.

As long as more companies are using the IFRS and the evaluation of assets and debts is based on the fair or present value it is talking about as it is named an actuarial accounting. According to the development of an economy, the actual (present) value means an estimation of future cash flow by a rate. If the level of inflow / outflow is foreseen through an evaluation of the managerial politics, the rate depends on some extern factors like: the economic politics, or inflation (as passive monthly liquidity depreciation). So, there is a difference between a net treasury recorded by a company in an excessive inflation economy and moderate one.

From this point of view, there is an opening of the accounting to the actuarial calculation in the context of passing from the engagement accounting to the treasury accounting. For all that, practically seems to be an inclination towards the engagement accounting as long as the events are recognized & reported when arise not when cash is collect or paid. In spite of this, for a company a good profit & loss account doesn't mean a strong treasury situation too.

Even if, there is a convention of using the accrual accounting I try to develop o strategy regarding the cash flow information – based on the cash accounting as an exception of this, for a correct evaluation of liquidity, knowing the strong influence for economic decisions. So, the cash foresees are used for the financial security of company through an adjustment of unjustified payments.

The evaluation activity means in fact the monetary expression of transactions, and it will be used for bringing the wished performances, by manipulating the measure of economical events and transactions.

For surpassing this limit, it has been adopted the cash accounting joining the engagement (accrual) one.

The relation between accrual and cash is significant for all users, even for the lenders, who are basing their loan approval and pricing decisions on assessed probability of applicants' ability to repay loans, or managers, investors and others too.

The Cash Flow Statement is offering information on the monetary cash in–out flow and which is the liquidity origin. So, in spite of the Balance sheet and the Profit and Loss Account (based on the accrual accounting) this statement is reflecting unconventional information (realities) on treasury situation.

2. Literature review

The present research is taking into consideration the most recent international and interesting articles in this area.

Regarding some specialist's conceptions on the relation accrual accounting versus cash accounting we have to report to some international researches articles.

So, referring to the relationship between disclosure quality and mispricing of the components of earnings (accruals and cash flow), is an evidence of significant accrual and cash flow mispricing for firms with lower–quality disclosures. So, the magnitude of cash flow subsumes the predictive ability of magnitude of accruals, suggesting that cash flow measure captures the mispricing associated with earnings components. There is an association between the magnitude of cash flow and future abnormal returns for firms with lower quality disclosures and a significant reduction in this association for firms with higher quality disclosures [Michael Drake, James Myres, Linda Myres, (2007)].

There is a value – relevance of cash flow from operations (CFO) and accruals with investment (growth) opportunities. The premise that accrual accounting based earnings is superior to cash flows for estimating firm value is a key element of the conceptual foundation of GAAP. An implication on this is represented by the accruals that are values relevant components of earnings [Barth *et al*. (1999), and Dechow (1994)] said that earnings dominate CFO in return association tests. It is important to mention that CFO and accruals regarding the value relevance of earnings influence their relative impact.

Also, Bowen *et al*. in 1987 suggest that CFO is more strongly associated with returns than accruals, and Rayburn in 1986 said that is no difference, and Bernard and Stober (1989) suggest that the valuation implications of cash flows and accruals vary with the economic conditions, quality of measurement.

As long as there are some transactions which are often distinct separate from their associated cash flow, we may see that accrual accounting allows firms to overcome timing and matching problems that make cash accounting a noisy measure of performance [Riahi Belkaoui, (1992); Dechow, (1994)]. By using the accruals, non–cash economic transactions can be reflected in financial reports in a timelier manner that better matches revenues and costs, thereby providing a better indication of enterprise performance [FASB, (1978)]. Using the accrual accounting it may provide a positive signal of a company's management since this method is assumed to reflect the potential management (for private information) and higher accounting quality [Louis, and Robinson, (2005)].

Jones *et al*. (1995) and Lee (1993) give some arguments for why cash accounting may be more beneficial then accrual accounting for lending decision. In addition to the arbitrary nature of accruals, these arguments include cash accounting being more predictive of future cash flow and financial distress in many businesses; providing an unambiguous measure of managerial performance; and an increased importance of cash resources for ongoing liquidity and solvency.

An experiment of Sharma and Iselin in 2003 prove that bankers judgments regarding solvency are more accurate using cash flow information than using accrual accounting, and in the same way Jones in 1998 concludes that cash flow statements, has a greater influence in taking a variety lending decisions, comparable with the financial statements based on accrual accounting, and Francis *et al* (2005) and Bharath *et al*. (2008) analyzed the implications of accrual accounting for small business and large/public companies in debt contracting.

The public sector doesn't make any exception of this report, for example in Romania, and not only, there were two trends: a traditional one based on cash accounting and a modern one based on

accrual accounting. Respect the first one it is appropriate for the public sector especially for the budget accounting and budget execution. Regarding the second model it was recommended for maximize the effects of the process of competition and public management efficiency being achieved with minimal costs (A. T. Tudor), Greece being a model of using both cash and accruals.

Also, Ryan, Tucker, Zarowin in 2005 reflect that in spite of classification of the cash flows on trading positions as operating, trading is economically a hybrid operating and non–operating activity. So, the market appreciates the hybrid natures of the cash flow and accruals associated with trading positions and can differentiate firms based on the relative operating character of their activities.

For some specialists, accrual accounting is more informative then cash one, and surveys find that small business lenders rate accrual accounting as their preferred source of financial information for taking the decisions [Baker, Cunningham, (1993), AICPA, (2004)], and for other reverse of this conception.

3. Theoretical background

Accounting versus globalization

Starting with the '90 period and continuation by now it's seems talking more about the process of globalization.

Etymologically, this word means a connection between the same field of activity of all countries which have clang to the international standards general accepted from the developed & developing countries. From this point of view, I was talking (in abstract) that the accounting as science is not an exception.

Once the liberalization of financial and capital market advanced it imposed an increased rhythm of needed information for the financial stability, starting with insignificant required information and ending with the calculation of financial indicators to present in fact the economical reality of an entity.

As long as the amount of information has increased as well as does the quality. Looking from this point of view the financial (accounting) information must be in accordance with the international financial reporting standards and some external factors like the market actors, because they require new information in this sector of activity.

After the period when the accounting was presenting a static image (XVIII – XIX century) and then a dynamic one (XX century) of the financial statements, now we are witnesses of a new tendency to an actuarial accounting which is in accordance with the globalization processes. Even if this is a subject debated for now, more on the theoretical level, it represents in fact the passing to a new stage of accounting. Now the actuarial services is going to assist in the development of social security for insurance, investing or other activities which focuses on the future cash flow evaluation from the present investments.

Regarding the relation, globalization versus accounting, first one as a part of this development processes of economy and the second one as science (and not only, practices too) we are able to recognize that this is a natural consequence of evolutional spirit.

Above all of this we must mention that this harmonization with the international standards must be implant taking in account the national norm and standards. From this point of view the processes of adaptation of our low to the European Directives is part of the economic globalization.

And so, all this factors enable to unanimous interpretation of some financial indicators, reported to the same values, by any accounting information users of each country which it accepted as general reporting standards.

4. Between historical cost and present value

Why would be today such a subject, a problem for accounting? The answer seems to be easy, that because doesn't exist a standard / an evaluation level generally accepted, as long as the framework tells that it is able to choose the adequate evaluation basis from a list: historical cost, current cost, realizable/ settlement value or present value.

If we take in account that now there are some situations where the evaluation of some assets and liabilities achieved in '90 are measured to historical cost we may say that is not fair for the economic reality.

Starting from the premise that every economic transaction even if it is goods acquisitions or a services or investment / financial activity, or creating a debt, is generating a plus or minus value for a period, the recording and the maintaining this type of measure (the historical cost) is not a solution.

For all of this a new evaluation to a fair value in some cases is necessary and recommended taking in account those factors which are imposed by the market strategy. In the same way we must see the actual value, because it represents an actualization of the future cash inflow / outflow, or the current cost or settlement value.

In the last period it was accredited the idea that the actuarial principles are generally applied only to the insurance activity and pension funds, or as long as this type of evaluation by actualize for the next period the present investments, why wouldn't extend to other kinds of activities.

In this context important to say that the present value of expected future cash flows is influenced by the: estimate future cash flows and to apply an appropriate discount rate to them. This estimate is taking into account that projections have to base on reasonable assumptions. The next formula expresses that point of view:

$$C_0 = F_1/(1+i)^1 + F_2/(1+i)^2 \ldots + F_n/(1+i)^n \quad (1)$$

Where:
C_0 – the assets for the T_0 moment;
F_n – the cash flow generated for the n moment;
i – discount rate

The discount rate must depend on: current market rate and asset class risk adjustment, and also it could be use the nominal interest rate reflecting the current market conditions as balance sheet date.

Another factor which mustn't ignore is the rate of inflation. If we consider it as a passive monthly monetary depreciation of the economic transactions it has really influences above the financial statement especially there, when, it has big figures (more than 7 – 8%/year).

Even if doesn't seems to have an important influences to the treasury we must reflect that if would exist an account that reflect the "Expenses resulted from the inflation evolution" as an unmonetary expenses, it could influence the net increase or decrease of CFO if we added it (like the depreciation of assets).

If we take into consideration the next statement which refers to the inflation rate evolution, for example, in Romania for the last ten years, we remark its impact for the liquidity of a company.

Table 1: The rate of inflation for 1988 – 2007 in Romania

YEAR	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Inflation rate %	59.1	45.8	45.7	34.5	22.5	15.3	11.9	9	6.56	4.84

Source: http://www.insse.ro/

There it is the evolution graphically:

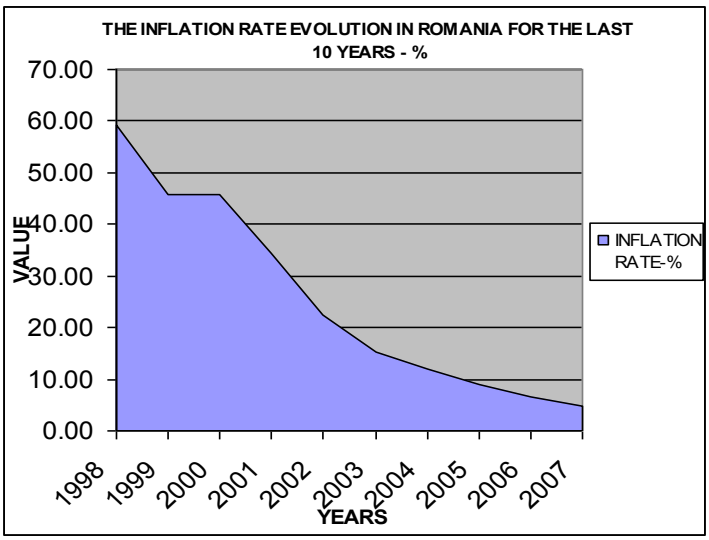


Figure 1. The inflation rate evolution in Romania for the last 10 years

So that, from this evolution such of expenses account (for the rate of inflation) could help to the liquidity evaluation.

Also, let's take an example, if we make a parallel between a subsidiary of firm that develop its activity in a country where the rate of inflation is over the 8% and other subsidiary of the same firm but in a country with a rate of inflation that is 2% we'll see that this has an important influence.

Let's take a look to the next example.

Table 2. Compared cash flow of a company from different countries

Indicators	company A in country with 2% inflation	company A in country with 8% inflation
net treasury from operating activities* (indirect method)	5.000	4.000
* expenses with the inflation	200	800
net treasury from investment activities	4.000	3.000
net treasury from financial activities	–6.000	–5.000
net increase /decrease treasury	3.200	2.800

So that, this table reflect the influences over the cash flow of the rate of inflation, as we considered it as a monetary passive depreciation (like the assets depreciation) as long as it is able to influence the CFO with its value.

Regarding its influences we may consider that as log as there exist a factor of physical and moral depreciation for the tangible and intangible assets also could exist a monetary value depreciation as an expression of the inflation rate.

Treasury (cash) accounting or accrual (engagement) accounting?

Even if is a simple question for the adepts or specialists, this represents a challenge for them. Why this happen?

From the start we are in a really quandary regarding the accounting approach between cash and accrual. Of course there are different points of view, some of them are supporting the first one and other the second one.

Practically there is an inclination for the accruals – and that because one of the financial statements, Profit and Loss Account it is based on the engagement accounting. Those who are sustaining this conception are staking on forecasting the cash in–outflow for the next period knowing the incomes and expenses levels for now.

And so, they are taking in account on there evaluation the present incomes and expenses which are engaged for the moment and not only the cash in–outflow, which are paid or collected by the company.

Even thought, over the last few years it has been adopted a new financial statement named – Cash Flow Statement – which but it seems that is not sustained as the other tow principal statements (Balance Sheet and Profit and Loss Account), not even by specified low. There is offering nothing more but a model of how to prepare it, for other problems we must consult the IFRS, IAS 7 – which are very resumed by offering some examples of operations (for those three activities – operating, investments, financial)

If the Balance sheet offers a static image of the financial statements for treasury (initial & final value) and Profit and loss account offer a dynamic one for the incomes and expenses level, the cash flow statement presents the liquidity level divided into those 3 categories of activity.

The IAS 7 – presents those three activities (operating, investing and financing), disclosed the main terms (cash, cash flows, cash equivalents) and presents a model of calculating the total net treasury (for operating – direct and indirect methods, investment and financial transactions). So we determinate the contribution of each activities to the liquidity level of company. The separation of flows regarding there origin has the advantage of some explanation concerning the firm's financial position. This statement it has its pluses and minuses. For the first category we have to mention that it offers information that other statements doesn't, for cash flow, in the second category there is relative difficult to introduce some transactions in each kind of activities (operating, investment or financial), IAS7 presenting only few examples of operations groped on those three activities.

A positive cash flow from an operation activity indicates that the current activity is efficiently managed and is generating more liquidities than it consumed. Regarding the investment activities, those reflect the investment and disinvestment operations in and off the financial market and other that could generate plus or minus cash. The financial operations are referring to the external funds used by a company when the own resources aren't enough.

Let's take the next example for explain the usefulness of the Cash Flow Statements. It's used information from Cash Flow Statements and Balance Sheet from two companies and the figures were rounded:

Table 3. Cash Flow Statements – information

Indicator	company A	company B
Operating activities	40.500	21.500
Investments activities	–21.300	–5.100
Financial activities	1.5800	19.600
Net cash flow	3.5000	36.000

Table 4. Balance Sheet – information

Indicator	31.12.2006	31.12.2007	Increase
Cash for A	42.800	77.800	**35.000**
Cash for B	32.500	68.500	**36.000**

Figure 2. Cash flow for thecompany A

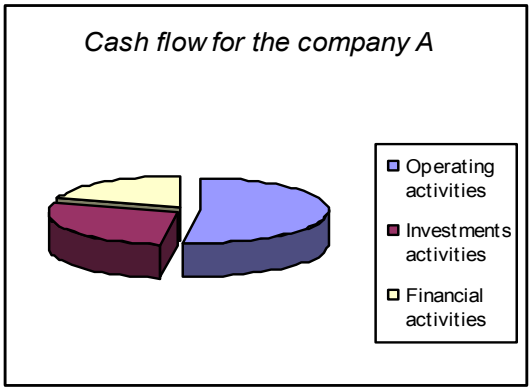


Figure 3. Cash flow for the company B

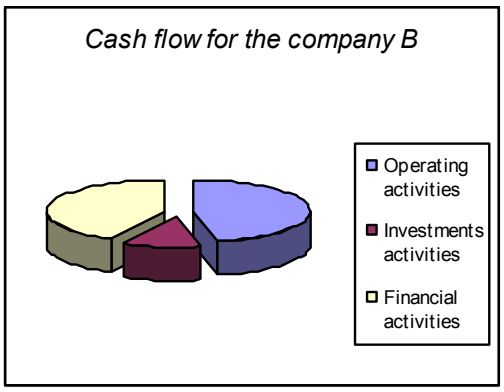
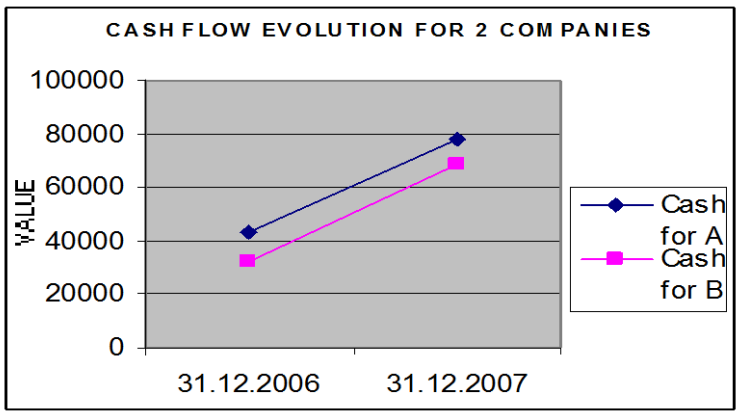


Figure 4. Cash flow evolution for 2 companies



From a first view, just looking to the Balance Sheet information we may say that company B (36.000) has recorded a better liquidity then A (35.000), and a strong cash flow report. Also, using information from the Cash Flow Statements, there is a difference between its provenances. Both of those companies have invested for new acquisition but in some different way: A basing on its main activity and B basing on lending founds.

So that, the net increase cash flows for those tow companies is almost the same. In spite of this, if we evaluate the evolution for every type of activity, we see that for the first company the main activity (operating one) was generating plus of liquidity, as long as the other company's activity is based on lending more then its main activity.

The net increase explains that the liquidity generated by the base activity, allowed covering the current and investment needs that are not financed by invested capital sales or a financing politics.

Under the cash accounting, income is not counted until the cash is actually received, and expenses has been paid, so revenues and expenses are recognized when are collected are paid to/by the company.

Based on this information the analyst could determinate: the ability of company to generate cash, or to finance its growth from internally generated funds, the effects of management's decisions. He is interested on assessing the firm's future cash generating capability from operations, taking in account that the cash flow (like the incomes and expenses) can be erratic from a period to the other being random, cyclical or seasonal for some transactions.

The standard reflects that for big companies often have negative free cash flows because of the capital expenditures and other investments that are required for the firm's development and other companies that are mature have a positive free cash flow, or a significantly positive free cash flow for other, which means that is a low level of capital expenditures (of investments).

There are some evaluation models that are basing on cash flow from the main activity. From this point of view some managers use to record cash inflow from operating and outflows form the other two. That's why are events which are discretionary grouped in the cash flow activities; from example the payment of taxes (there is an interest on reducing the current payments by deferring when is possible), or the manipulate of operating cash flow by timing the payments for development repairs or maintenance, or from contracts, and so on.

Let's see which are the benefits for bought types of accounting in the small business case:

Table 5. Accrual *versus* cash accounting benefits

Accrual accounting benefits	Cash accounting benefits
1. expenses are counted towards tax deduction even though are not paid 2. good financial evaluation for the account that refers to the firm's current situation for collection/payment transactions	1. easier for small business owners regarding the time spent 2. easier for determining the actual cash and not only the money owed 3. easier for understanding the basic cash flow information

Regarding this discussion, all companies, without any exception, must be interested on liquidity information and having a positive monetary situation.

In the mean time, we are able to say that for this period when the financial crisis covered all world it is recommended to keep liquidity as much as it is possible, so that the investments is not a solution.

For all of this the monetary expression of every transaction must joint with the specified operation of collecting or paying.

At this time is generally accepted the engagement accounting as convention for all transactions which are recognized in the financial statements when it arise not when are collected or paid. An exception from this is represented by the information regarding the cash flow level. The cash accounting is based on the cash in–out flow as a balance between payments and collections. The treasury / cash foresee is aiming the financial security and profitability of the company by decreasing the expenses (payments) which are financially unjustified.

From this point of view the cash evolution for the next short period is remarkable with strong influence for the economic decisions.

So that, the relationship between accrual and cash is significant for all users, starting with lenders, who are basing their loan approval and pricing decisions on assessed probability of applicants' ability to repay their debts, and also for managers, investors and others too.

5. Conclusion

The usefulness of one of these two models – accruals vs. cash – depends on the user's necessity (even it is: lender, manager, government, investors and others)

We should base our economical interpretation on the other financial statements too, because by using the accrual accounting it will providing information respecting the next payments and collects that will be recorded by the company. Now, only the information regarding the cash flow is an exception from the convention of engagement accounting general accepted by specialists. In accordance with this, the events and transactions are recognized when are arising not when cash is collected or paid.

For all of this, the managerial politics must follow to record the cash inflows from the operating activity and cash outflows for the investing and financial activity. By doing so the company could sustain all investment expenditures or an important part from the main (base) activity (operating one).

So, is recommended more attention to this financial statement for a faire evaluation liquidity of a company, because a plus value of incomings for the next period (maybe uncertainty), doesn't mean that for the moment the company have a good financial cash situation. This was able to see from the presented example where a net increased cash flow must be evaluate depending on the influence of each type of activity.

The utility of Cash Flow Statement is basing on the fact that a better monetary situation for a moment (start/end of the year from the Balance Sheet) doesn't mean a strong cash flow for the future evaluation liquidity report.

Another aspect that mustn't be ignored is the rate of inflation as a monthly monetary depreciation, because of its potential influences (in an economy with big figures more then 8%) to the cash flow from operating activity.

As a conclusion, even if it is recommended to use also, the accrual accounting, the cash flow situation must be a strong indicator for the company's liquidity for every time especially in a crisis period and so any company must have financial statement based both cash and engagement accounting.

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THE EFFECTS OF THE MINING ACTIVITY OVER THE WATERS FROM JIU VALLEY

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Abstract:

The upper Jiu Valley, around Petrosani and Lupeni, is Romania's principal coal mining region. Many miners feel that coal mining in Romania is a moribund industry that will never regain its position of significance. Environmental contaminants associated with mining activities may affect wildlife species in many ways and at many levels within the ecosystem. Some contaminants associated with mines (e.g., lead, arsenic, cyanide, etc.) may cause acute or chronic effects on resident wildlife.

In 1950–1989, the quality of the waters of the Jiu River has constantly worsened. Because of the restriction of the social–economic activities, after 1990, the situation of the waters of the Jiu River and of the waters in Romania has continually improved. In the same time, in 1990 there is a transfer to a more rigorous management of the environment which also includes legislation according to the international norms.

Keywords: mining activity, environment, waters pollution, heavy metals.

JEL Classification: O13, P28, Q25, Q53, Q56

1. Introduction

Jiu Valley had been reputing, along time, as well as a mining zone.

But the treasure, the coal, has begun to dry out and loose its local economical value. The extraction activity and process that represented "the engine" of economical and social development in the decades at the end of XX century, has known a drastic reduction of Jiu Valley activities, and has left without jobs lots of people who represented the only income source for their families. Over and above social twitch and social and economical tenseness, this activity has left as an entailment a bad fame of a very polluted zone.

That succession, the Jiu Valley area and has been declared by the Romanian Government as underprivileged zone, and has benefit of a special attention in the economical and durable development activity.

2. Theoretical background

As the German scholar Georgius Agricola (1550), put it in his treatise on mining: "The fields are devastated by mining operations... the woods and groves are cut down, for there is need of an endless amount of wood and timbers, machines, and the smelting of metals. And when the woods and groves are felled, then are exterminated the beasts and birds...Further when the ores are washed, the water which has been used poisons the brooks and streams, and either destroys the fish or drives them away."

Today mining's environmental effects remain much the same, but on a vastly greater scale. Technological advances allowed world mineral production to grow very rapidly and proportionally increased the harm to the environment. The effects of mining activity have impacted on all sections of the environment [Young, (1992)]. Today there are a number of potential impacts mining activities can have on the environment. Metals such as arsenic, lead, zinc, and cadmium, which can also spread to nearby drinking water aquifers, can contaminate water and sediments in rivers and downstream reservoirs. Soils can be contaminated with smelter emissions. Underground mining operations contain billions of litres of acid water that rise a little higher each year, threatening local aquifers and already tainted streams with contamination.

Waste material can clog streams and cloud the air over large areas. If removed overburden contains sulphur compounds, common in rock containing metal ores, it can react with rainwater to form sulphuric acid, which then may contaminate local soils and watercourses.

Tailings also usually contain residues of organic chemicals – such as toluene, a solvent damaging to human skin and to the respiratory, circulatory, and nervous systems – that are used in ore concentrations as part of the extraction process [Young, (1992)].

Another often forgotten side of the mining industry is its effects on local people and their environment. Mining operations have had devastating consequences for those whose homelands lie over mineral deposits. Developers and founders of large mining projects have rarely considered the future of local people during project planning. High levels of noise pollution, destruction of life supporting elements of their environment, such as clean water, vegetation, fertile soil, animal life and the aesthetic value of the environment, have all been consequences of mining activities all over the world. Physical threats, such as diseases, holes in the ground, explosions, mudslides, etc. can have an impact on the well–being of local residents if they are not taken into account [Craig, Rimstidt, (1998)].

Romania's most important pit coal reserves are located in the Jiu Valley basin. Before 1989, the mining industry development strategy provided for the full supply with mineral resources of the Romanian economy in order to reduce import.

The result of this policy was an overdeveloped mining sector compared to the solid mineral resources potential of Romania, absorbing over 350,000 people as direct labor and another 700,000 as indirect labor.

The economic conditions after 1989 have required the state support of the mining sector through a huge budgetary effort. Between 1990 and 2002, the state expenditure to sustain the mining sector was of USD 5,249.5 million.

The negative impact of the mining activities on the environment is a direct one and it is strictly connected with the extracting activity of the useful mineral ores, on the one hand, and it is indirectly connected with the processing activity of the mining products.

Up to 1997, when in the Jiu Valley took place an ample restructuring process of the mining sector, there functioned 13 mines that used to spill significant amounts of residual water in the emissary. They were: Lonea Mine, Lonea Pilier Mine, Petrila Mine, Petrila South Mine, Dalja Mine, Livezeni Mine, Aninoasa Mine, Vulcan Mine, Paroseni Mine, Lupeni Mine, Barbateni Mine, Uricani Mine, and Valea de Brazi Mine. Currently, 7 of these mines still function, namely: Lonea Mine, Petrila Mine, Livezeni Mine, Vulcan Mine, Paroseni Mine, Lupeni Mine and Uricani Mine, the rest of them being shut down.

In the Jiu Valley there used to function four coal processing plants (CPP). They were: Petrila CPP, Livezeni CPP, Coroiesti CPP and Lupeni CPP. Currently, Petrila CPP, Livezeni CPP and Lupeni CPP are shut down; only the Coroiesti CPP still exists.

In order to analyze the evolution in time of the Jiu River's level of pollution due to economic and social activities in the Jiu Valley towns, the variation of the quality and quantity parameters of the upstream and downstream emissary's waters was observed, variations due to the main polluting agents, between 2005–2008.

The mines that currently pollute the Eastern Jiu River are: Lonea Mine, Petrila Mine and Livezeni Mine, and the ones polluting the Western Jiu River are: Vulcan Mine, Paroseni Mine, Lupeni Mine and Uricani Mine.

As a result of the carried out analysis it was observed that both household waters and mine waters represent major pollution sources of the Jiu River.

Generally speaking, the mines and the CPP Coroiesti are great industrial and tap water consumers, while the eviction of the used waters in carried out both with and without purging them.

The main polluters within the Jiu hydrographical basin are: the city of Craiova, DOLJCHIM Craiova, Lupeni and Petrila mine dressings.

The main polluting agent present in the surface waters was represented by solid suspensions [Suess, (1982)]. They are to be found in small concentrations in the surface waters upstream of industrial units, and their value increases significantly after spilling the used waters from the respective mines.

Also, there were noted concentrations of ammonium, phosphorous, organic substances, hydrogen sulphide, detergents and mining substances exceeding the maximum allowed concentrations. The solid suspensions contain heavy metals. The concentration of heavy metals was determined by Inductively Coupled Plasma Mass Spectrometry (ICP–MS).

Inductively Coupled Plasma Mass Spectrometry (ICP–MS) is a very powerful tool for trace (ppb–ppm) and ultra–trace (ppq–ppb) elemental analysis. In ICP–MS, a plasma or gas consisting of ions, electrons and neutral particles is formed from Argon gas. The plasma is used to atomize and ionize the elements in a sample [Yau, Chan, (2005)]. The resulting ions are then passed through a series of apertures (cones) into the high vacuum mass analyzer. The isotopes of the elements are identified by their mass–to–charge ratio (m/e) and the intensity of a specific peak in the mass spectrum is proportional to the amount of that isotope (element) in the original sample.

This method has been widely applied to biological, agricultural, metallurgical, geological and environmental samples [Waddell, Lewis, Hang, Hassell, Majidi, (2005)].

3. Experimental

The acute problem of water pollution has been caused by a continuous growth in the anthropogenic impact on the natural environment. Heavy metals occupy one of the first places in the list of the most frequently occurring and toxic contamination.

The determinations of heavy metals have been made with an AGILENT 7500 ICP–MS instrument, G3155A pattern. It can measure elements traces at ppt level.

Water samples were collected manually into polyethylene bottles. Prior to use, all bottles were cleaned with 10% HNO_3, rinsed with distilled water and water to be analyzed [Stoica, Stanescu, Baiulescu, (2003)]. Before the analysis the samples were filtered. The relative non–condensing humidity was maintained within the range of 25% to 80%. The operational temperature range was 15 – 27^0C. The instrument was stored within a temperature of 5 ^{0}C to 45 ^{0}C [Stoica, Babaua, Iorgulescu, Marinescu, Baiulescu, (2002)]. The measurements of heavy metals concentration were made on the Jiu river course, in January and June 2005 that represent two seasons: winter and summer, and in January and June 2008. The most dangerous heavy metals from Jiu River, in seven points from Jiu: (1) Campu' lui Neag; (2) Lupeni (The West Jiu); (3) Iscroni (The West Jiu); (4) Livezeni (The East Jiu); (5) upstream the confluence with Sadu; (6) Balteni; (7) Podari have been determined. The first five harvesting points are situated in mining zone and the last two harvesting points are situated downstream of mining zone. These seven points were selected, because all of them are considered a critical zone by point of view of the waters pollution with heavy metals provided from mining activity.

The aspect of Jiu River was different during the three seasons, being under the influence of the meteorological conditions. The results of the analysis can be influenced by defective harvesting or by the improper preparation of the material. The distance from the river side is about 2.00 – 2.50 meters and the depth was about 0.20 – 0.50 meters [Stoica, Babaua, Iorgulescu, Marinescu, Baiulescu, (2002)].

Heavy metals represent one the most important categories of pollutants or natural water. Increased urbanization, industrialization and mining activity are to blame for an increased level of trace metals, especially heavy metals, in our waterways. Toxicity levels depend on the type of metal, its biological role, and the type of organisms that are exposed to it [*Current Medicinal Chemistry*, *Metals, Toxicity and Oxidative Stress*, (2005)].

Living organisms require varying amounts of "heavy metals." Iron, cobalt, copper, manganese, molybdenum, and zinc are required by humans. Excessive levels can be detrimental to the organism. Other heavy metals such as mercury and lead are toxic metals that have no known vital or beneficial effect on organisms, and their accumulation over time in the bodies of animals can cause serious illness. Certain elements that are normally toxic are, for certain organisms or under certain conditions, beneficial. Examples include vanadium and even cadmium.

The concentrations of four heavy metals: arsenic, mercury, lead and cadmium have been determined. The results obtained in this study, have been compared with the concentration from the Romanian Standard [MAPM, (2002)].

In the **table 1** the level of heavy metals from the Romanian Standard are presented [MAPM, (2002)].

Table 1. Concentrations of heavy metals from the Romanian Standard

Heavy Metals	M.U.	Concentrations values – Romanian standard				
		I	II	III	IV	V
As	µg/L	natural	5	10	25	>25
Hg	µg/L	natural	0,1	0,2	0,5	>0,5
Pb	µg/L	natural	5	10	25	>25
Cu	µg/L	10	20	40	100	>100
Cd	µg/L	natural	0,1	0,2	0,5	> 0,5

4. Results and Discussions

Arsenic contamination of groundwater is a natural occurring high concentration of arsenic in deeper levels of groundwater, which became a high–profile problem in recent years due to the use of deep tubewells for water supply causing serious arsenic poisoning to large numbers of people [Ford, (1996)]. A 2007 study found that over 137 million people in more than 70 countries are probably affected by arsenic poisoning of drinking water [Velitchcova, Pentcheva, Daskalova, (2007)]. Arsenic is a carcinogen which causes many cancers including skin, lung, and bladder as well as cardiovascular disease. The Elemental arsenic and arsenic compounds are classified as "toxic" and "dangerous for the environment" in the European Union under directive 67/548/EEC.

The IARC recognizes arsenic and arsenic compounds as group 1 carcinogens, and the EU lists arsenic trioxide, arsenic pentoxide and arsenate salts as category 1 carcinogens. Adults may be exposed through work in a metal foundry, mining, glass production, or the semiconductor industry. Also, arsenic can proceeds from acid mine drainage.

Sources of Mercury. Mining and incineration of coal, medical and other waste, contribute greatly to mercury concentrations in some areas. In the aquatic environment, mercury can be: dissolved or suspended in the water, trapped in the sediments, ingested by living things (biota) [Clifton, (2007)]. Methylmercury is the form of mercury most available and most toxic to biota (including zooplankton, insects, fish, and humans). This form of mercury is easily taken up by biota and bioaccumulate in their tissues. Unlike many other fish contaminants, such as PCBs and DDT, mercury does not concentrate in the fat, but in the muscle tissue. Thus, there is no simple way to remove mercury–contaminated portions from fish that is to be eaten. Methyl mercury is formed when metallic mercury enters the air or water from mining ore deposits and waste, and from manufacturing plants.

Sources of Lead. The most important ways lead can enter the environment are through mining practices and steel industry. The Lead is the most known metallic pollutant. Being strongly absorbed by the waters sediments, the lead gets to plants and animals. In the aquatic systems, influenced by the temperature, salinity and pH, its solubility can grow. High levels of this metal could be a result of environmental pollution as well as of high levels of mineral contents in soils of production areas [Pichard *et al*., (2002)]. It is extremely toxic, it diminishes immunity of the human body, diminishes the capacity of oxygenating the blood and alters the function of the nervous system. The Lead is also responsible for the illness known as saturnism. The effects of these illnesses are also obvious at the succeeding generations [Prased, (1988)].

Cadmium. Many acid mine discharges contain elevated levels of potentially toxic metals, especially nickel, cadmium and copper with lower levels of a range of trace and semi–metal ions such as lead, arsenic, and manganese.

In aquatic ecosystems cadmium can bio accumulate in mussels, oysters, lobsters and fish. The susceptibility to cadmium can vary greatly between aquatic organisms. Salt–water organisms are known to be more resistant to cadmium poisoning than freshwater organisms. Animals eating or drinking cadmium sometimes get high blood–pressures and nerve or brain damage [Nogowa, (2004)].

In the **figure 1** the concentrations of Arsenic, Mercury, Lead, Copper and Cadmium in January 2005, in seven harvesting points are presented.

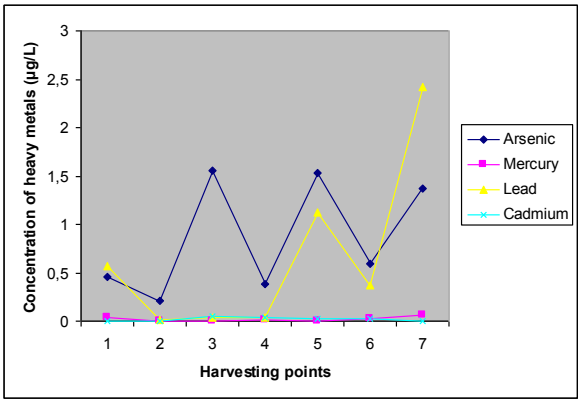

Figure 1. Concentrations of heavy metals in January 2005 (µg/L)

The provided limit for arsenic is As =7,2 µg/L, for mercury is 1 µg/L, for lead is 1,7µg/L and for cadmium is 1 µg/L [NTPA 001/2005].

The figure shows that the concentration of arsenic is between 0,23 µg/L in Lupeni point and 1,61 µg/L As in Iscroni point. Both of these harvesting points are inside the [Barbu, Popescu, Selisteanu, Preda, (2008)] mining zone. The concentration of lead is between 0 µg/L in Lupeni point and 2,57 µg/L in Podari point. That means the concentrations of Pb in Podari point, in June is more than provided limit. Podari is situated in downstream of evacuation of sewage waters from Craiova.

The concentrations of mercury in all the harvesting points do not overtake the admitted limit. The same situation is for cadmium.

In the **figure 2** the concentrations of Arsenic, Mercury, Lead, Copper and Cadmium in June 2005, in seven harvesting points are presented.

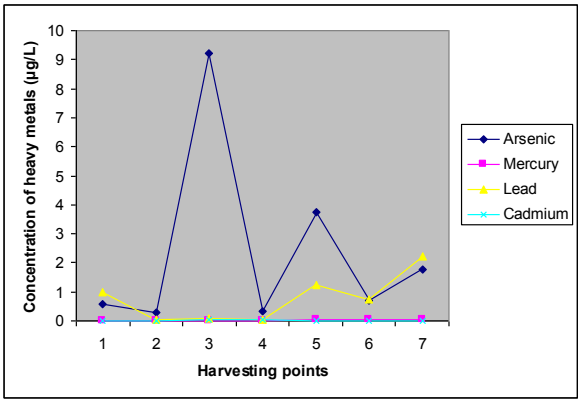

Figure 2. Concentrations of heavy metals in June 2005 (µg/L)

In June 2005, the concentration of the arsenic grows in Iscroni point until 9,1 µg/L, more than provided limit. This zone is intensively polluted by Vulcan Mine, Paroseni Mine, Lupeni Mine and Uricani Mine. The lead in (5) and (7) points overtakes the admitted limit. The (5) harvesting point is upstream the confluence with Sadu. Here Jiu River collects the waters of all mining zone and that explain the high level of pollution from that harvesting point. The concentrations of mercury and of cadmium in all the harvesting points do not overtake the admitted limit.

In the **figure 3** the concentrations of Arsenic, Mercury, Lead, Copper and Cadmium in January 2008, in seven harvesting points are presented.

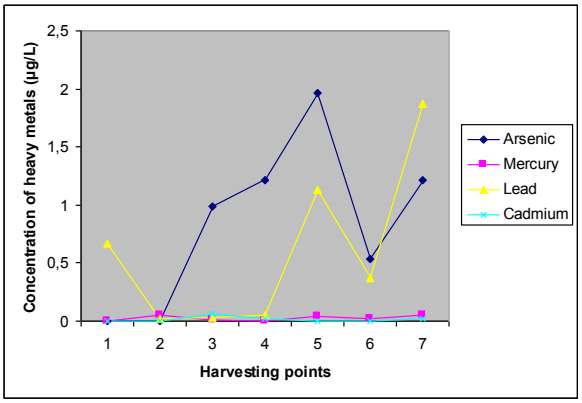

Figure 3. Concentrations of heavy metals in January 2008 (µg/L)

The concentration of arsenic grows relatively constantly, from the source towards the flowing point. In (5) harvesting point, upstream the confluence with Sadu, the concentration of As reach the value 1,99 µg/L, does not overtake the admitted limit. The level of Pb in (5) point is 1,12 µg/L and in Podari point is 1,95 µg/L, in that point more than provided limit. The concentrations of mercury and of cadmium in all the harvesting points do not overtake the admitted limit.

In the **figure 4** the concentrations of Arsenic, Mercury, Lead, Copper and Cadmium in June 2008, in seven harvesting points are presented.

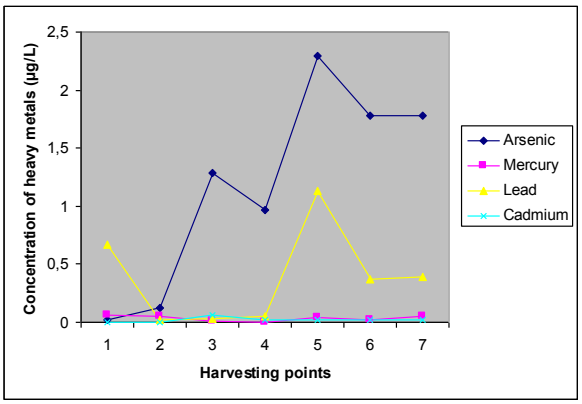

Figure 4. Concentrations of heavy metals in June 2005 (µg/L)

In June 2008 the concentration of arsenic is between 0,021µg/L in Campu' lui Neag and 2,29 µg/L upstream the confluence with Sadu. The concentrations of arsenic in all the harvesting points do not overtake the admitted limit. The measurements show that in all points of harvesting, the level of lead is below the admitted limit. It can be seen that upstream the confluence with Sadu the level of lead (1,13 µg/L) is bigger than the concentration of Pb in other points. The concentrations of mercury and of cadmium in all the harvesting points do not overtake the admitted limit.

5. Conclusions

Acid mine drainage, refers to the outflow of acidic water from (usually) abandoned metal mines or coal mines. However, other areas where the earth has been disturbed (e.g. construction sites, subdivisions, transportation corridors, etc.) may also contribute acid rock drainage to the environment [Freese, (2004)].

The mining industry of coal from Jiu Valley completely eliminates existing vegetation, destroys the genetic soil profile, displaces or destroys wildlife and habitat, extent permanently changes the general topography of the area mined. Ground water supplies may be adversely affected by surface mining. These impacts include drainage of usable water from shallow aquifers; contamination of usable aquifers below mining operations due to infiltration of poor quality mine water; and increased infiltration of precipitation on spoil piles.

The measurements show that in the Eastern Jiu only three mining units discharge (Lonea, Petrila and Livezeni), it is not so polluted due to dilution. Therefore it is confirmed that this affluent fits into the II quality category and it is in the process of natural regeneration.

The Western Jiu River's waters are more polluted than the ones in the eastern side of the basin, and they do not fulfil the quality conditions for the IV category waters. This pollution is due to large quantities of used waters discharged by the four mining units (Vulcan, Paroseni, Lupeni and Uricani) and by the CPP Coroiesti.

As the mine waters from the Jiu Valley have specific features that bear a negative influence on the cleaning processes, their simple cleaning is not enough in order to remove the evacuated solid suspensions. Due to their colloidal nature, the suspensions from the residual waters from the coal mining cannot be efficiently removed unless physical and chemical coagulation processes are engaged, using either classical chemical reagents. These water purging technologies are aimed at fitting these waters within limits admitted by regulations in force in our country, namely NTPA 001/2005 regarding the limit values for charging with polluting agents of industrial used waters and household waters discharged in natural receptors.

Coal mining is only a temporary use of land, so it is vital that rehabilitation of land takes place once mining operations have stopped.

It can be seen that in 2008 the levels of all analysed heavy metals are less than the concentrations in 2005. Also, it can be seen that both in 2005 and in 2008, in winter's months, the level of all analysed heavy metals is less than the level in summer's months.

After 1990, a part of the mines from the Jiu Valley were closed, which had led to a constant lower of the concentration of the heavy metals from the Jiu River. Until then, a part of the chemism of the waters in the area was determined by the excessively mining practiced in these areas.

6. Acknowledgments

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JOHN RUSKIN'S SOCIAL AND POLITICAL THEORY IN HIS ECONOMIC WRITINGS

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Abstract

Art, poetry and political economy were instruments that John Ruskin attempted to reshape the man of his time with. The appreciated Victorian writer, literary and art critic and political philosopher tried to apply to the artistic riches the general idea of economic riches such as: discovery, utilization, accumulation and distribution. According to *Ruskin's conception economists have as a task to state what things provide life and to decide how they can be acquired and distributed.*

Key words: political economy, wealth, man, education, intellectual progress, moral progress

JEL Classification: A11, A13

1. Introduction

John Ruskin is considered by Jaques Bardoux (1901, 9) along side with Thomas Carlyle, Charles Dickens, Mathew Arnold among the great names to whom the social and idealist movement of the 19th Victorian era confines. As the chief leader of this group of famous writers, Carlyle exercised a great influence upon the pleiad and, in his opinion, the writer is *an interpreter of the divine idea which lays at the basis of appearance and ... the developer of the infinite*. [Bardoux, (1901), 10]. According to Carlyle, the writer's works will be reliable, good, useful and beautiful if he nourishes solid convictions and feelings, if a person can draw out from his works, a theory of nature and a painting of race.

Of all reformers who were influenced by Carlyle the most original and the most efficient was John Ruskin. It is in Carlyle's works that John Ruskin found a part of his economic theories. His mysticism is not pantheistic as Carlyle's mysticism is, but aesthetic and Christian, less violent but passionate too, also fervent in his convictions.

Ruskin was preoccupied by the idea of people's state misery and he was aware of the calling of his mission. Carlyle was to Ruskin not only his master but also his friend and it was this friendship that influenced, guided and directed him to the study of all social problems and encouraged him throughout his activity. It was the reading of Carlyle's works *Sartor Resartus* (1832) and *Past and Present* (1843) that revealed to Ruskin the contemporary social order denounced by Carlyle in a vigorously biting style, as an everlasting contradiction with Christ's words and the promises of the Bible.

John Ruskin was shaped and formed in the spirit of the scholastic discipline at Oxford and he was nourished with the Bible principles, Walter Scott's ideas and love for journeys in the middle of nature so much ignored by the English. For his talent Ruskin deserves to be compared with Carlyle but by his actions he is maybe superior to his predecessor. Ruskin embodied, like Carlyle, all the characteristics of the literary movement to which he attached his name. Ruskin sought successively a way to rebuild, recreate and reshape, from the moral point of view, the man of his time; and in order to achieve this goal he made use of art, poetry and political economy. Referring to his own works on political economy Ruskin declared that, of all his works, those he had written on political economy are the most truthful in content and the most judicious in shape. The pages Ruskin dedicated to the study of political economy do not form a distinct part of his entire work. His life is not separated in two periods; it is not a revolution but an evolution of his ideas that can be clearly noticed.

The guiding idea of Ruskin's political economy, his conception regarding the state's paternal role can be found in the conferences about art that took place in Manchester in 1854. He tried to apply to the artistic riches the general idea of economic riches such as: discovery, utilization, accumulation and distribution.

According to his outlook, in each town there should be established, at Government expenses,

experimental schools that might be attended by any child who considers he has natural inclination for that particular type of training.

The State should provide convenient jobs to and for those who posses uncommon qualities, abilities, skills as they shouldn't exhaust themselves in the struggle for life.

There should be two stages of the artist's transformation into a *gentleman*: competition which will be dedicated to stimulate zeal, and lessons of moral and education. Under these circumstances the word *gentleman* means to Ruskin *an honest man*.

Ruskin asserts that liberalism is a dangerous utopia and he asks himself what man would become if he were given whole liberty. In Ruskin's opinion, and according to his principles, life is safe only if it is dedicated to work, to reprimand and support, to government and to punishment. The idea of liberty was not a delight for the legislator, because he is convinced that man must establish the laws and authorities that will guide him throughout his work, which will protect him against his madness and will help him in his misfortunes.

The school of Manchester endured numerous attacks during the former half of the 19th century. Wilfred Owen was the first who began the fight on the social field and the Chartist movement came to continue it on political field. Carlyle and his disciples, Maurice and Kingsley, who had founded the Christian Socialism, can also be mentioned among the fighters who combated with the School of Manchester.

Joining in the same movement Ruskin was the leader of a new army of opponents and disputants who condemned that particular type of doctrine that, starting from a false conception about man, doesn't take into account the moral laws when organizes society. The radical antagonism between the theories of the School of Manchester and Ruskin's economic ideas can be noticed in his *Unto this last* (1860) and *Munera Pulveris* (1862/1863, 1872).

In order to give their precepts an apparently solid basis, classical economists such as Adam Smith, Malthus and others, had analysed human nature. They tried to relieve man's activity from the hindrances created by manners, environment and education as well as by religion as a moral tradition. Disregarding the everlasting and truthfully human feature of this chain inside individual, they destroyed it. A human being who has his own life and necessities to comply with, this is the type of man whose actions political economy wants to study and this is the activity whose laws it pretends to have discovered. So, according to classical economists, the moral principles are accidental and subordinate elements of the human nature while the necessity to satisfy them is the permanent and constant element. Ruskin settled that the discovery of wealth and riches and the act of producing and gathering capital (assets) are the two stages man has to undergo in order to satisfy his own necessities. In his judgement classical economists are not in the position to solve the problems raised by these two formulae. Ruskin criticized Stuart Mill for his conviction and belief according to which wealth consists of all useful and agreeable objects that possess an exchange value. Mill favours the idea that useful and agreeable objects are at the basis of value and exchange, while Ruskin considers that the economical value is determined not only by the nature of objects but also by the number of people who need it, want and can use it, whence it follows that the useful character of things depends on the human faculty corresponding to it. Ruskin also asserts that the agreeable character of a certain thing is determined not only by the attraction it is capable to exercise upon people, but also by the number of people willing to let themselves seduced by it, meaning that the agreeable character of a thing depends on the human mood and willingness that tally with it. Ruskin concludes that political economy, which is the science of wealth, must equally be the science of human disposition, willingness, mood and faculties. The way classical economists analysed the functions of capital was also an opportunity for Ruskin to criticize them since he considers that kind of analysis as deficient, imperfect. Gathering a certain amount of capital or assets is not the ultimate stage of the economic activity but a middle one.

The capital is that substance, matter and essence that produces derived and secondary goods and it fulfils its real purpose if it generates things and goods that are different from it. Ruskin considers the analysis the economists of the time made on capital as being an incomplete one, and disagrees with then because they used to look over and consider capital as a merely reserve, stock, deposit and not as a source for producing secondary, derived goods.

The phenomenon that sums up the terms utility, value, wealth, capital, assets embraces the human being. These terms may be concentrated in clear definitions and formulae that should ground their study upon a thorough analysis of man and should not refuse to study what is best and most

important inside the human being – namely the spirit. It was also in the name of moral that Ruskin attacked those laws by which political economy pretends to explain the manifestations of man's activity: the particular laws of supply and demand, and the general law of competition. According to the then economists it would be enough to offer a price conditioned by supply and demand in order to obtain a service. Ruskin shows and proves that this would be very likely to happen if the worker were a machine propelled by steam whose force might be calculated; but man is that particular instrument set in motion and put into service by *soul.* The merely promise of wages will not be able to supply this strange machine with the whole amount of effort and work it can provide. The extreme point will be reached *only when the motive power – **the will** is brought to the maximum pressure by the agency of the fuel which is characteristic to it, namely **patience**.* [Ruskin, (1936), 113].

Ruskin concludes that the law of supply and demand is neither unfailing, nor immutable because it is not, and it will never be completely objective.

As to the law of competition, which is considered a necessity by the economists, one can say that Ruskin did not find in it any economic advantages; on the contrary, he traced and admitted its disadvantages. The merchant, the man of commerce is considered, by people, to belong *to an inferior grade of human personality*. [Ruskin, (1936), 28–29]. In his *Crown of Wild Olive* (1866) Ruskin stresses out upon the difference between economists and he notices that this difference came from the fact that some of them had studied only one branch of man's activity – namely his efforts to comply with his necessities – while the others had been more interested in art and social sciences and they subordinated their general doctrine, and even their personal, individual theories to the steadfast, constant goal of improving humanity's moral conduct.

Considering the way Ruskin defined political economy, he can be integrated in the group towards which he was driven by the natural tendencies of his spirit, by the pathos of his polemics, by the general character of his life. In Ruskin's opinion *political economy is neither an art nor a science but a system of legislation and conducts founded upon sciences which can be achieved under certain conditions of moral culture*. [Ruskin, (1968), 120]. This definition points out the fact that Ruskin settled a boundary between him and the classical school, and helps us understand the goal of his study. Political economy has as a purpose to multiply the human life in its highest type. The ideal type of humanity implies perfection of the human body, of heart and intellect, whence it follows that the material target – to produce, to use, to accumulate with the purpose of using – that belongs to the political economy, are things that are useful *either to support the body and stimulate its sensitiveness, or to shape its intellect*. [Ruskin, (1968), 122].

As the object of political economy is the above mentioned one, Ruskin considers that the economists' assignment is to settle which things provide life and to decide how they can be obtained and distributed. This quest can be accomplished by following three directions: the analysis of fortune, of wealth and of currency. The study of fortune is a branch of natural science and it deals with the essential characteristics of things, the study of wealth is a branch of moral science and it deals with the exact relation between men and the subject of the material possessions while the study of currency is a branch of commercial science and it studies the conditions of exchange. In a word, Ruskin considers that political economy deals with the study of three problems: the problem of value, the problem of commerce or of value's circulation and the problem of labour. By each of the solutions Ruskin suggests, he intends once again, to confute the three theories that are specific to the School of Manchester: the law of supply and demand, the law of competition, and the *laissez– faire* dogma.

When, in his work *Unto this last*, Ruskin comments upon the notion of value he declares that value and the quality of being valuable implies usefulness and profitableness for life, and maps out five groups of valuable objects. First of all he mentions earth together with air and water and everything related to them; as they provide our food and give birth to a mechanical force their value is double. They represent a delight for our eyes and soul, a source of reflection for our deepest thoughts and beget intellectual force. In the second group buildings, furniture and tools must be integrated. The value of the buildings is double, too. Their value rests in the ever–lasting solidity, which avails their long–term utility, in the beauty of their architecture and in their historical evidence and importance. Thirdly comes the group that comprises nourishment, means of subsistence, luxury articles and drugs followed by the group of books, meant to convey, from generation to generation, facts and knowledge that develop sensitiveness and intellectual activity. The last but not the least group mentioned by Ruskin is that of the works of art. Value means the power of a certain thing to entertain life; it depends

on man's judgement and on the stock's quality, and it becomes efficient when it belongs to that particular person who has a certain degree of vital force. When value is efficient one can say that the possessor is wealthy. Wealth is regarded as the possession of valuables by courageous people. Ruskin considers life to be the only wealth. *That nation is the wealthiest that nourishes the greatest number of happy and noble human beings; that person is the richest who has the largest favourable influence upon the others, by the agency of his own personality and his possessions*. [Ruskin (1936), 136].

The conclusions of the objective analysis Ruskin gives us can be summed up as follows: wealth is the efficient possession of valuable things and value is the intrinsic capacity of things to support existence, life. Combining the intrinsic character of value and the subjective character of wealth, Ruskin specifies the accounts that relate individual morality with the fruitfulness of the national and private capital. A huge capital is an unavailable condition for the development of a country's security, morality and commerce.

According to Ruskin's thinking the analysis of the social capital implies two questions: which is its value and which its relations with the number of inhabitants. As he states, this type of analysis is necessary in order to ascertain, to determine the value of the national wealth. The presence of things without intrinsic value in the social capital does not necessarily imply the corresponding absence of the valuable objects. Generally, useless and unvalued goods are produced as laughing objects, and nothing should have been produced instead of them, as they were made in wasted moments. If wealth consists in all means of subsistence a country will never become rich by reducing the number of its inhabitants; consequently, of two nations that have equal capital, the one that has the greatest number of inhabitants will be the wealthiest. That economist who wants to find out if a country must be considered wealthy or not, will have to compare the number of the poor with that of the rich. Individual capital, like the social capital *represents wealth only if a certain vital force of the possessors agrees with the intrinsic value of the object*. [Ruskin, (1968), 93–94].

Ruskin finds it more important and interesting to know who the possessors are than to have knowledge of what they possess. A nation will be rich the moment a moral and intellectual progress of its inhabitants will be achieved and noticeable.

A very ingenious effort of joining together the political economy and moral improvement breaks out from the statement that Ruskin made when he referred to the problem of value and capital, but however he did not analyse the concept of value without contradicting himself. When he asserted that the value of an object depended on its quality, he concurrently sent forth the most improbable paradox and, after he had asserted that value was intrinsic, objective, he remarked that the actual value of an object depended on its possible utilization. Thus Ruskin worded and delivered the most naïve contradiction but, despite this fact, his objections were correct and the author of *Unto this last* became a remarkable precursor. Where he pointed out certain errors and gaps, political economy made a step forward and evolved under the passionate pressure of the socialist school, some conceptions were abandoned, the notions of wealth and capital were enlarged and the idea of value was thoroughly analysed.

The analysis of commercial circulation is subdivided by Ruskin into two branches: the study of currency and that of exchange but, in both of them, his theories will be unaccountable unless one takes into consideration the fact that the standard of value is the standard of life and wealth means the possession of fortifying objects by vivid spirits.

What is currency? Currency is *a way of public acknowledgement of a debt that will be received by any person in exchange for a piece that will entitle him to receive its equivalent, in any place, at any time, doesn't matter in what manner*. [Ruskin, (1968), 18]. The best monetary system will be the one that, having the greatest steadiness possible, will not be part of value's characteristics and will not be mistaken for wealth.

Modern societies began to use gold as the only basis of their monetary system but gold is not a good currency as long as it can be sold, and it is not a proper object of value, as long as its value of exchange comes to disturb its public utilization; the opportunity to get other goods in exchange for gold always depends on its attractiveness and on the existing stock of gold in circulation. Currency must be based on several substances of an intrinsic and more real value instead of only one. Ruskin noticed that the steadiness of currency circulation depended on how large its basis was. Currency was not considered a means of exchange but a title of faith; to possess capital and to possess money were not two synonymous phrases. Is was asserted that wealth requires the capitalist to have a certain

degree of life in his heart and thinking, while having mere faith doesn't require the owner to have this type of qualities. If money is not a means of exchange but only a simple title of faith it is normal that money will not be productive. It is the physiocrats from whom Ruskin borrowed his conception about value and was also inspired by them in his theory about exchange. For Ruskin, an advantageous exchange always implies the inability or ignorance of one of the two parts. With the purpose in view of establishing a new theory Ruskin suggests the following laws: *There must be reciprocal advantage in the process of exchange or there mustn't be any disadvantage for either of the traders. It's important that any amount of time, work and intelligence of the intermediary should be rewarded* [Ruskin, (1936), 130–134].

There are two different ideas in this theory of exchange. The former one is an idea of social art, a moral precept – there must be reciprocal advantage when it comes to exchange; the latter one is an idea of economic science – there must never be profit in the process of exchange.

The two principles that governed Ruskin's ideas about economy are the two negations – the negation of liberty and that of equality. The individual is not entitled to liberty: the state may impose to his activity the restrictions it will consider as being useful for the progress of society, the same as nature has imposed its minute set of rules. The individual is not entitled to equality: the historical traditions and the social necessities brought about the creation of a hierarchy; each citizen must observe laws and he must try to reach real perfection. The state will organize social work in such a way as to succeed in decreasing as much as possible the negative consequences of the struggle for life; it must look after the disabled and old people and must provide them a safe place and home.

A second series of measures, that should be adopted, should have as a general purpose and goal the annulment of the consequences competition has upon value and upon the price of goods. The foundation of national manufactures, the re–establishment of the corporations, these are the means Ruskin foresaw in order to fulfil the above–mentioned target. Government will establish manufactures and stores to assure the manufacturing and selling of those products necessary to life. The state will not have to impose restrictions or to hinder the private enterprises; on the contrary it will have to give them whole freedom but it will have to watch over the goods that are made and sold because *bread must be bread and beer must be beer*. [Ruskin, (1936), 17–18].

Corporations will come to complete what the state achieved. The corporation council will settle the pattern and price of the manufactured products as well as the wages for the workers. So, according to Ruskin's idea of a system there will be three types of stores: those of the free merchants, those of the corporations and those of the state. Ruskin intended to annul the variations whose moral and financial consequences he feared and he was going to achieve this by the organization of production.

A certain idealism characterises legislation that is considered to have the mission to lead mankind towards moral perfection. Vice and indolence must be uprooted and punished with the same rigour in town and on board of the ship. The right of constraint and coercion held by those who work, over those who idle and disturb the process of work must also be absolute in society. The right to equally share everything necessary to life in common is also inalienable both in society and on board of the ship. The right of those who are ill and disabled, to be protected by the strong ones is also imperative and the necessity to grant, to vouch–safe the authority of the government, to the one who is a real, skilful pilot, is constant and clear. The state will have the role to impose its citizens the laws, considered necessary in order to achieve the unity of efforts and continuity in progress.

Ruskin drew up a plan of a vast code that embraces the whole human activity.

The first branch of legislation points out what can and what cannot be done. Man's liberty won't be restricted unless he did something wrong.

The second branch shows what can and what cannot be possessed. These laws have a double purpose: to show what a citizen can possess and at the same time to stress out which are the objects that community is not allowed to possess. Ruskin suggested that the accumulation of all kinds of goods should be limited, but at the same time he remembers the necessity to give man the right to possess a certain parcel of ground. *The State will authorize each man to become an owner, a proprietor, as a parent allows his son to marry*. [Ruskin, (1906), 85].

Finally a third branch of legislation will be made up by the extension of the penal code; laws will specify *what a man may or may not endure. The owner will be responsible for the conduct and behaviour of the people who are subjected to his laws*. [Ruskin, (1906), 8].

Through this organization of work Ruskin wanted to abolish competition and to pave the way

for a moral revival. Fighting against human cupidity and greediness and enforcing the respect superiors must display towards their subordinates, Ruskin succeeded to reduce the consequences of competition. One of his intentions was to renew the moral and economic situation of the contemporary societies. In order to supervise that such a minute code of complex structure and organization should be put into practice and should function, the state will have to increase the number of its employees. This ideal type of administration will be divided, in keeping with Ruskin, in seven groups: the first one will have to study and supervise each citizen, the second will set up assistance, a third group will control industrial explorations. The magisterial and teaching staff will be added to these. Referring to the seventh group Ruskin asserted that *an exemplary authority is that authority that will set good example to others and will show what is best and most beautiful in the art of life*. [Ruskin (1906), 182–191].

This was at large Ruskin's conception about an ideal administrative reorganization; its failure can be accounted for by the contradictions that have ruined Ruskin's system. The same author who accepted the three principles of the socialist school – the nationalization of public utility services and the establishment of national stores, the annulment of revenue, the establishment of wages and work hours as the basis of exchange, rejects the idea of land nationalization. Ruskin declares his consideration for property but on the other hand he pretends that certain limits for private wealth should be imposed.

One of the problems that dominated Ruskin's thinking was expressed as follows: *What could we initiate in order to render to our horizon its serenity, and to our society the calm of peace*? [Ruskin (1906), 89] and the answer was – to undertake a moral reform – that must be, as Carlyle maintained, useful and everlasting. This idea expounded so clearly by Ruskin, represents the most beautiful and durable part of his economic work.

There are two facts that concerned Ruskin simultaneously: the beauty of being an active and busy person during the lifetime span and the necessity and beauty of Christianity. Life is beautiful when it is not motionless, immobile and uneventful. It must be a permanent fight not against people, but against itself. And during this painful march life signifies, noble souls find out *that something* vainly looked for and chased after, which is like a ghost, appears only for a moment and whose name is – *happiness. The sweetest pleasure of youth vanishes in obscurity – that is greater than the past splendour –...while, on the contrary, daily hard and assiduous work fills us with joy and delight.* (Ruskin, 1907, 184–185). Life is nice and good provided that it is devoted to the purpose of reaching a moral ideal. There is a certain morality for each nation and for each individual. Sensitiveness, the natural perception of the beauty, truth, and goodness, the energy expressed by its fidelity towards the acquired traditions and customs – these are the real conditions of a nation's state of morality. Action supports and keeps up the great moral law of nations as well as people's life. People strove to improve their sensitiveness and thinking while nations strive to preserve their moral traditions. Putting into practice the Christian principles for the assiduous improvement of one's soul, this is the purpose that individual morality has in view; the constant melioration of the existing relations among people belonging to different social classes, different sexes and different ages this is the purpose of social morality,

Speaking about the mission the artists and men of science have to fulfil, Ruskin considers them to be the ones who train, educate and divert the vast masses of suffering, grieving people. Those who have understood that it is not necessary to be rich for being influential and respected may consider themselves happy because, sooner or later, they will be rewarded. The members of the social elite will carry out their mission and duties the moment they offer the unhappy people who form the community, a part of their pecuniary, literary, artistic and scientific wealth. If the members of the social elite are in just, fair and constant relations with the other members of the community, new moral obligations will come to underline their general duties; this is the case of the owner, landlord or of the trader who, instead of asking huge prices, or instead of falsifying the goods he trades should accept to be poor and work; this is the case of the soldier, who should choose to be killed than to leave his post.

Harmony that underlines the relations between the social classes must also exist between sexes; this is the context in which Ruskin dealt with women's mission. He rejected the idea of *modern women* and criticized Stuart Mill for having declared that women must have a more lucrative occupation than that of nourishing babies. Ruskin condemned the fact that women might become engineers or teachers or anything else. This doesn't mean that he turned back to the old precept and

theory that proclaimed male superiority.

Each sex has something peculiar that the other one lacks so they complement each other. The moralist settled a task for both man and woman. Man's force lays in action, progress, and defence; he is the one who creates, explains, defeats and defences at the same time. His intellect makes speculations and inventions, his energy wins. Despite the fact that women, according to Ruskin's conception, don't invent or create, but in exchange they are able to decide, to classify, to tidy up and to array themselves women are perfectly aware of the quality of things, of their accurate names and proper place. In family, in society, in state institutions woman's task will be to organize, to tidy up, to manage. In this particular case to manage is not synonymous with to lead. It means that women will act upon male souls as there are delicate and noble feelings in man's heart most often inspired by women. Due to the purity of their souls women will always be queens," *queens for their lovers, queens for their husbands and their sons, queens, much more mysterious, for the people who bowed, and will always bow in front of their crown and sceptre*. [Ruskin, (1907), 135]. Inside her own house a woman must be queen and she will remain so as long as she keeps in mind the truth that man–no matter if her fiancée, husband or son– is but the mirror reflecting her very image. Home will be everywhere she is. What is difficult for a woman is not to endure the whims of fate – love will help her endure them well – but to continue to be heroic in happiness and not to forget God when He offered her everything she languished after. This is the real courage, as Ruskin says. He appeals to women and asks them to pray for their sons and husbands, whose lives and characters are in their hands. Men will be what women want them to be, as women are the centre of their homes, the centre of goodness and excellence and they exercise a charitable task where beauty and order are scarce. If corruption, which reached the literary and political field as well as individuals, did not touch the home, this will mean safety and society will be safe, too; the day corruption touches the home, especially the woman, society will be irremediably lost because humanity's sources of physical and moral life will be imprisoned. When society follows this path no human force will be able to stop its decline.

Ruskin's call and warning was heard – hundreds of associations were founded by those women who had understood the beauty of their goal, the necessity of their actions.

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SPORTS SPONSORSHIP – MEANS OF COMMUNICATION

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Abstract:

Sport sponsorship represents, nowadays, an indispensable way of attracting additional funds that grants sports development, an important factor in the very existence of sports entities, sportsmen and sports events. That is why sponsorship aims at occupying a first–rate place in sports organizations' marketing activity. It is also an important means of communication that allows companies to promote their brand or products by associating them with sport events.

In Romania the Law of sponsorship had, in the course of time, since the overthrow of communism in 1989, an agitated history characterised by repeated changes that several decrees came to pass. Besides general aspects related to sports sponsorship the article discusses this issue too.

Key words: sponsorship, sports, sponsor, sponsored organization, sports event

JEL Classification: A12

1. Sponsorship – general considerations

Sponsorship is a first rank marketing technique, hence a communication technique, whose evolution was impressive in the 90' when its content and forms of manifestation improved. As a means of communication and component of promotion meant to attract further funds for sports development sponsorship allows a direct association between a company's brand and an event attractive to a certain category of audience. The world of business, companies in all fields of activity prosper by using sport, in its capacity of a universal activity and language, as well as the image of sports stars as instruments of promoting their products, services, ideas and image.

Etymologically the word *sponsor* comes from Latin, meaning a guarantor for someone (DEX, 1998). In American English, according to *The American Heritage Dictionary of English Language* (2000) the word is defined as: *One that finances a project or an event carried out by another person or group, especially a business enterprise that pays for radio or television programming in return for advertising time.*

Considering the importance of the component elements of sponsorship, the sponsor, the beneficiary of sponsorship and the target group, Sahnoun (1992:14) defines the concept as being *an instrument of communication that makes it possible to directly connect a brand or a company with an event, attractive for a special type of audience.*

In sport, sponsorship represents, according to the most exact definition, given by the European Ministers responsible for sport at their meeting occasioned by the third Conference held in Palma de Majorca on 8–10 April 1981, *the agreement under which one of the parties – the sponsor – supplies material, financial or other benefits to another – the sponsored – in exchange for its association with a sport or sportsman for advertising, especially television advertising purposes* [Ministerul Tineretului şi Sportului, (1991):38].

Virgiania Oprişan notices (2002:176) that sponsorship was defined differently by the authors in the field, depending on the referential points which can be:

- either the sponsor, in which case: *Sponsorship is a technique of communication which allows the company to associate its brand with a sports event generated or accomplished by it, with the purpose in view of turning it into profit through the instrumentality of a traditional advertising global action*. (Fabre and André, 1984, *apud* Oprişan 2002:176);
- or the beneficiary of the sponsorship: *Sponsorship consists in the financial or in kind support of a team, sportsman or event.* (Roufiac, 1976, *apud* Oprişan 2002:176);
- or the event, according to which sponsorship implies, as Gianelloni, J.L. notices in *Contribution à l'étude du mode d'influence de la communication par l'événement*: *the bringing into being of some events that generate a promotional and advertising exploitation, contribute to notoriety and make use of the sponsor's image and concept* (*apud* Oprişan 2002:176).

Sponsorship in sports, alongside with broadcasting and the use of the sportsmen's and brands' image, became more and more visible, at the level of local, national, international sports organizations, during the 1980s when the rather new concept of *sport marketing* draw attention and was defined as *The total number of activities meant to satisfy the necessities and desires of the sport consumers by exchange processes* [Mullin *et all*, (1993):6 *apud* Oprişan, (2002):38].

The growing interest for sports sponsorship, obvious during the last decades particularly for football, tennis, rugby, Formula 1, Olympic Games, does not have to impede upon the sports organization's policy of marketing, which, incidentally, the literature of specialty does not mention. Virgiania Oprişan presents (2002:41) a possible typology of sports marketing depending on:

- *the sports product or service* in which case we deal with: – the marketing of sports product, the marketing of sport services, the marketing of sport contest;
- *the consumer's involvement* – the marketing of the direct participant (sport star, professional sportsman, active participant in sport, circumstantial direct participant), the marketing of the sport spectator, the marketing of the collector of sports souvenirs;
- *the types of organizations in sports industry* – the Olympic marketing, International and National Sports Federation, the marketing of the sports clubs, leagues, companies in sports industry, etc.

Sport brings large profits to the business world which uses it as a promotional vehicle. Profitable or non–profitable organizations in all fields use sport, in its capacity of a universal activity, as means of promotion for their products, services, ideas or images.

Through the agency of sponsorship the sponsor is granted certain rights:

- the right to exclusive association with a product or service;
- the right to associate the sponsor's name with a sport event or sports centre;
- the right to use certain denominations that show the relation with the event or product; the International Olympic Committee, the Committee of the Olympic Games Organization and National Olympic Committees allow the sponsors to use names such as – *official partner, official sponsor, official product, official supplier, presenter, supporter* – in relation to the respective sports events;
- the right to convey messages (by posters, leaflets, advertising, press–conferences, direct mail etc.) in the frame of the communication process.

By sponsorship, which developed from a type of advertising based on sports events to the statute of a large investment that serves the purpose of attaining objectives, companies have the privilege of reaching the targeted groups in a more direct and simpler manner. The results of a sponsorship campaign can be translated in:

- improvement of one's own image and gain in notoriety;
- positive perception of the company by audience;
- company's involvement in the community's life;
- media profits;
- advantages over the competing companies;
- gaining the goodwill of the leaders' of opinion;
- growing of sales.

From the sponsor's point of view, sport sponsorship is considered, in marketing literature, as a means of *promotion by sport*; from that of the sponsored organization it is a means of *promotion of sport,* because of its importance in achieving the marketing and communication goals, characteristic to sports organization, through the instrumentality of the same channels used by sponsor, namely the event and media. The main goal of both the sponsor and the sponsored organization is to influence common categories of public.

Sponsorship implies three elements – the sponsor, the sponsor's organization, the event by which the public is addressed.

The event is used by both the sponsor and sponsored organization as a communicational channel by which they address messages to the targeted audience through the agency of some instruments of communication and according to a communicational strategy. From the point of view of the sponsored sports organizations the sport event is, on one hand, a product having characteristics specific to sport, and, on the other hand, a means of communication. The event is sold to both the public, by media, and to the sponsor, considered to be *the first customer* who is offered a potential product. [Oprişan, (2002):180]. In this way, media and audience become component parts of

sponsorship. The former presents, broadcasts, speaks about the event, amplifies the messages addressed to the public and draws attention upon the sponsor, whose major benefit is free advertising, the latter intercepts the messages from the two sources, the sponsored organization and the sponsor.

2. Factors that contributed to the development of sponsorship in sport

Companies that used to allot important amounts of money for written or broadcasted advertising realised that the ever growing squash on the market and, moreover, the costs began to be exorbitant. The use of sports as means of communication, through the instrumentality of sponsorship, was a more efficient and often less expensive alternative to the traditional advertising campaigns. This was an important factor that contributed to the development of sponsorship in sport as, by means of sponsorship, the message meant to be transmitted was related to an event which rendered it more credible, dynamical, more likely to be better intercepted.

The interest media took in sports events also influenced upon the increasing importance of sponsorship firstly because of the reduced costs of broadcasting sports events as compared to those implied by producing shows. Individuals' interest in sports and in a more active way of life, cable television networks, broadcasts by satellite, private televisions that made it possible that events should be transmitted live are all factors taken into account in favour of sponsorship as a means of communication by sports.

The companies' interest in activities able to improve the consumers' perception with regard to their products and the changes in the policy of financing sports events made the commercialization of sport became imperative and inevitable.

Marketing globalization was another factor that enhanced the development of sponsorship particularly in the field of sports where it is considered as an ideal means of intercultural communication by which multinational companies could surpass the difficulty of addressing to different cultures and languages and reach the target groups. On the other side, as sports organizations adopted the techniques of marketing they entered into association with commercial companies in order to reach their own goals.

Sponsorship is the most visible component of the marketing mix, and plays a critical and active role in affecting or influencing the consumers' opinion on the sponsor's brand. In general, it offers a great opportunity to both sponsor and the sponsored organization to build upon each others strength and growing reputation throughout the world. What sponsorship provides are the numerous opportunities for exposure, including promotional materials for an event, signage, on–site booths, cups and servicing items, premiums/give–aways and verbal mentioning by commentators. Sponsorship is meant to develop a heart to mind connection; relying on the emotional power of an event, league or a sportsman's personality, a sponsor can create a strong tie between his brand and the fans. The frequent appearance of a brand name or logo turns the company into part of what that personality, event, or league represents. Sponsorship usually creates a stronger tie with fans than advertising. The effectiveness of a sponsorship is measured by three elements: media exposure, awareness and purchase, and commitment; the importance of these three elements varies in accordance with the sponsorship's scope and duration. In general, no sponsor can expect to win the affection of consumers instantly. As a rule, it takes between three to five years for the results of sponsorship, increases in brand awareness and commitment, to appear. For one–time sports events, awareness and media exposure are the key aspects since commitment cannot be built with single events. It combines both attitudes and emotion and has the ability to predict future behaviour because the more committed a fan is, the more he or she is prepared to spend.

Sponsorship of sport or other events is, besides an essential element in the marketing mix, a proven communication vehicle or medium to facilitate the relationship between the sponsor and the sport consumer, in his capacity of either an active participant or a spectator of sport. Organizing several sports events or sponsoring them makes for an excellent advertising opportunity that companies can take. A company that manufactures sports utilities can sponsor a sports tournament – which thus becomes a means of communication – to advertise its products.

The role the media, which is a filter and an amplifier at the same time, plays in sponsorship is that of a go–between by which information is conveyed.

Media can be effectively used for advertising sponsorship: on television, radio, in newspapers and magazines; on T–shirts, equipment, banderoles; on tickets, programs, invitations, posters, flags; in

stations destined to public transport, as well as on the lateral parts or the back of the busses, trams, coaches; in commercial places, supermarkets; manifestations for clients or distributors; lodges of honour, saloons where sponsors can meet clients or customers; press conferences; manifestations for journalists; incentives for co–workers; encouraging co–workers to practice sports.

3. Sponsorship in Romania

The overthrown of communism in 1989 brought about the change of the political regime as well as of the Romanian economy which, according the post revolutionary Constitution firstly adopted in 1991 and modified in 2003, "is a market economy". [Romanian Constitution, (1991), 2003]

Under the new political and economic circumstances, it was impossible for the Government to provide budgetary support for the cultural necessities of the society so that the cultural institutions had to look for alternative resources to finance their activities. But the only way to support the cultural or sports events with funds was that of donations. The Civil Society claimed the creation of a legal frame that should allow private financing for culture and benefits for the financer. Consequently the Ministry of Finance initiated a draft bill concerning sponsorship of activities in the field of culture, art, science, education, religion, sports etc. which came into force as Law no. 32 of May 19th 1994; it was not long before discontentment arose against the stipulations meant to bring equal profit both to the beneficiary and to the Ministry or state budget. Sponsors were displeased with the fact that the only advantages were the promoting of their name, brand or image by the beneficiary of the sponsorship through the instrumentality of the event and a 5% tax deduction. These advantages, hardly considered as attractive, determined a lack of interest in sponsorship which reflected upon the beneficiaries. It is understandable that under these circumstances sponsorship was not attractive and law had to be changed; the Civil Society, particularly the League of the Nongovernmental Organisations for supporting the Sponsorship Law had a great contribution in the settlement of a system of sponsorship advantageous, to both the sponsor and the sponsored organization. As a consequence, the Decree no. 36/1998, which embodied most of the ideas of the experts' group and by which the tax reduction threshold was raised depending on the domain to be sponsored, passed. The domains and the percentage of deduction were:

- culture, art, heath, social assistance, humanitarian actions, environment preservation – 10%;
- education, human rights, science–research, philanthropy, preservation and restoration of the historical monuments, sport – except for football – 8%;
- religion, social and communitarian, professional associations, football – 5%

The changes stipulated by this Decree never came into force because the Ministry of Finance din not endorsed the instructions the ministries of each department should have offered situation which determined that the stipulations of Law no. 32/1994 should continue to be effective. The changes continued: the Sponsorship Law was modified again by Decree no. 127 of September 10th 1999 with fiscal measures, Law no. 204 April 20th 2001 concerning the passing of the Government's Decree no. 36/1998 that should have changed and completed Law no. 32/1994, Law no. 576 of October 22nd to pass the Government's Decree no. 127/1999, 2001 Law no. 414 of June 26th, 2002 concerning the tax on income and finally Law no. 571 of December 22nd 2003 with regard to the Fiscal Code, which abrogated Law no. 414/2002 and changed to a greater extent the deduction system. Because of all these changes the present law is different from that of 1994.

Regulations governing sponsorship in Romania at the moment are:

- Decree no. 36, of January 30th 1998, amending Law no. 32/1994 on sponsorship;
- Law no. 32, May 19th 1994 on sponsorship (updated until 22 October 2001);
- Law no. 204 of April 20th 2001 that ratifies the Government Decree no. 36/1998 amends Law no. 32/1994 on sponsorship.

Romanian legal or natural persons, which performs in the areas of sponsorship stipulated in article 4, benefit from the reduction of the taxable equivalent sponsorships, but no more than:

a. 10% of the taxable base for sponsorship in the fields of culture, art, education, health care and social services, humanitarian activities, environment protection;

b. 8% of the taxable base for sponsorship in the fields of education, human rights, science, fundamental and applied research, charity, maintenance, restoration, preservation of historical monuments, sports – except football;

c. 5% of the taxable base for sponsorship in the fields of religion, social and community, representing the interests of professional football associations.

The current law, besides the fact that is difficult to be consulted because of the numerous changes and the lack of enforcing norms – for the cases where the text is often confused, apart from the first three articles, has several shortcomings.

4. Shortcomings of the Sponsorship Law in Romania

First, it is the question of fields of activity for which a person can be sponsored. In many European countries, such as Bosnia and Herzegovina, Macedonia, Poland and Slovenia, reference is made to the field of activity for which sponsorship is permissible, the lack of clear or unanimously accepted definitions making it difficult to establish, for example, that a person performs activities belonging to one area or another. This can be proved, as a rule, by the statute or the constitutive document of the legal person in question, but in some cases documents may be irrelevant. On the other hand, in the absence of such documents, it is difficult to determine whether a particular activity is or is not part of the educational field, for example. In the same category of hindrances is the provision according to which the person wishing to be a beneficiary of the sponsorship must be "acknowledged" under the said proceedings, which greatly complicates the legal operations that precede the concluding of the sponsorship contract.

Secondly, obviously, insufficient incentives granted to sponsors are often seen as an obstacle for a satisfactory system of sponsorship. For Romania, incentives relate primarily to the deduction from the taxable profit. In other countries, there exist different types of incentives and thresholds of deduction of between 4 and 12%, depending on the case. Such deductions stimulate the sponsor so much the more if they are correlated with a certain level of income tax, so that the proportion of two percentages would allow a real cut of the financial effort of the sponsor. The lack of such incentives, in Romania, as well as the lack of correlation between the sponsored field and the percentage of deduction of the level of taxation on profit is to the detriment of those potential customers who have a lower profile or do not make use of campaigns to promote the name and logo of the sponsor.

One of the major obstacles that the present Romanian legislation generates is that sponsorship expenses are not considered as expenses for communication, but as charitable expenses.

5. Sports sponsorship in Romania

According to the text of the Law currently in force in Romania, sponsorship is the legal act by which two parts agree on the transfer of ownership of some goods or financial means for supporting non–profit activities carried out by one of the parties – the sponsorship beneficiary.

Concerns in the field of sponsorship in sports resulted in the formation of *Association of Sports Sponsors in Romania*, non–governmental organization which aims at supporting the sports movement in Romania and has as objectives the following:

a. to attract sponsors, to organize activities that coordinate and facilitate the sponsorship of athletes, sports clubs, sports associations and federations by companies or other individuals or legal entities in the country and abroad;

b. to support the organization of sports activities and cultural–sports manifestations taken by the Department of Sport of the former Minister of Youth and Sport or by other factors;

c. to carry out advertising actions that favour improvement of knowledge about sponsorship legislation, to contribute to the improvement of legislation on sponsorship;

d. to organize sports activities, such as those in the field of sport for everybody, classes of initiation in sports, etc.;

e. to support athletes or former performance athletes that face difficult life situations.

The association works with the structures of the former Minister of Youth and Sports, Ministry of Administration and Interior, with other Romanian legal persons and foreign companies that operate similar activities.

Most important examples of sports sponsorship in Romania are those concluded by large companies with:

1. The Romanian Gymnastics Federation (RGF); the official supplier of the International Federation of Gymnastics, the *Longines* sponsored RGF, providing equipment and services of

timekeeping and display. In compensation, RGF inscribed the name of the company on the national team's equipment worn in all major competitions.

Partial sponsorship has also been completed:

- with the Advertising Agency *Graffiti*, which organized the International Championships of Romania, covering all organizational costs, contracts with the media, including televised broadcast of the competition;
- with *MITA*, in exchange for the amounts required for awards and electronic equipment, RGF has given the company the right to advertise on the contest costumes.

2. The Romanian Tennis Field Federation (RTF). The International Tennis Federation, which provided important funds for a male tennis circuit, a female contest and for the purchase of a Mercedes minibus with eight seats. Important sponsors, which do not bear the official title of sponsor, were: *Dunlop* and *Slazenger* (provided sports material and the possibility of buying rackets at preferential prices), *Adidas* (provided sports equipment and materials for the national group), *Mercedes*, Coca–Cola, Intercontinental, QM (tennis equipment and sports material), *Attigram* (computer, fax), *Scop* (computer, emergency repairs).

3. The *Steaua* Club. The club benefits a 3 years sponsorship from *Philips.* The hockey department is sponsored by the company *Electrofar SA* which provides material support in money and other materials in exchange for compensations similar to those offered to *Philips*. The basketball department is sponsored by *Nithos* a Romanian–Italian company that produces and provides medical equipment in Romania and which supports the team's travels abroad.

4. The Romanian Athletics Federation (RAF). Following an improvement of the sponsor employability, RAF was able to attract a powerful sponsor – the *Champ* company.

5. The Romanian Soccer Federation (RFF) rendered profitable sponsorship contracts with: *Rank Xerox* (financial support), *Adidas* (sports equipment), *Tropicana* (money). Clubs belonging to this federation are free to conclude sponsorship contracts without the federation's authorization.

On the other hand, the Romanian Olympic Committee has also concluded partnership and sponsorship contracts, on the bases of the global programme TOP IV developed by the International Olympic Committee, with airline companies (*Tarom*), banks (*BCR, CEC– Bank*), insurance companies (*ASIROM*), car factories (*Mercedes, Ford*), sports supplies companies (*Adidas*), telephone companies (*ROMTELECOM*) as well as *Lenovo Group*, *Coca–Cola*, *Panasonic*, *Samsung*, *Kodak*, *Omega, Visa, Alexandrion Grour.*

Sports sponsorship generates certain problems such *as*:

- from the point of view of the sport organization there is a general tendency of the sponsors to support those sports or events that enjoy the highest popularity and rating to the detriment of the sports considered less attractive;
- from the point of view of the sponsor there arises the question of the quantification of the sponsorship outcomes as consequence of an improper knowledge of the communicational potential of sport or certain sports events situation which, very often, lead to too few claims from the part of the sponsor.

The legal aspects of sponsorship must be taken into consideration by both the sponsor and sponsored sportsman or sports organization. Lack of communication and coordination between the sports organizations on different levels of subordination (The Romanian Olympic Committee, Federations, Clubs etc.) may result in contract disagreements or even in conflicts (parallel promotion of several companies' brands or products under the name or image of the same sportsman or sportswoman), unless the rights of each part of the contract or each sports entity are clearly specified.

Lately companies started to develop a new outlook on sponsorship focusing more on the qualitative aspects of sport in relation to consumers; this proves a deeper concern of the companies for the problems that face communities, concern to answer the consumer's necessities. The consumer and the improvement of his life's quality became the major point of interest for sponsors, so the image of sports events and the idea of practicing sports for a healthier life are associated with a company's products or brand which are, in this way, consolidated in the viewers' perception – people favour those companies that support sport.

On the other side, mass participation events offer more to brands than merely a return on their sponsorship investment because events which promote health and fitness give a brand the opportunity

for both current and prospective consumers, who want to stay fit, to look at the brand in a different and more positive way.

According to Nick Rusling, the managing director of IMG Mass Participation Sport – mass events, such as marathons and triathlons, are becoming more and more popular during a period of financial crisis similar to the one the world faces at present. Referring to mass sports events such as London Marathon that gathers thousands of competitors and spectators, Rusling said [Sportbusiness International, (2008)]: "Cities should be looking to have marathon events – flagship events – because of their economic value. Participation in events is on the increase across the world, put down to people being fundamentally conscious of their own need to take part and stay fit."

Before their sponsorship of the London Marathon, Nick Bitel, CEO of the London Marathon, revealed that Unilever– that owned margarine–producer Flora asked their customers in 1995 for their motivation when buying the product, and a majority said it was because *they always have*. After their association with the race, consumers responded that they bought the product *because it is good for you*. [Sportbusiness International, (2008)].

The rapid evolution of the means of communication, particularly the internet, and the favourable opinion of the audience about the companies that sponsor sport in all its forms of manifestation will certainly cause a future development of sports sponsorship in the years to come.

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A SWOT ANALYSIS OF SMES' DEVELOPMENT IN ROMANIA

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Abstract:

Nowadays, the importance of the SME field becomes more and more a real basis for establishing and developing a modern, dynamic knowledge–based economy. The experience of the European Union clearly demonstrates that the SME sector can make a substantial contribution to Gross Domestic Product, enhance employment opportunities and stimulate export growth. SMEs have the ability to respond flexibly in a strongly competitive market and to adapt quickly to cyclical and structural changes in the global economy. Therefore, a dynamic SME sector is needed to ensure continued economic growth, to stimulate the employment and the improvement of the living standards.

The accession of Romania to the European Union involves a lot of challenges and opportunities for the Romania SMEs sector. In this context, the SWOT analysis will reveal the main strong and weak points of this sector development, the threats but also the ooportunities. Starting from this, there are presented the principles that will be followed for the development of this sector and the national strategy for the support and promotion of Romanian SMEs.

Keywords: SMEs, financing, performance indicators, SWOT analysis, development strategy, Romania

JEL Classification: F36, O16

1. Introduction

The economic and social importance of the SME sector is well recognized in academic and policy literature [Biggs, (2002)]. It is also recognized that these actors in the economy may be underserved, especially in terms of finance [Beck, (2007], [Ayyagari *et all*, (2006)], [Berger and Udell, (2005)].

The small business development literature argues that SMEs embody special advantages that generate some unique contributions to the economy such as: SMEs create an important part of the new generated jobs [Birch, (1987)] and therefore contribute to the reduction of unemployment and poverty; SMEs are considered as main actors for industrial growth [Acs and Audretsch, (1987)]; SMEs add dynamism and flexibility to business activity and improve economic performance; SMEs are considered a source of considerable innovative activity and contribute to the development of entrepreneurship [Johnson and Cathcart, (1979)] and export competitiveness.

Despite specific global efforts to strengthen the SME sector, these businesses face a number of financial and regulatory barriers, particularly in developing and emerging countries [Newberry, (2006)]. In the same time, the SMEs are the emerging private sector in developing countries and thus form the base for private sector–led growth [Hallberg, (2000)]

Romania has made considerable progress in setting up an extensive policy framework to support the SME sector, after 1990 [Giurca, (2007)]. There were developed a range of institutions, policy instruments, territorial tools, programs and resources in order to assist the small and medium enterprise development in Romania accordingly with the regulations on the European Union.

In 2000, the European Union launched the Lisbon Process designed to improve the competitiveness of European SMEs in an increasingly knowledge–based global economy. In 2002, Romania, together with other candidate countries, signed the Maribor Declaration and engaged to harmonize its policies for supporting the competitiveness of local companies to the provisions of the Lisbon Strategy. As an expression of Romania's international engagement, the National Development Plan 2007–2013 [NDP, (2005)] highlights the importance of restructuring and developing existing SMEs and the creation of new enterprises and in this context, defines the priority measures as improving the business environment, supporting access to financial resources and providing support services to SMEs and entrepreneurs. In the same time, the Ministry for SMEs, Trade, Tourism and Liberal Professions (the former National Agency of SMEs and Cooperatives) is also responsible for ensuring Romania's compliance with its obligations under the European Charter for Small Enterprises.

2. Recent development trends for the Romanian SME sector

The SMEs predominate in the Romanian economy having a substantial contribution to the GDP (70% in 2005) and playing a main role in job creation. Thus, in 2005 in the SMEs sector were employed 60.7% of active population and the weight of turnover achieved by these firms were of 57.6% from the total firms [NIS, (2006)].

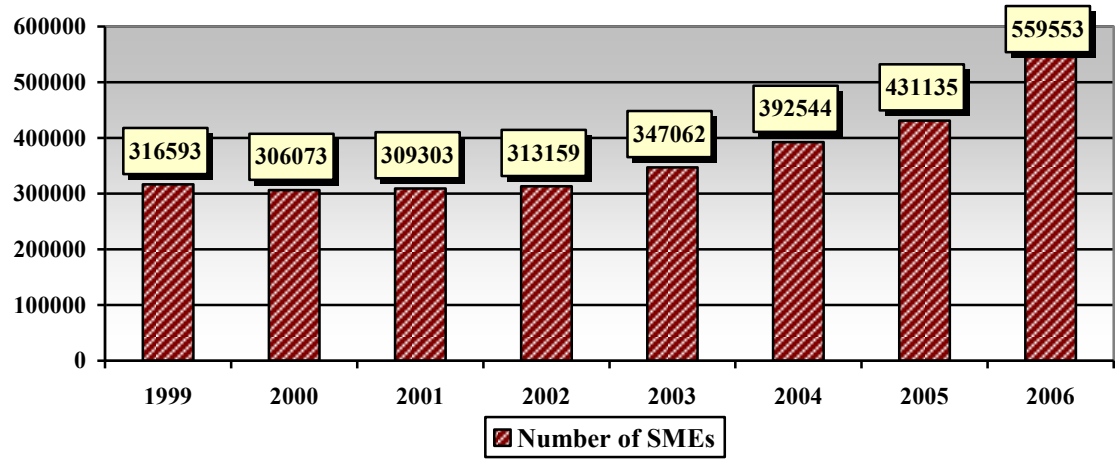
Table 1. Evolution of SME's turnover and employees (%)

Indicators	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Weight of staff in active SMEs	23.9	29.1	32.9	37.8	42.5	46.9	48.5	50.7	54.4	58.2	60.7
Weight of turnover achieved by active SMEs	46.7	48.3	45.2	52.8	54.0	55.9	57.2	55.9	54.7	57.5	57.6

Source: National Institute of Statistics, Statistical Yearbook, 2006

In conformity with the Romanian legislation, the small and medium enterprises (SMEs) are structured in three categories: micro–enterprises (less than 9 employees and a net turnover/total assets less than 2 million Euro); small firms (between 10 and 49 employees and a net turnover/total assets less than 10 million Euro); medium firms (between 50 and 249 employees and a net turnover less than 50 million Euro/total assets less than 43 million Euro). The firms with more than 250 employees and a net turnover more than 50 million Euro are considered corporations.

The number of SMEs registered a positive evolution: in 2005 there were active about 431,000 SMEs, which means an increase of 36% in comparison with 1999 *(figure 1)*.



Source: National Institute of Statistics, Statistical Yearbook, 2006

Figure 1. Number of active private SMEs by size (1999– 2005)

In 2006, there were 559,553 SMEs, from the total of 561,356 private firms (99.6%) and in 2007, there was registered and increase with 5% of the number of Romanian SMEs. Despite these positive evolutions, the average of 26 SMEs/1000 habitants in Romania is much lower than EU average of 52 SMEs/1000 habitants [Giurca and Popa, (2007)].

In structure, the micro–enterprises dominate the SME sector (90%) while the small firms represents 9% and the medium firms represents 1%, in 2006. But there are some differences in function of the activity sector, for instance in industry and constructions sectors, the microenterprises represents 74.9% (figure 2) in comparison with trade and other services, where they represent 92.2% *(figure 3)*. Also, the weight of medium firms in industry and constructions represents 17.2% while in the sector or trade ad other services it represents 6.7% in 2005 [NIS, (2006)].

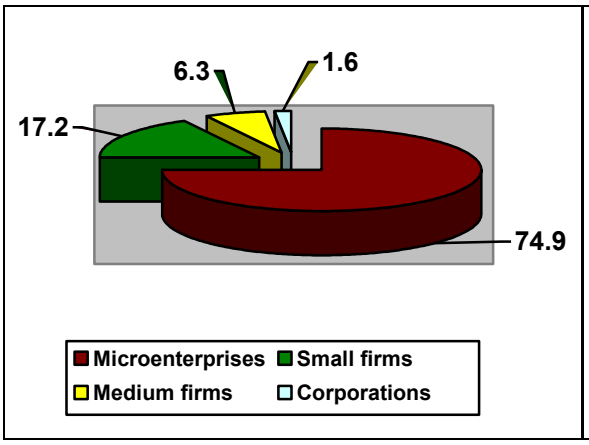


Figure 2. Structure of SMEs from industry and constructions by size

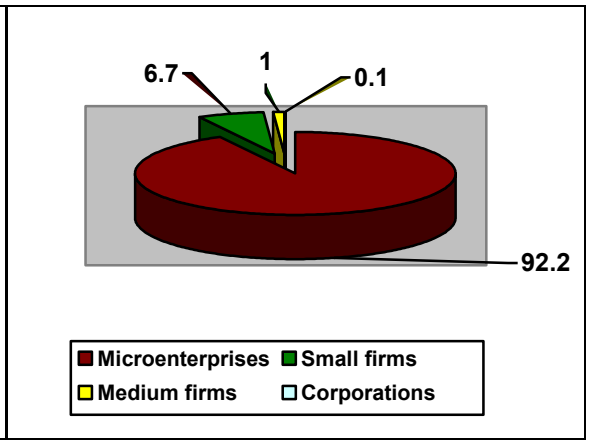


Figure 3. Structure of SMEs from trade and other services by size

The great share of micro–enterprises should not be interpreted as a feature of underdevelopment for the SME sector or the private sector. On the contrary, this is an aspect which justifies and consolidates flexibility and adjusting capacity to the continuous changes in the market.

By activity sector, it was registered a positive evolution, an increase in the number of SMEs in all the main activity sectors in 2005 as compared the previous years *(table 2)*.

Table 2. Number of active private SMEs by activity sector

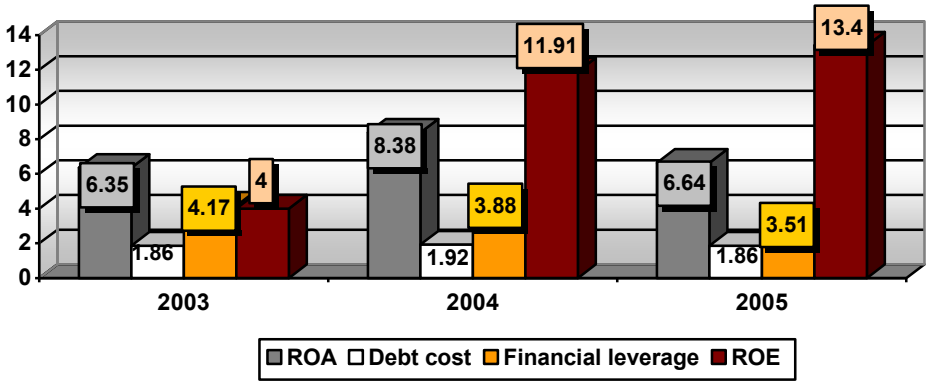
Activity sector	1999	2000	2001	2002	2003	2004	2005
Mining	202	233	281	342	470	584	642
Manufacturing	39605	40265	41525	45270	49595	54080	56765
Electric energy, gas and water	223	238	253	278	341	364	379
Construction	11092	11807	14096	16382	20441	25199	30204
Wholesale and retail	217316	202724	192480	177562	179148	191077	200246
Hotels and restaurants	10101	9906	10441	13513	15437	17213	19204
Transport	12281	12629	15474	17856	21127	25015	28810
Real estate transactions, rentings	15113	17905	23840	30436	45625	61089	74200
Education	614	542	622	762	926	1075	1365
Health and social assistance	3900	3558	4060	4423	5502	6832	7839
Others activities	6146	6266	6231	6335	8452	10016	11481
Total	**316593**	**306073**	**309303**	**313159**	**347064**	**392544**	**431135**

Source: National Institute of Statistics, Yearly Report 2006

An increased dynamics was registered by the SMEs belonging to the construction sector and the services sector. In relative terms, the most substantial share is the one of the SMEs belonging to the services sector (sector which incorporates wholesale, tail trade and other services) follows by industry, transport and constructions sector.

The fact that more and more SMEs are involved in the industrial sector shows that this sector is undergoing a development process. On the other side, because SMEs from the industrial sectors are bigger in size than others, this could be correlated and linked to the increased degree of complexity for production and organization processes. By comparison to the SMEs in the industrial sector, those in the services sector are more flexible; most of them are micro–enterprises involved in trade operations, being market intermediaries and having an additional degree of volatility.

The general economic development trend is reflected by the performance indicators of the SMEs: turnover, Return on Assets (ROA), Return on Equity (ROE), cost of debt (interest cost/total debts) and financial leverage (total debts/equity). *(figure 4)*.



Source: National Bank of Romania, Financial Stability Report (2007)

Figure 3. Evolutions of the profitability indicators for companies (by size)

The return of assets (ROA) for the SMEs increased in 2004, but in 2005 the increasing trend was maintained just for the small enterprises. A possible explanation for the decrease of ROA is the increase of investment in fixed and current assets. But these investments could improve the assets turnover and the profitability on long term.

The increase of the ROE in 2005 in comparison with 2004 can be explained by an increase of the return on assets and of the financial leverage.

In the last years, Return on equity (ROE) remained somewhat constant at aggregate level (14.6 % in June 2007), yet posted mixed developments in terms of structure: companies producing non–tradables registered a slightly declining ROE, companies with bank loans further posted lower profitability than those without loans; companies in the trade and services sector witnessed a shrinking ROE, albeit still considerably higher than the average economy [NBR, (2007)].

The turnover registered a slightly increase in 2005 in comparison with the previous years, due mostly the positive evolutions registered in industry, energy and services sector.The services represent the most important sector from the point of view of the turnover achieved, and had the most accentuated and relevant growth in the period 2000–2005 (19.4%) while the other sectors situate themselves close to the average result [NIS, (2006)]

Concerning the size categories, medium sized enterprises have an annual growth about average in 2001, a recovery in 2003 and the most significant and spectacular growth in 2004. Microentreprises and small enterprises confronted with a relative stagnation in 2002, but recovered and had an upward evolution of turnover in 2003 and especially in 2004 *(table 3)*.

Table 3: Evolution of SMEs' turnover by size category (lei – national currency)

Years	Type of SME			Total SME
	Micro	Small	Medium	
2000	535,027	1,02366	145,371	782,764
2001	732,776	161,033	237,942	1,131,751
2002	974,750	224,126	303,307	1,502,183
2003	1,282,157	308,793	390,020	1,980,970
2004	1,615,190	448,430	509,180	2,572,800
2005	1,867,540	508,150	573,350	2,949,040

Source: Ministry of Public Finances and National Institute of Statistics, Statistical Yearbook 2006

3. SMEs' development in Romania – SWOT analysis

The progresses achieved by Romania within the integration process is a proof of a future–oriented and dynamic assessment on the country's economic performance, thus demonstrating its capacity to meet the economic requirements, established by the European Council in Copenhagen. Despite these favorable evolutions of the Romanian economy and the restructuring process, it should be taken into consideration there are still difficulties the economy have to face, such as:

- the dependence of the economy on the traditional sectors;
- exports are not oriented to high value–added products and services;
- the innovative potential and the invention licenses are not encouraged enough;
- high technologies are taken in but to a low level;
- industrial productivity is lower than the European one.

Despite the general positive trend registered in the last years, the SMEs sector in Romania is still poorly developed and represented as compared with the developed EU countries. But there are some strong points which could represent important arguments for the next future development of this sector. Thus, the SWOT analysis of the SMEs sector reveals the main *strengths* of this sector, as follows:

- continuous development of the SMEs economic potential;
- high professional skills of the labor;
- existence of a network of research and development centers specialized on SMEs sector;
- the higher competitiveness of the SMEs involved in the ITC field;
- a medium educational level on entrepreneurship in the high school, university education;
- the high level of the women participation to the labor market.

The national strategy for sustaining SMEs took in consideration the following *weaknesses* in the development of Romanian SMEs sector:

- the absence of a well–developed entrepreneurial culture and weak management skills;
- the existence of administrative–bureaucratic barriers and additional costs for start–up firms;
- the burdensome regulatory and tax environment;
- the difficulties in accessing the financial resources for start–up firms and micro–enterprises. Banks in general ask for collaterals which are often difficult to meet by undercapitalized SMEs which do not possess enough assets to guarantee the bank loans;
- the underdevelopment of financial instruments supporting the SME sector: e.g. "mutual guarantee–schemes", venture capital and opening credit lines for SMEs with preferential interest;
- the low productivity and efficiency;
- the consulting, training and information sources are inadequate;
- improper development of support services (industrial parks and business incubators);
- lack of support for innovation activities;
- the lack of on–line services for SMEs in order to access business information and facilitate interaction with the public administration;
- insufficient knowledge and information for SMEs in order to access the external markets.

The opportunities for the development of the Romanian SMEs are the followings:

- continuing the process for simplification of regulation frame;
- IT development which is imposed by the competition at international level and necessity of elaboration of vertical strategies for SMEs with activity in IT field;
- increasing the competitiveness of services from tourism field which represents a potential for economic increase that can counteract the strong concurrence from regional competitors.

The main *threats* for the Romanian SME sector are the followings:

- the repeated legislative changes;
- international concurrence on intern market for produce and services(China, Southeast Asia);
- financing SME sector through banking credits with no attractive interest rates;
- high exposure of the SMEs sector to corruption and bureaucracy;
- adopting regulations Basel II by the credit institutions;
- the inefficient investments in professional training of employers or qualified personal;
- the mismatch between labour skills and market requirements;
- insufficient adequate Know–how for export.

Therefore the government's policy is targeted on the development of an environment that could stimulate the SMEs development, increase the enterprises competitiveness, format a new enterprising attitude in order to face the pressures of the market competition.

The necessary actions require a combination of improvements in the regulatory and administrative environments and the provision of an adequate mix of incentives complying with the European standards. The SME sector should be greatly expanded in both size and scope, as well as better integrated into the international economy and technologically enhanced.

4. The development strategy for Romanian SMEs

The Romanian Government recognises the importance of strengthening the capacity of SMEs to compete in the global market. In the first phase of Government support to the SME Sector, there were introduced measures to improve the technical/productive capacities of Romanian SMEs, to enhance product quality, to facilitate access to export markets and to increase management performance.

As an expression of Romania's international engagement, the Romanian Government has committed itself to finalize industrial restructuring, to encourage the start–up of new enterprises, to foster entrepreneurship business environment. These objectives have been incorporated into the National Development Plan 2007–2013 (NDP) which highlights the importance of restructuring and developing existing SMEs and the creation of new enterprises and in this context, defines the priority measures as improving the business environment, supporting access to financial resources and providing support services to SMEs and entrepreneurs. The medium term goals are to create 760,000 new jobs, raise the GDP contribution of the SME Sector to levels comparable to other Candidate States and to increase exports by 10% per annum.

In the same time, the Ministry for SMEs, Trade, Tourism and Liberal Professions (former National Agency for Small and Medium Sized Enterprises and Co–operatives) is also responsible for ensuring Romania's compliance with its obligations under the European Charter for Small Enterprises and for ensuring that the provisions of Governmental Strategy for Sustaining the Development of Small and Medium Sized Enterprises 2004–2008 are closely in harmony with the priorities, measures and implementation arrangements for Industrial and Regional Policy.

The directions and the measures defining the National Strategy for the support and promotion of SMEs for 2004–2008 show the internal needs of small companies but they are accordingly with European issues, as follows:

- creating a business environment supportive of SME development;
- developing SME competitiveness;
- improving the SME access to financing;
- improving the SME access to foreign markets;
- promoting an entrepreneurial culture and strengthening management performance.

These measures were designed to create a supportive legislative, regulatory and fiscal environment, to provide financial support to SME development and sustainability.

The principles that will be followed for developing the SMEs sector are the followings [NASMESC, (2005)]:

- ensuring a coherence of strategies developed at governmental level with an impact to SMEs sector;
- granting a financial support by state compatible with European Commission recommendations;
- measures of supporting SMEs should not distort the market mechanisms;
- ensuring the transparency of actions focused on developing SMEs sector;
- middle term development strategy for SMEs will be regularly updated according to designed and implemented measures;
- a special attention will be granted to the development of SMEs in regions in which social and industrial infrastructure is weak, and unemployment rate high.

The directions and the measures defining the National Strategy for the support of SMEs for 2004–2008 show the internal needs of small companies accordingly with European issues, as follows:

a. Creating a business environment supportive of SME development and growth. The measures which should be taken are:

- the improvement of the regulatory framework and elimination of administrative–technical barriers;
- the development of the institutional capacity of Ministry for SMEs, Trade, Tourism and Liberal Professions;
- the improving of the public – private dialogue with SME representative organizations.

b. Development of SME competitiveness and strengthening the capacity of SMEs to compete in the global market impose important measures as followings:

- Supporting innovation and improving the access of SMEs to new technologies;
- Supporting the introduction of quality standards and quality management systems;

- Promoting e–business;
- Facilitating access to the assets of state owned enterprises and to public procurement;
- Improving access to business support and information service;
- Supporting business incubators in the productive sector and in the higher added value elements of the services sector;
- Supporting the development of industrial parks;
- Decreasing regional disparities through targeted support to SMEs.

c. Improving SME access to finance through measures, such as:

- Improving productive SME capitalization through promoting innovative instruments to facilitate SME access to finance, both on the side of the financial institutions and of the enterprises;
- Sustaining a national network of SME Guarantee Funds development;
- Financing SME start–ups in priority sectors mainly through the Guarantee Fund network;
- Pilot innovative instruments for financing SMEs such as venture capital; seed money for start–ups, innovation funds and business angels' networks.

d. Improving the access of SME to external markets through the following interventions: stimulating the development of cross–border co–operation and regional business partnership; improving the access of SME to external markets.

e. Promoting an entrepreneurial culture and strengthening management performance. The measure and actions under this priority are: developing an entrepreneurial culture; training and consultancy services for managers and entrepreneurs.

As part of the European Union market, the Romanian SMEs will be the beneficiary of the "Small Business Act" (SBA) for Europe, adopted by the European Commission in June 2008 in order to further strengthen SMEs' sustainable growth and competitiveness. Accordingly with the "Think Small First" principle, the Small Business Act creates a new policy framework which integrates the existing enterprise policy instruments, based on the European Charter for Small Enterprises and on a genuine political partnership between the EU and Member States accordingly the principles of subsidiarity and proportionality [(EC, 2008)].

The Small Business Act recognises the central role of SMEs in the EU economy and put in place for the first time a comprehensive policy framework for the EU and its Member States through a set of ten principles to guide the conception and implementation of policies both at EU and Member State level. These principles are essential to bring added value at EU level, to create a level playing field for SMEs, to facilitate SMEs' access to finance and develop a legal and business environment, to improve the legal and administrative environment throughout the EU, to support SMEs to benefit from the growth of markets and from the opportunities offered by the Single Market.

5. Conclusions

It is well known that the small and medium enterprises represents the backbone of the economy adapting better to market demands, adapting easier to alternative strategies, due to their flexibility in size and orientation and playing a major social role through creating new jobs. But this sector can perform properly only if it is in close connection with the big "nervous centers" of the national economy such as the corporations, the banking system or the big utilities suppliers [Giurca and Popa, (2007)].

Small and medium sized enterprises are not a lonely island but a vivid ensemble which function in direct connection with what is happening at national, European and international economy level. Small and medium sized enterprises are the first developing entities when the economy is on the right path but also the first ones to pay the price of economic recession. That is why the governmental policy toward this sector has to be an integrant part of a general policy: fiscal, commercial and industrial.

The European integration process brings new challenges to the SMEs sector which have to participate on the EU market and have unrestricted access to over 500 million potential consumers. EU enlargement represents an opportunity for the further development of SMEs if they are supported to penetrate the new EU markets. The enlargement could contribute to lower transaction costs, in particular if it results in greater transparency, simplified procedures, harmonization and convergence of competitive conditions related to trade negotiations. SMEs will be the first to gain from an environment where transaction costs are lower. Their already important contribution to the

employment and the GDP throughout the European area could grow further if they have more access, more training and are given more exposure to the Internet and electronic commerce.

On the other hand, the Romanian SMEs have to face an increasing competition on the domestic and international markets. It is obviously that, for the moment, the majority of Romanian enterprises are not enough prepared to answer the opportunities and challenges generated by the European integration. The lack of the competitiveness necessary to Romanian enterprises is generated mostly by the inadaptation to the European standars; their incapacity to atract financing sources for investement in new technologies, new products; their incapacity to implement the quality systems, the certifications in environmental management.

Unless there are significant improvements in technical capacities, productivity levels and product quality, there is a serious risk that Romanian SMEs will not be able to protect their positions within their domestic market or take full advantage of the unrestricted access to the Single Market. In order to turn to good account the development potential of the Romanian SMEs and use the opportunities offered by European funds in this direction, stronger support should be offered to this sector within the overall economic policy, concentrating on three aggregate objectives: the removal of any administrative, financial, legal, etc. barriers that still hinder SME start–up and development; the provision of assistance and information to SMEs; encouraging cooperation and partnership between firms [Mitrut and Constantin, (2006)]

In the medium term, Romania will also have to compete more effectively in the global economy. There is therefore a need to grow SMEs capable of competing in the high–value added sectors. To achieve this goal, Romania must invest in research and development, ensure that new technologies are quickly adapted to the production processes and enable Romanian SMEs to participate efficiently in e–commerce systems.

SMEs competitiveness and adopting of Single Market regulations are two ‘’sine qua non’’ conditions, necessary to be fulfilled by Romanian SMEs in order to benefit in the future of knowledge–based sectors. Only in that way, the Romanian SMEs can promote new ventures by making the best of their knowledge of various places abroad and mainly in Europe, and thus, to build “bridge enterprises” – bringing together institutional, business and cultural environments.

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COMPREHENSIVE MACRO – MODEL FOR THE US ECONOMY

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Abstract

We present a comprehensive macroeconomic model for the US There exist strict long–term relations between real GDP, price inflation, labor force participation, productivity, and unemployment. The evolution of real GDP depends only on exogenous demographic forces. Other macro–variables follow up the real GDP. The links between the variables have been valid during the last several decades.

All relations were (successfully) tested for cointegration. Statistical estimates are also presented. The relationships allow a reliable prediction of the macroeconomic state at very large (more than 9 years) time horizons.

Keywords: US economy, GDP, inflation, unemployment, labor force, productivity, demography

JEL Classification: E1, J1, J2, D3

1. Introduction

This paper introduces our macroeconomic concepts. It also summarizes general empirical findings related to the evolution of principal macroeconomic variables in the US Thorough analysis and modeling of real GDP per capita, inflation, labor force participation rate, productivity and unemployment has revealed a number of (linear and nonlinear) relationships, often with time lags. The sequence of interaction between the aforementioned macroeconomic variables in the US is as follows: the evolution of the number of 9–year–olds completely defines the fluctuations in the growth rate of real GDP per capita relative to its potential rate. The latter term is represented by a reciprocal function of the attained level of real GDP per capita itself. Real economic growth drives labor force participation rate with a two–year lag. Apparently, working age population is an exogenous variable and can be obtained by independent measurements. Therefore, the level of labor force is completely defined in the model. The change in the level of labor force represents the driving force of price inflation (as represented by GDP deflator or CPI) and unemployment rate with two– and five–year lags, respectively. Labor productivity is unambiguously derived from real GDP and the number of employed, i.e. the difference between the labor force and the unemployment rate times the labor force.

Hence, one can extrapolate the change in an estimated birth rate in a given year and predict unemployment rate at a 16–year horizon; inflation at a 13–year horizon; labor force participation at an 11–year horizon, and real GDP per capita at a 9–year horizon. Big changes in demographic structure, i.e. highly varying levels of migration and an elevated death rate, can introduce substantial bias in the predictions. Such processes have been not observed in the US since the late 1950s, however.

The relationships compiling our macro–model of the US economy have passed rigorous statistical testing, including tests for cointegration, in order to avoid spurious regressions. These tests demonstrated the presence of cointegrating relations, high level of statistical significance and goodness–of–fit. Moreover, similar cointegrating relations were obtained for the biggest developed countries. The predictive power is illustrated by a comparison of measured and predicted variables.

In this paper, we also validate previously obtained relationships using new data. The data were obtained from various sources: population estimates from the US Census Bureau [Census Bureau, (2008)]; estimates of real GDP and GDP deflator – from the Bureau of Economic Analysis [Bureau of Economic Analysis, (2008)]; labor force level and participation rate, unemployment, and productivity – from the Bureau of Labor Statistics [Bureau of Labor Statistics, (2008)]. In some cases, we used data presented by the Conference Board [Conference Board, (2008)].

2. Real GDP

Real GDP is not a directly measured economic variable. It is a results of the correction of nominal (current dollar) GDP for GDP price deflator. This procedure leads to a somewhat elevated

level of measurement errors, which can be seen in consequent revisions conduced by the Bureau of Economic Analysis. A conservative estimate of the accuracy of real GDP measurement is slightly below one percentage point. Such relatively low accuracy creates additional problems for modeling of corresponding growth rate – annual changes in real GDP are compatible to this accuracy.

The change rate of real GDP is defined by the evolution of two components: working age population, N, and real GDP per capita, G:

$$dGDP/GDP = d(GN)/GN = dN/N + dG/G, \quad (1)$$

where G is based on the working age population. The former term represents the extensive source of real economic growth: the working age population has been growing since the late 1950s at a rate of ~1 per cent per year in the US.

Our (empirically derived) model [Kitov, (2006a)] stipulates that the growth rate of real GDP per capita is defined by the following equation:

$$dG/G = A/G + 0.5dN_9/N_9, \quad (2)$$

where A=$398 (2002 US dollars) is empirical constant, and N_9 is the number of 9–year–olds. The first term in (2) represents economic trend (potential), i.e. the growth rate that would be observed in the case of constant N_9. The second term introduces the fluctuations of the growth rate around its potential level. Asymptotically, the economic trend approaches the zero line. In 1975, the trend was ~2.4% per year, and it fell to 1.3% per year in 2005.

Equations (1) and (2) provide a complete description of the evolution of real GDP, when N(t) and $N_9(t)$ are known. These demographic variables are exogenous ones and driven by many factors, likely including the history of real economic growth. In practice, both variables are enumerated during decennial population censuses and estimated between the censuses.

Reciprocally, one can use real GDP to recover the evolution of the number of 9–year–olds from the start of accurate population and GDP measurements. Such recovery method might potentially be of a higher accuracy than routine censuses. Reversing and integrating (2), one can obtain the following equation for $N_9(t)$:

$$dN_9(t) = N_9(t) - N_9(t-1)$$
$$N_9(t) = N_9(t-1)[2*(dG/G - A/G) + 1] \quad (3)$$

where $N_9(t-1)$ is the specific age population at time t–1; and by default, $\Delta t=1$. Equation (3) can be interpreted in the following way – the deviation between the observed growth rate of real GDP per capita and that defined by the long–term trend is completely determined by the change rate of the number of 9–year–olds. A reversed statement is hardly to be correct – the number of people of some specific age can not be completely (or even in any significant part) defined by contemporary real economic growth. The causality principle prohibits any influence at the birth rate nine years ago.

In fact, Eq. (3) provides a prediction for the number of 9–year–olds using only independent measurements of real GDP per capita. Therefore, amplitude and statistical properties of the deviation between measured and predicted number of 9–year–olds can be used for the validation of Eq. (2). Figure 1 displays the measured and observed N_9 in the US between 1960 and 2003. Both Engle–Granger and Johansen tests for cointegration [Kitov, Kitov, Dolinskaya, (2007a)] confirmed the presence of a long–term equilibrium relation between the measured and predicted (i.e. derived from GDP) populations in Figure 1. The goodness–of–fit is (R^2=) 0.8 and the residual deviation between the curves in Figure 1 can be likely explained by errors in measurements. Effectively, the predicted curve lies practically inside the uncertainty bounds of the measured one, which are about ±300,000, i.e. the predicted curve might be the measured one with a high probability.

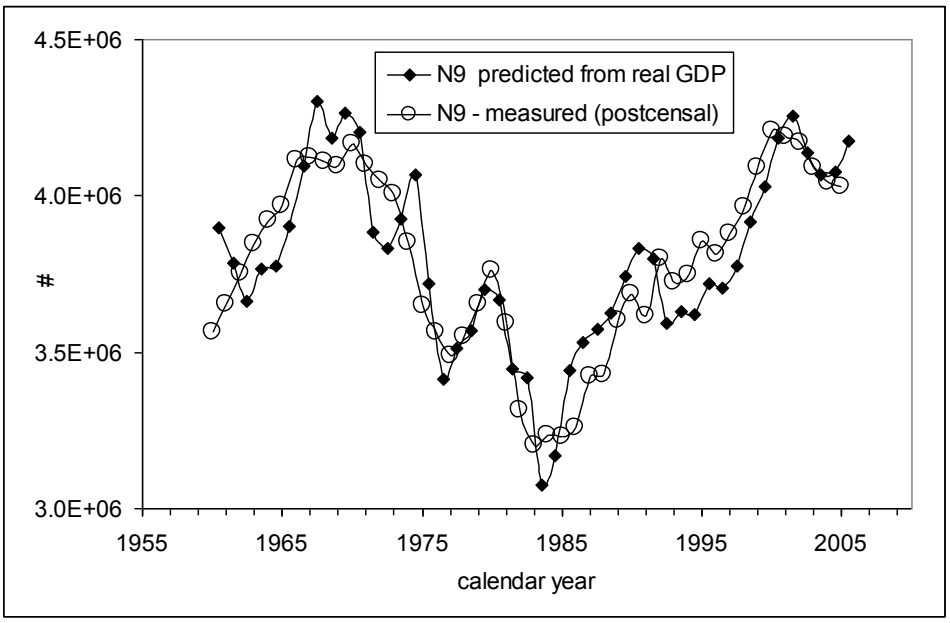
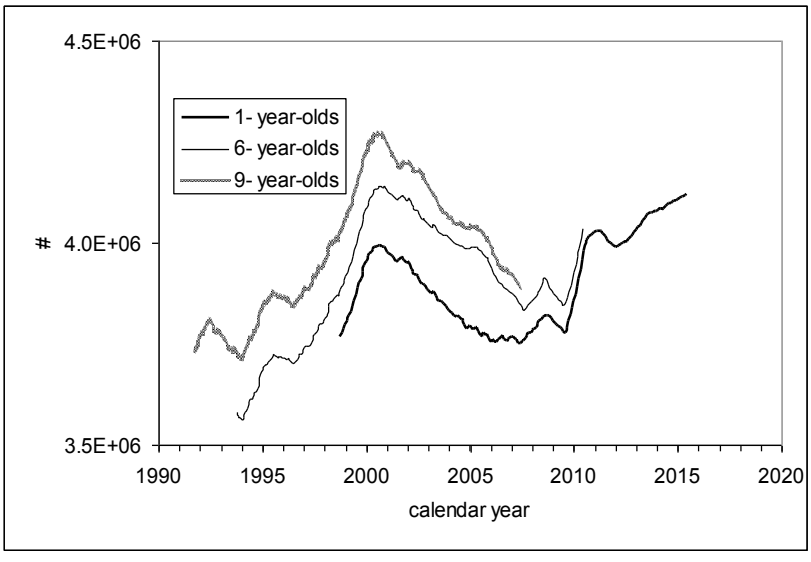


Figure 1. Measured and predicted number of 9–year–olds in the US The predicted number is obtained from the estimates of real GDP per capita according to (3). Here, real GDP per capita was estimated for persons of 16 years of age and over, i.e. for working age population. According to linear regression of the time series between 1962 and 2005, the goodness–of–fit is (R^2=) 0.81.

Hence, there is a one–to–one link between the number of 9–year–olds and real GDP per capita. This fact implies that real economic growth, as expressed in monetary units, is driven only by the evolution of age structure. (Same statement is valid for other developed countries.) An increasing number of 9–year–olds guarantees an elevated growth rate above that defined by constant annual increment of real GDP per capita.

The fluctuations of actual annual increment of real GDP per capita around a constant level represent a random process. This stochastic component is driven only by one force and can be actually predicted to the extent one can predict the number of 9–year–olds at various time horizons. The population estimates for younger ages in previous years provide an excellent source for such prediction. For example, the number of 6–year–olds today is a very good approximation of the number of 9–year–olds in three years, as Figure 2 demonstrates. The growth rate of a single year population can be predicted even with a higher accuracy because the levels of adjacent cohorts change practically in sync.



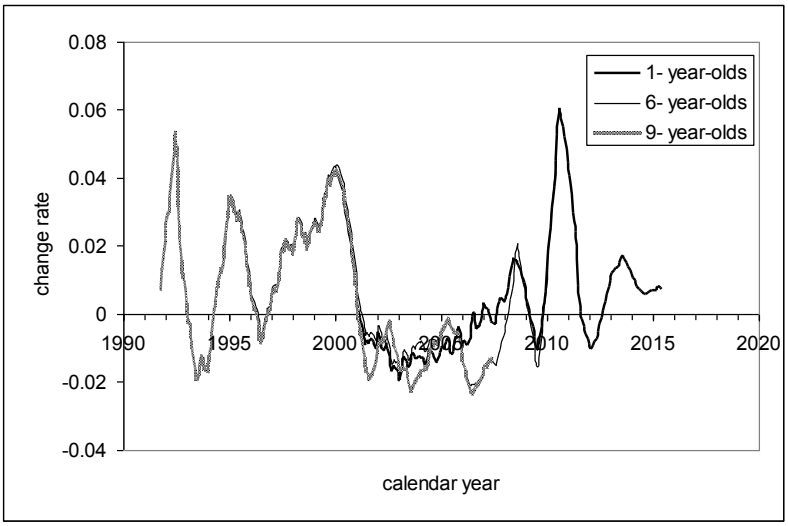


Figure 2. Prediction of the number of 9–year–olds by extrapolation of population estimates for younger ages (1– and 6–year–olds).

Upper panel: Population estimates of the number of 9–, 6, and 1–year–olds. The time series for younger ages are shifted ahead by 3 and 8 years, respectively.

Lower panel: The change rate of the population estimates, which is proportional to the growth rate of real GDP per capita. Notice the difference in the change rate provided by the 1–year–olds and 6–year–olds for the period between 2003 and 2010. This discrepancy is related to the age–dependent difference in population revisions.

Since 2002, the input of the population related component of the growth rate has been negative. It turns to a positive one near 2010. This also results in an elevated growth rate of real GDP per capita during the period between 2010 and 2017.

Our empirical analysis [Kitov, (2006a)] also showed that the growth rate of real GDP in the US can be split into another two components. First component is defined by the reciprocal value of the duration of the period of mean income growth with work experience, T_{cr}, [Kitov, (2005)]. In 2005, T_{cr} in the US was ~40 years, i.e. 55 years of age. The T_{cr} grows over time as the square root of real GDP per capita. Second component is again $0.5dN_9(t)/N_9(t)$. This finding, however, can be an artificial result of the functional dependence of T_{cr} on real GDP per capita and practically constant growth in working age population.

3. Labor force participation rate

The growth in real GDP drives the change in labor force supply through redistribution of personal incomes. Fluctuations in the number of 9–year–olds produce fluctuations in real GDP per capita relative to that defined by the potential economic growth and, thus, create variations in personal income relative to that associated with this "neutral" growth rate. The simplest assumption on the redistribution of an “excessive” (positive) amount of personal income consists in some increase in the fraction of population in labor force. At first glance, more people would be able to obtain paid jobs with extra money produced in a given economy.

Surprisingly, this assumption is wrong for the US. Correct intuition behind the mechanism of the reaction of labor force participation (LFP) to the redistribution is opposite – less people are forced to seek income through paid job because of the presence of some other channels (likely not included in the Current Population Survey’s questionnaire) of personal income distribution (PID). A smaller part of working age population obtains larger personal income and somehow transfers it to the residual fraction of the population (not in labor force) to recover original PID [Kitov, (2007a)]. When the growth rate of real GDP per capita is below its potential value, the overall personal income grows at a rate below the neutral one and the lack of personal income earned by people in the labor force has to be compensated by some increase in the LFP. Figure 1 demonstrates that the N_9 was on a downward trend in the late 1960s and the 1970s. These years are characterized by the growth rate of real GDP per capita below its potential and, thus, by an increase in the measured LFP.

Quantitatively, the influence of the growth in real GDP on the LFP has to be affected by exponential distribution of personal inputs to real GDP – the number of people with given income (GDP portion) rolls–off exponentially as a function of income. If the effect of real growth is based on the excess of the total personal income above its potential level, then higher levels of the LFP are more sensitive to this real growth. It is reasonable to assume that the sensitivity of the LFP to the difference between actual and potential growth rates, g(t)=dG/G–A/G, increases exponentially with a growing LFP. Also, there might be a time delay between action and reaction and the LFP may lag behind the g(t) [Kitov, Kitov, (2008a)]:

$$\{B_1 dLFP(t)/LFP(t) + C_1\}\exp\{\alpha_{\square}[LFP(t) - LFP(t_0)]/LFP(t_0) = \\ = \int\{dG(t-T))/G(t-T) - A/G(t-T)\}dt, \quad (4)$$

where: B_1 and C_1 are empirical constants, $\alpha_{\square}$ is an empirical exponent, t_0 is the start year (of modeling), T is the time lag, and $dt=t_2-t_1$, t_1 and t_2 are the start and the end time of integration of the g(t) (one year in our model). The exponential term defines the change in the sensitivity due to the deviation of the LFP from its initial value $LFP(t_0)$. Effectively, the LFP(t) is a nonlinear function of real economic growth.

A simple transformation of (4) using (3) provides another useful form of Eq. (4), which relies on $N_9(t)$ instead of the integral of g(t):

$$\{B_2 dLFP(t)/LFP(t) + C_2\}\ \exp\{\alpha_2[LFP(t) - LFP(t_0)]/LFP(t_0)\} = N_9(t-T) \quad (5)$$

where: B_2 and C_2 are empirical constant different from B_1, C_1 □ □and $\alpha_1=\alpha_2$.

Figure 3 depicts some results of the $N_9(t)$ prediction using original LFP time series from the BLS. Corresponding constants are as follows: t_0=1963; T=2 years, α_2=–1.85, B_2=–1.5E+8, C_2=4.94E+6. The predicted time series leads the observed one by two years, i.e. an accurate forecast at a two–year horizon is a natural feature of the model. Coefficient B_2 is negative and results in a declining rate of the LFP growth during the years of real growth above the potential one, for example, between 1983 and 2000. Exponential term in (5) provides a factor of 0.77 in 2000 (the largest LFP of 67.1%) relative to 1963, when the LFP was only 58.7%. This means that 1% change in the N_9 at the LFP level of 67.1% produces a larger change in the dLFP/LFP by factor of 1/0.77=1.3 than 1% change at the level of 58.7%. Also displayed is the case without exponential weighting, α_2=0. This case demonstrates that the specific age population (N_9) is overestimated by the model.

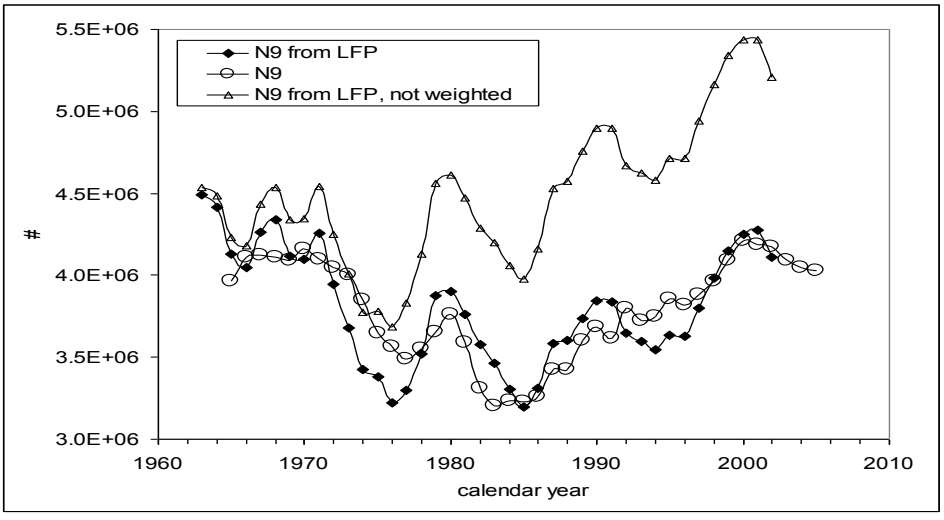


Figure 3. The number of 9–year–olds: the observed one and that obtained from the LFP with and without exponential weighting in (5). Constants t_0=1963; B_2=–1.5E+8, C_2=4.94E+6, α_2=–1.85. The case with α_2=0 in also shown: N_9 is highly overestimated.

Considering the uncertainty in the underlying time series – N_9 and LFP, the observed and predicted time series are in a good overall agreement: timing of main turns in both series is excellent and amplitudes of the largest changes are also practically coincide.

Historically, we first tried to model dLFP/LFP as a nonlinear function of G and tested a simple equation similar to (3):

$$dLFP(t)/LFP(t) = D_1[dG(t–T)/G(t–T) – A_2/G(t–T)] + D_2 \quad (6)$$

where D_1 and D_2 are empirical constants, and A_2 is also an empirical constant different from A in (2). This model served as a workhorse for those countries, which do not provide accurate estimates of the specific age population. According to (4) one can rewrite (6) in the following (discrete) form:

$$Ns(t_2) = Ns(t_1)\{ 2[dG(t_2–T)/G(t_2–T) – A_2/G(t_2–T)] + 1\} \quad (7)$$
$$dLFP(t_2)/LFP(t_2) = Ns(t_2–T)/B + C \quad (8)$$

where Ns(t) is the (formally defined) specific age population, as obtained using A_2 instead of A; B and C are empirical constants. Equation (7) defines the evolution of some specific age population, which is different from actual one. The discrete form is useful for calculations.

Figure 4 depicts the observed and predicted relative change rate of the LFP. The latter is obtained from (7) and (8) with the following constants and coefficients: Ns(1959)=4.5E+6, A_3=\$350, B_3=–1.23E+8, C_3=0.04225. Notice that coefficient A_2 is smaller than A=\$398 in (2). Due to high volatility of the original dLFP/LFP time series we compare the predicted series to MA(5) of the observed one. The goodness–of–fit is high: R^2=0.73.

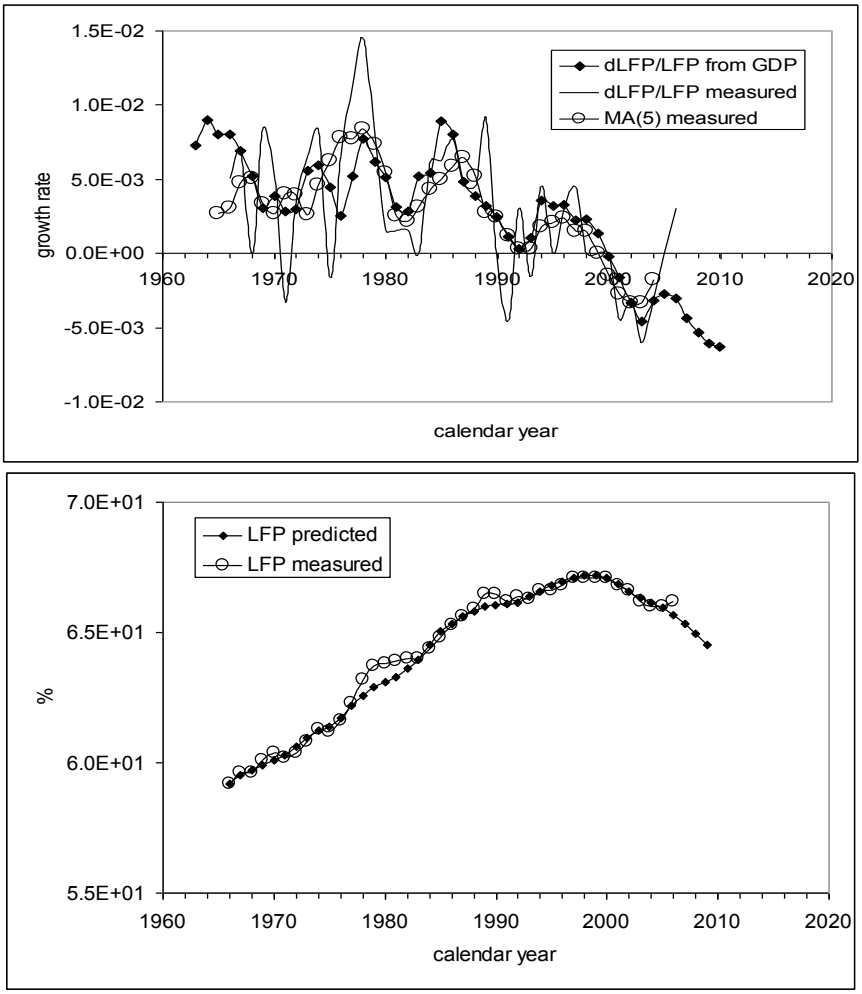


Figure 4. Upper panel: observed and predicted growth rate of LFP in the U.S. The predicted curve is obtained from real GDP per capita using (5) and (6) with Ns(1959)=4.5E+6, A_2=\$350 (2002–dollars), B=–1.23E+8, C=0.04225. Linear regression gives R^2=0.73.

Lower panel: measured and predicted LFP for the growth rates in the upper panel. The LFP has been decreasing after 2000.

Labor force participation rate determines the level of labor force, LF, in an economy with a given population:

$$LF(t) = LFP(t)N(t) \tag{9}$$

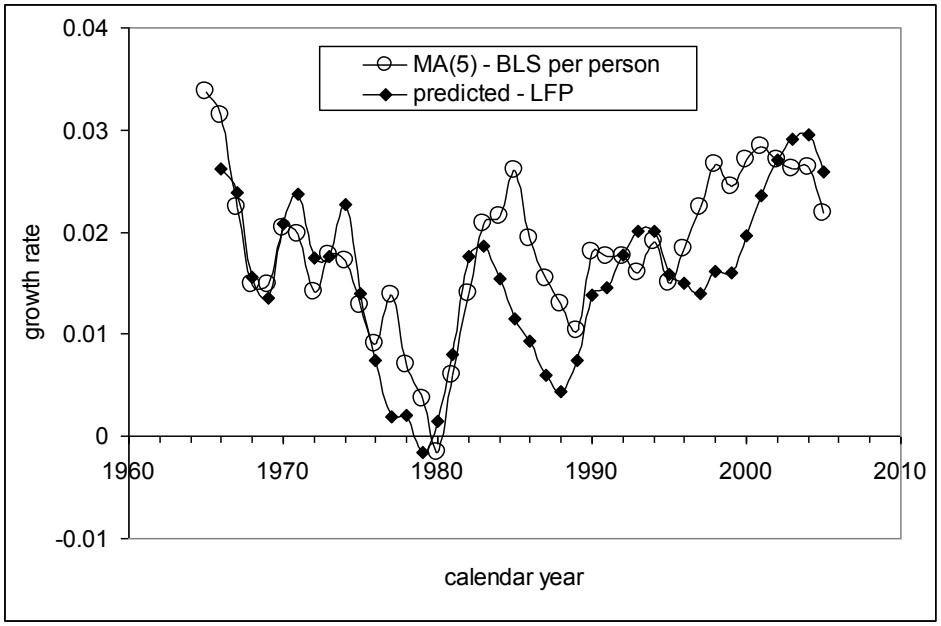
By definition, the level of employment, E(t), is the difference between labor force and the number of unemployed, E(t) = LF(t) – UE(t)*LF(t). The link between unemployment, EU, and labor force is described in Section 4.

4. Labor productivity

Labor productivity, P, can be represented as a function of LFP and G, P~G·N/N·LFP = G/LFP. From (4), it follows that P is a function of G only. Therefore, the growth rate of labor productivity can be presented in the same way as labor force participation. Since the change in productivity is synchronized with G and labor force participation, the first useful equation mimics (4):

$$dP(t)/P(t) = \{B_3 dLFP(t)/LFP(t) + C_3\} \cdot \exp\{ \alpha_3 [LFP(t) - LFP(t_0)]/LFP(t_0)\} \tag{10}$$

Figure 5 depicts two curves reported by the BLS and those predicted with B_3=–5.0, C_3=0.040, and α_3=5.0; and B_3=–3.5, C_3=0.042, and α_3=3.8, respectively. Due to volatility in the original productivity and labor force (time derivative) series we replace them with their MA(5). A five–year time interval provides an increased resolution and allows smoothing measurement noise. As expected, coefficient B_3 is negative implying a decline in productivity with increasing labor supply. The goodness–of–fit for both observed time series is about (R^2=) 0.6. Moreover, principal features (troughs and peaks) of the observed series are similar in the predicted series, with slight time shifts, however.



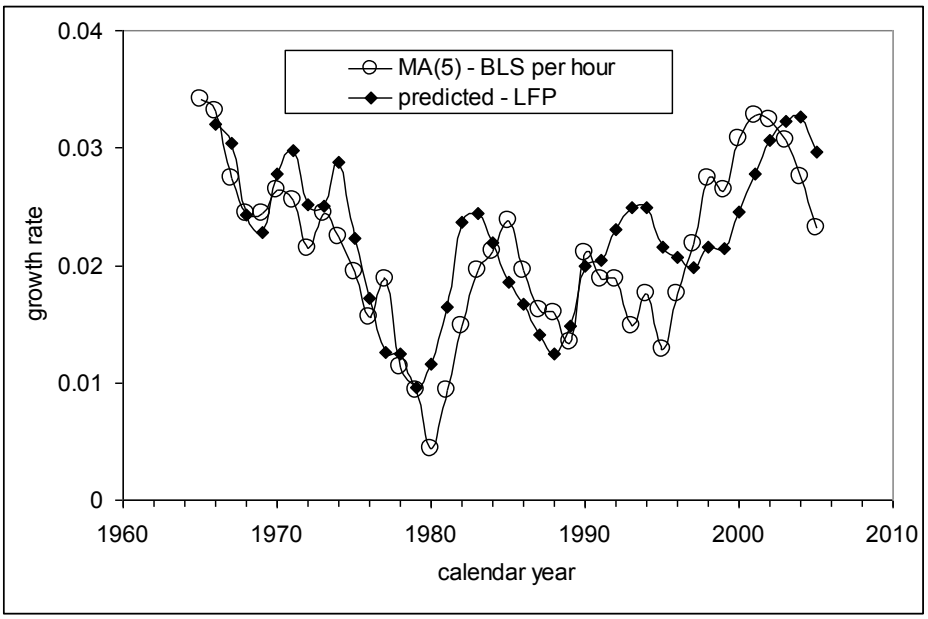


Figure 5. Observed and predicted growth rate of labor productivity. Two BLS measures of productivity are presented: upper panel – output ($) per person; lower panel – output ($) per hour. Linear regression gives close results – R^2=0.6 in both cases.

Another equation defines dP/P as a nonlinear function of G:

$$Ns(t_2) = Ns(t_1)\cdot \{ 2[dG(t_2–T)/G(t_2–T) – A_4/G(t_2–T)] + 1\} \quad (11)$$

$$dP(t_2)/P(t_2) = N(t_2–T)/B_4 + C_4 \quad (12)$$

where A_4, B_4, and C_4 are (country–specific) empirical constants.

Some results of productivity modeling by (11) and (12) are presented in Figure 6. (Model parameters are given in Figure captions.) Overall, 60% of variability in the observed curve is explained by the predicted one – same as explained by G itself. Timing of main turns in the curves is excellent. This is an expected effect, however, because productivity is essentially the same class variable as real GDP per capita. An important feature to predict is amplitude, as Figure 6 indicates – the productivity is not a scaled version of the real GDP per capita. So, the success of our model is related to a good prediction of the LFP.

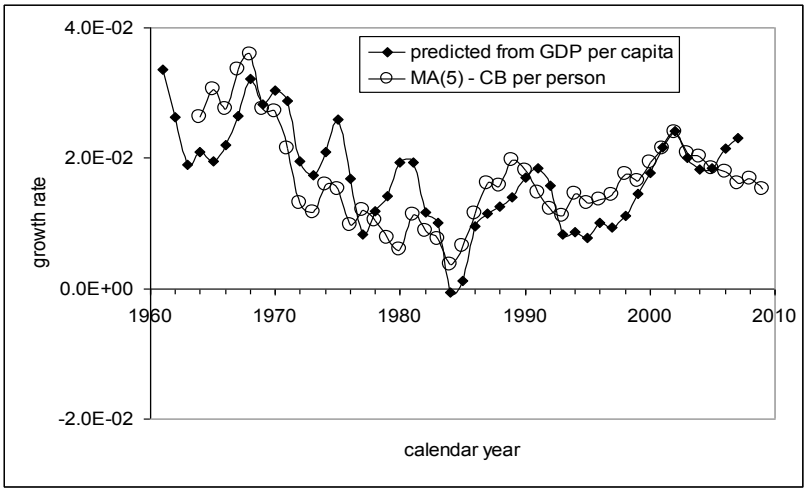


Figure 6. Observed and predicted change rate of productivity (Conference Board –GDP per person employed). The observed curve is represented by MA(5) of the original one. Linear regression gives R^2=0.6. Model parameters are as follows: Ns(1959)=4500000, A_4=$420 (2002–dollars), B_4=3500000, C_4=–0.095.

As a validation of our model, we predicted the evolution of productivity for other developed countries using relevant GDP per capita data [Kitov, Kitov, Dolinskaya, (2007)]. Figure 7 presents predicted and measured productivity in Canada. Overall, this is the best example we have obtained.

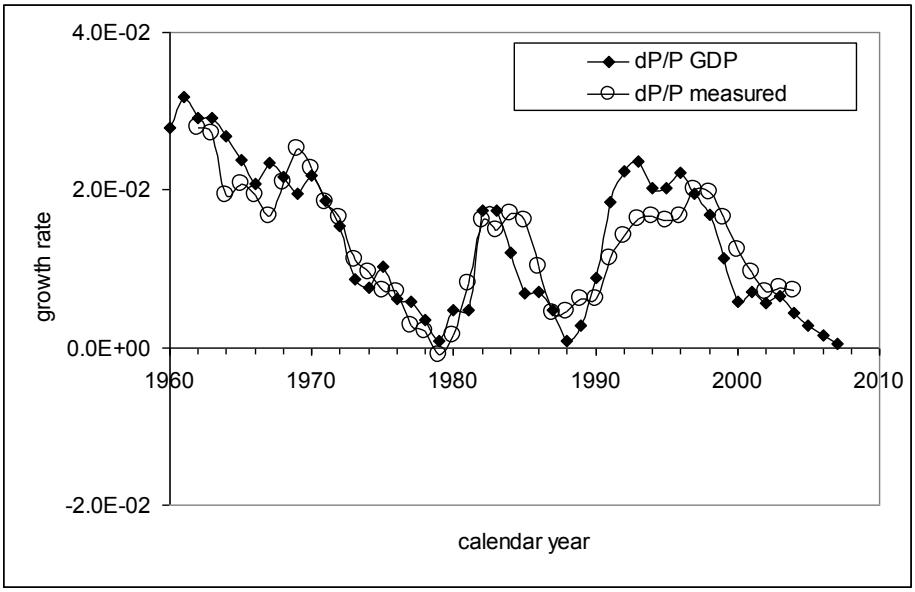


Figure 7. Observed and predicted productivity in Canada: Ns(1959)=270000, A_4=\$300 (1990 US dollars) , B_4=–3200000, C_4=0.108. R^2=0.8.

Productivity is a secondary (dependent) economic variable. The growth of real GDP per capita above or below its potential rate is transferred one–to–one in relevant changes in labor force participation and, thus, in employment and productivity. Since real economic growth depends only on the evolution of specific age population, one must control demographic processes in order to control productivity and stable economic growth.

One may also conclude that all attempts to place labor productivity in the center of conventional theories of real economic growth are practically worthless. Productivity is not an independent variable, which can be influenced and controlled by any means except demography.

5. Inflation and unemployment

According to our model [Kitov, (2006b), Kitov, (2006c)], inflation and unemployment are linear and lagged functions of labor force change as expressed by the following equations:

$$\pi(t)=a_1 dLF(t-t_1)/LF(t-T_1)+a_2 \quad (13)$$

$$UE(t)=b_1 dLF(t-t_2)/LF(t-T_2)+b_2 \quad (14)$$

where $\pi(t)$ is the inflation rate at time t, UE(t) is the unemployment rate at time t, LF(t) is the level of labor force, T_1 and T_2 are the time lags between the inflation, unemployment and the labor force, respectively; a_1, b_1, a_2, and b_2 are country–dependent empirical coefficients. In Section 2, the level of labor force is wholly defined by Eq. (9) as a lagged function of real GDP per capita.

Linear Eqs. (13) and (14) define inflation and unemployment separately as functions of labor force change. These two variables are indivisible sides of a unique process, however. The process is the labor force growth, which is accommodated in developed economies though two channels. (We always stress that these relationships are valid only for large developed economics implying that small developed, developing and emerging economies might be characterized by different links.) The first channel is the change in employment and relevant reaction of PID. All persons obtaining new paid jobs or their equivalents presumably change their incomes to some higher levels. There is a reliable empirical fact, however, that PID in the US has not been changing over time in relative terms [Kitov, (2007)].

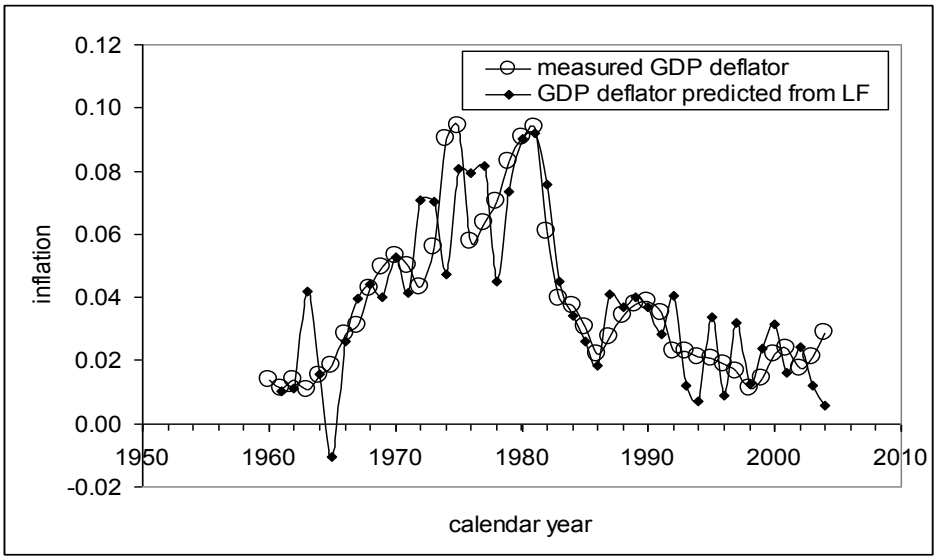
The increasing number of people at higher income levels, as related to the new paid jobs, leads to a certain disturbance in the PID. This over–concentration must be compensated by such an extension in the income scale, which returns the PID to its original density. In other words, the economy demands an injection of some amount of money extra to that defined by real economic growth in order to recover the PID. As a result, prices in the economy grow at an elevated rate, i.e. are prone to inflation. This process is accompanied by corresponding stretch in the PID income scale. The mechanism responsible for the compensation and the scale stretching has some relaxation time, which effectively separates in time the source of inflation, i.e. the labor force change, and the reaction, i.e. price inflation.

The second channel is related to those who failed to obtain a new paid job, i.e. to enter employment. These people do not leave the labor force but join unemployment. Effectively, they do not change the PID because they do not change their incomes. So, the total labor force change (wholly defined by G) equals the unemployment change plus employment change. In the case of "normal" behavior of an economic system, the proportion between unemployment and inflation is retained through time and both linear relationships hold separately. There is always a possibility, however, to fix one of the two variables. For example, central banks are able to fix inflation by some monetary means. Such violations of the natural behavior will undoubtedly distort the partition of the labor force change – the portion previously accommodated by inflation will be redirected to unemployment, and vice versa. To account for this effect one should use a generalized equation as represented by the sum of Eqs. (13) and (14):

$$\pi(t) + UE(t) = a_1 dLF(t-T_1)/LF(t-T_1) + b_1 dLF(t-T_2)/LF(t-T_2) + a_2 + b_2 \qquad (15)$$

Equation (15) balances labor force change, inflation and unemployment, the latter two variables potentially lagging by different times behind the labor force change. The importance of this generalized equation is demonstrated by [Kitov, (2007)] for the case of France before and after joining the European Monetary Union.

For the US, there is no need (so far) to apply Eq. (15). The changing monetary policy of the Federal Reserve has not affected the natural partition of labor force change, as has been observed since the late 1950s. Therefore, Eq. (13) with a_1=4, a_2=–0.03, T_1=2 years (GDP deflator as a measure of inflation) provides the best fit between observed and predicted inflation, as presented in Figure 8 and 9 for annual and cumulative values. The best fit of the cumulative curves provides an accurate procedure for the estimation of the coefficients.



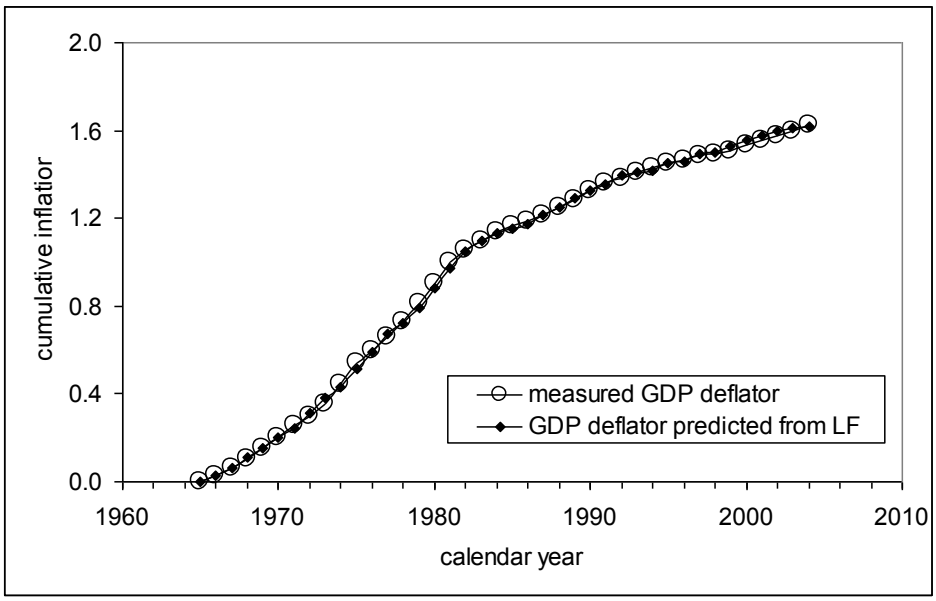


Figure 8. Observed and predicted inflation (GDP deflator). The predicted values are obtained using Eq. (13) with a_1=4.0, a_2= –0.3, and T_1=2 years. The upper panel compares annual readings and the lower one – cumulative values.

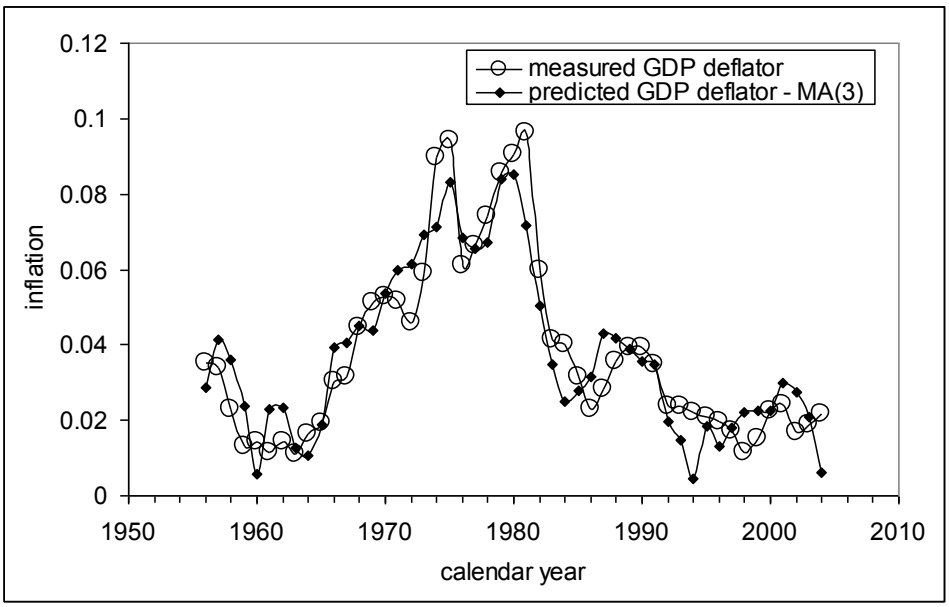


Figure 9. Measured and predicted inflation, The latter is represented by MA(3). Linear regression is characterized by R^2=0.88 and Standard Error of 0.0057, i.e. RMSFE is only 0.6% at a 1 year horizon.

Negative constant a_2 makes some permanent increase in labor force of great importance for avoiding deflationary periods. Population growth rate of 0.01 to 0.015 per year, as has been observed in the US during the last twenty years, completely compensates the effects of negative term a_2. With the boomers' retirement, however, the growth rate of labor force started to decelerate in 2005.

One can describe inflation in the US with an uncertainty controlled by the accuracy of labor force estimates. Thus, a direct way to improve the predictive power of the inflation/labor force relationship is available. Only some simple arrangements are necessary. Moreover, one can easily introduce a target value for the inflation uncertainty and link it to the resources available and needed.

In our model, inflation forecasting is equivalent to the inflation regression against the change rate of labor force. In forecasting practice, the root mean square forecast error (RMSFE) is a standard measure of uncertainty. This term indicates that forecasted values of inflation are obtained in the

framework of out–of–sample approach, i.e. using only past values of predictors. The best prediction obtained with our model for the period between 1960 and 2005 for the annual readings gives RMSFE of 0.008 (0.8%). This value is lower than any RMSFE at a two–year horizon we were able to find in literature for the same or comparable period.

Unemployment in the U.S. has been also predicted as a linear lagged function of the labor force change and is as follows: UE(t)=0.023+2.1*dLF(t–5)/LF(t–5). The lag of the observed unemployment behind the change in labor fore is five years – the value obtained by simple visual fit of the smoothed curves as presented in Figure 10. Due to high volatility associated with measurement errors, there is some discrepancy between the two curves in Figure 10, however. Figure 11 displays the same curves smoothed with MA(7) for the period between 1960 and 2004. The predicted curve almost coincides with the observed one during the last 35 years and provides a prediction for the next five years.

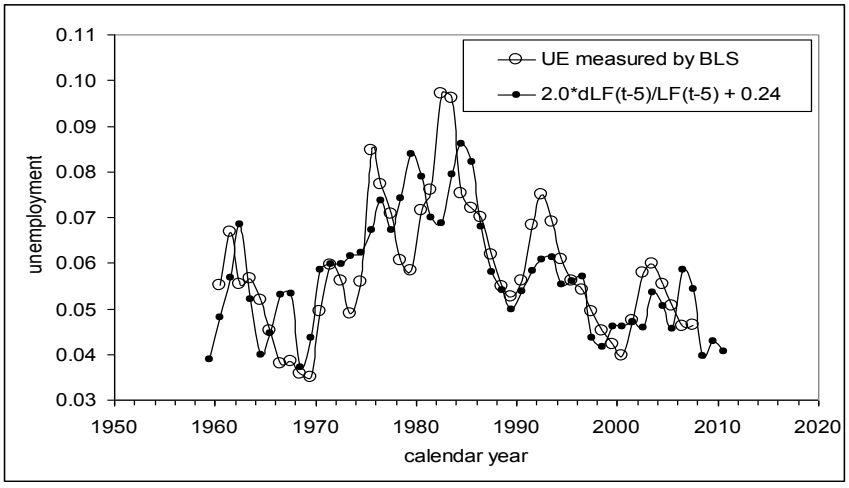


Figure 10. Observed and predicted unemployment rate. The latter is obtained from the estimates of the labor force in the US between 1960 and 2006. The 5–year lag of the unemployment behind the labor force allows a prediction of unemployment up to 2011. Notice a local peak in the predicted curve near 2008.

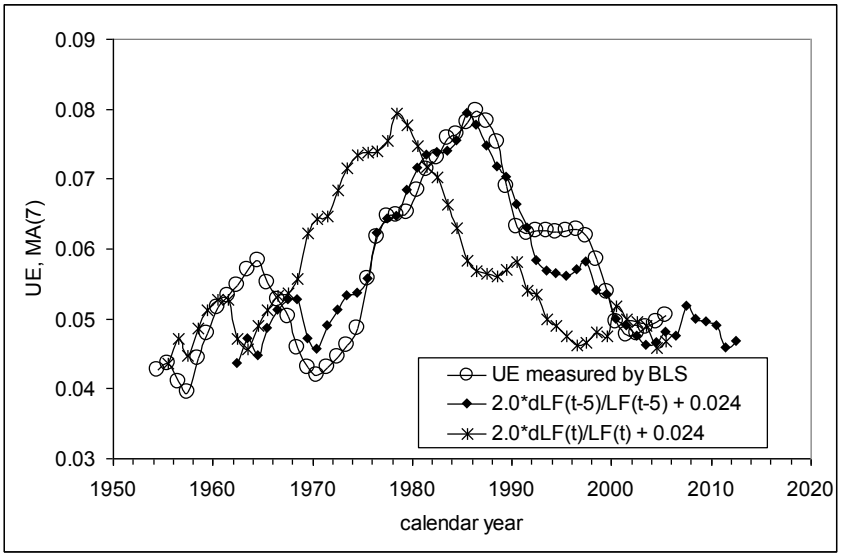


Figure 11. Predicted and observed unemployment rate smoothed by MA(7). The original predicted curve and that shifted by five years back are presented in order to illustrate synchronization process and the lag estimation.

Figure 12 presents a prediction for the unemployment according to (15), i.e. based on the labor force change and inflation. The following empirical version is obtained: UE(t) = π(t–3) – 2.5dLF(t–5)/LF(t–5) + 0.0585. The lags are three years for inflation and five years for labor force change. Figure 13 depicts corresponding MA(7) smoothed curves used to estimate corresponding coefficients.

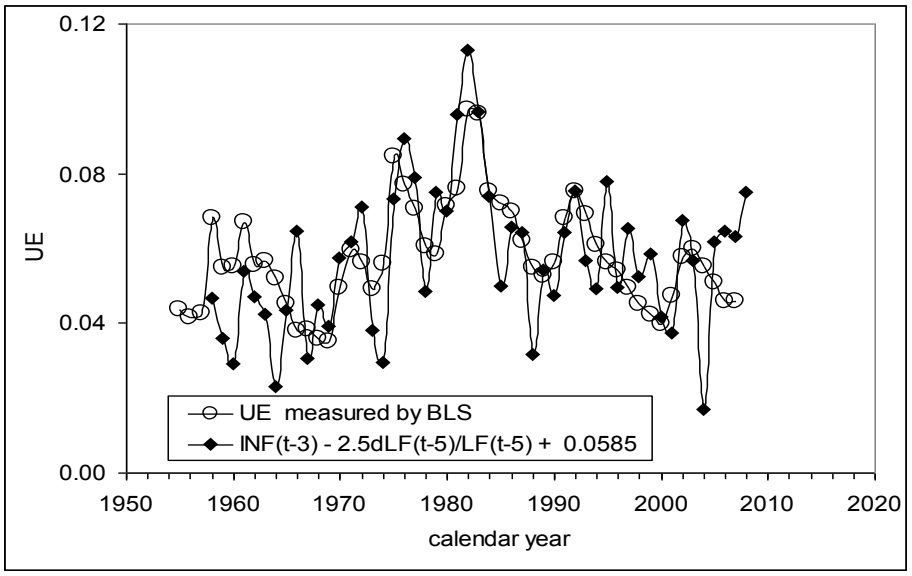


Figure 12. Unemployment measured by the BLS and that predicted as a lagged linear function of labor force change rate (dLF/LF) and inflation (INF) represented by GDP deflator:
$UE(t) = \pi(t-3) - 2.5dLF(t-5)/LF(t-5) + 0.0585$.

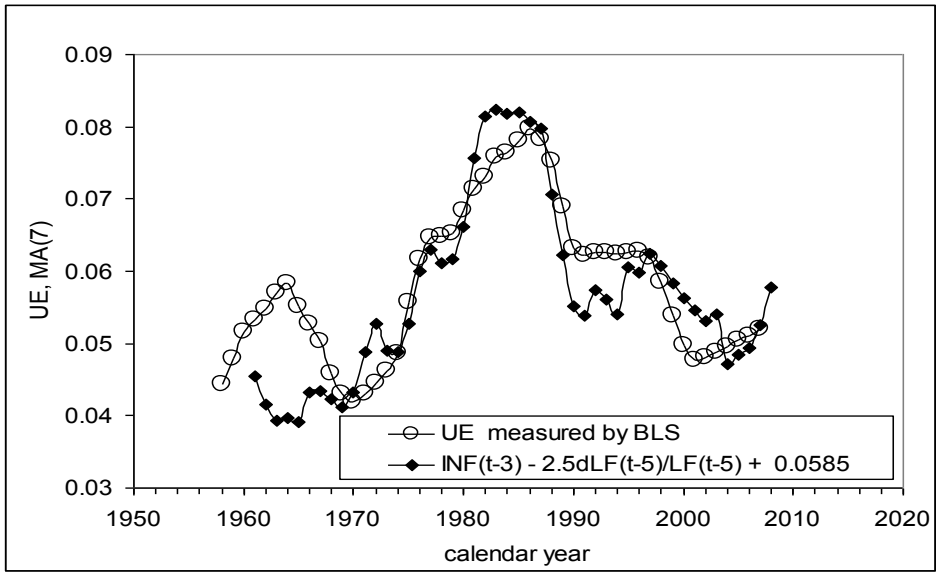


Figure 13. Same as in Figure 12, but smoothed by MA(7). There are some weak deviations (approximately 0.5 %) between the smoothed curves in the 1990s and the beginning of the 2000s.

6. Conclusion

In the US, the change in the specific age population drives such macroeconomic variables as real economic growth, labor force participation rate, productivity, inflation, and unemployment according to Eqs. (1) through (15). These equations represent a comprehensive macro–model of the U.S. economy, i.e. its reaction to exogenous (demographic) forces and the interaction between principal macro–variables.

This conclusion is supported by corresponding tests for the presence of cointegrating relations and other statistical estimates [Kitov, Kitov, Dolinskaya, (2007); Kitov, Kitov, Dolinskaya, (2007); Kitov, Kitov, Dolinskaya, (2007)]. Moreover, our concept provides reliable relationships for the prediction of the studied macroeconomic variables at very large (more than 9 years) time horizons.

There were several relationships between main macroeconomic variables revealed in our study. These equations have been valid during the last several decades. (It should be notice here that one cannot extend these relationships further in the past due to the absence of reliable demographic and economic data before 1960.) The relationships reflect inherent links between people, which had been

established in the US economy as a result of economic and social evolution. There was time, however, when these relationships were not valid. Also, it is possible that they will fail some time in the future due to the development of some new links. Therefore, we consider current macro–state of the US economy as a temporary and transient one. In addition, the macroeconomic predictions we have given in the study are prone to corrections, as related to changes in monetary policy (shift in inflation/unemployment balance) and various demographic processes including fluctuations in immigration.

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FINANCIAL INTEGRATION AND FINANCIAL DEEPENING IN THE SELECTED EUROPEAN TRANSITION ECONOMIES

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Abstract:

International financial integration of transition countries from the region of Central, Eastern and South–Eastern Europe suggests an interesting example of the relation between the overall macroeconomic performance and the changes in the height as well as the structure of the cross–border capital inflows and outflows. Structural changes, high economic growth and dynamic convergence toward the Western European countries stimulated the pressures on the domestic capital base of the transition countries. Current account and international investment position deficits that many of the European transition countries have experienced till the present days emphasize their role on the foreign markets as net debtors.

In the paper we examine main trends in the international financial integration of the selected European transition economies (Bulgaria, the Czech republic, Romania and the Slovak republic). At the same time we explore the essential features of the financial deepening of the selected group of the countries. The objective is to identify the country specific aspects in the international financial integration and financial deepening as well as the potential linkage between them.

Keywords: financial integration, financial deepening, external capital portfolio structure, transition economies

JEL Classification: F15, F36, F41

1. Introduction

International financial integration of the European transition economies became the most significant outcome of capital flows liberalization process that past central planning economies have started since the second half of the 1990s. The decision to allow the cross–border allocation of capital assets and liabilities resulted from the ability of the transition countries to sustain negative balance of payments and exchange rate pressures. Initial low domestic capital base together with usually higher domestic interest rates stimulated significant foreign capital inflows to such a degree that many European transition countries rapidly became net international debtors [Lane, Milesi, and Ferretti, (2006)]. In addition to this obvious trend, the changes in the external capital portfolio structure reflected the progress in the domestic economic and institutional reforms, increasing the reliance of foreign investors to allocate more direct and portfolio equity investments in those countries.

Among the other significant aspects that became at least as important as continuously increasing international financial integration we emphasize the progress in the financial sector development and the financial deepening in the European transition countries [Buiter, and Taci, (2003)]. Of course, institutional aspects, heritage from the central planning period and transitional rigidities has fundamentally affected the overall progress as well as durability of partial steps shaping the individual features of the financial sector development and the financial deepening in each particular country. Hence we assume the financial sector development in the European transition countries became even more complicated and country specific when comparing with the financial integration process.

It is not clear how to estimate general linkage and relationship between **a.** the financial sector development and the financial deepening and **b.** the international financial integration. For example Eichengreen (1997) suggests that the financial integration leads to the financial deepening (to more active, liquid and efficient domestic financial markets), and that the financial deepening encourages higher investments, faster growth and more rapidly rising living standards. The linkage between the financial integration and the financial deepening is evident from the fact that countries facing relatively large capital inflows have seen disproportionate growth in the volume of transactions on their stock markets, disproportionate growth in stock market capitalization, and disproportionate growth in bank loans to the private sector.

Rousseau and Wachtel (2007) emphasizes that in order to get benefits from the financial deepening associated with the foreign capital inflows the country should liberalize capital account transactions only when the legal and regulatory institutions were successfully well developed.

Hasan, Wachtel and Zhou (2007) argue that the financial deepening and the international financial integration is not necessary accompanied only with the positive influence on the domestic transition economy (i.e. economic growth) and the overall effect is largely determined by the financial deepening features and the structure of the foreign capital inflows. While the capital market depth has usually a strong influence on the growth the bank credits may have non–significant or sometimes even negative impact on the growth. At the same time the equity and debt capital inflows have obviously positive influence on the economic growth.

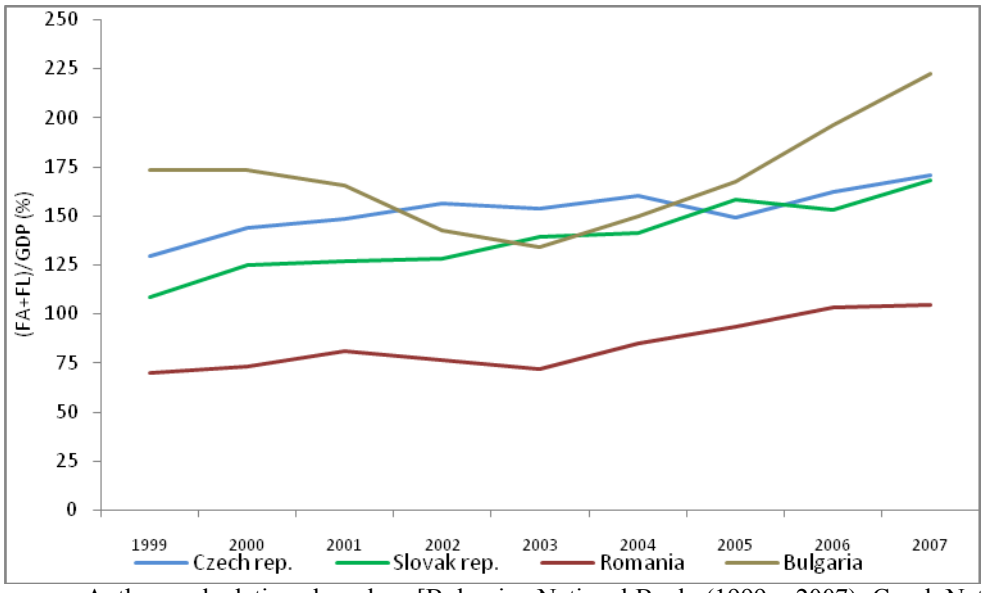
Mohan (2006) assumes that the financial deepening has usually overall positive macroeconomic outcomes, but on the microeconomic level it is rather questionable, whether such performance incentives also extend to small and medium enterprises. He also emphasizes that it is rather inconclusive, whether intensified financial intermediation usually coupled with the financial deepening also includes small and medium enterprises. On the other hand the international financial integration is usually coupled with broad set of the microeconomic collateral benefits, i.e. increased quality of institutions and the corporate governance.

In the paper we analyze the main aspects of the international financial integration and the financial deepening of Bulgaria, the Czech republic, Romania and the Slovak republic in the period 1999–2007. The starting point of the period we have selected in order to eliminate the influence of the country specific determinants that could negatively affect the process of the international financial integration and the financial deepening in all selected countries related to the phase of the macroeconomic stabilization. The objective of the analysis is to emphasize the main trends and find similar and different features in the international financial integration and the financial deepening in the selected group of the transition economies that reflect different economic performance of the countries. In the analysis we consider the development of external financial openness and net external financial position of the selected countries in order to highlight the main implications of the transition process as well as the process of the convergence to the Western European countries. We also observe the development of the external financial liabilities and assets portfolio to decompose the foreign capital inflows and outflows of the selected countries. The main features in the financial deepening of Bulgaria, the Czech republic, Romania and the Slovak republic we observe by the analysis of overall credits, deposits, money supply and interest rates development.

2. Financial integration in the selected European transition economies

Macroeconomic stabilization followed by the initial shock from the transition to market based economic environment became one of the most challenging objective for the countries from the region of Central, Eastern and South–Eastern Europe. International competition together with an increasing trade and a financial openness of the European transition economies has fully uncovered their role in the foreign markets (net debtors). Internal structural changes conditionally related to the international competitiveness of the transition countries have generally stimulated the pressure on the sources of domestic capital base formation.

Capital flows liberalization together with the macroeconomic stabilization were the first and the most crucial assumptions for the increasing international financial integration of the European transition countries. At the same time it is important to emphasize that restrictions on the international financial transactions were not removed by the governments immediately so that this fact has significantly determined the initial structure of the foreign capital inflows to the European transition countries [Edison *et al*., (2002)].



Source: Authors calculations based on [Bulgarian National Bank, (1999 – 2007); Czech National Bank, (1999 - 2007); International Monetary Fund, (2008); National Bank of Romania, (1999 – 2007); National Bank of Slovakia, (1999 – 2007)].

Note: FA – foreign assets, FL – foreign liabilities.

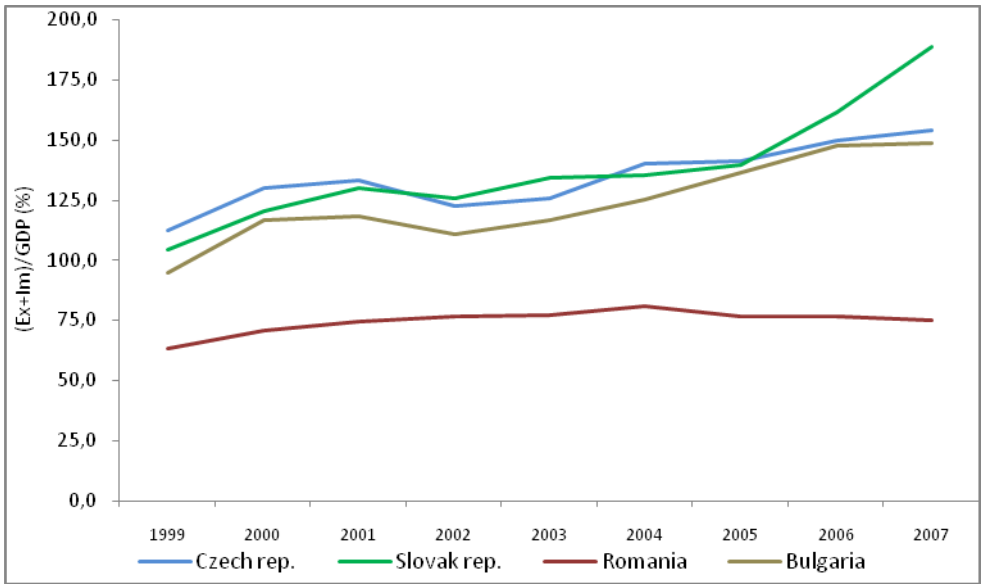
Figure 1. International Financial Integration, 1999–2007

Figure 1 explores the overall development of the international financial integration in the Czech republic, Bulgaria, Romania and the Slovak republic. All countries, except Bulgaria, have experienced the long trend of an increased share of the foreign financial assets and foreign financial liabilities in the GDP through the most of the period 1999–2007. Tendency to the "external financial depth" increase was obvious in spite of the strong economic growth that all countries have experienced since 2001. Initial negative trend in the international financial integration of Bulgaria (period 2001–2003) was the result of high economic growth (almost 5 percent on average in the period 2000–2003) combined with the decrease of both foreign assets and foreign liabilities. In the period 2002–2003 it was partially the result of the government official debt rescheduling[1] in the period 2002–2003. As a result the total foreign financial assets of the domestic banks have decreased while the domestic financial assets (especially government securities) of the domestic banks have increased. Continuously increasing international financial integration of the Czech republic, Romania and the Slovak republic through the whole period and of the Bulgaria since 2004 onward has allowed the transition countries to effectively share the risk with the foreign partners and gain effects from the technology sharing. It had also positive influence on the domestic financial systems functionality through the increased availability of the financial resources.

International financial integration measured as a share of financial assets and financial liabilities in the GDP also reflects the overall financial openness of the economy. All countries from the group except Romania are typical examples of small open transition economies.

Relatively high openness of Bulgaria, the Czech republic and the Slovak republic also demonstrates the overall trade openness. While the financial integration allows the country to increase the availability of the financial resources and to share the risk among the countries, trade integration is stimulated by the international division of the labour based especially on the competitive advantage.

[1] Government actions have induced the decreased involvement of the foreign investors in financing the country's official debt.



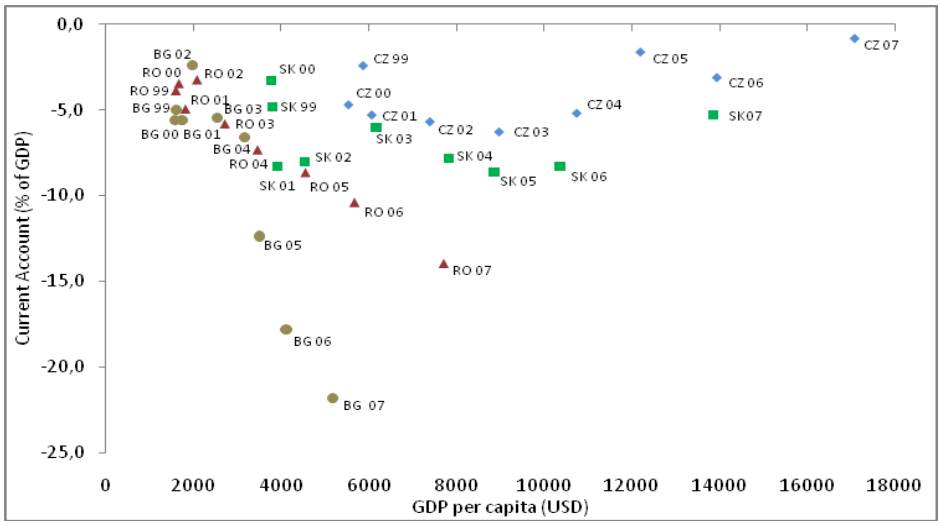
Source: Authors calculations based on [Bulgarian National Bank, (1999 – 2007); Czech National Bank, (1999 - 2007); International Monetary Fund, (2008); National Bank of Romania, (1999 – 2007); National Bank of Slovakia, (1999 – 2007)].

Note: Ex – export of goods, Im – Import of goods.

Figure 2 International Trade Integration, 1999–2007

Figure 2 explores the overall development of the international trade integration in the Bulgaria, Czech republic, Romania and the Slovak republic. Here again we see that overall trade openness of Romania was lower than in the remaining countries. We suggest that the international financial integration and the international trade integration represent two simultaneous processes stimulated by the relatively different determinants while reflecting an increase in the overall openness of the national economy. Intensity of the trade integration has lagged behind the financial integration only by a negligible percentage in all four countries through the whole period.

Overall situation that emphasizes the role of the selected group of the European transition economies in the international trade integration indicates the current account development. This indicator directly reflects the international competitiveness of the transition countries on the foreign good markets.

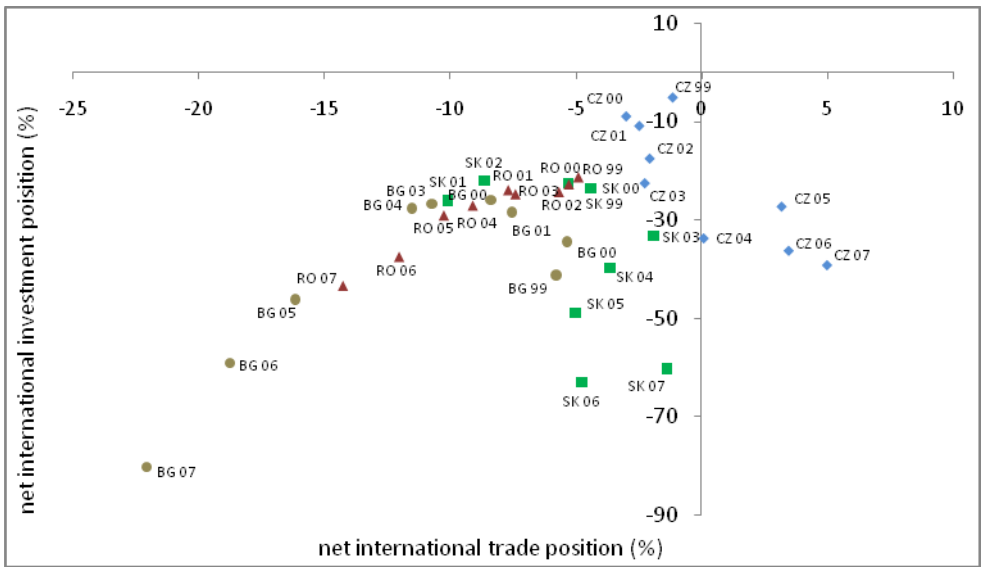


Source: Authors calculations based on [Bulgarian National Bank, (1999 – 2007); Czech National Bank, (1999 - 2007); International Monetary Fund, (2008); National Bank of Romania, (1999 – 2007); National Bank of Slovakia, (1999 – 2007)].

Figure 3 GDP per capita and Current Account, 1999–2007

From the Figure 3 we may observe rather different implications of the international trade integration for two pairs of the transition countries. In the Czech republic and the Slovak republic an increasing macroeconomic performance was coupled with the relatively stable and at the end of the period even decreasing share of current account deficit in the GDP reflecting a rise in the their international competitiveness in the process of convergence toward the Western European countries. Positive current account development tendency is of a significant importance especially if we take into account a trend of a nominal exchange rate appreciation through more than a half of the selected period. On the other hand the situation in the current account development is much different in Bulgaria and Romania. Both countries face a rapid deepening of a current account deficit and the situation is not sustainable in the medium period. We consider that this negative trend is the price for the high exchange rate stability stipulated by the central banks of Bulgaria (currency board with the exchange rate as the nominal anchor) and Romania[2] (managed floating with EUR as the reference currency) together with the progressive decrease of competitiveness on the foreign markets.

Net international investment position in the selected group of the countries partially reflects the trends in the current account development (proxied by the net international trade position).



Source: Authors calculations based on [Bulgarian National Bank, (1999 – 2007); Czech National Bank, (1999 - 2007); International Monetary Fund, (2008); National Bank of Romania, (1999 – 2007); National Bank of Slovakia, (1999 – 2007)].

Note: Net international investment position = (FA – FL)/GDP

Net international trade position = (Ex – IM)/GDP

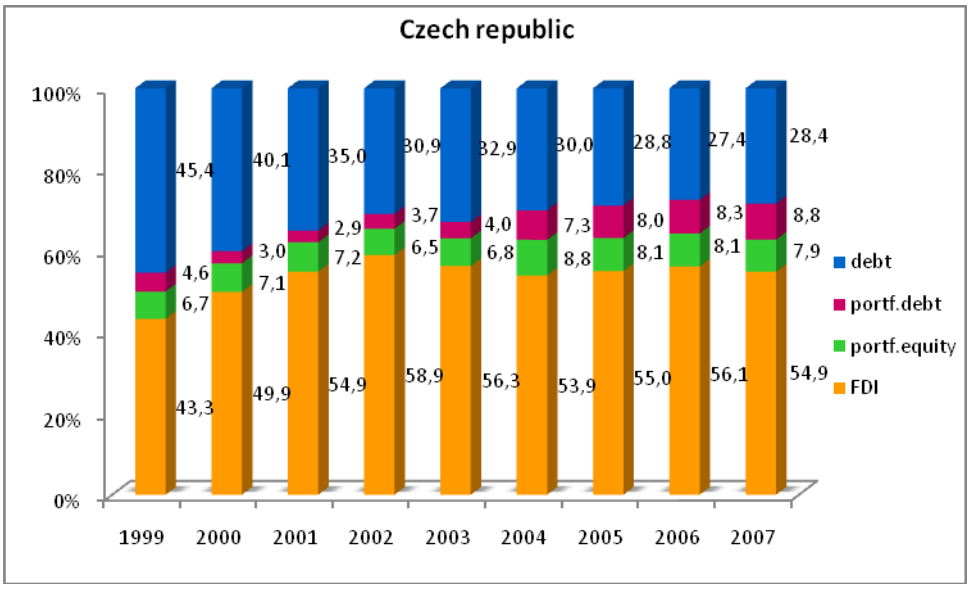
Figure 4 Net International Trade and Investment position, 1999–2007

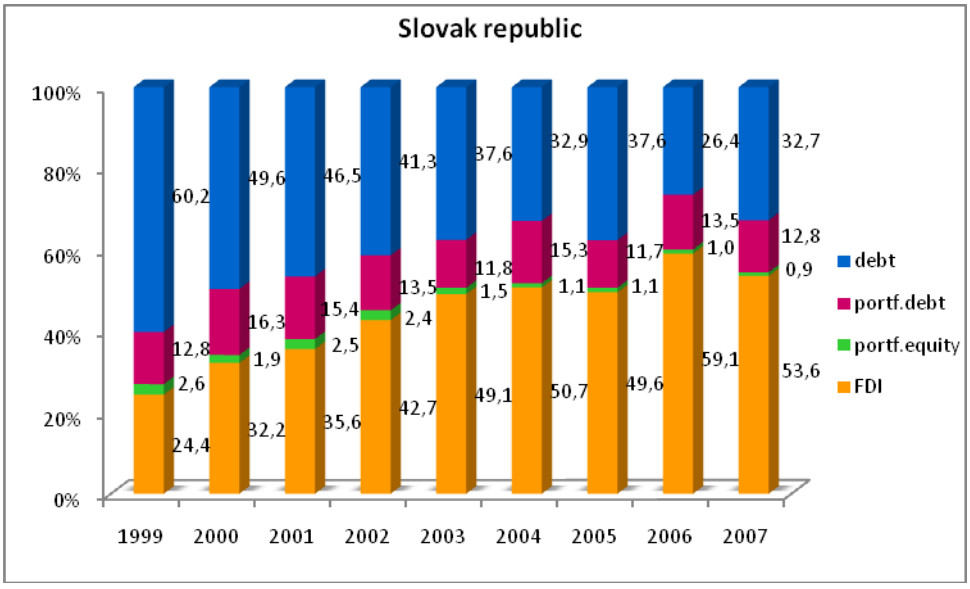
Negative development of the net international trade position in Bulgaria and Romania was coupled with an increasing deficit in the international investment position shown in the Figure 4 especially as the result of faster increase in the foreign liabilities in comparison with the foreign assets. In both countries the negative trend in the international investment position development was stimulated by the huge foreign direct investments (FDI) inflows (especially since 2004). We expect FDI inflows would help both countries to raise the international competitiveness of their domestic production on the foreign markets so that corresponding increase in the export performance would help Bulgaria and Romania to eliminate the negative trend in the current account development in the near future (assumption is based on the example of the FDI effects in the Slovak republic). Among the

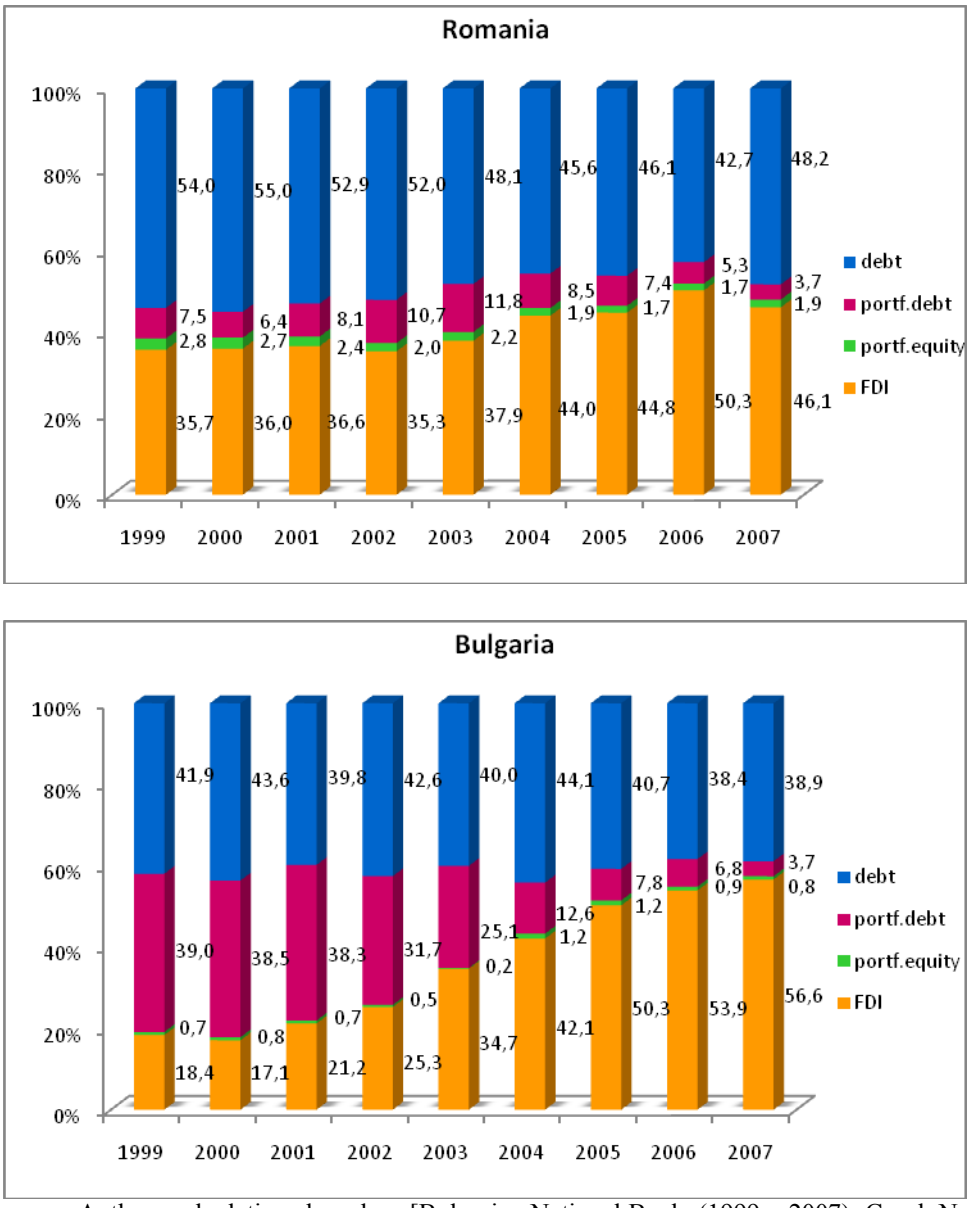
[2] Since July 2007 till December 2007 the exchange rate of RON has depreciated at around 11 percent partially reflecting the risks resulting from the current account development.

most important challenges for all four countries we consider the ability to decrease the share of debt capital inflows and to stimulate FDI of domestic private enterprises abroad.

In order to analyze country specific features of the international financial integration of the selected group of the transition countries we have observe the detailed structure of the external capital portfolio in the period 1999–2007.







Source: Authors calculations based on [Bulgarian National Bank, (1999 – 2007); Czech National Bank, (1999 - 2007); International Monetary Fund, (2008); National Bank of Romania, (1999 – 2007); National Bank of Slovakia, (1999 – 2007)].

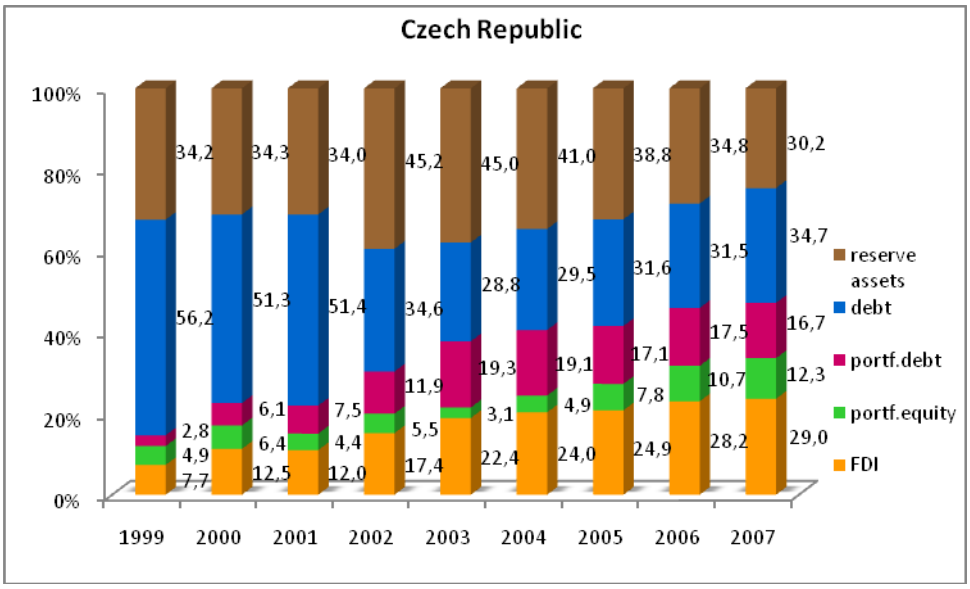
Figure 5 External Financial Liabilities Portfolio Structure, 1999–2007

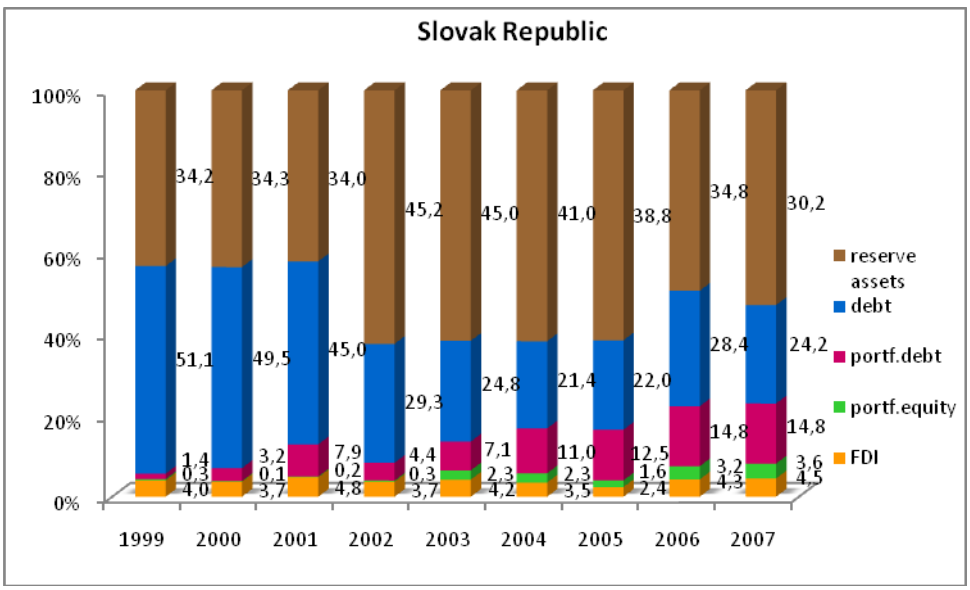
In spite of the relatively different net international investment position of each individual country it is clear to identify the common trend in the external liabilities portfolio development in the whole group of the countries. In all countries the relative importance of the debt capital inflows has been decreasing (Figure 5) while the share of FDI inflows has been increasing through the whole period 1999–2007 indicating an increased interest of foreign investors to allocate the real investments in profitable domestic industries. This trend is the most obvious since 2004 in case of Bulgaria and partially Romania. Gradually increasing and relatively high share of the FDI in the foreign financial liabilities brings few interesting implications. First, the FDI enables domestic companies to share the business and investment risk with the foreign investor. The FDI returns for the foreign investor are not fixed but determined by the overall profitability of the capital allocated in the target economy. The risk transfer from the domestic to foreign investors enables target economies to cover relatively higher current account deficits that on the other hand stimulate the process of the convergence toward the Western European economies. Second, the inflows of the FDI to the selected group of the countries stimulate the transfer of the new technologies that contribute to the overall productivity and national

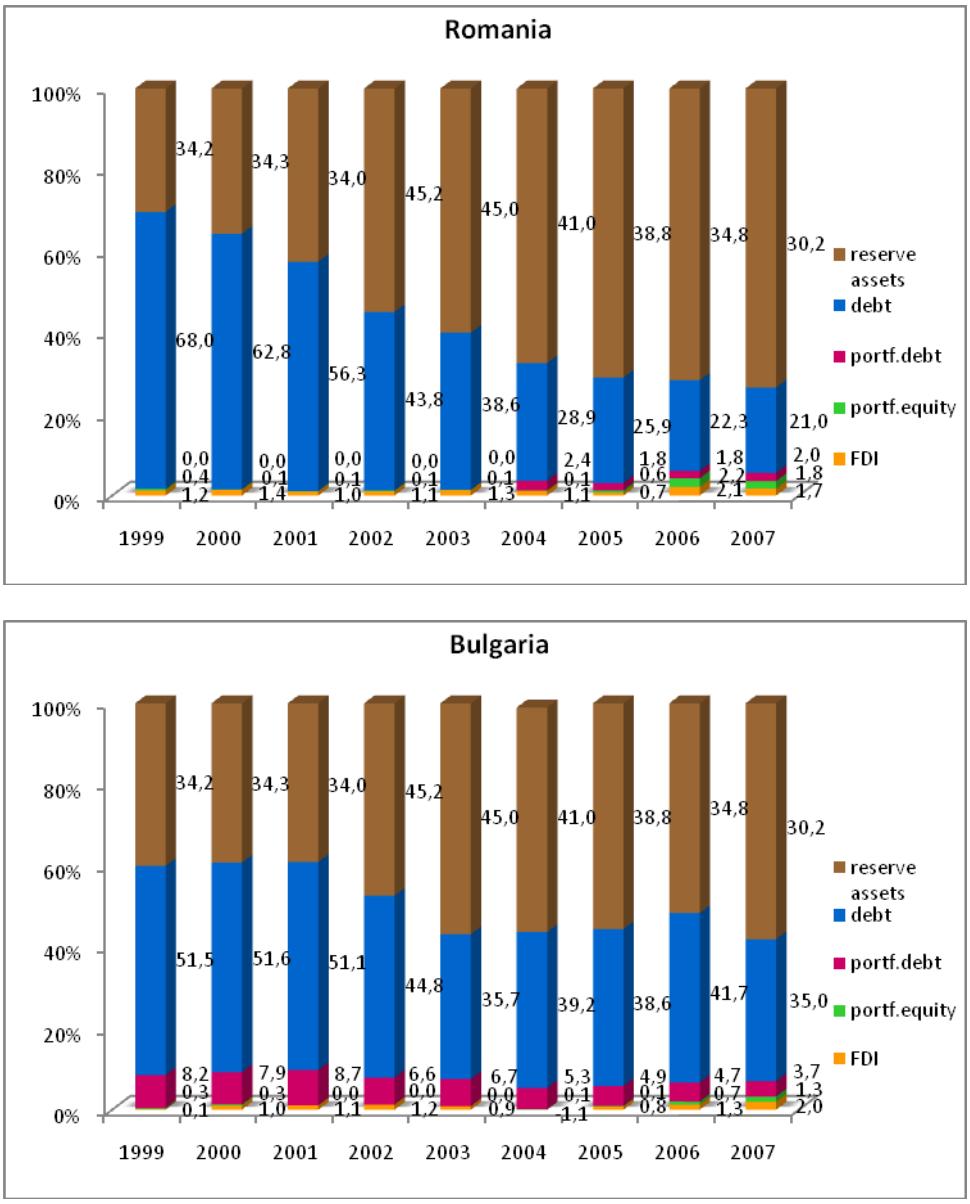
income growth. On the other hand we suppose that significant part of the profits from the projects financed by the FDI flows back to the foreign investors domicile.

On the other hand it is clear that the higher economic performance of the country (measured by the GDP per capita) is associated with the lower debt capital inflows. At the same time the share of portfolio (debt and capital) capital inflows is really low in all countries suggesting the relatively insufficient level and the low absorption capacity of the domestic capital markets. The share of the portfolio investments in the total foreign financial liabilities in the selected group of countries remains rather low in spite of the generally expected convergence of the foreign financial liabilities structure toward the Western European countries. Due to the persisting international financial integration and the domestic financial markets deepening as well as increasing quality of the corporate governance we expect an increase in the weight of the foreign portfolio equity and portfolio debt investments in the selected transition economies.

While the structure of the foreign liabilities portfolio seems to be crucial considering the negative development of the net international investment position of the selected transition economies resulting from the intensive foreign capital inflows through the whole period it is still important to observe the structure of the foreign assets portfolio to analyze the ability of the countries to allocate the domestic capital abroad.







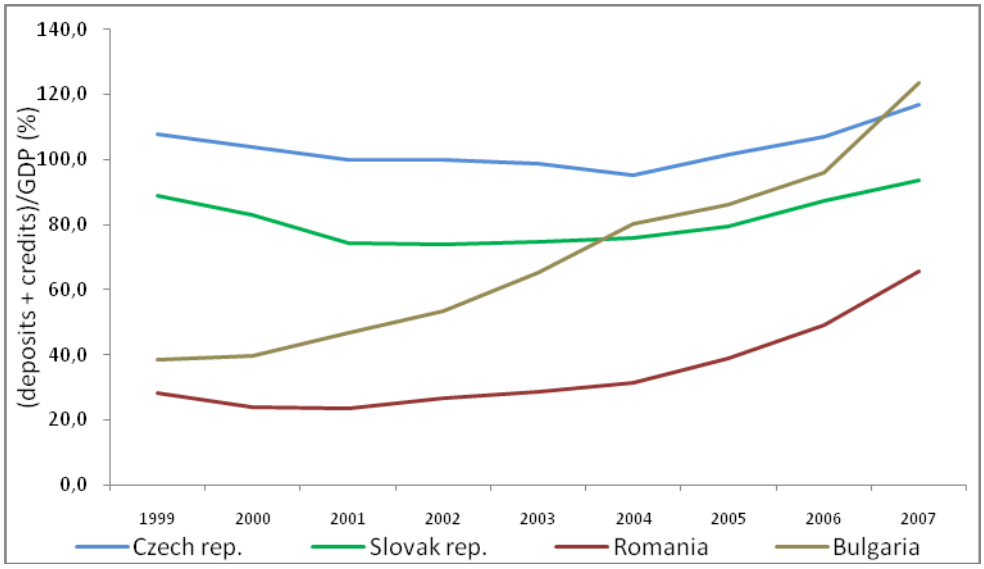
Source: Authors calculations based on [Bulgarian National Bank, (1999 – 2007); Czech National Bank, (1999 - 2007); International Monetary Fund, (2008); National Bank of Romania, (1999 – 2007); National Bank of Slovakia, (1999 – 2007)].

Figure 6 External Financial Assets Portfolio Structure, 1999–2007

From the detailed structure of the foreign assets portfolio in Bulgaria, the Czech republic, Romania and the Slovak republic (Figure 6) we have observed the dominant share of the central banks' reserve assets. The situation is different a lot especially when comparing with the Western European countries, in which the share of reserve assets usually doesn't exceed 5 percent. As the main reason of such a trend we have recognized relatively high importance of the reserve assets for the national central banks (foreign exchange market interventions, smoothing the balance of payments imbalances). Another essential feature resulting from the foreign assets portfolio structure is the negligible role of the equity investments (FDI and portfolio equity investments) in all countries except the Czech republic reflecting relatively low involvement of domestic investors on the foreign capital markets so that they don't take the full advantages of the risk sharing with foreign partners. Relatively high share of the debt investments (credits) represents almost completely activities of the domestic commercial banks.

3. Financial deepening in the selected European transition economies

While the international financial integration reflects the involvement of the national economy on the cross–border allocation of the capital with the foreign partners, the financial deepening represents the process of economy's financial system deepening. We have observed that the periods of a persisting high real economic growth in all four countries has been associated not only with an increasing international financial integration but also with a dynamic financial deepening. We suggest that a financial system deepening of a national economy becomes one of the key assumptions for the country in order to take the advantages of the international financial integration.

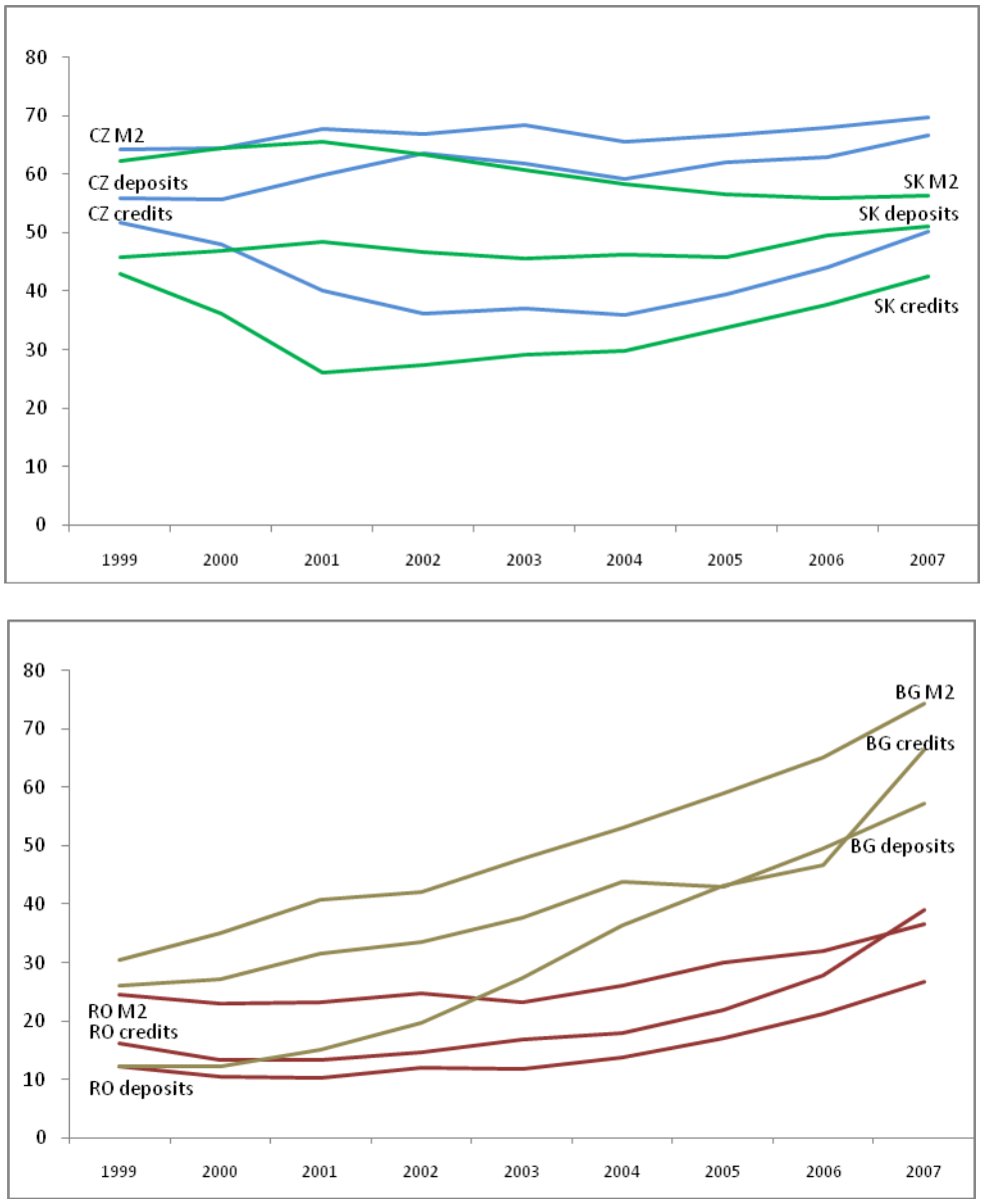


Source: Authors calculations based on [Bulgarian National Bank, (1999 – 2007); Czech National Bank, (1999 - 2007); International Monetary Fund, (2008); National Bank of Romania, (1999 – 2007); National Bank of Slovakia, (1999 – 2007)].

Figure 7 Financial Deepening, 1999–2007

In the Figure 7 we outline the financial deepening development of the selected European transition economies. One of the most obvious fact are significant differences in the financial sector depth in (a) the Czech republic and the Slovak republic and (b) Bulgaria and Romania. At the beginning of the period Bulgaria and Romania were almost at the same starting position but at the end of the period the share of deposits and credits in the GDP in Bulgaria has more than doubled in comparison with the Romania. Especially at the beginning of the period the stagnation in the financial deepening progress in Romania was the result of the financial system instability, the fact partially outlined by the extremely high interest rates in Romania at the beginning of the period (Figure 9). Since 2001 Romania as the biggest from all four economies has experienced the fast real economic growth (approximately 6 percent annually on average) so that the share of deposits and loans in the GDP didn't increase so sharp. Among the main reasons we have observed as the main determinants of the Bulgaria's dynamic financial deepening development (considering Bulgaria's initial low starting position) was the macroeconomic stability anchored by the fixed exchange rate and currency board system and rapid increase in the foreign capital inflows.

In general, fast credits and deposits growth is related to the expansion and increased sophistication in the services that financial institutions offer to support the economic activity in the economy. Financial intermediaries play a key role in different stages of economic development by mobilizing national savings; by improving the allocation of capital by gathering information and identifying the most profitable investment projects; by managing means of payment and by providing liquidity to facilitate the exchange of goods and services; and by making it easier to diversify risk. By reducing the financial constraints on economic agents, i.e. firms and households, they promote increased investment and consumption, and, ultimately, a higher economic growth rate [Sopanha, (2006)].



Source: Authors calculations based on [Bulgarian National Bank, (1999 – 2007); Czech National Bank, (1999 - 2007); International Monetary Fund, (2008); National Bank of Romania, (1999 – 2007); National Bank of Slovakia, (1999 – 2007)].

Figure 8 Deposits, Credits, M2, 1999–2007 (% of GDP)

Detailed preview of the financial deepening in the selected group of the countries outlines Figure 8. In the first graph we observe the development of the deposits, credits and money supply in the Czech republic and the Slovak republic. The ratio of broad money to the level of nominal GDP is usually used to express the extension of monetization rather than financial deepening of the country. On the other hand together with two remaining indicators it still provides sufficient information about the financial depth of the country. All general indicators we have applied to measure financial deepening in the Czech republic and the Slovak republic signalized quite stability of the financial depth through the almost whole period. The decrease in the credits development in the Czech republic in the period 1999–2003 was the result of the increased interest of the commercial banks to allocate resources to other revenue assets instead of the commercial loans as well as the transfer of certain quantity of loss credits to the Czech Consolidation Agency. The decrease in the credits development in the Slovak republic at the beginning of the period was the result of the loss credits delimitation from the commercial banks balance sheets compensated by the revenues from the government bonds issue.

In the second graph we observe the development of the deposits, credits and money supply in Bulgaria and Romania. The situation here is much different in comparison with the previous couple of the countries, especially in case of Bulgaria. While the fast financial deepening expressed in the terms of fast credits and deposits share in the GDP reflects the ability of the economy to dynamically stimulate domestic savings accumulation and their transformation to the domestic investments, rapid growth of the credits may lead to both inflation and weakened banking systems which in turn gave rise to growth–inhibiting financial crises [Rousseau, and Wachtel, (2007)]. As the inflation in Bulgaria remains stable through the whole period 1999–2007 we suggest that the country was able to gain positive effects (effects on economic growth, financial sector stability) from the rapid financial deepening without any significant negative trade–offs.

In Bulgaria, Romania and the Slovak republic the credits growth was not adequately matched by the deposits growth so that incremental credits expansion was financed either by the reduction of the stock of securities in banks' portfolios or by the external resources from the abroad.

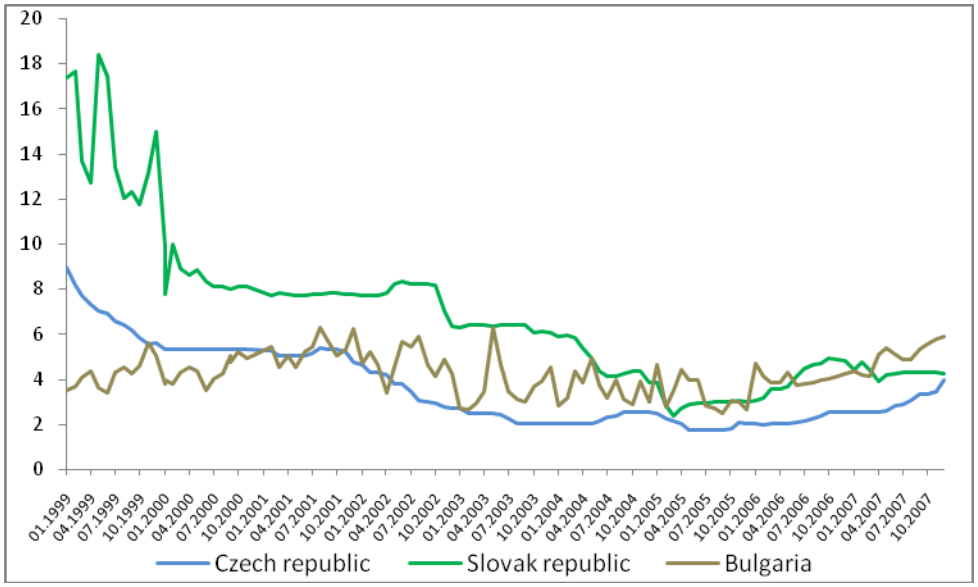
Table 1. Selected Financial Deepening Indicators, 1999–2007 (%)

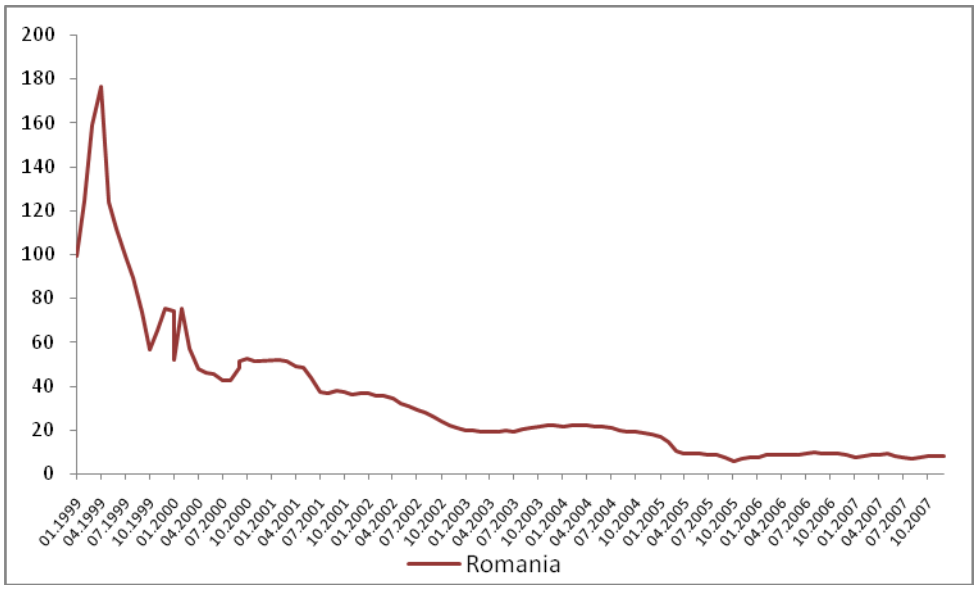
	Czech Republic		Slovak Republic		Romania		Bulgaria	
	1999	2007	1999	2007	1999	2007	1999	2007
Currency/Deposits	13,53	13,68	14,84	14,95	26,21	19,88	32,88	23,00
M1/GDP	21,52	40,51	18,21	35,24	5,44	21,13	13,16	36,67

Source: Authors calculations based on [Bulgarian National Bank, (1999 – 2007); Czech National Bank, (1999 - 2007); International Monetary Fund, (2008); National Bank of Romania, (1999 – 2007); National Bank of Slovakia, (1999 – 2007)].

In Table 1 we summarize the development of the additional financial deepening indicators in Bulgaria, the Czech republic, Romania and the Slovak republic. Both indicators reflect the role of the financial institutions in mediating the financial transactions in the economy. The lower is the share of the currency in the deposits (especially demand deposits) the more transactions in the economy is performed through the financial institutions. Monetary aggregate M1 represents the transaction demand in the economy. The higher is the share of M1 in the GDP the lower is the velocity of money.

The last indicator we have chosen to analyze development of the financial deepening in the selected European transition economies is the interest rates development. In general, lower interest rates stimulate financial deepening in the economy. The stable and low interest rates are usually associated with the price stability so that the macroeconomic stability is one of the most essential determinants that transmit impulses from the interest rates lowering to the positive progress in the financial deepening.





Source: Authors calculations based on [Bulgarian National Bank, (1999 – 2007); Czech National Bank, (1999 - 2007); International Monetary Fund, (2008); National Bank of Romania, (1999 – 2007); National Bank of Slovakia, (1999 – 2007)].

Figure 9 One Month Interbank Offered Rates, 1999–2007

As the main indicator of the interest rate development in our group of the European transition economies we have selected the interbank offered rate for the one month deposits. While the one month interbank offered development rate in Bulgaria, the Czech republic and the Slovak republic became relatively stable in the whole period reflecting the stable money market development, the situation in Romania especially at the beginning of the period was much different. Higher interest rates in the Czech republic and the Slovak republic were related to the sudden shift from the fixed exchange rate to the managed floating (the Czech republic – May 1997, the Slovak republic – October 1998), following by the strong foreign exchange market pressures. Stability of the Bulgarian interest rates (as well as the inflation) was anchored by the currency board and the nominal exchange rate fixed to EUR (since July 1997). We suggest that the low interest rates in Bulgaria during the period 1999–2007 became another crucial determinant of the fast financial deepening. In Romania the objective of the National Bank of Romania to keep the real exchange rate close to the equilibrium led the nominal exchange rate to depreciate under managed floating. We suggest the resulting higher interest rates together with the higher inflation in Romania (they both didn't decrease under the one digit number till 2005) led to the slower progress in the financial deepening.

4. Conclusion

Analysis of the financial integration and financial deepening in the selected European transition economies (Bulgaria, the Czech republic, Romania, the Slovak republic) allows as to identify the country specific aspects of the economic convergence to the Western European countries emphasizing the impact of the capital flows liberalization on the transition economies. We suggest that the relatively different economic performance as well as the overall size of the economy are the main determinants that affect the intensity and the structure of the financial integration and the financial deepening. Initial low domestic capital base together with usually higher domestic interest rates stimulated significant foreign capital inflows to such a degree that many European transition countries rapidly became net international debtors. In addition to this obvious trend, the changes in the external capital portfolio structure reflected the progress in the domestic economic and institutional reforms, increasing the reliance of foreign investors to allocate more direct and portfolio equity investments in the selected countries. On the other hand we suggest the ability of the transition countries to reduce current account imbalances (especially in Bulgaria and Romania) reduces the reliance especially on the external debt financing.

Among the other significant aspect that became at least as important as continuously increasing international financial integration we emphasize the progress in the financial sector development and financial deepening in the European transition countries. We suggest that the financial system deepening becomes one of the key assumptions for the country in order to take the advantages of the international financial integration. The link between the financial integration and the financial deepening is evident from the fact that countries receiving relatively large capital inflows usually face the disproportionate growth in the volume of transactions on their stock markets, disproportionate growth in stock market capitalization, and disproportionate growth in bank loans to the private sector. Ability to transform domestic deposits to investments effectively while eliminating inflationary pressures and risks related to the excessive credits supply allows the transition countries to gain the positive effects from the financial deepening.

Tendency to the "external financial depth" increase was obvious in spite of the strong economic growth the selected group of the countries have experienced since 2001 (except Bulgaria). This allowed the transition countries to effectively share the risk with the foreign partners and gain effects from the technology sharing. It had also positive influence on the domestic financial systems functionality through the increased availability of the financial resources. At the same time we have observed significant differences in the financial sector depth in (a) the Czech republic and the Slovak republic and (b) Bulgaria and Romania. First two countries have experienced relatively stable development of the financial deepening. On the other hand the financial deepening in Romania (since 2004) and especially in Bulgaria was much more intensive.

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ROBUST TWO–STAGE LEAST SQUARES: SOME MONTE CARLO EXPERIMENTS

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Abstract

The Two–Stage Least Squares (2–SLS) is a well known econometric technique used to estimate the parameters of a multi–equation econometric model when errors across the equations are not correlated and the equation(s) concerned is (are) over–identified or exactly identified. However, in presence of outliers in the data matrix, the classical 2–SLS has a very poor performance. In this study a method has been proposed to generalize the 2–SLS to the Weighted Two–Stage Least Squares (W2–SLS), which is robust to the effects of outliers and perturbations. Monte Carlo experiments have been conducted to demonstrate the performance of the proposed method. It has been found that robustness of the proposed method is not much destabilized by the magnitude of outliers. The breakdown point of the method is quite high, somewhere between 45 to 50 percent of the number of points in the data matrix.

Keywords: Two–Stage Least Squares, multi–equation econometric model, simultaneous equations, outliers, robust, weighted least squares, Monte Carlo experiments, unbiasedness, efficiency, breakdown point, perturbation, structural parameters, reduced form

JEL Classification: **C13, C14, C63, C15, C01**

1. Introduction:

The Two–Stage Least Squares (2–SLS) is a well known econometric technique used to estimate the parameters of a multi–equation (or simultaneous equations) econometric model when errors across the equations are not correlated and the equation(s) concerned is (are) over–identified or exactly identified. It is one of the members of the family of k–class estimators. Unlike the Three–Stage Least Squares, it does not estimate the parameters of all the equations of the model in one go. The 2–SLS estimates the parameters of an econometric model equation by equation, that is, one equation at a time.

Let a multi–equation econometric model be described by the system of its structural equations $YA+XB+U=0,$ where Y is an $n\times m$ data matrix of m endogenous variables in n observations, X is an $n\times k$ data matrix of k exogenous or pre–determined variables in n observations, A is an $m\times m$ full rank matrix of unknown parameters or coefficients associated with Y, B is a $k\times m$ matrix of unknown parameters or coefficients associated with X and U is an $n\times m$ matrix of (unobserved) errors. The elements of A and B are called the structural parameters. Since U is often correlated with Y which is itself stochastic, the parameters in the columns of A and B cannot be estimated by means of the Ordinary Least Squares (OLS) in view of the violation of the Gauss–Markov assumptions for the applicability of the OLS. Instead of using the OLS directly, the system of equations $YA+XB+U=0$ is first transformed into the reduced form equations. The reduced form equations describe Y in terms of X only. Indeed if we post–multiply the system of equations $YA+XB+U=0$ by A^{-1}, we have $YAA^{-1}+XBA^{-1}+UA^{-1}=0$ or $Y=XP+E,$ where $P=-BA^{-1}$ and $E=-UA^{-1}$. Now since X is fixed (non–stochastic) and it cannot be correlated with $E,$ the system of reduced form equations $Y=XP+E$ is amenable to estimation by the OLS. Therefore, P (which is the matrix of the reduced form coefficients) is estimated by the OLS as $\hat{P}=[X'X]^{-1}X'Y$ and used to obtain $\hat{Y}=X\hat{P}.$ Then in each equation where any endogenous variable $Y_j\subset Y$ appears as an explanatory variable, Y_j is replaced by $\hat{Y}_j$. Due to this replacement, the explanatory variables are no longer stochastic or correlated with the error term in the equation concerned, and so the equation is amenable to estimation by the OLS. Application of the OLS (once again) on this transformed equation readily gives the estimates of the parameters in that equation.

2. Implications of the Presence of Outliers in the Data Matrices:

Now suppose there are some outliers in X, Y or both the data matrices. This would affect $\hat{P}=[X'X]^{-1}X'Y$ and consequently $\hat{Y}=X\hat{P}.$ At the second stage since $\hat{Y}_j \subset \hat{Y}$ appear as explanatory variables, all the estimated parameters would be affected. As a matter of fact, the effects of outliers will pervade through all the equations and the estimated structural parameters in them. These effects are so intricately pervasive that it is very difficult to assess the influence of outliers on the estimated structural parameters.

A number of methods have been proposed to obtain robust estimators of regression parameters but most of them are limited to single equation models. Their adaptation to estimation of the structural parameters of multi–equation models is not only operationally inconvenient, it is also theoretically unconvincing. Moreover, generalization of those methods to multi–equation cases has scarcely been either successful or popular.

3. The Objectives of the Present Study:

In this study a method has been proposed to conveniently generalize the 2–SLS to the weighted 2–SLS (W2–SLS) so that $\hat{P}=[(wX)'(wX)]^{-1}(wX)'(wY),$ where w is the weight matrix applied to Y and X. Accordingly, we have $\hat{Y}=X\hat{P}.$ At the 2nd stage, for the i^{th} equation we have $g_i=[(\omega_i Z_i)'(\omega_i Z_i)]^{-1}(\omega_i Z_i)'(\omega_i y_i),$ where $g_i=[a_i \mid b_i]'$; $Z_i=[\hat{Y}_i \mid X_i]$; $y_i \subset Y$; $\hat{Y}_i \subset \hat{Y}$; $\hat{y}_i \notin \hat{Y}_i$; $X_i \subset X$; y_i is the observed endogenous variable appearing in the i^{th} structural equation as the dependent variable, $\hat{Y}_i$ is the set of estimated endogenous variables appearing in the i^{th} equation as the explanatory variables and X_i is the set of exogenous (or predetermined) variables appearing in the i^{th} equation as the explanatory variables. It may be noted that at the second stage of the proposed W2–SLS we use different weights (ω) for different equations. These weights (w and ω_i) are obtained in a particular manner as described latter in this paper. We also conduct some Monte Carlo experiments to demonstrate that our proposed method performs very well in estimating the structural parameters of multi–equation econometric models while the data matrices are containing numerous large outliers.

4. Determination of Weights in the Weighted Two–Stage Least Squares

Using the Mahalanobis distance as a measure of deviation from center, Campbell (1980) obtained a robust covariance matrix that is almost free from the influence of outliers. Campbell's method is an iterative method. Given an observed data matrix, Z, in n observations (rows) and v variables (columns) it obtains a v–elements vector of weighted (arithmetic) mean, $\bar{z}$, and weighted variance–covariance matrix, $S(v,v),$ in the following manner. Initially, all weights, $\varpi_\ell;\ell=1,n$ are considered to be equal, $1/n,$ and the sum of weights, $\sum_{\ell=1}^{n}\varpi_\ell=1.$ Defining $d_0=\sqrt{v}+\beta_1/\sqrt{2};\ \beta_1=2,\ \beta_2=1.25,$ we obtain

$$\bar{z}=\sum_{\ell=1}^{n}\varpi_\ell z_\ell / \sum_{\ell=1}^{n}\varpi_\ell \ ;\ S=\sum_{\ell=1}^{n}\varpi_\ell^2(z_\ell-\bar{z})'(z_\ell-\bar{z})/\left[\sum_{\ell=1}^{n}\varpi_\ell^2-1\right]\ ;$$

$$d_\ell=\left\{(z_\ell-\bar{z})S^{-1}(z_\ell-\bar{z})'\right\}^{1/2};\ell=1,n\ ;$$

$$\varpi_\ell=\varpi(d_\ell)/d_\ell;\ell=1,n:\varpi(d_\ell)=d_\ell \ \textit{if}\ d_\ell\le d_0\ \textit{else}\ \varpi(d_\ell)=d_0\exp[-0.5(d_\ell-d_0)^2/\beta_2^2].$$

If $d_\ell \cong 0$ then $\varpi_\ell=1.$ We will call it the original Campbell procedure to obtain a robust covariance matrix. However, our experience with this procedure to obtain a robust covariance matrix is not very encouraging in this study as well as elsewhere (Mishra, 2008). We will use the acronym OCP for this original Campbell procedure.

Hampel *et al*. (1986) defined the median of absolute deviations (from median) as a measure of scale, $s_H(z_a)=\underset{\ell}{median}\mid z_{\ell a}-\underset{\ell}{median}(z_{\ell a})\mid/0.6745$ which is a very robust measure of deviation. Using this measure of deviation also, we may assign weights to different data points. If we choose to

heuristically assign the weight $\varpi_\ell = 1$ for $d_\ell - s_H(d) \le d_\ell < d_\ell + s_H(d)$, $\varpi_\ell = (1/2)^2$ for $d_\ell - 2s_H(d) \le d_\ell < d_\ell - s_H(d)$ as well as $d_\ell + 2s_H(d) \ge d_\ell > d_\ell + s_H(d)$ and so on, and use Campbell's iterative method incorporating these weights, we may obtain a robust covariance matrix and weights. Our experience with this procedure has been highly rewarding in this study as well as elsewhere [Mishra, (2008)]. We will call it the Modified Campbell Procedure (MCP) to obtain a robust covariance matrix and weights to different data points.

The weights (ϖ) obtained through the MCP (or OCP, as the case may be) are used as w in $\hat{P} = [(wX)'(wX)]^{-1}(wX)'(wY)$ at the first stage of the W2–SLS to obtain the robust estimates of the matrix of reduced form coefficients. In this procedure of obtaining $\hat{P}$, X contains the unitary vector to take care of the intercept term, although weights $(w = \varpi)$ are obtained with Z^* that contains Y and all the variables in X, sans the unitary vector relating to the intercept term. Similarly, at the second stage, the MCP/OCP weights $(\omega_i = \varpi_i)$ are obtained from $Z^* = [y_i \mid \hat{Y}_i \mid X_i^*]$, where X_i^* contains all exogenous (predetermined) variables appearing in the i^{th} structural equations, sans the unitary vector related to the intercept term. However, in obtaining $g_i = [a_i \mid b_i]'$, the matrix $Z_i = [\hat{Y}_i \mid X_i]$ is used wherein X_i contains all exogenous (predetermined) variables, including the one related to the intercept term in the i^{th} equation.

5. Some Monte Caro Experiments

In order to assess the performance of our proposed method and compare it with the 2–SLS when data matrices (Y and X) contain outliers, we have conducted some Monte Carlo experiments. Using the random number generator seed = 1111, we have generated X containing five exogenous variables in 100 observations and appended to it the 6th column of unitary vector to take care of the intercept term. Thus, in all, we have X in 100 rows and 6 columns. All values of X lie between 0 and 20 such that $0 < x_{ij} < 20$. Then the data matrix for endogenous variables, Y, has been generated with the parameter matrices, A and B and adding a very small normally distributed random error, $U \sim N(0, 0.001)$ directly, without going into the subtleties of obtaining $U = -EA$. The magnitude of error has been kept at a very low level since our objective is not to mingle the effects of errors with those of outliers on the estimated parameters. If the magnitude of errors is large, it would affect the estimated values of parameters and it would be difficult to disentangle the effects of outliers from those of the errors. The computer program GENDAT (in FORTRAN 77) to generate data is appended. As already mentioned, the program was run with the random number generator seed = 1111. The following are the matrices of structural parameters used in our experiments.

$$A' = \begin{bmatrix} -1 & 7 & 0 & -6 & 0 \\ 3 & -1 & 5 & 0 & 0 \\ 0 & 0 & -1 & 3 & 0 \\ 6 & 0 & 0 & -1 & -3 \\ -11 & 0 & 9 & 0 & -1 \end{bmatrix}; \qquad B' = \begin{bmatrix} 0 & 5 & 0 & -7 & 0 & 60 \\ 3 & 0 & -5 & 0 & 0 & 20 \\ 0 & 2 & 0 & 0 & 0 & 9 \\ 0 & 4 & 0 & 0 & -3 & -8 \\ 0 & 0 & 0 & 6 & 0 & -11 \end{bmatrix}$$

The data (Y and X) thus generated are used as the base data to which different number and different sizes of perturbation quantities are added in different experiments. For every experiment we have limited the number of replicates (NR) to 100, although this number could have been larger or smaller. For each experiment the mean, standard deviation and RMS (Root–Mean–Square) of expected parameters ($\hat{A}$ and $\hat{B}$) have been computed over the 100 replicates. The following formulas are used for computing these statistics.

$$Mean(\hat{a}_{ij}) = (1/NR)\sum_{\ell=1}^{NR} \hat{a}_{\ell ij};\ i, j = 1, m \ ;\ Mean(\hat{b}_{ij}) = (1/NR)\sum_{\ell=1}^{NR} \hat{b}_{\ell ij} \ ; i = 1, k \ ;\ j = 1, m$$

$$SD(\hat{a}_{ij}) = \left[\frac{1}{NR}\sum_{\ell=1}^{NR}(\hat{a}_{\ell ij})^2 - Mean^2(\hat{a}_{ij})\right]^{0.5} ; i, j = 1, m \ ;\ SD(\hat{b}_{ij}) = \left[\frac{1}{NR}\sum_{\ell=1}^{NR}(\hat{b}_{\ell ij})^2 - Mean^2(\hat{b}_{ij})\right]^{0.5} ; i = 1, k \ ;\ j = 1, m$$

$$RMS(\hat{a}_{ij})=\left[\frac{1}{NR}\sum_{\ell=1}^{NR}(\hat{a}_{\ell ij}-a_{ij})^2\right]^{0.5};i,j=1,m \quad ; \quad RMS(\hat{b}_{ij})=\left[\frac{1}{NR}\sum_{\ell=1}^{NR}(\hat{b}_{\ell ij}-b_{ij})^2\right]^{0.5};i=1,k \; ; \; j=1,m$$

A distance between RMS and SD entails bias of the estimation formula and a larger SD entails inefficiency of the estimation formula. Reduction in SD as a response to increase in the number of replicates entails consistency of the estimator formula. In the present exercise we have not looked into the consistency aspect by fixing the number of replicates (NR) to 100, although it could have been done without much effort by increasing NR from (say) 20 to 200 (or more) by an increment of 20 or so.

Experiment–1: In this experiment we have set the number of perturbations at 10 (i.e. NOUT=10) and the size of perturbation (OL) in the range of 10 ± 25 or between –15 to 35. In this range the size of perturbation quantities is randomly chosen and those quantities are added to the data at equiprobable random locations. Accordingly, in the program ROB2SLS the parameters are set at OMIN=10, OMAX=50 such that OL=OMIN+(OMAX–OMIN)*(RAND–0.5). The random number RAND lays between zero and unity (exclusive of limits). To generate the random numbers seed = 2211 has been used (in this as well as subsequent experiments). With this design, we have estimated the structural parameters by 2–SLS, OCP and MCP. The results are presented in tables 1.1 through 3.3. A perusal of these table immediately reveals that the 2–SLS and the W2–SLS(OCP) perform very poorly. Of the two, the 2–SLS appears to perform somewhat better. However, the performance of the W2–SLS(MCP) is excellent.

Table–1.1. Mean of Estimates of Structural Parameters: Method –2–SLS

Variables/ Equations	Mean of Estimated A Matrix					Mean of Estimated B Matrix					
	y_1	y_2	y_3	y_4	y_5	x_1	x_2	x_3	x_4	x_5	x_6
Eq–1	–1	1.4935	0	0.3483	0	0	2.0789	0	–1.146	0	17.9371
Eq–2	2.8945	–1	4.9785	0	0	2.9256	0	–4.9462	0	0	22.1262
Eq–3	0	0	–1	2.8951	0	0	1.9202	0	0	0	9.5226
Eq–4	1.99	0	0	–1	–0.8833	0	0.7576	0	0	–0.9063	–5.6702
Eq–5	–9.9835	0	8.1432	0	–1	0	0	0	5.5251	0	–10.194

Table–1.2. Standard Deviation of Estimates of Structural Parameters: Method –2–SLS

Variables/ Equations	Standard Dev of Estimated A Matrix					Standard Dev of Estimated B Matrix					
	y_1	y_2	y_3	y_4	y_5	x_1	x_2	x_3	x_4	x_5	x_6
Eq–1	0	2.1017	0	2.591	0	0	1.1407	0	2.2643	0	14.9058
Eq–2	0.4527	0	1.6893	0	0	0.7541	0	1.3289	0	0	13.289
Eq–3	0	0	0	0.3976	0	0	0.3328	0	0	0	2.0584
Eq–4	6.1134	0	0	0	3.2882	0	4.9767	0	0	3.227	3.1004
Eq–5	3.8894	0	2.7011	0	0	0	0	0	2.076	0	9.5898

Table–1.3. Root Mean Square of Estimates of Structural Parameters: Method –2–SLS

Variables/ Equations	RMS of Estimated A Matrix					RMS of Estimated B Matrix					
	y_1	y_2	y_3	y_4	y_5	x_1	x_2	x_3	x_4	x_5	x_6
Eq–1	0	5.894	0	6.8566	0	0	3.1359	0	6.2767	0	44.6259
Eq–2	0.4648	0	1.6894	0	0	0.7577	0	1.33	0	0	13.458
Eq–3	0	0	0	0.4112	0	0	0.3422	0	0	0	2.1237
Eq–4	7.3112	0	0	0	3.9105	0	5.9397	0	0	3.8467	3.8782
Eq–5	4.02	0	2.8337	0	0	0	0	0	2.1296	0	9.6236

Table–2.1. Mean of Estimates of Structural Parameters: Method –W2–SLS (OCP)

Variables/ Equations	Mean of Estimated A Matrix					Mean of Estimated B Matrix					
	y_1	y_2	y_3	y_4	y_5	x_1	x_2	x_3	x_4	x_5	x_6
Eq–1	–1	4.5418	0	–	0	0	3.6247	0	–	0	36.9997

				3.2473					4.271		
Eq–2	2.0327	–1	5.0332	0	0	3.1394	0	–4.0161	0	0	12.6559
Eq–3	0	0	–1	2.654	0	0	1.6841	0	0	0	9.0044
Eq–4	2.402	0	0	–1	–1.1363	0	2.1191	0	0	–2.2551	–1.4636
Eq–5	–8.5972	0	7.1151	0	–1	0	0	0	4.68	0	–7.7846

Table–2.1. Mean of Estimates of Structural Parameters: Method –W2–SLS (OCP)

Variables/ Equations	Standard Dev of Estimated A Matrix					Standard Dev of Estimated B Matrix					
	y_1	y_2	y_3	y_4	y_5	x_1	x_2	x_3	x_4	x_5	x_6
Eq–1	0	3.3486	0	3.7184	0	0	2.0598	0	3.7719	0	48.4423
Eq–2	4.0175	0	9.9488	0	0	6.521	0	3.7596	0	0	64.2183
Eq–3	0	0	0	1.1314	0	0	1.2864	0	0	0	12.064
Eq–4	10.0494	0	0	0	4.2537	0	7.802	0	0	6.6725	53.6402
Eq–5	13.1535	0	10.9899	0	0	0	0	0	8.5956	0	24.2266

Table–2.3. Root Mean Square of Estimates of Structural Parameters: Method –W2–SLS (OCP)

Variables/ Equations	RMS of Estimated A Matrix					RMS of Estimated B Matrix					
	y_1	y_2	y_3	y_4	y_5	x_1	x_2	x_3	x_4	x_5	x_6
Eq–1	0	4.154	0	4.6265	0	0	2.4767	0	4.6556	0	53.6253
Eq–2	4.1323	0	9.9489	0	0	6.5225	0	3.8862	0	0	64.6369
Eq–3	0	0	0	1.1831	0	0	1.3246	0	0	0	12.064
Eq–4	10.674	0	0	0	4.6441	0	8.0255	0	0	6.7139	54.037
Eq–5	13.3711	0	11.1504	0	0	0	0	0	8.6964	0	24.439

Table–3.1. Mean of Estimates of Structural Parameters: Method –W2–SLS (MCP)

Variables/ Equations	Mean of Estimated A Matrix					Mean of Estimated B Matrix					
	y_1	y_2	y_3	y_4	y_5	x_1	x_2	x_3	x_4	x_5	x_6
Eq–1	–1	7.0498	0	–6.058	0	0	5.0261	0	–7.0532	0	60.3819
Eq–2	3.0002	–1	5.0011	0	0	3.0004	0	–5.0011	0	0	20.01
Eq–3	0	0	–1	2.9999	0	0	1.9999	0	0	0	8.9995
Eq–4	5.9973	0	0	–1	–2.9984	0	3.9975	0	0	–2.9986	–7.9969
Eq–5	–11.0005	0	9.0001	0	–1	0	0	0	5.9999	0	–10.9989

Table–3.2. Standard Deviation of Estimates of Structural Parameters: Method –W2–SLS (MCP)

Variables/ Equations	Standard Dev of Estimated A Matrix					Standard Dev of Estimated B Matrix					
	y_1	y_2	y_3	y_4	y_5	x_1	x_2	x_3	x_4	x_5	x_6
Eq–1	0	0.0067	0	0.0078	0	0	0.0035	0	0.0071	0	0.051
Eq–2	0.0001	0	0.0004	0	0	0.0002	0	0.0004	0	0	0.0035
Eq–3	0	0	0	0.0001	0	0	0.0001	0	0	0	0.0005
Eq–4	0.002	0	0	0	0.001	0	0.0016	0	0	0.0011	0.0014
Eq–5	0.0013	0	0.0009	0	0	0	0	0	0.0006	0	0.002

Table–3.3. Root Mean Square of Estimates of Structural Parameters: Method –W2–SLS (MCP)

Variables/ Equations	RMS of Estimated A Matrix					RMS of Estimated B Matrix					
	y_1	y_2	y_3	y_4	y_5	x_1	x_2	x_3	x_4	x_5	x_6
Eq–1	0	0.0503	0	0.0585	0	0	0.0263	0	0.0536	0	0.3852
Eq–2	0.0002	0	0.0012	0	0	0.0004	0	0.0012	0	0	0.0106
Eq–3	0	0	0	0.0002	0	0	0.0001	0	0	0	0.0007
Eq–4	0.0033	0	0	0	0.0019	0	0.003	0	0	0.0017	0.0034
Eq–5	0.0014	0	0.0009	0	0	0	0	0	0.0006	0	0.0022

Experiment–2: In this experiment we have set the number of perturbations at 10 (i.e. NOUT=10) and the size of perturbation (OL) in the range of 10 ± 50 or between –40 to 60. The

parameters in the program are set at OMIN=10, OMAX=100 and hence OL=OMIN+(OMAX–OMIN)*(RAND–0.5). The dismal performance of 2–SLS and W2–SLS(OCP) observed in experiment–1 has been further aggravated and therefore we do not consider it necessary to report the mean, SD and RMS of estimated structural parameters for those estimators. However, once again the W2–SLS(MCP) has performed exceedingly well and the results have been presented in Tables 4.1 through 4.3.

A comparison of Tables 3.1 through 3.3 with the Tables 4.1 through 4.3 reveals that increase in the magnitude of perturbation has hardly affected the results.

Table–4.1. Mean of Estimates of Structural Parameters: Method –W2–SLS (MCP)

Variables/ Equations	Mean of Estimated A Matrix					Mean of Estimated B Matrix					
	y_1	y_2	y_3	y_4	y_5	x_1	x_2	x_3	x_4	x_5	x_6
Eq–1	–1	7.0498	0	–6.0579	0	0	5.0261	0	–7.0531	0	60.3817
Eq–2	3.0002	–1	5.0011	0	0	3.0004	0	–5.0011	0	0	20.0097
Eq–3	0	0	–1	2.9999	0	0	2	0	0	0	8.9996
Eq–4	5.9973	0	0	–1	–2.9984	0	3.9974	0	0	–2.9986	–7.9969
Eq–5	–11.0005	0	9.0001	0	–1	0	0	0	5.9999	0	–10.9989

Table–4.2. Standard Deviation of Estimates of Structural Parameters: Method –W2–SLS (MCP)

Variables/ Equations	Standard Deviation of Estimated A Matrix					Standard Deviation of Estimated B Matrix					
	y_1	y_2	y_3	y_4	y_5	x_1	x_2	x_3	x_4	x_5	x_6
Eq–1	0	0.0065	0	0.0076	0	0	0.0034	0	0.0069	0	0.0492
Eq–2	0.0001	0	0.0005	0	0	0.0002	0	0.0004	0	0	0.0038
Eq–3	0	0	0	0.0001	0	0	0.0001	0	0	0	0.0005
Eq–4	0.0018	0	0	0	0.001	0	0.0015	0	0	0.001	0.0015
Eq–5	0.0014	0	0.0009	0	0	0	0	0	0.0006	0	0.002

Table–4.3. Root Mean Square of Estimates of Structural Parameters: Method –W2–SLS (MCP)

Variables/ Equations	RMS of Estimated A Matrix					RMS of Estimated B Matrix					
	y_1	y_2	y_3	y_4	y_5	x_1	x_2	x_3	x_4	x_5	x_6
Eq–1	0	0.0502	0	0.0584	0	0	0.0263	0	0.0536	0	0.3848
Eq–2	0.0002	0	0.0012	0	0	0.0004	0	0.0012	0	0	0.0104
Eq–3	0	0	0	0.0002	0	0	0.0001	0	0	0	0.0007
Eq–4	0.0033	0	0	0	0.0019	0	0.003	0	0	0.0017	0.0034
Eq–5	0.0014	0	0.0009	0	0	0	0	0	0.0006	0	0.0023

Experiment–3: In this experiment we have once again set the number of perturbations at 10 (i.e. NOUT=10) and the size of perturbation (OL) in the range of 10 ± 150 or between –140 to 160. The parameters in the program are set at OMIN=10, OMAX=300 and hence OL=OMIN+(OMAX–OMIN)*(RAND–0.5). The results are presented in Tables 5.1 through 5.3. The findings are that increase in the magnitude of perturbation has not affected the W2–SLS(MCP) estimates in any significant manner.

Table–5.1. Mean of Estimates of Structural Parameters: Method –W2–SLS (MCP)

Variables/ Equations	Mean of Estimated A Matrix					Mean of Estimated B Matrix					
	y_1	y_2	y_3	y_4	y_5	x_1	x_2	x_3	x_4	x_5	x_6
Eq–1	–1	7.0501	0	–6.0583	0	0	5.0262	0	–7.0534	0	60.3836
Eq–2	3.0002	–1	5.0011	0	0	3.0004	0	–5.0011	0	0	20.0095
Eq–3	0	0	–1	2.9999	0	0	1.9999	0	0	0	8.9996
Eq–4	5.9973	0	0	–1	–2.9984	0	3.9975	0	0	–2.9986	–7.997
Eq–5	–11.0004	0	9	0	–1	0	0	0	5.9998	0	–10.9989

Table–5.2. Standard Deviation of Estimates of Structural Parameters: Method –W2–SLS (MCP)

Variables/ Equations	Standard Dev of Estimated A Matrix					Standard Dev of Estimated B Matrix					
	y_1	y_2	y_3	y_4	y_5	x_1	x_2	x_3	x_4	x_5	x_6
Eq–1	0	0.0071	0	0.0083	0	0	0.0036	0	0.0075	0	0.0539
Eq–2	0.0001	0	0.0004	0	0	0.0002	0	0.0004	0	0	0.0036
Eq–3	0	0	0	0.0001	0	0	0.0001	0	0	0	0.0005
Eq–4	0.0019	0	0	0	0.001	0	0.0015	0	0	0.001	0.0014
Eq–5	0.0012	0	0.0009	0	0	0	0	0	0.0006	0	0.002

Table–5.3. Root Mean Square of Estimates of Structural Parameters: Method –W2–SLS (MCP)

Variables/ Equations	RMS of Estimated A Matrix					RMS of Estimated B Matrix					
	y_1	y_2	y_3	y_4	y_5	x_1	x_2	x_3	x_4	x_5	x_6
Eq–1	0	0.0506	0	0.0589	0	0	0.0264	0	0.054	0	0.3874
Eq–2	0.0002	0	0.0012	0	0	0.0004	0	0.0012	0	0	0.0101
Eq–3	0	0	0	0.0002	0	0	0.0001	0	0	0	0.0006
Eq–4	0.0032	0	0	0	0.0019	0	0.0029	0	0	0.0017	0.0033
Eq–5	0.0013	0	0.0009	0	0	0	0	0	0.0006	0	0.0023

Experiment–4: In this experiment we have set the number of perturbations at 30 (i.e. NOUT=30) and the size of perturbation (OL) in the range of 10 ± 25 or between –15 to 35 as in the experiment–1. We want to look into the effects of increasing the number of perturbations in the data matrix. A perusal of the results (presented in Tables 6.1 through 6.3) reveals that the W2–SLS estimator continues to be robust.

Table–6.1. Mean of Estimates of Structural Parameters: Method –W2–SLS (MCP)

Variables/ Equations	Mean of Estimated A Matrix					Mean of Estimated B Matrix					
	y_1	y_2	y_3	y_4	y_5	x_1	x_2	x_3	x_4	x_5	x_6
Eq–1	–1	7.0367	0	–6.0423	0	0	5.0194	0	–7.0391	0	60.2825
Eq–2	3.0002	–1	5.0009	0	0	3.0003	0	–5.0009	0	0	20.0077
Eq–3	0	0	–1	2.9998	0	0	1.9999	0	0	0	8.9992
Eq–4	5.9981	0	0	–1	–2.9988	0	3.9981	0	0	–2.9989	–7.9988
Eq–5	–11.0017	0	9.001	0	–1	0	0	0	6.0005	0	–11.0009

Table–6.2. Standard Deviation of Estimates of Structural Parameters: Method –W2–SLS (MCP)

Variables/ Equations	Standard Dev of Estimated A Matrix					Standard Dev of Estimated B Matrix					
	y_1	y_2	y_3	y_4	y_5	x_1	x_2	x_3	x_4	x_5	x_6
Eq–1	0	0.012	0	0.014	0	0	0.0063	0	0.0129	0	0.0915
Eq–2	0.0001	0	0.0007	0	0	0.0003	0	0.0006	0	0	0.0055
Eq–3	0	0	0	0.0001	0	0	0.0001	0	0	0	0.0007
Eq–4	0.0026	0	0	0	0.0014	0	0.0021	0	0	0.0014	0.0025
Eq–5	0.0014	0	0.001	0	0	0	0	0	0.0007	0	0.0025

Table–6.3. Root Mean Square of Estimates of Structural Parameters: Method –W2–SLS (MCP)

Variables/ Equations	RMS of Estimated A Matrix					RMS of Estimated B Matrix					
	y_1	y_2	y_3	y_4	y_5	x_1	x_2	x_3	x_4	x_5	x_6
Eq–1	0	0.0386	0	0.0446	0	0	0.0204	0	0.0412	0	0.2969
Eq–2	0.0002	0	0.0011	0	0	0.0004	0	0.0011	0	0	0.0095
Eq–3	0	0	0	0.0002	0	0	0.0001	0	0	0	0.001
Eq–4	0.0032	0	0	0	0.0018	0	0.0028	0	0	0.0017	0.0027
Eq–5	0.0022	0	0.0014	0	0	0	0	0	0.0008	0	0.0026

Experiment–5: In this experiment we set NOUT=30 as in experiment–4, but increase the size of perturbations (OL) in the range of 10 ± 150 or between –140 to 160 (as in experiment–3). The results are presented in the Tables 7.1 through 7.3. It is observed that the increase in the size of perturbation has not affected the robustness of W2–SLS(MCP) in any significant manner.

Table–7.1. Mean of Estimates of Structural Parameters: Method –W2–SLS (MCP)

Variables/ Equations	Mean of Estimated A Matrix					Mean of Estimated B Matrix					
	y_1	y_2	y_3	y_4	y_5	x_1	x_2	x_3	x_4	x_5	x_6
Eq–1	–1	7.0359	0	–6.0416	0	0	5.0189	0	–7.0383	0	60.277
Eq–2	3.0002	–1	5.0009	0	0	3.0003	0	–5.0009	0	0	20.0075
Eq–3	0	0	–1	2.9999	0	0	1.9999	0	0	0	8.9992
Eq–4	5.9982	0	0	–1	–2.9989	0	3.9982	0	0	–2.999	–7.9989
Eq–5	–11.0016	0	9.0009	0	–1	0	0	0	6.0005	0	–11.0009

Table–7.2. Standard Deviation of Estimates of Structural Parameters: Method –W2–SLS (MCP)

Variables/ Equations	Standard Dev of Estimated A Matrix					Standard Dev of Estimated B Matrix					
	y_1	y_2	y_3	y_4	y_5	x_1	x_2	x_3	x_4	x_5	x_6
Eq–1	0	0.0124	0	0.0145	0	0	0.0066	0	0.0133	0	0.0948
Eq–2	0.0001	0	0.0007	0	0	0.0003	0	0.0006	0	0	0.0055
Eq–3	0	0	0	0.0002	0	0	0.0001	0	0	0	0.0008
Eq–4	0.0025	0	0	0	0.0013	0	0.002	0	0	0.0013	0.0024
Eq–5	0.0016	0	0.0011	0	0	0	0	0	0.0007	0	0.0026

Table–7.3. Root Mean Square of Estimates of Structural Parameters: Method –W2–SLS (MCP)

Variables/ Equations	RMS of Estimated A Matrix					RMS of Estimated B Matrix					
	y_1	y_2	y_3	y_4	y_5	x_1	x_2	x_3	x_4	x_5	x_6
Eq–1	0	0.038	0	0.044	0	0	0.02	0	0.0406	0	0.2928
Eq–2	0.0002	0	0.0011	0	0	0.0004	0	0.001	0	0	0.0094
Eq–3	0	0	0	0.0002	0	0	0.0001	0	0	0	0.0011
Eq–4	0.0031	0	0	0	0.0017	0	0.0027	0	0	0.0017	0.0026
Eq–5	0.0022	0	0.0015	0	0	0	0	0	0.0009	0	0.0028

Experiment–6: Now we increase the number of perturbations (NOUT=60) but keep the size as in experiment–1 (between –15 to 35). The results are presented in the Tables 8.1 through 8.3. We observe an increase in the RMS of estimated parameters. Yet, the SD and the RMS values are quite close to each other and the mean coefficients are not far from the true values. These findings indicate that even now the robustness of W2–SLS has not been much affected.

Table–8.1. Mean of Estimates of Structural Parameters: Method –W2–SLS (MCP)

Variables/ Equations	Mean of Estimated A Matrix					Mean of Estimated B Matrix					
	y_1	y_2	y_3	y_4	y_5	x_1	x_2	x_3	x_4	x_5	x_6
Eq–1	–1	6.8745	0	–5.8587	0	0	4.9293	0	–6.8653	0	59.0309
Eq–2	2.993	–1	5.0427	0	0	3.017	0	–5.0316	0	0	20.3147
Eq–3	0	0	–1	2.9998	0	0	1.9999	0	0	0	8.9992
Eq–4	5.9328	0	0	–1	–2.9627	0	3.9389	0	0	–2.9597	–7.9645
Eq–5	–11.0289	0	9.0121	0	–1	0	0	0	6.0301	0	–11.2607

Table–8.2. Standard Deviation of Estimates of Structural Parameters: Method –W2–SLS (MCP)

Variables/ Equations	Standard Dev of Estimated A Matrix					Standard Dev of Estimated B Matrix					
	y_1	y_2	y_3	y_4	y_5	x_1	x_2	x_3	x_4	x_5	x_6
Eq–1	0	0.8672	0	0.9883	0	0	0.477	0	0.9275	0	6.6729
Eq–2	0.1023	0	0.2672	0	0	0.0961	0	0.1807	0	0	2.0419
Eq–3	0	0	0	0.0002	0	0	0.0001	0	0	0	0.0009
Eq–4	0.9662	0	0	0	0.5063	0	0.7721	0	0	0.4964	0.5506
Eq–5	1.1557	0	0.7296	0	0	0	0	0	0.5238	0	2.1615

Table–8.3. Root Mean Square of Estimates of Structural Parameters: Method –W2–SLS (MCP)

Variables/ Equations	RMS of Estimated A Matrix					RMS of Estimated B Matrix					
	y_1	y_2	y_3	y_4	y_5	x_1	x_2	x_3	x_4	x_5	x_6
Eq–1	0	0.8762	0	0.9984	0	0	0.4822	0	0.9372	0	6.7429
Eq–2	0.1025	0	0.2706	0	0	0.0976	0	0.1834	0	0	2.066
Eq–3	0	0	0	0.0002	0	0	0.0002	0	0	0	0.0012
Eq–4	0.9685	0	0	0	0.5077	0	0.7746	0	0	0.498	0.5517
Eq–5	1.1561	0	0.7297	0	0	0	0	0	0.5247	0	2.1772

Experiment–7: Now we keep NOUT=60 but increase the size of perturbations to –140 to 160 (as in experiment–3). The results are presented in the Tables 9.1 through 9.3. We observe that the mean estimated structural parameters are as yet quite close to the true values, SDs are quite close to the RMS values, much smaller than the magnitude of the mean estimates in most cases. Hence, we may hold that the W2–SLS continues to be robust to outliers/perturbations.

Table–9.1. Mean of Estimates of Structural Parameters: Method –W2–SLS (MCP)

Variables/ Equations	Mean of Estimated A Matrix					Mean of Estimated B Matrix					
	y_1	y_2	y_3	y_4	y_5	x_1	x_2	x_3	x_4	x_5	x_6
Eq–1	–1	6.4972	0	–5.4211	0	0	4.7328	0	–6.4631	0	56.1148
Eq–2	2.9728	–1	4.7654	0	0	2.9132	0	–4.8139	0	0	18.0302
Eq–3	0	0	–1	2.9348	0	0	1.9504	0	0	0	8.7548
Eq–4	5.6354	0	0	–1	–2.8069	0	3.7122	0	0	–2.8101	–7.8982
Eq–5	–9.9977	0	8.1903	0	–1	0	0	0	5.4531	0	– 9.2529

Table–9.2. Standard Deviation of Estimates of Structural Parameters: Method –W2–SLS (MCP)

Variables/ Equations	Standard Dev of Estimated A Matrix					Standard Dev of Estimated B Matrix					
	y_1	y_2	y_3	y_4	y_5	x_1	x_2	x_3	x_4	x_5	x_6
Eq–1	0	1.8062	0	2.0791	0	0	0.961	0	1.9283	0	13.9632
Eq–2	0.5312	0	2.0574	0	0	0.8135	0	1.489	0	0	15.7156
Eq–3	0	0	0	0.4834	0	0	0.3779	0	0	0	1.8151
Eq–4	1.4475	0	0	0	0.7716	0	1.1431	0	0	0.759	1.6985
Eq–5	3.5302	0	2.6157	0	0	0	0	0	1.7315	0	5.5525

Table–9.3. Root Mean Square of Estimates of Structural Parameters: Method –W2–SLS (MCP)

Variables/ Equations	RMS of Estimated A Matrix					RMS of Estimated B Matrix					
	y_1	y_2	y_3	y_4	y_5	x_1	x_2	x_3	x_4	x_5	x_6
Eq–1	0	1.8749	0	2.1582	0	0	0.9974	0	2.0016	0	14.4936
Eq–2	0.5319	0	2.0708	0	0	0.8181	0	1.5006	0	0	15.8385
Eq–3	0	0	0	0.4878	0	0	0.3811	0	0	0	1.8316
Eq–4	1.4927	0	0	0	0.7954	0	1.1787	0	0	0.7823	1.7016
Eq–5	3.6697	0	2.7381	0	0	0	0	0	1.8158	0	5.8209

Experiment–8: Next, we increase the number of perturbations to set NOUT=75 and set the size of perturbations in the range of –15 to 35. The results are presented in the Tables 10.1 through 10.3. We observe that the unbiasedness of W2–SLS is not much disturbed since the SDs and the RMS values are close to each other. However, many of the mean estimated structural parameters are now quite far from the true values and many SDs are not much smaller than the mean estimated structural parameters. These observations suggest that the W2–SLS is no longer robust to perturbations and it has surpassed its breakdown point. It may be noted that the data matrix has 100 points. When NOUT=60, on an average about 45 of the points are perturbed. Some points are perturbed more than once. For NOUT= 75 about 52 of the points are perturbed; some points are perturbed more than once. Hence we may conclude that W2–SLS has a breakdown point somewhere between 45 to 50 percent. When more than 45 percent of points are perturbed, the estimator may break down and hence may not be reliable.

Table–10.1. Mean of Estimates of Structural Parameters: Method –W2–SLS (MCP)

Variables/ Equations	Mean of Estimated A Matrix					Mean of Estimated B Matrix					
	y_1	y_2	y_3	y_4	y_5	x_1	x_2	x_3	x_4	x_5	x_6
Eq–1	–1	3.3231	0	–1.7563	0	0	3.0309	0	–3.0828	0	31.9744
Eq–2	2.9671	–1	4.985	0	0	3.007	0	–4.9555	0	0	19.8781
Eq–3	0	0	–1	2.9232	0	0	1.9397	0	0	0	9.1577
Eq–4	4.7061	0	0	–1	–2.319	0	2.9417	0	0	–2.335	–7.0549
Eq–5	–10.0395	0	8.2862	0	–1	0	0	0	5.5304	0	–9.8211

Table–10.2. Standard Deviation of Estimates of Structural Parameters: Method –W2–SLS (MCP)

Variables/ Equations	Standard Dev of Estimated A Matrix					Standard Dev of Estimated B Matrix					
	y_1	y_2	y_3	y_4	y_5	x_1	x_2	x_3	x_4	x_5	x_6
Eq–1	0	3.5138	0	4.0812	0	0	1.8679	0	3.7447	0	26.6848
Eq–2	0.3998	0	1.8369	0	0	0.7822	0	1.3523	0	0	12.602
Eq–3	0	0	0	0.3961	0	0	0.3163	0	0	0	1.3959
Eq–4	4.1717	0	0	0	2.2287	0	3.5142	0	0	2.1507	4.343
Eq–5	2.7754	0	2.1354	0	0	0	0	0	1.387	0	5.734

Table–10.3. Root Mean Square of Estimates of Structural Parameters: Method –W2–SLS (MCP)

Variables/ Equations	RMS of Estimated A Matrix					RMS of Estimated B Matrix					
	y_1	y_2	y_3	y_4	y_5	x_1	x_2	x_3	x_4	x_5	x_6
Eq–1	0	5.0859	0	5.8877	0	0	2.7141	0	5.4191	0	38.6977
Eq–2	0.4011	0	1.837	0	0	0.7822	0	1.353	0	0	12.6026
Eq–3	0	0	0	0.4035	0	0	0.322	0	0	0	1.4047
Eq–4	4.3678	0	0	0	2.3304	0	3.6701	0	0	2.2512	4.4446
Eq–5	2.9369	0	2.2516	0	0	0	0	0	1.4644	0	5.8539

6. Conclusion

In this paper we have proposed a robust 2–Stage Weighted Least Squares estimator for estimating the parameters of a multi–equation econometric model when data contain outliers. The estimator is based on the procedure developed by Norm Campbell which has been modified by using the measure of robust median deviation suggested by Hampel et al. The estimation method based on the original Campbell procedure performs poorly, while the method based on the modified Campbell procedure shows appreciable robustness. Robustness of the proposed method is not much destabilized by the magnitude of outliers, but it is sensitive to the number of outliers/perturbations in the data matrix. The breakdown point of the method, is somewhere between 45 to 50 percent of the number of points in the data matrix.

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ADVANCES IN KNOWLEDGE DISCOVERY IN DATABASES

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Abstract:
The Knowledge Discovery in Databases and Data Mining field proposes the development of methods and techniques for assigning useful meanings for data stored in databases. It gathers researches from many study fields like machine learning, pattern recognition, databases, statistics, artificial intelligence, knowledge acquisition for expert systems, data visualization and grids. While Data Mining represents a set of specific algorithms of finding useful meanings in stored data, Knowledge Discovery in Databases represents the overall process of finding knowledge and includes the Data Mining as one step among others such as selection, pre–processing, transformation and interpretation of mined data. This paper aims to point the most important steps that were made in the Knowledge Discovery in Databases field of study and to show how the overall process of discovering can be improved in the future.

Keywords: KDD, Knowledge Discovery in Databases, Data Mining, Knowledge Management

1. Introduction

Knowledge Discovery in Databases (KDD) is the non–trivial process of identifying valid, novel, potentially useful, and ultimately understandable patterns in data [Fayadd, Piatesky–Shapiro, and Smyth, (1996)].

Data Mining (DM) represents a set of specific methods and algorithms aimed solely at extracting patterns from raw data [Fayadd, Piatesky–Shapiro, and Smyth, (1996)].

The KDD process has developed due to the immense volume of data that must be handled easier in areas such as: business, medical industry, astronomy, genetics or banking field. Also, the success and the extraordinary development of hardware technologies led to the big capacity of storage on hard–disks, fact that challenged the appearance of many problems in manipulating immense volumes of data. Of course the most important aspect here is the fast growth of the Internet.

The core of the KDD process lies in applying DM methods and algorithms in order to discover and extract patterns from stored data but before this step data must be pre–processed. It is well known that simple use of DM algorithms does not produce good results. Thus, the overall process of finding useful knowledge in raw data involves the sequential adhibition of the following steps: developing an understanding of the application domain, creating a target data set based on an intelligent way of selecting data by focusing on a subset of variables or data samples, data cleaning and pre–processing, data reduction and projection, choosing the data mining task, choosing the data mining algorithm, the data mining step, interpreting mined patterns with possible return to any of the previous steps and consolidating discovered knowledge [Fayadd, Piatesky–Shapiro, and Smyth, (1996)].

Typical DM tasks are: classification – is learning a function that maps (classifies) a data item into one of several predefined classes [Weiss and Kuliakowski (1981); Hand (1981)], regression – is learning a function that maps a data item to a real–valued prediction variable [Fayadd, Piatesky–Shapiro, and Smyth, (1996)], clustering – is the partitioning of a data set into subsets (clusters), association rules – determine implication rules for a subset of record attributes, summarization – involves methods for finding a compact description for a subset of data [Fayadd, Piatesky–Shapiro, and Smyth, (1996)], dependency modelling – consists of finding a model that describes significant dependencies between variables [Fayadd, Piatesky–Shapiro, and Smyth, (1996)], change and deviation detection – represents the search for finding the most important changes in the data from previous measured values [Fayadd, Piatesky–Shapiro, and Smyth, (1996)].

The discovery of knowledge in databases contains many study areas such as machine–learning, pattern recognition in data, databases, statistics, artificial intelligence, data acquisition for expert systems and data visualization. The most important goal here is to extract patterns from data and to bring useful knowledge into an understandable form to the human observer. It is recommended that

obtained information to be facile to interpret for the easiness of use. The entire process aims to obtain high–level data from low level–data.

In terms of applying the KDD process there are a wide variety of sciences in which it can be used such as biology, medicine, genetics, astronomy, high–energy physics, banking, business and many others. DM methods and algorithms can be applied on a multitude of information from plain text to multimedia formats.

2. State Of The Art in KDD

The studies made about knowledge discovery in databases are advanced regarding DM methods and algorithms used to extract knowledge from data.

The main goals of KDD are: verification and discovery [Fayadd, Piatesky–Shapiro, and Smyth, (1996)]. With the verification goal, the system takes account only of user's hypothesis. Following the discovery goal, the system acts autonomous in finding useful data [Fayadd, Piatesky–Shapiro, and Smyth, (1996)]. Further, the discovery goal is subdivided in prediction and description [Fayadd, Piatesky–Shapiro, and Smyth, (1996)]. In the prediction goal, the system extracts patterns from data in order to predict future behavior of some entities. Description focuses on finding human–interpretable patterns describing the data. The importance of prediction and description goals for certain data mining applications can vary very much. However, in the context of KDD, description tends to be more important than prediction. This is in contrast to pattern recognition and machine learning applications (such as speech recognition) where prediction is often the primary goal of the KDD process [*Knowledge Discovery in Database*]. These goals are achieved with DM tasks.

For each DM task there were developed a wide variety of data mining algorithms and methods such as: decision trees, decision rules, non–linear regression, classification methods (the neural networks play an important role here), example based methods, models based on relational learning.

Intersecting the KDD field with parallel computing or distributed computing can develop the existent DM algorithms. The most important problem in the process of finding knowledge is the optimized applying of all KDD steps. Each step from the KDD process takes an amount of time. Besides analyzing certain neural network methods of classification, in this thesis we will focus also on the possibility of minimizing the amount time consumed on some KDD steps.

When the KDD term was introduced back in 1989 by the researcher Gregory Piatesky–Shapiro, there weren't too many data mining instruments for resolving one single task. A good example is the C4.5 decision tree algorithm [Quinlan, (1986)] and SNNS neural network, or parallel–coordinate visualization [Inselberg, (1985)]. This tools were hard to use and required important data preparation [Piatesky–Saphiro, (1991)].

The second–generation data mining systems were called suites and were developed by vendors, starting from 1995. These tools took into account that the KDD process requires multiple types of data analysis, and most of the effort is spent in the data cleaning and preprocessing steps. Suites like SPSS Clementine, SGI Mineset, IBM Intelligent Miner, or SAS Enterprise Miner allowed the user to perform several discovery tasks (usually classification, clustering, and visualization) and also supported data transformation and visualization. One of the most important advances, pioneered by Clementine, was a GUI (Graphical User Interface) that allowed users to build their knowledge discovery process visually [Piatesky–Saphiro, (1991)].

By the year 1999, there were over 200 tools available for solving different tasks but even the best of them addressed only a part from the overall KDD framework. Data still had to be cleaned and preprocessed. The development of this type of applications in areas like direct marketing, telecom, and fraud detection, led to emergence of data–mining–based "vertical solutions". The best examples of such applications are the systems HNC Falcon for credit card fraud detection, IBM Advanced Scout for sports analysis and NASD KDD Detection system [Kirkland, (1999); Piatesky–Saphiro, (1991)]

A very important issue is the way that data was stored over the time. Many years the main approach was to use a specific DM method or algorithm on a data set. In most cases the data set was stored in a centralized database. In present, because of big volumes of data the main solution is to use distributed databases systems. For mining in this data in the traditional way it is supposed that all data stored on local computers should be transferred on a central point for processing. In most cases this would be impossible because the existent connection bandwidth won't permit such big transfers. A very important matter is that when big transfers are made over the Internet can appear security issues:

the intimacy of client's data must be kept. Thus, a new KDD study area appeared that was called Privacy Preserving Data Mining. This field focuses on studying the security risks that can occur in the KDD process. Because the number of steps that are included in the KDD framework is relative big client's data that are mined can be violated. Privacy Preserving Data Mining tries to create algorithms that may prevent such problems [University of Munich Institute for Computer Science Database and Information Systems].

In the last years the KDD process was approached from two perspectives: parallel and distributed computing. These directions led to the apparition of Parallel KDD and Distributed KDD. In Parallel KDD, data sets are assigned to high performance multi–computer machines for analysis. The availability of this kind of machines is increasing and all algorithms that were used on single–processor units must be scaled in order to run on parallel–computers. The Parallel KDD technology is suitable for scientific simulation, transaction data or telecom data. Distributed KDD must provide solutions for local analysis of data and global solutions for recombining local results from each computing unit without causing massive data transfer to a central server. Parallel computing and distributed KDD are both integrated in Grid technologies. One of the creators of Grid concept, I. Foster wrote the followings: *The real and specific problem that underlies the Grid concept is coordinated resource sharing and problem solving in dynamic, multi–institutional virtual organizations (VO). The sharing that we are concerned with is not primarily file exchange but rather direct access to computers, software, data, and other resources, as is required by a range of collaborative problem–solving and resource–brokering strategies emerging in industry, science, and engineering. Among them, Data Mining is one of the most challenging.*

Grid computing emerged because computational power is falling behind storage possibilities. The annual doubling of data storage capacity managed to reduce the cost of a terabyte and now many researchers in physics or astronomy discuss the possibility of mining into petabyte archives. The solution to these problems lies in dramatic changes taking place in networking. All Data Mining algorithms and methods must be adapted to operate intelligent with raw data stored in a distributed way. Managing such great quantities of data over such big geographical distances brings in discussion the security problem again. Developing study fields like Privacy Preserving Data Mining is crucial for keeping the intimacy over client's data intact.

Next–generation grids will face many problems such as the management and exploitation of the overwhelming amount of data produced by applications but also Grid operations, and the intelligent use of Grid resources and services. The new generations of Grids should contain knowledge discovery and knowledge management functionalities, for both applications and system management.[Cannataro, (2003)]

3. KDD and Neural Networks

The Data Mining step is at the heart of the KDD process. Many of the DM tasks are achieved with the help of neural networks. The computing model of these networks is the human brain, so neural networks are supposed to share some brain abilities to learn and adapt in response to external inputs. When exposed to a set of training or test data, neural networks can discover previously unknown relationships and learn complex non–linear patterns in the data.

One of the most important function that our brain is able to do is the ability to classify between two things. The evolutional success of many species was made possible through this ability of discerning between what is friendly and what is dangerous for a particular specie.

Although classification is very important, sometimes it can be overdone. Because of our limited storage capacity it's crucial for us to be able to group similar notions or objects together. This ability is called clustering and is one of the main tools involved in reasoning. Because of this skill we can think in terms of abstracts notions and solve problems by seeing the hole picture and neglect unimportant details.

Regression is learning function that maps a detail of data into a real variable used for prediction. This is similar with what people do: just from seeing a few examples people can learn to interpolate between the examples given in order to generalize to new problems or cases that were not encountered. In fact the ability of generalize is one of the strongest points in using the neural network technology.

Neurophysiologists proved that the learning theory of brain called Hebbian is true: people store information by associating ideas with other related memories. In our brain there is a complex network of semantically related ideas. The theory says that when two neurons are activated in the brain at the same time, then the connection between them grows stronger and that physical changes in the synapse of the neurons took place. Associative memory branch from the neural network filed deals with implementing models that describe the associative behaviour. Neural networks such as Binary Adaptive Memories and Hopfield networks shown to be limited capacity, but working, associative memories.

These DM operations are resolved with different neural models: backpropagation networks, recurrent backpropagation networks, Self–organizing Maps(SOM), Radial Basis Function networks(RBF), Adaptive Resonance Theory networks (ART), probabilistic neural networks, Fuzzy perceptrons. Each structure can make certain DM operations.

We use in our experiments the following distributed architectures only for resolving the classification task:

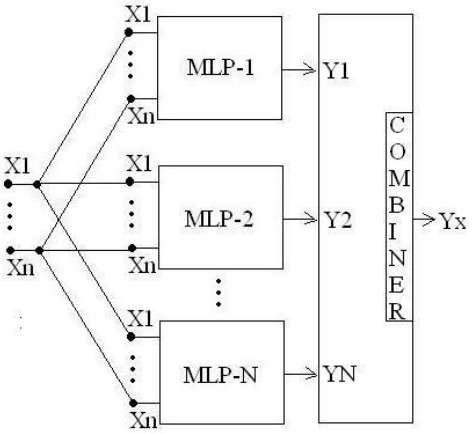

Figure 1. Multilayer Perceptron Committee Machine.

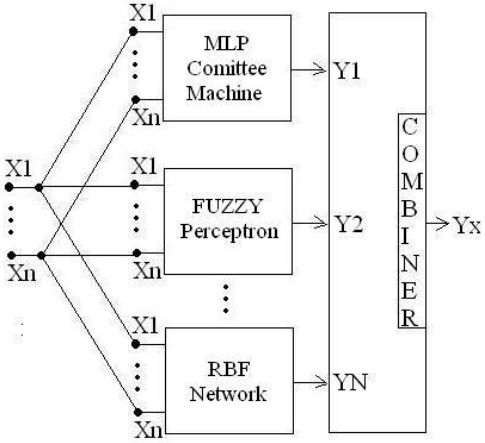

Figure 2. General Committee Machine

In the General Committee Machine (G–CM) arhitecture we have multiple neural topologies runing in the same time in a distributed way. The first block from G–CM (MLP–CM) is working in a distributed manner by itself [Mukarram, and Tahir, (2007)]. This method is prefered because of the advantages that every topology has to offer. Multilayer perceptron should be more resistant to noise than other topologies. The Fuzzy Perceptron and RBF Neural Networks are used mainly for speed. Natural organisms are equipped with multiple instruments for analyse certain problems so the proposed architectures must be fast and reliable. The entire system is autonomous and will try not to use more computational power than it's necessary. In the MLP–CM, each MLP–block will start with random weights and will work in parallel in order to reach a global error faster than normally. The result will depend on the randomly generated weights so some of the MLP–blocks will reach local minimums but some of them will reach a global minimum. Each block will have its error function. The final results will be transmited to the combiner in order to select the best result.

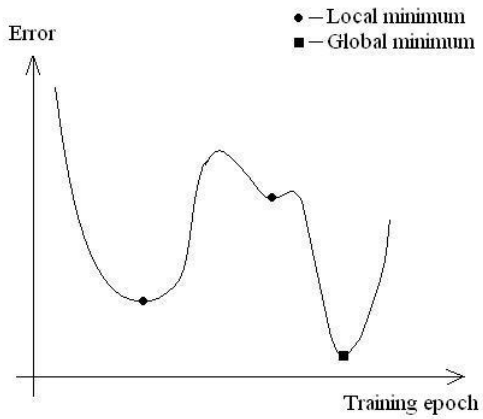

Figure 3. Example of error function

The architecture proposed in Fig.2 is the most suited for performing the clasification task in the buisness field because of the resistance to noise data.

As we can see, the ultimate goal of the neural networks is to imitate the behaviour of natural organisms.

At the base of neurology lies the studies of neurons. Neural Network field constantly benefits and depends on this field of research. Recent studies show that many of the old views should be revised because the structure and the behaviour of the natural neurons. First of all, it seems that electric synapses are more common than previously thought [Connors, and Long, (2004)]. So, instead of having an individual functionality, in some portions of the brain we have distributed computing of the information – many groups of neurons are activated simultaneous. Another observation is that dendrites and axons have the so called "voltage–gated ion channels" which can generate electric information carrying potentials from and towards the soma. This behaviour rise doubts about many actual theories that stipulate that dendrites are passive information receivers and the axons sole transmitters. These observations lead to the conclusion that neurons are more complex in structure and operations than previously thought. An important fact is also that role played by glia cells. Neurons and glias are the main components of the central nervous system. The number of the glia cells is ten times bigger than that of neurons. New studies about glia cells show that these cells are vital for the processing of information [Witcher, Kirov, and Harris, (2007)].

The McCulloch–Pitts neuron is a reduced model of the real neuron. Because of the new discoveries that are made in neurology research a new neuron model will appear eventually. These is a very feasible prediction and it can be sustained by the increase of computing power, parallel and distributed computing technologies.

4. Future Directions of Study

Although there are many future directions of study into this field of research, we can summarize the most important of them:

- The continuous development and optimisation of the Data Mining algorithms. From those presented we can predict that the neural network field can still be improved by bringing artificial neuron models as close as possible to the functionality of the biologic neuron. As we come close to the real neuron we should obtain similar performances and because of parallel and distributed technologies the functionality of large numbers of neuron units acting in a simultaneous way will be achieved.
- One of the most important study is the one about the implementation of the KDD steps on GRID platforms. Other areas of research are Parallel KDD and Distributed KDD. Because of the fact that Knowledge Discovery in Databases is an intense computing process the problem of testing specific algorithms in distributed systems is still opened.
- The continuous improvement of additional steps from the KDD process. A very important matter here is that in the real world analysed data is not pre–processed. Most of the time it is

incomplete or incorrect. So the data must be pre–processed in an intelligent and optimised manner. It is well known that DM algorithms applied on wrong data it's worthless time consumption. Certain tests must be made to see exactly how the well known neural topologies behave when they have also noise besides good data at the input. This problem must be determined because there are groups of researchers that are saying that some neural topologies are more resistant to noise and other groups that are saying that all topologies are affected equally.

▪ The development of expert acquisition systems can resolve many of the aforementioned problems. A big problem is that many DM systems loose so much time with eliminating and correcting the rough data. It would be correct to move this process to the moment in which the data are gathered. This is one of the main reasons that slows down the development of KDD.

We propose to follow the second scheme as much as possible when data are collected for Data Mining:

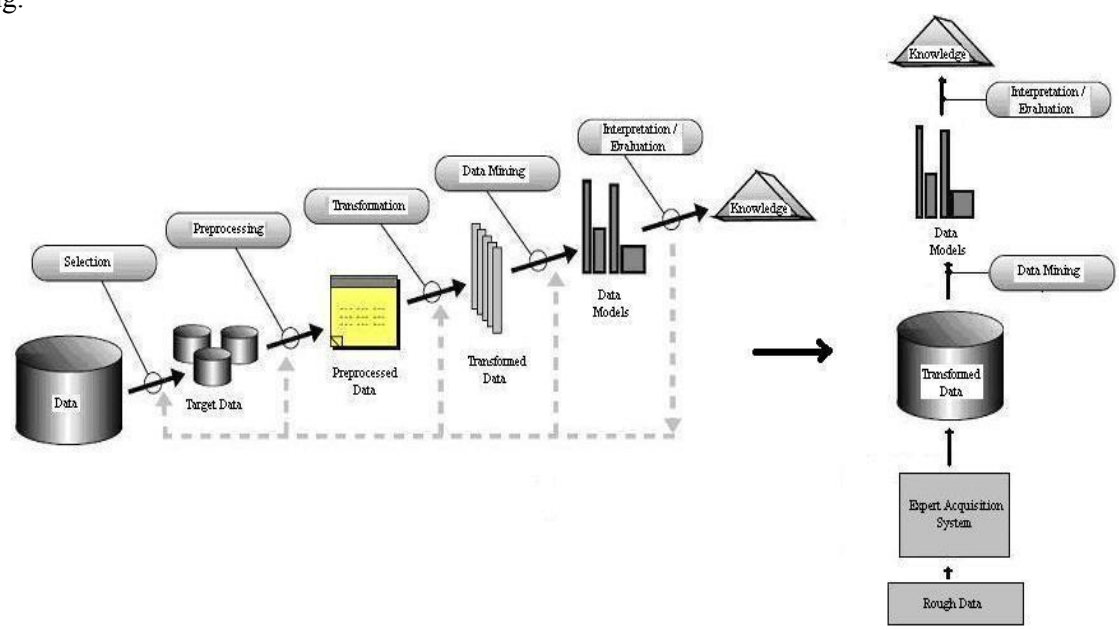

Figure 4: The classic KDD process and the new proposed model

The schemes are mainly the same but the difference is that the Expert Acquisition System (EAS) makes all the verifications at the moment when data are gathered. A big part from the selection and preprocessing steps is already done by the EAS. The best situation for KDD systems is to have good data from the start. It is well known that selection, preprocessing and transformation steps take more time than the Data Mining step.

▪ One of the most important future directions of study in KDD is also to resolve the security issues that might appear. Working in distributed systems is unavoidable because DM is an intense computing process so we can have important data exposed to other parties. This is something that must be avoided.

5. Conclusions

Knowledge Discovery in Databases process still poses many problems to the researchers.

In our future research we aim to study the performances of applying certain neural network algorithms on stored data and the possibility to improve the results by optimising the way that data is stored. We will treat also the performances of specific neural algorithms applied on data stored into centralized and distributed databases and observe exactly what effects has the noise on analysed data and how well certain topologies are more or less sensitive to it. Tests will be made to see how the dimensionality of databases affects the performances of the neural network architectures. The overall process of discovering useful information in data will be analysed and we hope to improve some steps from the KDD process.

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RATING AND OTHER FACTORS EXPLAINING THE CORPORATE CREDIT SPREAD: EMPIRICAL EVIDENCE FROM TUNISIAN BOND MARKET

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Abstract:
This is an examination of the determinants of corporate bond credit spreads using both primary and secondary market spreads for Tunisian corporate bonds. The factors which I use as explanatory variables in our estimations can be divided into three categories: market variables, issue and issuer characteristics. To some extent, these three categories correspond to the different types of risk, namely interest rate risk, liquidity risk and credit risk. Using OLS regressions, our empirical results indicate that primary market spreads are sensible to issue characteristics such as rating. Also, spreads observed in secondary market are sensible to market variables namely Exchange Index and Slope, characteristics issuers and issues (Rating and Time to maturity). This is the first study to indicate that the explanatory power of factors depends of spreads modelled. Hence, corporate credit spreads are driven by both default and interest rate risk for the secondary market and only by default risk for the primary market.

Keywords: credit spread, interest rate risk, liquidity risk, rating.

JEL Classification: G12, G24, G33

1. Introduction

In recent literature, a great deal of attention has been devoted to understanding the stochastic nature and determinants of credit spread. This issue plays a central role in the fixed income literature, primarily because of its importance in the pricing of risky debt and credit derivatives [Duffee, (1998), Longstaff, and Schwartz, (1995); Jarrow and Turnbull, (1995)].

The credit spread is defined to be the additional amount of interest prayed by a risky asset over the yield of a risk–free investment. In this context the term risky represents the credit risk, to which the asset is exposed through the probability of the issuer not being able to meet his obligations. This inability of meeting the obligation can be caused by insolvency, bankruptcy and further reasons leading to a delay or loss of promised payments and is referred to as the defaults of the obligor.

In the literature, there are two theoretical approaches to the pricing of risky debt. Both approaches take into account credit spreads as a central component in their pricing models.

In the structural approach [Merton, (1974), Longstaff and Schwartz, (1995)], Bevan and Garzarelli, (2000), Colin–Dufresne, *et al*., (2001), and Huang and Huang, (2003)], one makes explicit assumptions about the dynamics of a firm's assets, its capital structure, as well as its debt and share holders. It is then supposed that the firm defaults if its assets are not sufficient to pay off the due debt.

The factors affecting the price of a default–risky bond in a structural model differ for the various variants and extensions of Merton's basic model. They are determined by the respective specification of the firm value process, the definition of the threshold for the default event and other modelling issues like consideration of bankruptcy costs or stochastic interest rates. However, the set of factors which determine the price of a default–risky bond according to Merton's basic specification is common to all of its variants. In Merton's model the price of the put option on the firm's value is given by the well known Black Scholes formula and hence the factors are the ratio of debt to the value of the firm, i.e., the leverage ratio, the volatility of the firm value and the risk–free interest rate. We can see additional factors which are motivated by extensions of the basic framework, like the structural model of default risk with stochastic interest rates by Longstaff and Schwartz (1995), as well as variables motivated by empirical evidence such as measures for liquidity risk.

In the reduced form approach [Fons (1994); Jarrow and Turnbull (1995); Jarrow, *et al*., (1997); Elton, *et al*., (2001)] the default is not causally modelled in terms of firm's assets and liabilities, but is typically given exogenously i.e., the default occurs completely unexpectedly, by surprise so to speak. The stochastic structure of default is directly prescribed by an intensity or compensators process. Due

to the unpredictability of default time, the implied credit spread properties are empirically quite plausible.

Recently, the yield spread is regarded as a measure of a comprehensive risk premium to compensate investors for a number of risks associated with corporate bonds. As described in Huang and Kong (2003), this credit spread on corporate bonds is the extra yield offered to compensate investors for a variety of risks, such as expected default loss, credit risk premium due to the uncertainty of default losses and liquidity and tax premiums. For investment–grade corporate bonds, Elton *et al*., (2001), using a reduced form model, estimate a state tax premium on the order of 40 basic points and Houweling *et al*., (2003) estimate a liquidity premium on the order of 20 basic points. Delianedis and Geske (2001) study the proportion of the credit spread that is explained by default risk, using a structural model. They conclude that it only explains a small fraction of the credit spreads; the rest is attributable to taxes, jumps, liquidity and market risk factors. The paper of Collin–Dufresne *et al*., (2001) studies which factors determine the first differences of credit spreads of individual industrial bonds on US market. Their main finding is that the spreads are mostly determined by a single common factor, which is not related to pricing theory.

The main focus of the present paper is not the pricing of assets subject to credit risk, but I examine theoretical implications and empirical evidence of credit spreads. The purpose of this study is to examine the determinants of credit spreads observed in primary and secondary Tunisian market. I do this in four ways. First, published empirical work has concentrated though almost uniquely on the secondary market, especially on the US bond market. This is the first study to indicate that the explanatory power of factors depends of spreads modelled. Second, previous research focuses on the determinants of either default risk [Duffee (1998)], systematic risk [Elton, *et al*., (2001)] or liquidity risk [Ericsson and Renault, (2006)]. In this paper, I use several explanatory variables that correspond to the different types of risk. Third, the factors used in this paper present qualitative and quantitative characters. Fourth, I include an analysis of investment and no investment grade bonds to better understand how these risk factors change across risk classes.

Notice that this paper is one of very few to document the determinants of credit spread in the emerging market, namely Tunisian market of corporate bonds.

The factors which I use as explanatory variables in this study can be divided into three categories: market variables, issue and issuer characteristics. To some extent, these three categories correspond to the different types of risk which account for the spreads between the yield of corporate bonds and the yield on government bonds, namely interest rate risk, liquidity risk and credit risk.

The analysis confirms that credit spread for new issues are closely related to issuer characteristics, namely rating. Notice that the coefficient of rating is consistent with intuition (Investment Grade is usually associated with a low credit spreads). We can see that spreads observed in secondary market are sensible to market variables namely Exchange Index and Slope, issuer and issue characteristics (Rating and Time to maturity). To summarize, the Tunisian credit spreads are driven by both default and interest rate risk for the secondary market and only by default risk for the primary market and also provides evidence in favour of incorporating macroeconomic indicators into credit risk models.

The paper is organised in the following manner. First, I examine previous empirical and theoretical research suggesting a number of explanatory variables, which could affect the credit spreads. Second, I describe the main empirical results. Finally, I conclude the paper.

2. Explanatory Variables

The theoretical approach and empirical evidence show that the corporate credit spreads are affected by three factor types: market variables, issue and issuer characteristics. The most commonly mentioned factors are the default risk, liquidity effects, the term–structure of the risk free interest rate, macroeconomic indicators and the term to maturity.

2.1. Issuer characteristics

2.1.1 Rating

The theoretical central component of the credit spreads is the default risk. It refers to the probability that the issuer of a bond may default on its obligations and to the associated capital loss.

Previous studies found a strong relation between a yield spreads and rating. In fact, rating provides important information in the issuer ability to meet his obligations. A declining in credit quality of issuer can leads to inability of meeting the obligation and to a delay or loss of promised payments.

Empirical studies, like Duffee (1998) and Alessandrini (1999), have proven a tight relationship between rating and default experience and thus the credit spread. Fons (1994), Alessandrini (1999), Delianedis and Geske (2001) and Zhang (2002) observed a stronger reaction of low–graded corporate bonds spreads to systematic business cycle–related risk than high–grade bonds else equal. Alessandrini (1999) and Düllmann, *et al*., (2000) detected a higher volatility for lower–grade bonds.

Notice that Merli and Roger (1999) and Merli (2000) illustrate a negative relationship between rating and risk premiums observed in the French market of corporate bonds.

2.2 Market variables

2.2.1 Interest Rate Variables

In order to study the relationship between credit spreads and the term–structure, empirical studies implement two variables, which summarize most of the variation of the term–structure, the level and the slope of the term structure.

2.2.1.1 Level

We can see several theoretical arguments concerning the relation between credit spreads and the risk–free interest rate. While structural approach illustrates a negative relationship between the risk free rate and the default risk and thus the credit spread [Longstaff and Schwartz, (1995)], reduced form models usually postulate for empirical implementation the independence of risk–free interest rates and default risk.

Mixed empirical evidence has been found on the relationship between the credit spread and the term–structure of the risk–free interest rate.

Empirical studies like Duffee (1998) and Alessandrini (1999) for the US market, Annaert and DeCeuster (19999 for the European market by, Frino *et al*., (2006) for Australian market by and for the German market by Düllmann, *et al*. (2000) confirm a negative relation for longer maturities as well as for lower–grade bonds.

Bevan and Garzarelli (2000) support the negative relationship over the short term, over the long run, however, they document a theoretically inconsistent positive relationship.

Joutz, *et al*., (2000) suggest that Treasury yields are positively related to credit spreads in the long run, but negatively related in the short run. This has implications in the contingent claims and the reduced form approaches for valuing risky debt. In the contingent claims approach framework, an increase in Treasury yields is a negative signal to the market over the long run about the firm's future cash flows. In the short run, however, an increase in the Treasury yield indicates an increase in the value of the call option.

Huang and Kong (2003) shows that relation between interest rate level and credit spreads depend of rating. Notice that this factor can account for only a small portion of the credit spread changes for the investment–grade indexes. The signs of the coefficients on the interest rate are consistent with intuition. High interest rates and steep yield curves are usually associated with an expanding economy and low credit spreads. This variable performs much better for the high–yield credit spread series.

2.2.1.2 Slope

The interpretation of the slope of the riskless yield curve is twofold: first, in the context of the Longstaff and Schwartz (1995) structural model with stochastic interest rate, in the long run the short rate is expected to converge to the long interest rate. Hence an increase in the slope of the term structure should lead to an increase in the expected future spot rate. This in turn will decrease the credit spread, as has been pointed out above. Second, from a more general perspective, a decreasing slope of the term structure may imply a weakening economy, which in turn may lower the expected growth rate of the firm value and hence lead to higher credit spreads. Thus both arguments predict an inverse effect of changes in the slope of the yield curve on changes in the credit spread.

Boss and Scheicher (2006) show that the slope of the yield curve has a statistically significant influence on credit spreads, with coefficient around –0.28. The sign is in accordance with bond pricing theory.

Brown and Zarnic (2003) indicate that the sign of the coefficient for the term–structure slope is negative, which is in accordance with intuition, but the coefficient is statistically insignificant.

Joutz, *et al*., (2000) indicate that relation between credit spreads and the slope is complex. For intermediate investment grade bonds, there is a positive relation in both the short and long run, but for long–term bonds the predominant relation in the long run is negative and there is no statistically significant relation in the short run.

Frino *et al*., (2006) find that changes in the slope of the yield curve possess a significant amount of explanatory power for changes in AAA, AA and A spreads.

Batten and Hogan (2003) and Collin–Dufresne *et al*., (2001) find that the coefficients on the changes of the slope of the yield curve are not significant explanators of changes in the credit spread.

2.2.2 Macroeconomic Indicators

Empirical evidence indicates that credit spreads behave cyclically over time [Van Horne, (2001)]. During periods of economic downturn, credit spreads are expected to widen as investors become more risk–averse and firms have lower asset returns. Fridson and Jonsson (1995) find that an index of lagging economic indicators has significant impact on credit spread changes for high yield bond indexes. Helwege and Kleiman (1997) find that the GDP growth rate and recession indicators are important in explaining the aggregate default rates of high–yield bonds.

Jarrow and Turnbull (2000) also suggest that incorporating macroeconomic variables may improve a reduced–form model.

Huang and Kong (2003) use the month–to–month percentage changes in the three indexes of leading, coincident, and lagging indicators as gauges of the state of the US economy. The leading indicator index indicates the future direction of aggregate economic activity. The coincident indicator index measures the current health of the economy. And the lagging indicator index usually reaches its cyclical peaks in the middle of a recession.

As expected, increases in the leading index lead to narrowing credit spreads. But surprisingly, the coincident index, which measures the current health of the economy, has positive coefficients that are significant at the 5% level for four of nine credit spread series. The sign on the lagged index is mixed, and is insignificant in all cases.

Bedendo *et al*., (2004) found that a phase of economic downturn which affected the US economy in 2000–2001 had a significant impact on corporate credit spreads.

2.3 Issue characteristics

2.3.1 Term to maturity

Theoretical studies illustrate a strong relationship between term to maturity of a corporate bond and its credit spread, which is referred to as the term structure of credit spreads or credit spread curve. This relation is regarded as complex and depends on the risk of the issuing firm.

While the probability of a downgrade of high–rated companies increases with increasing term to maturity, resulting into an upward–sloping credit spread curve, low–grade companies experience an increasing probability of being upgraded the longer the term to maturity and thus a decreasing spread. This functional dependence of the credit spread on the maturity has been empirically supported by Fons (1994) and Sarig and Warga (1989).

Helwege and Turner (1999) found similar results for investment grade bonds, but argue that the downward–slope might result from a sample selection bias related to the use of ratings–related aggregate spreads.

Using the Helwege and Turner approach, He, *et al.*, (2002) confirm the findings of Fons (1994) and Sarig and Warga (1989) i.e., an upward–sloping credit spread curve for investment grade bonds and a downward–slope for speculative grade bonds.

Empirical studies like Truck *et al*. (2004) find only upward–sloping credit spread curves. These empirical results, which contradict theory, are explained by dependence on parameter values or no directly applicapability of theories for individual firms to aggregate credit spreads. The issue is still quite controversial.

2.3.2. Liquidity measuring variables

Liquidity is usually referred to as the ease with which a financial asset can be sold at or near its value. There are competing models, which examine different markets and use different measures to capture its effect on bond yields. Mostly it is not clear how much liquidity risk contributes to the spread credit. The great majority of the academic literature defines liquidity within market microstructure models in terms of transaction costs. This approach is mainly concerned about inventory risk, which will be priced by market participants in the form of higher bid–ask spreads.

In literature different measures for liquidity were used. For corporate bonds, where most transactions occur on the over the counter market, direct liquidity measures based on transaction data are often not reliable and difficult to obtain.

Fisher (1959) was among the first academics that proposed the issued amount as a proxy variable. He claimed that large issues trade more often, so that the issued amount is actually a proxy for the direct liquidity measure trading volume. Recent studies' results suggest that larger issues are more liquid than smaller issues and should have a higher price and lower yield in order to account for the liquidity premium. Although all studies found the positive price effect of the issued size on government bond yields, the empirical research on corporate bonds is inconclusive; both positive and negative effects are observed.

The age of the bond is a popular measure of its liquidity [Yu, (2005)]. Sarig and Warga (1989) observed that while a bond gets older, an increasing percentage of its issued amount is absorbed in investors' buy–and–hold portfolios. Thus, the older the bond gets, the less trading takes place, and the less liquid it becomes. Moreover, once a bond becomes illiquid, it stays illiquid until it matures.

Houwelling, *et al*., (2003) suggest that yield dispersion, which reflects the extent to which market participants agree on the value of a bond, may be used as a good proxy for liquidity. The first argument is, that if investors have more heterogeneous perceptions, the liquidity premium is larger. Secondly, in spirit of the inventory costs argument, dealers face more uncertainty if prices show a larger diffusion among contributors. Either way, the positive relation between yield dispersion and bond yields can be assumed.

Huang and Kong (2003) calculate the ratio of net new cash flow to total net assets and the ratio of liquid assets to total net assets for all corporate bond mutual funds and all high yield mutual funds. The estimation results indicate that, as expected, the coefficient on the liquid asset ratio is positive for all the credit spread series, and the coefficient on the net cash flow ratio is negative.

Bedendo *et al*., (2004) use the difference between the yield on the Refcorp bonds and the yield on the treasury zero–coupon bonds for the corresponding maturity as a measure of liquidity premium. Refcorp bonds are virtually risk–free therefore the calculated risk premium measures the flight–to–liquidity on the risk–free bond market and its potential impact on credit spreads. They find that high liquidity premium are reflected in the corporate bond market, and lead to a significant increase in credit spreads.

Boss and Scheicher (2006) use two measures, namely the liquidity spread of 30–year government benchmark bonds, i.e., the difference between the on–the–run and the off–the–run 30–year benchmark bund, and the liquidity spread of the government bond market, which is the average absolute deviation from the mean yield error derived from a term structure estimation according to Svensson's (1994) model. The regression results show that the second measure has a strong impact on the changes of credit spreads.

Fridson and Jonsson (1995) found increased fund flow into high–yield mutual funds, as a percentage, to be associated with a narrowing of the yield spread and an increase in the price of no investment grade securities. Further, an increase in the amount of assets held as liquid securities, a percentage of high–yield assets, was associated with an increase in yield spread and a decrease in the price on no investment grade securities.

3. Modelling the Tunisian credit spread

This study models the determinants of the credit spread. Our focus lies on the detection of relevant variables that affecting credit premiums observed in primary and secondary market. To do this I formulate original testable hypotheses. The main hypotheses considered in this paper are:

H1: Credit spreads observed in primary market are more sensible to issue and issuer characteristics.

H2: Credit spreads observed in secondary market are more sensible to market variables.

I first describe our corporate bonds data. I then discuss the integration of explanatory variables used in our empirical analysis and provide some basic summary statistics on credit spread. Finally, I present and discuss the results of our estimations and provide some interpretation.

3.1 Data

I use new issues (primary market bonds) and bond of secondary market. In fact, the impacts of factors on spreads are not similar for the different market. Hence, the primary market spreads are well affected by factors characterising the issue and issuers. In the other hand, the secondary market spreads are more sensible to variations of market variables.

I consider two samples. The first (S1) is composed by the new issues for the period 1998–2007. Thus, for 133 bonds issued by the Tunisian firm corporate we have 133 observations. The second (S2) is composed by the secondary market bonds spanning the period 02/01/2004 to 22/12/2006. For 67 bonds presents in this market, we chose a bi–monthly frequency. Thus, we have 70 observations by data series.

I note that this database contains two rating categories: investment grade (rating A) and speculative grade (rating BBB). Also, I consider two sector categories: financial sector (leasing, bank and factoring) and no financial sector (trade, tourism and industry).

Table 1. Bond Repartition by Sector and Rating

Sector and Rating	Financial Sector		No Financial Sector		Rating A		Rating BBB	
	S 1	S 2	S 1	S 2	S 1	S 2	S 1	S 2
Number	80	41	23	26	45	23	36	20
%	64.10	61.19	35.9	38.81	43.69	34.33	34.95	29.85

This table shows the reparation of bonds used in our study by sectors and categories of rating, namely, investment grade (rating A) and speculative grade (rating BBB).

3.2 Integration of variables

3.2.1 Qualitative variables

The qualitative information can not be measured by a continuous manner and can take tow or several modalities. Hence, it is necessary to definer (p–1) auxiliary variables that taken, respectively, the value 0 or 1.

Rating

The *rating* is modelled as follow: for three modalities of this factor, I have the following values for two auxiliary variables. The table 1 provides a manner of integration of this variable in our regression models.

Table 2. Integration of Rating in our Regression Model

Modalities	R 1	R 2
A	1	0
BBB	0	1
No Rated	0	0

Descriptive statistics of primary and secondary market spreads for the entire samples of corporate bonds and for investment, and speculative groups are reported in appendix. Credit spreads differ substantially among the credit–risk groups. As descriptive statistics show, we can see a negative relation between rating and credit spread. This finding is subject to our empirical evidence.

Table 3: Basic summary statistics on corporate bond yield spreads observed on primary market

This table presents the mean, median, standard deviation, min and max of the credit spreads and the number of bonds analysed in this study. The spreads are partitioned according to North Africa Fitch Rating. The period of analysis is 1998 to 2007.

Sample	All bonds	A	BBB
Median	1.7825	1.2033	1.7518
Mean	1.9535	1.2433	1.8501
Min	0.9855	0.9855	1.2500
Max	3.0512	1.7480	3.0512
Number of bonds	133	28	61

Table 4: Basic summary statistics on corporate bond yield spreads observed on secondary market

This table presents the mean, median, standard deviation, min and max of the credit spreads and the number of bonds analysed in this study. The spreads are partitioned according to North Africa Fitch Rating. The period of analysis is 02/01/2004 to 22/12/2006.

Sample	All bonds	A	BBB
Median	2.4968	1.2687	2.4502
Mean	2.2144	1.2478	2.3647
Std dev	0.7511	0.2311	0.3851
Min	0.6258	0.6258	1.0968
Max	3.4622	1.6715	3.4622
Number of bonds	67	23	20

3.2.2 Quantitative variables

I include the maturity of a bond in order to describe the shape of the credit spread term structure. On average, the term structure of credit spreads is upward–sloping [see Helwege and Turner (1999)]. Therefore, longer maturity should be associated with higher yield spreads.

According to structural models of the credit risk the risk–free spot rate is a relevant factor for the pricing of risky debt. I use changes in the monetary market rate as a proxy for the risk–free spot rate. As has been pointed out above, in Merton's basic framework the price of the put option on the firm value, which determines the price of the risky debt, equals the well known Black–Scholes formula. The risk–free rate enters the Black–Scholes formula as the rate at which the expected payoff of the option at maturity is discounted to the present value.

The second variable in the category of interest rate related factors is the change in the slope of the term structure. I define the slope as the difference between the risk free rate of 3–years and short risk free rate observed.

As liquidity proxies, I use issue size. This factor has been shown to relate negatively to credit spreads [see Warga, (1992); Perraudin and Taylor, (2002)]. Generally speaking, a larger issue size is associated with more investor interest, more secondary market trading, and consequently, lower spreads. A larger issue size may also benefit from the economy of scale in underwriting costs.

I use the exchange index as a measure of general economic conditions. Although the yield curve slope is taken as measure of economic conditions, I believe that the exchange index should be a better barometer of future economic conditions.

I summarize explanatory variables taken in our studies and the expected sign of relation with credit spreads in table 5. Also, descriptive statistics for the independent variables are presented in tables 6 and 7.

Table 5: Explanatory variables and expected signs on the coefficients of the regression

Variable	Description	Expected Sign
SIZE	Size	–
MAT	Time to maturity	+
R	Rating	–
MMR	Free risk rate	–/+/0
INDBVM	Exchange index	–
SLOPE	The slope of the yield curve	–/+/0

Table 6: Descriptive statistics: independent variables**,** January 1998–July 2007

This table reports descriptive statistics of independent variables analysed in this study. The period of analysis is January 1998 through July 2007.

Variables	*SIZE*	*MAT*	*MMR*	*EI*	*SLOPE*
Median	10.0000	7.0000	5.0500	1001.220	0.5875
Mean	11.6875	6.5789	5.4843	1090.392	0.6042
Std dev	10.9919	2.5767	0.4901	310.1113	0.0740
Min	0.5	5.0000	6.8750	729.7300	0.7565
Max	70	25.0000	5.0000	1727.260	0.4796

Table 7: Descriptive statistics: independent variables, January 2004–december 2006

This table reports descriptive statistics of independent variables analysed in this study. The period of analysis is 02/01/2004 to 22/12/2006.

Variables	*SIZE*	*MAT*	*MMR*	*EI*	*SLOPE*
Median	9.8515	4.0809	5.0072	1102.180	0.28000
Mean	10.2575	4.0236	5.0092	1149.514	0.2990
Std dev	8.7714	1.7484	0.0088	180.2832	0.2511
Min	0.5	0.0073	4.9985	652.0000	–0.0387
Max	70	6.8514	5.0350	1612.590	0.7565

3.3 Empirical results

3.3.1 Explanatory factors of primary market spread

The general form of relation between dependant variable and explanatory variables is presented as follow:

$$SPREAD_i = \beta_0 + \beta_1 R1_i + \beta_2 R2_i + \beta_3 SIZE_i + \beta_4 MAT_i + \beta_5 MMR_i + \beta_6 EI_i + \beta_7 SLOPE_i + \varepsilon \quad (1)$$

Where:

i = 1, 2, …,133

$j = 0, 1, 2, ..., 7$

ε is the error term.

The estimation results using data from January 1998 through July 2007 are presented in appendix. To judge the overall fit of our set of proxies for interest rate risk, liquidity risk, rating and macroeconomics indicators the R^2 is of particular interest. The measure of determination is around 76 % (R^2 = 0.763607) and indicate that our variables have some information content.

This finding is confirmed by Fisher–Snedecor test (F–statistic = 29.063 > 2.08). In fact, at least one variable provide a significant contribution in explaining risk premium.

The Student–Fisher test of marginal contribution shows that only the factors characterising issuer such as rating have significant impact on credit spreads.

The estimation results, reported in table 8, indicate, as expected, that the signs of the coefficients on the Rating are consistent with intuition. Investment grade bonds are usually associated with a low credit spreads. Notice that the coefficients on the rating are also statistically significant at the 5 % level.

I find that both level of the risk–free interest rate, and the slope of the treasury yield curve, which are used as proxies for the interest–rate factor, have not a significant influence on credit spread. While the coefficient on risk free rate is statistically insignificant, the sign is in accordance with bond pricing theory. As has been pointed out, according to the Merton model the changes of yields affect spreads in a negative form, i.e., when the general level of interest rates rises, the spread falls.

Notice that the behaviour of market liquidity is not a potentially important determinant of the spreads between risky and risk–free debt. Also, it should be noted that the sign of coefficient illustrates an economic insignificance. The estimation results indicate that, the coefficient on the macroeconomic indicator is positive for the primary market credit spread series, which is counter–intuitive.

The hypothesis H1 is partially confirmed by empirical results. In fact, primary market credit spreads are only sensible to issuer characteristics, namely the rating. Hence, corporate credit spreads are driven default risk.

3.3.2 Explanatory factors of secondary market spread

I define the following regression for the credit spread:

$$SPREAD_i^t = \beta_0 + \beta_1 R1_i^t + \beta_2 R2_i^t + \beta_3 SIZE_i^t + \beta_4 MAT_i^t + \beta_5 MMR_i^t + \beta_6 EI_i^t + \beta_7 SLOPE_t^i + \varepsilon \quad (2)$$

Where:

i = 1, 2… 67

t = 1, 2… 70.

ε is the error term.

The variables taken in our regression model have an explanatory power important, R^2 = 0.954739. At the 5% level, the Fisher–Snedecor test shows that at least one variable provide a significant contribution in explaining credit spreads (F–statistic = 31.128 > 2.08). Notice that the regression results are presented in table 8.

More importantly, the empirical results show that rating, time to maturity, exchange index and slope of risk free term structure are statistically significant at the level of 5 %. Also, they illustrate that the risk–free interest rate and the factor used as proxy of liquidity risk are not a significant explanators of changes in the credit spread.

The signs of the coefficients on the rating variables are consistent with intuition. But surprisingly, the coefficient on exchange index, which measures the current health of the economy, is negative, which is counter–intuitive. Notice that this coefficient is statistically highly significant.

I also find that the term to maturity, has a significant explanatory power on credit spread, consistent with the empirical evidence. Specifically, we find that the credit spreads are negatively related to this factor.

Empirical results are not consistent with hypothesis H2. I can see that secondary market premiums are jointly sensible to variables that correspond to market variations (Exchange Index and Slope), issuer and issue characteristics (Rating and Time to maturity). Hence, corporate credit spreads are driven by both default and interest rate risk.

For further analysis, I divided our sample into four credit–risk groups (all financial bonds, financial bonds A rated, financial bonds BBB rated and no financial bonds) and reestimated the Equation (2) for each group separately. Notice that, unlike financial bonds, the number of no financial bonds rated is much reduced.

The results of the regression are presented in table 9, for each credit rating (A and BBB) and sector. I find that credit spreads observed in Tunisian secondary market are more closely related to market variables (except the risk free rate for all cases and slope of term structure for financial bonds rated BBB) and time to maturity. The coefficients are statistically significant at the level of 5 %. I obtain similar results about the signs of coefficients.

The slope of the yield curve has a statistically significant influence on spreads. The relation between credit spreads and the slope is complex. We can conclude that only for financial bonds (all bonds and bonds rated BBB), the negative sign of the parameter for the slope of the term structure is also in line with what we expected. From the theoretical point of view a decrease in the slope should lead to a higher expected future spot rate and hence a rising credit spread. The same is true, when the slope is interpreted as an indicator for future economic growth. The estimated coefficients are large enough for economic significance to be present. For the other samples (no financial bonds and financial investment grade bonds) there is a positive relation between credit spreads and this factor.

As a proxy for the cyclical component of the credit spread I use the exchange index. While in most estimations this measure appeared to be highly significant, the sign positive, is counter–intuitive. Contrary, for financial bonds rated BBB this factor is statistically insignificant, but the sign of the coefficient on the Exchange Index is consistent with intuition. As expected, increases in this measure lead to narrowing credit spreads.

I find that term to maturity is highly significant in all cases at the level of 5 %. The positive coefficients indicate that longer time to maturity is associated with more risk, but this effect is somewhat counter intuitive if we take A and BBB rated bonds (0.103881 for A and 0.185853 for

BBB). Notice that Fons (1994); Sarig and Warga, (1989) indicate that while low–grade companies experience an increasing probability of being upgraded the longer the term to maturity and thus a decreasing spread, the probability of a downgrade of high–rated companies increases with increasing term to maturity, resulting into a upward–sloping credit spread curve.

Table 8: Estimation results

This table shows the results of regression of the credit spreads for primary and secondary market bonds on the selected variable. The values in parentheses are the t–values. I also report the p–value. The t–values in bold are statistically significant at 5% level.

Variable	Model 1 Estimate	p–Val	Model 2 Estimate	p–Val
Intercept	0.8857 (**3.02**)	0.0003	4.029121 (1.64)	0.1001
A	–1.05138 (**–12.91**)	0.0000	–1.4756 (**–245.53**)	0.0000
BBB	–0.13755 (**–2.73**)	0.00861	–0.4885 (**–83.64**)	0.0000
SIZE	0.000163 (0.38)	0.7032	–0.4152 (–0.88)	0.8825
MAT	–0.03042 (–1.12)	0.2632	0.12745 (**78.72**)	0.0000
MMR	–0.00025 (0.06)	0.3678	–0.3843 (–0.77)	0.4376
EI	0.004789 (0.06)	0.9502	0.00012 (**3.32**)	0.0009
SLOPE	0.00253 (0.35)	0.6253	0.2283 (**11.70**)	0.0000

Table 9: Regression results

This table shows the results of regression of the credit spreads for financial bonds (all samples, A–rated bonds and BBB–rated bonds) and no financial bonds on the selected variables. The values in parentheses are the t–values. The t–values in bold are statistically significant at 5% level.

Variable	Financial Sector			No Financial Sector
	All Bonds	A rated Bonds	BBB rated Bonds	
Intercept	–1.226348 (–0.13)	2.512714 (1.26)	3.579532 (0.53)	5.679735 (**2.37**)
SIZE	0.002536 (0.26)	0.01527 (0.27)	–0.2156 (–0.52)	0.08527 (0.35)
MAT	0.278907 (**48.50**)	0.103881 (**96.79**)	0.185853 (**44.58**)	0.109377 (**45.78**)
MMR	0.421753 (0.22)	–0.29812 (–0.74)	–0.45044 (–0.33)	–0.74595 (–1.54)
EI	0.000234 (1.70)	–0.000119 (**–4.02**)	0.000221 (**2.24**)	0.000264 (**7.38**)
SLOPE	–0.20737 (**–2.83**)	0.095712 (**6.12**)	–0.01761 (–0.33)	0.492193 (**24.78**)

4. Conclusion

This paper has examined which factors influence the credit spreads in the Tunisian corporate bonds. I evaluate two series, namely the primary and secondary corporate spreads. By means of linear regressions, I examine the significance of various factors proxying for interest rate, credit and liquidity risk. I examine statistical as well economic significance to quantify the overall effects of the various factors.

I proxy the term–structure of the risk–free interest rate by the level and the slope and expect a negative influence on the spread. The level is defined as the monetary market rate and the slope as the difference of the 3 –years risk free rate and the monthly rate. As a proxy for the cyclical component of the credit spread I use exchange index. To capture the liquidity risk I use size of issue. This factor has been shown to relate negatively to credit spreads.

Our principal results indicate that the hypothesis H1 is partially confirmed by our empirical results. In fact, primary market credit spreads are only sensible to issuer characteristics, namely rating. Notice that the coefficient of rating is consistent with intuition (Investment Grade is usually associated with a low credit spreads). The coefficient on the rating is also statistically significant at the 5 % level. Notice that empirical results are not consistent with hypothesis H2. We can see that spreads observed in secondary market are sensible to market variables namely Exchange Index and Slope, issuer and issue characteristics (Rating and Time to maturity). To summarize, the Tunisian credit spreads are sensible only to interest rate risk and credit risk.

In order to extend the results in this paper, I intend to analyse the regression for each credit rating (A and BBB) and sector. The results show that credit spreads observed in Tunisian secondary market are sensible to market variables (except the risk free rate for all samples and slope of term structure for financial bonds rated BBB) and time to maturity. The coefficients are statistically significant at the level of 5 %.

Generally, I confirm for the Tunisian market results of previous studies and our findings support the view that the credit spread is not an adequate measure for default risk. I provide proof that time to maturity, slope and macroeconomic indicators play a significant role in determining the credit spread on corporate bonds.

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THE RELATIONSHIP BETWEEN TEAMWORK EFFECTIVENESS AND INFORMATION TECHNOLOGY

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Abstract:
Even organizations that are better served by a team model find disadvantages. These include an increase in time to communicate, poor communication between members and groups, poor coordination between group members, and competing objectives. Some self–managed teams never reach their full potential or fail to be functional altogether, because they were not set up correctly and the other aforementioned negative results occur. Other teams increase productivity and quality in organization. In this article the authors have investigated how information technology can increase teamwork effectiveness.

Keywords: teamwork, organization, information technology, development.

1. Introduction

In today‘s world of work, fundamental transformation in complex structures are taking place. Organizations face complex and dynamic environments that have been attributed to increases in the globalization and competitiveness of the global economy.

As most every body knows, change is constant within teamwork productivity and effectiveness. The emergence of new technologies, coupled with escalating demands from business, has brought about both instability as well as new challenge.

In turn, teamwork must now look for new ways to adapt quickly, operate more efficiently and better prepare themselves for future. Not surprisingly, many organizations believe redesigning the structure of their organization is the solution, on the other hand, as well designed and planned, organization can have dramatic benefits for the enterprise, including increased profitability, greater overall efficiency and better alignment of teamwork to business needs.

Many studies have indicated that variation in team performance can be explained by differences in team structure [Cohen, and Bailey, (1997); Hackman, (1987), Manz, and Sims, (1987); Murray, and Stewart, (2000), Wageman, (1995)].

Tranfield and Smith [Tranfield, and Smith, (2002)] examined, in depth, the form of team working which take in a number of teamworking organizations across the study to ascertain their similarities and differences.

The performance in team–based working also largely depends on the employee's authorities and function design [Doorewaard, Huys, and Van Hootegem, (2002)]; i.e. to which extent the planning, performing and controlling responsibilities integrated in the team tasks.

Delarue, Gryp & Van Hootegem [Delarue, Gryp, and Van Hootegem, (2003)] investigated the impact of specific structure team types on the performance of the organization, measured by labour productivity.

When a new project starts, one of the most difficult tasks is to choose the most suitable members of the work team. The most relevant factors may be grouped into three categories: I) Individual characteristics; II) Social characteristics; III) Temporal and economic costs [Moreno, Valls, and Marin, (2004)].

Advances in information technology have enabled new organizational forms and new ways to structuring work.

In the age of the knowledge economy, most tasks accomplished as part of one's job require some forms of communications [Watson–Manheim, and Belanger, (2002)].

For long, researchers have investigated organizational communications, both formal and informal. Yet, we still need to understand better how communication based tasks can be better supported to lead to efficiencies in an environment where individuals are distributed. Regardless of specific type of work environment, individuals must manage multiple relationships to work

productively [Watson–Manheim, and Belanger, (2002)].

Team can enable a company to execute more quickly changes, are made easily, allowing the company flexibility [Mohrman, Cohen, and Mohrman, (1995)].

Each member of a group adds more information, perspective, experience and competencies [Gmelch, (1984)].

Even organizations that are better served by a team model find disadvantages. These include an increase in time to communicate, poor communication between members and groups, poor coordination between group members and competing objectives [West, Borrill, and Unsworth, (1998)].

This paper is organized as follows, we explain the assumptions of the proposed model in section 2. Section three introduces the parameters, used in the model. Section four presents a model that can be used to determine the value of teamwork performance versus information technology and team size factors. Section five includes a sensitivity analysis to the model, based on information technology, and Section six summarizes the contribution of the paper.

2. The model assumptions

Although the model can be used for any team structure (with any division), in our proposed model we assume, there is a particular assembly line (Figure 1). Also it's assumed, teamwork size is n and divided in 4 parts: I) Assembly Line 1; with $\left(\frac{n-1}{3}\right)$ members (Group 1), II) Assembly Line 2, 3; each one with $\left(\frac{n-1}{3}\right)$ members (Group 2) and III) One supervisor for all above assembly lines' members.

Each assembly line has full information interaction between members separately and all members have information interaction with supervisor.

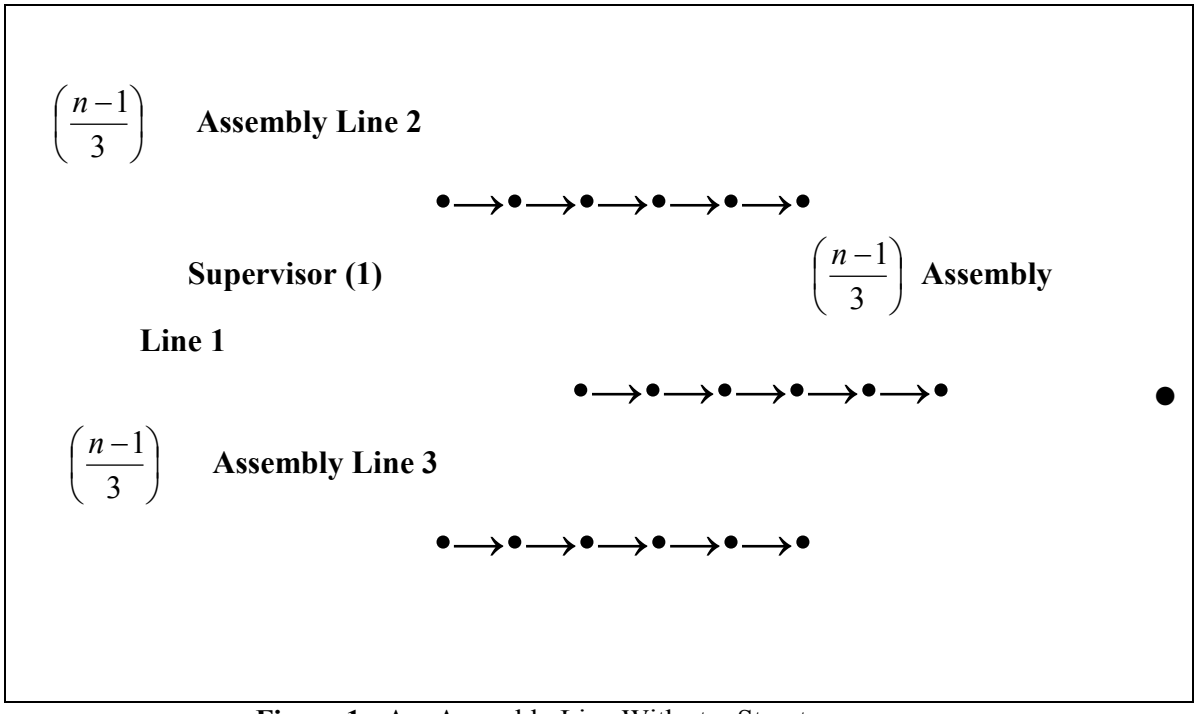

Figure 1 : An Assembly Line With star Structure

General assumptions

- An individual divides his/her time between production and information processing.
- If one unit is exclusively devoted to production, exactly one unit of output is generated.
- For each unit of output, there is also a unit of information generated.
- Each individual has to process all information received from the other team members in order

to coordinate the team task.

- It takes less than one time unit to process one unit of information.

3. Parameters used in the considered model

n : The number of team members. Also, $n \geq 4$ and *(n–1)* is multiplier of *3*.

α : The fraction of a time unit it takes to process a unit of information provided by other team members about their production. Also, $0 < \alpha < 1$.

$\Omega(n)$: The fraction of time an individual can spend on production after processing the information received from the other members.

$P(n)$: Output of team (Quantity of production).

a. The model

It is assumed that all received information must be processed, so the processing of information during one time period can be computed as follows:

(I) For each assembly line:

$\alpha\Omega_1(n)\left(\frac{n-1}{3}\right)$ units of each individual's time (1)

(Π) For supervisor:

$\alpha\Omega_2(n)(n-1)$ unit of individual's time (2)

The remaining fraction of the time period which can be spent on production, is given by:

For each assembly line:

$$\Omega_1(n) = 1 - \alpha\Omega_1(n)\left(\frac{n-1}{3}\right) \quad (3)$$

$$\Omega_1(n) = \frac{1}{1+\alpha\left(\frac{n-1}{3}\right)} \quad (4)$$

$$\Omega_2(n) = 1 - \alpha\Omega_2(n)(n-1) \quad (5)$$

For supervisor:

$$\Omega_2(n) = \frac{1}{1+\alpha(n-1)} \quad (6)$$

So equations (1) and (2) are equilibrium conditions on information generation and inf (7)
processing. As the size of team increases, each individual will spend a larger proportion of his/ processing information provided by other team members and, hence, the time left for production is reduced. In practical terms, this implies that as the team size grows, the individual team mem bers get saturated with information and productivity drops [Hilz, and Turoff, (1985)].

The total production of the team during one time period is the n:

$$\mathrm{P}(n) = \frac{n-1}{1+\alpha\left(\frac{n-1}{3}\right)} + \frac{1}{1+\alpha(n-1)} \quad (8)$$

Theorem 1: $P(n)$ is a concave, monotonically increasing function of *n* for all α and $0 < \alpha < 1$ and $n \geq 4$

Proof:

$$\frac{dP(n)}{dn} = \frac{1+\frac{\alpha}{3}(n-1)-\frac{\alpha}{3}(n-1)}{\left[1+\alpha\left(\frac{n-1}{3}\right)\right]^2} + \frac{-\alpha}{[1+\alpha(n-1)]^2} \tag{9}$$

$$= \frac{1}{\left[1+\alpha\left(\frac{n-1}{3}\right)\right]^2} - \frac{\alpha}{[1+\alpha(n-1)]^2} > 0 \quad , \quad 0<\alpha<1 \tag{10}$$

$$\frac{d^2P(n)}{dn^2} = \frac{\frac{-\alpha}{3}}{\left[1+\alpha\left(\frac{n-1}{3}\right)\right]^3} + \frac{2\alpha^2}{[1+\alpha(n-1)]^3} < 0 \quad , \quad 0<\alpha<1 \quad \text{and} \tag{11}$$

$n \geq 4$

Hence, $P(n)$ is a concave, monotonically increasing function in n .

Theorem 1 indicates that team output can be increased by adding members to the team. However, the marginal product of team members is decreasing due to the increased coordination effort required so that for each added team member, there is a smaller and smaller increase in output.

Beyond some value of *n*, the marginal cost of an additional team member exceeds the marginal value of the team's production.

Theorem 2: For any non zero α , $P(n)$ is a bounded function.

Proof: From theorem 1, $P(n)$ is a concave and monotonically increasing function of n . Also, $P(0)=0$.

$$\lim_{n\to\infty} P(n) = \lim_{n\to\infty} \frac{n-\mathbf{1}}{\mathbf{1}+\alpha\left(\frac{n-\mathbf{1}}{\mathbf{3}}\right)} + \frac{\mathbf{1}}{\mathbf{1}+\alpha(n-\mathbf{1})} = \frac{\mathbf{3}}{\alpha} \tag{12}$$

Hence, $P(n)$ is a bounded function.

The practical implication of Theorem 2 is that the maximum total production of a team during one time period depends on the speed at which the team members can coordinate their activities with their peers.

To increase the team's maximum production capacity, it is necessary to change the communication and processing technology (i.e. decrease the value of α) or, the work has to be reorganized so that each team member does not process all of the information provided by the other members.

Theorem 3: The marginal product of team size is asymptotically zero.

Proof:

$$\lim_{n\to\infty} \frac{dP(n)}{dn} = \lim_{n\to\infty} \frac{\mathbf{1}}{\left[\mathbf{1}+\alpha\left(\frac{n-\mathbf{1}}{\mathbf{3}}\right)\right]^2} - \frac{\alpha}{[\mathbf{1}+\alpha(n-\mathbf{1})]^2} = \mathbf{0} \tag{13}$$

Theorem 1 shows that the marginal product of team size is decreasing and theorem 3 states that the marginal product of team size is asymptotically zero. These two facts imply that for a one–period production effort, there is a single optimal team size if the cost per team member is positive and marginally non–decreasing. This condition is equivalent to the well–known profit maximum condition that marginal cost equals marginal revenue in economic theory.

b. Sensitivity Analysis:

In the following the effect of changing information technology on team output is studied. An improvement in information technology implies that the time it takes to communicate and process a unit of information is reduced. Thus, as information technology improves the parameter α decreases.

Although information technology improvements are likely to occur in discrete increments, it is useful to study the first order derivative of the total team output.

Theorem 4: $P(n,\alpha)$ is monotonically decreasing function of α for all values of $0<\alpha<1$.

Proof:

$$0<\alpha<1,\ \frac{\partial P(n,\alpha)}{\partial \alpha}=\frac{-(n-1)^2}{3\left[1+\alpha\left(\frac{n-1}{3}\right)\right]^2}+\frac{-(n-1)}{[1+\alpha(n-1)]^2}<0 \qquad (14)$$

Hence, $P(n,\alpha)$ is monotonically decreasing in α.

Thus, as information technology improves (α is reduced), team output increases. This result is consistent with expectation since less time spent on information processing implies more time spent on production.

Similarly, as information technology improves, so does the maximum output of the team. Let Δ be the reduction in processing time of one unit of information so that $\alpha'=\alpha(1-\Delta)$. Then, the increase in maximum team output is:

$$\frac{3}{\alpha'}-\frac{3}{\alpha}=\frac{3}{\alpha(1-\Delta)}-\frac{3}{\alpha}=\frac{\Delta}{1-\Delta}\frac{3}{\alpha} \qquad (15)$$

In marginal terms, there is a trade–off between adding manpower to a team and improving the information technology support to the team.

The following example will illustrate the concept. Consider a team with 22 members and information technology which allow team members to process information at a rate of 22 units per time period (i.e. $\alpha=0.05$). According to (8) the output of this team is 16.o5 per time period. If the team size is increased to 28 members it's output will be 19.05.

The same output per time period can be achieved by information technology improvement with rate of information technology processing (i.e. $\alpha=0.02$).

If the cost of 6 new team members is higher than the cost of upgrading the information technology, then an information technology upgrade is the best decision. If there is a number of technology improvement options, there may be a mix of technology improvement and team size increase that will yield the most cost efficient solution to increase team output.

Similarly, if demand for the organization output is fixed, the organization can achieve a productivity increase by investing in improved communication and processing technology and reduce the number of team members. If technology investments change the information processing rate (i.e. $\alpha=0.02$), In this Example, the team size can be reduced to 22 members without reducing production. Thus, by investing in communication and information processing technology, labor cost can be reduced by 21.5% considering the significant price reduction trends in communication and information processing technology, this explains the substantial reduction in team size, often referred to as corporate downsizing, taken in modern post–industrial economies.

4. Conclusions:

In this paper, a model has been presented that can be used to determine the value of teamwork performance versus information technology and team size.

According to this model, team output can be increased by adding members to the team. But beyond some value of team size, the marginal cost of an additional team member exceeds the marginal value of team's production. Also to increase the team's maximum production capacity, it is necessary to change the communication and processing technology.

If the cost per team member is positive and marginally non decreasing, there is a single optimal team size.

If there is a number of technology improvement options, there may be a mix of technology improvement and team size increase that will yield the most cost efficient solution to increase team output.

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ADVANCES IN DECISION ANALYSIS. EFFICIENT METHODS IN FINANCE

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Abstract:
Decision analysis offer workable solutions in domain such as the environment, health and medicine, engineering and operations research and finance. In finance area we can observe a big variety of method and techniques for research fluctuates from economy and financial date.
Most economic decisions are related to monetary variables. Since money has a capacity to connect the present and the future, conflicts among long–run and short–run economic goals and uncertainties of the future make economic decisions very complicated.
In this paper we will introduce some models to show how monetary variables can be investigated real aspects of economic development. We discusses problems encountered in financial models, describes efficient method and show how to apply them to practical problems in finance.

Key words: decision analysis, mathematical modeling, dynamic models, money.

JEL Classification: C6, E4

1. Decision analysis and mathematical modeling

The length or weight of the decisional problems is large enough, from quotidian ones of everyone, so with a particular value, to those of major importance, which are confronted by the ones skilled to lead and coordinate high level activities. In the last time, the efforts of the researchers are concentrated over the problems referring to the codification of the information and to structuralize a theory capable of to contribute to successful knowing and solving the complex decisional aspects, specific to the modern society. An unforgettable advantage can be that *the methodology of the decisional analysis* obligates the decider to see the problem as an organic whole and to surprise the information connections and fluxes between its elementary components, favoring the communication between specialists of diverse domains (engineers, economists, mathematicians, sociologists.) implicated in evaluating and solving particular segments of the problem, in which purpose they use a similar language and an advantaging ground or environment for obtaining realizable compromises between their opinions, which aren't always identical. More than that, the methodology mentioned before requests the decomposition of the problem examined, with precedence to the complex ones, in other more simple ones, concomitant with the logic synthesizing of the results obtained concerning the conception, projection and constructing an unitary and realist action program, viable under the report of the economical, technological, ecological and, why not, juridical economy.

Besides, such an analysis needs responses more clear and correct answers, without equivoque to the elementary or hypothetical problems. Sometimes, these are hard enough to solve, needing the explicitly of the points of view until the smallest details, confirming the conclusion in conform to which the "bet", the ambition of *the theory of decision* is that of quantifying the incertitude and the risks, the preferences and accepting the consequences in any situation, the efforts done by the researchers in the last years being a proof more than obvious, in this sense.

The continuous growth of diversity and complexity of calculation and modelation problems that were requested by the research activity, as a domain of avant–grade, in front of the scientists, has leaded lately to an explosive evolution of methods and ways of calculation. So, the dynamic modeling today is a discipline in full progress from the fame of the mathematic modeling and computer science but also a component that we find more and more in the everyday life, implicated in the industrial and social technology. It represents a distinctive, mature chapter of the competitional sciences which, by mathematical fine concepts and advanced informatics instruments with which they operate constitute a

production force that is manifested with pregnancy in all the techno–scientific domain and economic activities.

Generally, as much as complex the activities are, in the same way the planning, the search for formal and systematic strategies and actions grow. The monetary domain is a domain in which the degree of incertitude and the risk is very high and where the planning plays a very important role in trying to reduce this incertitude. In essence, the elaboration of strategies in this domain purposes a clear and systematic structuring of the modes by which the followed objectives may be reached by a judicious allocation of resources on medium of high ground. In the frame of any development of this type there must be considered the most important aspects of planning.

Preoccupations of the economists concerning the international commerce and finances have appeared since the 14th century. These domains of economy, private in strengthened independency have stood in the view of some eminent scientific personalities, like: Adam Smith, David Hume and John Stuart Mill, which theories and concepts continue to be, in a large part, available today.

The analysis of economic relations, including those from the international currency transactions, by the prism of the creative methods (statistic, mathematical), concerning assuring a scientific rigor in the economic area as well as in the nature sciences, has started in the same century [Matei, (2004)].

The representative of the mathematical–political school (W. Petty, Gr. King, J. Grount etc.) has approached by the prism of the quantitative problems concerning the tax rate and money in the international commerce and finance. Later, in the 18th and 19th centuries, there are approached, under the quantitative aspect concerning the import and the export (Fr. Quesnay) or the request in report with the determinant facts (Ernst Engel).

In the starting of the 20th century, eminent scientists have given the economists methods of measuring and analyzing the level and intensity of the economic processes, like the grade of dependency between phenomenons. We remind, in the same sense K.Pearson, W. Pearson, I.Fisher, I. Hooker, M. Yule and M. Benini. The quantitative approaches purposed have vised the price dynamics domain, the imports and exports but also that of measuring connections between the economic processes in evolution (the correlation, the business cycle, the late effect, etc.)

Once the econometric society appeared (in 1930), this kind of preoccupations concerning the measuring and rigorous analyzing in economy by statistic and mathematical methods have took amplitude. The first models appeared (J. Tinbergen, L. Klein, J. Koopman etc.) which describe by an equation, or, especially, by an equation system of simultaneous equations of economical cause–effect type of relations. These type of models show schematically a sector of economy or national economy in ensemble (macroeconomic models), making possible the influence analysis, economic processes development prognosis, monetary politics simulation, representing an expression of progresses realized in analyzing and economic foresight in the modern and contemporary époque.

2. Efficient methods in finance

Just like the new telescopes enlarge our horizons without invalidating the discoveries did before from the close part of the universe, the mathematics show also new views, while it develops on existent knowledge. Perspectives may change, but not truths.

The new territories rediscover the reality of change. Time no longer represents the eternal repeat of some identical things, but becomes wearer of differences. This means that the status of a system at an ordinary moment is not contained in a previous state: between the first and second state there's a qualitative change. The sudden transactions, "catastrophic" bifurcations are not produced in an uncertain manner. On the contrary, they result from the conjunction of a multitude of facts that lead the system in one direction instead of another.

The dynamic models follow to make understood the temporal relations. The model operates with events and states that express the value of an attribute by which is identified the apparition of events. With the help of the data structures there are constructed transition diagrams of the states that indicate all the opinions specific to every type of object and corresponding class.

On this changing background of research facilities, the econometric studies have reoriented the analysis of periods by the dynamic models that can be studied by the new theories.

The model, as an instrument of scientific knowledge, is used in numerous theoretic and practice disciplines. The knowledge obtained from the work with methods and the try to apply them may discover new valuable concepts about a certain problem and with the type of decisions that are

necessary. Simply knowing of the decision zones may be a major progress in some situations. Plus, using models, there can be recognized variables tat may be controlled for influencing the system's performance, the relevant costs and their dimension as well as the correlation between costs and variables, including the options of important costs.

The modeling of an economic process constitutes a scientific way of unfolding the determinant factors that interfere in the frame of the respective phenomenon. In order to see the importance of these factors for the considered process it is necessary to introduce in the model constructed of the most important factors, so that, every time it is possible, there must be assured their possible quantification, which will permit the mathematical treatment.

Starting from the idea that any model is based on real data and parameters there is necessary to consider the fact of obtaining trustful data which will permit a good representation of the reality by the model. This way, when this is the case, the clinical or periodical aspect of the studied phenomenon is identified, implicitly the horizon of time it refers to.

From an econometric point of view, the classical methods based on continuity, linearity and stability have been proven unstable for representing economic phenomenon and processes with a higher degree of complexity. The researchers are obligated to follow these processes in a dynamic way, to study qualitatively the changes that interfere with the economic variables implicated as well as the results obtained with their help. Besides other characteristics, the mathematical models permit the introducing of a new isomorphism between the real economic system and the ideal one, represented as model. With their help it becomes possible to approach the instable components of different economic nonlinear systems accentuating more often the fact that linearity and stability are particular cases of economic growth.

The dynamic modeling is based on the fact that the functionality of a system is represented by the knowledge of interactions between the fluxes of information, commands, human resources, material resources etc. a dynamic model surprises the behavior of complex systems showing how their structure determinates the trajectory, respectively the behavior in time.

The apparition of the nonlinear dynamics theory has enabled the understanding and developing of some processes and methods that approach us more to reality. The development of the theory of singularities and the theory of bifurcation has completed the multitude of ways by which we dispose for analyzing and representing more and more complex, dynamics, giving the possibility of analyzing some systems which were hard, if not impossible to approach by traditional methods. The study of nonlinear dynamics is of maximum interest because the economical systems are by excellence nonlinear systems. Many of these contain multiple discontinuities and incorporate inherent instability being permanently under shock actions, extern and intern perturbations.

The application of dynamic methods represents mainly an exercise of simulation. Indifferent if someone studies the clinic behavior, alternative politics, history interpretation, model error evaluation or anything else, the numeric simulation is the correct instrument for this. For the small or linear systems, to many of these questions can be directly answered in the frame of the analytic work, many times by forms including mathematical expressions, but for the general cases, especially in the case of the large proportion used today, the numeric simulation represents the only method that is possible to use. However, "of all the types of simulation of the model, one is considered "queen" – presage"[Ungureanu, (2004)].

3. Same mathematical models used in finance

In economic science, especially in the organizational and leading disciplines, the models are used in all the diversity of types that exist. In the last decades however, there is a more and more tendency of using, in these disciplines, the mathematical type models, especially because of their capacity to condensate rigorously the essential, and also their possibility to be programmed with the help of computational techniques, forming together an instrument of scientific investment of an unknown power until the present, a prodigious "extension" of human intelligence.

3.1 Theoretic model of fiscal evasion (Allingham and Sandmo, 1972)

The high tax rates, the controller fragility and the gentle fines in the case of fiscal fraud unveiling has contributed to stimulating people to try their chances of not being discovered when a

fiscal evasion strategy is applied. The tax and tax rates payer's problem is in maximizing the total income waiting utilities in case he adopts the fiscal evasion.

In the frame of this model [Albu, (2002)], it is considered the situation in which a tax payer with risk aversion receives the possibility to declare to the fiscal a smaller sum than its real income, X. The declared income $X_n > 0$ is imposited with a constant rate, $\theta > 0$, while the undeclared income $X - X_n$ is taxed, if detected, with a larger rate π. The contributable chooses X_n^* for maximizing his expected utility.

$$E[U] = (1-p)U(Y) + pU(Z)$$

where p is the possibility of detection (hexogen data) and $Y = X - \theta X_n$, $Z = X - \theta X_n - \pi(X - X_n)$ represents its income in case of detected and respectively undetected. The ordinal condition first for maximizing E[U] is

$dE[U]/dX_n = -\theta(1-p)U'(Y) + (\pi - \theta)pU'(Z) = 0$ from where the response of the tax payer at a change of θ may be determined by the derivation of

$$dX_n^*/d\theta = -D^{-1}(1-p)U'(Y)\{\theta X_n[R_A(Z) - R_A(Y)] - \pi/(\pi - \theta)\}$$

where $D = \theta^2(1-p)U''(Y) + (\pi - \theta)^2 pU''(Z) < 0$ represents the second order condition for maximization and $R_A(I) = -U''(I)/U'(I)$ is the Arrow–Pratt measure of the absolute aversion to risk. The model is discussed depending on the $dX_n^*/d\theta$ sign, considering the cases where the aversion with absolute risk is in diminution, constant or growing.

3.2 The dynamic model of Dornbusch – the exchange rate and monetary politics (1975)

This model is given by [Dameron, (2001)]

$$p_{t+1} - p_t = \pi\delta(e - p_t)$$

$$e_{t+1} - e_t = \frac{\alpha}{\beta}e_t - \left(\frac{\alpha}{\beta} - \frac{1}{\lambda}\right)p_1 - \frac{1}{\lambda}m - i$$

Where e_t represents the logarithm of the p_t exchange rate, it is the price index number logarithm, i is the intern rate of the mortgage, m the logarithm of the quantity of monetary offer, and π is the adjusting coefficient, and the parameters verify the inequalities $\alpha > 0$, $\beta > 0$, $\lambda > 0$, $\alpha > 0, \beta > \alpha\lambda$.

3.3 The deflation spiral (Groth (1993) and Krugman (1999))

The model presented forward constitutes a try to model the economic recession from Japan and SUA from the last years. All the variables from the model, excepting the inflation and mortgage rates are under the logarithmic form. The model is described by equation [Krugman, (1999)].

$$c = a + b(1 - t_1)y,$$

$$i = i_0 - h(r - \pi^e),$$

$$y = c + i + g,$$

$$m^d = ky - ur,$$

$$m^s = m - p,$$

$$m^d = m^s,$$

$$\pi = \alpha(y - y_n) + \pi^e,$$

$$\dot{\pi}^e = \beta(\pi - \pi^e)$$

where c is the real consummation, y the real income, i real investments, r nominal mortgage rate, π^e prognosed inflation, g governmental spending, m^d real request of money, m^s real money offer,

m the nominal stock of money, p the price level, g, y_n, a, i_0 and m are supposed constants, the parameters b, t_1, h, k, u, α and β are positive, and $bt_1 < 1$. The dynamic of the model is analyzed in report with the real money offer and the forecasted inflation rate.

3.4 IS–LM model with tax rate incomes (Cesare and Sportelli, 2005)

We present a model where the real money offer m^s is variable in time, so $m^s = m(t)$, and which considers, at the same time, the incomes from taxes.

In formulating the model, it is purposed for the incomes from taxes $T(t)$ to represent the sum between a component from the current income and one from the past income, so that

$$T(t) = (1-\varepsilon)\tau Y(t) + \varepsilon\tau Y(t-\theta),\ 0 \le \varepsilon < 1,$$

where τ is the medium rate of tax rates, and θ is a constant lateness in collecting taxes.

The IS–LM model with a collection lateness of tax rate payments purposed in [Cesare, and Sportelli, (2005)] is written under this form

$$\begin{cases} \dot{Y}(t) = \alpha\left[I(Y(t), r(t)) + G - S(Y^d(t)) - T(t)\right], \\ \dot{r}(t) = \beta\left[L(Y(t), r(t)) - M(t)\right], \\ \dot{M}(t) = G - T(t). \end{cases}$$

α and β are coefficients of positive adjustment, $Y^d(t) = Y(t) - T(t)$ is the real income available.

The third equation refers to the governmental budget constraint and expresses the necessity for the government to supply money for financing its deficit or to retreat money in case of surplus from taxes.

The system's dynamic is very complex, putting in evidence stable or unstable regions, limited cycles generated by the Hopf bifurcation, limited cycles existent simultaneously.

4. Study of case. The inflation evolution in Romania

In this section we extend the Tobin's model [Zhang, (1990)]. We will study the case in which the markets are cleared and expectations are fulfilled in every period of time.

The model is given by

$$\begin{cases} \dot{x} = x\{z - \alpha[x - g(q)]\} \\ \dot{q} = \beta\{\alpha[x - g(q)] - q\} \end{cases}$$

where x is real per capita money holdings, q is the expected inflation rate, z is the constant proportional rate of increase in the nominal stock of money (is fixed by the government), β is the "expectation coefficient" (introduced by Cagan, 1956) and α is a positive constant parameter.

It is assumed that the expected inflation rate may be different from the actual inflation rate.

4.1 Equilibrium points

The equilibrium for this model is given by

$$\begin{cases} x\{z - \alpha[x - g(q)]\} = 0 \\ \beta\{\alpha[x - g(q)] - q\} = 0 \end{cases}$$

whose solution is denoted $(x_0, q_0) = \left(\frac{z}{\alpha} + g(z), z\right)$. The Jacobian matrix is given by $A = \begin{pmatrix} -\alpha x_0 & \alpha x_0 g'(q_0) \\ \alpha\beta & -\alpha\beta g'(q_0) - \beta \end{pmatrix}$ and we obtain $\det A = \alpha\beta x_0$, $trA = -\alpha\beta\left(\frac{x_0}{\beta} + \frac{1}{\alpha} + g'\right)$.

A necessary and sufficient condition for stability of the equilibrium is that $\det A > 0$ and $traceA > 0$. We will do a local analysis for this model.

4.2 Local analysis. The stability of the model

Theorem 4.1 a) If both α and $\beta \to \infty$, then the model is locally unstable,

b) Even if neither α or $\beta \to \infty$, if money is a perfect substitute for capital, the model is locally unstable.

Theorem 4.2. a) The model is locally stable if and only if: $g/\beta + 1/\alpha + g' > 0$;

b) If $\beta \to \infty$, $\alpha < \infty$, then the condition of stability is: $\alpha < -1/g'$;

c) If $\alpha \to \infty$, $\beta < \infty$, then the condition of stability is: $\beta < -g/g'$;

We will determine the function g from the date who we found of the BNR site. We use the date of the December 2005 – June 2008 period.

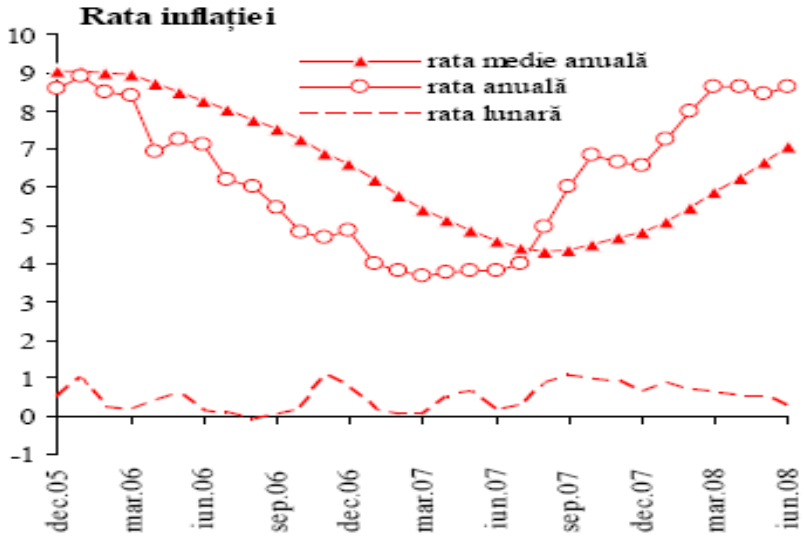

Figure 1. The inflation rate in December 2005 – June 2008 period **Source**: INS, National Bank of Romania

That observes g have a sinusoidal form, approaching or declining to the increase line witch represented the target of inflation ($d: 3{,}7x + 40y - 30 = 0$). We propose for the g function the form $g = \dfrac{\sin\dfrac{x}{2}}{x} + 8$. We deduced this expression utilized the classic method from prevision the method "the littlest squares". Its graphic is in figure 2.

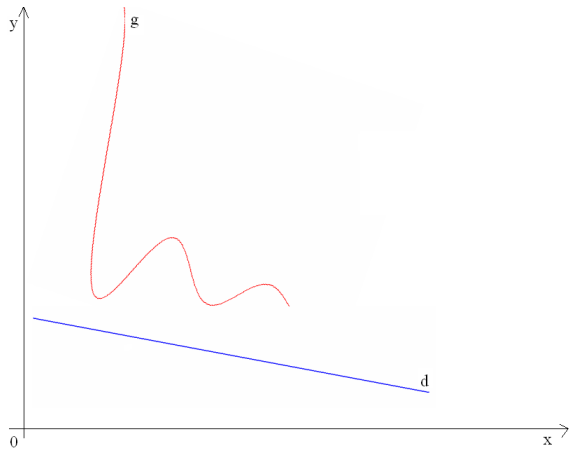

Figure 2. Graphic representation for curves g and d

Theorems 3.1 and 3.2 imply that the equilibrium may be either stable or instable; this is independent on the parameter values.

Consider the phase plane of this dynamics. First we can show that along $\dot{x} = 0$ the following result holds

$$dx/dq = g' - 1/\alpha < 0,$$

i.e. $\dot{x} = 0$ is a downward–sloping curve. Moreover, above the curve $\dot{x} = 0$, $\dot{x} < 0$ and below it $\dot{x} > 0$. We can similarly examine the properties of $\dot{q}$. The behavior is illustrated in Figure 3.

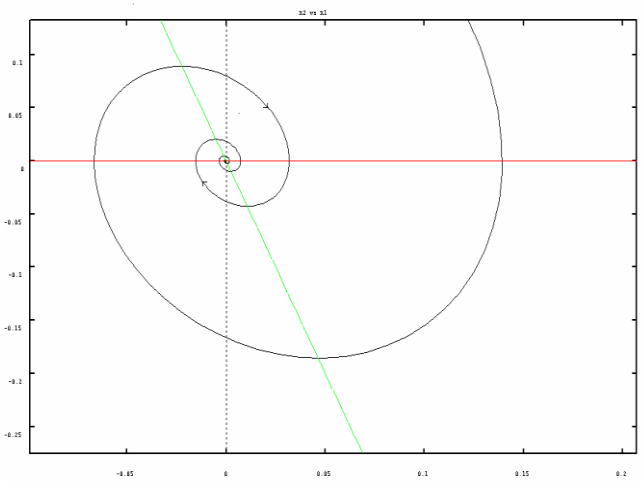

Figure 3. The Case of Stable Focus in x–q plane

5. Conclusion: recent and future development in the modeling of financial date

The relation between the degree of financial development of an economy (measured by the extent in which constraints to credit exist) and fluctuations affecting the trend of economic growth, is a relevant theme of discussion in macroeconomics.

The base element of a decision that determinates it's content, realism and efficiency, is constituted by its scientific fundament, no dissident will be able to adopt a correct decision basing only on intuition, by an empirical way, without a rigorous evaluation of the objective and subjective conditions of its implementation. The scientific foundation structure constitutes the result of some logic and exact methods to lead to the stabilizing of a more efficient decision.

In the last years, we can observe an impressive growth of interest of the scientific community for analyzing the nonlinear systems. The research of such systems, emerged by the studies realized by the mathematic and natural sciences domain researchers, has lead to the development of some new fundamental methods and concepts. Although their application in the frame of the economic science is still in the beginning phase, there have already been obtained some remarkable results of big interest for the economists. There are various economic domains and contexts in which the nonlinear methods can be proven very useful, as well as the behavior of the capital and exchange rate markets, the extern debt problems, economic depressions, hyperinflation and bank risk etc. It is clear that developing concepts and nonlinear methods represents a product of the computer era. Most of the studies from incipient phases have started with numeric analysis of very simple nonlinear methods, which today represent only the base of data editing and calculation by PC. This way it has been discovered that event the most simple nonlinear methods are capable to reproduce a large variety of properties. For example, there has been discovered that very small changes of the parameter values produce surprising results, like even the case of some classic simple methods, which in the past have been considered to have a clear cyclic behavior and easily predictable.

The open character of the national economy in the monetary politics context attest the fact that for reaching and maintaining successfully the macroeconomic stability, a multitude of circumstances

in the frame of which there are implemented the politics and financial–banking institutions are developed must be considered.

The monetary policy has a impact over the output and the workforce occupation on short term, but not for long term, being necessary here to contribute with the real economy. So, the monetary policy is a combination of a target–inflation chosen and a discrete response to certain shocks. These shocks are the ones to which the central bank can respond before the private sector adjusts its activity.

The monetary policy is under the influence of a multitude of hexogen factors, so any prognosis of it hare a high degree of incertitude. However, the monetary authority can purpose certain targets (inflation reduction, choosing the exchange rate course of the national coin) and model its policies in a manner to permit their reaching. Because the prices answer with a certain delay any economic shock, the objective of price stability implicates the debt rate growth immediately after the shock and not waiting for the prices to grow.

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NATURE OF THE FIRM: A STUDY ON DEVELOPERS IN CHINA AND HONG KONG

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Abstract:
In Hong Kong, dwellings are fitted with neat and tidy paintings, well decorated floor and wall tiles. Equipped with world–renowned kitchen and bathroom appliance, housing owners can move in with a bag of cloths. Builders in China, however, only provide fundamental elements such as windows, doors, ironmongery and grayish wall. By the time home purchasers receive their dwellings, they need to do a lot of shopping before they can move in. They need to buy water closet, tiles, towel rings and so on. Scope of services provided by Hong Kong developers is much wider than those in China's. Ronald Coase, Nobel economist 1991 addresses two questions in his 1937 paper: why firms exist and what determines their scale and scope. What are the major determining factors which affect the size of the developers and their scope of services? Few or even no paper has studied this issue. This paper reviews that unpredictable rules and regulations couple with poor law drafting decrease firms' incentive in vertical integration.

Keywords: firm, developers, Hong Kong, China

JEL Classification: K40, L16, L22

1. Introduction

Close–to–ideal fully–equipped dwellings have provided much convenience to busy nest–builders in Hong Kong. It is not unusual to find the first hand dwellings in Hong Kong with creamy white, tiled floor, floor–to–ceiling windows for unobstructed harbor views, quality appliances and fittings in kitchen and bathroom from renowned manufacturers. Fitted with high technology, residents can operate electrical appliance via PDA. There is, however, a complete different scenario in China. Builders only provide flats with no wall and file tiles and coverings for the electric socket. One of the major differences lie in the developers of two places is the scope of services provided or the size of the firms. Developers in Hong Kong provided a wide scope of services, such as provisions of painting services, decoration services etc. Developers in china simply provide concreting and steel services and nothing else. Internal contract of developers in Hong Kong is much more complicated than those in China. "Size" of the developers in Hong Kong is also larger. The question lies here is: what determine the size of scope of services of the firm? While Nobel winner Coase provided an explaination as "differences in transaction costs", this paper will try to shed light on how differences in legal regulations and perspective on laws and regulations affect the costs of transactions and size and scope of the firms in turn.

2. Bare residential units in Hong Kong, Shanghai and Haerbin: a general overview

While most of the dwellings in China are bare flats without any fittings, all the residential units are well–equipped with fittings. The table below illustrates the percentage of bare flats in Shanghai and Haerbin, two major provinces in China and Hong Kong.

Table 1. Percentage of bare flats in Shanghai, Haerbin and Hong Kong

	% of bare flats in Shanghai	% of bare flats in Haerbin	% of bare flats in Hong Kong
2001	84.8	100	0
2002	81.4	100	0
2003	79.3	93.8	0
2004	78.3	78.3	0
2005	82.9	89.2	0

Source: (Li, 2008b)

3. The nature and size of the firm

Coase comments in his recent paper "*The firm …is very extraordinary given that most resources in a modern economic system are employed within firms, with how these resources are used dependent on administrative decisions and not directly on the operation of a market. Consequently, the efficiency of the economic system depends to a very considerable extent on how these organizations conduct their affairs, particularly, of course, the modern corporation* [Coase, (2008)]." The existence of firm has arose interests of many economists, the classical economists, neo institutional economists, resource based economists and so on. While Milton Freidman has stated the importance of free to choose, why would there be some individuals would like to give up the precious opportunity to be the director of resources but choose to be directed, supervised or monitored instead?

Clues might be able to find in Adam Simth's first chapter in Wealth of Nation "*First, the improvement of the dexterity of the workman necessary increases the quantity of the work he can perform; and the division of labour, by reducing every man's business to some one simple operation, and by making this operation the sole employment of his life, necessarily increases very much the dexterity of the workman …Secondly, the advantage which is gained by saving the time commonly lost in passing from one sort of work to another…*"[Smith, (2000)] From Smith's perspective, the establishment of firm can be explained by the merits provided by the division of labour: time saving and learning by doing.

Other classic economists such as Adam Smith and Alfred Marshall have agreed that firm is a legal entity whose law prescribes its boundaries. Smith is aware of the impact of legal regulations on the nature of the firm: he has includes a section in wealth of nation where he compares the minimally regulated joint–stock companies of his time and the corporations. Clearly, Alfred Marshall holds the view that legislation in 19th century had facilitated its joint stock company's capacity to obtain capital for investment. Early institutional economists include John Commons also shed light on the importance of legal foundations on the firm.

In 1937, Coase has written a paper which proposes that differences in costs of operating institutions lead to the emergence of a firm which supersedes the market. While transactions in market involve products or commodities, transactions within a firm involve factors of production. By replacing of a product market by a factor market, Firm can save much costs of transaction. Nevertheless, Coase has never defined the term "firm" nor provide "a clear distinction between factor and product market [Coase, (1937)]. The most obvious of transaction by means of market is costs of *discovering the relevant prices*. In the absence of a firm, each input owner needs to find the price for every single component. If that is the case, costs of the final product will be enormously high. One of the possible ways to solve the problem is the emergence of a central agent who is responsible for contracting each input owners. This agent, in return, receives a price for his hard work. All these many contracts are then reduced into one single contract [Cheung, (1983)].

Based on Coase's paper, Steven Cheung in 1983 suggests that each input owners of productive input has the option of (1) producing and selling goods by himself, (2) selling his productive inputs entirely, or (3) giving up his use of his input and entering into a contractual arrangement with an agent in exchange for his income. Firm is a typical example of the third option. It emerges when the entrepreneur who holds a limited set of use rights by contract directing the production activities without immediate reference to the price of every single economic activity.

Have there been no private property rights and therefore none of the above choices are available, it is easy to realize why the worker or a resource owner is directed by a firm owner instead of market prices. Nevertheless, by the time there are private property rights – which really exist in our society; the question has become difficult to answer: nobody would like to give up his individual' rights in exchange for supervised, directed and pushed by the employer at all. What is resource owner's motivation behind to surrender his own right? To reduce transaction costs [Cheung, (1983)].

Steven Cheung proposes that there is a second factor which apparently have not considered by Coase is the information cost of knowing a product. It is often difficult for a layman to know the usage of each component or part. As Cheung comments "*[r]eaching agreement on the price of a spring inside a camera incurs a proportionately higher cost than does the camera. Although the consumer has the final say in assessing the worth of the whole product, he cannot be expected to recognize the value of each component part–he may not even know what some of them are or even that they exist. It simply costs too much to learn about everything in every commodity we buy…for a component which*

by itself has no readily identifiable value, agreement on price is less costly between specialists and input owners than it would be between input owners and consumers or between specialists and consumers. The one who produces component parts tends to know more about them than the one who consumes" [Cheung, (1983)].

He then continues to elaborate on the reasons for a firm to emerge" measurement costs. Whether the deal is between and an input owner and his agent, an agent and a customer, or a customer and input owner, some attributes or characteristics or must be measured in every transaction. Generally speaking, there are 3 circumstances which the presence of firm is much more efficient: **1.** some of the activities to be performed cannot be predetermined in advance conveniently; **2.** the activities performed by an input owner vary frequently or 3) change greatly, it then becomes more economical to surrender any direct measurement activities, substitute another measurement to serve as a proxy [Cheung, (1983)].

On top of the aforementioned reasons, there is also a problem of separating contributions generates cost in reaching price agreement. By the time input owners work together, contribution of each may not be easily delineated in some situations. It is also likely that each of them may claim more than he deserves. Although competition among resource owners lowers all the unnecessary excessive claims, the problem cannot be totally eliminated. An agent who hires workers may therefore offer a salary for each on all or nothing basis by a proxy measurement instead of contributing itself [Cheung, (1983)].

This, however, is heavily criticized by Hodgson (1988): "*The nature of the firm is not simply a minimiser of transaction costs, but a kind of protective enclave from the potentially volatile and sometimes destructive, ravaging speculation of a competitive market . . . Habits and traditions within the firm are necessarily more enduring because they embody skills and information which cannot always or easily be codified or made subject to rational calculus. What the firm achieves is an institutionalization of these rules and routines within a durable organizational structure. In consequence they are given some degree of permanence, and guarded to some extent from the moody waves of speculation in the market*" [Hodgson, (1988)].

Powell (1990), on the other hand, argues that "transactions that involve uncertainty about their outcome, that recur frequently and require substantial "transaction–specific investments" of money, time or energy that cannot be easily transferred are more likely to take place within hierarchically organized firms. Exchanges that are straightforward, non–repetitive and require no transaction–specific investment will take place across a market interface. Hence transactions are moved out of markets into hierarchies as knowledge specific to the transaction (asset specificity) builds up. When this occurs, the inefficiencies of bureaucratic organization are preferred to the relatively greater costs of market transactions.

There are two reasons for this: **1.** bounded rationality – the inability of economic actors to write contracts that cover all possible contingencies; when transactions are internalize, there is little need to anticipate such contingencies since they can be handled within the firm's" governance structure"; and **2.** opportunism – the rational pursuit by economic actors of their own advantage.

Conner and Prahalad (1996) suggests that one of the major differences between firm and market is the existence of employer–employee relation or the so–called authority, the existence of authority in the employer over his employee. In firm the latter gives up his right of autonomy and are directed by the former one.

As early as 1957, Simon suggests that we are all under the constraint of bounded rationality; nobody has got perfect information and knowledge. In market individuals are directors of their own. Transactions between them imply an establishment of a market contract which lists out the compensations and obligations of both parties. Once the contract terms are established, both parties are obliged to fulfill them.

(a) Market Contracting (b) Firm Organization

Source: (Conner and Prahalad (1996)

Figure 1 Market contracting and firm organisation.

In firm, relations between the two parties are different. Z has become the employer of Y. Z has become the legal owner of the firm. On the other hand, it is also natural to consider Z as the legal owner of the firm. Z can be the sole shareholder in case the firm is a corporation or the owner given that the firm is a sole proprietorship. Hence, we may concede that Z is the residual claimant of a firm.

On top of the prevailing view of transaction costs reduction, the emergence of firm – rather than market transactions – according to Cordes et al (2008) is to internalize scale economies as well as to reduce post–contractual hazard. Kay (2000) argues instead that the character of decisions that influences and defines nature of firms.

Apart from the nature of the firm, it has also been long regarded as "chronic puzzle" to an explanation on the limits of firm size: why couldn't we find one single giant firm does everything but a collection of small firms? We all know that bulk purchase can enable us to obtain a bargain price. It is natural, therefore, to see someone who buys a pack of six bottles lemon tea instead of one single bottle even they do not drink all at once. Large firms are in a relatively strong position in seeking source of finance for their operations. In sharp contrast, small firms often face difficulty in securing external finance [Pollard, (2003)]. One of the various obvious reasons for limited firm size can be explained by the concept of efficiency as Knight Comments:

"The relation between efficiency and size is one of the most serious problems of theory, being in contrast with the relation for a plant, largely a matter of personality and historical accident rather than of intelligible general principles…the possibility of monopoly gain offers a powerful incentive to continuous and unlimited expansion of the firm, which force must be offset by some equally powerful one making for decreased efficiency (in the production of money income) with growth in size, if even boundary competition is to exist"[Coase, (1937)].

Whilst Knight views the size of firm is determined by efficiency of the organization, Coase shares similar idea "The reason for an organization of the business unit which, the business unit, I said in exist when anyone produced to sell in the market. This implied exchange and exchange specialization. But this specialization is a specialization of the business unit – it needs imply no specialization within the business unit…Why there are two separate firms? Two reasons – 1.Increasing cost for each additional market transaction until cost of organizing marginal market transaction was equal to marketing cost that of organization. 2.That as transaction increased, might not carry out its object of reproducing market conditions [Coase, (1988)]."

Cordes et al. (2008), on the other hand, proposes firm size is determined by opportunistic behavior. If the costs of opportunistic behavior are low, *relatively few cooperative employees can support a large firm*. It is only via monitoring combined with employment contracts that appeal to an agent's self interest that shirking may be mitigated. When firm size keeps small, a higher level of cooperation can be maintained inside the group.

4. Legal system in China and Hong Kong: a general overview

"If we move from a regime of zero transaction costs to one of positive transaction costs, what becomes immediately clear is the crucial importance of the legal system in this new world. I explained in "The Problem of Social Cost" that what are traded on the market are not, as is often supposed by economists, physical entities, but the rights to perform certain actions, and the rights which individuals possess are established by the legal system [Coase, (2008)]."

China has drafted and implemented laws and regulations to govern the construction activities. It mainly consists of the laws and regulations at three levels. The highest levels of laws which govern the

construction industry include the Construction Law 1997 and the Bidding and Tendering Law 1999, two laws laid down by the People's Republic of China.

The Construction Law 1997 is the most important law among all laws and regulations which concern about construction industry. It provides legal framework for construction activities and its legal effect overrides all the other construction rules and regulations.

The Construction Law is consisted of 8 chapters and 85 articles which mainly concern about bidding. The administrative regulations (*xingzheng fagui*) belongs to the second level of laws concerning are the disseminated by the State Council of PRC. They are mainly concerned about several important issues, e.g. registered architects regulations, construction project quality management and so on. At the third level, departmental regulations and rules about human relations are deal. They are promulgated by the Ministry of Construction.

Although China has drafted, enacted and implemented numerous laws, rules and regulations, nearly none is enforced completely [Luo, (2007)] There are several characteristics in Chinese legal rules and regulations: **1.** Flexibility: In China, the major objective for legal rules and regulations is to develop the market economy by increasing certainty. By improving the certainty in legal rules, more foreign investors come to invest and speed up the economic progress in turn. Some researchers in law in China concede that it flexibility allows officials to deal with different local circumstances. Nevertheless, because of such flexibility, it brings preferential treatment by human connections and corruption [Lam, and Chen, (2004)]. **2.** Fragmentation of regulatory departments and bureaus: Usually, before a piece of legislation is put into practice in China, the Central government chooses some areas for testing the effectiveness of the new law and delegate authority to these local officials so that they can flexibly exercise the power according to local circumstances. Nevertheless, it is also Because of such flexibility, laws become uncertain. **3.** Ambiguity in regulations and laws drafting: to meet the fast growing economy in China, legal drafters have to draft laws quickly for business activities. Nevertheless, also because of this reason, they do not have enough time to consider every facet in laws and regulations. Legal rules and regulations were often drafted ambiguously. There is only a general overview without detail consideration. Making every piece of legislation can be explained in two ways [Lam, and Chen, (2004)]. **4.** Legal rules are swords of the central government, instead of shields of the general public. Similar to the traditional emperors, Marxist rulers only consider laws as a tool which help achieve the goal of certain policy enforcement and targets of the Chinese Communist Party. This is in sharp contrast to the role of law in UK and some other countries: laws are not instruments to restrain state power, but an instrument of it [Zhao, and Fu, (1999)].

There is, however, a complete different story in Hong Kong. Although Hong Kong has a relatively short history, her legal system is well–developed. It follows common law system, i.e. any precedents in court become the future legal rules. Any ambiguity in rules and regulations can be clarified by way of this. Fragmentation of legal rules never exists in Hong Kong. Largely because of its small geographical areas, it is unnecessary to further divide this tiny dot into different small pieces of area for ruling. Interpretation of laws and regulations were never in hand of politicians and ruling body, but in the hand of judges who are well–trained in law with years of experiences in handling court cases. After all, legislations, rules and regulations in Hong Kong are not the swords of the high rank rulers, but the shields of the general public. From this aspect, it is quite similar to the idea of provisions of laws in many European countries.

Failure of the legal systems can be explained by both the inherent problem in legal system as well as the informal system "*law serves a social order, i.e. the relations between individuals, and actions which affect nobody but the individuals, who perform them ought not to be subject to the control of law, however strongly they may be regulated by custom and morals*" [Hayek, (1979)].

Construction laws and practices in China have also been influenced heavily by its unique culture [Lam and Chen, (2004)]. Confucianism Chinese culture has been predominately major thought for most of the time in Chinese history. Although Confucian has brought along many good aspects to Chinese, e.g, it has build up the foundation of good human relations between friends, sons and fathers, employers and employees and so on. Confucian's thinking has under valued the importance of law. Chinese kids were told that ethical rules are more important than laws compliance [Viet, (2005)].

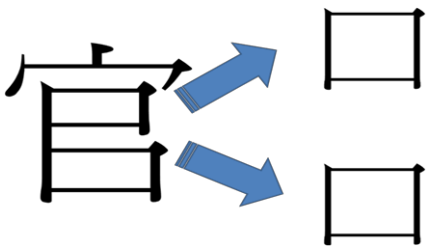
Laozi said" the more restrictions and prohibitions there are in the world, the poorer the people will be the more laws that more promulgated, the more thieve and bandits there will be" [Gunde, (2002)].

In most of the villages in China, whenever there is some crimes happen. The one who is caught usually will not be sent to the police station first but to the village leader. The village leader and/or senior village members will decide the method of punishments. Besides, they are also of the view that "the law is dead, human are alive", laws have to be adjusted according to different situations [Bhatia, (1974)]. In view of all the aforementioned characteristics, people seldom treat the terms as in contract seriously. Contracts between contractors and developers are of no exception. Not only the home buyers find the quality of the final products unacceptable, the developers also can hardly accept the workmanship of the contractors.

Traditionally, government officials have the highest and absolute power. The officials have "two mouths" while the ordinary citizen has one mouth only. "Shuo Wen Jie Zi", the first and the most famous books written to interpret the origin of Chinese words, suggests that all the words are developed from pictures with a meaning. An intrinsic meaning from these words can be discovered by looking at the words. Below is a Chinese word of "government officials" in China, there is a "宀" part which visualises the hat of the government officials (government officials in the past need to wear hat to work every day and their hats represent the position of their job), two "口" are the mouths of the officials. While the ordinary person only has one mouth, these officials have two mouths. Such word does reveal the absolute power of officials: they voices override all those general public [Li, (2008a)]. Vague terms in laws in China allow the officials to insert their own interpretation and the general public have no say at all. The toughest battle that most plaintiffs face is persuading the court to accept the case. Citizens in China cannot sue the Party committee or secretary [O'Brien, and Li, (2005)].

All they can do is to follow the instructions from these officials for most of the time. Developers are not of exceptions. In view of the ever changing markets in China, the central government has often inserted new rules and laws suddenly.

For instance, by the time Olympic Games was held, some of the residential owners were forced to sell their units to the central government and some shop sellers were forced to close their shops. Laws were the tools of the ruling body in achieving certain objectives only. In view of the ever changing, unpredictable rules and regulations, reduction in contracting with too many contractors are one of the ways to decrease the risks in doing their business.



Source: (Li, 2008a).

Figure 1. The Chinese word of government officials "Guan" on the left and two Chinses words "mouths" "*kou*" on the right.

There is a totally different story in Hong Kong. It usually takes more than a year to pass a piece of legislations. Have there been any sudden changes in rules, politicians will help these shops and sellers to voice the problem. The power of the government is also limited by Basic Law, common law and legislations. Rules and regulations, from this perspective, are highly predictable. Black box decisions on legislations never happen in Hong Kong at present, all the legislators' opinions are recorded in black and white and uploaded on the web of the Hong Kong Legislative Council. Rules and regulations, certainly override the ethical rules in case of contradictions.

5. Implications

Because of these inherent problems in legal drafting, highly unpredictable rules and regulations, information costs in knowing and predicting the future change in regulations is high. Developers in China protect themselves by lowering the number of contracts with different contractors to decrease their risks. Have they provided wall paintings, floor tiles, washing basins, kitchen TV etc, they have to

supervise them closely — contractors can easily find ways to escape their responsibilities — developers have to spend an enormously high supervision costs to ensure contractors' workmanship are up to standard. Scope of services provided by these developers has been limited by the risks and uncertainty, costs of predicting the quality of the final products. If we consider Steven Cheung's idea that the firm is a kind of contractual relation, size of the developers in China is relatively small – limited on the contract with the steel and concrete suppliers only.

Developers in Hong Kong, however, are highly protected by law. By the time the contractors fail to do an up–to–standard piece of work. There are many ways to sue or get back the money from these contractors. Purchasing kitchen TV, washing basin, PDA facilities, contracting with wall and floor tiles contractors etc are not regarded or treated as a high risk activities from developers' perspectives, cost of knowing the final product provided by contractors are low. Rather, it is a good marketing strategy to attract potential buyers and a good opportunity to capture any potential gain from these commercial activities. Therefore, they are willing to provide a wide scope of services. "Size" of the firms is therefore larger.

6. Conclusions

The nature and size of the firm has arose the interests of many economists. Adam Smith provided the first explanation by the benefit in division of labor. Hundred years later, neo–institutional economists shed light on transaction costs. Such explanation also opens the door for identifying reasons for "several small firms" instead of "one single giant firm". Whilst previous literature suggests that choice of firm instead of market rests in the existence of costs of knowing the product, measurement and discovering the relevant price, this paper advocates that costs of predicting and interpreting legal rules and regulations limit the size of the firm. To avoid unnecessary losses, developers reduce the number of contracts with suppliers and contractors.

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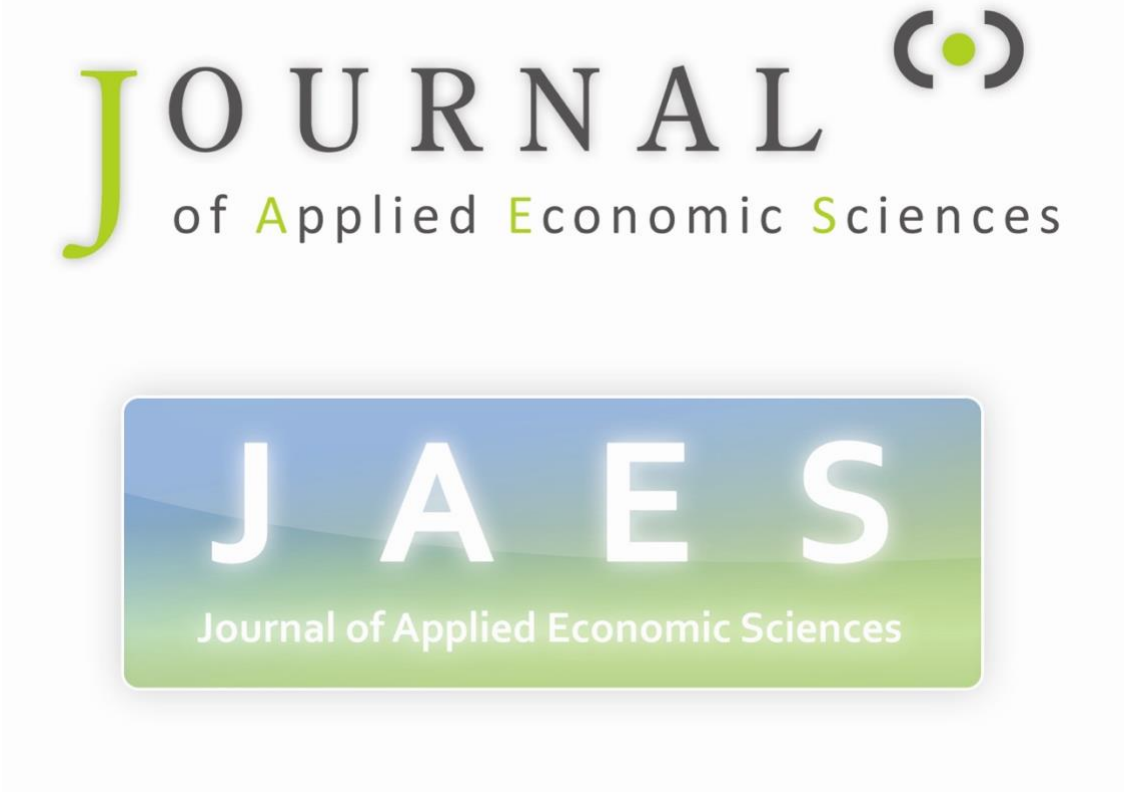

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THE SPREAD OF THE CAPITAL MARKETS'S GLOBAL CRISIS: DOES THE COUNTRIES' INDUSTRIAL PROFILE MATTER?

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Abstract:

The causes of 2007's financial perturbations and mainly of the subprime crisis are well known at the beginning of 2008. Nevertheless, the specialists pay little attention to capital markets global crisis and to its consequences. In this study, we demonstrate using Infinancials data, that we are experiencing a global capital markets crisis, where the European financial markets are the most affected. The impact of the crisis upon the 45 analysed countries differs depending on their industrial structure. Among the other factors which led to a different impact of the global crisis we can range the capital markets development and the correction of the assets prices boom. The effects of this crisis on the real economy are less obvious at the beginning of 2008, especially at European level, but the economic growth forecasts became pessimistic. The credit activity is negatively influenced and the foreign exchange market crosses over a turbulent period. The financial crisis consequences in respect of the real economy will depend on the recovery capacity of the United States economy.

Key words: capital markets contagion, global financial crisis, subprime crisis, stock prices, industrial profile

JEL Classification: E3, G1

1. Introduction

The United States subprime crisis was largely analysed in the economic literature, but little attention is paid to the financial markets global crisis. We are crossing a period with severe financial turbulences around the world. At the beginning of 2008 almost all the countries were severely touched by the crisis, but the effect of the shock upon the stock prices differed between capital markets.

In a recent study [Albulescu, (2008)], we have tried to identify the factors which contributed to a different impact upon the 45 analysed countries. Analysing the evolution of the European capital markets stock prices we discovered that there is no relation between the recent financial results of the companies and the drop of the stock prices. In addition, the importance of the degradation of macroeconomic fundamentals is not obviously related to the crisis effect. That is why we have concluded that the different impact was rather correlated with the stock price correction, but those results were not satisfactory.

In this study we test the correlation between the industrial profile of the countries and the impact of the global crisis. The analysed companies were grouped in 18th industrial sectors in order to identify which sectors are more exposed. This method allowed us to demonstrate the correlation between the countries' industrial profile and the crisis' impact upon the capital markets.

The structure of the article is the following: the first part presents the subprime crisis and its repercussions and the second part presents the results related to the industrial profile of the analysed countries. Finally, we point out the conclusions.

2. The subprime crisis and the turbulences on the international capital markets

In the capitalist financial systems, especially in the market–based ones, there is a continuous process of capital accumulation. If this process stops, the entire financial and economic system enters into collapse. This was also the case of the 2007 subprime crisis.

A financial crisis can be defined in several ways and can take different forms (banking crisis, foreign exchange crisis, debt crisis, etc.). A financial crisis can also be defined as a crisis which affects the stock exchange markets and the credit markets in a country or in a group of countries. If the financial crisis will continue, it can emerge and affect the real economy, leading even to a recession.

In respect of asset prices, real growth and public debt, Reinhart and Rogoff (2008) affirmed that there is a strong resemblance between 2007 subprime crisis and the other financial crisis. We consider that there are also some particular aspects which characterize the actual crisis, like the increased role of financial innovations (the securitisation and credit derivatives) and a very important contagion

phenomenon which began within the American economy and spread over the global financial markets, deteriorating the investors' confidence.

The shock on the American real estate market has been a starting point for the financial turbulences at international scale. At the end of 2006, an important number of clues have already announced the international financial markets crisis: depreciation of dollar denominated assets, degradation of banks financial indicators, reserves reduction and mortgage credit problems. Between 1997 and 2006, the houses prices increased with about 124% in the United States [The Economist, (2007)].

The financial turbulences have begun before the subprime crisis. A first contagion phenomenon related to stock prices drop was signalled in emerging markets in May 2006 [Mauro, and Yafeh, (2007)]. A second event of financial turbulences was represented by the Chinese capital market disorder in February 2007. The credit mortgage crisis in the United Stated followed.

In the United States, during the '90, many mortgage loans were granted to debtors with a doubtful repayment history. Thereby, in 2006 these subprime loans represented 600 billion dollars, reaching about 20% of the total mortgage loans. The default rate increased to 42% in 2006 as compared with 2005 [Lasserre, (2007)]. In 2007, the volume of subprime loans represented 13% of total loans amount (about 1300 billion dollars) and the delinquency rate increased to 15% in 2007 as compared with 10% in 2005 [Banque de France, (2007)].

These doubtful loans were known as "2/28" and "3/27" and the most part of these loans were *adjustable rate mortgages loans* (ARM), granted without assessing the repayment capacity of their beneficiaries [Schumer, and Maloney, (2007)]. For example, a hybrid ARM "2/28" is characterized by a fix interest rate, adjusted every six months, depending on a reference rate. In 2007, the adjustment of the ARM caused a 30% increase of the payments amount, and an important part of the borrowers were no longer able to pay.

This situation was well known a few years ago, but a considerable number of specialists argued that the exponential increase of real estate prices is justified by the financial innovation and the Asiatic capital flow towards the United States. The US wealth contraction in 2007, the credit spread growth and the malfunctioning of credit market contradicted their theory.

Equally, the international macroeconomic climate deteriorates. The previous period was called by the specialists – "*The Great Moderation*". This period is characterised by a low inflation and an ongoing increase of the real GDP[1]. However, in the last years, several events occurred and contributed to the economic climate deterioration. The surplus of savings in countries like China and the interest of the petroleum exporting countries to limit the appreciation of their currencies toward the American dollar contributed to the economic deterioration of the US The financial inflation was also considerable before the start of the crisis and the FED and ECB contributed to its amplification, by maintaining a liquidity excess in the market.

But the most important factors which contributed to the crisis appearance were the financial innovations (represented by the securitization activity and the credit derivatives), combined with the imperfections of the regulatory and surveillance activities.

The securitization process is described by Durand (2007). The banks set up the so called "package" of mortgage loans (repackaging process), with different risk profiles (the subprime loans are the most likely to make default), and declined the property of this loans to investors which assumed the risk (especially to the hedge funds). The risk transfer is possible under the form of securities which can be negotiated on the market (asset–backed securities – ABS). If the loans are mortgage loans, we speak about "mortgage backed securities".

The credit derivatives also give to banks the possibility to take an important part of their credit portfolio off from the balance sheet. Several reasons are in favour of this option. The first one is represented by a better financial situation of the balance sheet which increases the investors' confidence in the bank. Another reason is the interest rate arbitrage which gives to the banks the possibility to take profit on the difference between the interest obtained by the intermediary entities who invested in the outstanding debt of the bank (the Special Purpose Vehicle – SPV) and the interest which must be paid to investors, indirectly, by means of the same SPV [Léonard, (2008)].

[1] Some authors considered that this period was favourable to risk construction [Buiter, (2007)].

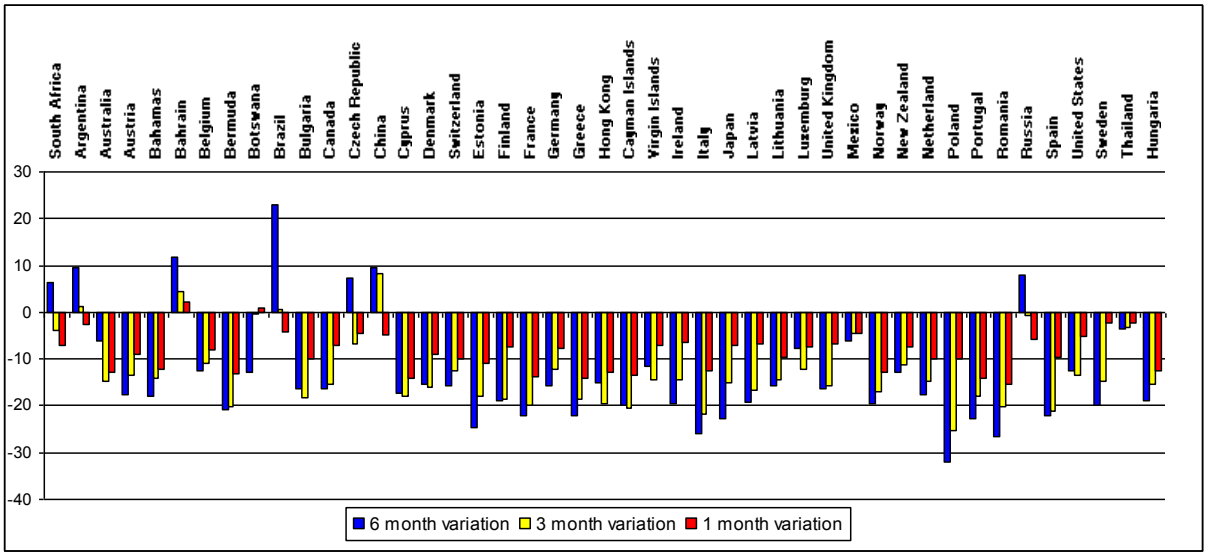
The regulation process deficiencies also represent an important factor of the recent crisis. The Basel I implementation pushed the financial firms to avoid the capital constraints and to sell a part of the granted loans. The new Agreement – Basel II – is less rigid, but it still does not use the loss distribution. The stress–test methodology takes indeed into account the extreme loss distribution, but it was not often used in practice.

The subprime crisis extended at international level, following two main directions: the credit crunch and the capital markets turmoil. In our study we analyse the contagion phenomenon on the stock markets, trying to find out the reason for which the stock markets were differently affected around the world. Our analysis is similar to the Balit Moussalli's (2007) who studied the different impact of the Asian crisis.

Up to now, the impact of the crisis on the real economy is not so evident. That is why the specialists speak about a paradox of the actual crisis [Riskbank, (2007); Landau, (2007); Noyer, (2007)]. Any employed indicator (spread or volatility) shows that the shock on the credit markets and on the stock exchange is important and the losses are considerable. However, these spectacularly losses incurred by some companies, do not appear like a major threat to financial stability.

The international financial crisis was amplified by the loss of investors' confidence and by the speculation process. We consider that the financial system learned to respond to the financial turbulences and the effects of the crisis are delayed. The losses incurred will have an important impact upon the real economy, but it is difficult to forecast when the end of the crisis occurs.

Before we proceed to the analysis of the factors which contribute to a different propagation of the crisis in the stock markets, we will show that we are crossing a global financial crisis. The analysis is made in February 2008, six month after the start of the subprime crisis. For demonstrating that the stock market crisis has an international extension, we have used *Infinancials* data for 45 countries (more than 20.000 listed companies, grouped in 18 industrial sectors). The stock price at 6 months drops for the large majority of the countries, except for several emerging economies. However, at the beginning of 2008, only the stock market in Bahrain knew a slight increase. In all the other markets, the stock prices decreased. In order to obtain a robust analysis, we have worked with the average stock prices variation, for all the companies listed, but also for the 10 largest companies. We also performed the analysis for the stock market representative index. The results of the two last analyses are similar to the first one. That is why we present in the following graph the stock prices evolution for all the listed companies (Figure 1).



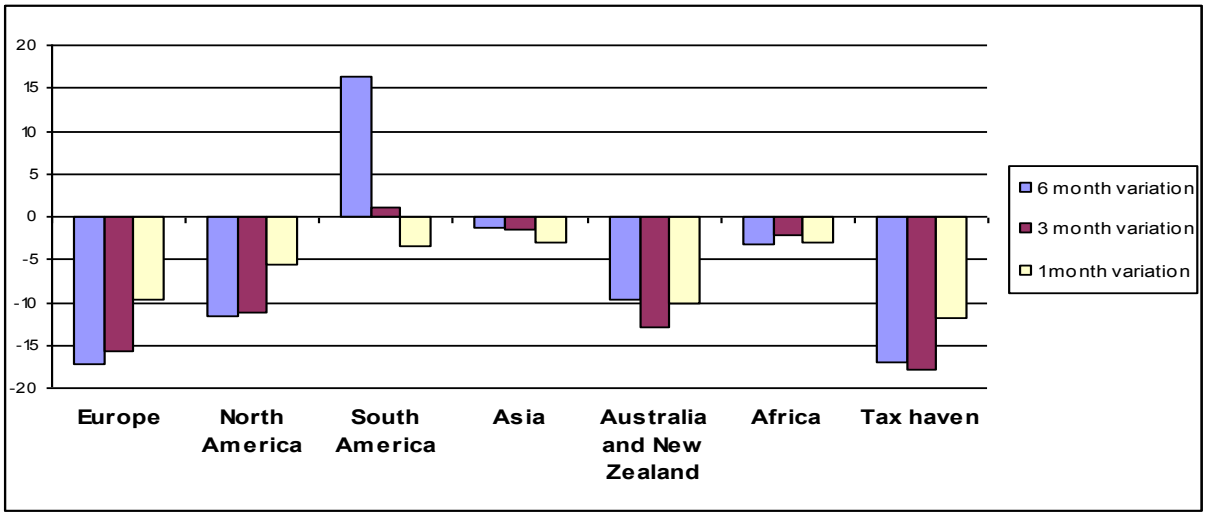
Source: INFINANCIALS database

Figure 1: Average stock prices evolution for all the listed companies

Figure 1 shows that only five emerging countries (Brazil, Argentine, China, Russia and South Africa) recorded a positive evolution of the stock prices at six months. Czech Republic joins this group, being the single European country which was not severely affected by the contagion phenomenon (the

investors' anticipations had an important role in this case). However, in 2008 all this countries were touched by the crisis.

Analysing Figure 1 we can see that the impact of the crisis in not similar among the countries taken into account. In order to identify the geographic zones which were more affected, we grouped the countries by continent (the tax heaven formed a distinctive group).



Source: INFINANCIALS database

Figure 2: Average stock prices evolution by continent

Up to now, we showed that the international capital markets experience a severe crisis. In the rest of the paper we try to identify the factors which led to a different propagation of the crisis, taking into account the countries' industrial profile.

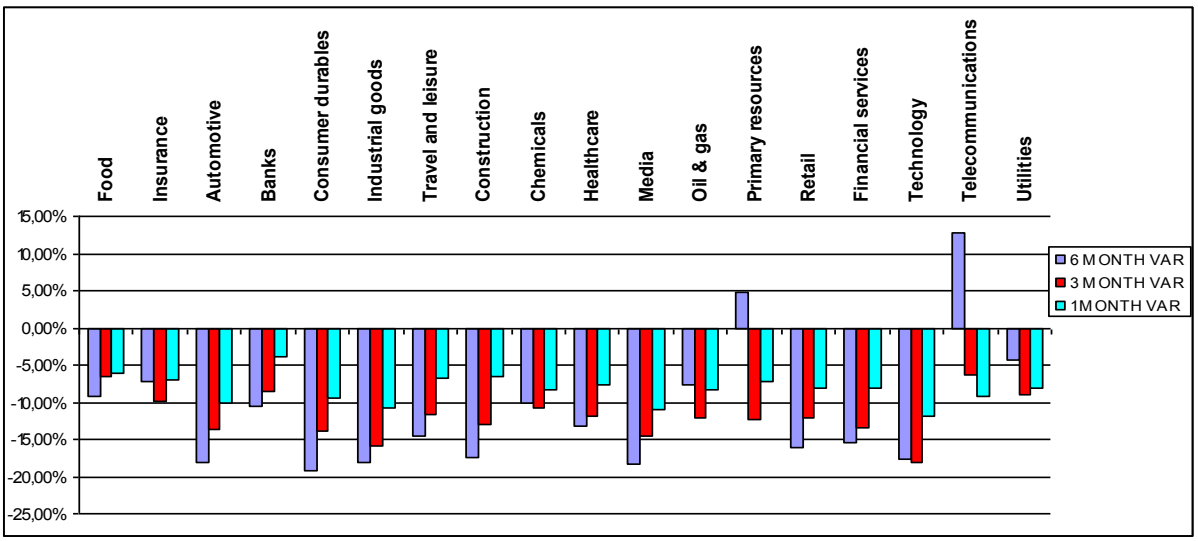
3. The industrial profile and the crisis impact

In our previous paper [Albulescu, (2008)], we focused on the relation between the evolution of the companies' financial situation and the evolution of the stock prices, in the context of the capital markets global crisis. We found out that there is no relation between these two variables. Apparently, it seems that the evolution of the macroeconomic context of the countries does not represent either a viable response (i.e. Poland and Romania were strongly affected by the capital market crisis but their economic situation improved during the last years). It appears that a strong price correction took place on the stock exchange which recorded a price increased above the average.

These explanations are not completely satisfactory; that is why we proceed to a supplementary analysis – we investigate the stock price evolution by industrial sector in order to make a comparison with the industrial profile of the analysed countries[2]. The 18 industrial sectors are: food, insurances, automotive, banks, consumer durables goods, industrial goods, travel & leisure, construction, chemicals, healthcare, media, oil & gas, primary resources, retail, financial services, technology, telecommunications, utilities.

If we inspect the stock price evolution by sectors (Figure 3), we can observe that for all the sectors the average stock prices recorded negative evolutions at 3 months, respectively at 1 month (corresponding to 2008). The actual level of the stock prices, as compared with the prices level from 6 months ago, shows that the trend was favourable only for two sectors (primary resources and telecommunications). The industries of automobiles, consumer durables and industrial goods, media and technology, were the most affected. Taking into consideration the fact that the crisis initially emerged in the financial sectors (banks, financial services and insurances), we expected that these industries will be the most touched by the stock market crisis.

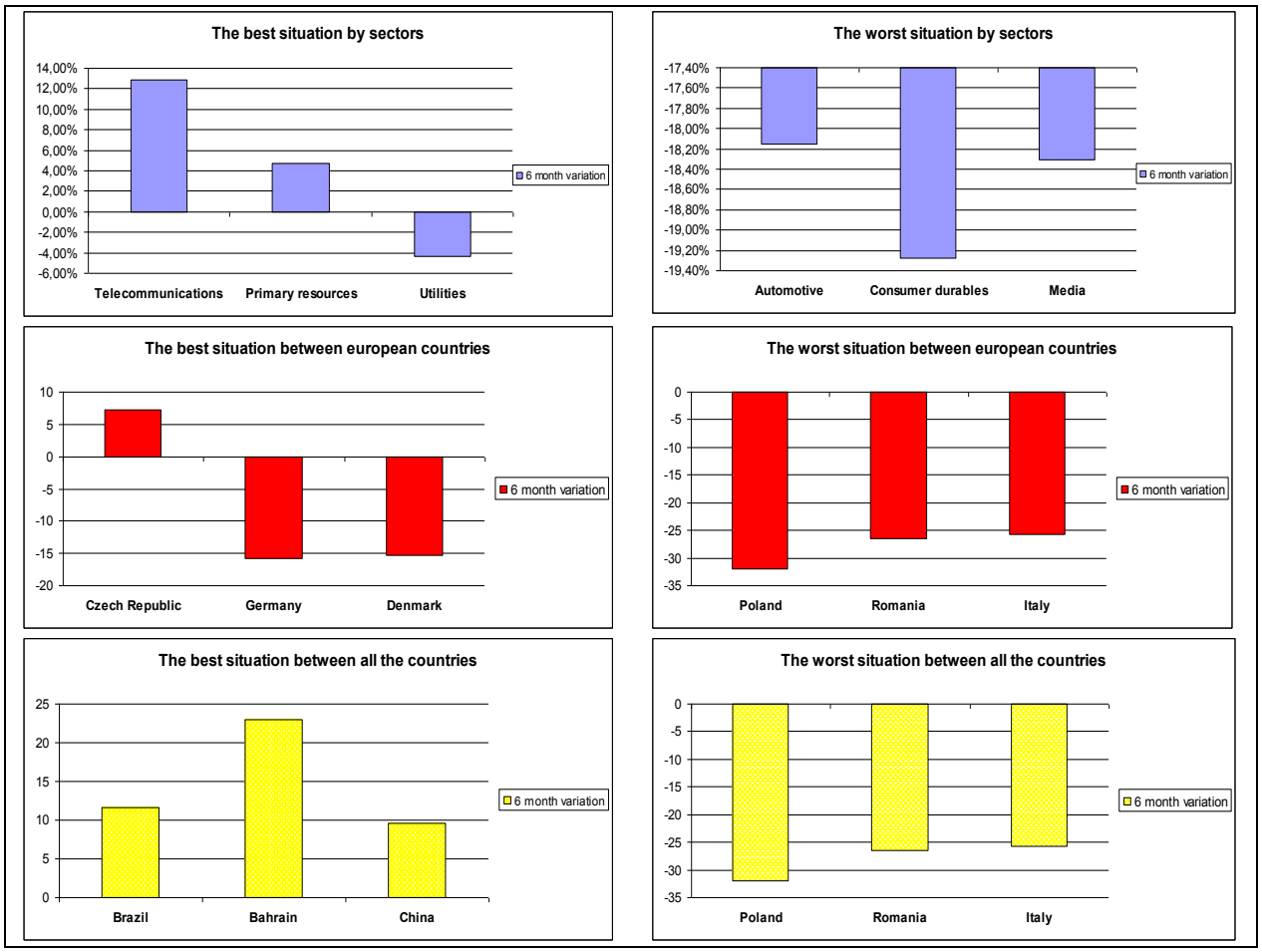
[2] In *Global Europe Anticipation Bulletin* [GEAB, (2006)], the specialists estimated the sectors which will be the most affected by the crisis: international trade, exchange market, financial sector and energetic sector.



Source: INFINANCIALS database

Figure 3: Average stock prices evolution by industrial sectors

We proceed now to a comparison between the countries and the sectors that were the most affected, and those that were less influenced by the crisis. In order to do that, we have built Figure 4.



Source: INFINANCIALS database

Figure 4: Comparison between the impact of the crisis at country level and at sectoral level

Because the 6 month variation is the most representative to monitor the stock price dynamics, we present only these data. Several findings can be highlighted after analysing Figure 4. Firstly, the financial sectors are not the most exposed to the stock market crisis. The most affected industrial sectors are the consumer durable goods, automotive sector and media. On the contrary, the less affected sectors are the telecommunications and the primary resources. Secondly, if we look now to the countries that were the most affected by the crisis, these are the three European countries: Poland, Romania and Italy. The less affected between all the analysed countries is Bahrain (a tax heaven country[3]), Brazil and China (two emerging countries). In Europe, Denmark and Germany stock exchanges suffered the smallest losses, which were, however, significant (–15% of the market capitalisation at 6 months). The Czech Republic is the single European country which was not touched by the crisis at the beginning of 2008.

Analysing the industrial profile of these countries, we reach two conclusions. The primary resources sector is important in the emerging countries, and the telecommunication industry develops quickly. Taking into consideration the fact that these two sectors were less affected by the crisis, we may find an explanation related to its impact. But if we look only to the European countries, the reasoning fails. The automotive sectors and media (the most affected by the stock market crisis) are well developed in the European industrialised countries like Germany and Denmark. The automobile industry is well developed in Czech Republic also. If we look at Romania and Poland we see that the primary resources sector has a significant presence in these countries. Moreover, the durable goods sector is also strong because the transition imposed a "catching–up" process related to life quality in these countries.

These findings show that there is a connection between the industrial profile and the crisis impact on the capital market, but this relation does not apply for the European countries. It is difficult to defend the idea that the industrial profile of the country is responsible for the different impact of the global capital market crisis in all the countries. The development of the capital markets and the previous sharp increase of the stock prices seem the most plausible elements to explain the different impact of the crisis.

4. Conclusion

The first financial crisis of the 21st century is characterized by esoteric instruments, unaware regulators and skittish investors [Reinhart, and Rogoff, (2008)]. The authorities accepted the severity of the crisis too late and their intervention was hesitant. The recent turmoil highlighted the phenomena of spillover between countries and financial markets [de Rato, (2007)].

The subprime crisis represented the starting point for the global credit crisis and international capital market crisis. In this study we have analysed the stock market crisis and the factors which contributed to a different impact of the crisis upon the stock exchange markets all over the world. In a recent study we have showed that there is no relation between the financial situation of listed companies and the evolution of the stock prices. In this paper we investigate the relation between the countries' industrial profile and the stock prices drop.

The first conclusion is that all the countries and all the sectors were affected by the international capital market crisis. Another conclusion is that the European countries recorded important falls of the stock prices. A third conclusion is related to the most and to the less affected sectors: the consumer durable goods, the automotive sector and media experienced a severe correction of the stock prices, whereas the telecommunications and the primary resources sectors were less affected (see Figure 4 which presents the stock price variation at 6 months). The most important conclusion is that the industrial profile of the countries led to a different impact of the crisis, but this assertion is not valid for the European countries as an individual group. The correction of the sharp increase of the stock prices explains better the crisis different effects.

The economic consequences of the crisis are not well known at present. The first estimation related to the subprime crisis was optimistic: "*The fundamentals remain robust, the profits of the companies, banks, and financial institutions are high and the economic growth prospect is good*" [Banque de France, (2007)]. Likewise, Buiter (2007) observes a sign of economic stabilization towards the second half of 2008. These signs are represented by the action of major banks related to the inclusion of the off balance sheet elements into their balance sheet. Besides, the liquidities of high savings countries like the countries of the Gulf Region, China and Russia were oriented towards the financial

[3] Figure 2 shows that the tax heaven countries were severely affected by the stock prices crisis. Bahrain represents an exception.

markets severely affected by the crisis. Many American banks were rescued by the sovereign funds from the emerging markets. This situation also leads to a change in the diplomatic and political relationship at international level.

But, at the end of 2007, the financial indicators deteriorated and the investor's confidence consequently declined. The specialists of Riksbank (2007) consider that the main threat to the economic development is represented by the real estate situation in the United States. GEAB (2008) foresaw that the American economy will enter into recession.

We consider that the international financial crisis will continue. The financial market crisis has already been followed by important frictions on the foreign exchange market. The real estate market is also fragile in many countries. If the United States economy enters into recession, the impact of the crisis amplifies at global level. Taking into account the fact that the main central banks proceeded to a monetary tightening, the probability of a global recession is considerably high.

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FISCAL ASPECTS REGARDING TAXING THE INCOMES OF NON–RESIDENTS IN ROMANIA

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Abstract:
The tax on the non–residents incomes has become a more present issue, because the new economical and political conjuncture, and especially because of the European one, the foreign companies intending to invest more in Romania. Through Romania's adhering to the European Union the volume of foreign investments in Romania knew an important increase, and, implicitly, the incomes obtained by non–residents from the activities unfolded in Romania, having as consequence the increase of the tax volumes cashed from this sector. This under the conditions of a favorable fiscal treatment applied to the investors from the European Union compared to the non–residents from the extra–communitarian area. The problem of the tax applied to the incomes of the non–residents knows a few important changes, brought by Romania's adhering to the European Union, such as, for example, those regarding the tax levels and tax exemption, the new Fiscal Code basing on protecting the residents from the states members of the European Union and on avoiding double international taxing. The specialized international organisms reached to the conclusion that the optimal solution for avoiding double taxing is represented by concluding bilateral or multilateral conventions between states, their disposals having the role to clarify the status of the residents involved in different economical activities in other states We present below the approached problems together with the new changes in force starting with January 1st 2009.

Key words: non–resident, incomes, tax, double taxing, residence

JEL Classification: H30, K34

1. Application field. The notion of non–resident

Non–resident means any foreign juridical person, any non–resident individual and any other foreign entities, including collective assets placing organisms, not registered in Romania, according to the law. The foreign juridical person is any juridical person not established according to Romanian legislation or that does not have Romania as effective leading place. The non–resident individual is, according to legislation, any individual that is not a resident individual. An individual is a resident if fulfills at least one of the following conditions:

- Has the domicile in Romania;
- The center of the person's vital interests is placed in Romania;
- Is present in Romania for a period of time or a few periods of time that overcome 183 days, during 12 consecutive months, that ends in the vized calendar year;
- Is a Romania citizen that works abroad, as officer or Romania's employee in a foreign state.

2. Incomes categories liable to taxing

According to law, liable to taxing are the following incomes categories:

Dividends

In Romania are liable to taxing the dividends received from a Romanian juridical entity, no matter they are received in Romania or abroad. Dividend means a distribution in money or nature, made by a juridical entity to a participant to that juridical entity. There are not considered dividends the following:

- A supplementary participation title distribution that does not modify the participation titles percentage of any participant to a juridical entity;

- A distribution in money or nature made connected to a compensation of the participation titles to the juridical entity, other than that making part from the compensation, that does not modify the percentage of participation titles of any participant to the juridical entity;
- A distribution in money or nature, made connected to the liquidation of a juridical entity;
- A distribution in money or nature, having as reason the decrease of the share capital effectively constituted by the participants;

The law also considers a dividend receiving by a shareholder/associate the value of some goods or services delivered to the juridical entity, if the paid amount overcomes the market's price for these kind of goods or services; the difference is treated as dividend. Also, if the paid amount by a juridical entity for the goods or supplied services in favor of a shareholder or an associate of that juridical entity is made for the personal purpose of these, then the respective amount is treated as a dividend.

Interests

The interest represents any amount that has to be paid or received for the use of money, no matter if it has to be paid or received within a debt, a deposit or a financial leasing contract, instalments payment sale or any sale with postponed payment. There are taxed the incomes obtained in Romania, no matter if they received in Romania or abroad, meaning the interests from a resident or from a non–resident person that has a permanent headquarters in Romania, if the interest is an expense of the permanent headquarters.

Due

Due means any amount that has to be paid in money or nature for the use or the usage right of any of the following:

- Author right over a literary, artistic or scientific work, including over movies, tapes radio or TV shows, and performing of audio or video registering;
- Any license, invention, innovation, commerce or factory mark, project, drawing, model, plan, sketch, secret formula or fabrication procedure or software;
- Any transmission, including to public, direct or indirect, through cable, satellite, optical fiber, or similar technologies;
- Any industrial, commercial or scientific equipment, any transportation mean or container;
- Any know–how;
- Numbers or image of any individual or other similar rights referring to an individual.

Due also comprises any other amount that has to be paid in money or nature for the right to register or broadcast any form of spectacle, show, sport event or similar activities.

There are taxed the dues obtained in Romania, no matter if they are received in Romania or abroad, meaning the dues from a resident or from a non–resident person that has a permanent headquarters in Romania, if the due is an expense of the permanent headquarters.

Fees

Fee means any payment in money or nature made by a broker, a fee agent, a general fee agent or any other person assimilated to a broker or a general fee agent, for the intermediary services performed connected to a commercial operation.

There are taxed the fees obtained in Romania, no matter if they are received in Romania or abroad, meaning the fees from a resident or from a non–resident person that has a permanent headquarters in Romania, if the fee is an expense of the permanent headquarters.

Incomes from sport and entertaining activities

According to law, there are taxed the incomes from sport or entertainment activities developed in Romania, no matter if the incomes are received by the persons that effectively take place to these activities or by any other person. All these incomes are considered as being obtained in Romania, no matter if they are received in Romania or abroad.

Incomes from management or counseling services

Incomes from management or counseling services in any field are considered as obtained in Romania, no matter if they are received in Romania or abroad, if these incomes are obtained from a resident or if the fee is an expense of the permanent headquarters.

The incomes obtained from Romania from management or counseling services in any field, that are not performed in Romania, or the incomes that are expenses made for a permanent headquarters in Romania of a non–resident are liable to tax if there are conventions concluded for avoiding double taxing in Romania and the residence state of the income beneficiary or when the income beneficiary does not present the documents regarding the fiscal residence.

Incomes from remunerations

It concerns the remunerations received by non–residents that have the quality of administrators, founder or member in the Board of Directors of a Romanian juridical entity. The remuneration can be established, according to law, through the constitutive deed of the Romanian juridical entity or the decision of the General Meeting. There must be mentioned that, according to Romanian law concerning commercial companies, the quality of shareholder/associate can be assigned to an individual or a juridical entity.

Incomes from services performed in Romania

It concerns the incomes obtained from any type of services performed in Romania, not matter their nature, less the incomes obtained from international transportation and performed services accessories to this kind of transportation.

Incomes from independent professions

It concerns the incomes from independent professions unfolded in Romania as: doctor, lawyer, engineer, dentist, architect, auditor and other similar professions. There are liable to taxes only the incomes obtained in other conditions than through a permanent headquarters or in a period of time or some periods of time that do not overcome a total of 183 days during 12 consecutive months that close in the vised calendaristic year.

Incomes from pensions

There are liable to tax the incomes from pensions received from the social insurances budget or state budget, if the monthly pension overcomes the limit of 1.000 lei.

Incomes from prizes

This category includes and concerns taxing of all the incomes from prizes granted at contests organized in Romania, no matter their nature, less the prizes obtained by non–residents at artistic, cultural and sport contests, financed by public funds and awards granted to non–residents students at contests financed by public funds.

Incomes from gambling

It concerns any income from gambling practiced in Romania. The incomes are considered as taxing base at every gambling, if they are obtained from the same organizer in a single day.

Incomes from liquidation or dissolving without liquidation

It concerns any income from liquidation or dissolving without liquidation of a Romanian juridical entity. The gross profit achieved from liquidation or dissolving without liquidation of a Romanian juridical entity represents the sum of the exceeding distribution in money or nature that overcomes the contribution at the share capital of the beneficiary juridical entity/individual.

3. Tax share

The tax on the non–residents incomes is of 16 %, except the following:

- 10% for the incomes from interests and dues, if the effective beneficiary of these incomes is a resident juridical entity from a state member of the European Union or one of the states from the Free Exchange European Association, respectively Island, Liechtenstein and the Kingdom of Norway, or a permanent headquarters of a company from any of these states. This taxing share applies in the transition period, from the date of the Romania's adhering to the European Union until the 31st of December 2010, under the condition that the effective beneficiary of the interests or dues owns minimum 25% from the value/number of participation titles at the Romanian juridical entity, for an uninterrupted period of at least 2 years, that closes at the payment date of interests or dues.
- 10% for the dividends paid by a company, Romanian juridical entity, to a juridical entity resident in a member state of the European Union, or one of the states from the Free Exchange European

Association, respectively Island, Liechtenstein and the Kingdom of Norway, or a permanent headquarters of a company from any of these states;

- 20 % for the incomes obtained from gambling practiced in Romania.

As a transitory disposal, in case of the incomes obtained from term deposits, constituted current accounts, deposit certificates, and saving instruments, obtained before the 1st of January 2007, the tax share is applied from the constituting – achieving date.

The incomes from term deposits, deposit certificates, and other saving instruments, at banks and other authorized credit in Romania, constituted /achieved between 4th of June and 31st of December 2005 inclusive, are taxed with 10% from their amounts. The incomes from interests at term deposits, deposit certificates, saving instruments, at banks and other authorized credit in Romania, constituted /achieved starting with January 1st 2006, are taxed with16% .

Starting with 1st of January 2007, the interests at constituted deposits and current accounts are not taxed, no matter the inter–banking interests' rates at one month deposits.

The incomes that represent remunerations received by non–residents that have the quality of administrator, fonder or member of the Board of Directors of a Romanian juridical entity are assimilated to salaries and are taxed according to the regulations of the IIIrd Title of the Fiscal Code.

4. Tax free and tax exempt incomes

Starting with the 1st of January 2009 are considered tax free the followings:

- incomes obtained by the collective placing organisms without juridical entity, non–resident, from value titles transfer, respectively of the participation titles owned directly or indirectly in a Romanian juridical entity;
- incomes obtained in Romania by non–residents from derivate financial instruments transfer;
- incomes obtained by non–residents on foreign capital markets from transfers of participation titles, owned at a Romanian juridical entity, and from the transfer of value titles issued by Romanian residents.

There are tax exempt the followings:

- interests to deposits/current accounts;
- interest afferent to public debts instruments in Ron or foreign currency and incomes obtained from transactions of state titles and bonds issued by the administrative–territorial units in Ron or foreign currency on internal and/or international financial markets, and also the interest afferent to instruments issued by the national Bank of Romania, for achieving the monetary policy objectives, and incomes obtained from transactions of movables issued by the National Bank of Romania;
- interest to instruments/receivable titles issued by Romanian commercial companies, established according to Romanian law, if the instruments/receivable titles are transactioned on a movables market regulated by the state authority where this market is placed and interest is paid to a person who is not affiliated to the issuer of the instruments/receivable titles;
- prizes of a non–resident individual obtained in Romania, as a consequence of a participation to artistic, cultural and sport national and international festivals financed from public funds;
- prizes granted non–resident students to contests financed from public funds;
- incomes obtained from non–residents in Romania, that supply counseling services, technical assistance and other similar services in any field, within contracts financed through loans, credit, or other financial agreement concluded between international financial organisms, and the Romanian state or Romanian juridical entity, including public authorities, having the guarantee of the Romanian state, and also within contracts financed through loan agreements concluded by the Romanian state with other financial organisms, if the perceived interest is under the level of 3% per year;
- incomes of the foreign juridical entities unfolding in Romania consultancy activities within free financing agreements, concluded by the Romanian Government/public authorities with other governments/public authorities or governmental or non–governmental international organizations;
- dividends paid by a company, Romanian juridical entity, to a resident juridical entity in another state member of the European Union, or in one of the states of the Free Exchange Association or to a permanent headquarters of a company in one of these states, placed in another state member of the European Union or of the European Association of Free Exchange, if the beneficiary of the dividends owns minimum 15% from the participation titles to a company Romanian juridical entity, for an

uninterrupted period of at least 2 years, that closes at the dividend payment date. The minimum owning condition will be of 10%, starting with 2009;

- incomes from savings under the form of interest payment, obtained in Romania by resident individuals in state members of the European Union;
- the incomes from interests and dues obtained in Romania by resident juridical entities in states members of the European Union or European Association of Free Exchange, starting with January 1st 2011, if the effective beneficiary of the interests and dues owns minimum 25% form the value/number of the participation titles to a Romanian juridical entity, for an uninterrupted period of at least 2 years, that closes at the payment date of interests and dues;

5. Tax payment

The tax due by non–residents for the taxable incomes obtained in Romania is calculated and retained when the payment is made at the state budget by the income payers until the 25th day of the following month inclusively. The interest is calculated, retained and paid in Ron, at the state budget, at the exchange rate of the market, communicated by the National Bank of Romania, valid for the day when the tax is retained for non–residents.

In case of distributed dividends, not paid to shareholders or associates by the end of the year for which were approved the annual financial statements, the tax on dividends is declared and paid until the 31st of December of the respective year.

For the incomes representing interests to term deposits, deposit certificates and other saving instruments at banks and other credit institutions authorized and located in Romania, the tax is calculated and retained by the payers of this kind of incomes at the moment of registration in the deposit account of the holder, respectively at the paying off moment, in the case deposit certificates and saving instruments. Taxing for the incomes from interests is made monthly, until the 25 inclusively of the following moth of registration/paying off.

The contributors have the obligation to present an informal declaration regarding the retained tax and paid during the year, on income beneficiaries, to the appropriate fiscal authority, until the 28th, respectively 29th of February of the following year. The declaration will contain the payments and payment arrangements to non–resident persons, purpose and amount of each payment, name and address of the beneficiary. The declaration does not contain the engaged or paid amounts for imported goods or for international transportation.

Income payers under the form of interests have the obligation to present an informative declaration regarding the payments of this kind of incomes made to individuals resident in states members of the European Union. The declaration is presented until the last day of February of the current year, concerning the information referring to interests payments made during the previous year.

The income payers that have the obligation retain taxes from the incomes obtained by contributors in Romania must supply the contributor written information regarding the nature and amount of the taxable incomes, and also the retained tax in the contributor's name. The information is sent to each contributor until the last day of February of the following year to that for which the tax is paid.

6. Avoiding international double taxing

If a contributor is a resident of a country that has concluded a convention with Romania for avoiding double taxing regarding tax on income and capital, the tax share that applies to the taxable income obtained by that contributor from Romania can not overcome the tax share regarded by the convention, that applies to that income. If the tax shares from internal legislation are more favorable than those from the conventions regarding avoiding double taxing, then the more favorable tax share apply.

In order to apply the stipulations of avoiding double taxing convention, the non–resident has the obligation to present to the income payer, when the income is achieved, the fiscal residence certificate issued by the appropriate authority from his/her residence state. If the residence fiscal certificate is not presented in due time, there applies the stipulations of the Romanian legislation. When the residence fiscal certificate is presented, there applies the stipulations of the convention regarding avoiding double taxing and is also made the tax regularization within legal prescription term, if the residence fiscal

certificate mentions that the beneficiary of the income had, within prescription term, fiscal residence in the contracting state for the period the incomes where achieved in Romania.

The fiscal residence certificate presented during the year for which the payments are made is also valid in the first 60 days of the following year, if the residence conditions do not change.

In order to prove the residence, there can also be presented another document issued by another authority than the fiscal one that has attributions residence certification field, according to the legislation of that state. The non–residents that are beneficiaries of the incomes from Romania will present to the income payer the original document or a copy of the fiscal residence certificate or the translated and authenticated document.

A non–resident can be considered resident of a state also as a consequence of the information received on basis of the information exchange initiated/amiable procedure initiated by a avoiding double taxing convention partner country.

7. Conclusions

The new fiscal regulations continue the previous principles, protecting the investments developed in Romania by residents from European Union, that have a fiscal organization more favorable in what concerns the tax on income than the non–residents from the extra–European area.

It is important to mention that, from the total of 164 countries, Romania has conclude conventions of avoiding double taxing with 82 countries, meaning that the non–residents from the other countries will be taxed for the incomes obtained in Romania according to Romania law.

8. References:

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[2] *Law no.571/2003 regarding Fiscal Code*, with subsequent changes and appendages published in the M.Of. until the 16th of October 2008.

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[4] *Model Convention regarding taxes on income and capital*, 2003 Edition.

THE OPENING OF ACCOUNTING TO THE PRESENT VALUE IN THE CONTEXT OF PASSING FROM THE ACCRUALS TO CASH

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Abstract:

Passing through the globalization period, we are witnesses of a larger gateway to the values general accepted in the developed and developing countries. Part of this process is represented by the accounting craft. So, after the period when accounting was representing a static image and then a dynamic one, now it seems to be in accordance with this continuing evolution.

As long as more companies are using the IFRS and the evaluation of assets and debts is based on the fair or present value it is talking about as it is named an actuarial accounting. According to the development of an economy, the actual (present) value means an estimation of future cash flow by a rate.

Practically seems to be an inclination towards the engagement accounting as long as the events are recognized & reported when arise not when cash is collect or paid. In spite of this, for a company a good profit and loss account doesn't mean a strong treasury situation too.

Even if, there is a convention of using the accrual accounting I try to develop o strategy regarding the cash flow information – based on the cash accounting as an exception of this, for a correct evaluation of liquidity, knowing the strong influence for economic decisions. So, the cash foresees are used for the financial security of company through an adjustment of unjustified payments.

Regarding to all of those reasons, a joining of accruals with cash may be an important factor for a correct evaluation financial statements.

Key words: accrual – engagement accounting, cash – treasury accounting, liquidities, present – actual value, IAS

JEL Classification: M4

1. Introduction

If we start from the premise that every economic transaction (goods acquisitions, services or investment / financial activity, or creating a debt) is generating a plus or minus value for a period, we must express it correctly from liquidity point of view.

As long as more companies are using the IFRS and the evaluation of assets and debts is based on the fair or present value it is talking about as it is named an actuarial accounting. According to the development of an economy, the actual (present) value means an estimation of future cash flow by a rate. If the level of inflow / outflow is foreseen through an evaluation of the managerial politics, the rate depends on some extern factors like: the economic politics, or inflation (as passive monthly liquidity depreciation). So, there is a difference between a net treasury recorded by a company in an excessive inflation economy and moderate one.

From this point of view, there is an opening of the accounting to the actuarial calculation in the context of passing from the engagement accounting to the treasury accounting. For all that, practically seems to be an inclination towards the engagement accounting as long as the events are recognized & reported when arise not when cash is collect or paid. In spite of this, for a company a good profit & loss account doesn't mean a strong treasury situation too.

Even if, there is a convention of using the accrual accounting I try to develop o strategy regarding the cash flow information – based on the cash accounting as an exception of this, for a correct evaluation of liquidity, knowing the strong influence for economic decisions. So, the cash foresees are used for the financial security of company through an adjustment of unjustified payments.

The evaluation activity means in fact the monetary expression of transactions, and it will be used for bringing the wished performances, by manipulating the measure of economical events and transactions.

For surpassing this limit, it has been adopted the cash accounting joining the engagement (accrual) one.

The relation between accrual and cash is significant for all users, even for the lenders, who are basing their loan approval and pricing decisions on assessed probability of applicants' ability to repay loans, or managers, investors and others too.

The Cash Flow Statement is offering information on the monetary cash in–out flow and which is the liquidity origin. So, in spite of the Balance sheet and the Profit and Loss Account (based on the accrual accounting) this statement is reflecting unconventional information (realities) on treasury situation.

2. Literature review

The present research is taking into consideration the most recent international and interesting articles in this area.

Regarding some specialist's conceptions on the relation accrual accounting versus cash accounting we have to report to some international researches articles.

So, referring to the relationship between disclosure quality and mispricing of the components of earnings (accruals and cash flow), is an evidence of significant accrual and cash flow mispricing for firms with lower–quality disclosures. So, the magnitude of cash flow subsumes the predictive ability of magnitude of accruals, suggesting that cash flow measure captures the mispricing associated with earnings components. There is an association between the magnitude of cash flow and future abnormal returns for firms with lower quality disclosures and a significant reduction in this association for firms with higher quality disclosures [Michael Drake, James Myres, Linda Myres, (2007)].

There is a value – relevance of cash flow from operations (CFO) and accruals with investment (growth) opportunities. The premise that accrual accounting based earnings is superior to cash flows for estimating firm value is a key element of the conceptual foundation of GAAP. An implication on this is represented by the accruals that are values relevant components of earnings [Barth *et al*. (1999), and Dechow (1994)] said that earnings dominate CFO in return association tests. It is important to mention that CFO and accruals regarding the value relevance of earnings influence their relative impact.

Also, Bowen *et al*. in 1987 suggest that CFO is more strongly associated with returns than accruals, and Rayburn in 1986 said that is no difference, and Bernard and Stober (1989) suggest that the valuation implications of cash flows and accruals vary with the economic conditions, quality of measurement.

As long as there are some transactions which are often distinct separate from their associated cash flow, we may see that accrual accounting allows firms to overcome timing and matching problems that make cash accounting a noisy measure of performance [Riahi Belkaoui, (1992); Dechow, (1994)]. By using the accruals, non–cash economic transactions can be reflected in financial reports in a timelier manner that better matches revenues and costs, thereby providing a better indication of enterprise performance [FASB, (1978)]. Using the accrual accounting it may provide a positive signal of a company's management since this method is assumed to reflect the potential management (for private information) and higher accounting quality [Louis, and Robinson, (2005)].

Jones *et al*. (1995) and Lee (1993) give some arguments for why cash accounting may be more beneficial then accrual accounting for lending decision. In addition to the arbitrary nature of accruals, these arguments include cash accounting being more predictive of future cash flow and financial distress in many businesses; providing an unambiguous measure of managerial performance; and an increased importance of cash resources for ongoing liquidity and solvency.

An experiment of Sharma and Iselin in 2003 prove that bankers judgments regarding solvency are more accurate using cash flow information than using accrual accounting, and in the same way Jones in 1998 concludes that cash flow statements, has a greater influence in taking a variety lending decisions, comparable with the financial statements based on accrual accounting, and Francis *et al* (2005) and Bharath *et al*. (2008) analyzed the implications of accrual accounting for small business and large/public companies in debt contracting.

The public sector doesn't make any exception of this report, for example in Romania, and not only, there were two trends: a traditional one based on cash accounting and a modern one based on accrual accounting. Respect the first one it is appropriate for the public sector especially for the budget accounting and budget execution. Regarding the second model it was recommended for maximize the

effects of the process of competition and public management efficiency being achieved with minimal costs (A. T. Tudor), Greece being a model of using both cash and accruals.

Also, Ryan, Tucker, Zarowin in 2005 reflect that in spite of classification of the cash flows on trading positions as operating, trading is economically a hybrid operating and non–operating activity. So, the market appreciates the hybrid natures of the cash flow and accruals associated with trading positions and can differentiate firms based on the relative operating character of their activities.

For some specialists, accrual accounting is more informative then cash one, and surveys find that small business lenders rate accrual accounting as their preferred source of financial information for taking the decisions [Baker, Cunningham, (1993), AICPA, (2004)], and for other reverse of this conception.

3. Theoretical background

Accounting versus globalization

Starting with the '90 period and continuation by now it's seems talking more about the process of globalization.

Etymologically, this word means a connection between the same field of activity of all countries which have clang to the international standards general accepted from the developed & developing countries. From this point of view, I was talking (in abstract) that the accounting as science is not an exception.

Once the liberalization of financial and capital market advanced it imposed an increased rhythm of needed information for the financial stability, starting with insignificant required information and ending with the calculation of financial indicators to present in fact the economical reality of an entity.

As long as the amount of information has increased as well as does the quality. Looking from this point of view the financial (accounting) information must be in accordance with the international financial reporting standards and some external factors like the market actors, because they require new information in this sector of activity.

After the period when the accounting was presenting a static image (XVIII – XIX century) and then a dynamic one (XX century) of the financial statements, now we are witnesses of a new tendency to an actuarial accounting which is in accordance with the globalization processes. Even if this is a subject debated for now, more on the theoretical level, it represents in fact the passing to a new stage of accounting. Now the actuarial services is going to assist in the development of social security for insurance, investing or other activities which focuses on the future cash flow evaluation from the present investments.

Regarding the relation, globalization versus accounting, first one as a part of this development processes of economy and the second one as science (and not only, practices too) we are able to recognize that this is a natural consequence of evolutional spirit.

Above all of this we must mention that this harmonization with the international standards must be implant taking in account the national norm and standards. From this point of view the processes of adaptation of our low to the European Directives is part of the economic globalization.

And so, all this factors enable to unanimous interpretation of some financial indicators, reported to the same values, by any accounting information users of each country which it accepted as general reporting standards.

4. Between historical cost and present value

Why would be today such a subject, a problem for accounting? The answer seems to be easy, that because doesn't exist a standard / an evaluation level generally accepted, as long as the framework tells that it is able to choose the adequate evaluation basis from a list: historical cost, current cost, realizable/ settlement value or present value.

If we take in account that now there are some situations where the evaluation of some assets and liabilities achieved in '90 are measured to historical cost we may say that is not fair for the economic reality.

Starting from the premise that every economic transaction even if it is goods acquisitions or a services or investment / financial activity, or creating a debt, is generating a plus or minus value for a period, the recording and the maintaining this type of measure (the historical cost) is not a solution.

For all of this a new evaluation to a fair value in some cases is necessary and recommended taking in account those factors which are imposed by the market strategy. In the same way we must see the actual value, because it represents an actualization of the future cash inflow / outflow, or the current cost or settlement value.

In the last period it was accredited the idea that the actuarial principles are generally applied only to the insurance activity and pension funds, or as long as this type of evaluation by actualize for the next period the present investments, why wouldn't extend to other kinds of activities.

In this context important to say that the present value of expected future cash flows is influenced by the: estimate future cash flows and to apply an appropriate discount rate to them. This estimate is taking into account that projections have to base on reasonable assumptions. The next formula expresses that point of view:

$$C_0 = F_1/(1+i)^1 + F_2/(1+i)^2 \ldots + F_n/(1+i)^n \quad (1)$$

Where:
C_0 – the assets for the T_0 moment;
F_n – the cash flow generated for the n moment;
i – discount rate

The discount rate must depend on: current market rate and asset class risk adjustment, and also it could be use the nominal interest rate reflecting the current market conditions as balance sheet date.

Another factor which mustn't ignore is the rate of inflation. If we consider it as a passive monthly monetary depreciation of the economic transactions it has really influences above the financial statement especially there, when, it has big figures (more than 7 – 8%/year).

Even if doesn't seems to have an important influences to the treasury we must reflect that if would exist an account that reflect the "Expenses resulted from the inflation evolution" as an unmonetary expenses, it could influence the net increase or decrease of CFO if we added it (like the depreciation of assets).

If we take into consideration the next statement which refers to the inflation rate evolution, for example, in Romania for the last ten years, we remark its impact for the liquidity of a company.

Table 1: The rate of inflation for 1988 – 2007 in Romania

YEAR	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Inflation rate %	59.1	45.8	45.7	34.5	22.5	15.3	11.9	9	6.56	4.84

Source: http://www.insse.ro/

There it is the evolution graphically:

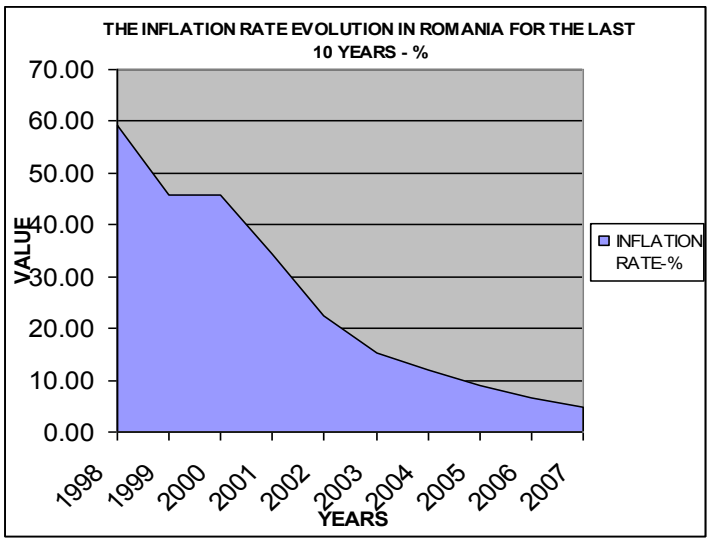


Figure 1. The inflation rate evolution in Romania for the last 10 years

So that, from this evolution such of expenses account (for the rate of inflation) could help to the liquidity evaluation.

Also, let's take an example, if we make a parallel between a subsidiary of firm that develop its activity in a country where the rate of inflation is over the 8% and other subsidiary of the same firm but in a country with a rate of inflation that is 2% we'll see that this has an important influence.

Let's take a look to the next example.

Table 2. Compared cash flow of a company from different countries

Indicators	company A in country with 2% inflation	company A in country with 8% inflation
net treasury from operating activities* (indirect method)	5.000	4.000
* expenses with the inflation	200	800
net treasury from investment activities	4.000	3.000
net treasury from financial activities	–6.000	–5.000
net increase /decrease treasury	3.200	2.800

So that, this table reflect the influences over the cash flow of the rate of inflation, as we considered it as a monetary passive depreciation (like the assets depreciation) as long as it is able to influence the CFO with its value.

Regarding its influences we may consider that as log as there exist a factor of physical and moral depreciation for the tangible and intangible assets also could exist a monetary value depreciation as an expression of the inflation rate.

Treasury (cash) accounting or accrual (engagement) accounting?

Even if is a simple question for the adepts or specialists, this represents a challenge for them. Why this happen?

From the start we are in a really quandary regarding the accounting approach between cash and accrual. Of course there are different points of view, some of them are supporting the first one and other the second one.

Practically there is an inclination for the accruals – and that because one of the financial statements, Profit and Loss Account it is based on the engagement accounting. Those who are sustaining this conception are staking on forecasting the cash in–outflow for the next period knowing the incomes and expenses levels for now.

And so, they are taking in account on there evaluation the present incomes and expenses which are engaged for the moment and not only the cash in–outflow, which are paid or collected by the company.

Even thought, over the last few years it has been adopted a new financial statement named – Cash Flow Statement – which but it seems that is not sustained as the other tow principal statements (Balance Sheet and Profit and Loss Account), not even by specified low. There is offering nothing more but a model of how to prepare it, for other problems we must consult the IFRS, IAS 7 – which are very resumed by offering some examples of operations (for those three activities – operating, investments, financial)

If the Balance sheet offers a static image of the financial statements for treasury (initial & final value) and Profit and loss account offer a dynamic one for the incomes and expenses level, the cash flow statement presents the liquidity level divided into those 3 categories of activity.

The IAS 7 – presents those three activities (operating, investing and financing), disclosed the main terms (cash, cash flows, cash equivalents) and presents a model of calculating the total net treasury (for operating – direct and indirect methods, investment and financial transactions). So we determinate the contribution of each activities to the liquidity level of company. The separation of flows regarding there origin has the advantage of some explanation concerning the firm's financial position. This statement it has its pluses and minuses. For the first category we have to mention that it offers information that other statements doesn't, for cash flow, in the second category there is relative difficult to introduce some transactions in each kind of activities (operating, investment or financial), IAS7 presenting only few examples of operations groped on those three activities.

A positive cash flow from an operation activity indicates that the current activity is efficiently managed and is generating more liquidities than it consumed. Regarding the investment activities, those reflect the investment and disinvestment operations in and off the financial market and other that could generate plus or minus cash. The financial operations are referring to the external funds used by a company when the own resources aren't enough.

Let's take the next example for explain the usefulness of the Cash Flow Statements. It's used information from Cash Flow Statements and Balance Sheet from two companies and the figures were rounded:

Table 3. Cash Flow Statements – information

Indicator	company A	company B
Operating activities	40.500	21.500
Investments activities	–21.300	–5.100
Financial activities	1.5800	19.600
Net cash flow	3.5000	36.000

Table 4. Balance Sheet – information

Indicator	31.12.2006	31.12.2007	Increase
Cash for A	42.800	77.800	**35.000**
Cash for B	32.500	68.500	**36.000**

Figure 2. Cash flow for thecompany A

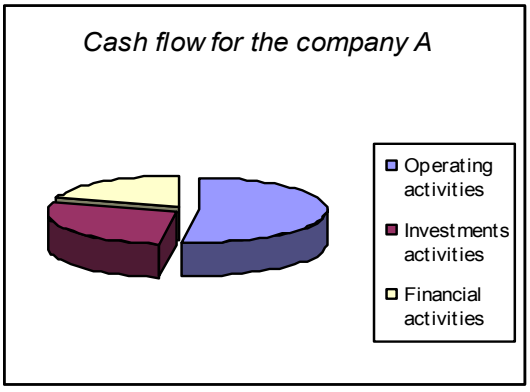


Figure 3. Cash flow for the company B

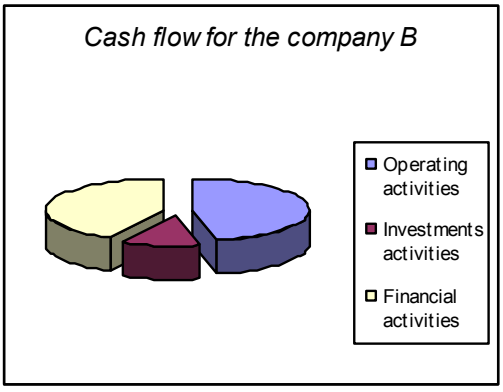
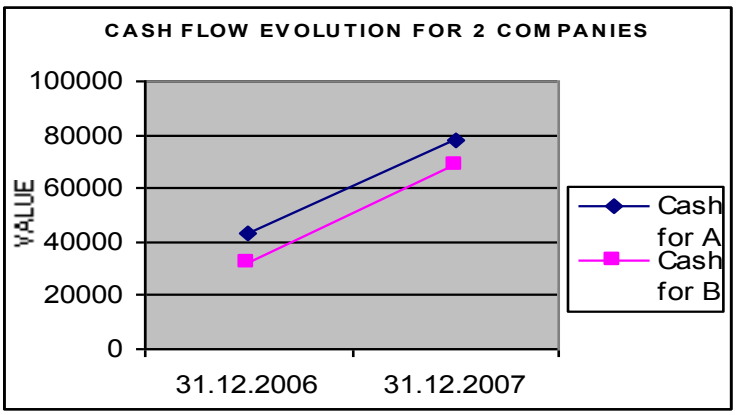


Figure 4. Cash flow evolution for 2 companies



From a first view, just looking to the Balance Sheet information we may say that company B (36.000) has recorded a better liquidity then A (35.000), and a strong cash flow report. Also, using information from the Cash Flow Statements, there is a difference between its provenances. Both of those companies have invested for new acquisition but in some different way: A basing on its main activity and B basing on lending founds.

So that, the net increase cash flows for those tow companies is almost the same. In spite of this, if we evaluate the evolution for every type of activity, we see that for the first company the main activity (operating one) was generating plus of liquidity, as long as the other company's activity is based on lending more then its main activity.

The net increase explains that the liquidity generated by the base activity, allowed covering the current and investment needs that are not financed by invested capital sales or a financing politics.

Under the cash accounting, income is not counted until the cash is actually received, and expenses has been paid, so revenues and expenses are recognized when are collected are paid to/by the company.

Based on this information the analyst could determinate: the ability of company to generate cash, or to finance its growth from internally generated funds, the effects of management's decisions. He is interested on assessing the firm's future cash generating capability from operations, taking in account that the cash flow (like the incomes and expenses) can be erratic from a period to the other being random, cyclical or seasonal for some transactions.

The standard reflects that for big companies often have negative free cash flows because of the capital expenditures and other investments that are required for the firm's development and other companies that are mature have a positive free cash flow, or a significantly positive free cash flow for other, which means that is a low level of capital expenditures (of investments).

There are some evaluation models that are basing on cash flow from the main activity. From this point of view some managers use to record cash inflow from operating and outflows form the other two. That's why are events which are discretionary grouped in the cash flow activities; from example the payment of taxes (there is an interest on reducing the current payments by deferring when is possible), or the manipulate of operating cash flow by timing the payments for development repairs or maintenance, or from contracts, and so on.

Let's see which are the benefits for bought types of accounting in the small business case:

Table 5. Accrual *versus* cash accounting benefits

Accrual accounting benefits	Cash accounting benefits
1. expenses are counted towards tax deduction even though are not paid 2. good financial evaluation for the account that refers to the firm's current situation for collection/payment transactions	1. easier for small business owners regarding the time spent 2. easier for determining the actual cash and not only the money owed 3. easier for understanding the basic cash flow information

Regarding this discussion, all companies, without any exception, must be interested on liquidity information and having a positive monetary situation.

In the mean time, we are able to say that for this period when the financial crisis covered all world it is recommended to keep liquidity as much as it is possible, so that the investments is not a solution.

For all of this the monetary expression of every transaction must joint with the specified operation of collecting or paying.

At this time is generally accepted the engagement accounting as convention for all transactions which are recognized in the financial statements when it arise not when are collected or paid. An exception from this is represented by the information regarding the cash flow level. The cash accounting is based on the cash in–out flow as a balance between payments and collections. The treasury / cash foresee is aiming the financial security and profitability of the company by decreasing the expenses (payments) which are financially unjustified.

From this point of view the cash evolution for the next short period is remarkable with strong influence for the economic decisions.

So that, the relationship between accrual and cash is significant for all users, starting with lenders, who are basing their loan approval and pricing decisions on assessed probability of applicants' ability to repay their debts, and also for managers, investors and others too.

5. Conclusion

The usefulness of one of these two models – accruals vs. cash – depends on the user's necessity (even it is: lender, manager, government, investors and others)

We should base our economical interpretation on the other financial statements too, because by using the accrual accounting it will providing information respecting the next payments and collects that will be recorded by the company. Now, only the information regarding the cash flow is an exception from the convention of engagement accounting general accepted by specialists. In accordance with this, the events and transactions are recognized when are arising not when cash is collected or paid.

For all of this, the managerial politics must follow to record the cash inflows from the operating activity and cash outflows for the investing and financial activity. By doing so the company could sustain all investment expenditures or an important part from the main (base) activity (operating one).

So, is recommended more attention to this financial statement for a faire evaluation liquidity of a company, because a plus value of incomings for the next period (maybe uncertainty), doesn't mean that for the moment the company have a good financial cash situation. This was able to see from the presented example where a net increased cash flow must be evaluate depending on the influence of each type of activity.

The utility of Cash Flow Statement is basing on the fact that a better monetary situation for a moment (start/end of the year from the Balance Sheet) doesn't mean a strong cash flow for the future evaluation liquidity report.

Another aspect that mustn't be ignored is the rate of inflation as a monthly monetary depreciation, because of its potential influences (in an economy with big figures more then 8%) to the cash flow from operating activity.

As a conclusion, even if it is recommended to use also, the accrual accounting, the cash flow situation must be a strong indicator for the company's liquidity for every time especially in a crisis period and so any company must have financial statement based both cash and engagement accounting.

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THE EFFECTS OF THE MINING ACTIVITY OVER THE WATERS FROM JIU VALLEY

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Abstract:

The upper Jiu Valley, around Petrosani and Lupeni, is Romania's principal coal mining region. Many miners feel that coal mining in Romania is a moribund industry that will never regain its position of significance. Environmental contaminants associated with mining activities may affect wildlife species in many ways and at many levels within the ecosystem. Some contaminants associated with mines (e.g., lead, arsenic, cyanide, etc.) may cause acute or chronic effects on resident wildlife.

In 1950–1989, the quality of the waters of the Jiu River has constantly worsened. Because of the restriction of the social–economic activities, after 1990, the situation of the waters of the Jiu River and of the waters in Romania has continually improved. In the same time, in 1990 there is a transfer to a more rigorous management of the environment which also includes legislation according to the international norms.

Keywords: mining activity, environment, waters pollution, heavy metals.

JEL Classification: O13, P28, Q25, Q53, Q56

1. Introduction

Jiu Valley had been reputing, along time, as well as a mining zone.

But the treasure, the coal, has begun to dry out and loose its local economical value. The extraction activity and process that represented "the engine" of economical and social development in the decades at the end of XX century, has known a drastic reduction of Jiu Valley activities, and has left without jobs lots of people who represented the only income source for their families. Over and above social twitch and social and economical tenseness, this activity has left as an entailment a bad fame of a very polluted zone.

That succession, the Jiu Valley area and has been declared by the Romanian Government as underprivileged zone, and has benefit of a special attention in the economical and durable development activity.

2. Theoretical background

As the German scholar Georgius Agricola (1550), put it in his treatise on mining: "The fields are devastated by mining operations... the woods and groves are cut down, for there is need of an endless amount of wood and timbers, machines, and the smelting of metals. And when the woods and groves are felled, then are exterminated the beasts and birds...Further when the ores are washed, the water which has been used poisons the brooks and streams, and either destroys the fish or drives them away."

Today mining's environmental effects remain much the same, but on a vastly greater scale. Technological advances allowed world mineral production to grow very rapidly and proportionally increased the harm to the environment. The effects of mining activity have impacted on all sections of the environment [Young, (1992)]. Today there are a number of potential impacts mining activities can have on the environment. Metals such as arsenic, lead, zinc, and cadmium, which can also spread to nearby drinking water aquifers, can contaminate water and sediments in rivers and downstream reservoirs. Soils can be contaminated with smelter emissions. Underground mining operations contain billions of litres of acid water that rise a little higher each year, threatening local aquifers and already tainted streams with contamination.

Waste material can clog streams and cloud the air over large areas. If removed overburden contains sulphur compounds, common in rock containing metal ores, it can react with rainwater to form sulphuric acid, which then may contaminate local soils and watercourses.

Tailings also usually contain residues of organic chemicals – such as toluene, a solvent damaging to human skin and to the respiratory, circulatory, and nervous systems – that are used in ore concentrations as part of the extraction process [Young, (1992)].

Another often forgotten side of the mining industry is its effects on local people and their environment. Mining operations have had devastating consequences for those whose homelands lie over mineral deposits. Developers and founders of large mining projects have rarely considered the future of local people during project planning. High levels of noise pollution, destruction of life supporting elements of their environment, such as clean water, vegetation, fertile soil, animal life and the aesthetic value of the environment, have all been consequences of mining activities all over the world. Physical threats, such as diseases, holes in the ground, explosions, mudslides, etc. can have an impact on the well–being of local residents if they are not taken into account [Craig, Rimstidt, (1998)].

Romania's most important pit coal reserves are located in the Jiu Valley basin. Before 1989, the mining industry development strategy provided for the full supply with mineral resources of the Romanian economy in order to reduce import.

The result of this policy was an overdeveloped mining sector compared to the solid mineral resources potential of Romania, absorbing over 350,000 people as direct labor and another 700,000 as indirect labor.

The economic conditions after 1989 have required the state support of the mining sector through a huge budgetary effort. Between 1990 and 2002, the state expenditure to sustain the mining sector was of USD 5,249.5 million.

The negative impact of the mining activities on the environment is a direct one and it is strictly connected with the extracting activity of the useful mineral ores, on the one hand, and it is indirectly connected with the processing activity of the mining products.

Up to 1997, when in the Jiu Valley took place an ample restructuring process of the mining sector, there functioned 13 mines that used to spill significant amounts of residual water in the emissary. They were: Lonea Mine, Lonea Pilier Mine, Petrila Mine, Petrila South Mine, Dalja Mine, Livezeni Mine, Aninoasa Mine, Vulcan Mine, Paroseni Mine, Lupeni Mine, Barbateni Mine, Uricani Mine, and Valea de Brazi Mine. Currently, 7 of these mines still function, namely: Lonea Mine, Petrila Mine, Livezeni Mine, Vulcan Mine, Paroseni Mine, Lupeni Mine and Uricani Mine, the rest of them being shut down.

In the Jiu Valley there used to function four coal processing plants (CPP). They were: Petrila CPP, Livezeni CPP, Coroiesti CPP and Lupeni CPP. Currently, Petrila CPP, Livezeni CPP and Lupeni CPP are shut down; only the Coroiesti CPP still exists.

In order to analyze the evolution in time of the Jiu River's level of pollution due to economic and social activities in the Jiu Valley towns, the variation of the quality and quantity parameters of the upstream and downstream emissary's waters was observed, variations due to the main polluting agents, between 2005–2008.

The mines that currently pollute the Eastern Jiu River are: Lonea Mine, Petrila Mine and Livezeni Mine, and the ones polluting the Western Jiu River are: Vulcan Mine, Paroseni Mine, Lupeni Mine and Uricani Mine.

As a result of the carried out analysis it was observed that both household waters and mine waters represent major pollution sources of the Jiu River.

Generally speaking, the mines and the CPP Coroiesti are great industrial and tap water consumers, while the eviction of the used waters in carried out both with and without purging them.

The main polluters within the Jiu hydrographical basin are: the city of Craiova, DOLJCHIM Craiova, Lupeni and Petrila mine dressings.

The main polluting agent present in the surface waters was represented by solid suspensions [Suess, (1982)]. They are to be found in small concentrations in the surface waters upstream of industrial units, and their value increases significantly after spilling the used waters from the respective mines.

Also, there were noted concentrations of ammonium, phosphorous, organic substances, hydrogen sulphide, detergents and mining substances exceeding the maximum allowed concentrations. The solid suspensions contain heavy metals. The concentration of heavy metals was determined by Inductively Coupled Plasma Mass Spectrometry (ICP–MS).

Inductively Coupled Plasma Mass Spectrometry (ICP–MS) is a very powerful tool for trace (ppb–ppm) and ultra–trace (ppq–ppb) elemental analysis. In ICP–MS, a plasma or gas consisting of ions, electrons and neutral particles is formed from Argon gas. The plasma is used to atomize and ionize the

elements in a sample [Yau, Chan, (2005)]. The resulting ions are then passed through a series of apertures (cones) into the high vacuum mass analyzer. The isotopes of the elements are identified by their mass–to–charge ratio (m/e) and the intensity of a specific peak in the mass spectrum is proportional to the amount of that isotope (element) in the original sample.

This method has been widely applied to biological, agricultural, metallurgical, geological and environmental samples [Waddell, Lewis, Hang, Hassell, Majidi, (2005)].

3. Experimental

The acute problem of water pollution has been caused by a continuous growth in the anthropogenic impact on the natural environment. Heavy metals occupy one of the first places in the list of the most frequently occurring and toxic contamination.

The determinations of heavy metals have been made with an AGILENT 7500 ICP–MS instrument, G3155A pattern. It can measure elements traces at ppt level.

Water samples were collected manually into polyethylene bottles. Prior to use, all bottles were cleaned with 10% HNO_3, rinsed with distilled water and water to be analyzed [Stoica, Stanescu, Baiulescu, (2003)]. Before the analysis the samples were filtered. The relative non–condensing humidity was maintained within the range of 25% to 80%. The operational temperature range was 15 – 27^0C. The instrument was stored within a temperature of 5 ^{0}C to 45 ^{0}C [Stoica, Babaua, Iorgulescu, Marinescu, Baiulescu, (2002)]. The measurements of heavy metals concentration were made on the Jiu river course, in January and June 2005 that represent two seasons: winter and summer, and in January and June 2008. The most dangerous heavy metals from Jiu River, in seven points from Jiu: (1) Campu' lui Neag; (2) Lupeni (The West Jiu); (3) Iscroni (The West Jiu); (4) Livezeni (The East Jiu); (5) upstream the confluence with Sadu; (6) Balteni; (7) Podari have been determined. The first five harvesting points are situated in mining zone and the last two harvesting points are situated downstream of mining zone. These seven points were selected, because all of them are considered a critical zone by point of view of the waters pollution with heavy metals provided from mining activity.

The aspect of Jiu River was different during the three seasons, being under the influence of the meteorological conditions. The results of the analysis can be influenced by defective harvesting or by the improper preparation of the material. The distance from the river side is about 2.00 – 2.50 meters and the depth was about 0.20 – 0.50 meters [Stoica, Babaua, Iorgulescu, Marinescu, Baiulescu, (2002)].

Heavy metals represent one the most important categories of pollutants or natural water. Increased urbanization, industrialization and mining activity are to blame for an increased level of trace metals, especially heavy metals, in our waterways. Toxicity levels depend on the type of metal, its biological role, and the type of organisms that are exposed to it [*Current Medicinal Chemistry*, *Metals, Toxicity and Oxidative Stress*, (2005)].

Living organisms require varying amounts of "heavy metals." Iron, cobalt, copper, manganese, molybdenum, and zinc are required by humans. Excessive levels can be detrimental to the organism. Other heavy metals such as mercury and lead are toxic metals that have no known vital or beneficial effect on organisms, and their accumulation over time in the bodies of animals can cause serious illness. Certain elements that are normally toxic are, for certain organisms or under certain conditions, beneficial. Examples include vanadium and even cadmium.

The concentrations of four heavy metals: arsenic, mercury, lead and cadmium have been determined. The results obtained in this study, have been compared with the concentration from the Romanian Standard [MAPM, (2002)].

In the **table 1** the level of heavy metals from the Romanian Standard are presented [MAPM, (2002)].

Table 1. Concentrations of heavy metals from the Romanian Standard

Heavy Metals	M.U.	Concentrations values – Romanian standard

		I	II	III	IV	V
As	µg/L	natural	5	10	25	>25
Hg	µg/L	natural	0,1	0,2	0,5	>0,5
Pb	µg/L	natural	5	10	25	>25
Cu	µg/L	10	20	40	100	>100
Cd	µg/L	natural	0,1	0,2	0,5	> 0,5

4. Results and Discussions

Arsenic contamination of groundwater is a natural occurring high concentration of arsenic in deeper levels of groundwater, which became a high–profile problem in recent years due to the use of deep tubewells for water supply causing serious arsenic poisoning to large numbers of people [Ford, (1996)]. A 2007 study found that over 137 million people in more than 70 countries are probably affected by arsenic poisoning of drinking water [Velitchcova, Pentcheva, Daskalova, (2007)]. Arsenic is a carcinogen which causes many cancers including skin, lung, and bladder as well as cardiovascular disease. The Elemental arsenic and arsenic compounds are classified as "toxic" and "dangerous for the environment" in the European Union under directive 67/548/EEC.

The IARC recognizes arsenic and arsenic compounds as group 1 carcinogens, and the EU lists arsenic trioxide, arsenic pentoxide and arsenate salts as category 1 carcinogens. Adults may be exposed through work in a metal foundry, mining, glass production, or the semiconductor industry. Also, arsenic can proceeds from acid mine drainage.

Sources of Mercury. Mining and incineration of coal, medical and other waste, contribute greatly to mercury concentrations in some areas. In the aquatic environment, mercury can be: dissolved or suspended in the water, trapped in the sediments, ingested by living things (biota) [Clifton, (2007)]. Methylmercury is the form of mercury most available and most toxic to biota (including zooplankton, insects, fish, and humans). This form of mercury is easily taken up by biota and bioaccumulate in their tissues. Unlike many other fish contaminants, such as PCBs and DDT, mercury does not concentrate in the fat, but in the muscle tissue. Thus, there is no simple way to remove mercury–contaminated portions from fish that is to be eaten. Methyl mercury is formed when metallic mercury enters the air or water from mining ore deposits and waste, and from manufacturing plants.

Sources of Lead. The most important ways lead can enter the environment are through mining practices and steel industry. The Lead is the most known metallic pollutant. Being strongly absorbed by the waters sediments, the lead gets to plants and animals. In the aquatic systems, influenced by the temperature, salinity and pH, its solubility can grow. High levels of this metal could be a result of environmental pollution as well as of high levels of mineral contents in soils of production areas [Pichard *et al*., (2002)]. It is extremely toxic, it diminishes immunity of the human body, diminishes the capacity of oxygenating the blood and alters the function of the nervous system. The Lead is also responsible for the illness known as saturnism. The effects of these illnesses are also obvious at the succeeding generations [Prased, (1988)].

Cadmium. Many acid mine discharges contain elevated levels of potentially toxic metals, especially nickel, cadmium and copper with lower levels of a range of trace and semi–metal ions such as lead, arsenic, and manganese.

In aquatic ecosystems cadmium can bio accumulate in mussels, oysters, lobsters and fish. The susceptibility to cadmium can vary greatly between aquatic organisms. Salt–water organisms are known to be more resistant to cadmium poisoning than freshwater organisms. Animals eating or drinking cadmium sometimes get high blood–pressures and nerve or brain damage [Nogowa, (2004)].

In the **figure 1** the concentrations of Arsenic, Mercury, Lead, Copper and Cadmium in January 2005, in seven harvesting points are presented.

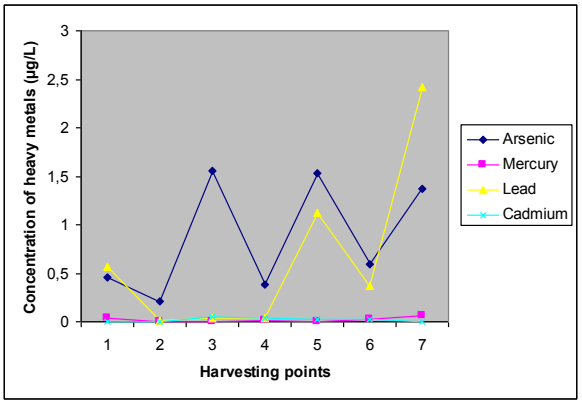

Figure 1. Concentrations of heavy metals in January 2005 (µg/L)

The provided limit for arsenic is As =7,2 µg/L, for mercury is 1 µg/L, for lead is 1,7µg/L and for cadmium is 1 µg/L [NTPA 001/2005].

The figure shows that the concentration of arsenic is between 0,23 µg/L in Lupeni point and 1,61 µg/L As in Iscroni point. Both of these harvesting points are inside the [Barbu, Popescu, Selisteanu, Preda, (2008)] mining zone. The concentration of lead is between 0 µg/L in Lupeni point and 2,57 µg/L in Podari point. That means the concentrations of Pb in Podari point, in June is more than provided limit. Podari is situated in downstream of evacuation of sewage waters from Craiova.

The concentrations of mercury in all the harvesting points do not overtake the admitted limit. The same situation is for cadmium.

In the **figure 2** the concentrations of Arsenic, Mercury, Lead, Copper and Cadmium in June 2005, in seven harvesting points are presented.

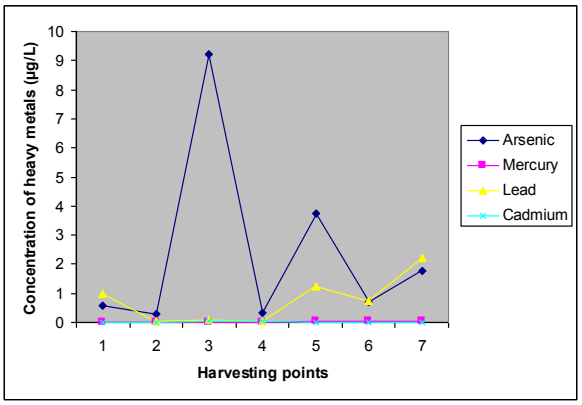

Figure 2. Concentrations of heavy metals in June 2005 (µg/L)

In June 2005, the concentration of the arsenic grows in Iscroni point until 9,1 µg/L, more than provided limit. This zone is intensively polluted by Vulcan Mine, Paroseni Mine, Lupeni Mine and Uricani Mine. The lead in (5) and (7) points overtakes the admitted limit. The (5) harvesting point is upstream the confluence with Sadu. Here Jiu River collects the waters of all mining zone and that explain the high level of pollution from that harvesting point. The concentrations of mercury and of cadmium in all the harvesting points do not overtake the admitted limit.

In the **figure 3** the concentrations of Arsenic, Mercury, Lead, Copper and Cadmium in January 2008, in seven harvesting points are presented.

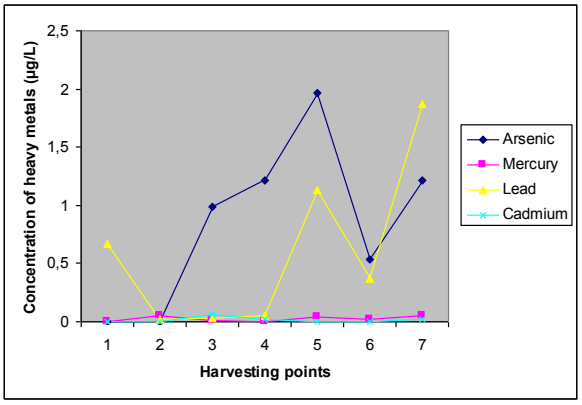

Figure 3. Concentrations of heavy metals in January 2008 (µg/L)

The concentration of arsenic grows relatively constantly, from the source towards the flowing point. In (5) harvesting point, upstream the confluence with Sadu, the concentration of As reach the value 1,99 µg/L, does not overtake the admitted limit. The level of Pb in (5) point is 1,12 µg/L and in Podari point is 1,95 µg/L, in that point more than provided limit. The concentrations of mercury and of cadmium in all the harvesting points do not overtake the admitted limit.

In the **figure 4** the concentrations of Arsenic, Mercury, Lead, Copper and Cadmium in June 2008, in seven harvesting points are presented.

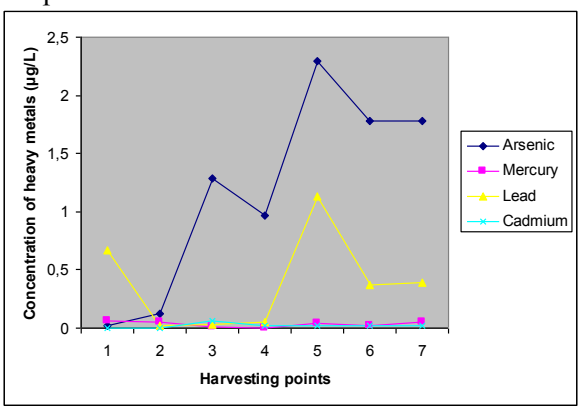

Figure 4. Concentrations of heavy metals in June 2005 (µg/L)

In June 2008 the concentration of arsenic is between 0,021µg/L in Campu' lui Neag and 2,29 µg/L upstream the confluence with Sadu. The concentrations of arsenic in all the harvesting points do not overtake the admitted limit. The measurements show that in all points of harvesting, the level of lead is below the admitted limit. It can be seen that upstream the confluence with Sadu the level of lead (1,13 µg/L) is bigger than the concentration of Pb in other points. The concentrations of mercury and of cadmium in all the harvesting points do not overtake the admitted limit.

5. Conclusions

Acid mine drainage, refers to the outflow of acidic water from (usually) abandoned metal mines or coal mines. However, other areas where the earth has been disturbed (e.g. construction sites, subdivisions, transportation corridors, etc.) may also contribute acid rock drainage to the environment [Freese, (2004)].

The mining industry of coal from Jiu Valley completely eliminates existing vegetation, destroys the genetic soil profile, displaces or destroys wildlife and habitat, extent permanently changes the general topography of the area mined. Ground water supplies may be adversely affected by surface mining. These impacts include drainage of usable water from shallow aquifers; contamination of usable aquifers below mining operations due to infiltration of poor quality mine water; and increased infiltration of precipitation on spoil piles.

The measurements show that in the Eastern Jiu only three mining units discharge (Lonea, Petrila and Livezeni), it is not so polluted due to dilution. Therefore it is confirmed that this affluent fits into the II quality category and it is in the process of natural regeneration.

The Western Jiu River's waters are more polluted than the ones in the eastern side of the basin, and they do not fulfil the quality conditions for the IV category waters. This pollution is due to large quantities of used waters discharged by the four mining units (Vulcan, Paroseni, Lupeni and Uricani) and by the CPP Coroiesti.

As the mine waters from the Jiu Valley have specific features that bear a negative influence on the cleaning processes, their simple cleaning is not enough in order to remove the evacuated solid suspensions. Due to their colloidal nature, the suspensions from the residual waters from the coal mining cannot be efficiently removed unless physical and chemical coagulation processes are engaged, using either classical chemical reagents. These water purging technologies are aimed at fitting these waters within limits admitted by regulations in force in our country, namely NTPA 001/2005 regarding the limit values for charging with polluting agents of industrial used waters and household waters discharged in natural receptors.

Coal mining is only a temporary use of land, so it is vital that rehabilitation of land takes place once mining operations have stopped.

It can be seen that in 2008 the levels of all analysed heavy metals are less than the concentrations in 2005. Also, it can be seen that both in 2005 and in 2008, in winter's months, the level of all analysed heavy metals is less than the level in summer's months.

After 1990, a part of the mines from the Jiu Valley were closed, which had led to a constant lower of the concentration of the heavy metals from the Jiu River. Until then, a part of the chemism of the waters in the area was determined by the excessively mining practiced in these areas.

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JOHN RUSKIN'S SOCIAL AND POLITICAL THEORY IN HIS ECONOMIC WRITINGS

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Abstract

Art, poetry and political economy were instruments that John Ruskin attempted to reshape the man of his time with. The appreciated Victorian writer, literary and art critic and political philosopher tried to apply to the artistic riches the general idea of economic riches such as: discovery, utilization, accumulation and distribution. According to *Ruskin's conception economists have as a task to state what things provide life and to decide how they can be acquired and distributed.*

Key words: political economy, wealth, man, education, intellectual progress, moral progress

JEL Classification: A11, A13

1. Introduction

John Ruskin is considered by Jaques Bardoux (1901, 9) along side with Thomas Carlyle, Charles Dickens, Mathew Arnold among the great names to whom the social and idealist movement of the 19th Victorian era confines. As the chief leader of this group of famous writers, Carlyle exercised a great influence upon the pleiad and, in his opinion, the writer is *an interpreter of the divine idea which lays at the basis of appearance and ... the developer of the infinite*. [Bardoux, (1901), 10]. According to Carlyle, the writer's works will be reliable, good, useful and beautiful if he nourishes solid convictions and feelings, if a person can draw out from his works, a theory of nature and a painting of race.

Of all reformers who were influenced by Carlyle the most original and the most efficient was John Ruskin. It is in Carlyle's works that John Ruskin found a part of his economic theories. His mysticism is not pantheistic as Carlyle's mysticism is, but aesthetic and Christian, less violent but passionate too, also fervent in his convictions.

Ruskin was preoccupied by the idea of people's state misery and he was aware of the calling of his mission. Carlyle was to Ruskin not only his master but also his friend and it was this friendship that influenced, guided and directed him to the study of all social problems and encouraged him throughout his activity. It was the reading of Carlyle's works *Sartor Resartus* (1832) and *Past and Present* (1843) that revealed to Ruskin the contemporary social order denounced by Carlyle in a vigorously biting style, as an everlasting contradiction with Christ's words and the promises of the Bible.

John Ruskin was shaped and formed in the spirit of the scholastic discipline at Oxford and he was nourished with the Bible principles, Walter Scott's ideas and love for journeys in the middle of nature so much ignored by the English. For his talent Ruskin deserves to be compared with Carlyle but by his actions he is maybe superior to his predecessor. Ruskin embodied, like Carlyle, all the characteristics of the literary movement to which he attached his name. Ruskin sought successively a way to rebuild, recreate and reshape, from the moral point of view, the man of his time; and in order to achieve this goal he made use of art, poetry and political economy. Referring to his own works on political economy Ruskin declared that, of all his works, those he had written on political economy are the most truthful in content and the most judicious in shape. The pages Ruskin dedicated to the study of political economy do not form a distinct part of his entire work. His life is not separated in two periods; it is not a revolution but an evolution of his ideas that can be clearly noticed.

The guiding idea of Ruskin's political economy, his conception regarding the state's paternal role can be found in the conferences about art that took place in Manchester in 1854. He tried to apply to the artistic riches the general idea of economic riches such as: discovery, utilization, accumulation and distribution.

According to his outlook, in each town there should be established, at Government expenses, experimental schools that might be attended by any child who considers he has natural inclination for that particular type of training.

The State should provide convenient jobs to and for those who posses uncommon qualities, abilities, skills as they shouldn't exhaust themselves in the struggle for life.

There should be two stages of the artist's transformation into a *gentleman*: competition which will be dedicated to stimulate zeal, and lessons of moral and education. Under these circumstances the word *gentleman* means to Ruskin *an honest man*.

Ruskin asserts that liberalism is a dangerous utopia and he asks himself what man would become if he were given whole liberty. In Ruskin's opinion, and according to his principles, life is safe only if it is dedicated to work, to reprimand and support, to government and to punishment. The idea of liberty was not a delight for the legislator, because he is convinced that man must establish the laws and authorities that will guide him throughout his work, which will protect him against his madness and will help him in his misfortunes.

The school of Manchester endured numerous attacks during the former half of the 19th century. Wilfred Owen was the first who began the fight on the social field and the Chartist movement came to continue it on political field. Carlyle and his disciples, Maurice and Kingsley, who had founded the Christian Socialism, can also be mentioned among the fighters who combated with the School of Manchester.

Joining in the same movement Ruskin was the leader of a new army of opponents and disputants who condemned that particular type of doctrine that, starting from a false conception about man, doesn't take into account the moral laws when organizes society. The radical antagonism between the theories of the School of Manchester and Ruskin's economic ideas can be noticed in his *Unto this last* (1860) and *Munera Pulveris* (1862/1863, 1872).

In order to give their precepts an apparently solid basis, classical economists such as Adam Smith, Malthus and others, had analysed human nature. They tried to relieve man's activity from the hindrances created by manners, environment and education as well as by religion as a moral tradition. Disregarding the everlasting and truthfully human feature of this chain inside individual, they destroyed it. A human being who has his own life and necessities to comply with, this is the type of man whose actions political economy wants to study and this is the activity whose laws it pretends to have discovered. So, according to classical economists, the moral principles are accidental and subordinate elements of the human nature while the necessity to satisfy them is the permanent and constant element. Ruskin settled that the discovery of wealth and riches and the act of producing and gathering capital (assets) are the two stages man has to undergo in order to satisfy his own necessities. In his judgement classical economists are not in the position to solve the problems raised by these two formulae. Ruskin criticized Stuart Mill for his conviction and belief according to which wealth consists of all useful and agreeable objects that possess an exchange value. Mill favours the idea that useful and agreeable objects are at the basis of value and exchange, while Ruskin considers that the economical value is determined not only by the nature of objects but also by the number of people who need it, want and can use it, whence it follows that the useful character of things depends on the human faculty corresponding to it. Ruskin also asserts that the agreeable character of a certain thing is determined not only by the attraction it is capable to exercise upon people, but also by the number of people willing to let themselves seduced by it, meaning that the agreeable character of a thing depends on the human mood and willingness that tally with it. Ruskin concludes that political economy, which is the science of wealth, must equally be the science of human disposition, willingness, mood and faculties. The way classical economists analysed the functions of capital was also an opportunity for Ruskin to criticize them since he considers that kind of analysis as deficient, imperfect. Gathering a certain amount of capital or assets is not the ultimate stage of the economic activity but a middle one.

The capital is that substance, matter and essence that produces derived and secondary goods and it fulfils its real purpose if it generates things and goods that are different from it. Ruskin considers the analysis the economists of the time made on capital as being an incomplete one, and disagrees with then because they used to look over and consider capital as a merely reserve, stock, deposit and not as a source for producing secondary, derived goods.

The phenomenon that sums up the terms utility, value, wealth, capital, assets embraces the human being. These terms may be concentrated in clear definitions and formulae that should ground their study upon a thorough analysis of man and should not refuse to study what is best and most important inside the human being – namely the spirit. It was also in the name of moral that Ruskin attacked those laws by which political economy pretends to explain the manifestations of man's activity: the particular laws

of supply and demand, and the general law of competition. According to the then economists it would be enough to offer a price conditioned by supply and demand in order to obtain a service. Ruskin shows and proves that this would be very likely to happen if the worker were a machine propelled by steam whose force might be calculated; but man is that particular instrument set in motion and put into service by *soul.* The merely promise of wages will not be able to supply this strange machine with the whole amount of effort and work it can provide. The extreme point will be reached *only when the motive power – **the will** is brought to the maximum pressure by the agency of the fuel which is characteristic to it, namely **patience**.* [Ruskin, (1936), 113].

Ruskin concludes that the law of supply and demand is neither unfailing, nor immutable because it is not, and it will never be completely objective.

As to the law of competition, which is considered a necessity by the economists, one can say that Ruskin did not find in it any economic advantages; on the contrary, he traced and admitted its disadvantages. The merchant, the man of commerce is considered, by people, to belong *to an inferior grade of human personality*. [Ruskin, (1936), 28–29]. In his *Crown of Wild Olive* (1866) Ruskin stresses out upon the difference between economists and he notices that this difference came from the fact that some of them had studied only one branch of man's activity – namely his efforts to comply with his necessities – while the others had been more interested in art and social sciences and they subordinated their general doctrine, and even their personal, individual theories to the steadfast, constant goal of improving humanity's moral conduct.

Considering the way Ruskin defined political economy, he can be integrated in the group towards which he was driven by the natural tendencies of his spirit, by the pathos of his polemics, by the general character of his life. In Ruskin's opinion *political economy is neither an art nor a science but a system of legislation and conducts founded upon sciences which can be achieved under certain conditions of moral culture*. [Ruskin, (1968), 120]. This definition points out the fact that Ruskin settled a boundary between him and the classical school, and helps us understand the goal of his study. Political economy has as a purpose to multiply the human life in its highest type. The ideal type of humanity implies perfection of the human body, of heart and intellect, whence it follows that the material target – to produce, to use, to accumulate with the purpose of using – that belongs to the political economy, are things that are useful *either to support the body and stimulate its sensitiveness, or to shape its intellect*. [Ruskin, (1968), 122].

As the object of political economy is the above mentioned one, Ruskin considers that the economists' assignment is to settle which things provide life and to decide how they can be obtained and distributed. This quest can be accomplished by following three directions: the analysis of fortune, of wealth and of currency. The study of fortune is a branch of natural science and it deals with the essential characteristics of things, the study of wealth is a branch of moral science and it deals with the exact relation between men and the subject of the material possessions while the study of currency is a branch of commercial science and it studies the conditions of exchange. In a word, Ruskin considers that political economy deals with the study of three problems: the problem of value, the problem of commerce or of value's circulation and the problem of labour. By each of the solutions Ruskin suggests, he intends once again, to confute the three theories that are specific to the School of Manchester: the law of supply and demand, the law of competition, and the *laissez– faire* dogma.

When, in his work *Unto this last*, Ruskin comments upon the notion of value he declares that value and the quality of being valuable implies usefulness and profitableness for life, and maps out five groups of valuable objects. First of all he mentions earth together with air and water and everything related to them; as they provide our food and give birth to a mechanical force their value is double. They represent a delight for our eyes and soul, a source of reflection for our deepest thoughts and beget intellectual force. In the second group buildings, furniture and tools must be integrated. The value of the buildings is double, too. Their value rests in the ever–lasting solidity, which avails their long–term utility, in the beauty of their architecture and in their historical evidence and importance. Thirdly comes the group that comprises nourishment, means of subsistence, luxury articles and drugs followed by the group of books, meant to convey, from generation to generation, facts and knowledge that develop sensitiveness and intellectual activity. The last but not the least group mentioned by Ruskin is that of the works of art. Value means the power of a certain thing to entertain life; it depends on man's judgement and on the stock's quality, and it becomes efficient when it belongs to that particular person who has a certain degree of vital force. When value is efficient one can say that the possessor is wealthy.

Wealth is regarded as the possession of valuables by courageous people. Ruskin considers life to be the only wealth. *That nation is the wealthiest that nourishes the greatest number of happy and noble human beings; that person is the richest who has the largest favourable influence upon the others, by the agency of his own personality and his possessions*. [Ruskin (1936), 136].

The conclusions of the objective analysis Ruskin gives us can be summed up as follows: wealth is the efficient possession of valuable things and value is the intrinsic capacity of things to support existence, life. Combining the intrinsic character of value and the subjective character of wealth, Ruskin specifies the accounts that relate individual morality with the fruitfulness of the national and private capital. A huge capital is an unavailable condition for the development of a country's security, morality and commerce.

According to Ruskin's thinking the analysis of the social capital implies two questions: which is its value and which its relations with the number of inhabitants. As he states, this type of analysis is necessary in order to ascertain, to determine the value of the national wealth. The presence of things without intrinsic value in the social capital does not necessarily imply the corresponding absence of the valuable objects. Generally, useless and unvalued goods are produced as laughing objects, and nothing should have been produced instead of them, as they were made in wasted moments. If wealth consists in all means of subsistence a country will never become rich by reducing the number of its inhabitants; consequently, of two nations that have equal capital, the one that has the greatest number of inhabitants will be the wealthiest. That economist who wants to find out if a country must be considered wealthy or not, will have to compare the number of the poor with that of the rich. Individual capital, like the social capital *represents wealth only if a certain vital force of the possessors agrees with the intrinsic value of the object*. [Ruskin, (1968), 93–94].

Ruskin finds it more important and interesting to know who the possessors are than to have knowledge of what they possess. A nation will be rich the moment a moral and intellectual progress of its inhabitants will be achieved and noticeable.

A very ingenious effort of joining together the political economy and moral improvement breaks out from the statement that Ruskin made when he referred to the problem of value and capital, but however he did not analyse the concept of value without contradicting himself. When he asserted that the value of an object depended on its quality, he concurrently sent forth the most improbable paradox and, after he had asserted that value was intrinsic, objective, he remarked that the actual value of an object depended on its possible utilization. Thus Ruskin worded and delivered the most naïve contradiction but, despite this fact, his objections were correct and the author of *Unto this last* became a remarkable precursor. Where he pointed out certain errors and gaps, political economy made a step forward and evolved under the passionate pressure of the socialist school, some conceptions were abandoned, the notions of wealth and capital were enlarged and the idea of value was thoroughly analysed.

The analysis of commercial circulation is subdivided by Ruskin into two branches: the study of currency and that of exchange but, in both of them, his theories will be unaccountable unless one takes into consideration the fact that the standard of value is the standard of life and wealth means the possession of fortifying objects by vivid spirits.

What is currency? Currency is *a way of public acknowledgement of a debt that will be received by any person in exchange for a piece that will entitle him to receive its equivalent, in any place, at any time, doesn't matter in what manner*. [Ruskin, (1968), 18]. The best monetary system will be the one that, having the greatest steadiness possible, will not be part of value's characteristics and will not be mistaken for wealth.

Modern societies began to use gold as the only basis of their monetary system but gold is not a good currency as long as it can be sold, and it is not a proper object of value, as long as its value of exchange comes to disturb its public utilization; the opportunity to get other goods in exchange for gold always depends on its attractiveness and on the existing stock of gold in circulation. Currency must be based on several substances of an intrinsic and more real value instead of only one. Ruskin noticed that the steadiness of currency circulation depended on how large its basis was. Currency was not considered a means of exchange but a title of faith; to possess capital and to possess money were not two synonymous phrases. Is was asserted that wealth requires the capitalist to have a certain degree of life in his heart and thinking, while having mere faith doesn't require the owner to have this type of qualities. If money is not a means of exchange but only a simple title of faith it is normal that money will not be

productive. It is the physiocrats from whom Ruskin borrowed his conception about value and was also inspired by them in his theory about exchange. For Ruskin, an advantageous exchange always implies the inability or ignorance of one of the two parts. With the purpose in view of establishing a new theory Ruskin suggests the following laws: *There must be reciprocal advantage in the process of exchange or there mustn't be any disadvantage for either of the traders. It's important that any amount of time, work and intelligence of the intermediary should be rewarded* [Ruskin, (1936), 130–134].

There are two different ideas in this theory of exchange. The former one is an idea of social art, a moral precept – there must be reciprocal advantage when it comes to exchange; the latter one is an idea of economic science – there must never be profit in the process of exchange.

The two principles that governed Ruskin's ideas about economy are the two negations – the negation of liberty and that of equality. The individual is not entitled to liberty: the state may impose to his activity the restrictions it will consider as being useful for the progress of society, the same as nature has imposed its minute set of rules. The individual is not entitled to equality: the historical traditions and the social necessities brought about the creation of a hierarchy; each citizen must observe laws and he must try to reach real perfection. The state will organize social work in such a way as to succeed in decreasing as much as possible the negative consequences of the struggle for life; it must look after the disabled and old people and must provide them a safe place and home.

A second series of measures, that should be adopted, should have as a general purpose and goal the annulment of the consequences competition has upon value and upon the price of goods. The foundation of national manufactures, the re–establishment of the corporations, these are the means Ruskin foresaw in order to fulfil the above–mentioned target. Government will establish manufactures and stores to assure the manufacturing and selling of those products necessary to life. The state will not have to impose restrictions or to hinder the private enterprises; on the contrary it will have to give them whole freedom but it will have to watch over the goods that are made and sold because *bread must be bread and beer must be beer*. [Ruskin, (1936), 17–18].

Corporations will come to complete what the state achieved. The corporation council will settle the pattern and price of the manufactured products as well as the wages for the workers. So, according to Ruskin's idea of a system there will be three types of stores: those of the free merchants, those of the corporations and those of the state. Ruskin intended to annul the variations whose moral and financial consequences he feared and he was going to achieve this by the organization of production.

A certain idealism characterises legislation that is considered to have the mission to lead mankind towards moral perfection. Vice and indolence must be uprooted and punished with the same rigour in town and on board of the ship. The right of constraint and coercion held by those who work, over those who idle and disturb the process of work must also be absolute in society. The right to equally share everything necessary to life in common is also inalienable both in society and on board of the ship. The right of those who are ill and disabled, to be protected by the strong ones is also imperative and the necessity to grant, to vouch–safe the authority of the government, to the one who is a real, skilful pilot, is constant and clear. The state will have the role to impose its citizens the laws, considered necessary in order to achieve the unity of efforts and continuity in progress.

Ruskin drew up a plan of a vast code that embraces the whole human activity.

The first branch of legislation points out what can and what cannot be done. Man's liberty won't be restricted unless he did something wrong.

The second branch shows what can and what cannot be possessed. These laws have a double purpose: to show what a citizen can possess and at the same time to stress out which are the objects that community is not allowed to possess. Ruskin suggested that the accumulation of all kinds of goods should be limited, but at the same time he remembers the necessity to give man the right to possess a certain parcel of ground. *The State will authorize each man to become an owner, a proprietor, as a parent allows his son to marry*. [Ruskin, (1906), 85].

Finally a third branch of legislation will be made up by the extension of the penal code; laws will specify *what a man may or may not endure. The owner will be responsible for the conduct and behaviour of the people who are subjected to his laws*. [Ruskin, (1906), 8].

Through this organization of work Ruskin wanted to abolish competition and to pave the way for a moral revival. Fighting against human cupidity and greediness and enforcing the respect superiors must display towards their subordinates, Ruskin succeeded to reduce the consequences of competition. One of his intentions was to renew the moral and economic situation of the contemporary societies. In

order to supervise that such a minute code of complex structure and organization should be put into practice and should function, the state will have to increase the number of its employees. This ideal type of administration will be divided, in keeping with Ruskin, in seven groups: the first one will have to study and supervise each citizen, the second will set up assistance, a third group will control industrial explorations. The magisterial and teaching staff will be added to these. Referring to the seventh group Ruskin asserted that *an exemplary authority is that authority that will set good example to others and will show what is best and most beautiful in the art of life*. [Ruskin (1906), 182–191].

This was at large Ruskin's conception about an ideal administrative reorganization; its failure can be accounted for by the contradictions that have ruined Ruskin's system. The same author who accepted the three principles of the socialist school – the nationalization of public utility services and the establishment of national stores, the annulment of revenue, the establishment of wages and work hours as the basis of exchange, rejects the idea of land nationalization. Ruskin declares his consideration for property but on the other hand he pretends that certain limits for private wealth should be imposed.

One of the problems that dominated Ruskin's thinking was expressed as follows: *What could we initiate in order to render to our horizon its serenity, and to our society the calm of peace*? [Ruskin (1906), 89] and the answer was – to undertake a moral reform – that must be, as Carlyle maintained, useful and everlasting. This idea expounded so clearly by Ruskin, represents the most beautiful and durable part of his economic work.

There are two facts that concerned Ruskin simultaneously: the beauty of being an active and busy person during the lifetime span and the necessity and beauty of Christianity. Life is beautiful when it is not motionless, immobile and uneventful. It must be a permanent fight not against people, but against itself. And during this painful march life signifies, noble souls find out *that something* vainly looked for and chased after, which is like a ghost, appears only for a moment and whose name is – *happiness. The sweetest pleasure of youth vanishes in obscurity – that is greater than the past splendour –...while, on the contrary, daily hard and assiduous work fills us with joy and delight.* (Ruskin, 1907, 184–185). Life is nice and good provided that it is devoted to the purpose of reaching a moral ideal. There is a certain morality for each nation and for each individual. Sensitiveness, the natural perception of the beauty, truth, and goodness, the energy expressed by its fidelity towards the acquired traditions and customs – these are the real conditions of a nation's state of morality. Action supports and keeps up the great moral law of nations as well as people's life. People strove to improve their sensitiveness and thinking while nations strive to preserve their moral traditions. Putting into practice the Christian principles for the assiduous improvement of one's soul, this is the purpose that individual morality has in view; the constant melioration of the existing relations among people belonging to different social classes, different sexes and different ages this is the purpose of social morality,

Speaking about the mission the artists and men of science have to fulfil, Ruskin considers them to be the ones who train, educate and divert the vast masses of suffering, grieving people. Those who have understood that it is not necessary to be rich for being influential and respected may consider themselves happy because, sooner or later, they will be rewarded. The members of the social elite will carry out their mission and duties the moment they offer the unhappy people who form the community, a part of their pecuniary, literary, artistic and scientific wealth. If the members of the social elite are in just, fair and constant relations with the other members of the community, new moral obligations will come to underline their general duties; this is the case of the owner, landlord or of the trader who, instead of asking huge prices, or instead of falsifying the goods he trades should accept to be poor and work; this is the case of the soldier, who should choose to be killed than to leave his post.

Harmony that underlines the relations between the social classes must also exist between sexes; this is the context in which Ruskin dealt with women's mission. He rejected the idea of *modern women* and criticized Stuart Mill for having declared that women must have a more lucrative occupation than that of nourishing babies. Ruskin condemned the fact that women might become engineers or teachers or anything else. This doesn't mean that he turned back to the old precept and theory that proclaimed male superiority.

Each sex has something peculiar that the other one lacks so they complement each other. The moralist settled a task for both man and woman. Man's force lays in action, progress, and defence; he is the one who creates, explains, defeats and defences at the same time. His intellect makes speculations and inventions, his energy wins. Despite the fact that women, according to Ruskin's conception, don't invent or create, but in exchange they are able to decide, to classify, to tidy up and to array themselves

women are perfectly aware of the quality of things, of their accurate names and proper place. In family, in society, in state institutions woman's task will be to organize, to tidy up, to manage. In this particular case to manage is not synonymous with to lead. It means that women will act upon male souls as there are delicate and noble feelings in man's heart most often inspired by women. Due to the purity of their souls women will always be queens," *queens for their lovers, queens for their husbands and their sons, queens, much more mysterious, for the people who bowed, and will always bow in front of their crown and sceptre*. [Ruskin, (1907), 135]. Inside her own house a woman must be queen and she will remain so as long as she keeps in mind the truth that man–no matter if her fiancée, husband or son– is but the mirror reflecting her very image. Home will be everywhere she is. What is difficult for a woman is not to endure the whims of fate – love will help her endure them well – but to continue to be heroic in happiness and not to forget God when He offered her everything she languished after. This is the real courage, as Ruskin says. He appeals to women and asks them to pray for their sons and husbands, whose lives and characters are in their hands. Men will be what women want them to be, as women are the centre of their homes, the centre of goodness and excellence and they exercise a charitable task where beauty and order are scarce. If corruption, which reached the literary and political field as well as individuals, did not touch the home, this will mean safety and society will be safe, too; the day corruption touches the home, especially the woman, society will be irremediably lost because humanity's sources of physical and moral life will be imprisoned. When society follows this path no human force will be able to stop its decline.

Ruskin's call and warning was heard – hundreds of associations were founded by those women who had understood the beauty of their goal, the necessity of their actions.

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SPORTS SPONSORSHIP – MEANS OF COMMUNICATION

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Abstract:

Sport sponsorship represents, nowadays, an indispensable way of attracting additional funds that grants sports development, an important factor in the very existence of sports entities, sportsmen and sports events. That is why sponsorship aims at occupying a first–rate place in sports organizations' marketing activity. It is also an important means of communication that allows companies to promote their brand or products by associating them with sport events.

In Romania the Law of sponsorship had, in the course of time, since the overthrow of communism in 1989, an agitated history characterised by repeated changes that several decrees came to pass. Besides general aspects related to sports sponsorship the article discusses this issue too.

Key words: sponsorship, sports, sponsor, sponsored organization, sports event

JEL Classification: A12

1. Sponsorship – general considerations

Sponsorship is a first rank marketing technique, hence a communication technique, whose evolution was impressive in the 90' when its content and forms of manifestation improved. As a means of communication and component of promotion meant to attract further funds for sports development sponsorship allows a direct association between a company's brand and an event attractive to a certain category of audience. The world of business, companies in all fields of activity prosper by using sport, in its capacity of a universal activity and language, as well as the image of sports stars as instruments of promoting their products, services, ideas and image.

Etymologically the word *sponsor* comes from Latin, meaning a guarantor for someone (DEX, 1998). In American English, according to *The American Heritage Dictionary of English Language* (2000) the word is defined as: *One that finances a project or an event carried out by another person or group, especially a business enterprise that pays for radio or television programming in return for advertising time.*

Considering the importance of the component elements of sponsorship, the sponsor, the beneficiary of sponsorship and the target group, Sahnoun (1992:14) defines the concept as being *an instrument of communication that makes it possible to directly connect a brand or a company with an event, attractive for a special type of audience.*

In sport, sponsorship represents, according to the most exact definition, given by the European Ministers responsible for sport at their meeting occasioned by the third Conference held in Palma de Majorca on 8–10 April 1981, *the agreement under which one of the parties – the sponsor – supplies material, financial or other benefits to another – the sponsored – in exchange for its association with a sport or sportsman for advertising, especially television advertising purposes* [Ministerul Tineretului şi Sportului, (1991):38].

Virgiania Oprişan notices (2002:176) that sponsorship was defined differently by the authors in the field, depending on the referential points which can be:

- either the sponsor, in which case: *Sponsorship is a technique of communication which allows the company to associate its brand with a sports event generated or accomplished by it, with the purpose in view of turning it into profit through the instrumentality of a traditional advertising global action*. (Fabre and André, 1984, *apud* Oprişan 2002:176);
- or the beneficiary of the sponsorship: *Sponsorship consists in the financial or in kind support of a team, sportsman or event.* (Roufiac, 1976, *apud* Oprişan 2002:176);
- or the event, according to which sponsorship implies, as Gianelloni, J.L. notices in *Contribution à l'étude du mode d'influence de la communication par l'événement*: *the bringing into being of some events that generate a promotional and advertising exploitation, contribute to notoriety and make use of the sponsor's image and concept* (*apud* Oprişan 2002:176).

Sponsorship in sports, alongside with broadcasting and the use of the sportsmen's and brands' image, became more and more visible, at the level of local, national, international sports organizations, during the 1980s when the rather new concept of *sport marketing* draw attention and was defined as *The total number of activities meant to satisfy the necessities and desires of the sport consumers by exchange processes* [Mullin *et all*, (1993):6 *apud* Oprişan, (2002):38].

The growing interest for sports sponsorship, obvious during the last decades particularly for football, tennis, rugby, Formula 1, Olympic Games, does not have to impede upon the sports organization's policy of marketing, which, incidentally, the literature of specialty does not mention. Virgiania Oprişan presents (2002:41) a possible typology of sports marketing depending on:

- *the sports product or service* in which case we deal with: – the marketing of sports product, the marketing of sport services, the marketing of sport contest;
- *the consumer's involvement* – the marketing of the direct participant (sport star, professional sportsman, active participant in sport, circumstantial direct participant), the marketing of the sport spectator, the marketing of the collector of sports souvenirs;
- *the types of organizations in sports industry* – the Olympic marketing, International and National Sports Federation, the marketing of the sports clubs, leagues, companies in sports industry, etc.

Sport brings large profits to the business world which uses it as a promotional vehicle. Profitable or non–profitable organizations in all fields use sport, in its capacity of a universal activity, as means of promotion for their products, services, ideas or images.

Through the agency of sponsorship the sponsor is granted certain rights:

- the right to exclusive association with a product or service;
- the right to associate the sponsor's name with a sport event or sports centre;
- the right to use certain denominations that show the relation with the event or product; the International Olympic Committee, the Committee of the Olympic Games Organization and National Olympic Committees allow the sponsors to use names such as – *official partner, official sponsor, official product, official supplier, presenter, supporter* – in relation to the respective sports events;
- the right to convey messages (by posters, leaflets, advertising, press–conferences, direct mail etc.) in the frame of the communication process.

By sponsorship, which developed from a type of advertising based on sports events to the statute of a large investment that serves the purpose of attaining objectives, companies have the privilege of reaching the targeted groups in a more direct and simpler manner. The results of a sponsorship campaign can be translated in:

- improvement of one's own image and gain in notoriety;
- positive perception of the company by audience;
- company's involvement in the community's life;
- media profits;
- advantages over the competing companies;
- gaining the goodwill of the leaders' of opinion;
- growing of sales.

From the sponsor's point of view, sport sponsorship is considered, in marketing literature, as a means of *promotion by sport*; from that of the sponsored organization it is a means of *promotion of sport,* because of its importance in achieving the marketing and communication goals, characteristic to sports organization, through the instrumentality of the same channels used by sponsor, namely the event and media. The main goal of both the sponsor and the sponsored organization is to influence common categories of public.

Sponsorship implies three elements – the sponsor, the sponsor's organization, the event by which the public is addressed.

The event is used by both the sponsor and sponsored organization as a communicational channel by which they address messages to the targeted audience through the agency of some instruments of communication and according to a communicational strategy. From the point of view of the sponsored sports organizations the sport event is, on one hand, a product having characteristics specific to sport, and, on the other hand, a means of communication. The event is sold to both the public, by media, and to the sponsor, considered to be *the first customer* who is offered a potential product. [Oprişan, (2002):180]. In this way, media and audience become component parts of sponsorship. The former presents, broadcasts, speaks about the event, amplifies the messages addressed to the public and draws

attention upon the sponsor, whose major benefit is free advertising, the latter intercepts the messages from the two sources, the sponsored organization and the sponsor.

2. Factors that contributed to the development of sponsorship in sport

Companies that used to allot important amounts of money for written or broadcasted advertising realised that the ever growing squash on the market and, moreover, the costs began to be exorbitant. The use of sports as means of communication, through the instrumentality of sponsorship, was a more efficient and often less expensive alternative to the traditional advertising campaigns. This was an important factor that contributed to the development of sponsorship in sport as, by means of sponsorship, the message meant to be transmitted was related to an event which rendered it more credible, dynamical, more likely to be better intercepted.

The interest media took in sports events also influenced upon the increasing importance of sponsorship firstly because of the reduced costs of broadcasting sports events as compared to those implied by producing shows. Individuals' interest in sports and in a more active way of life, cable television networks, broadcasts by satellite, private televisions that made it possible that events should be transmitted live are all factors taken into account in favour of sponsorship as a means of communication by sports.

The companies' interest in activities able to improve the consumers' perception with regard to their products and the changes in the policy of financing sports events made the commercialization of sport became imperative and inevitable.

Marketing globalization was another factor that enhanced the development of sponsorship particularly in the field of sports where it is considered as an ideal means of intercultural communication by which multinational companies could surpass the difficulty of addressing to different cultures and languages and reach the target groups. On the other side, as sports organizations adopted the techniques of marketing they entered into association with commercial companies in order to reach their own goals.

Sponsorship is the most visible component of the marketing mix, and plays a critical and active role in affecting or influencing the consumers' opinion on the sponsor's brand. In general, it offers a great opportunity to both sponsor and the sponsored organization to build upon each others strength and growing reputation throughout the world. What sponsorship provides are the numerous opportunities for exposure, including promotional materials for an event, signage, on–site booths, cups and servicing items, premiums/give–aways and verbal mentioning by commentators. Sponsorship is meant to develop a heart to mind connection; relying on the emotional power of an event, league or a sportsman's personality, a sponsor can create a strong tie between his brand and the fans. The frequent appearance of a brand name or logo turns the company into part of what that personality, event, or league represents. Sponsorship usually creates a stronger tie with fans than advertising. The effectiveness of a sponsorship is measured by three elements: media exposure, awareness and purchase, and commitment; the importance of these three elements varies in accordance with the sponsorship's scope and duration. In general, no sponsor can expect to win the affection of consumers instantly. As a rule, it takes between three to five years for the results of sponsorship, increases in brand awareness and commitment, to appear. For one–time sports events, awareness and media exposure are the key aspects since commitment cannot be built with single events. It combines both attitudes and emotion and has the ability to predict future behaviour because the more committed a fan is, the more he or she is prepared to spend.

Sponsorship of sport or other events is, besides an essential element in the marketing mix, a proven communication vehicle or medium to facilitate the relationship between the sponsor and the sport consumer, in his capacity of either an active participant or a spectator of sport. Organizing several sports events or sponsoring them makes for an excellent advertising opportunity that companies can take. A company that manufactures sports utilities can sponsor a sports tournament – which thus becomes a means of communication – to advertise its products.

The role the media, which is a filter and an amplifier at the same time, plays in sponsorship is that of a go–between by which information is conveyed.

Media can be effectively used for advertising sponsorship: on television, radio, in newspapers and magazines; on T–shirts, equipment, banderoles; on tickets, programs, invitations, posters, flags; in stations destined to public transport, as well as on the lateral parts or the back of the busses, trams, coaches; in commercial places, supermarkets; manifestations for clients or distributors; lodges of

honour, saloons where sponsors can meet clients or customers; press conferences; manifestations for journalists; incentives for co–workers; encouraging co–workers to practice sports.

3. Sponsorship in Romania

The overthrown of communism in 1989 brought about the change of the political regime as well as of the Romanian economy which, according the post revolutionary Constitution firstly adopted in 1991 and modified in 2003, "is a market economy". [Romanian Constitution, (1991), 2003]

Under the new political and economic circumstances, it was impossible for the Government to provide budgetary support for the cultural necessities of the society so that the cultural institutions had to look for alternative resources to finance their activities. But the only way to support the cultural or sports events with funds was that of donations. The Civil Society claimed the creation of a legal frame that should allow private financing for culture and benefits for the financer. Consequently the Ministry of Finance initiated a draft bill concerning sponsorship of activities in the field of culture, art, science, education, religion, sports etc. which came into force as Law no. 32 of May 19th 1994; it was not long before discontentment arose against the stipulations meant to bring equal profit both to the beneficiary and to the Ministry or state budget. Sponsors were displeased with the fact that the only advantages were the promoting of their name, brand or image by the beneficiary of the sponsorship through the instrumentality of the event and a 5% tax deduction. These advantages, hardly considered as attractive, determined a lack of interest in sponsorship which reflected upon the beneficiaries. It is understandable that under these circumstances sponsorship was not attractive and law had to be changed; the Civil Society, particularly the League of the Nongovernmental Organisations for supporting the Sponsorship Law had a great contribution in the settlement of a system of sponsorship advantageous, to both the sponsor and the sponsored organization. As a consequence, the Decree no. 36/1998, which embodied most of the ideas of the experts' group and by which the tax reduction threshold was raised depending on the domain to be sponsored, passed. The domains and the percentage of deduction were:

- culture, art, heath, social assistance, humanitarian actions, environment preservation – 10%;
- education, human rights, science–research, philanthropy, preservation and restoration of the historical monuments, sport – except for football – 8%;
- religion, social and communitarian, professional associations, football – 5%

The changes stipulated by this Decree never came into force because the Ministry of Finance din not endorsed the instructions the ministries of each department should have offered situation which determined that the stipulations of Law no. 32/1994 should continue to be effective. The changes continued: the Sponsorship Law was modified again by Decree no. 127 of September 10th 1999 with fiscal measures, Law no. 204 April 20th 2001 concerning the passing of the Government's Decree no. 36/1998 that should have changed and completed Law no. 32/1994, Law no. 576 of October 22nd to pass the Government's Decree no. 127/1999, 2001 Law no. 414 of June 26th, 2002 concerning the tax on income and finally Law no. 571 of December 22nd 2003 with regard to the Fiscal Code, which abrogated Law no. 414/2002 and changed to a greater extent the deduction system. Because of all these changes the present law is different from that of 1994.

Regulations governing sponsorship in Romania at the moment are:

- Decree no. 36, of January 30th 1998, amending Law no. 32/1994 on sponsorship;
- Law no. 32, May 19th 1994 on sponsorship (updated until 22 October 2001);
- Law no. 204 of April 20th 2001 that ratifies the Government Decree no. 36/1998 amends Law no. 32/1994 on sponsorship.

Romanian legal or natural persons, which performs in the areas of sponsorship stipulated in article 4, benefit from the reduction of the taxable equivalent sponsorships, but no more than:

a. 10% of the taxable base for sponsorship in the fields of culture, art, education, health care and social services, humanitarian activities, environment protection;

b. 8% of the taxable base for sponsorship in the fields of education, human rights, science, fundamental and applied research, charity, maintenance, restoration, preservation of historical monuments, sports – except football;

c. 5% of the taxable base for sponsorship in the fields of religion, social and community, representing the interests of professional football associations.

The current law, besides the fact that is difficult to be consulted because of the numerous changes and the lack of enforcing norms – for the cases where the text is often confused, apart from the first three articles, has several shortcomings.

4. Shortcomings of the Sponsorship Law in Romania

First, it is the question of fields of activity for which a person can be sponsored. In many European countries, such as Bosnia and Herzegovina, Macedonia, Poland and Slovenia, reference is made to the field of activity for which sponsorship is permissible, the lack of clear or unanimously accepted definitions making it difficult to establish, for example, that a person performs activities belonging to one area or another. This can be proved, as a rule, by the statute or the constitutive document of the legal person in question, but in some cases documents may be irrelevant. On the other hand, in the absence of such documents, it is difficult to determine whether a particular activity is or is not part of the educational field, for example. In the same category of hindrances is the provision according to which the person wishing to be a beneficiary of the sponsorship must be "acknowledged" under the said proceedings, which greatly complicates the legal operations that precede the concluding of the sponsorship contract.

Secondly, obviously, insufficient incentives granted to sponsors are often seen as an obstacle for a satisfactory system of sponsorship. For Romania, incentives relate primarily to the deduction from the taxable profit. In other countries, there exist different types of incentives and thresholds of deduction of between 4 and 12%, depending on the case. Such deductions stimulate the sponsor so much the more if they are correlated with a certain level of income tax, so that the proportion of two percentages would allow a real cut of the financial effort of the sponsor. The lack of such incentives, in Romania, as well as the lack of correlation between the sponsored field and the percentage of deduction of the level of taxation on profit is to the detriment of those potential customers who have a lower profile or do not make use of campaigns to promote the name and logo of the sponsor.

One of the major obstacles that the present Romanian legislation generates is that sponsorship expenses are not considered as expenses for communication, but as charitable expenses.

5. Sports sponsorship in Romania

According to the text of the Law currently in force in Romania, sponsorship is the legal act by which two parts agree on the transfer of ownership of some goods or financial means for supporting non–profit activities carried out by one of the parties – the sponsorship beneficiary.

Concerns in the field of sponsorship in sports resulted in the formation of *Association of Sports Sponsors in Romania*, non–governmental organization which aims at supporting the sports movement in Romania and has as objectives the following:

a. to attract sponsors, to organize activities that coordinate and facilitate the sponsorship of athletes, sports clubs, sports associations and federations by companies or other individuals or legal entities in the country and abroad;

b. to support the organization of sports activities and cultural–sports manifestations taken by the Department of Sport of the former Minister of Youth and Sport or by other factors;

c. to carry out advertising actions that favour improvement of knowledge about sponsorship legislation, to contribute to the improvement of legislation on sponsorship;

d. to organize sports activities, such as those in the field of sport for everybody, classes of initiation in sports, etc.;

e. to support athletes or former performance athletes that face difficult life situations.

The association works with the structures of the former Minister of Youth and Sports, Ministry of Administration and Interior, with other Romanian legal persons and foreign companies that operate similar activities.

Most important examples of sports sponsorship in Romania are those concluded by large companies with:

1. The Romanian Gymnastics Federation (RGF); the official supplier of the International Federation of Gymnastics, the *Longines* sponsored RGF, providing equipment and services of timekeeping and display. In compensation, RGF inscribed the name of the company on the national team's equipment worn in all major competitions.

Partial sponsorship has also been completed:

▪ with the Advertising Agency *Graffiti*, which organized the International Championships of Romania, covering all organizational costs, contracts with the media, including televised broadcast of the competition;

▪ with *MITA*, in exchange for the amounts required for awards and electronic equipment, RGF has given the company the right to advertise on the contest costumes.

2. The Romanian Tennis Field Federation (RTF). The International Tennis Federation, which provided important funds for a male tennis circuit, a female contest and for the purchase of a Mercedes minibus with eight seats. Important sponsors, which do not bear the official title of sponsor, were: *Dunlop* and *Slazenger* (provided sports material and the possibility of buying rackets at preferential prices), *Adidas* (provided sports equipment and materials for the national group), *Mercedes*, Coca–Cola, Intercontinental, QM (tennis equipment and sports material), *Attigram* (computer, fax), *Scop* (computer, emergency repairs).

3. The *Steaua* Club. The club benefits a 3 years sponsorship from *Philips*. The hockey department is sponsored by the company *Electrofar SA* which provides material support in money and other materials in exchange for compensations similar to those offered to *Philips*. The basketball department is sponsored by *Nithos* a Romanian–Italian company that produces and provides medical equipment in Romania and which supports the team's travels abroad.

4. The Romanian Athletics Federation (RAF). Following an improvement of the sponsor employability, RAF was able to attract a powerful sponsor – the *Champ* company.

5. The Romanian Soccer Federation (RFF) rendered profitable sponsorship contracts with: *Rank Xerox* (financial support), *Adidas* (sports equipment), *Tropicana* (money). Clubs belonging to this federation are free to conclude sponsorship contracts without the federation's authorization.

On the other hand, the Romanian Olympic Committee has also concluded partnership and sponsorship contracts, on the bases of the global programme TOP IV developed by the International Olympic Committee, with airline companies (*Tarom*), banks (*BCR, CEC– Bank*), insurance companies (*ASIROM*), car factories (*Mercedes, Ford*), sports supplies companies (*Adidas*), telephone companies (*ROMTELECOM*) as well as *Lenovo Group*, *Coca–Cola*, *Panasonic*, *Samsung*, *Kodak*, *Omega, Visa, Alexandrion Grour.*

Sports sponsorship generates certain problems such *as*:

▪ from the point of view of the sport organization there is a general tendency of the sponsors to support those sports or events that enjoy the highest popularity and rating to the detriment of the sports considered less attractive;

▪ from the point of view of the sponsor there arises the question of the quantification of the sponsorship outcomes as consequence of an improper knowledge of the communicational potential of sport or certain sports events situation which, very often, lead to too few claims from the part of the sponsor.

The legal aspects of sponsorship must be taken into consideration by both the sponsor and sponsored sportsman or sports organization. Lack of communication and coordination between the sports organizations on different levels of subordination (The Romanian Olympic Committee, Federations, Clubs etc.) may result in contract disagreements or even in conflicts (parallel promotion of several companies' brands or products under the name or image of the same sportsman or sportswoman), unless the rights of each part of the contract or each sports entity are clearly specified.

Lately companies started to develop a new outlook on sponsorship focusing more on the qualitative aspects of sport in relation to consumers; this proves a deeper concern of the companies for the problems that face communities, concern to answer the consumer's necessities. The consumer and the improvement of his life's quality became the major point of interest for sponsors, so the image of sports events and the idea of practicing sports for a healthier life are associated with a company's products or brand which are, in this way, consolidated in the viewers' perception – people favour those companies that support sport.

On the other side, mass participation events offer more to brands than merely a return on their sponsorship investment because events which promote health and fitness give a brand the opportunity for both current and prospective consumers, who want to stay fit, to look at the brand in a different and more positive way.

According to Nick Rusling, the managing director of IMG Mass Participation Sport – mass events, such as marathons and triathlons, are becoming more and more popular during a period of

financial crisis similar to the one the world faces at present. Referring to mass sports events such as London Marathon that gathers thousands of competitors and spectators, Rusling said [Sportbusiness International, (2008)]: "Cities should be looking to have marathon events – flagship events – because of their economic value. Participation in events is on the increase across the world, put down to people being fundamentally conscious of their own need to take part and stay fit."

Before their sponsorship of the London Marathon, Nick Bitel, CEO of the London Marathon, revealed that Unilever– that owned margarine–producer Flora asked their customers in 1995 for their motivation when buying the product, and a majority said it was because *they always have*. After their association with the race, consumers responded that they bought the product *because it is good for you*. [Sportbusiness International, (2008)].

The rapid evolution of the means of communication, particularly the internet, and the favourable opinion of the audience about the companies that sponsor sport in all its forms of manifestation will certainly cause a future development of sports sponsorship in the years to come.

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A SWOT ANALYSIS OF SMES' DEVELOPMENT IN ROMANIA

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Abstract:

Nowadays, the importance of the SME field becomes more and more a real basis for establishing and developing a modern, dynamic knowledge–based economy. The experience of the European Union clearly demonstrates that the SME sector can make a substantial contribution to Gross Domestic Product, enhance employment opportunities and stimulate export growth. SMEs have the ability to respond flexibly in a strongly competitive market and to adapt quickly to cyclical and structural changes in the global economy. Therefore, a dynamic SME sector is needed to ensure continued economic growth, to stimulate the employment and the improvement of the living standards.

The accession of Romania to the European Union involves a lot of challenges and opportunities for the Romania SMEs sector. In this context, the SWOT analysis will reveal the main strong and weak points of this sector development, the threats but also the ooportunities. Starting from this, there are presented the principles that will be followed for the development of this sector and the national strategy for the support and promotion of Romanian SMEs.

Keywords: SMEs, financing, performance indicators, SWOT analysis, development strategy, Romania

JEL Classification: F36, O16

1. Introduction

The economic and social importance of the SME sector is well recognized in academic and policy literature [Biggs, (2002)]. It is also recognized that these actors in the economy may be underserved, especially in terms of finance [Beck, (2007], [Ayyagari *et all*, (2006)], [Berger and Udell, (2005)].

The small business development literature argues that SMEs embody special advantages that generate some unique contributions to the economy such as: SMEs create an important part of the new generated jobs [Birch, (1987)] and therefore contribute to the reduction of unemployment and poverty; SMEs are considered as main actors for industrial growth [Acs and Audretsch, (1987)]; SMEs add dynamism and flexibility to business activity and improve economic performance; SMEs are considered a source of considerable innovative activity and contribute to the development of entrepreneurship [Johnson and Cathcart, (1979)] and export competitiveness.

Despite specific global efforts to strengthen the SME sector, these businesses face a number of financial and regulatory barriers, particularly in developing and emerging countries [Newberry, (2006)]. In the same time, the SMEs are the emerging private sector in developing countries and thus form the base for private sector–led growth [Hallberg, (2000)]

Romania has made considerable progress in setting up an extensive policy framework to support the SME sector, after 1990 [Giurca, (2007)]. There were developed a range of institutions, policy instruments, territorial tools, programs and resources in order to assist the small and medium enterprise development in Romania accordingly with the regulations on the European Union.

In 2000, the European Union launched the Lisbon Process designed to improve the competitiveness of European SMEs in an increasingly knowledge–based global economy. In 2002, Romania, together with other candidate countries, signed the Maribor Declaration and engaged to harmonize its policies for supporting the competitiveness of local companies to the provisions of the Lisbon Strategy. As an expression of Romania's international engagement, the National Development Plan 2007–2013 [NDP, (2005)] highlights the importance of restructuring and developing existing SMEs and the creation of new enterprises and in this context, defines the priority measures as improving the business environment, supporting access to financial resources and providing support services to SMEs and entrepreneurs. In the same time, the Ministry for SMEs, Trade, Tourism and Liberal Professions (the former National Agency of SMEs and Cooperatives) is also responsible for ensuring Romania's compliance with its obligations under the European Charter for Small Enterprises.

2. Recent development trends for the Romanian SME sector

The SMEs predominate in the Romanian economy having a substantial contribution to the GDP (70% in 2005) and playing a main role in job creation. Thus, in 2005 in the SMEs sector were employed 60.7% of active population and the weight of turnover achieved by these firms were of 57.6% from the total firms [NIS, (2006)].

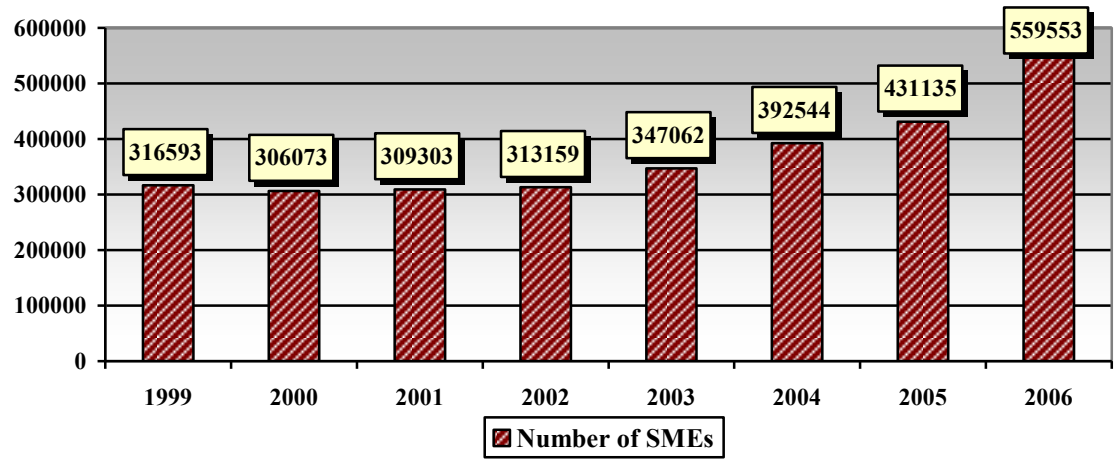
Table 1. Evolution of SME's turnover and employees (%)

Indicators	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Weight of staff in active SMEs	23.9	29.1	32.9	37.8	42.5	46.9	48.5	50.7	54.4	58.2	60.7
Weight of turnover achieved by active SMEs	46.7	48.3	45.2	52.8	54.0	55.9	57.2	55.9	54.7	57.5	57.6

Source: National Institute of Statistics, Statistical Yearbook, 2006

In conformity with the Romanian legislation, the small and medium enterprises (SMEs) are structured in three categories: micro–enterprises (less than 9 employees and a net turnover/total assets less than 2 million Euro); small firms (between 10 and 49 employees and a net turnover/total assets less than 10 million Euro); medium firms (between 50 and 249 employees and a net turnover less than 50 million Euro/total assets less than 43 million Euro). The firms with more than 250 employees and a net turnover more than 50 million Euro are considered corporations.

The number of SMEs registered a positive evolution: in 2005 there were active about 431,000 SMEs, which means an increase of 36% in comparison with 1999 *(figure 1)*.



Source: National Institute of Statistics, Statistical Yearbook, 2006

Figure 1. Number of active private SMEs by size (1999– 2005)

In 2006, there were 559,553 SMEs, from the total of 561,356 private firms (99.6%) and in 2007, there was registered and increase with 5% of the number of Romanian SMEs. Despite these positive evolutions, the average of 26 SMEs/1000 habitants in Romania is much lower than EU average of 52 SMEs/1000 habitants [Giurca and Popa, (2007)].

In structure, the micro–enterprises dominate the SME sector (90%) while the small firms represents 9% and the medium firms represents 1%, in 2006. But there are some differences in function of the activity sector, for instance in industry and constructions sectors, the microenterprises represents 74.9% (figure 2) in comparison with trade and other services, where they represent 92.2% *(figure 3)*. Also, the weight of medium firms in industry and constructions represents 17.2% while in the sector or trade ad other services it represents 6.7% in 2005 [NIS, (2006)].

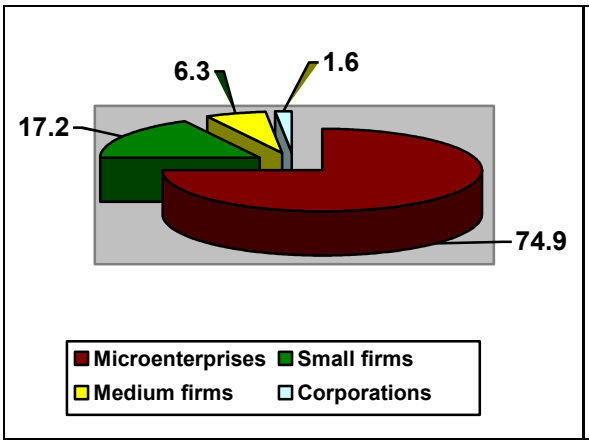


Figure 2. Structure of SMEs from industry and constructions by size

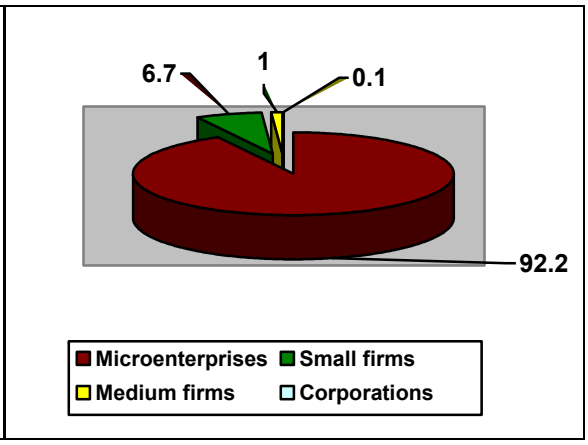


Figure 3. Structure of SMEs from trade and other services by size

The great share of micro–enterprises should not be interpreted as a feature of underdevelopment for the SME sector or the private sector. On the contrary, this is an aspect which justifies and consolidates flexibility and adjusting capacity to the continuous changes in the market.

By activity sector, it was registered a positive evolution, an increase in the number of SMEs in all the main activity sectors in 2005 as compared the previous years *(table 2)*.

Table 2. Number of active private SMEs by activity sector

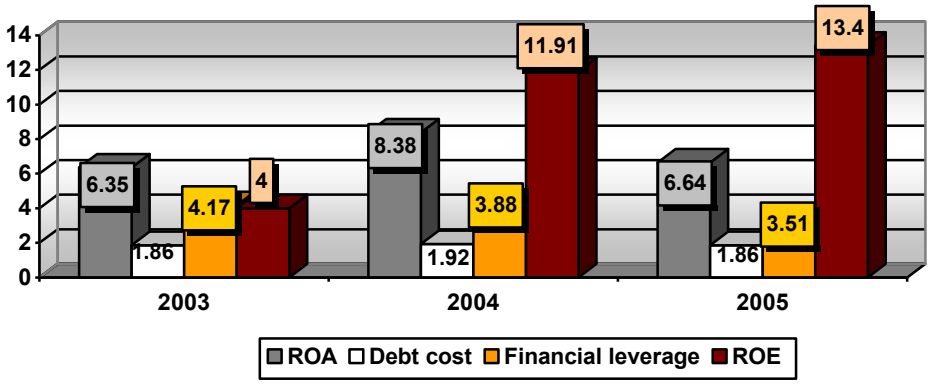
Activity sector	1999	2000	2001	2002	2003	2004	2005
Mining	202	233	281	342	470	584	642
Manufacturing	39605	40265	41525	45270	49595	54080	56765
Electric energy, gas and water	223	238	253	278	341	364	379
Construction	11092	11807	14096	16382	20441	25199	30204
Wholesale and retail	217316	202724	192480	177562	179148	191077	200246
Hotels and restaurants	10101	9906	10441	13513	15437	17213	19204
Transport	12281	12629	15474	17856	21127	25015	28810
Real estate transactions, rentings	15113	17905	23840	30436	45625	61089	74200
Education	614	542	622	762	926	1075	1365
Health and social assistance	3900	3558	4060	4423	5502	6832	7839
Others activities	6146	6266	6231	6335	8452	10016	11481
Total	**316593**	**306073**	**309303**	**313159**	**347064**	**392544**	**431135**

Source: National Institute of Statistics, Yearly Report 2006

An increased dynamics was registered by the SMEs belonging to the construction sector and the services sector. In relative terms, the most substantial share is the one of the SMEs belonging to the services sector (sector which incorporates wholesale, tail trade and other services) follows by industry, transport and constructions sector.

The fact that more and more SMEs are involved in the industrial sector shows that this sector is undergoing a development process. On the other side, because SMEs from the industrial sectors are bigger in size than others, this could be correlated and linked to the increased degree of complexity for production and organization processes. By comparison to the SMEs in the industrial sector, those in the services sector are more flexible; most of them are micro–enterprises involved in trade operations, being market intermediaries and having an additional degree of volatility.

The general economic development trend is reflected by the performance indicators of the SMEs: turnover, Return on Assets (ROA), Return on Equity (ROE), cost of debt (interest cost/total debts) and financial leverage (total debts/equity). *(figure 4)*.



Source: National Bank of Romania, Financial Stability Report (2007)

Figure 3. Evolutions of the profitability indicators for companies (by size)

The return of assets (ROA) for the SMEs increased in 2004, but in 2005 the increasing trend was maintained just for the small enterprises. A possible explanation for the decrease of ROA is the increase of investment in fixed and current assets. But these investments could improve the assets turnover and the profitability on long term.

The increase of the ROE in 2005 in comparison with 2004 can be explained by an increase of the return on assets and of the financial leverage.

In the last years, Return on equity (ROE) remained somewhat constant at aggregate level (14.6 % in June 2007), yet posted mixed developments in terms of structure: companies producing non–tradables registered a slightly declining ROE, companies with bank loans further posted lower profitability than those without loans; companies in the trade and services sector witnessed a shrinking ROE, albeit still considerably higher than the average economy [NBR, (2007)].

The turnover registered a slightly increase in 2005 in comparison with the previous years, due mostly the positive evolutions registered in industry, energy and services sector.The services represent the most important sector from the point of view of the turnover achieved, and had the most accentuated and relevant growth in the period 2000–2005 (19.4%) while the other sectors situate themselves close to the average result [NIS, (2006)]

Concerning the size categories, medium sized enterprises have an annual growth about average in 2001, a recovery in 2003 and the most significant and spectacular growth in 2004. Microentreprises and small enterprises confronted with a relative stagnation in 2002, but recovered and had an upward evolution of turnover in 2003 and especially in 2004 *(table 3)*.

Table 3: Evolution of SMEs' turnover by size category (lei – national currency)

Years	Type of SME			Total SME
	Micro	Small	Medium	
2000	535,027	1,02366	145,371	782,764
2001	732,776	161,033	237,942	1,131,751
2002	974,750	224,126	303,307	1,502,183
2003	1,282,157	308,793	390,020	1,980,970
2004	1,615,190	448,430	509,180	2,572,800
2005	1,867,540	508,150	573,350	2,949,040

Source: Ministry of Public Finances and National Institute of Statistics, Statistical Yearbook 2006

3. SMEs' development in Romania – SWOT analysis

The progresses achieved by Romania within the integration process is a proof of a future–oriented and dynamic assessment on the country's economic performance, thus demonstrating its capacity to meet the economic requirements, established by the European Council in Copenhagen. Despite these favorable evolutions of the Romanian economy and the restructuring process, it should be taken into consideration there are still difficulties the economy have to face, such as:

- the dependence of the economy on the traditional sectors;
- exports are not oriented to high value–added products and services;
- the innovative potential and the invention licenses are not encouraged enough;
- high technologies are taken in but to a low level;
- industrial productivity is lower than the European one.

Despite the general positive trend registered in the last years, the SMEs sector in Romania is still poorly developed and represented as compared with the developed EU countries. But there are some strong points which could represent important arguments for the next future development of this sector. Thus, the SWOT analysis of the SMEs sector reveals the main *strengths* of this sector, as follows:

- continuous development of the SMEs economic potential;
- high professional skills of the labor;
- existence of a network of research and development centers specialized on SMEs sector;
- the higher competitiveness of the SMEs involved in the ITC field;
- a medium educational level on entrepreneurship in the high school, university education;
- the high level of the women participation to the labor market.

The national strategy for sustaining SMEs took in consideration the following *weaknesses* in the development of Romanian SMEs sector:

- the absence of a well–developed entrepreneurial culture and weak management skills;
- the existence of administrative–bureaucratic barriers and additional costs for start–up firms;
- the burdensome regulatory and tax environment;
- the difficulties in accessing the financial resources for start–up firms and micro–enterprises. Banks in general ask for collaterals which are often difficult to meet by undercapitalized SMEs which do not possess enough assets to guarantee the bank loans;
- the underdevelopment of financial instruments supporting the SME sector: e.g. "mutual guarantee–schemes", venture capital and opening credit lines for SMEs with preferential interest;
- the low productivity and efficiency;
- the consulting, training and information sources are inadequate;
- improper development of support services (industrial parks and business incubators);
- lack of support for innovation activities;
- the lack of on–line services for SMEs in order to access business information and facilitate interaction with the public administration;
- insufficient knowledge and information for SMEs in order to access the external markets.

The opportunities for the development of the Romanian SMEs are the followings:

- continuing the process for simplification of regulation frame;
- IT development which is imposed by the competition at international level and necessity of elaboration of vertical strategies for SMEs with activity in IT field;
- increasing the competitiveness of services from tourism field which represents a potential for economic increase that can counteract the strong concurrence from regional competitors.

The main *threats* for the Romanian SME sector are the followings:

- the repeated legislative changes;
- international concurrence on intern market for produce and services(China, Southeast Asia);
- financing SME sector through banking credits with no attractive interest rates;
- high exposure of the SMEs sector to corruption and bureaucracy;
- adopting regulations Basel II by the credit institutions;
- the inefficient investments in professional training of employers or qualified personal;
- the mismatch between labour skills and market requirements;
- insufficient adequate Know–how for export.

Therefore the government's policy is targeted on the development of an environment that could stimulate the SMEs development, increase the enterprises competitiveness, format a new enterprising attitude in order to face the pressures of the market competition.

The necessary actions require a combination of improvements in the regulatory and administrative environments and the provision of an adequate mix of incentives complying with the European standards. The SME sector should be greatly expanded in both size and scope, as well as better integrated into the international economy and technologically enhanced.

4. The development strategy for Romanian SMEs

The Romanian Government recognises the importance of strengthening the capacity of SMEs to compete in the global market. In the first phase of Government support to the SME Sector, there were introduced measures to improve the technical/productive capacities of Romanian SMEs, to enhance product quality, to facilitate access to export markets and to increase management performance.

As an expression of Romania's international engagement, the Romanian Government has committed itself to finalize industrial restructuring, to encourage the start–up of new enterprises, to foster entrepreneurship business environment. These objectives have been incorporated into the National Development Plan 2007–2013 (NDP) which highlights the importance of restructuring and developing existing SMEs and the creation of new enterprises and in this context, defines the priority measures as improving the business environment, supporting access to financial resources and providing support services to SMEs and entrepreneurs. The medium term goals are to create 760,000 new jobs, raise the GDP contribution of the SME Sector to levels comparable to other Candidate States and to increase exports by 10% per annum.

In the same time, the Ministry for SMEs, Trade, Tourism and Liberal Professions (former National Agency for Small and Medium Sized Enterprises and Co–operatives) is also responsible for ensuring Romania's compliance with its obligations under the European Charter for Small Enterprises and for ensuring that the provisions of Governmental Strategy for Sustaining the Development of Small and Medium Sized Enterprises 2004–2008 are closely in harmony with the priorities, measures and implementation arrangements for Industrial and Regional Policy.

The directions and the measures defining the National Strategy for the support and promotion of SMEs for 2004–2008 show the internal needs of small companies but they are accordingly with European issues, as follows:

- creating a business environment supportive of SME development;
- developing SME competitiveness;
- improving the SME access to financing;
- improving the SME access to foreign markets;
- promoting an entrepreneurial culture and strengthening management performance.

These measures were designed to create a supportive legislative, regulatory and fiscal environment, to provide financial support to SME development and sustainability.

The principles that will be followed for developing the SMEs sector are the followings [NASMESC, (2005)]:

- ensuring a coherence of strategies developed at governmental level with an impact to SMEs sector;
- granting a financial support by state compatible with European Commission recommendations;
- measures of supporting SMEs should not distort the market mechanisms;
- ensuring the transparency of actions focused on developing SMEs sector;
- middle term development strategy for SMEs will be regularly updated according to designed and implemented measures;
- a special attention will be granted to the development of SMEs in regions in which social and industrial infrastructure is weak, and unemployment rate high.

The directions and the measures defining the National Strategy for the support of SMEs for 2004–2008 show the internal needs of small companies accordingly with European issues, as follows:

a. Creating a business environment supportive of SME development and growth. The measures which should be taken are:

- the improvement of the regulatory framework and elimination of administrative–technical barriers;
- the development of the institutional capacity of Ministry for SMEs, Trade, Tourism and Liberal Professions;
- the improving of the public – private dialogue with SME representative organizations.

b. Development of SME competitiveness and strengthening the capacity of SMEs to compete in the global market impose important measures as followings:

- Supporting innovation and improving the access of SMEs to new technologies;
- Supporting the introduction of quality standards and quality management systems;
- Promoting e–business;
- Facilitating access to the assets of state owned enterprises and to public procurement;

- Improving access to business support and information service;
- Supporting business incubators in the productive sector and in the higher added value elements of the services sector;
- Supporting the development of industrial parks;
- Decreasing regional disparities through targeted support to SMEs.

c. Improving SME access to finance through measures, such as:

- Improving productive SME capitalization through promoting innovative instruments to facilitate SME access to finance, both on the side of the financial institutions and of the enterprises;
- Sustaining a national network of SME Guarantee Funds development;
- Financing SME start–ups in priority sectors mainly through the Guarantee Fund network;
- Pilot innovative instruments for financing SMEs such as venture capital; seed money for start–ups, innovation funds and business angels' networks.

d. Improving the access of SME to external markets through the following interventions: stimulating the development of cross–border co–operation and regional business partnership; improving the access of SME to external markets.

e. Promoting an entrepreneurial culture and strengthening management performance. The measure and actions under this priority are: developing an entrepreneurial culture; training and consultancy services for managers and entrepreneurs.

As part of the European Union market, the Romanian SMEs will be the beneficiary of the "Small Business Act" (SBA) for Europe, adopted by the European Commission in June 2008 in order to further strengthen SMEs' sustainable growth and competitiveness. Accordingly with the "Think Small First" principle, the Small Business Act creates a new policy framework which integrates the existing enterprise policy instruments, based on the European Charter for Small Enterprises and on a genuine political partnership between the EU and Member States accordingly the principles of subsidiarity and proportionality [(EC, 2008)].

The Small Business Act recognises the central role of SMEs in the EU economy and put in place for the first time a comprehensive policy framework for the EU and its Member States through a set of ten principles to guide the conception and implementation of policies both at EU and Member State level. These principles are essential to bring added value at EU level, to create a level playing field for SMEs, to facilitate SMEs' access to finance and develop a legal and business environment, to improve the legal and administrative environment throughout the EU, to support SMEs to benefit from the growth of markets and from the opportunities offered by the Single Market.

5. Conclusions

It is well known that the small and medium enterprises represents the backbone of the economy adapting better to market demands, adapting easier to alternative strategies, due to their flexibility in size and orientation and playing a major social role through creating new jobs. But this sector can perform properly only if it is in close connection with the big "nervous centers" of the national economy such as the corporations, the banking system or the big utilities suppliers [Giurca and Popa, (2007)].

Small and medium sized enterprises are not a lonely island but a vivid ensemble which function in direct connection with what is happening at national, European and international economy level. Small and medium sized enterprises are the first developing entities when the economy is on the right path but also the first ones to pay the price of economic recession. That is why the governmental policy toward this sector has to be an integrant part of a general policy: fiscal, commercial and industrial.

The European integration process brings new challenges to the SMEs sector which have to participate on the EU market and have unrestricted access to over 500 million potential consumers. EU enlargement represents an opportunity for the further development of SMEs if they are supported to penetrate the new EU markets. The enlargement could contribute to lower transaction costs, in particular if it results in greater transparency, simplified procedures, harmonization and convergence of competitive conditions related to trade negotiations. SMEs will be the first to gain from an environment where transaction costs are lower. Their already important contribution to the employment and the GDP throughout the European area could grow further if they have more access, more training and are given more exposure to the Internet and electronic commerce.

On the other hand, the Romanian SMEs have to face an increasing competition on the domestic and international markets. It is obviously that, for the moment, the majority of Romanian enterprises

are not enough prepared to answer the opportunities and challenges generated by the European integration. The lack of the competitiveness necessary to Romanian enterprises is generated mostly by the inadaptation to the European standars; their incapacity to atract financing sources for investement in new technologies, new products; their incapacity to implement the quality systems, the certifications in environmental management.

Unless there are significant improvements in technical capacities, productivity levels and product quality, there is a serious risk that Romanian SMEs will not be able to protect their positions within their domestic market or take full advantage of the unrestricted access to the Single Market. In order to turn to good account the development potential of the Romanian SMEs and use the opportunities offered by European funds in this direction, stronger support should be offered to this sector within the overall economic policy, concentrating on three aggregate objectives: the removal of any administrative, financial, legal, etc. barriers that still hinder SME start–up and development; the provision of assistance and information to SMEs; encouraging cooperation and partnership between firms [Mitrut and Constantin, (2006)]

In the medium term, Romania will also have to compete more effectively in the global economy. There is therefore a need to grow SMEs capable of competing in the high–value added sectors. To achieve this goal, Romania must invest in research and development, ensure that new technologies are quickly adapted to the production processes and enable Romanian SMEs to participate efficiently in e–commerce systems.

SMEs competitiveness and adopting of Single Market regulations are two ‘’sine qua non’’ conditions, necessary to be fulfilled by Romanian SMEs in order to benefit in the future of knowledge–based sectors. Only in that way, the Romanian SMEs can promote new ventures by making the best of their knowledge of various places abroad and mainly in Europe, and thus, to build “bridge enterprises” – bringing together institutional, business and cultural environments.

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COMPREHENSIVE MACRO – MODEL FOR THE US ECONOMY

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Abstract

We present a comprehensive macroeconomic model for the US There exist strict long–term relations between real GDP, price inflation, labor force participation, productivity, and unemployment. The evolution of real GDP depends only on exogenous demographic forces. Other macro–variables follow up the real GDP. The links between the variables have been valid during the last several decades.

All relations were (successfully) tested for cointegration. Statistical estimates are also presented. The relationships allow a reliable prediction of the macroeconomic state at very large (more than 9 years) time horizons.

Keywords: US economy, GDP, inflation, unemployment, labor force, productivity, demography

JEL Classification: E1, J1, J2, D3

1. Introduction

This paper introduces our macroeconomic concepts. It also summarizes general empirical findings related to the evolution of principal macroeconomic variables in the US Thorough analysis and modeling of real GDP per capita, inflation, labor force participation rate, productivity and unemployment has revealed a number of (linear and nonlinear) relationships, often with time lags. The sequence of interaction between the aforementioned macroeconomic variables in the US is as follows: the evolution of the number of 9–year–olds completely defines the fluctuations in the growth rate of real GDP per capita relative to its potential rate. The latter term is represented by a reciprocal function of the attained level of real GDP per capita itself. Real economic growth drives labor force participation rate with a two–year lag. Apparently, working age population is an exogenous variable and can be obtained by independent measurements. Therefore, the level of labor force is completely defined in the model. The change in the level of labor force represents the driving force of price inflation (as represented by GDP deflator or CPI) and unemployment rate with two– and five–year lags, respectively. Labor productivity is unambiguously derived from real GDP and the number of employed, i.e. the difference between the labor force and the unemployment rate times the labor force.

Hence, one can extrapolate the change in an estimated birth rate in a given year and predict unemployment rate at a 16–year horizon; inflation at a 13–year horizon; labor force participation at an 11–year horizon, and real GDP per capita at a 9–year horizon. Big changes in demographic structure, i.e. highly varying levels of migration and an elevated death rate, can introduce substantial bias in the predictions. Such processes have been not observed in the US since the late 1950s, however.

The relationships compiling our macro–model of the US economy have passed rigorous statistical testing, including tests for cointegration, in order to avoid spurious regressions. These tests demonstrated the presence of cointegrating relations, high level of statistical significance and goodness–of–fit. Moreover, similar cointegrating relations were obtained for the biggest developed countries. The predictive power is illustrated by a comparison of measured and predicted variables.

In this paper, we also validate previously obtained relationships using new data. The data were obtained from various sources: population estimates from the US Census Bureau [Census Bureau, (2008)]; estimates of real GDP and GDP deflator – from the Bureau of Economic Analysis [Bureau of Economic Analysis, (2008)]; labor force level and participation rate, unemployment, and productivity – from the Bureau of Labor Statistics [Bureau of Labor Statistics, (2008)]. In some cases, we used data presented by the Conference Board [Conference Board, (2008)].

2. Real GDP

Real GDP is not a directly measured economic variable. It is a results of the correction of nominal (current dollar) GDP for GDP price deflator. This procedure leads to a somewhat elevated level of

measurement errors, which can be seen in consequent revisions conduced by the Bureau of Economic Analysis. A conservative estimate of the accuracy of real GDP measurement is slightly below one percentage point. Such relatively low accuracy creates additional problems for modeling of corresponding growth rate – annual changes in real GDP are compatible to this accuracy.

The change rate of real GDP is defined by the evolution of two components: working age population, N, and real GDP per capita, G:

$$dGDP/GDP = d(GN)/GN = dN/N + dG/G, \quad (1)$$

where G is based on the working age population. The former term represents the extensive source of real economic growth: the working age population has been growing since the late 1950s at a rate of ~1 per cent per year in the US.

Our (empirically derived) model [Kitov, (2006a)] stipulates that the growth rate of real GDP per capita is defined by the following equation:

$$dG/G = A/G + 0.5dN_9/N_9, \quad (2)$$

where A=$398 (2002 US dollars) is empirical constant, and N_9 is the number of 9–year–olds. The first term in (2) represents economic trend (potential), i.e. the growth rate that would be observed in the case of constant N_9. The second term introduces the fluctuations of the growth rate around its potential level. Asymptotically, the economic trend approaches the zero line. In 1975, the trend was ~2.4% per year, and it fell to 1.3% per year in 2005.

Equations (1) and (2) provide a complete description of the evolution of real GDP, when N(t) and $N_9(t)$ are known. These demographic variables are exogenous ones and driven by many factors, likely including the history of real economic growth. In practice, both variables are enumerated during decennial population censuses and estimated between the censuses.

Reciprocally, one can use real GDP to recover the evolution of the number of 9–year–olds from the start of accurate population and GDP measurements. Such recovery method might potentially be of a higher accuracy than routine censuses. Reversing and integrating (2), one can obtain the following equation for $N_9(t)$:

$$dN_9(t) = N_9(t) - N_9(t-1)$$
$$N_9(t) = N_9(t-1)[2*(dG/G - A/G) + 1] \quad (3)$$

where $N_9(t-1)$ is the specific age population at time t–1; and by default, $\Delta t=1$. Equation (3) can be interpreted in the following way – the deviation between the observed growth rate of real GDP per capita and that defined by the long–term trend is completely determined by the change rate of the number of 9–year–olds. A reversed statement is hardly to be correct – the number of people of some specific age can not be completely (or even in any significant part) defined by contemporary real economic growth. The causality principle prohibits any influence at the birth rate nine years ago.

In fact, Eq. (3) provides a prediction for the number of 9–year–olds using only independent measurements of real GDP per capita. Therefore, amplitude and statistical properties of the deviation between measured and predicted number of 9–year–olds can be used for the validation of Eq. (2). Figure 1 displays the measured and observed N_9 in the US between 1960 and 2003. Both Engle–Granger and Johansen tests for cointegration [Kitov, Kitov, Dolinskaya, (2007a)] confirmed the presence of a long–term equilibrium relation between the measured and predicted (i.e. derived from GDP) populations in Figure 1. The goodness–of–fit is (R^2=) 0.8 and the residual deviation between the curves in Figure 1 can be likely explained by errors in measurements. Effectively, the predicted curve lies practically inside the uncertainty bounds of the measured one, which are about ±300,000, i.e. the predicted curve might be the measured one with a high probability.

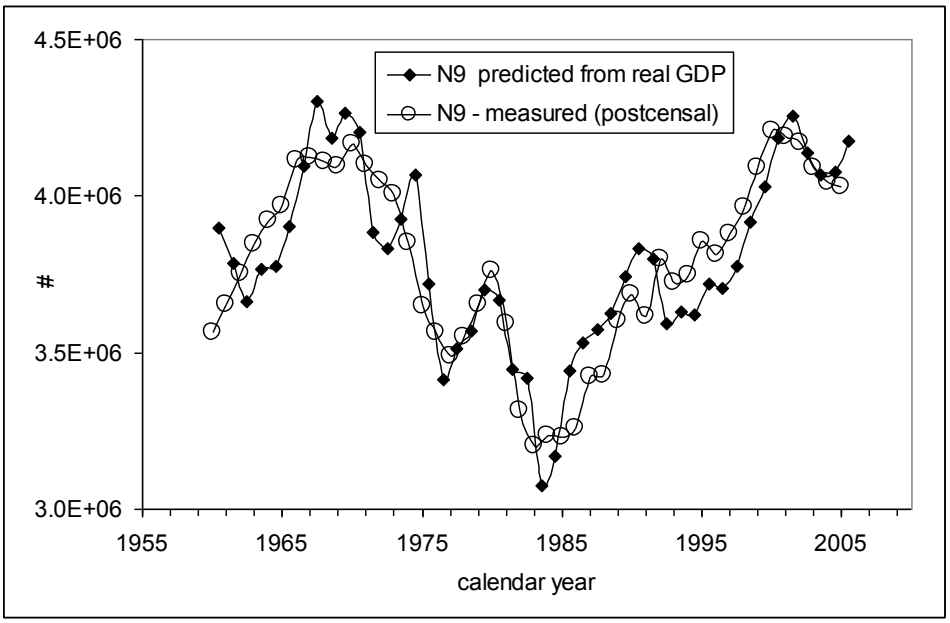
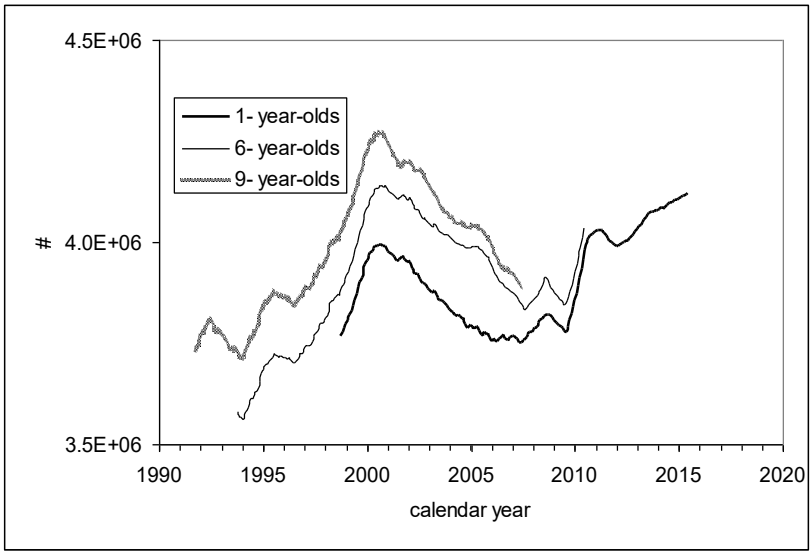


Figure 1. Measured and predicted number of 9–year–olds in the US The predicted number is obtained from the estimates of real GDP per capita according to (3). Here, real GDP per capita was estimated for persons of 16 years of age and over, i.e. for working age population. According to linear regression of the time series between 1962 and 2005, the goodness–of–fit is (R^2=) 0.81.

Hence, there is a one–to–one link between the number of 9–year–olds and real GDP per capita. This fact implies that real economic growth, as expressed in monetary units, is driven only by the evolution of age structure. (Same statement is valid for other developed countries.) An increasing number of 9–year–olds guarantees an elevated growth rate above that defined by constant annual increment of real GDP per capita.

The fluctuations of actual annual increment of real GDP per capita around a constant level represent a random process. This stochastic component is driven only by one force and can be actually predicted to the extent one can predict the number of 9–year–olds at various time horizons. The population estimates for younger ages in previous years provide an excellent source for such prediction. For example, the number of 6–year–olds today is a very good approximation of the number of 9–year–olds in three years, as Figure 2 demonstrates. The growth rate of a single year population can be predicted even with a higher accuracy because the levels of adjacent cohorts change practically in sync.



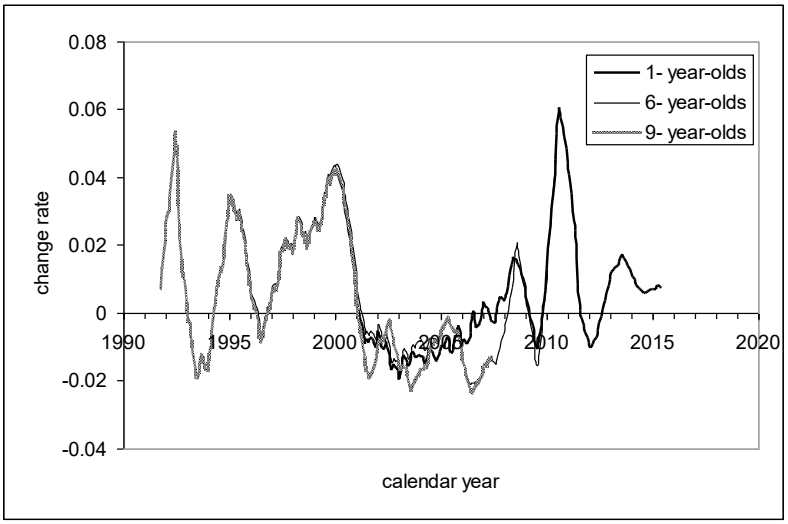


Figure 2. Prediction of the number of 9–year–olds by extrapolation of population estimates for younger ages (1– and 6–year–olds).

Upper panel: Population estimates of the number of 9–, 6, and 1–year–olds. The time series for younger ages are shifted ahead by 3 and 8 years, respectively.

Lower panel: The change rate of the population estimates, which is proportional to the growth rate of real GDP per capita. Notice the difference in the change rate provided by the 1–year–olds and 6–year–olds for the period between 2003 and 2010. This discrepancy is related to the age–dependent difference in population revisions.

Since 2002, the input of the population related component of the growth rate has been negative. It turns to a positive one near 2010. This also results in an elevated growth rate of real GDP per capita during the period between 2010 and 2017.

Our empirical analysis [Kitov, (2006a)] also showed that the growth rate of real GDP in the US can be split into another two components. First component is defined by the reciprocal value of the duration of the period of mean income growth with work experience, T_{cr}, [Kitov, (2005)]. In 2005, T_{cr} in the US was ~40 years, i.e. 55 years of age. The T_{cr} grows over time as the square root of real GDP per capita. Second component is again $0.5dN_9(t)/N_9(t)$. This finding, however, can be an artificial result of the functional dependence of T_{cr} on real GDP per capita and practically constant growth in working age population.

3. Labor force participation rate

The growth in real GDP drives the change in labor force supply through redistribution of personal incomes. Fluctuations in the number of 9–year–olds produce fluctuations in real GDP per capita relative to that defined by the potential economic growth and, thus, create variations in personal income relative to that associated with this "neutral" growth rate. The simplest assumption on the redistribution of an "excessive" (positive) amount of personal income consists in some increase in the fraction of population in labor force. At first glance, more people would be able to obtain paid jobs with extra money produced in a given economy.

Surprisingly, this assumption is wrong for the US. Correct intuition behind the mechanism of the reaction of labor force participation (LFP) to the redistribution is opposite – less people are forced to seek income through paid job because of the presence of some other channels (likely not included in the Current Population Survey's questionnaire) of personal income distribution (PID). A smaller part of working age population obtains larger personal income and somehow transfers it to the residual fraction of the population (not in labor force) to recover original PID [Kitov, (2007a)]. When the growth rate of real GDP per capita is below its potential value, the overall personal income grows at a rate below the neutral one and the lack of personal income earned by people in the labor force has to be compensated by some increase in the LFP. Figure 1 demonstrates that the N_9 was on a downward trend in the late 1960s and the 1970s. These years are characterized by the growth rate of real GDP per capita below its potential and, thus, by an increase in the measured LFP.

Quantitatively, the influence of the growth in real GDP on the LFP has to be affected by exponential distribution of personal inputs to real GDP – the number of people with given income (GDP portion) rolls–off exponentially as a function of income. If the effect of real growth is based on the excess of the total personal income above its potential level, then higher levels of the LFP are more sensitive to this real growth. It is reasonable to assume that the sensitivity of the LFP to the difference between actual and potential growth rates, g(t)=dG/G–A/G, increases exponentially with a growing LFP. Also, there might be a time delay between action and reaction and the LFP may lag behind the g(t) [Kitov, Kitov, (2008a)]:

$$\{B_1 dLFP(t)/LFP(t) + C_1\}\exp\{\alpha_\square[LFP(t) - LFP(t_0)]/LFP(t_0) = \\ = \int\{dG(t–T))/G(t–T) – A/G(t–T)\}dt, \quad (4)$$

where: B_1 and C_1 are empirical constants, $\alpha_\square$ is an empirical exponent, t_0 is the start year (of modeling), T is the time lag, and $dt=t_2–t_1$, t_1 and t_2 are the start and the end time of integration of the g(t) (one year in our model). The exponential term defines the change in the sensitivity due to the deviation of the LFP from its initial value $LFP(t_0)$. Effectively, the LFP(t) is a nonlinear function of real economic growth.

A simple transformation of (4) using (3) provides another useful form of Eq. (4), which relies on $N_9(t)$ instead of the integral of g(t):

$$\{B_2 dLFP(t)/LFP(t) + C_2\}\ \exp\{\alpha_2[LFP(t) - LFP(t_0)]/LFP(t_0)\} = N_9(t–T) \quad (5)$$

where: B_2 and C_2 are empirical constant different from B_1, C_1 □ □and $\alpha_1=\alpha_2$.

Figure 3 depicts some results of the $N_9(t)$ prediction using original LFP time series from the BLS. Corresponding constants are as follows: t_0=1963; T=2 years, α_2=–1.85, B_2=–1.5E+8, C_2=4.94E+6. The predicted time series leads the observed one by two years, i.e. an accurate forecast at a two–year horizon is a natural feature of the model. Coefficient B_2 is negative and results in a declining rate of the LFP growth during the years of real growth above the potential one, for example, between 1983 and 2000. Exponential term in (5) provides a factor of 0.77 in 2000 (the largest LFP of 67.1%) relative to 1963, when the LFP was only 58.7%. This means that 1% change in the N_9 at the LFP level of 67.1% produces a larger change in the dLFP/LFP by factor of 1/0.77=1.3 than 1% change at the level of 58.7%. Also displayed is the case without exponential weighting, α_2=0. This case demonstrates that the specific age population (N_9) is overestimated by the model.

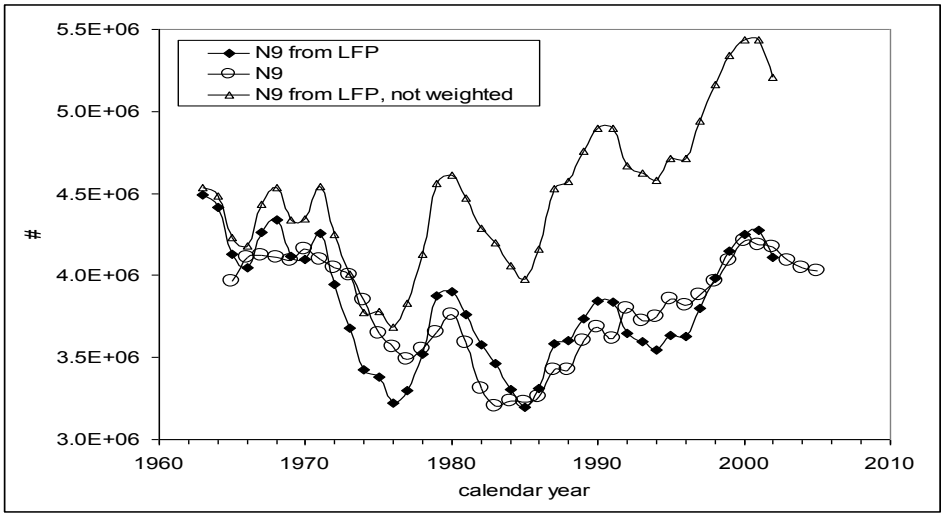


Figure 3. The number of 9–year–olds: the observed one and that obtained from the LFP with and without exponential weighting in (5). Constants t_0=1963; B_2=–1.5E+8, C_2=4.94E+6, α_2=–1.85. The case with α_2=0 in also shown: N_9 is highly overestimated.

Considering the uncertainty in the underlying time series – N_9 and LFP, the observed and predicted time series are in a good overall agreement: timing of main turns in both series is excellent and amplitudes of the largest changes are also practically coincide.

Historically, we first tried to model dLFP/LFP as a nonlinear function of G and tested a simple equation similar to (3):

$$dLFP(t)/LFP(t) = D_1[dG(t–T)/G(t–T) – A_2/G(t–T)] + D_2 \quad (6)$$

where D_1 and D_2 are empirical constants, and A_2 is also an empirical constant different from A in (2). This model served as a workhorse for those countries, which do not provide accurate estimates of the specific age population. According to (4) one can rewrite (6) in the following (discrete) form:

$$Ns(t_2) = Ns(t_1)\{ 2[dG(t_2–T)/G(t_2–T) – A_2/G(t_2–T)] + 1\} \quad (7)$$
$$dLFP(t_2)/LFP(t_2) = Ns(t_2–T)/B + C \quad (8)$$

where Ns(t) is the (formally defined) specific age population, as obtained using A_2 instead of A; B and C are empirical constants. Equation (7) defines the evolution of some specific age population, which is different from actual one. The discrete form is useful for calculations.

Figure 4 depicts the observed and predicted relative change rate of the LFP. The latter is obtained from (7) and (8) with the following constants and coefficients: Ns(1959)=4.5E+6, A_3=\$350, B_3=–1.23E+8, C_3=0.04225. Notice that coefficient A_2 is smaller than A=\$398 in (2). Due to high volatility of the original dLFP/LFP time series we compare the predicted series to MA(5) of the observed one. The goodness–of–fit is high: R^2=0.73.

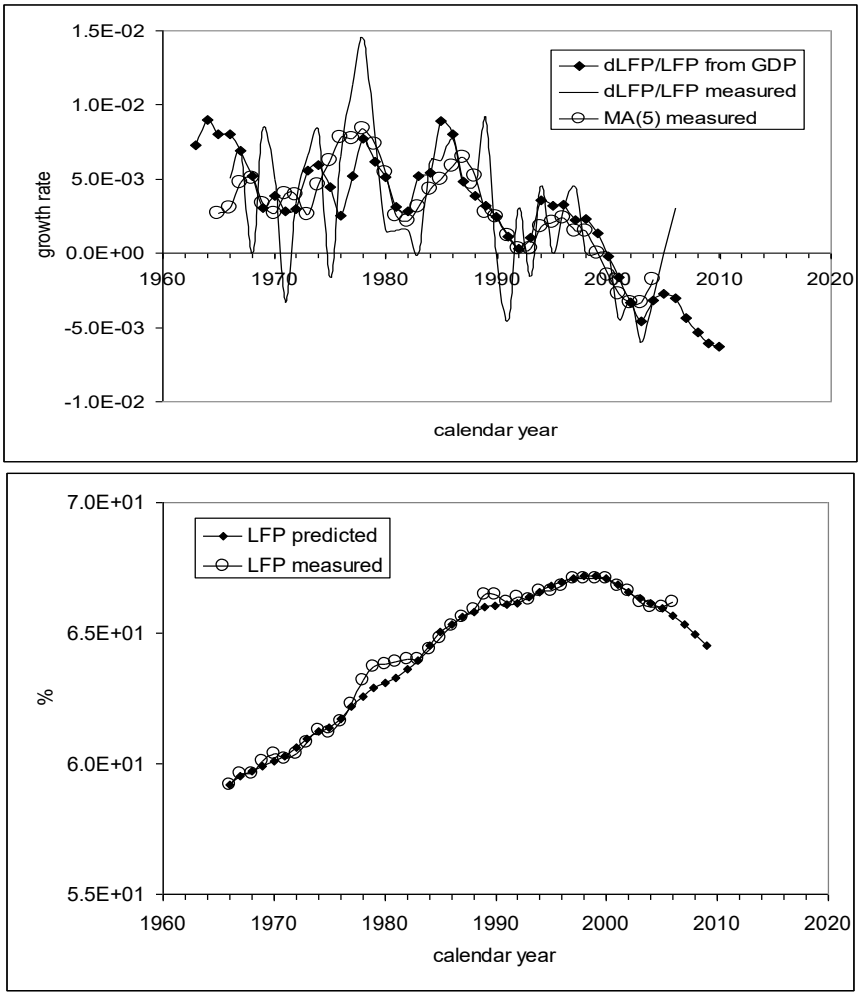


Figure 4. Upper panel: observed and predicted growth rate of LFP in the U.S. The predicted curve is obtained from real GDP per capita using (5) and (6) with Ns(1959)=4.5E+6, A_2=\$350 (2002–dollars), B=–1.23E+8, C=0.04225. Linear regression gives R^2=0.73.

Lower panel: measured and predicted LFP for the growth rates in the upper panel. The LFP has been decreasing after 2000.

Labor force participation rate determines the level of labor force, LF, in an economy with a given population:

$$LF(t) = LFP(t)N(t) \qquad (9)$$

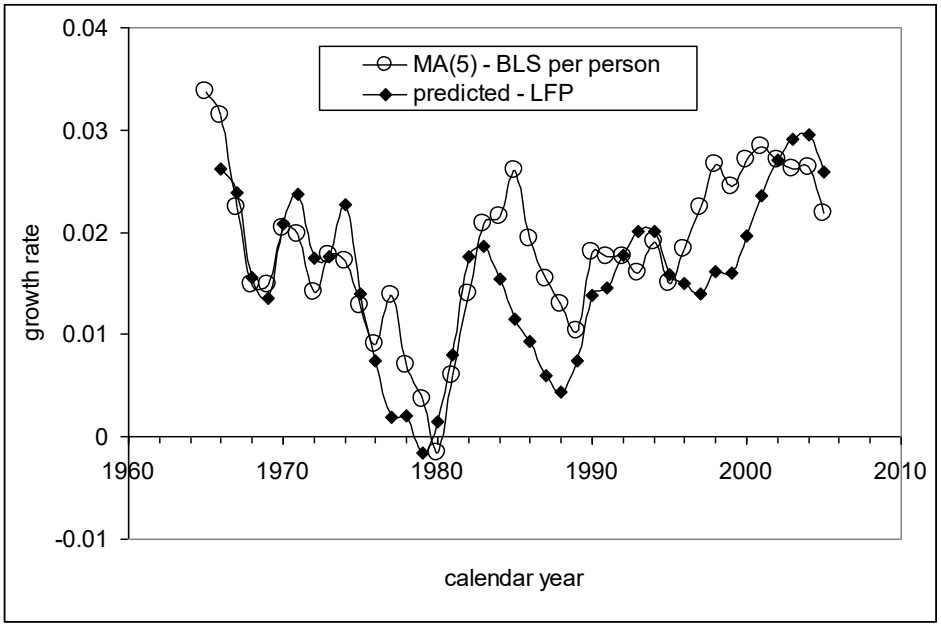
By definition, the level of employment, E(t), is the difference between labor force and the number of unemployed, E(t) = LF(t) – UE(t)*LF(t). The link between unemployment, EU, and labor force is described in Section 4.

4. Labor productivity

Labor productivity, P, can be represented as a function of LFP and G, P~G·N/N·LFP = G/LFP. From (4), it follows that P is a function of G only. Therefore, the growth rate of labor productivity can be presented in the same way as labor force participation. Since the change in productivity is synchronized with G and labor force participation, the first useful equation mimics (4):

$$dP(t)/P(t) = \{B_3 dLFP(t)/LFP(t) + C_3\} \cdot \exp\{ \alpha_3 [LFP(t) - LFP(t_0)]/LFP(t_0)\} \qquad (10)$$

Figure 5 depicts two curves reported by the BLS and those predicted with B_3=–5.0, C_3=0.040, and α_3=5.0; and B_3=–3.5, C_3=0.042, and α_3=3.8, respectively. Due to volatility in the original productivity and labor force (time derivative) series we replace them with their MA(5). A five–year time interval provides an increased resolution and allows smoothing measurement noise. As expected, coefficient B_3 is negative implying a decline in productivity with increasing labor supply. The goodness–of–fit for both observed time series is about (R^2=) 0.6. Moreover, principal features (troughs and peaks) of the observed series are similar in the predicted series, with slight time shifts, however.



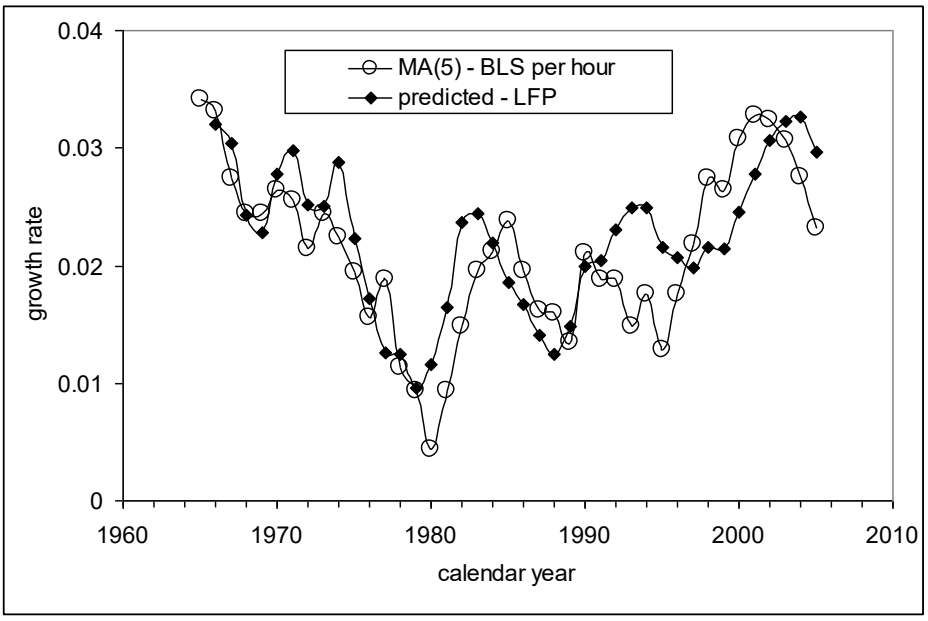


Figure 5. Observed and predicted growth rate of labor productivity. Two BLS measures of productivity are presented: upper panel – output ($) per person; lower panel – output ($) per hour. Linear regression gives close results – R^2=0.6 in both cases.

Another equation defines dP/P as a nonlinear function of G:

$$Ns(t_2) = Ns(t_1)\cdot\{ 2[dG(t_2–T)/G(t_2–T) – A_4/G(t_2–T)] + 1\} \quad (11)$$

$$dP(t_2)/P(t_2) = N(t_2–T)/B_4 + C_4 \quad (12)$$

where A_4, B_4, and C_4 are (country–specific) empirical constants.

Some results of productivity modeling by (11) and (12) are presented in Figure 6. (Model parameters are given in Figure captions.) Overall, 60% of variability in the observed curve is explained by the predicted one – same as explained by G itself. Timing of main turns in the curves is excellent. This is an expected effect, however, because productivity is essentially the same class variable as real GDP per capita. An important feature to predict is amplitude, as Figure 6 indicates – the productivity is not a scaled version of the real GDP per capita. So, the success of our model is related to a good prediction of the LFP.

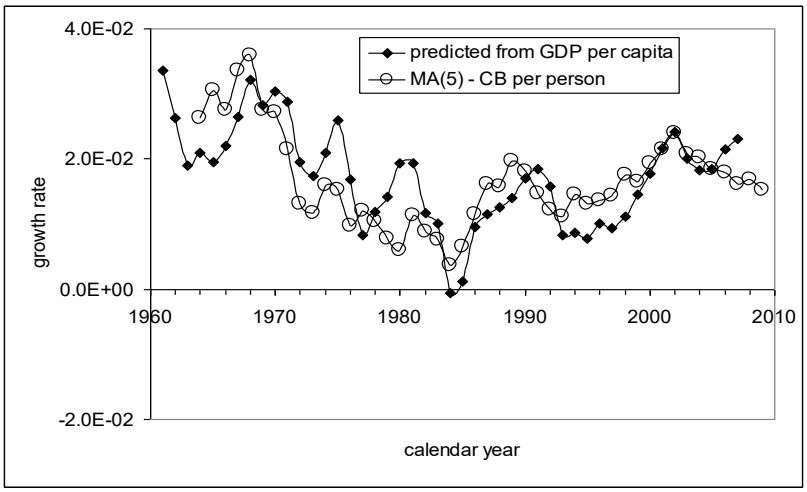


Figure 6. Observed and predicted change rate of productivity (Conference Board –GDP per person employed). The observed curve is represented by MA(5) of the original one. Linear regression gives R^2=0.6. Model parameters are as follows: Ns(1959)=4500000, A_4=$420 (2002–dollars), B_4=3500000, C_4=–0.095.

As a validation of our model, we predicted the evolution of productivity for other developed countries using relevant GDP per capita data [Kitov, Kitov, Dolinskaya, (2007)]. Figure 7 presents predicted and measured productivity in Canada. Overall, this is the best example we have obtained.

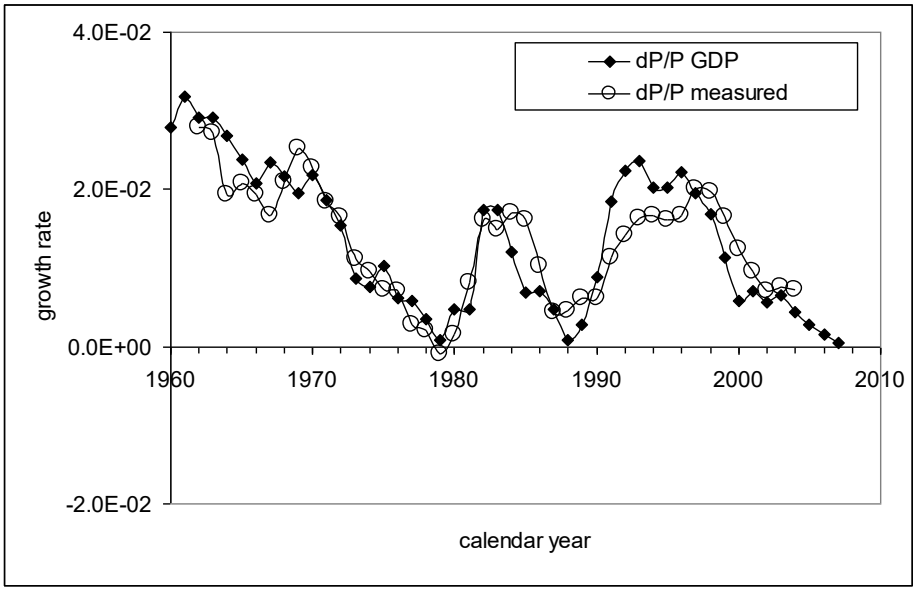


Figure 7. Observed and predicted productivity in Canada: Ns(1959)=270000, A_4=\$300 (1990 US dollars) , B_4=–3200000, C_4=0.108. R^2=0.8.

Productivity is a secondary (dependent) economic variable. The growth of real GDP per capita above or below its potential rate is transferred one–to–one in relevant changes in labor force participation and, thus, in employment and productivity. Since real economic growth depends only on the evolution of specific age population, one must control demographic processes in order to control productivity and stable economic growth.

One may also conclude that all attempts to place labor productivity in the center of conventional theories of real economic growth are practically worthless. Productivity is not an independent variable, which can be influenced and controlled by any means except demography.

5. Inflation and unemployment

According to our model [Kitov, (2006b), Kitov, (2006c)], inflation and unemployment are linear and lagged functions of labor force change as expressed by the following equations:

$$\pi(t)=a_1 dLF(t-t_1)/LF(t-T_1)+a_2 \quad (13)$$

$$UE(t)=b_1 dLF(t-t_2)/LF(t-T_2)+b_2 \quad (14)$$

where $\pi(t)$ is the inflation rate at time t, UE(t) is the unemployment rate at time t, LF(t) is the level of labor force, T_1 and T_2 are the time lags between the inflation, unemployment and the labor force, respectively; a_1, b_1, a_2, and b_2 are country–dependent empirical coefficients. In Section 2, the level of labor force is wholly defined by Eq. (9) as a lagged function of real GDP per capita.

Linear Eqs. (13) and (14) define inflation and unemployment separately as functions of labor force change. These two variables are indivisible sides of a unique process, however. The process is the labor force growth, which is accommodated in developed economies though two channels. (We always stress that these relationships are valid only for large developed economics implying that small developed, developing and emerging economies might be characterized by different links.) The first channel is the change in employment and relevant reaction of PID. All persons obtaining new paid jobs or their equivalents presumably change their incomes to some higher levels. There is a reliable empirical fact, however, that PID in the US has not been changing over time in relative terms [Kitov, (2007)].

The increasing number of people at higher income levels, as related to the new paid jobs, leads to a certain disturbance in the PID. This over–concentration must be compensated by such an extension in

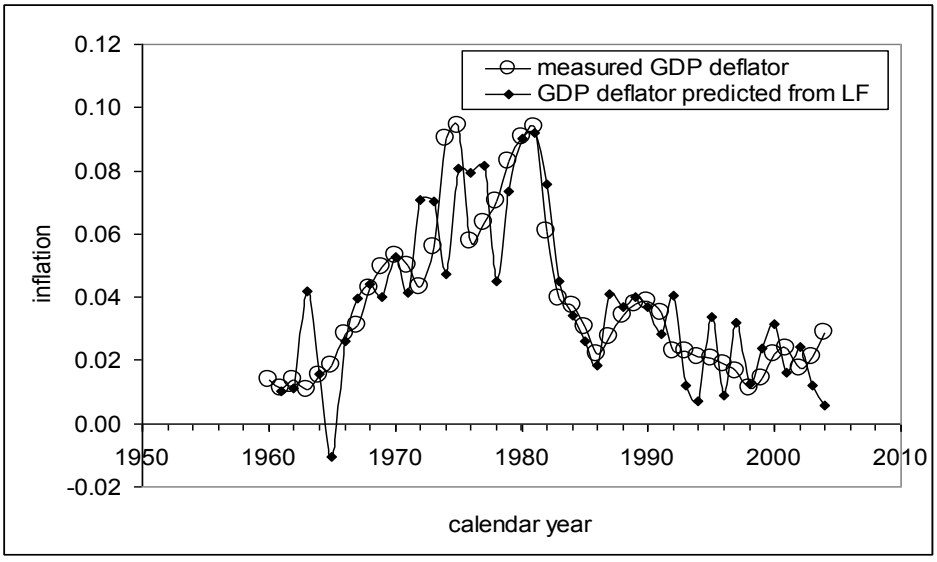
the income scale, which returns the PID to its original density. In other words, the economy demands an injection of some amount of money extra to that defined by real economic growth in order to recover the PID. As a result, prices in the economy grow at an elevated rate, i.e. are prone to inflation. This process is accompanied by corresponding stretch in the PID income scale. The mechanism responsible for the compensation and the scale stretching has some relaxation time, which effectively separates in time the source of inflation, i.e. the labor force change, and the reaction, i.e. price inflation.

The second channel is related to those who failed to obtain a new paid job, i.e. to enter employment. These people do not leave the labor force but join unemployment. Effectively, they do not change the PID because they do not change their incomes. So, the total labor force change (wholly defined by G) equals the unemployment change plus employment change. In the case of "normal" behavior of an economic system, the proportion between unemployment and inflation is retained through time and both linear relationships hold separately. There is always a possibility, however, to fix one of the two variables. For example, central banks are able to fix inflation by some monetary means. Such violations of the natural behavior will undoubtedly distort the partition of the labor force change – the portion previously accommodated by inflation will be redirected to unemployment, and vice versa. To account for this effect one should use a generalized equation as represented by the sum of Eqs. (13) and (14):

$$\pi(t) + UE(t) = a_1 dLF(t-T_1)/LF(t-T_1) + b_1 dLF(t-T_2)/LF(t-T_2) + a_2 + b_2 \qquad (15)$$

Equation (15) balances labor force change, inflation and unemployment, the latter two variables potentially lagging by different times behind the labor force change. The importance of this generalized equation is demonstrated by [Kitov, (2007)] for the case of France before and after joining the European Monetary Union.

For the US, there is no need (so far) to apply Eq. (15). The changing monetary policy of the Federal Reserve has not affected the natural partition of labor force change, as has been observed since the late 1950s. Therefore, Eq. (13) with a_1=4, a_2=–0.03, T_1=2 years (GDP deflator as a measure of inflation) provides the best fit between observed and predicted inflation, as presented in Figure 8 and 9 for annual and cumulative values. The best fit of the cumulative curves provides an accurate procedure for the estimation of the coefficients.



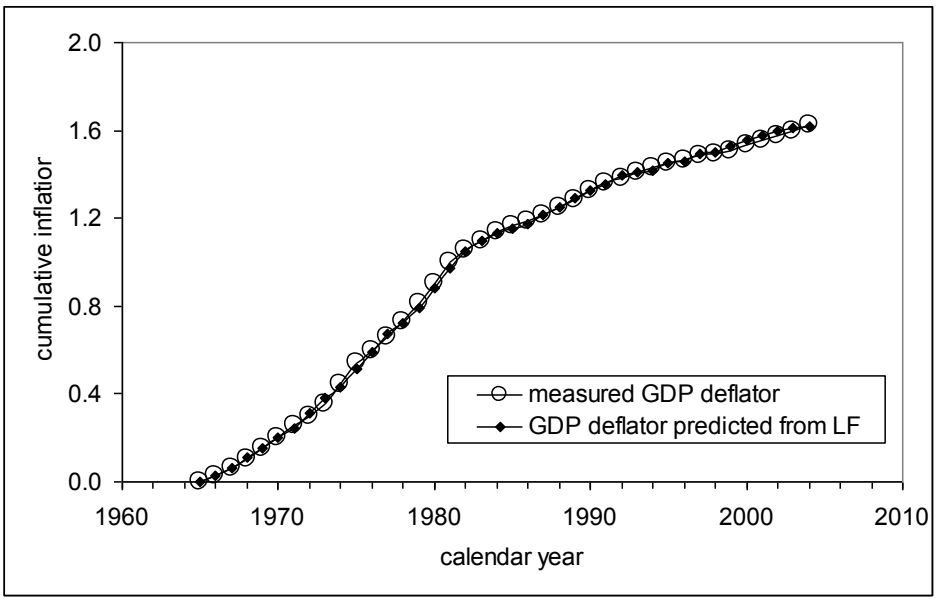


Figure 8. Observed and predicted inflation (GDP deflator). The predicted values are obtained using Eq. (13) with a_1=4.0, a_2= –0.3, and T_1=2 years. The upper panel compares annual readings and the lower one – cumulative values.

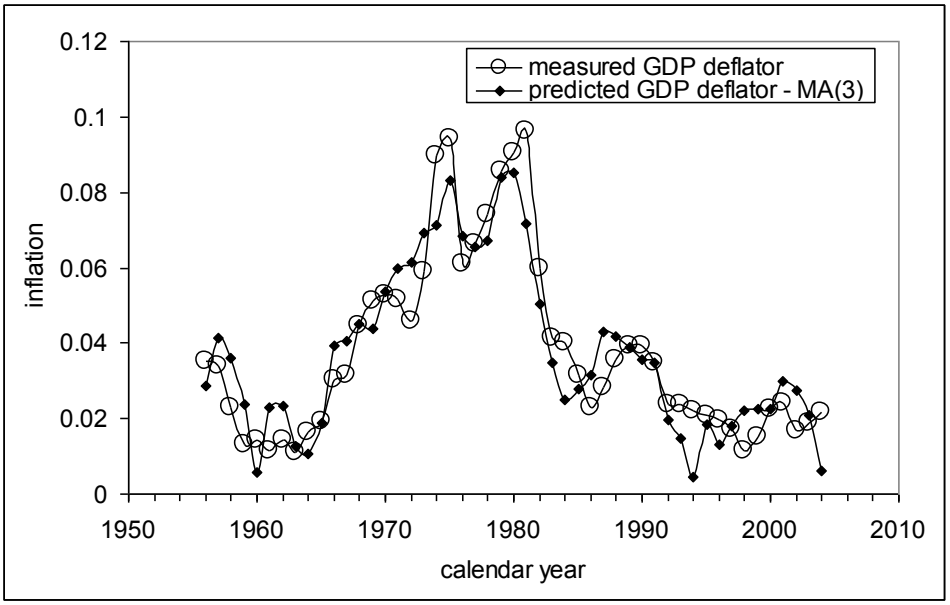


Figure 9. Measured and predicted inflation, The latter is represented by MA(3). Linear regression is characterized by R^2=0.88 and Standard Error of 0.0057, i.e. RMSFE is only 0.6% at a 1 year horizon.

Negative constant a_2 makes some permanent increase in labor force of great importance for avoiding deflationary periods. Population growth rate of 0.01 to 0.015 per year, as has been observed in the US during the last twenty years, completely compensates the effects of negative term a_2. With the boomers' retirement, however, the growth rate of labor force started to decelerate in 2005.

One can describe inflation in the US with an uncertainty controlled by the accuracy of labor force estimates. Thus, a direct way to improve the predictive power of the inflation/labor force relationship is available. Only some simple arrangements are necessary. Moreover, one can easily introduce a target value for the inflation uncertainty and link it to the resources available and needed.

In our model, inflation forecasting is equivalent to the inflation regression against the change rate of labor force. In forecasting practice, the root mean square forecast error (RMSFE) is a standard measure of uncertainty. This term indicates that forecasted values of inflation are obtained in the

framework of out–of–sample approach, i.e. using only past values of predictors. The best prediction obtained with our model for the period between 1960 and 2005 for the annual readings gives RMSFE of 0.008 (0.8%). This value is lower than any RMSFE at a two–year horizon we were able to find in literature for the same or comparable period.

Unemployment in the U.S. has been also predicted as a linear lagged function of the labor force change and is as follows: UE(t)=0.023+2.1*dLF(t–5)/LF(t–5). The lag of the observed unemployment behind the change in labor fore is five years – the value obtained by simple visual fit of the smoothed curves as presented in Figure 10. Due to high volatility associated with measurement errors, there is some discrepancy between the two curves in Figure 10, however. Figure 11 displays the same curves smoothed with MA(7) for the period between 1960 and 2004. The predicted curve almost coincides with the observed one during the last 35 years and provides a prediction for the next five years.

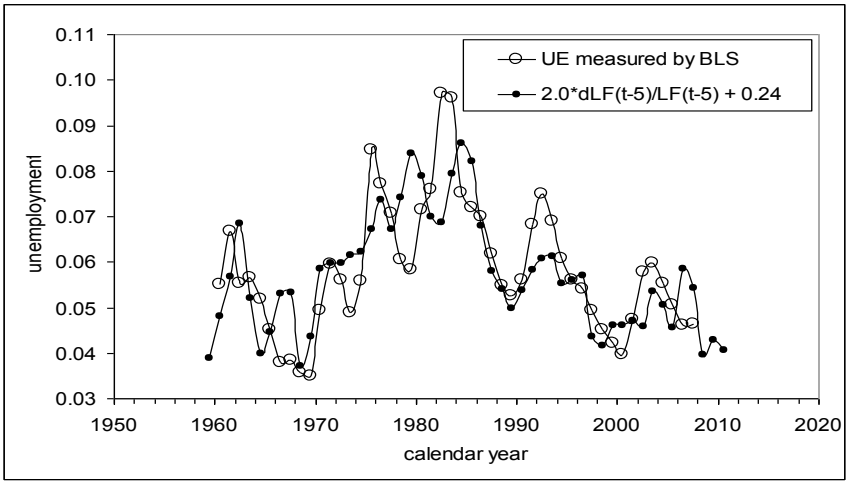


Figure 10. Observed and predicted unemployment rate. The latter is obtained from the estimates of the labor force in the US between 1960 and 2006. The 5–year lag of the unemployment behind the labor force allows a prediction of unemployment up to 2011. Notice a local peak in the predicted curve near 2008.

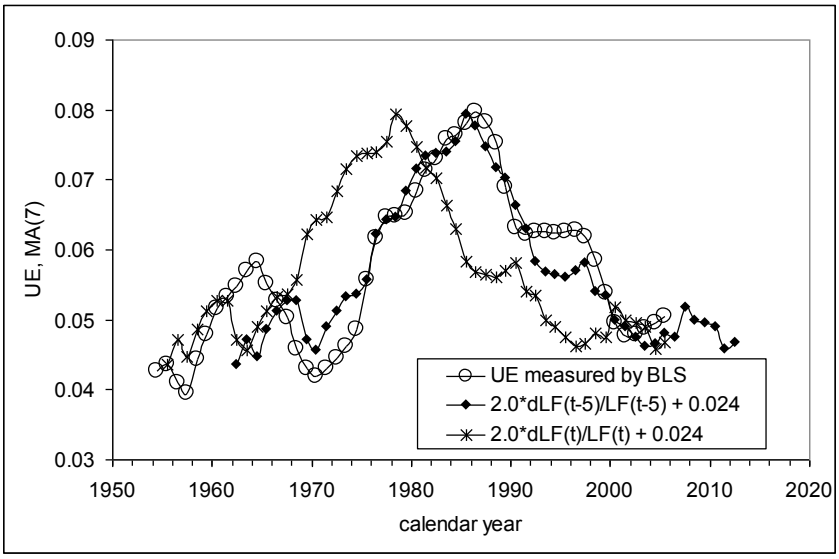


Figure 11. Predicted and observed unemployment rate smoothed by MA(7). The original predicted curve and that shifted by five years back are presented in order to illustrate synchronization process and the lag estimation.

Figure 12 presents a prediction for the unemployment according to (15), i.e. based on the labor force change and inflation. The following empirical version is obtained: UE(t) = π(t–3) – 2.5dLF(t–5)/LF(t–5) + 0.0585. The lags are three years for inflation and five years for labor force change. Figure 13 depicts corresponding MA(7) smoothed curves used to estimate corresponding coefficients.

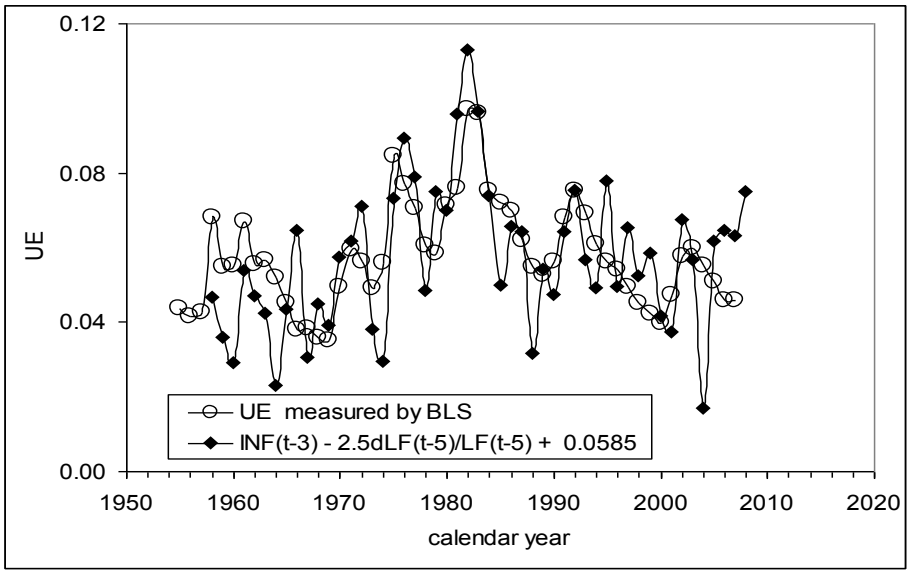


Figure 12. Unemployment measured by the BLS and that predicted as a lagged linear function of labor force change rate (dLF/LF) and inflation (INF) represented by GDP deflator:
$UE(t) = \pi(t-3) - 2.5dLF(t-5)/LF(t-5) + 0.0585$.

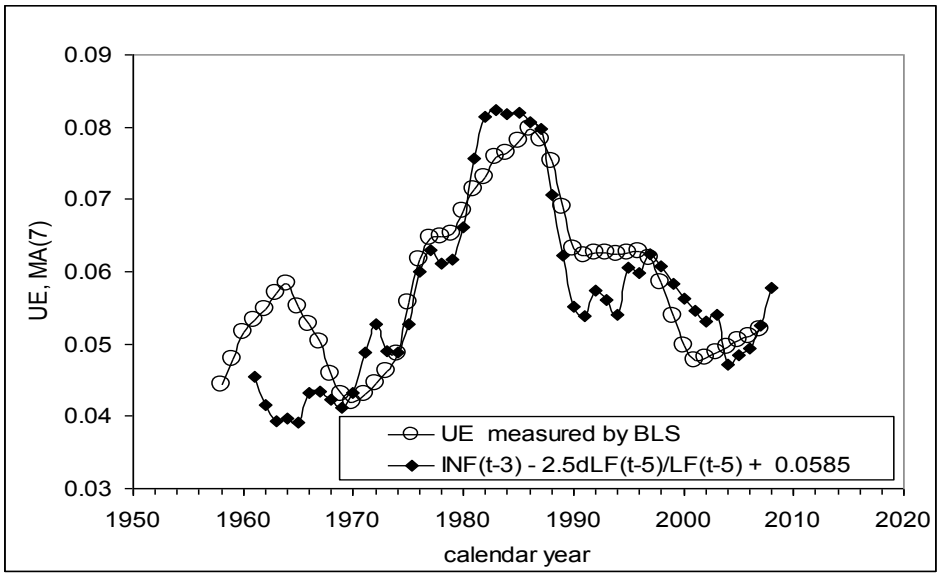


Figure 13. Same as in Figure 12, but smoothed by MA(7). There are some weak deviations (approximately 0.5 %) between the smoothed curves in the 1990s and the beginning of the 2000s.

6. Conclusion

In the US, the change in the specific age population drives such macroeconomic variables as real economic growth, labor force participation rate, productivity, inflation, and unemployment according to Eqs. (1) through (15). These equations represent a comprehensive macro–model of the U.S. economy, i.e. its reaction to exogenous (demographic) forces and the interaction between principal macro–variables.

This conclusion is supported by corresponding tests for the presence of cointegrating relations and other statistical estimates [Kitov, Kitov, Dolinskaya, (2007); Kitov, Kitov, Dolinskaya, (2007); Kitov, Kitov, Dolinskaya, (2007)]. Moreover, our concept provides reliable relationships for the prediction of the studied macroeconomic variables at very large (more than 9 years) time horizons.

There were several relationships between main macroeconomic variables revealed in our study. These equations have been valid during the last several decades. (It should be notice here that one cannot extend these relationships further in the past due to the absence of reliable demographic and economic data before 1960.) The relationships reflect inherent links between people, which had been established

in the US economy as a result of economic and social evolution. There was time, however, when these relationships were not valid. Also, it is possible that they will fail some time in the future due to the development of some new links. Therefore, we consider current macro–state of the US economy as a temporary and transient one. In addition, the macroeconomic predictions we have given in the study are prone to corrections, as related to changes in monetary policy (shift in inflation/unemployment balance) and various demographic processes including fluctuations in immigration.

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FINANCIAL INTEGRATION AND FINANCIAL DEEPENING IN THE SELECTED EUROPEAN TRANSITION ECONOMIES

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Abstract:

International financial integration of transition countries from the region of Central, Eastern and South–Eastern Europe suggests an interesting example of the relation between the overall macroeconomic performance and the changes in the height as well as the structure of the cross–border capital inflows and outflows. Structural changes, high economic growth and dynamic convergence toward the Western European countries stimulated the pressures on the domestic capital base of the transition countries. Current account and international investment position deficits that many of the European transition countries have experienced till the present days emphasize their role on the foreign markets as net debtors.

In the paper we examine main trends in the international financial integration of the selected European transition economies (Bulgaria, the Czech republic, Romania and the Slovak republic). At the same time we explore the essential features of the financial deepening of the selected group of the countries. The objective is to identify the country specific aspects in the international financial integration and financial deepening as well as the potential linkage between them.

Keywords: financial integration, financial deepening, external capital portfolio structure, transition economies

JEL Classification: F15, F36, F41

1. Introduction

International financial integration of the European transition economies became the most significant outcome of capital flows liberalization process that past central planning economies have started since the second half of the 1990s. The decision to allow the cross–border allocation of capital assets and liabilities resulted from the ability of the transition countries to sustain negative balance of payments and exchange rate pressures. Initial low domestic capital base together with usually higher domestic interest rates stimulated significant foreign capital inflows to such a degree that many European transition countries rapidly became net international debtors [Lane, Milesi, and Ferretti, (2006)]. In addition to this obvious trend, the changes in the external capital portfolio structure reflected the progress in the domestic economic and institutional reforms, increasing the reliance of foreign investors to allocate more direct and portfolio equity investments in those countries.

Among the other significant aspects that became at least as important as continuously increasing international financial integration we emphasize the progress in the financial sector development and the financial deepening in the European transition countries [Buiter, and Taci, (2003)]. Of course, institutional aspects, heritage from the central planning period and transitional rigidities has fundamentally affected the overall progress as well as durability of partial steps shaping the individual features of the financial sector development and the financial deepening in each particular country. Hence we assume the financial sector development in the European transition countries became even more complicated and country specific when comparing with the financial integration process.

It is not clear how to estimate general linkage and relationship between **a.** the financial sector development and the financial deepening and **b.** the international financial integration. For example Eichengreen (1997) suggests that the financial integration leads to the financial deepening (to more active, liquid and efficient domestic financial markets), and that the financial deepening encourages higher investments, faster growth and more rapidly rising living standards. The linkage between the financial integration and the financial deepening is evident from the fact that countries facing relatively large capital inflows have seen disproportionate growth in the volume of transactions on their stock markets, disproportionate growth in stock market capitalization, and disproportionate growth in bank loans to the private sector.

Rousseau and Wachtel (2007) emphasizes that in order to get benefits from the financial deepening associated with the foreign capital inflows the country should liberalize capital account transactions only when the legal and regulatory institutions were successfully well developed.

Hasan, Wachtel and Zhou (2007) argue that the financial deepening and the international financial integration is not necessary accompanied only with the positive influence on the domestic transition economy (i.e. economic growth) and the overall effect is largely determined by the financial deepening features and the structure of the foreign capital inflows. While the capital market depth has usually a strong influence on the growth the bank credits may have non–significant or sometimes even negative impact on the growth. At the same time the equity and debt capital inflows have obviously positive influence on the economic growth.

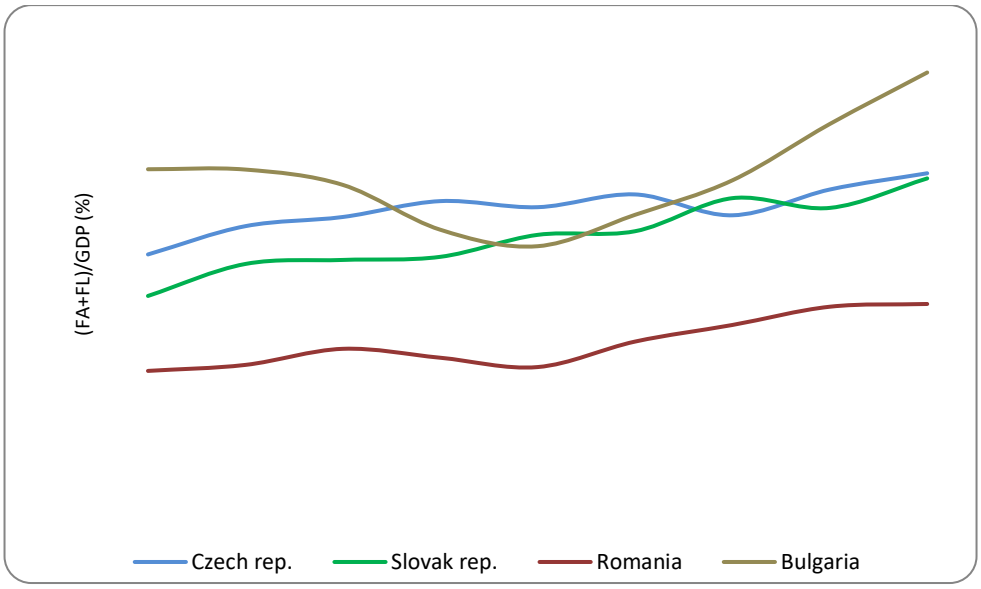
Mohan (2006) assumes that the financial deepening has usually overall positive macroeconomic outcomes, but on the microeconomic level it is rather questionable, whether such performance incentives also extend to small and medium enterprises. He also emphasizes that it is rather inconclusive, whether intensified financial intermediation usually coupled with the financial deepening also includes small and medium enterprises. On the other hand the international financial integration is usually coupled with broad set of the microeconomic collateral benefits, i.e. increased quality of institutions and the corporate governance.

In the paper we analyze the main aspects of the international financial integration and the financial deepening of Bulgaria, the Czech republic, Romania and the Slovak republic in the period 1999–2007. The starting point of the period we have selected in order to eliminate the influence of the country specific determinants that could negatively affect the process of the international financial integration and the financial deepening in all selected countries related to the phase of the macroeconomic stabilization. The objective of the analysis is to emphasize the main trends and find similar and different features in the international financial integration and the financial deepening in the selected group of the transition economies that reflect different economic performance of the countries. In the analysis we consider the development of external financial openness and net external financial position of the selected countries in order to highlight the main implications of the transition process as well as the process of the convergence to the Western European countries. We also observe the development of the external financial liabilities and assets portfolio to decompose the foreign capital inflows and outflows of the selected countries. The main features in the financial deepening of Bulgaria, the Czech republic, Romania and the Slovak republic we observe by the analysis of overall credits, deposits, money supply and interest rates development.

2. Financial integration in the selected European transition economies

Macroeconomic stabilization followed by the initial shock from the transition to market based economic environment became one of the most challenging objective for the countries from the region of Central, Eastern and South–Eastern Europe. International competition together with an increasing trade and a financial openness of the European transition economies has fully uncovered their role in the foreign markets (net debtors). Internal structural changes conditionally related to the international competitiveness of the transition countries have generally stimulated the pressure on the sources of domestic capital base formation.

Capital flows liberalization together with the macroeconomic stabilization were the first and the most crucial assumptions for the increasing international financial integration of the European transition countries. At the same time it is important to emphasize that restrictions on the international financial transactions were not removed by the governments immediately so that this fact has significantly determined the initial structure of the foreign capital inflows to the European transition countries [Edison *et al*., (2002)].



Source: Authors calculations based on [Bulgarian National Bank, (1999 – 2007); Czech National Bank, (1999 - 2007); International Monetary Fund, (2008); National Bank of Romania, (1999 – 2007); National Bank of Slovakia, (1999 – 2007)].

Note: FA – foreign assets, FL – foreign liabilities.

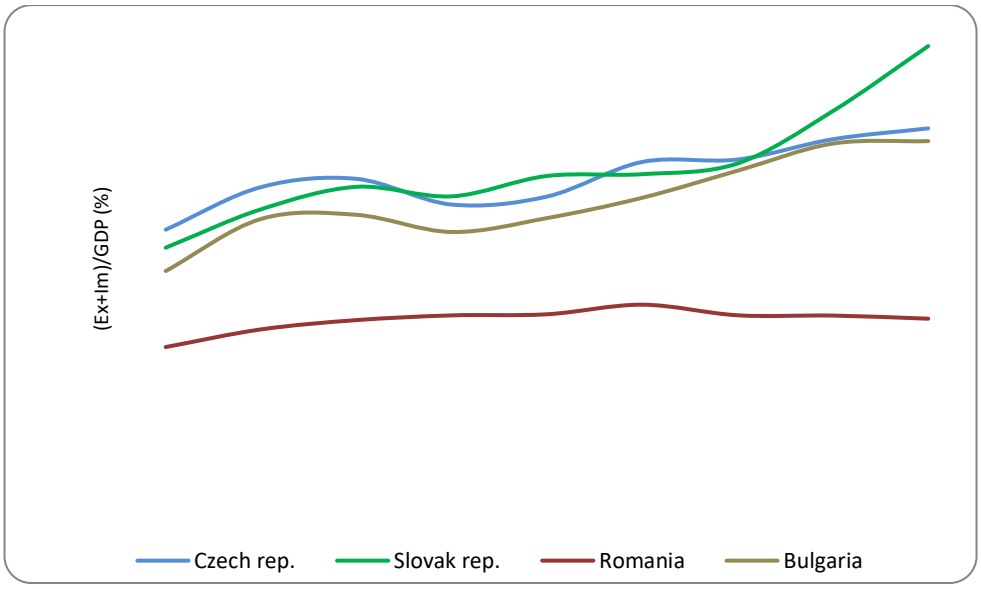
Figure 1. International Financial Integration, 1999–2007

Figure 1 explores the overall development of the international financial integration in the Czech republic, Bulgaria, Romania and the Slovak republic. All countries, except Bulgaria, have experienced the long trend of an increased share of the foreign financial assets and foreign financial liabilities in the GDP through the most of the period 1999–2007. Tendency to the "external financial depth" increase was obvious in spite of the strong economic growth that all countries have experienced since 2001. Initial negative trend in the international financial integration of Bulgaria (period 2001–2003) was the result of high economic growth (almost 5 percent on average in the period 2000–2003) combined with the decrease of both foreign assets and foreign liabilities. In the period 2002–2003 it was partially the result of the government official debt rescheduling[1] in the period 2002–2003. As a result the total foreign financial assets of the domestic banks have decreased while the domestic financial assets (especially government securities) of the domestic banks have increased. Continuously increasing international financial integration of the Czech republic, Romania and the Slovak republic through the whole period and of the Bulgaria since 2004 onward has allowed the transition countries to effectively share the risk with the foreign partners and gain effects from the technology sharing. It had also positive influence on the domestic financial systems functionality through the increased availability of the financial resources.

International financial integration measured as a share of financial assets and financial liabilities in the GDP also reflects the overall financial openness of the economy. All countries from the group except Romania are typical examples of small open transition economies.

Relatively high openness of Bulgaria, the Czech republic and the Slovak republic also demonstrates the overall trade openness. While the financial integration allows the country to increase the availability of the financial resources and to share the risk among the countries, trade integration is stimulated by the international division of the labour based especially on the competitive advantage.

[1] Government actions have induced the decreased involvement of the foreign investors in financing the country's official debt.



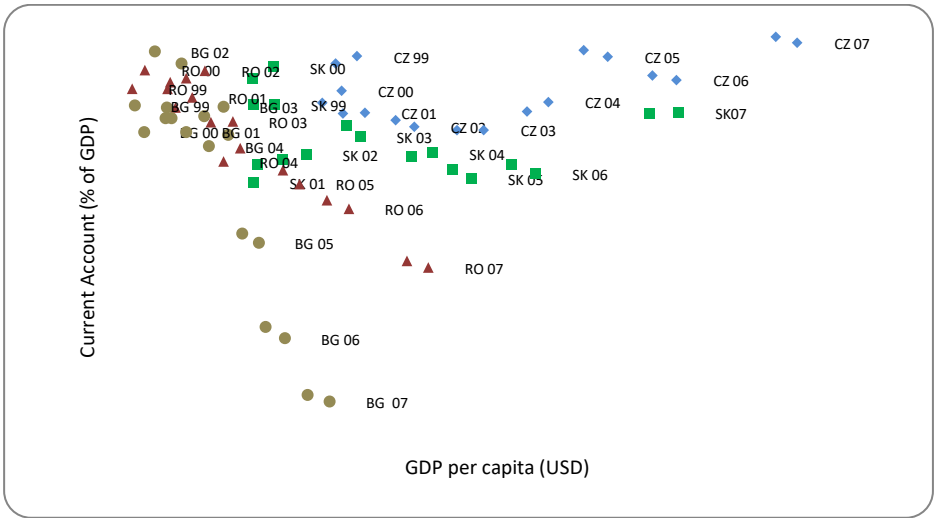
Source: Authors calculations based on [Bulgarian National Bank, (1999 – 2007); Czech National Bank, (1999 - 2007); International Monetary Fund, (2008); National Bank of Romania, (1999 – 2007); National Bank of Slovakia, (1999 – 2007)].

Note: Ex – export of goods, Im – Import of goods.

Figure 2 International Trade Integration, 1999–2007

Figure 2 explores the overall development of the international trade integration in the Bulgaria, Czech republic, Romania and the Slovak republic. Here again we see that overall trade openness of Romania was lower than in the remaining countries. We suggest that the international financial integration and the international trade integration represent two simultaneous processes stimulated by the relatively different determinants while reflecting an increase in the overall openness of the national economy. Intensity of the trade integration has lagged behind the financial integration only by a negligible percentage in all four countries through the whole period.

Overall situation that emphasizes the role of the selected group of the European transition economies in the international trade integration indicates the current account development. This indicator directly reflects the international competitiveness of the transition countries on the foreign good markets.

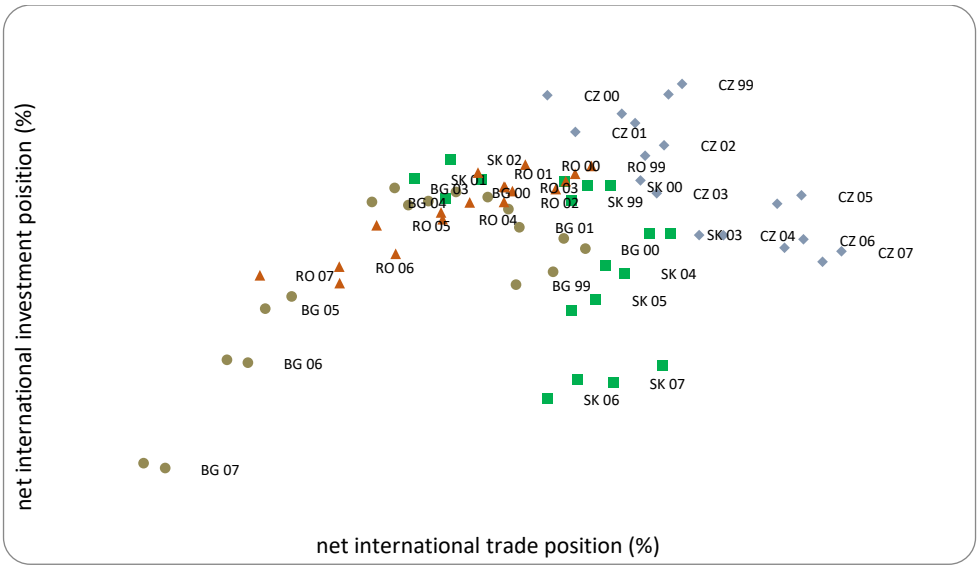


Source: Authors calculations based on [Bulgarian National Bank, (1999 – 2007); Czech National Bank, (1999 - 2007); International Monetary Fund, (2008); National Bank of Romania, (1999 – 2007); National Bank of Slovakia, (1999 – 2007)].

Figure 3 GDP per capita and Current Account, 1999–2007

From the Figure 3 we may observe rather different implications of the international trade integration for two pairs of the transition countries. In the Czech republic and the Slovak republic an increasing macroeconomic performance was coupled with the relatively stable and at the end of the period even decreasing share of current account deficit in the GDP reflecting a rise in the their international competitiveness in the process of convergence toward the Western European countries. Positive current account development tendency is of a significant importance especially if we take into account a trend of a nominal exchange rate appreciation through more than a half of the selected period. On the other hand the situation in the current account development is much different in Bulgaria and Romania. Both countries face a rapid deepening of a current account deficit and the situation is not sustainable in the medium period. We consider that this negative trend is the price for the high exchange rate stability stipulated by the central banks of Bulgaria (currency board with the exchange rate as the nominal anchor) and Romania[2] (managed floating with EUR as the reference currency) together with the progressive decrease of competitiveness on the foreign markets.

Net international investment position in the selected group of the countries partially reflects the trends in the current account development (proxied by the net international trade position).



Source: Authors calculations based on [Bulgarian National Bank, (1999 – 2007); Czech National Bank, (1999 - 2007); International Monetary Fund, (2008); National Bank of Romania, (1999 – 2007); National Bank of Slovakia, (1999 – 2007)].

Note: Net international investment position = (FA – FL)/GDP

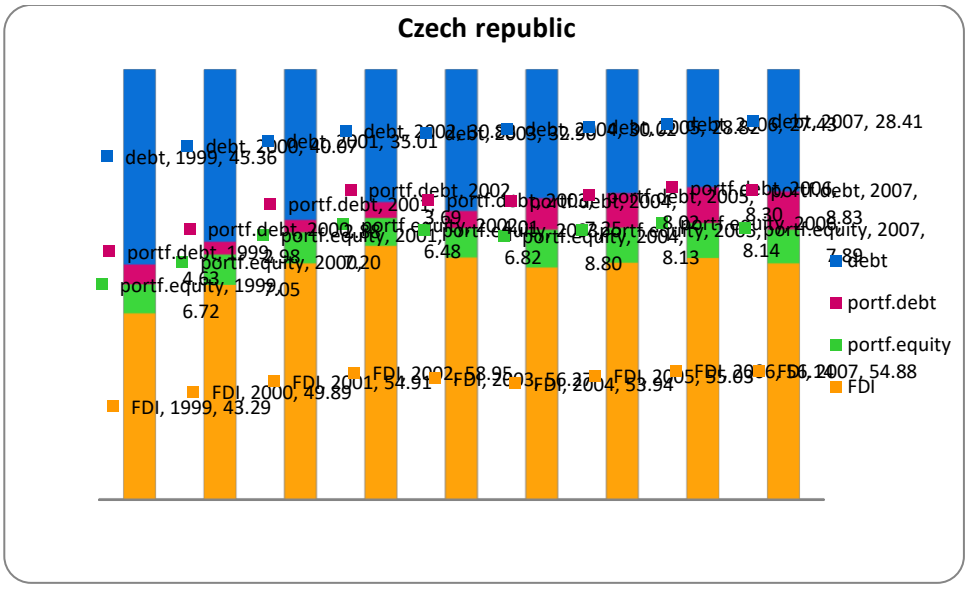
Net international trade position = (Ex – IM)/GDP

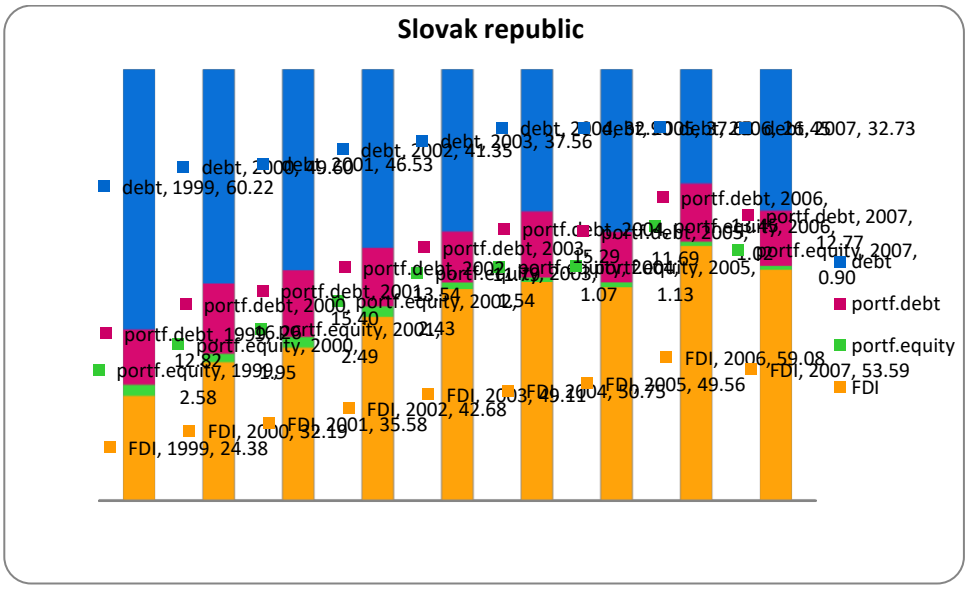
Figure 4 Net International Trade and Investment position, 1999–2007

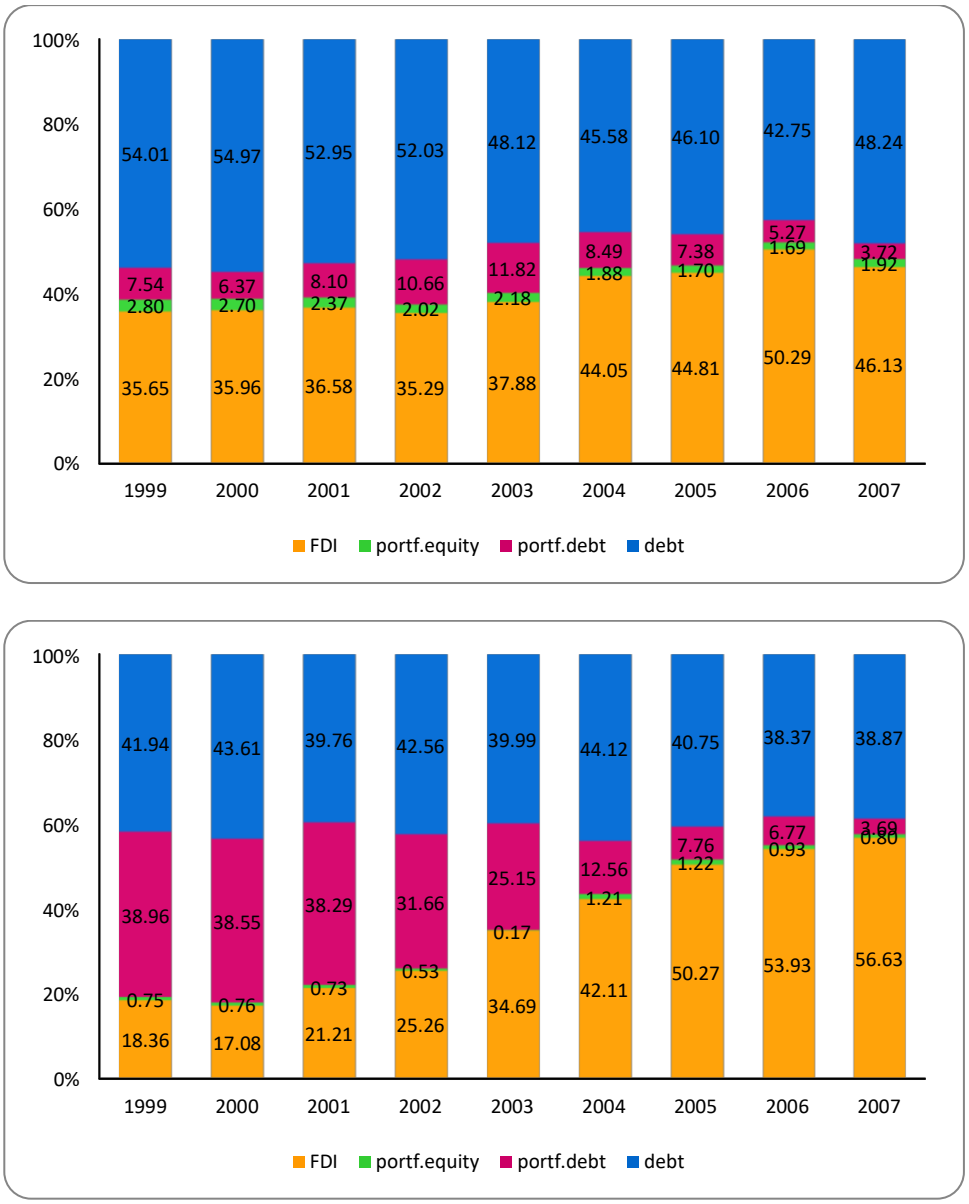
Negative development of the net international trade position in Bulgaria and Romania was coupled with an increasing deficit in the international investment position shown in the Figure 4 especially as the result of faster increase in the foreign liabilities in comparison with the foreign assets. In both countries the negative trend in the international investment position development was stimulated by the huge foreign direct investments (FDI) inflows (especially since 2004). We expect FDI inflows would help both countries to raise the international competitiveness of their domestic production on the foreign markets so that corresponding increase in the export performance would help Bulgaria and Romania to eliminate the negative trend in the current account development in the near future (assumption is based on the example of the FDI effects in the Slovak republic). Among the most important challenges for all four countries we consider the ability to decrease the share of debt capital inflows and to stimulate FDI of domestic private enterprises abroad.

[2] Since July 2007 till December 2007 the exchange rate of RON has depreciated at around 11 percent partially reflecting the risks resulting from the current account development.

In order to analyze country specific features of the international financial integration of the selected group of the transition countries we have observe the detailed structure of the external capital portfolio in the period 1999–2007.







Source: Authors calculations based on [Bulgarian National Bank, (1999 – 2007); Czech National Bank, (1999 - 2007); International Monetary Fund, (2008); National Bank of Romania, (1999 – 2007); National Bank of Slovakia, (1999 – 2007)].

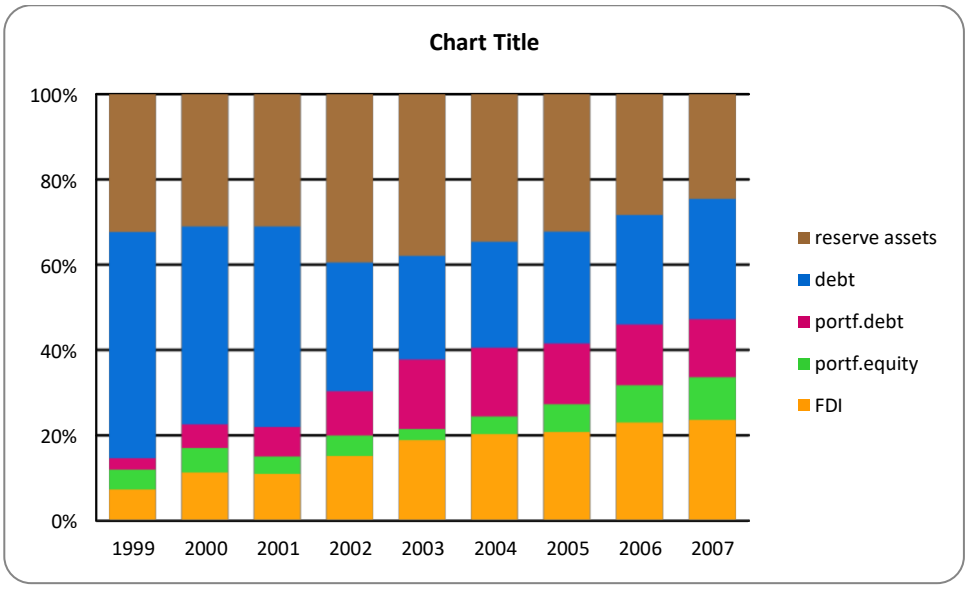
Figure 5 External Financial Liabilities Portfolio Structure, 1999–2007

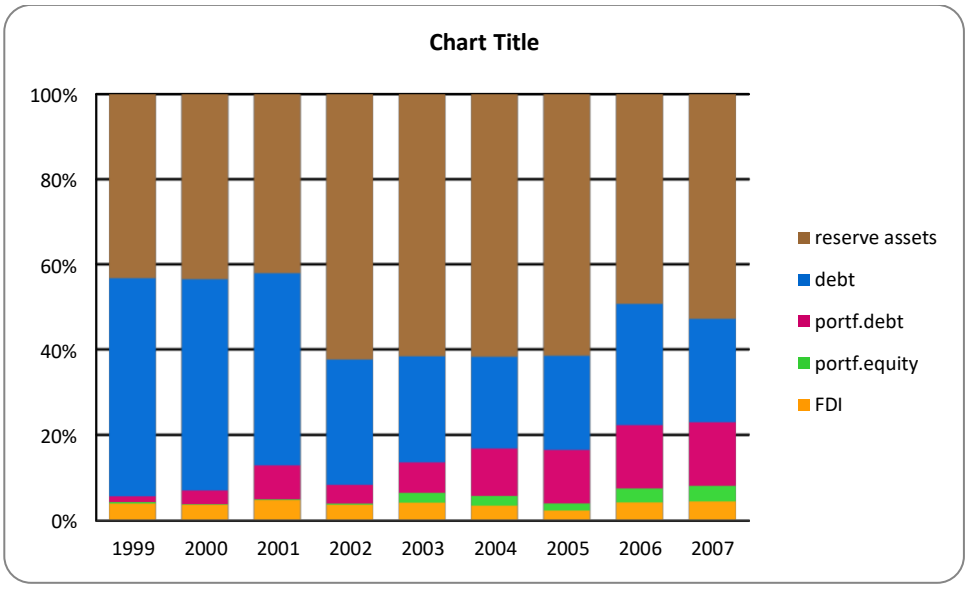
In spite of the relatively different net international investment position of each individual country it is clear to identify the common trend in the external liabilities portfolio development in the whole group of the countries. In all countries the relative importance of the debt capital inflows has been decreasing (Figure 5) while the share of FDI inflows has been increasing through the whole period 1999–2007 indicating an increased interest of foreign investors to allocate the real investments in profitable domestic industries. This trend is the most obvious since 2004 in case of Bulgaria and partially Romania. Gradually increasing and relatively high share of the FDI in the foreign financial liabilities brings few interesting implications. First, the FDI enables domestic companies to share the business and investment risk with the foreign investor. The FDI returns for the foreign investor are not fixed but determined by the overall profitability of the capital allocated in the target economy. The risk transfer from the domestic to foreign investors enables target economies to cover relatively higher current account deficits that on the other hand stimulate the process of the convergence toward the Western European economies. Second, the inflows of the FDI to the selected group of the countries stimulate the transfer of the new technologies that contribute to the overall productivity and national income growth.

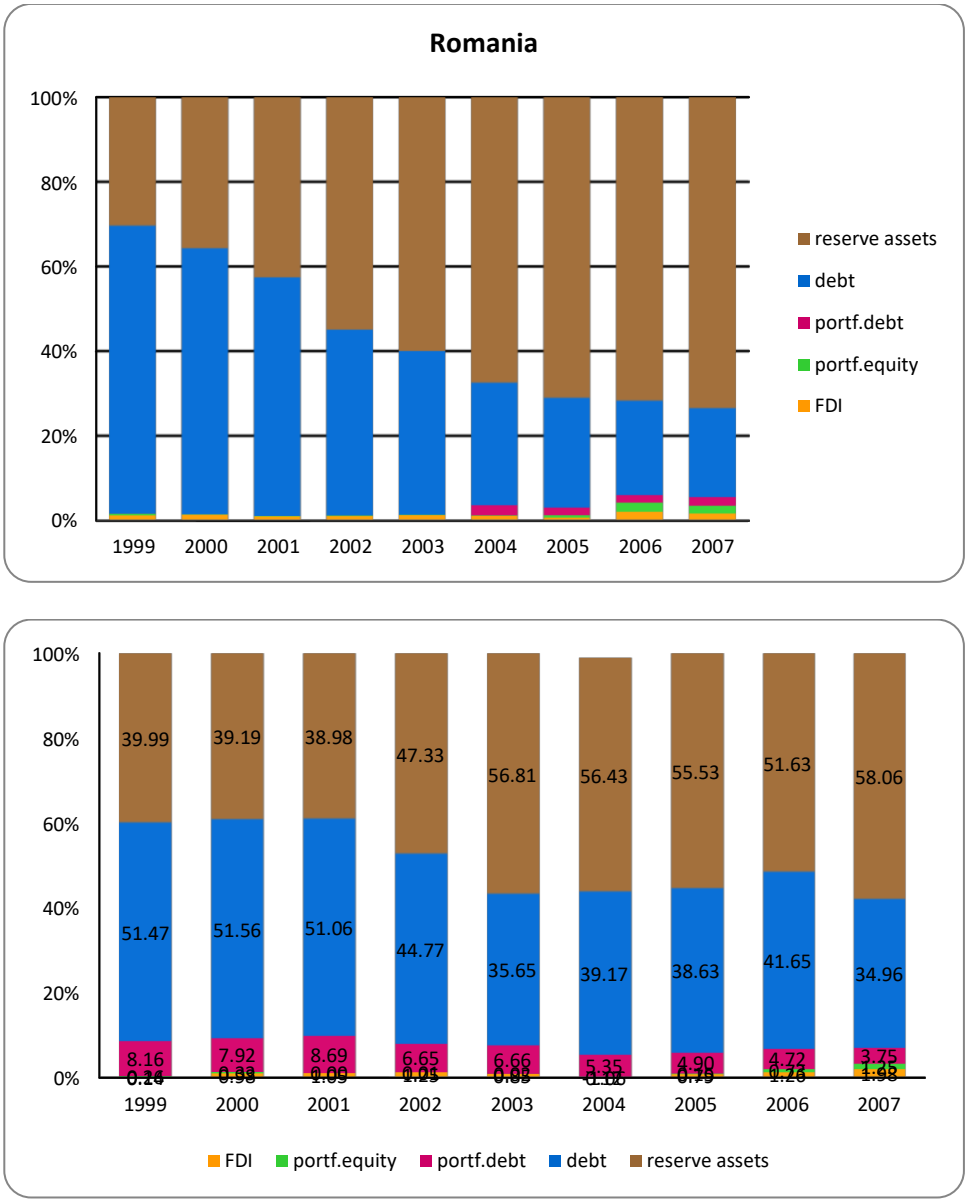
On the other hand we suppose that significant part of the profits from the projects financed by the FDI flows back to the foreign investors domicile.

On the other hand it is clear that the higher economic performance of the country (measured by the GDP per capita) is associated with the lower debt capital inflows. At the same time the share of portfolio (debt and capital) capital inflows is really low in all countries suggesting the relatively insufficient level and the low absorption capacity of the domestic capital markets. The share of the portfolio investments in the total foreign financial liabilities in the selected group of countries remains rather low in spite of the generally expected convergence of the foreign financial liabilities structure toward the Western European countries. Due to the persisting international financial integration and the domestic financial markets deepening as well as increasing quality of the corporate governance we expect an increase in the weight of the foreign portfolio equity and portfolio debt investments in the selected transition economies.

While the structure of the foreign liabilities portfolio seems to be crucial considering the negative development of the net international investment position of the selected transition economies resulting from the intensive foreign capital inflows through the whole period it is still important to observe the structure of the foreign assets portfolio to analyze the ability of the countries to allocate the domestic capital abroad.







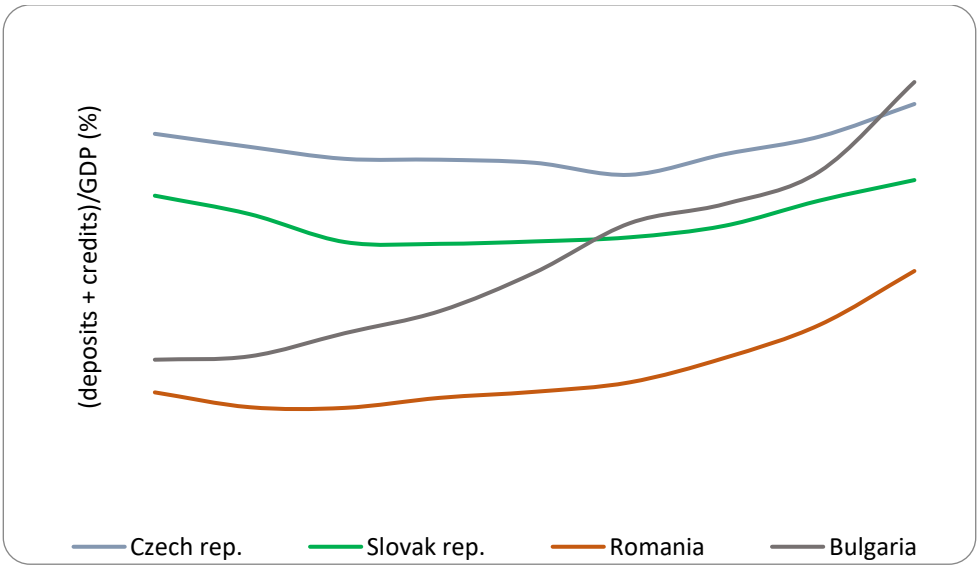
Source: Authors calculations based on [Bulgarian National Bank, (1999 – 2007); Czech National Bank, (1999 - 2007); International Monetary Fund, (2008); National Bank of Romania, (1999 – 2007); National Bank of Slovakia, (1999 – 2007)].

Figure 6 External Financial Assets Portfolio Structure, 1999–2007

From the detailed structure of the foreign assets portfolio in Bulgaria, the Czech republic, Romania and the Slovak republic (Figure 6) we have observed the dominant share of the central banks' reserve assets. The situation is different a lot especially when comparing with the Western European countries, in which the share of reserve assets usually doesn't exceed 5 percent. As the main reason of such a trend we have recognized relatively high importance of the reserve assets for the national central banks (foreign exchange market interventions, smoothing the balance of payments imbalances). Another essential feature resulting from the foreign assets portfolio structure is the negligible role of the equity investments (FDI and portfolio equity investments) in all countries except the Czech republic reflecting relatively low involvement of domestic investors on the foreign capital markets so that they don't take the full advantages of the risk sharing with foreign partners. Relatively high share of the debt investments (credits) represents almost completely activities of the domestic commercial banks.

3. Financial deepening in the selected European transition economies

While the international financial integration reflects the involvement of the national economy on the cross–border allocation of the capital with the foreign partners, the financial deepening represents the process of economy's financial system deepening. We have observed that the periods of a persisting high real economic growth in all four countries has been associated not only with an increasing international financial integration but also with a dynamic financial deepening. We suggest that a financial system deepening of a national economy becomes one of the key assumptions for the country in order to take the advantages of the international financial integration.

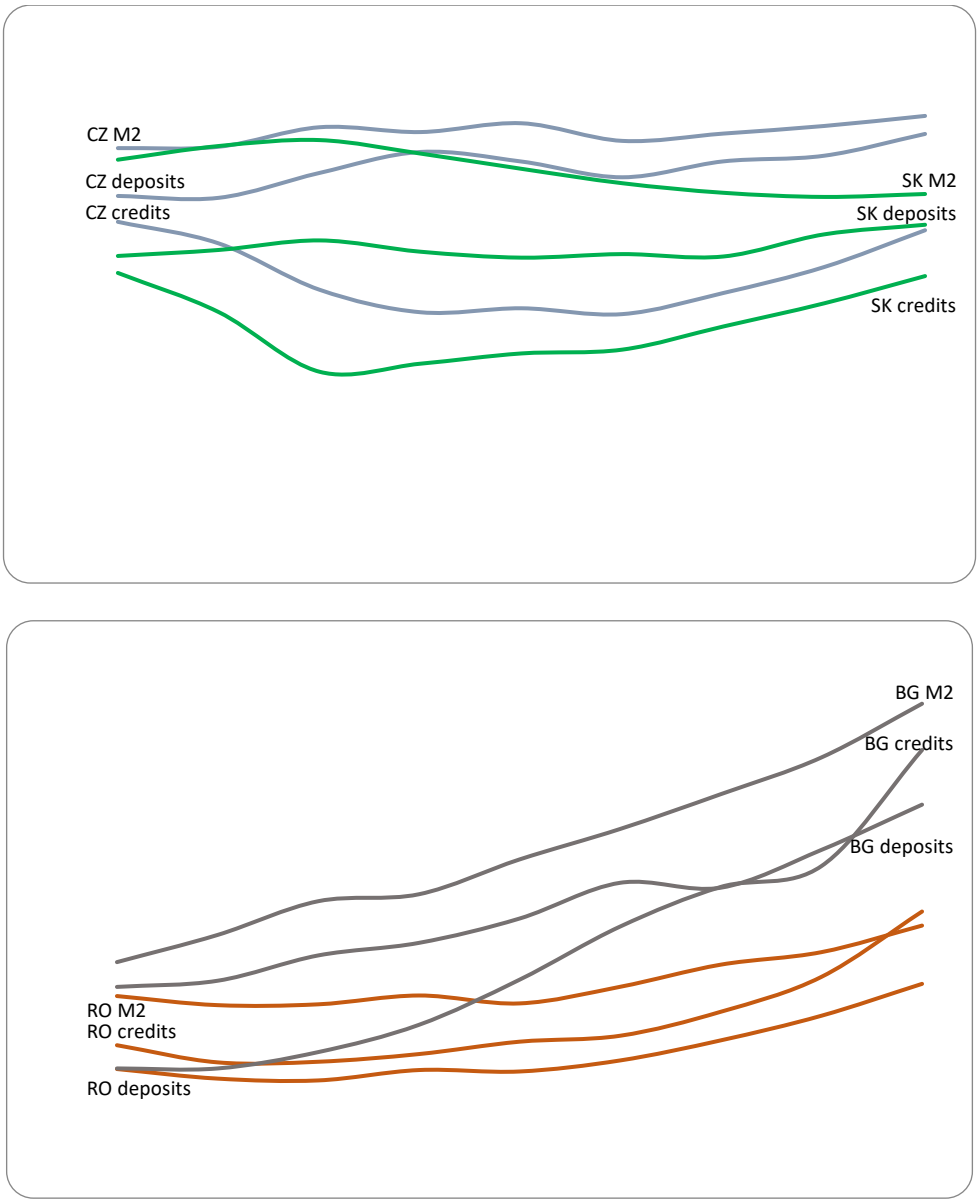


Source: Authors calculations based on [Bulgarian National Bank, (1999 – 2007); Czech National Bank, (1999 - 2007); International Monetary Fund, (2008); National Bank of Romania, (1999 – 2007); National Bank of Slovakia, (1999 – 2007)].

Figure 7 Financial Deepening, 1999–2007

In the Figure 7 we outline the financial deepening development of the selected European transition economies. One of the most obvious fact are significant differences in the financial sector depth in (a) the Czech republic and the Slovak republic and (b) Bulgaria and Romania. At the beginning of the period Bulgaria and Romania were almost at the same starting position but at the end of the period the share of deposits and credits in the GDP in Bulgaria has more than doubled in comparison with the Romania. Especially at the beginning of the period the stagnation in the financial deepening progress in Romania was the result of the financial system instability, the fact partially outlined by the extremely high interest rates in Romania at the beginning of the period (Figure 9). Since 2001 Romania as the biggest from all four economies has experienced the fast real economic growth (approximately 6 percent annually on average) so that the share of deposits and loans in the GDP didn't increase so sharp. Among the main reasons we have observed as the main determinants of the Bulgaria's dynamic financial deepening development (considering Bulgaria's initial low starting position) was the macroeconomic stability anchored by the fixed exchange rate and currency board system and rapid increase in the foreign capital inflows.

In general, fast credits and deposits growth is related to the expansion and increased sophistication in the services that financial institutions offer to support the economic activity in the economy. Financial intermediaries play a key role in different stages of economic development by mobilizing national savings; by improving the allocation of capital by gathering information and identifying the most profitable investment projects; by managing means of payment and by providing liquidity to facilitate the exchange of goods and services; and by making it easier to diversify risk. By reducing the financial constraints on economic agents, i.e. firms and households, they promote increased investment and consumption, and, ultimately, a higher economic growth rate [Sopanha, (2006)].



Source: Authors calculations based on [Bulgarian National Bank, (1999 – 2007); Czech National Bank, (1999 - 2007); International Monetary Fund, (2008); National Bank of Romania, (1999 – 2007); National Bank of Slovakia, (1999 – 2007)].

Figure 8 Deposits, Credits, M2, 1999–2007 (% of GDP)

Detailed preview of the financial deepening in the selected group of the countries outlines Figure 8. In the first graph we observe the development of the deposits, credits and money supply in the Czech republic and the Slovak republic. The ratio of broad money to the level of nominal GDP is usually used to express the extension of monetization rather than financial deepening of the country. On the other hand together with two remaining indicators it still provides sufficient information about the financial depth of the country. All general indicators we have applied to measure financial deepening in the Czech republic and the Slovak republic signalized quite stability of the financial depth through the almost whole period. The decrease in the credits development in the Czech republic in the period 1999–2003 was the result of the increased interest of the commercial banks to allocate resources to other revenue assets instead of the commercial loans as well as the transfer of certain quantity of loss credits to the Czech Consolidation Agency. The decrease in the credits development in the Slovak republic at the beginning of the period was the result of the loss credits delimitation from the commercial banks balance sheets compensated by the revenues from the government bonds issue.

In the second graph we observe the development of the deposits, credits and money supply in Bulgaria and Romania. The situation here is much different in comparison with the previous couple of the countries, especially in case of Bulgaria. While the fast financial deepening expressed in the terms of fast credits and deposits share in the GDP reflects the ability of the economy to dynamically stimulate domestic savings accumulation and their transformation to the domestic investments, rapid growth of the credits may lead to both inflation and weakened banking systems which in turn gave rise to growth–inhibiting financial crises [Rousseau, and Wachtel, (2007)]. As the inflation in Bulgaria remains stable through the whole period 1999–2007 we suggest that the country was able to gain positive effects (effects on economic growth, financial sector stability) from the rapid financial deepening without any significant negative trade–offs.

In Bulgaria, Romania and the Slovak republic the credits growth was not adequately matched by the deposits growth so that incremental credits expansion was financed either by the reduction of the stock of securities in banks' portfolios or by the external resources from the abroad.

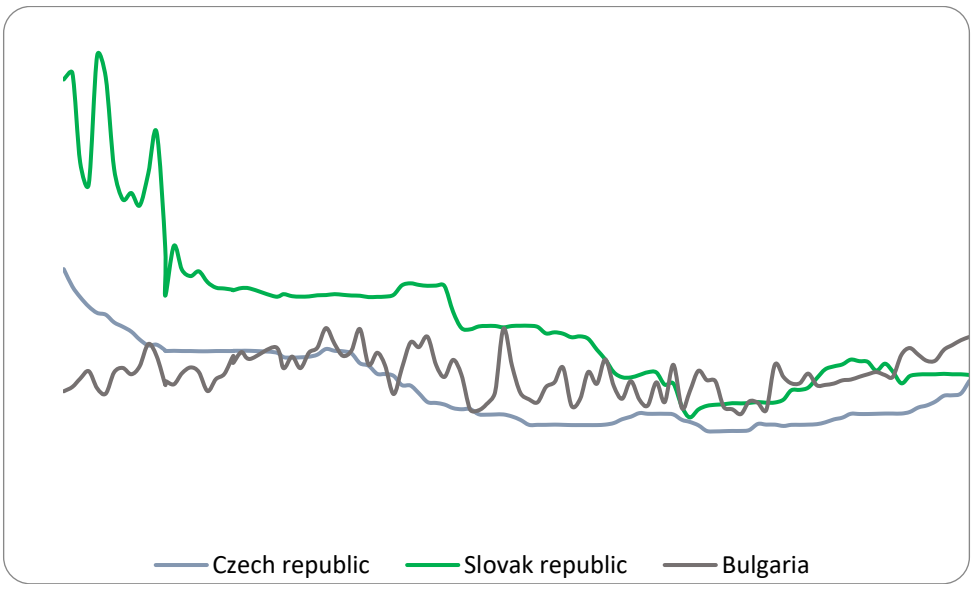
Table 1. Selected Financial Deepening Indicators, 1999–2007 (%)

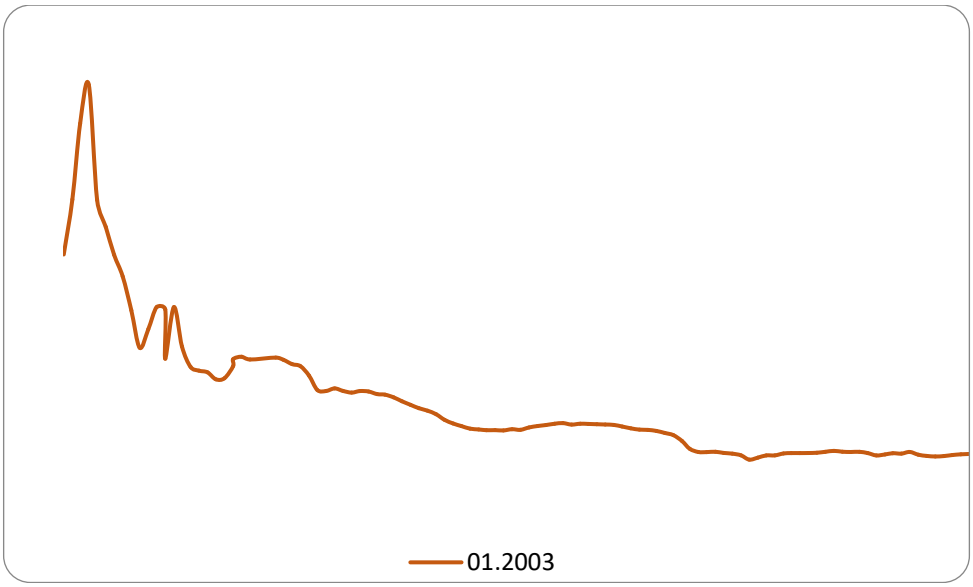
	Czech Republic		Slovak Republic		Romania		Bulgaria	
	1999	2007	1999	2007	1999	2007	1999	2007
Currency/Deposits	13,53	13,68	14,84	14,95	26,21	19,88	32,88	23,00
M1/GDP	21,52	40,51	18,21	35,24	5,44	21,13	13,16	36,67

Source: Authors calculations based on [Bulgarian National Bank, (1999 – 2007); Czech National Bank, (1999 - 2007); International Monetary Fund, (2008); National Bank of Romania, (1999 – 2007); National Bank of Slovakia, (1999 – 2007)].

In Table 1 we summarize the development of the additional financial deepening indicators in Bulgaria, the Czech republic, Romania and the Slovak republic. Both indicators reflect the role of the financial institutions in mediating the financial transactions in the economy. The lower is the share of the currency in the deposits (especially demand deposits) the more transactions in the economy is performed through the financial institutions. Monetary aggregate M1 represents the transaction demand in the economy. The higher is the share of M1 in the GDP the lower is the velocity of money.

The last indicator we have chosen to analyze development of the financial deepening in the selected European transition economies is the interest rates development. In general, lower interest rates stimulate financial deepening in the economy. The stable and low interest rates are usually associated with the price stability so that the macroeconomic stability is one of the most essential determinants that transmit impulses from the interest rates lowering to the positive progress in the financial deepening.





Source: Authors calculations based on [Bulgarian National Bank, (1999 – 2007); Czech National Bank, (1999 - 2007); International Monetary Fund, (2008); National Bank of Romania, (1999 – 2007); National Bank of Slovakia, (1999 – 2007)].

Figure 9 One Month Interbank Offered Rates, 1999–2007

As the main indicator of the interest rate development in our group of the European transition economies we have selected the interbank offered rate for the one month deposits. While the one month interbank offered development rate in Bulgaria, the Czech republic and the Slovak republic became relatively stable in the whole period reflecting the stable money market development, the situation in Romania especially at the beginning of the period was much different. Higher interest rates in the Czech republic and the Slovak republic were related to the sudden shift from the fixed exchange rate to the managed floating (the Czech republic – May 1997, the Slovak republic – October 1998), following by the strong foreign exchange market pressures. Stability of the Bulgarian interest rates (as well as the inflation) was anchored by the currency board and the nominal exchange rate fixed to EUR (since July 1997). We suggest that the low interest rates in Bulgaria during the period 1999–2007 became another crucial determinant of the fast financial deepening. In Romania the objective of the National Bank of Romania to keep the real exchange rate close to the equilibrium led the nominal exchange rate to depreciate under managed floating. We suggest the resulting higher interest rates together with the higher inflation in Romania (they both didn't decrease under the one digit number till 2005) led to the slower progress in the financial deepening.

4. Conclusion

Analysis of the financial integration and financial deepening in the selected European transition economies (Bulgaria, the Czech republic, Romania, the Slovak republic) allows as to identify the country specific aspects of the economic convergence to the Western European countries emphasizing the impact of the capital flows liberalization on the transition economies. We suggest that the relatively different economic performance as well as the overall size of the economy are the main determinants that affect the intensity and the structure of the financial integration and the financial deepening. Initial low domestic capital base together with usually higher domestic interest rates stimulated significant foreign capital inflows to such a degree that many European transition countries rapidly became net international debtors. In addition to this obvious trend, the changes in the external capital portfolio structure reflected the progress in the domestic economic and institutional reforms, increasing the reliance of foreign investors to allocate more direct and portfolio equity investments in the selected countries. On the other hand we suggest the ability of the transition countries to reduce current account imbalances (especially in Bulgaria and Romania) reduces the reliance especially on the external debt financing.

Among the other significant aspect that became at least as important as continuously increasing international financial integration we emphasize the progress in the financial sector development and financial deepening in the European transition countries. We suggest that the financial system deepening becomes one of the key assumptions for the country in order to take the advantages of the international financial integration. The link between the financial integration and the financial deepening is evident from the fact that countries receiving relatively large capital inflows usually face the disproportionate growth in the volume of transactions on their stock markets, disproportionate growth in stock market capitalization, and disproportionate growth in bank loans to the private sector. Ability to transform domestic deposits to investments effectively while eliminating inflationary pressures and risks related to the excessive credits supply allows the transition countries to gain the positive effects from the financial deepening.

Tendency to the "external financial depth" increase was obvious in spite of the strong economic growth the selected group of the countries have experienced since 2001 (except Bulgaria). This allowed the transition countries to effectively share the risk with the foreign partners and gain effects from the technology sharing. It had also positive influence on the domestic financial systems functionality through the increased availability of the financial resources. At the same time we have observed significant differences in the financial sector depth in (a) the Czech republic and the Slovak republic and (b) Bulgaria and Romania. First two countries have experienced relatively stable development of the financial deepening. On the other hand the financial deepening in Romania (since 2004) and especially in Bulgaria was much more intensive.

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ROBUST TWO–STAGE LEAST SQUARES: SOME MONTE CARLO EXPERIMENTS

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Abstract

The Two–Stage Least Squares (2–SLS) is a well known econometric technique used to estimate the parameters of a multi–equation econometric model when errors across the equations are not correlated and the equation(s) concerned is (are) over–identified or exactly identified. However, in presence of outliers in the data matrix, the classical 2–SLS has a very poor performance. In this study a method has been proposed to generalize the 2–SLS to the Weighted Two–Stage Least Squares (W2–SLS), which is robust to the effects of outliers and perturbations. Monte Carlo experiments have been conducted to demonstrate the performance of the proposed method. It has been found that robustness of the proposed method is not much destabilized by the magnitude of outliers. The breakdown point of the method is quite high, somewhere between 45 to 50 percent of the number of points in the data matrix.

Keywords: Two–Stage Least Squares, multi–equation econometric model, simultaneous equations, outliers, robust, weighted least squares, Monte Carlo experiments, unbiasedness, efficiency, breakdown point, perturbation, structural parameters, reduced form

JEL Classification: **C13, C14, C63, C15, C01**

1. Introduction:

The Two–Stage Least Squares (2–SLS) is a well known econometric technique used to estimate the parameters of a multi–equation (or simultaneous equations) econometric model when errors across the equations are not correlated and the equation(s) concerned is (are) over–identified or exactly identified. It is one of the members of the family of k–class estimators. Unlike the Three–Stage Least Squares, it does not estimate the parameters of all the equations of the model in one go. The 2–SLS estimates the parameters of an econometric model equation by equation, that is, one equation at a time.

Let a multi–equation econometric model be described by the system of its structural equations $YA+XB+U=0$, where Y is an $n\times m$ data matrix of m endogenous variables in n observations, X is an $n\times k$ data matrix of k exogenous or pre–determined variables in n observations, A is an $m\times m$ full rank matrix of unknown parameters or coefficients associated with Y, B is a $k\times m$ matrix of unknown parameters or coefficients associated with X and U is an $n\times m$ matrix of (unobserved) errors. The elements of A and B are called the structural parameters. Since U is often correlated with Y which is itself stochastic, the parameters in the columns of A and B cannot be estimated by means of the Ordinary Least Squares (OLS) in view of the violation of the Gauss–Markov assumptions for the applicability of the OLS. Instead of using the OLS directly, the system of equations $YA+XB+U=0$ is first transformed into the reduced form equations. The reduced form equations describe Y in terms of X only. Indeed if we post–multiply the system of equations $YA+XB+U=0$ by A^{-1}, we have $YAA^{-1}+XBA^{-1}+UA^{-1}=0$ or $Y=XP+E$, where $P=-BA^{-1}$ and $E=-UA^{-1}$. Now since X is fixed (non–stochastic) and it cannot be correlated with E, the system of reduced form equations $Y=XP+E$ is amenable to estimation by the OLS. Therefore, P (which is the matrix of the reduced form coefficients) is estimated by the OLS as $\hat{P}=[X'X]^{-1}X'Y$ and used to obtain $\hat{Y}=X\hat{P}$. Then in each equation where any endogenous variable $Y_j\subset Y$ appears as an explanatory variable, Y_j is replaced by $\hat{Y}_j$. Due to this replacement, the explanatory variables are no longer stochastic or correlated with the error term in the equation concerned, and so the equation is amenable to estimation by the OLS. Application of the OLS (once again) on this transformed equation readily gives the estimates of the parameters in that equation.

2. Implications of the Presence of Outliers in the Data Matrices:

Now suppose there are some outliers in X, Y or both the data matrices. This would affect $\hat{P} = [X'X]^{-1}X'Y$ and consequently $\hat{Y} = X\hat{P}$. At the second stage since $\hat{Y}_j \subset \hat{Y}$ appear as explanatory variables, all the estimated parameters would be affected. As a matter of fact, the effects of outliers will pervade through all the equations and the estimated structural parameters in them. These effects are so intricately pervasive that it is very difficult to assess the influence of outliers on the estimated structural parameters.

A number of methods have been proposed to obtain robust estimators of regression parameters but most of them are limited to single equation models. Their adaptation to estimation of the structural parameters of multi–equation models is not only operationally inconvenient, it is also theoretically unconvincing. Moreover, generalization of those methods to multi–equation cases has scarcely been either successful or popular.

3. The Objectives of the Present Study:

In this study a method has been proposed to conveniently generalize the 2–SLS to the weighted 2–SLS (W2–SLS) so that $\hat{P} = [(wX)'(wX)]^{-1}(wX)'(wY)$, where w is the weight matrix applied to Y and X. Accordingly, we have $\hat{Y} = X\hat{P}$. At the 2nd stage, for the i^{th} equation we have $g_i = [(\omega_i Z_i)'(\omega_i Z_i)]^{-1}(\omega_i Z_i)'(\omega_i y_i)$, where $g_i = [a_i \mid b_i]'$; $Z_i = [\hat{Y}_i \mid X_i]$; $y_i \subset Y$; $\hat{Y}_i \subset \hat{Y}$; $\hat{y}_i \notin \hat{Y}_i$; $X_i \subset X$; y_i is the observed endogenous variable appearing in the i^{th} structural equation as the dependent variable, $\hat{Y}_i$ is the set of estimated endogenous variables appearing in the i^{th} equation as the explanatory variables and X_i is the set of exogenous (or predetermined) variables appearing in the i^{th} equation as the explanatory variables. It may be noted that at the second stage of the proposed W2–SLS we use different weights (ω) for different equations. These weights (w and ω_i) are obtained in a particular manner as described latter in this paper. We also conduct some Monte Carlo experiments to demonstrate that our proposed method performs very well in estimating the structural parameters of multi–equation econometric models while the data matrices are containing numerous large outliers.

4. Determination of Weights in the Weighted Two–Stage Least Squares

Using the Mahalanobis distance as a measure of deviation from center, Campbell (1980) obtained a robust covariance matrix that is almost free from the influence of outliers. Campbell's method is an iterative method. Given an observed data matrix, Z , in n observations (rows) and v variables (columns) it obtains a v–elements vector of weighted (arithmetic) mean, $\bar{z}$, and weighted variance–covariance matrix, $S(v,v)$, in the following manner. Initially, all weights, $\varpi_\ell; \ell = 1,n$ are considered to be equal, $1/n$, and the sum of weights, $\sum_{\ell=1}^{n} \varpi_\ell = 1$. Defining $d_0 = \sqrt{v} + \beta_1/\sqrt{2};\ \beta_1 = 2,\ \beta_2 = 1.25,$ we obtain

$$\bar{z} = \sum_{\ell=1}^{n} \varpi_\ell z_\ell / \sum_{\ell=1}^{n} \varpi_\ell \ ;\ S = \sum_{\ell=1}^{n} \varpi_\ell^2 (z_\ell - \bar{z})'(z_\ell - \bar{z}) / \left[\sum_{\ell=1}^{n} \varpi_\ell^2 - 1\right] \ ;$$

$$d_\ell = \left\{(z_\ell - \bar{z})S^{-1}(z_\ell - \bar{z})'\right\}^{1/2};\ell = 1,n \ ;$$

$$\varpi_\ell = \varpi(d_\ell)/d_\ell; \ell = 1,n : \varpi(d_\ell) = d_\ell \ \textit{if}\ d_\ell \le d_0 \ \textit{else}\ \varpi(d_\ell) = d_0 \exp[-0.5(d_\ell - d_0)^2/\beta_2^2].$$

If $d_\ell \cong 0$ then $\varpi_\ell = 1$. We will call it the original Campbell procedure to obtain a robust covariance matrix. However, our experience with this procedure to obtain a robust covariance matrix is not very encouraging in this study as well as elsewhere (Mishra, 2008). We will use the acronym OCP for this original Campbell procedure.

Hampel *et al*. (1986) defined the median of absolute deviations (from median) as a measure of scale, $s_H(z_a) = \underset{\ell}{median} \mid z_{\ell a} - \underset{\ell}{median}(z_{\ell a}) \mid / 0.6745$ which is a very robust measure of deviation. Using this measure of deviation also, we may assign weights to different data points. If we choose to heuristically assign the weight $\varpi_\ell = 1$ for $d_\ell - s_H(d) \le d_\ell < d_\ell + s_H(d)$, $\varpi_\ell = (1/2)^2$ for

$d_\ell - 2s_H(d) \le d_\ell < d_\ell - s_H(d)$ as well as $d_\ell + 2s_H(d) \ge d_\ell > d_\ell + s_H(d)$ and so on, and use Campbell's iterative method incorporating these weights, we may obtain a robust covariance matrix and weights. Our experience with this procedure has been highly rewarding in this study as well as elsewhere [Mishra, (2008)]. We will call it the Modified Campbell Procedure (MCP) to obtain a robust covariance matrix and weights to different data points.

The weights (ϖ) obtained through the MCP (or OCP, as the case may be) are used as w in $\hat{P} = [(wX)'(wX)]^{-1}(wX)'(wY)$ at the first stage of the W2–SLS to obtain the robust estimates of the matrix of reduced form coefficients. In this procedure of obtaining $\hat{P}$, X contains the unitary vector to take care of the intercept term, although weights ($w = \varpi$) are obtained with Z^* that contains Y and all the variables in X, sans the unitary vector relating to the intercept term. Similarly, at the second stage, the MCP/OCP weights ($\omega_i = \varpi_i$) are obtained from $Z^* = [y_i \mid \hat{Y}_i \mid X_i^*]$, where X_i^* contains all exogenous (predetermined) variables appearing in the i^{th} structural equations, sans the unitary vector related to the intercept term. However, in obtaining $g_i = [a_i \mid b_i]'$, the matrix $Z_i = [\hat{Y}_i \mid X_i]$ is used wherein X_i contains all exogenous (predetermined) variables, including the one related to the intercept term in the i^{th} equation.

5. Some Monte Caro Experiments

In order to assess the performance of our proposed method and compare it with the 2–SLS when data matrices (Y and X) contain outliers, we have conducted some Monte Carlo experiments. Using the random number generator seed = 1111, we have generated X containing five exogenous variables in 100 observations and appended to it the 6th column of unitary vector to take care of the intercept term. Thus, in all, we have X in 100 rows and 6 columns. All values of X lie between 0 and 20 such that $0 < x_{ij} < 20$. Then the data matrix for endogenous variables, Y, has been generated with the parameter matrices, A and B and adding a very small normally distributed random error, $U \sim N(0, 0.001)$ directly, without going into the subtleties of obtaining $U = -EA$. The magnitude of error has been kept at a very low level since our objective is not to mingle the effects of errors with those of outliers on the estimated parameters. If the magnitude of errors is large, it would affect the estimated values of parameters and it would be difficult to disentangle the effects of outliers from those of the errors. The computer program GENDAT (in FORTRAN 77) to generate data is appended. As already mentioned, the program was run with the random number generator seed = 1111. The following are the matrices of structural parameters used in our experiments.

$$A' = \begin{bmatrix} -1 & 7 & 0 & -6 & 0 \\ 3 & -1 & 5 & 0 & 0 \\ 0 & 0 & -1 & 3 & 0 \\ 6 & 0 & 0 & -1 & -3 \\ -11 & 0 & 9 & 0 & -1 \end{bmatrix}; \qquad B' = \begin{bmatrix} 0 & 5 & 0 & -7 & 0 & 60 \\ 3 & 0 & -5 & 0 & 0 & 20 \\ 0 & 2 & 0 & 0 & 0 & 9 \\ 0 & 4 & 0 & 0 & -3 & -8 \\ 0 & 0 & 0 & 6 & 0 & -11 \end{bmatrix}$$

The data (Y and X) thus generated are used as the base data to which different number and different sizes of perturbation quantities are added in different experiments. For every experiment we have limited the number of replicates (NR) to 100, although this number could have been larger or smaller. For each experiment the mean, standard deviation and RMS (Root–Mean–Square) of expected parameters ($\hat{A}$ and $\hat{B}$) have been computed over the 100 replicates. The following formulas are used for computing these statistics.

$$Mean(\hat{a}_{ij}) = (1/NR)\sum_{\ell=1}^{NR} \hat{a}_{\ell ij};\ i, j = 1, m \quad ; \quad Mean(\hat{b}_{ij}) = (1/NR)\sum_{\ell=1}^{NR} \hat{b}_{\ell ij} \ ;i = 1, k \ ; \ j = 1, m$$

$$SD(\hat{a}_{ij}) = \left[\frac{1}{NR}\sum_{\ell=1}^{NR}(\hat{a}_{\ell ij})^2 - Mean^2(\hat{a}_{ij})\right]^{0.5} ;i, j = 1, m \quad ; \quad SD(\hat{b}_{ij}) = \left[\frac{1}{NR}\sum_{\ell=1}^{NR}(\hat{b}_{\ell ij})^2 - Mean^2(\hat{b}_{ij})\right]^{0.5} ;i = 1, k \ ; \ j = 1, m$$

$$RMS(\hat{a}_{ij}) = \left[\frac{1}{NR}\sum_{\ell=1}^{NR}(\hat{a}_{\ell ij} - a_{ij})^2\right]^{0.5} ;i, j = 1, m \quad ; \quad RMS(\hat{b}_{ij}) = \left[\frac{1}{NR}\sum_{\ell=1}^{NR}(\hat{b}_{\ell ij} - b_{ij})^2\right]^{0.5} ;i = 1, k \ ; \ j = 1, m$$

A distance between RMS and SD entails bias of the estimation formula and a larger SD entails inefficiency of the estimation formula. Reduction in SD as a response to increase in the number of replicates entails consistency of the estimator formula. In the present exercise we have not looked into the consistency aspect by fixing the number of replicates (NR) to 100, although it could have been done without much effort by increasing NR from (say) 20 to 200 (or more) by an increment of 20 or so.

Experiment–1: In this experiment we have set the number of perturbations at 10 (i.e. NOUT=10) and the size of perturbation (OL) in the range of 10 ± 25 or between –15 to 35. In this range the size of perturbation quantities is randomly chosen and those quantities are added to the data at equiprobable random locations. Accordingly, in the program ROB2SLS the parameters are set at OMIN=10, OMAX=50 such that OL=OMIN+(OMAX–OMIN)*(RAND–0.5). The random number RAND lays between zero and unity (exclusive of limits). To generate the random numbers seed = 2211 has been used (in this as well as subsequent experiments). With this design, we have estimated the structural parameters by 2–SLS, OCP and MCP. The results are presented in tables 1.1 through 3.3. A perusal of these table immediately reveals that the 2–SLS and the W2–SLS(OCP) perform very poorly. Of the two, the 2–SLS appears to perform somewhat better. However, the performance of the W2–SLS(MCP) is excellent.

Table–1.1. Mean of Estimates of Structural Parameters: Method –2–SLS

Variables/ Equations	Mean of Estimated A Matrix					Mean of Estimated B Matrix					
	y_1	y_2	y_3	y_4	y_5	x_1	x_2	x_3	x_4	x_5	x_6
Eq–1	–1	1.4935	0	0.3483	0	0	2.0789	0	–1.146	0	17.9371
Eq–2	2.8945	–1	4.9785	0	0	2.9256	0	–4.9462	0	0	22.1262
Eq–3	0	0	–1	2.8951	0	0	1.9202	0	0	0	9.5226
Eq–4	1.99	0	0	–1	–0.8833	0	0.7576	0	0	–0.9063	–5.6702
Eq–5	–9.9835	0	8.1432	0	–1	0	0	0	5.5251	0	–10.194

Table–1.2. Standard Deviation of Estimates of Structural Parameters: Method –2–SLS

Variables/ Equations	Standard Dev of Estimated A Matrix					Standard Dev of Estimated B Matrix					
	y_1	y_2	y_3	y_4	y_5	x_1	x_2	x_3	x_4	x_5	x_6
Eq–1	0	2.1017	0	2.591	0	0	1.1407	0	2.2643	0	14.9058
Eq–2	0.4527	0	1.6893	0	0	0.7541	0	1.3289	0	0	13.289
Eq–3	0	0	0	0.3976	0	0	0.3328	0	0	0	2.0584
Eq–4	6.1134	0	0	0	3.2882	0	4.9767	0	0	3.227	3.1004
Eq–5	3.8894	0	2.7011	0	0	0	0	0	2.076	0	9.5898

Table–1.3. Root Mean Square of Estimates of Structural Parameters: Method –2–SLS

Variables/ Equations	RMS of Estimated A Matrix					RMS of Estimated B Matrix					
	y_1	y_2	y_3	y_4	y_5	x_1	x_2	x_3	x_4	x_5	x_6
Eq–1	0	5.894	0	6.8566	0	0	3.1359	0	6.2767	0	44.6259
Eq–2	0.4648	0	1.6894	0	0	0.7577	0	1.33	0	0	13.458
Eq–3	0	0	0	0.4112	0	0	0.3422	0	0	0	2.1237
Eq–4	7.3112	0	0	0	3.9105	0	5.9397	0	0	3.8467	3.8782
Eq–5	4.02	0	2.8337	0	0	0	0	0	2.1296	0	9.6236

Table–2.1. Mean of Estimates of Structural Parameters: Method –W2–SLS (OCP)

Variables/ Equations	Mean of Estimated A Matrix					Mean of Estimated B Matrix					
	y_1	y_2	y_3	y_4	y_5	x_1	x_2	x_3	x_4	x_5	x_6
Eq–1	–1	4.5418	0	–3.2473	0	0	3.6247	0	–4.271	0	36.9997

Eq–2	2.0327	–1	5.0332	0	0	3.1394	0	–4.0161	0	0	12.6559
Eq–3	0	0	–1	2.654	0	0	1.6841	0	0	0	9.0044
Eq–4	2.402	0	0	–1	–1.1363	0	2.1191	0	0	–2.2551	–1.4636
Eq–5	–8.5972	0	7.1151	0	–1	0	0	0	4.68	0	–7.7846

Table–2.1. Mean of Estimates of Structural Parameters: Method –W2–SLS (OCP)

Variables/ Equations	Standard Dev of Estimated A Matrix					Standard Dev of Estimated B Matrix					
	y_1	y_2	y_3	y_4	y_5	x_1	x_2	x_3	x_4	x_5	x_6
Eq–1	0	3.3486	0	3.7184	0	0	2.0598	0	3.7719	0	48.4423
Eq–2	4.0175	0	9.9488	0	0	6.521	0	3.7596	0	0	64.2183
Eq–3	0	0	0	1.1314	0	0	1.2864	0	0	0	12.064
Eq–4	10.0494	0	0	0	4.2537	0	7.802	0	0	6.6725	53.6402
Eq–5	13.1535	0	10.9899	0	0	0	0	0	8.5956	0	24.2266

Table–2.3. Root Mean Square of Estimates of Structural Parameters: Method –W2–SLS (OCP)

Variables/ Equations	RMS of Estimated A Matrix					RMS of Estimated B Matrix					
	y_1	y_2	y_3	y_4	y_5	x_1	x_2	x_3	x_4	x_5	x_6
Eq–1	0	4.154	0	4.6265	0	0	2.4767	0	4.6556	0	53.6253
Eq–2	4.1323	0	9.9489	0	0	6.5225	0	3.8862	0	0	64.6369
Eq–3	0	0	0	1.1831	0	0	1.3246	0	0	0	12.064
Eq–4	10.674	0	0	0	4.6441	0	8.0255	0	0	6.7139	54.037
Eq–5	13.3711	0	11.1504	0	0	0	0	0	8.6964	0	24.439

Table–3.1. Mean of Estimates of Structural Parameters: Method –W2–SLS (MCP)

Variables/ Equations	Mean of Estimated A Matrix					Mean of Estimated B Matrix					
	y_1	y_2	y_3	y_4	y_5	x_1	x_2	x_3	x_4	x_5	x_6
Eq–1	–1	7.0498	0	–6.058	0	0	5.0261	0	–7.0532	0	60.3819
Eq–2	3.0002	–1	5.0011	0	0	3.0004	0	–5.0011	0	0	20.01
Eq–3	0	0	–1	2.9999	0	0	1.9999	0	0	0	8.9995
Eq–4	5.9973	0	0	–1	–2.9984	0	3.9975	0	0	–2.9986	–7.9969
Eq–5	–11.0005	0	9.0001	0	–1	0	0	0	5.9999	0	–10.9989

Table–3.2. Standard Deviation of Estimates of Structural Parameters: Method –W2–SLS (MCP)

Variables/ Equations	Standard Dev of Estimated A Matrix					Standard Dev of Estimated B Matrix					
	y_1	y_2	y_3	y_4	y_5	x_1	x_2	x_3	x_4	x_5	x_6
Eq–1	0	0.0067	0	0.0078	0	0	0.0035	0	0.0071	0	0.051
Eq–2	0.0001	0	0.0004	0	0	0.0002	0	0.0004	0	0	0.0035
Eq–3	0	0	0	0.0001	0	0	0.0001	0	0	0	0.0005
Eq–4	0.002	0	0	0	0.001	0	0.0016	0	0	0.0011	0.0014
Eq–5	0.0013	0	0.0009	0	0	0	0	0	0.0006	0	0.002

Table–3.3. Root Mean Square of Estimates of Structural Parameters: Method –W2–SLS (MCP)

Variables/ Equations	RMS of Estimated A Matrix					RMS of Estimated B Matrix					
	y_1	y_2	y_3	y_4	y_5	x_1	x_2	x_3	x_4	x_5	x_6
Eq–1	0	0.0503	0	0.0585	0	0	0.0263	0	0.0536	0	0.3852
Eq–2	0.0002	0	0.0012	0	0	0.0004	0	0.0012	0	0	0.0106
Eq–3	0	0	0	0.0002	0	0	0.0001	0	0	0	0.0007
Eq–4	0.0033	0	0	0	0.0019	0	0.003	0	0	0.0017	0.0034
Eq–5	0.0014	0	0.0009	0	0	0	0	0	0.0006	0	0.0022

Experiment–2: In this experiment we have set the number of perturbations at 10 (i.e. NOUT=10) and the size of perturbation (OL) in the range of 10 ± 50 or between –40 to 60. The parameters in the

program are set at OMIN=10, OMAX=100 and hence OL=OMIN+(OMAX–OMIN)*(RAND–0.5). The dismal performance of 2–SLS and W2–SLS(OCP) observed in experiment–1 has been further aggravated and therefore we do not consider it necessary to report the mean, SD and RMS of estimated structural parameters for those estimators. However, once again the W2–SLS(MCP) has performed exceedingly well and the results have been presented in Tables 4.1 through 4.3.

A comparison of Tables 3.1 through 3.3 with the Tables 4.1 through 4.3 reveals that increase in the magnitude of perturbation has hardly affected the results.

Table–4.1. Mean of Estimates of Structural Parameters: Method –W2–SLS (MCP)

Variables/ Equations	Mean of Estimated A Matrix					Mean of Estimated B Matrix					
	y_1	y_2	y_3	y_4	y_5	x_1	x_2	x_3	x_4	x_5	x_6
Eq–1	–1	7.0498	0	–6.0579	0	0	5.0261	0	–7.0531	0	60.3817
Eq–2	3.0002	–1	5.0011	0	0	3.0004	0	–5.0011	0	0	20.0097
Eq–3	0	0	–1	2.9999	0	0	2	0	0	0	8.9996
Eq–4	5.9973	0	0	–1	–2.9984	0	3.9974	0	0	–2.9986	–7.9969
Eq–5	–11.0005	0	9.0001	0	–1	0	0	0	5.9999	0	–10.9989

Table–4.2. Standard Deviation of Estimates of Structural Parameters: Method –W2–SLS (MCP)

Variables/ Equations	Standard Deviation of Estimated A Matrix					Standard Deviation of Estimated B Matrix					
	y_1	y_2	y_3	y_4	y_5	x_1	x_2	x_3	x_4	x_5	x_6
Eq–1	0	0.0065	0	0.0076	0	0	0.0034	0	0.0069	0	0.0492
Eq–2	0.0001	0	0.0005	0	0	0.0002	0	0.0004	0	0	0.0038
Eq–3	0	0	0	0.0001	0	0	0.0001	0	0	0	0.0005
Eq–4	0.0018	0	0	0	0.001	0	0.0015	0	0	0.001	0.0015
Eq–5	0.0014	0	0.0009	0	0	0	0	0	0.0006	0	0.002

Table–4.3. Root Mean Square of Estimates of Structural Parameters: Method –W2–SLS (MCP)

Variables/ Equations	RMS of Estimated A Matrix					RMS of Estimated B Matrix					
	y_1	y_2	y_3	y_4	y_5	x_1	x_2	x_3	x_4	x_5	x_6
Eq–1	0	0.0502	0	0.0584	0	0	0.0263	0	0.0536	0	0.3848
Eq–2	0.0002	0	0.0012	0	0	0.0004	0	0.0012	0	0	0.0104
Eq–3	0	0	0	0.0002	0	0	0.0001	0	0	0	0.0007
Eq–4	0.0033	0	0	0	0.0019	0	0.003	0	0	0.0017	0.0034
Eq–5	0.0014	0	0.0009	0	0	0	0	0	0.0006	0	0.0023

Experiment–3: In this experiment we have once again set the number of perturbations at 10 (i.e. NOUT=10) and the size of perturbation (OL) in the range of 10 ± 150 or between –140 to 160. The parameters in the program are set at OMIN=10, OMAX=300 and hence OL=OMIN+(OMAX–OMIN)*(RAND–0.5). The results are presented in Tables 5.1 through 5.3. The findings are that increase in the magnitude of perturbation has not affected the W2–SLS(MCP) estimates in any significant manner.

Table–5.1. Mean of Estimates of Structural Parameters: Method –W2–SLS (MCP)

Variables/ Equations	Mean of Estimated A Matrix					Mean of Estimated B Matrix					
	y_1	y_2	y_3	y_4	y_5	x_1	x_2	x_3	x_4	x_5	x_6
Eq–1	–1	7.0501	0	–6.0583	0	0	5.0262	0	–7.0534	0	60.3836
Eq–2	3.0002	–1	5.0011	0	0	3.0004	0	–5.0011	0	0	20.0095
Eq–3	0	0	–1	2.9999	0	0	1.9999	0	0	0	8.9996
Eq–4	5.9973	0	0	–1	–2.9984	0	3.9975	0	0	–2.9986	–7.997
Eq–5	–11.0004	0	9	0	–1	0	0	0	5.9998	0	–10.9989

Table–5.2. Standard Deviation of Estimates of Structural Parameters: Method –W2–SLS (MCP)

Variables/ Equations	Standard Dev of Estimated A Matrix					Standard Dev of Estimated B Matrix					
	y_1	y_2	y_3	y_4	y_5	x_1	x_2	x_3	x_4	x_5	x_6
Eq–1	0	0.0071	0	0.0083	0	0	0.0036	0	0.0075	0	0.0539
Eq–2	0.0001	0	0.0004	0	0	0.0002	0	0.0004	0	0	0.0036
Eq–3	0	0	0	0.0001	0	0	0.0001	0	0	0	0.0005
Eq–4	0.0019	0	0	0	0.001	0	0.0015	0	0	0.001	0.0014
Eq–5	0.0012	0	0.0009	0	0	0	0	0	0.0006	0	0.002

Table–5.3. Root Mean Square of Estimates of Structural Parameters: Method –W2–SLS (MCP)

Variables/ Equations	RMS of Estimated A Matrix					RMS of Estimated B Matrix					
	y_1	y_2	y_3	y_4	y_5	x_1	x_2	x_3	x_4	x_5	x_6
Eq–1	0	0.0506	0	0.0589	0	0	0.0264	0	0.054	0	0.3874
Eq–2	0.0002	0	0.0012	0	0	0.0004	0	0.0012	0	0	0.0101
Eq–3	0	0	0	0.0002	0	0	0.0001	0	0	0	0.0006
Eq–4	0.0032	0	0	0	0.0019	0	0.0029	0	0	0.0017	0.0033
Eq–5	0.0013	0	0.0009	0	0	0	0	0	0.0006	0	0.0023

Experiment–4: In this experiment we have set the number of perturbations at 30 (i.e. NOUT=30) and the size of perturbation (OL) in the range of 10 ± 25 or between –15 to 35 as in the experiment–1. We want to look into the effects of increasing the number of perturbations in the data matrix. A perusal of the results (presented in Tables 6.1 through 6.3) reveals that the W2–SLS estimator continues to be robust.

Table–6.1. Mean of Estimates of Structural Parameters: Method –W2–SLS (MCP)

Variables/ Equations	Mean of Estimated A Matrix					Mean of Estimated B Matrix					
	y_1	y_2	y_3	y_4	y_5	x_1	x_2	x_3	x_4	x_5	x_6
Eq–1	–1	7.0367	0	–6.0423	0	0	5.0194	0	–7.0391	0	60.2825
Eq–2	3.0002	–1	5.0009	0	0	3.0003	0	–5.0009	0	0	20.0077
Eq–3	0	0	–1	2.9998	0	0	1.9999	0	0	0	8.9992
Eq–4	5.9981	0	0	–1	–2.9988	0	3.9981	0	0	–2.9989	–7.9988
Eq–5	–11.0017	0	9.001	0	–1	0	0	0	6.0005	0	–11.0009

Table–6.2. Standard Deviation of Estimates of Structural Parameters: Method –W2–SLS (MCP)

Variables/ Equations	Standard Dev of Estimated A Matrix					Standard Dev of Estimated B Matrix					
	y_1	y_2	y_3	y_4	y_5	x_1	x_2	x_3	x_4	x_5	x_6
Eq–1	0	0.012	0	0.014	0	0	0.0063	0	0.0129	0	0.0915
Eq–2	0.0001	0	0.0007	0	0	0.0003	0	0.0006	0	0	0.0055
Eq–3	0	0	0	0.0001	0	0	0.0001	0	0	0	0.0007
Eq–4	0.0026	0	0	0	0.0014	0	0.0021	0	0	0.0014	0.0025
Eq–5	0.0014	0	0.001	0	0	0	0	0	0.0007	0	0.0025

Table–6.3. Root Mean Square of Estimates of Structural Parameters: Method –W2–SLS (MCP)

Variables/ Equations	RMS of Estimated A Matrix					RMS of Estimated B Matrix					
	y_1	y_2	y_3	y_4	y_5	x_1	x_2	x_3	x_4	x_5	x_6
Eq–1	0	0.0386	0	0.0446	0	0	0.0204	0	0.0412	0	0.2969

Eq–2	0.0002	0	0.0011	0	0	0.0004	0	0.0011	0	0	0.0095
Eq–3	0	0	0	0.0002	0	0	0.0001	0	0	0	0.001
Eq–4	0.0032	0	0	0	0.0018	0	0.0028	0	0	0.0017	0.0027
Eq–5	0.0022	0	0.0014	0	0	0	0	0	0.0008	0	0.0026

Experiment–5: In this experiment we set NOUT=30 as in experiment–4, but increase the size of perturbations (OL) in the range of 10 ± 150 or between –140 to 160 (as in experiment–3). The results are presented in the Tables 7.1 through 7.3. It is observed that the increase in the size of perturbation has not affected the robustness of W2–SLS(MCP) in any significant manner.

Table–7.1. Mean of Estimates of Structural Parameters: Method –W2–SLS (MCP)

Variables/ Equations	Mean of Estimated A Matrix					Mean of Estimated B Matrix					
	y_1	y_2	y_3	y_4	y_5	x_1	x_2	x_3	x_4	x_5	x_6
Eq–1	–1	7.0359	0	–6.0416	0	0	5.0189	0	–7.0383	0	60.277
Eq–2	3.0002	–1	5.0009	0	0	3.0003	0	–5.0009	0	0	20.0075
Eq–3	0	0	–1	2.9999	0	0	1.9999	0	0	0	8.9992
Eq–4	5.9982	0	0	–1	–2.9989	0	3.9982	0	0	–2.999	–7.9989
Eq–5	–11.0016	0	9.0009	0	–1	0	0	0	6.0005	0	–11.0009

Table–7.2. Standard Deviation of Estimates of Structural Parameters: Method –W2–SLS (MCP)

Variables/ Equations	Standard Dev of Estimated A Matrix					Standard Dev of Estimated B Matrix					
	y_1	y_2	y_3	y_4	y_5	x_1	x_2	x_3	x_4	x_5	x_6
Eq–1	0	0.0124	0	0.0145	0	0	0.0066	0	0.0133	0	0.0948
Eq–2	0.0001	0	0.0007	0	0	0.0003	0	0.0006	0	0	0.0055
Eq–3	0	0	0	0.0002	0	0	0.0001	0	0	0	0.0008
Eq–4	0.0025	0	0	0	0.0013	0	0.002	0	0	0.0013	0.0024
Eq–5	0.0016	0	0.0011	0	0	0	0	0	0.0007	0	0.0026

Table–7.3. Root Mean Square of Estimates of Structural Parameters: Method –W2–SLS (MCP)

Variables/ Equations	RMS of Estimated A Matrix					RMS of Estimated B Matrix					
	y_1	y_2	y_3	y_4	y_5	x_1	x_2	x_3	x_4	x_5	x_6
Eq–1	0	0.038	0	0.044	0	0	0.02	0	0.0406	0	0.2928
Eq–2	0.0002	0	0.0011	0	0	0.0004	0	0.001	0	0	0.0094
Eq–3	0	0	0	0.0002	0	0	0.0001	0	0	0	0.0011
Eq–4	0.0031	0	0	0	0.0017	0	0.0027	0	0	0.0017	0.0026
Eq–5	0.0022	0	0.0015	0	0	0	0	0	0.0009	0	0.0028

Experiment–6: Now we increase the number of perturbations (NOUT=60) but keep the size as in experiment–1 (between –15 to 35). The results are presented in the Tables 8.1 through 8.3. We observe an increase in the RMS of estimated parameters. Yet, the SD and the RMS values are quite close to each other and the mean coefficients are not far from the true values. These findings indicate that even now the robustness of W2–SLS has not been much affected.

Table–8.1. Mean of Estimates of Structural Parameters: Method –W2–SLS (MCP)

Variables/ Equations	Mean of Estimated A Matrix					Mean of Estimated B Matrix					
	y_1	y_2	y_3	y_4	y_5	x_1	x_2	x_3	x_4	x_5	x_6
Eq–1	–1	6.8745	0	–5.8587	0	0	4.9293	0	–6.8653	0	59.0309
Eq–2	2.993	–1	5.0427	0	0	3.017	0	–5.0316	0	0	20.3147
Eq–3	0	0	–1	2.9998	0	0	1.9999	0	0	0	8.9992
Eq–4	5.9328	0	0	–1	–2.9627	0	3.9389	0	0	–2.9597	–7.9645
Eq–5	–11.0289	0	9.0121	0	–1	0	0	0	6.0301	0	–11.2607

Table–8.2. Standard Deviation of Estimates of Structural Parameters: Method –W2–SLS (MCP)

Variables/ Equations	Standard Dev of Estimated A Matrix					Standard Dev of Estimated B Matrix					
	y_1	y_2	y_3	y_4	y_5	x_1	x_2	x_3	x_4	x_5	x_6
Eq–1	0	0.8672	0	0.9883	0	0	0.477	0	0.9275	0	6.6729
Eq–2	0.1023	0	0.2672	0	0	0.0961	0	0.1807	0	0	2.0419
Eq–3	0	0	0	0.0002	0	0	0.0001	0	0	0	0.0009
Eq–4	0.9662	0	0	0	0.5063	0	0.7721	0	0	0.4964	0.5506
Eq–5	1.1557	0	0.7296	0	0	0	0	0	0.5238	0	2.1615

Table–8.3. Root Mean Square of Estimates of Structural Parameters: Method –W2–SLS (MCP)

Variables/ Equations	RMS of Estimated A Matrix					RMS of Estimated B Matrix					
	y_1	y_2	y_3	y_4	y_5	x_1	x_2	x_3	x_4	x_5	x_6
Eq–1	0	0.8762	0	0.9984	0	0	0.4822	0	0.9372	0	6.7429
Eq–2	0.1025	0	0.2706	0	0	0.0976	0	0.1834	0	0	2.066
Eq–3	0	0	0	0.0002	0	0	0.0002	0	0	0	0.0012
Eq–4	0.9685	0	0	0	0.5077	0	0.7746	0	0	0.498	0.5517
Eq–5	1.1561	0	0.7297	0	0	0	0	0	0.5247	0	2.1772

Experiment–7: Now we keep NOUT=60 but increase the size of perturbations to –140 to 160 (as in experiment–3). The results are presented in the Tables 9.1 through 9.3. We observe that the mean estimated structural parameters are as yet quite close to the true values, SDs are quite close to the RMS values, much smaller than the magnitude of the mean estimates in most cases. Hence, we may hold that the W2–SLS continues to be robust to outliers/perturbations.

Table–9.1. Mean of Estimates of Structural Parameters: Method –W2–SLS (MCP)

Variables/ Equations	Mean of Estimated A Matrix					Mean of Estimated B Matrix					
	y_1	y_2	y_3	y_4	y_5	x_1	x_2	x_3	x_4	x_5	x_6
Eq–1	–1	6.4972	0	–5.4211	0	0	4.7328	0	–6.4631	0	56.1148
Eq–2	2.9728	–1	4.7654	0	0	2.9132	0	–4.8139	0	0	18.0302
Eq–3	0	0	–1	2.9348	0	0	1.9504	0	0	0	8.7548
Eq–4	5.6354	0	0	–1	–2.8069	0	3.7122	0	0	–2.8101	–7.8982
Eq–5	–9.9977	0	8.1903	0	–1	0	0	0	5.4531	0	–9.2529

Table–9.2. Standard Deviation of Estimates of Structural Parameters: Method –W2–SLS (MCP)

Variables/ Equations	Standard Dev of Estimated A Matrix					Standard Dev of Estimated B Matrix					
	y_1	y_2	y_3	y_4	y_5	x_1	x_2	x_3	x_4	x_5	x_6
Eq–1	0	1.8062	0	2.0791	0	0	0.961	0	1.9283	0	13.9632
Eq–2	0.5312	0	2.0574	0	0	0.8135	0	1.489	0	0	15.7156
Eq–3	0	0	0	0.4834	0	0	0.3779	0	0	0	1.8151
Eq–4	1.4475	0	0	0	0.7716	0	1.1431	0	0	0.759	1.6985
Eq–5	3.5302	0	2.6157	0	0	0	0	0	1.7315	0	5.5525

Table–9.3. Root Mean Square of Estimates of Structural Parameters: Method –W2–SLS (MCP)

Variables/ Equations	RMS of Estimated A Matrix					RMS of Estimated B Matrix					
	y_1	y_2	y_3	y_4	y_5	x_1	x_2	x_3	x_4	x_5	x_6
Eq–1	0	1.8749	0	2.1582	0	0	0.9974	0	2.0016	0	14.4936
Eq–2	0.5319	0	2.0708	0	0	0.8181	0	1.5006	0	0	15.8385
Eq–3	0	0	0	0.4878	0	0	0.3811	0	0	0	1.8316
Eq–4	1.4927	0	0	0	0.7954	0	1.1787	0	0	0.7823	1.7016
Eq–5	3.6697	0	2.7381	0	0	0	0	0	1.8158	0	5.8209

Experiment–8: Next, we increase the number of perturbations to set NOUT=75 and set the size of perturbations in the range of –15 to 35. The results are presented in the Tables 10.1 through 10.3.

We observe that the unbiasedness of W2–SLS is not much disturbed since the SDs and the RMS values are close to each other. However, many of the mean estimated structural parameters are now quite far from the true values and many SDs are not much smaller than the mean estimated structural parameters. These observations suggest that the W2–SLS is no longer robust to perturbations and it has surpassed its breakdown point. It may be noted that the data matrix has 100 points. When NOUT=60, on an average about 45 of the points are perturbed. Some points are perturbed more than once. For NOUT= 75 about 52 of the points are perturbed; some points are perturbed more than once. Hence we may conclude that W2–SLS has a breakdown point somewhere between 45 to 50 percent. When more than 45 percent of points are perturbed, the estimator may break down and hence may not be reliable.

Table–10.1. Mean of Estimates of Structural Parameters: Method –W2–SLS (MCP)

Variables/ Equations	Mean of Estimated A Matrix					Mean of Estimated B Matrix					
	y_1	y_2	y_3	y_4	y_5	x_1	x_2	x_3	x_4	x_5	x_6
Eq–1	–1	3.3231	0	–1.7563	0	0	3.0309	0	–3.0828	0	31.9744
Eq–2	2.9671	–1	4.985	0	0	3.007	0	–4.9555	0	0	19.8781
Eq–3	0	0	–1	2.9232	0	0	1.9397	0	0	0	9.1577
Eq–4	4.7061	0	0	–1	–2.319	0	2.9417	0	0	–2.335	–7.0549
Eq–5	–10.0395	0	8.2862	0	–1	0	0	0	5.5304	0	–9.8211

Table–10.2. Standard Deviation of Estimates of Structural Parameters: Method –W2–SLS (MCP)

Variables/ Equations	Standard Dev of Estimated A Matrix					Standard Dev of Estimated B Matrix					
	y_1	y_2	y_3	y_4	y_5	x_1	x_2	x_3	x_4	x_5	x_6
Eq–1	0	3.5138	0	4.0812	0	0	1.8679	0	3.7447	0	26.6848
Eq–2	0.3998	0	1.8369	0	0	0.7822	0	1.3523	0	0	12.602
Eq–3	0	0	0	0.3961	0	0	0.3163	0	0	0	1.3959
Eq–4	4.1717	0	0	0	2.2287	0	3.5142	0	0	2.1507	4.343
Eq–5	2.7754	0	2.1354	0	0	0	0	0	1.387	0	5.734

Table–10.3. Root Mean Square of Estimates of Structural Parameters: Method –W2–SLS (MCP)

Variables/ Equations	RMS of Estimated A Matrix					RMS of Estimated B Matrix					
	y_1	y_2	y_3	y_4	y_5	x_1	x_2	x_3	x_4	x_5	x_6
Eq–1	0	5.0859	0	5.8877	0	0	2.7141	0	5.4191	0	38.6977
Eq–2	0.4011	0	1.837	0	0	0.7822	0	1.353	0	0	12.6026
Eq–3	0	0	0	0.4035	0	0	0.322	0	0	0	1.4047
Eq–4	4.3678	0	0	0	2.3304	0	3.6701	0	0	2.2512	4.4446
Eq–5	2.9369	0	2.2516	0	0	0	0	0	1.4644	0	5.8539

6. Conclusion

In this paper we have proposed a robust 2–Stage Weighted Least Squares estimator for estimating the parameters of a multi–equation econometric model when data contain outliers. The estimator is based on the procedure developed by Norm Campbell which has been modified by using the measure of robust median deviation suggested by Hampel et al. The estimation method based on the original Campbell procedure performs poorly, while the method based on the modified Campbell procedure shows appreciable robustness. Robustness of the proposed method is not much destabilized by the magnitude of outliers, but it is sensitive to the number of outliers/perturbations in the data matrix. The breakdown point of the method, is somewhere between 45 to 50 percent of the number of points in the data matrix.

7. References:

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ADVANCES IN KNOWLEDGE DISCOVERY IN DATABASES

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Abstract:
The Knowledge Discovery in Databases and Data Mining field proposes the development of methods and techniques for assigning useful meanings for data stored in databases. It gathers researches from many study fields like machine learning, pattern recognition, databases, statistics, artificial intelligence, knowledge acquisition for expert systems, data visualization and grids. While Data Mining represents a set of specific algorithms of finding useful meanings in stored data, Knowledge Discovery in Databases represents the overall process of finding knowledge and includes the Data Mining as one step among others such as selection, pre–processing, transformation and interpretation of mined data. This paper aims to point the most important steps that were made in the Knowledge Discovery in Databases field of study and to show how the overall process of discovering can be improved in the future.

Keywords: KDD, Knowledge Discovery in Databases, Data Mining, Knowledge Management

1. Introduction

Knowledge Discovery in Databases (KDD) is the non–trivial process of identifying valid, novel, potentially useful, and ultimately understandable patterns in data [Fayadd, Piatesky–Shapiro, and Smyth, (1996)].

Data Mining (DM) represents a set of specific methods and algorithms aimed solely at extracting patterns from raw data [Fayadd, Piatesky–Shapiro, and Smyth, (1996)].

The KDD process has developed due to the immense volume of data that must be handled easier in areas such as: business, medical industry, astronomy, genetics or banking field. Also, the success and the extraordinary development of hardware technologies led to the big capacity of storage on hard–disks, fact that challenged the appearance of many problems in manipulating immense volumes of data. Of course the most important aspect here is the fast growth of the Internet.

The core of the KDD process lies in applying DM methods and algorithms in order to discover and extract patterns from stored data but before this step data must be pre–processed. It is well known that simple use of DM algorithms does not produce good results. Thus, the overall process of finding useful knowledge in raw data involves the sequential adhibition of the following steps: developing an understanding of the application domain, creating a target data set based on an intelligent way of selecting data by focusing on a subset of variables or data samples, data cleaning and pre–processing, data reduction and projection, choosing the data mining task, choosing the data mining algorithm, the data mining step, interpreting mined patterns with possible return to any of the previous steps and consolidating discovered knowledge [Fayadd, Piatesky–Shapiro, and Smyth, (1996)].

Typical DM tasks are: classification – is learning a function that maps (classifies) a data item into one of several predefined classes [Weiss and Kuliakowski (1981); Hand (1981)], regression – is learning a function that maps a data item to a real–valued prediction variable [Fayadd, Piatesky–Shapiro, and Smyth, (1996)], clustering – is the partitioning of a data set into subsets (clusters), association rules – determine implication rules for a subset of record attributes, summarization – involves methods for finding a compact description for a subset of data [Fayadd, Piatesky–Shapiro, and Smyth, (1996)], dependency modelling – consists of finding a model that describes significant dependencies between variables [Fayadd, Piatesky–Shapiro, and Smyth, (1996)], change and deviation detection – represents the search for finding the most important changes in the data from previous measured values [Fayadd, Piatesky–Shapiro, and Smyth, (1996)].

The discovery of knowledge in databases contains many study areas such as machine–learning, pattern recognition in data, databases, statistics, artificial intelligence, data acquisition for expert systems and data visualization. The most important goal here is to extract patterns from data and to bring useful knowledge into an understandable form to the human observer. It is recommended that obtained

information to be facile to interpret for the easiness of use. The entire process aims to obtain high–level data from low level–data.

In terms of applying the KDD process there are a wide variety of sciences in which it can be used such as biology, medicine, genetics, astronomy, high–energy physics, banking, business and many others. DM methods and algorithms can be applied on a multitude of information from plain text to multimedia formats.

2. State Of The Art in KDD

The studies made about knowledge discovery in databases are advanced regarding DM methods and algorithms used to extract knowledge from data.

The main goals of KDD are: verification and discovery [Fayadd, Piatesky–Shapiro, and Smyth, (1996)]. With the verification goal, the system takes account only of user's hypothesis. Following the discovery goal, the system acts autonomous in finding useful data [Fayadd, Piatesky–Shapiro, and Smyth, (1996)]. Further, the discovery goal is subdivided in prediction and description [Fayadd, Piatesky–Shapiro, and Smyth, (1996)]. In the prediction goal, the system extracts patterns from data in order to predict future behavior of some entities. Description focuses on finding human–interpretable patterns describing the data. The importance of prediction and description goals for certain data mining applications can vary very much. However, in the context of KDD, description tends to be more important than prediction. This is in contrast to pattern recognition and machine learning applications (such as speech recognition) where prediction is often the primary goal of the KDD process [*Knowledge Discovery in Database*]. These goals are achieved with DM tasks.

For each DM task there were developed a wide variety of data mining algorithms and methods such as: decision trees, decision rules, non–linear regression, classification methods (the neural networks play an important role here), example based methods, models based on relational learning.

Intersecting the KDD field with parallel computing or distributed computing can develop the existent DM algorithms. The most important problem in the process of finding knowledge is the optimized applying of all KDD steps. Each step from the KDD process takes an amount of time. Besides analyzing certain neural network methods of classification, in this thesis we will focus also on the possibility of minimizing the amount time consumed on some KDD steps.

When the KDD term was introduced back in 1989 by the researcher Gregory Piatesky–Shapiro, there weren't too many data mining instruments for resolving one single task. A good example is the C4.5 decision tree algorithm [Quinlan, (1986)] and SNNS neural network, or parallel–coordinate visualization [Inselberg, (1985)]. This tools were hard to use and required important data preparation [Piatesky–Saphiro, (1991)].

The second–generation data mining systems were called suites and were developed by vendors, starting from 1995. These tools took into account that the KDD process requires multiple types of data analysis, and most of the effort is spent in the data cleaning and preprocessing steps. Suites like SPSS Clementine, SGI Mineset, IBM Intelligent Miner, or SAS Enterprise Miner allowed the user to perform several discovery tasks (usually classification, clustering, and visualization) and also supported data transformation and visualization. One of the most important advances, pioneered by Clementine, was a GUI (Graphical User Interface) that allowed users to build their knowledge discovery process visually [Piatesky–Saphiro, (1991)].

By the year 1999, there were over 200 tools available for solving different tasks but even the best of them addressed only a part from the overall KDD framework. Data still had to be cleaned and preprocessed. The development of this type of applications in areas like direct marketing, telecom, and fraud detection, led to emergence of data–mining–based "vertical solutions". The best examples of such applications are the systems HNC Falcon for credit card fraud detection, IBM Advanced Scout for sports analysis and NASD KDD Detection system [Kirkland, (1999); Piatesky–Saphiro, (1991)]

A very important issue is the way that data was stored over the time. Many years the main approach was to use a specific DM method or algorithm on a data set. In most cases the data set was stored in a centralized database. In present, because of big volumes of data the main solution is to use distributed databases systems. For mining in this data in the traditional way it is supposed that all data stored on local computers should be transferred on a central point for processing. In most cases this would be impossible because the existent connection bandwidth won't permit such big transfers. A very important matter is that when big transfers are made over the Internet can appear security issues: the

intimacy of client's data must be kept. Thus, a new KDD study area appeared that was called Privacy Preserving Data Mining. This field focuses on studying the security risks that can occur in the KDD process. Because the number of steps that are included in the KDD framework is relative big client's data that are mined can be violated. Privacy Preserving Data Mining tries to create algorithms that may prevent such problems [University of Munich Institute for Computer Science Database and Information Systems].

In the last years the KDD process was approached from two perspectives: parallel and distributed computing. These directions led to the apparition of Parallel KDD and Distributed KDD. In Parallel KDD, data sets are assigned to high performance multi–computer machines for analysis. The availability of this kind of machines is increasing and all algorithms that were used on single–processor units must be scaled in order to run on parallel–computers. The Parallel KDD technology is suitable for scientific simulation, transaction data or telecom data. Distributed KDD must provide solutions for local analysis of data and global solutions for recombining local results from each computing unit without causing massive data transfer to a central server. Parallel computing and distributed KDD are both integrated in Grid technologies. One of the creators of Grid concept, I. Foster wrote the followings: *The real and specific problem that underlies the Grid concept is coordinated resource sharing and problem solving in dynamic, multi–institutional virtual organizations (VO). The sharing that we are concerned with is not primarily file exchange but rather direct access to computers, software, data, and other resources, as is required by a range of collaborative problem–solving and resource–brokering strategies emerging in industry, science, and engineering. Among them, Data Mining is one of the most challenging.*

Grid computing emerged because computational power is falling behind storage possibilities. The annual doubling of data storage capacity managed to reduce the cost of a terabyte and now many researchers in physics or astronomy discuss the possibility of mining into petabyte archives. The solution to these problems lies in dramatic changes taking place in networking. All Data Mining algorithms and methods must be adapted to operate intelligent with raw data stored in a distributed way. Managing such great quantities of data over such big geographical distances brings in discussion the security problem again. Developing study fields like Privacy Preserving Data Mining is crucial for keeping the intimacy over client's data intact.

Next–generation grids will face many problems such as the management and exploitation of the overwhelming amount of data produced by applications but also Grid operations, and the intelligent use of Grid resources and services. The new generations of Grids should contain knowledge discovery and knowledge management functionalities, for both applications and system management.[Cannataro, (2003)]

3. KDD and Neural Networks

The Data Mining step is at the heart of the KDD process. Many of the DM tasks are achieved with the help of neural networks. The computing model of these networks is the human brain, so neural networks are supposed to share some brain abilities to learn and adapt in response to external inputs. When exposed to a set of training or test data, neural networks can discover previously unknown relationships and learn complex non–linear patterns in the data.

One of the most important function that our brain is able to do is the ability to classify between two things. The evolutional success of many species was made possible through this ability of discerning between what is friendly and what is dangerous for a particular specie.

Although classification is very important, sometimes it can be overdone. Because of our limited storage capacity it's crucial for us to be able to group similar notions or objects together. This ability is called clustering and is one of the main tools involved in reasoning. Because of this skill we can think in terms of abstracts notions and solve problems by seeing the hole picture and neglect unimportant details.

Regression is learning function that maps a detail of data into a real variable used for prediction. This is similar with what people do: just from seeing a few examples people can learn to interpolate between the examples given in order to generalize to new problems or cases that were not encountered. In fact the ability of generalize is one of the strongest points in using the neural network technology.

Neurophysiologists proved that the learning theory of brain called Hebbian is true: people store information by associating ideas with other related memories. In our brain there is a complex network of semantically related ideas. The theory says that when two neurons are activated in the brain at the

same time, then the connection between them grows stronger and that physical changes in the synapse of the neurons took place. Associative memory branch from the neural network filed deals with implementing models that describe the associative behaviour. Neural networks such as Binary Adaptive Memories and Hopfield networks shown to be limited capacity, but working, associative memories.

These DM operations are resolved with different neural models: backpropagation networks, recurrent backpropagation networks, Self–organizing Maps(SOM), Radial Basis Function networks(RBF), Adaptive Resonance Theory networks (ART), probabilistic neural networks, Fuzzy perceptrons. Each structure can make certain DM operations.

We use in our experiments the following distributed architectures only for resolving the classification task:

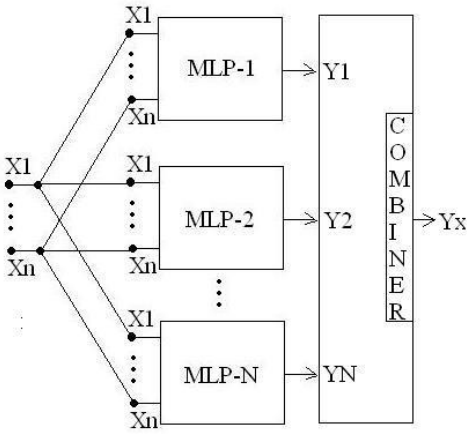

Figure 1. Multilayer Perceptron Committee Machine.

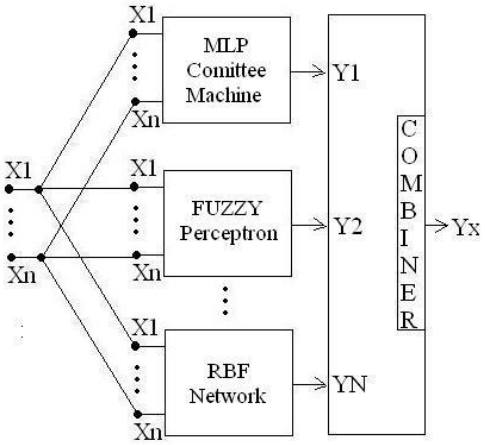

Figure 2. General Committee Machine

In the General Committee Machine (G–CM) arhitecture we have multiple neural topologies runing in the same time in a distributed way. The first block from G–CM (MLP–CM) is working in a distributed manner by itself [Mukarram, and Tahir, (2007)]. This method is prefered because of the advantages that every topology has to offer. Multilayer perceptron should be more resistant to noise than other topologies. The Fuzzy Perceptron and RBF Neural Networks are used mainly for speed. Natural organisms are equipped with multiple instruments for analyse certain problems so the proposed architectures must be fast and reliable. The entire system is autonomous and will try not to use more computational power than it's necessary. In the MLP–CM, each MLP–block will start with random weights and will work in parallel in order to reach a global error faster than normally. The result will depend on the randomly generated weights so some of the MLP–blocks will reach local minimums but some of them will reach a global minimum. Each block will have its error function. The final results will be transmited to the combiner in order to select the best result.

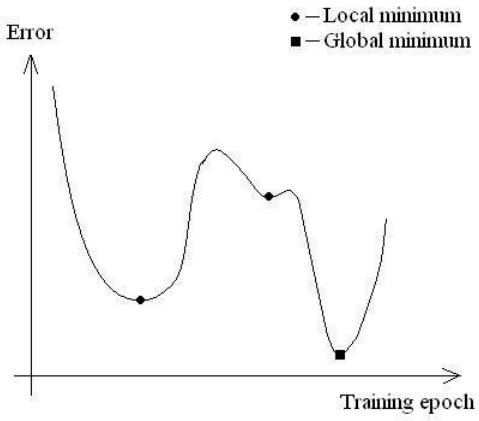

Figure 3. Example of error function

The architecture proposed in Fig.2 is the most suited for performing the clasification task in the buisness field because of the resistance to noise data.

As we can see, the ultimate goal of the neural networks is to imitate the behaviour of natural organisms.

At the base of neurology lies the studies of neurons. Neural Network field constantly benefits and depends on this field of research. Recent studies show that many of the old views should be revised because the structure and the behaviour of the natural neurons. First of all, it seems that electric synapses are more common than previously thought [Connors, and Long, (2004)]. So, instead of having an individual functionality, in some portions of the brain we have distributed computing of the information – many groups of neurons are activated simultaneous. Another observation is that dendrites and axons have the so called "voltage–gated ion channels" which can generate electric information carrying potentials from and towards the soma. This behaviour rise doubts about many actual theories that stipulate that dendrites are passive information receivers and the axons sole transmitters. These observations lead to the conclusion that neurons are more complex in structure and operations than previously thought. An important fact is also that role played by glia cells. Neurons and glias are the main components of the central nervous system. The number of the glia cells is ten times bigger than that of neurons. New studies about glia cells show that these cells are vital for the processing of information [Witcher, Kirov, and Harris, (2007)].

The McCulloch–Pitts neuron is a reduced model of the real neuron. Because of the new discoveries that are made in neurology research a new neuron model will appear eventually. These is a very feasible prediction and it can be sustained by the increase of computing power, parallel and distributed computing technologies.

4. Future Directions of Study

Although there are many future directions of study into this field of research, we can summarize the most important of them:

- The continuous development and optimisation of the Data Mining algorithms. From those presented we can predict that the neural network field can still be improved by bringing artificial neuron models as close as possible to the functionality of the biologic neuron. As we come close to the real neuron we should obtain similar performances and because of parallel and distributed technologies the functionality of large numbers of neuron units acting in a simultaneous way will be achieved.
- One of the most important study is the one about the implementation of the KDD steps on GRID platforms. Other areas of research are Parallel KDD and Distributed KDD. Because of the fact that Knowledge Discovery in Databases is an intense computing process the problem of testing specific algorithms in distributed systems is still opened.
- The continuous improvement of additional steps from the KDD process. A very important matter here is that in the real world analysed data is not pre–processed. Most of the time it is incomplete or incorrect. So the data must be pre–processed in an intelligent and optimised manner. It is well known that DM algorithms applied on wrong data it's worthless time consumption. Certain tests must be made to see exactly how the well known neural topologies behave when they have also noise besides good data at the input. This problem must be determined because there are groups of researchers that are saying that some neural topologies are more resistant to noise and other groups that are saying that all topologies are affected equally.
- The development of expert acquisition systems can resolve many of the aforementioned problems. A big problem is that many DM systems loose so much time with eliminating and correcting the rough data. It would be correct to move this process to the moment in which the data are gathered. This is one of the main reasons that slows down the development of KDD.

We propose to follow the second scheme as much as possible when data are collected for Data Mining:

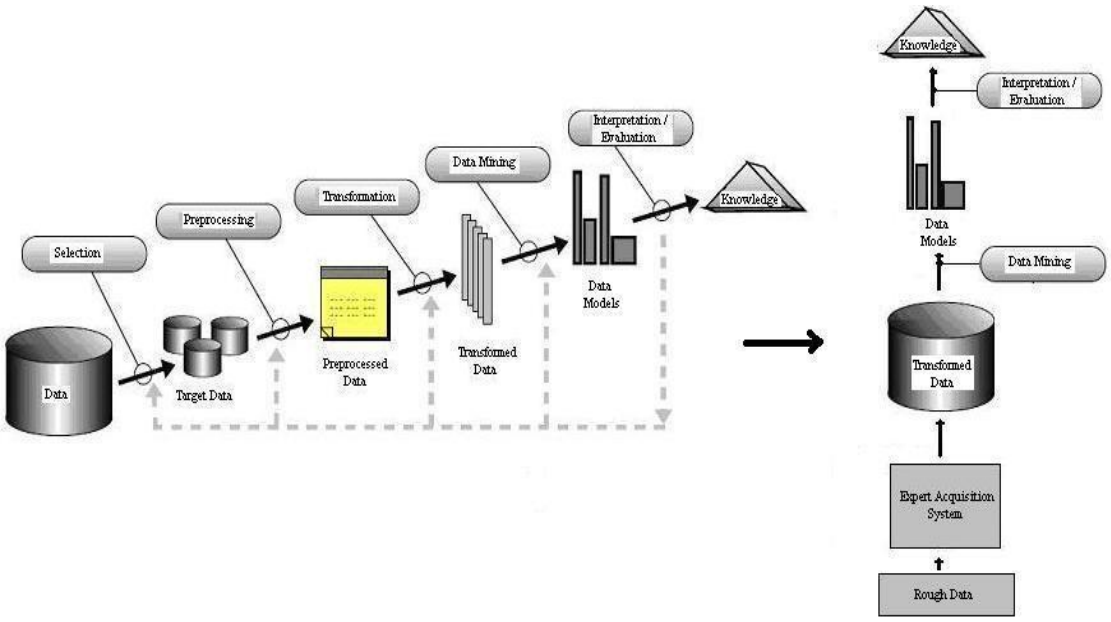

Figure 4: The classic KDD process and the new proposed model

The schemes are mainly the same but the difference is that the Expert Acquisition System (EAS) makes all the verifications at the moment when data are gathered. A big part from the selection and preprocessing steps is already done by the EAS. The best situation for KDD systems is to have good data from the start. It is well known that selection, preprocessing and transformation steps take more time than the Data Mining step.

- One of the most important future directions of study in KDD is also to resolve the security issues that might appear. Working in distributed systems is unavoidable because DM is an intense computing process so we can have important data exposed to other parties. This is something that must be avoided.

5. Conclusions

Knowledge Discovery in Databases process still poses many problems to the researchers.

In our future research we aim to study the performances of applying certain neural network algorithms on stored data and the possibility to improve the results by optimising the way that data is stored. We will treat also the performances of specific neural algorithms applied on data stored into centralized and distributed databases and observe exactly what effects has the noise on analysed data and how well certain topologies are more or less sensitive to it. Tests will be made to see how the dimensionality of databases affects the performances of the neural network architectures. The overall process of discovering useful information in data will be analysed and we hope to improve some steps from the KDD process.

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RATING AND OTHER FACTORS EXPLAINING THE CORPORATE CREDIT SPREAD: EMPIRICAL EVIDENCE FROM TUNISIAN BOND MARKET

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Abstract:
This is an examination of the determinants of corporate bond credit spreads using both primary and secondary market spreads for Tunisian corporate bonds. The factors which I use as explanatory variables in our estimations can be divided into three categories: market variables, issue and issuer characteristics. To some extent, these three categories correspond to the different types of risk, namely interest rate risk, liquidity risk and credit risk. Using OLS regressions, our empirical results indicate that primary market spreads are sensible to issue characteristics such as rating. Also, spreads observed in secondary market are sensible to market variables namely Exchange Index and Slope, characteristics issuers and issues (Rating and Time to maturity). This is the first study to indicate that the explanatory power of factors depends of spreads modelled. Hence, corporate credit spreads are driven by both default and interest rate risk for the secondary market and only by default risk for the primary market.

Keywords: credit spread, interest rate risk, liquidity risk, rating.

JEL Classification: G12, G24, G33

1. Introduction

In recent literature, a great deal of attention has been devoted to understanding the stochastic nature and determinants of credit spread. This issue plays a central role in the fixed income literature, primarily because of its importance in the pricing of risky debt and credit derivatives [Duffee, (1998), Longstaff, and Schwartz, (1995); Jarrow and Turnbull, (1995)].

The credit spread is defined to be the additional amount of interest prayed by a risky asset over the yield of a risk–free investment. In this context the term risky represents the credit risk, to which the asset is exposed through the probability of the issuer not being able to meet his obligations. This inability of meeting the obligation can be caused by insolvency, bankruptcy and further reasons leading to a delay or loss of promised payments and is referred to as the defaults of the obligor.

In the literature, there are two theoretical approaches to the pricing of risky debt. Both approaches take into account credit spreads as a central component in their pricing models.

In the structural approach [Merton, (1974), Longstaff and Schwartz, (1995)], Bevan and Garzarelli, (2000), Colin–Dufresne, *et al*., (2001), and Huang and Huang, (2003)], one makes explicit assumptions about the dynamics of a firm's assets, its capital structure, as well as its debt and share holders. It is then supposed that the firm defaults if its assets are not sufficient to pay off the due debt.

The factors affecting the price of a default–risky bond in a structural model differ for the various variants and extensions of Merton's basic model. They are determined by the respective specification of the firm value process, the definition of the threshold for the default event and other modelling issues like consideration of bankruptcy costs or stochastic interest rates. However, the set of factors which determine the price of a default–risky bond according to Merton's basic specification is common to all of its variants. In Merton's model the price of the put option on the firm's value is given by the well known Black Scholes formula and hence the factors are the ratio of debt to the value of the firm, i.e., the leverage ratio, the volatility of the firm value and the risk–free interest rate. We can see additional factors which are motivated by extensions of the basic framework, like the structural model of default risk with stochastic interest rates by Longstaff and Schwartz (1995), as well as variables motivated by empirical evidence such as measures for liquidity risk.

In the reduced form approach [Fons (1994); Jarrow and Turnbull (1995); Jarrow, *et al*., (1997); Elton, *et al*., (2001)] the default is not causally modelled in terms of firm's assets and liabilities, but is typically given exogenously i.e., the default occurs completely unexpectedly, by surprise so to speak. The stochastic structure of default is directly prescribed by an intensity or compensators process. Due

to the unpredictability of default time, the implied credit spread properties are empirically quite plausible.

Recently, the yield spread is regarded as a measure of a comprehensive risk premium to compensate investors for a number of risks associated with corporate bonds. As described in Huang and Kong (2003), this credit spread on corporate bonds is the extra yield offered to compensate investors for a variety of risks, such as expected default loss, credit risk premium due to the uncertainty of default losses and liquidity and tax premiums. For investment–grade corporate bonds, Elton *et al*., (2001), using a reduced form model, estimate a state tax premium on the order of 40 basic points and Houweling *et al*., (2003) estimate a liquidity premium on the order of 20 basic points. Delianedis and Geske (2001) study the proportion of the credit spread that is explained by default risk, using a structural model. They conclude that it only explains a small fraction of the credit spreads; the rest is attributable to taxes, jumps, liquidity and market risk factors. The paper of Collin–Dufresne *et al*., (2001) studies which factors determine the first differences of credit spreads of individual industrial bonds on US market. Their main finding is that the spreads are mostly determined by a single common factor, which is not related to pricing theory.

The main focus of the present paper is not the pricing of assets subject to credit risk, but I examine theoretical implications and empirical evidence of credit spreads. The purpose of this study is to examine the determinants of credit spreads observed in primary and secondary Tunisian market. I do this in four ways. First, published empirical work has concentrated though almost uniquely on the secondary market, especially on the US bond market. This is the first study to indicate that the explanatory power of factors depends of spreads modelled. Second, previous research focuses on the determinants of either default risk [Duffee (1998)], systematic risk [Elton, *et al*., (2001)] or liquidity risk [Ericsson and Renault, (2006)]. In this paper, I use several explanatory variables that correspond to the different types of risk. Third, the factors used in this paper present qualitative and quantitative characters. Fourth, I include an analysis of investment and no investment grade bonds to better understand how these risk factors change across risk classes.

Notice that this paper is one of very few to document the determinants of credit spread in the emerging market, namely Tunisian market of corporate bonds.

The factors which I use as explanatory variables in this study can be divided into three categories: market variables, issue and issuer characteristics. To some extent, these three categories correspond to the different types of risk which account for the spreads between the yield of corporate bonds and the yield on government bonds, namely interest rate risk, liquidity risk and credit risk.

The analysis confirms that credit spread for new issues are closely related to issuer characteristics, namely rating. Notice that the coefficient of rating is consistent with intuition (Investment Grade is usually associated with a low credit spreads). We can see that spreads observed in secondary market are sensible to market variables namely Exchange Index and Slope, issuer and issue characteristics (Rating and Time to maturity). To summarize, the Tunisian credit spreads are driven by both default and interest rate risk for the secondary market and only by default risk for the primary market and also provides evidence in favour of incorporating macroeconomic indicators into credit risk models.

The paper is organised in the following manner. First, I examine previous empirical and theoretical research suggesting a number of explanatory variables, which could affect the credit spreads. Second, I describe the main empirical results. Finally, I conclude the paper.

2. Explanatory Variables

The theoretical approach and empirical evidence show that the corporate credit spreads are affected by three factor types: market variables, issue and issuer characteristics. The most commonly mentioned factors are the default risk, liquidity effects, the term–structure of the risk free interest rate, macroeconomic indicators and the term to maturity.

2.1. Issuer characteristics

2.1.1 Rating

The theoretical central component of the credit spreads is the default risk. It refers to the probability that the issuer of a bond may default on its obligations and to the associated capital loss.

Previous studies found a strong relation between a yield spreads and rating. In fact, rating provides important information in the issuer ability to meet his obligations. A declining in credit quality of issuer can leads to inability of meeting the obligation and to a delay or loss of promised payments.

Empirical studies, like Duffee (1998) and Alessandrini (1999), have proven a tight relationship between rating and default experience and thus the credit spread. Fons (1994), Alessandrini (1999), Delianedis and Geske (2001) and Zhang (2002) observed a stronger reaction of low–graded corporate bonds spreads to systematic business cycle–related risk than high–grade bonds else equal. Alessandrini (1999) and Düllmann, *et al*., (2000) detected a higher volatility for lower–grade bonds.

Notice that Merli and Roger (1999) and Merli (2000) illustrate a negative relationship between rating and risk premiums observed in the French market of corporate bonds.

2.2 Market variables

2.2.1 Interest Rate Variables

In order to study the relationship between credit spreads and the term–structure, empirical studies implement two variables, which summarize most of the variation of the term–structure, the level and the slope of the term structure.

2.2.1.1 Level

We can see several theoretical arguments concerning the relation between credit spreads and the risk–free interest rate. While structural approach illustrates a negative relationship between the risk free rate and the default risk and thus the credit spread [Longstaff and Schwartz, (1995)], reduced form models usually postulate for empirical implementation the independence of risk–free interest rates and default risk.

Mixed empirical evidence has been found on the relationship between the credit spread and the term–structure of the risk–free interest rate.

Empirical studies like Duffee (1998) and Alessandrini (1999) for the US market, Annaert and DeCeuster (19999 for the European market by, Frino *et al*., (2006) for Australian market by and for the German market by Düllmann, *et al*. (2000) confirm a negative relation for longer maturities as well as for lower–grade bonds.

Bevan and Garzarelli (2000) support the negative relationship over the short term, over the long run, however, they document a theoretically inconsistent positive relationship.

Joutz, *et al*., (2000) suggest that Treasury yields are positively related to credit spreads in the long run, but negatively related in the short run. This has implications in the contingent claims and the reduced form approaches for valuing risky debt. In the contingent claims approach framework, an increase in Treasury yields is a negative signal to the market over the long run about the firm's future cash flows. In the short run, however, an increase in the Treasury yield indicates an increase in the value of the call option.

Huang and Kong (2003) shows that relation between interest rate level and credit spreads depend of rating. Notice that this factor can account for only a small portion of the credit spread changes for the investment–grade indexes. The signs of the coefficients on the interest rate are consistent with intuition. High interest rates and steep yield curves are usually associated with an expanding economy and low credit spreads. This variable performs much better for the high–yield credit spread series.

2.2.1.2 Slope

The interpretation of the slope of the riskless yield curve is twofold: first, in the context of the Longstaff and Schwartz (1995) structural model with stochastic interest rate, in the long run the short rate is expected to converge to the long interest rate. Hence an increase in the slope of the term structure should lead to an increase in the expected future spot rate. This in turn will decrease the credit spread, as has been pointed out above. Second, from a more general perspective, a decreasing slope of the term structure may imply a weakening economy, which in turn may lower the expected growth rate of the firm value and hence lead to higher credit spreads. Thus both arguments predict an inverse effect of changes in the slope of the yield curve on changes in the credit spread.

Boss and Scheicher (2006) show that the slope of the yield curve has a statistically significant influence on credit spreads, with coefficient around –0.28. The sign is in accordance with bond pricing theory.

Brown and Zarnic (2003) indicate that the sign of the coefficient for the term–structure slope is negative, which is in accordance with intuition, but the coefficient is statistically insignificant.

Joutz, *et al*., (2000) indicate that relation between credit spreads and the slope is complex. For intermediate investment grade bonds, there is a positive relation in both the short and long run, but for long–term bonds the predominant relation in the long run is negative and there is no statistically significant relation in the short run.

Frino *et al*., (2006) find that changes in the slope of the yield curve possess a significant amount of explanatory power for changes in AAA, AA and A spreads.

Batten and Hogan (2003) and Collin–Dufresne *et al*., (2001) find that the coefficients on the changes of the slope of the yield curve are not significant explanators of changes in the credit spread.

2.2.2 Macroeconomic Indicators

Empirical evidence indicates that credit spreads behave cyclically over time [Van Horne, (2001)]. During periods of economic downturn, credit spreads are expected to widen as investors become more risk–averse and firms have lower asset returns. Fridson and Jonsson (1995) find that an index of lagging economic indicators has significant impact on credit spread changes for high yield bond indexes. Helwege and Kleiman (1997) find that the GDP growth rate and recession indicators are important in explaining the aggregate default rates of high–yield bonds.

Jarrow and Turnbull (2000) also suggest that incorporating macroeconomic variables may improve a reduced–form model.

Huang and Kong (2003) use the month–to–month percentage changes in the three indexes of leading, coincident, and lagging indicators as gauges of the state of the US economy. The leading indicator index indicates the future direction of aggregate economic activity. The coincident indicator index measures the current health of the economy. And the lagging indicator index usually reaches its cyclical peaks in the middle of a recession.

As expected, increases in the leading index lead to narrowing credit spreads. But surprisingly, the coincident index, which measures the current health of the economy, has positive coefficients that are significant at the 5% level for four of nine credit spread series. The sign on the lagged index is mixed, and is insignificant in all cases.

Bedendo *et al*., (2004) found that a phase of economic downturn which affected the US economy in 2000–2001 had a significant impact on corporate credit spreads.

2.3 Issue characteristics

2.3.1 Term to maturity

Theoretical studies illustrate a strong relationship between term to maturity of a corporate bond and its credit spread, which is referred to as the term structure of credit spreads or credit spread curve. This relation is regarded as complex and depends on the risk of the issuing firm.

While the probability of a downgrade of high–rated companies increases with increasing term to maturity, resulting into an upward–sloping credit spread curve, low–grade companies experience an increasing probability of being upgraded the longer the term to maturity and thus a decreasing spread. This functional dependence of the credit spread on the maturity has been empirically supported by Fons (1994) and Sarig and Warga (1989).

Helwege and Turner (1999) found similar results for investment grade bonds, but argue that the downward–slope might result from a sample selection bias related to the use of ratings–related aggregate spreads.

Using the Helwege and Turner approach, He, *et al.*, (2002) confirm the findings of Fons (1994) and Sarig and Warga (1989) i.e., an upward–sloping credit spread curve for investment grade bonds and a downward–slope for speculative grade bonds.

Empirical studies like Truck *et al*. (2004) find only upward–sloping credit spread curves. These empirical results, which contradict theory, are explained by dependence on parameter values or no directly applicapability of theories for individual firms to aggregate credit spreads. The issue is still quite controversial.

2.3.2. Liquidity measuring variables

Liquidity is usually referred to as the ease with which a financial asset can be sold at or near its value. There are competing models, which examine different markets and use different measures to

capture its effect on bond yields. Mostly it is not clear how much liquidity risk contributes to the spread credit. The great majority of the academic literature defines liquidity within market microstructure models in terms of transaction costs. This approach is mainly concerned about inventory risk, which will be priced by market participants in the form of higher bid–ask spreads.

In literature different measures for liquidity were used. For corporate bonds, where most transactions occur on the over the counter market, direct liquidity measures based on transaction data are often not reliable and difficult to obtain.

Fisher (1959) was among the first academics that proposed the issued amount as a proxy variable. He claimed that large issues trade more often, so that the issued amount is actually a proxy for the direct liquidity measure trading volume. Recent studies' results suggest that larger issues are more liquid than smaller issues and should have a higher price and lower yield in order to account for the liquidity premium. Although all studies found the positive price effect of the issued size on government bond yields, the empirical research on corporate bonds is inconclusive; both positive and negative effects are observed.

The age of the bond is a popular measure of its liquidity [Yu, (2005)]. Sarig and Warga (1989) observed that while a bond gets older, an increasing percentage of its issued amount is absorbed in investors' buy–and–hold portfolios. Thus, the older the bond gets, the less trading takes place, and the less liquid it becomes. Moreover, once a bond becomes illiquid, it stays illiquid until it matures.

Houwelling, *et al*., (2003) suggest that yield dispersion, which reflects the extent to which market participants agree on the value of a bond, may be used as a good proxy for liquidity. The first argument is, that if investors have more heterogeneous perceptions, the liquidity premium is larger. Secondly, in spirit of the inventory costs argument, dealers face more uncertainty if prices show a larger diffusion among contributors. Either way, the positive relation between yield dispersion and bond yields can be assumed.

Huang and Kong (2003) calculate the ratio of net new cash flow to total net assets and the ratio of liquid assets to total net assets for all corporate bond mutual funds and all high yield mutual funds. The estimation results indicate that, as expected, the coefficient on the liquid asset ratio is positive for all the credit spread series, and the coefficient on the net cash flow ratio is negative.

Bedendo *et al*., (2004) use the difference between the yield on the Refcorp bonds and the yield on the treasury zero–coupon bonds for the corresponding maturity as a measure of liquidity premium. Refcorp bonds are virtually risk–free therefore the calculated risk premium measures the flight–to–liquidity on the risk–free bond market and its potential impact on credit spreads. They find that high liquidity premium are reflected in the corporate bond market, and lead to a significant increase in credit spreads.

Boss and Scheicher (2006) use two measures, namely the liquidity spread of 30–year government benchmark bonds, i.e., the difference between the on–the–run and the off–the–run 30–year benchmark bund, and the liquidity spread of the government bond market, which is the average absolute deviation from the mean yield error derived from a term structure estimation according to Svensson's (1994) model. The regression results show that the second measure has a strong impact on the changes of credit spreads.

Fridson and Jonsson (1995) found increased fund flow into high–yield mutual funds, as a percentage, to be associated with a narrowing of the yield spread and an increase in the price of no investment grade securities. Further, an increase in the amount of assets held as liquid securities, a percentage of high–yield assets, was associated with an increase in yield spread and a decrease in the price on no investment grade securities.

3. Modelling the Tunisian credit spread

This study models the determinants of the credit spread. Our focus lies on the detection of relevant variables that affecting credit premiums observed in primary and secondary market. To do this I formulate original testable hypotheses. The main hypotheses considered in this paper are:

H1: Credit spreads observed in primary market are more sensible to issue and issuer characteristics.

H2: Credit spreads observed in secondary market are more sensible to market variables.

I first describe our corporate bonds data. I then discuss the integration of explanatory variables used in our empirical analysis and provide some basic summary statistics on credit spread. Finally, I present and discuss the results of our estimations and provide some interpretation.

3.1 Data

I use new issues (primary market bonds) and bond of secondary market. In fact, the impacts of factors on spreads are not similar for the different market. Hence, the primary market spreads are well affected by factors characterising the issue and issuers. In the other hand, the secondary market spreads are more sensible to variations of market variables.

I consider two samples. The first (S1) is composed by the new issues for the period 1998–2007. Thus, for 133 bonds issued by the Tunisian firm corporate we have 133 observations. The second (S2) is composed by the secondary market bonds spanning the period 02/01/2004 to 22/12/2006. For 67 bonds presents in this market, we chose a bi–monthly frequency. Thus, we have 70 observations by data series.

I note that this database contains two rating categories: investment grade (rating A) and speculative grade (rating BBB). Also, I consider two sector categories: financial sector (leasing, bank and factoring) and no financial sector (trade, tourism and industry).

Table 1. Bond Repartition by Sector and Rating

Sector and Rating	Financial Sector		No Financial Sector		Rating A		Rating BBB	
	S 1	S 2	S 1	S 2	S 1	S 2	S 1	S 2
Number	80	41	23	26	45	23	36	20
%	64.10	61.19	35.9	38.81	43.69	34.33	34.95	29.85

This table shows the reparation of bonds used in our study by sectors and categories of rating, namely, investment grade (rating A) and speculative grade (rating BBB).

3.2 Integration of variables

3.2.1 Qualitative variables

The qualitative information can not be measured by a continuous manner and can take tow or several modalities. Hence, it is necessary to definer (p–1) auxiliary variables that taken, respectively, the value 0 or 1.

Rating

The *rating* is modelled as follow: for three modalities of this factor, I have the following values for two auxiliary variables. The table 1 provides a manner of integration of this variable in our regression models.

Table 2. Integration of Rating in our Regression Model

Modalities	R 1	R 2
A	1	0
BBB	0	1
No Rated	0	0

Descriptive statistics of primary and secondary market spreads for the entire samples of corporate bonds and for investment, and speculative groups are reported in appendix. Credit spreads differ substantially among the credit–risk groups. As descriptive statistics show, we can see a negative relation between rating and credit spread. This finding is subject to our empirical evidence.

Table 3: Basic summary statistics on corporate bond yield spreads observed on primary market

This table presents the mean, median, standard deviation, min and max of the credit spreads and the number of bonds analysed in this study. The spreads are partitioned according to North Africa Fitch Rating. The period of analysis is 1998 to 2007.

Sample	All bonds	A	BBB
Median	1.7825	1.2033	1.7518
Mean	1.9535	1.2433	1.8501
Min	0.9855	0.9855	1.2500
Max	3.0512	1.7480	3.0512
Number of bonds	133	28	61

Table 4: Basic summary statistics on corporate bond yield spreads observed on secondary market

This table presents the mean, median, standard deviation, min and max of the credit spreads and the number of bonds analysed in this study. The spreads are partitioned according to North Africa Fitch Rating. The period of analysis is 02/01/2004 to 22/12/2006.

Sample	All bonds	A	BBB
Median	2.4968	1.2687	2.4502
Mean	2.2144	1.2478	2.3647
Std dev	0.7511	0.2311	0.3851
Min	0.6258	0.6258	1.0968
Max	3.4622	1.6715	3.4622
Number of bonds	67	23	20

3.2.2 Quantitative variables

I include the maturity of a bond in order to describe the shape of the credit spread term structure. On average, the term structure of credit spreads is upward–sloping [see Helwege and Turner (1999)]. Therefore, longer maturity should be associated with higher yield spreads.

According to structural models of the credit risk the risk–free spot rate is a relevant factor for the pricing of risky debt. I use changes in the monetary market rate as a proxy for the risk–free spot rate. As has been pointed out above, in Merton's basic framework the price of the put option on the firm value, which determines the price of the risky debt, equals the well known Black–Scholes formula. The risk–free rate enters the Black–Scholes formula as the rate at which the expected payoff of the option at maturity is discounted to the present value.

The second variable in the category of interest rate related factors is the change in the slope of the term structure. I define the slope as the difference between the risk free rate of 3–years and short risk free rate observed.

As liquidity proxies, I use issue size. This factor has been shown to relate negatively to credit spreads [see Warga, (1992); Perraudin and Taylor, (2002)]. Generally speaking, a larger issue size is associated with more investor interest, more secondary market trading, and consequently, lower spreads. A larger issue size may also benefit from the economy of scale in underwriting costs.

I use the exchange index as a measure of general economic conditions. Although the yield curve slope is taken as measure of economic conditions, I believe that the exchange index should be a better barometer of future economic conditions.

I summarize explanatory variables taken in our studies and the expected sign of relation with credit spreads in table 5. Also, descriptive statistics for the independent variables are presented in tables 6 and 7.

Table 5: Explanatory variables and expected signs on the coefficients of the regression

Variable	Description	Expected Sign
SIZE	Size	–
MAT	Time to maturity	+
R	Rating	–
MMR	Free risk rate	–/+/0
INDBVM	Exchange index	–
SLOPE	The slope of the yield curve	–/+/0

Table 6: Descriptive statistics: independent variables**,** January 1998–July 2007

This table reports descriptive statistics of independent variables analysed in this study. The period of analysis is January 1998 through July 2007.

Variables	*SIZE*	*MAT*	*MMR*	*EI*	*SLOPE*
Median	10.0000	7.0000	5.0500	1001.220	0.5875
Mean	11.6875	6.5789	5.4843	1090.392	0.6042
Std dev	10.9919	2.5767	0.4901	310.1113	0.0740
Min	0.5	5.0000	6.8750	729.7300	0.7565
Max	70	25.0000	5.0000	1727.260	0.4796

Table 7: Descriptive statistics: independent variables, January 2004–december 2006

This table reports descriptive statistics of independent variables analysed in this study. The period of analysis is 02/01/2004 to 22/12/2006.

Variables	*SIZE*	*MAT*	*MMR*	*EI*	*SLOPE*
Median	9.8515	4.0809	5.0072	1102.180	0.28000
Mean	10.2575	4.0236	5.0092	1149.514	0.2990
Std dev	8.7714	1.7484	0.0088	180.2832	0.2511
Min	0.5	0.0073	4.9985	652.0000	–0.0387
Max	70	6.8514	5.0350	1612.590	0.7565

3.3 Empirical results

3.3.1 Explanatory factors of primary market spread

The general form of relation between dependant variable and explanatory variables is presented as follow:

$$SPREAD_i = \beta_0 + \beta_1 R1_i + \beta_2 R2_i + \beta_3 SIZE_i + \beta_4 MAT_i + \beta_5 MMR_i + \beta_6 EI_i + \beta_7 SLOPE_i + \varepsilon \quad (1)$$

Where:

i = 1, 2, …,133

$j = 0,1, 2,...,7$

ε is the error term.

The estimation results using data from January 1998 through July 2007 are presented in appendix. To judge the overall fit of our set of proxies for interest rate risk, liquidity risk, rating and macroeconomics indicators the R^2 is of particular interest. The measure of determination is around 76 % ($R^2 = 0.763607$) and indicate that our variables have some information content.

This finding is confirmed by Fisher–Snedecor test (F–statistic = 29.063 > 2.08). In fact, at least one variable provide a significant contribution in explaining risk premium.

The Student–Fisher test of marginal contribution shows that only the factors characterising issuer such as rating have significant impact on credit spreads.

The estimation results, reported in table 8, indicate, as expected, that the signs of the coefficients on the Rating are consistent with intuition. Investment grade bonds are usually associated with a low credit spreads. Notice that the coefficients on the rating are also statistically significant at the 5 % level.

I find that both level of the risk–free interest rate, and the slope of the treasury yield curve, which are used as proxies for the interest–rate factor, have not a significant influence on credit spread. While the coefficient on risk free rate is statistically insignificant, the sign is in accordance with bond pricing theory. As has been pointed out, according to the Merton model the changes of yields affect spreads in a negative form, i.e., when the general level of interest rates rises, the spread falls.

Notice that the behaviour of market liquidity is not a potentially important determinant of the spreads between risky and risk–free debt. Also, it should be noted that the sign of coefficient illustrates an economic insignificance. The estimation results indicate that, the coefficient on the macroeconomic indicator is positive for the primary market credit spread series, which is counter–intuitive.

The hypothesis H1 is partially confirmed by empirical results. In fact, primary market credit spreads are only sensible to issuer characteristics, namely the rating. Hence, corporate credit spreads are driven default risk.

3.3.2 Explanatory factors of secondary market spread

I define the following regression for the credit spread:

$$SPREAD_i^t = \beta_0 + \beta_1 R1_i^t + \beta_2 R2_i^t + \beta_3 SIZE_i^t + \beta_4 MAT_i^t + \beta_5 MMR_i^t + \beta_6 EI_i^t + \beta_7 SLOPE_t^i + \varepsilon \quad (2)$$

Where:

i = 1, 2… 67

t = 1, 2… 70.

ε is the error term.

The variables taken in our regression model have an explanatory power important, R^2 = 0.954739. At the 5% level, the Fisher–Snedecor test shows that at least one variable provide a significant contribution in explaining credit spreads (F–statistic = 31.128 > 2.08). Notice that the regression results are presented in table 8.

More importantly, the empirical results show that rating, time to maturity, exchange index and slope of risk free term structure are statistically significant at the level of 5 %. Also, they illustrate that the risk–free interest rate and the factor used as proxy of liquidity risk are not a significant explanators of changes in the credit spread.

The signs of the coefficients on the rating variables are consistent with intuition. But surprisingly, the coefficient on exchange index, which measures the current health of the economy, is negative, which is counter–intuitive. Notice that this coefficient is statistically highly significant.

I also find that the term to maturity, has a significant explanatory power on credit spread, consistent with the empirical evidence. Specifically, we find that the credit spreads are negatively related to this factor.

Empirical results are not consistent with hypothesis H2. I can see that secondary market premiums are jointly sensible to variables that correspond to market variations (Exchange Index and Slope), issuer and issue characteristics (Rating and Time to maturity). Hence, corporate credit spreads are driven by both default and interest rate risk.

For further analysis, I divided our sample into four credit–risk groups (all financial bonds, financial bonds A rated, financial bonds BBB rated and no financial bonds) and reestimated the Equation (2) for each group separately. Notice that, unlike financial bonds, the number of no financial bonds rated is much reduced.

The results of the regression are presented in table 9, for each credit rating (A and BBB) and sector. I find that credit spreads observed in Tunisian secondary market are more closely related to market variables (except the risk free rate for all cases and slope of term structure for financial bonds rated BBB) and time to maturity. The coefficients are statistically significant at the level of 5 %. I obtain similar results about the signs of coefficients.

The slope of the yield curve has a statistically significant influence on spreads. The relation between credit spreads and the slope is complex. We can conclude that only for financial bonds (all bonds and bonds rated BBB), the negative sign of the parameter for the slope of the term structure is also in line with what we expected. From the theoretical point of view a decrease in the slope should lead to a higher expected future spot rate and hence a rising credit spread. The same is true, when the slope is interpreted as an indicator for future economic growth. The estimated coefficients are large enough for economic significance to be present. For the other samples (no financial bonds and financial investment grade bonds) there is a positive relation between credit spreads and this factor.

As a proxy for the cyclical component of the credit spread I use the exchange index. While in most estimations this measure appeared to be highly significant, the sign positive, is counter–intuitive. Contrary, for financial bonds rated BBB this factor is statistically insignificant, but the sign of the coefficient on the Exchange Index is consistent with intuition. As expected, increases in this measure lead to narrowing credit spreads.

I find that term to maturity is highly significant in all cases at the level of 5 %. The positive coefficients indicate that longer time to maturity is associated with more risk, but this effect is somewhat counter intuitive if we take A and BBB rated bonds (0.103881 for A and 0.185853 for BBB). Notice

that Fons (1994); Sarig and Warga, (1989) indicate that while low–grade companies experience an increasing probability of being upgraded the longer the term to maturity and thus a decreasing spread, the probability of a downgrade of high–rated companies increases with increasing term to maturity, resulting into a upward–sloping credit spread curve.

Table 8: Estimation results

This table shows the results of regression of the credit spreads for primary and secondary market bonds on the selected variable. The values in parentheses are the t–values. I also report the p–value. The t–values in bold are statistically significant at 5% level.

Variable	Model 1 Estimate	p–Val	Model 2 Estimate	p–Val
Intercept	0.8857 (**3.02**)	0.0003	4.029121 (1.64)	0.1001
A	–1.05138 (**–12.91**)	0.0000	–1.4756 (**–245.53**)	0.0000
BBB	–0.13755 (**–2.73**)	0.00861	–0.4885 (**–83.64**)	0.0000
SIZE	0.000163 (0.38)	0.7032	–0.4152 (–0.88)	0.8825
MAT	–0.03042 (–1.12)	0.2632	0.12745 (**78.72**)	0.0000
MMR	–0.00025 (0.06)	0.3678	–0.3843 (–0.77)	0.4376
EI	0.004789 (0.06)	0.9502	0.00012 (**3.32**)	0.0009
SLOPE	0.00253 (0.35)	0.6253	0.2283 (**11.70**)	0.0000

Table 9: Regression results

This table shows the results of regression of the credit spreads for financial bonds (all samples, A–rated bonds and BBB–rated bonds) and no financial bonds on the selected variables. The values in parentheses are the t–values. The t–values in bold are statistically significant at 5% level.

Variable	Financial Sector			No Financial Sector
	All Bonds	A rated Bonds	BBB rated Bonds	
Intercept	–1.226348 (–0.13)	2.512714 (1.26)	3.579532 (0.53)	5.679735 (**2.37**)
SIZE	0.002536 (0.26)	0.01527 (0.27)	–0.2156 (–0.52)	0.08527 (0.35)
MAT	0.278907 (**48.50**)	0.103881 (**96.79**)	0.185853 (**44.58**)	0.109377 (**45.78**)
MMR	0.421753 (0.22)	–0.29812 (–0.74)	–0.45044 (–0.33)	–0.74595 (–1.54)
EI	0.000234 (1.70)	–0.000119 (**–4.02**)	0.000221 (**2.24**)	0.000264 (**7.38**)
SLOPE	–0.20737 (**–2.83**)	0.095712 (**6.12**)	–0.01761 (–0.33)	0.492193 (**24.78**)

4. Conclusion

This paper has examined which factors influence the credit spreads in the Tunisian corporate bonds. I evaluate two series, namely the primary and secondary corporate spreads. By means of linear regressions, I examine the significance of various factors proxying for interest rate, credit and liquidity risk. I examine statistical as well economic significance to quantify the overall effects of the various factors.

I proxy the term–structure of the risk–free interest rate by the level and the slope and expect a negative influence on the spread. The level is defined as the monetary market rate and the slope as the difference of the 3 –years risk free rate and the monthly rate. As a proxy for the cyclical component of the credit spread I use exchange index. To capture the liquidity risk I use size of issue. This factor has been shown to relate negatively to credit spreads.

Our principal results indicate that the hypothesis H1 is partially confirmed by our empirical results. In fact, primary market credit spreads are only sensible to issuer characteristics, namely rating. Notice that the coefficient of rating is consistent with intuition (Investment Grade is usually associated with a low credit spreads). The coefficient on the rating is also statistically significant at the 5 % level. Notice that empirical results are not consistent with hypothesis H2. We can see that spreads observed in secondary market are sensible to market variables namely Exchange Index and Slope, issuer and issue characteristics (Rating and Time to maturity). To summarize, the Tunisian credit spreads are sensible only to interest rate risk and credit risk.

In order to extend the results in this paper, I intend to analyse the regression for each credit rating (A and BBB) and sector. The results show that credit spreads observed in Tunisian secondary market are sensible to market variables (except the risk free rate for all samples and slope of term structure for financial bonds rated BBB) and time to maturity. The coefficients are statistically significant at the level of 5 %.

Generally, I confirm for the Tunisian market results of previous studies and our findings support the view that the credit spread is not an adequate measure for default risk. I provide proof that time to maturity, slope and macroeconomic indicators play a significant role in determining the credit spread on corporate bonds.

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THE RELATIONSHIP BETWEEN TEAMWORK EFFECTIVENESS AND INFORMATION TECHNOLOGY

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Abstract:
Even organizations that are better served by a team model find disadvantages. These include an increase in time to communicate, poor communication between members and groups, poor coordination between group members, and competing objectives. Some self–managed teams never reach their full potential or fail to be functional altogether, because they were not set up correctly and the other aforementioned negative results occur. Other teams increase productivity and quality in organization. In this article the authors have investigated how information technology can increase teamwork effectiveness.

Keywords: teamwork, organization, information technology, development.

1. Introduction

In today‘s world of work, fundamental transformation in complex structures are taking place. Organizations face complex and dynamic environments that have been attributed to increases in the globalization and competitiveness of the global economy.

As most every body knows, change is constant within teamwork productivity and effectiveness. The emergence of new technologies, coupled with escalating demands from business, has brought about both instability as well as new challenge.

In turn, teamwork must now look for new ways to adapt quickly, operate more efficiently and better prepare themselves for future. Not surprisingly, many organizations believe redesigning the structure of their organization is the solution, on the other hand, as well designed and planned, organization can have dramatic benefits for the enterprise, including increased profitability, greater overall efficiency and better alignment of teamwork to business needs.

Many studies have indicated that variation in team performance can be explained by differences in team structure [Cohen, and Bailey, (1997); Hackman, (1987), Manz, and Sims, (1987); Murray, and Stewart, (2000), Wageman, (1995)].

Tranfield and Smith [Tranfield, and Smith, (2002)] examined, in depth, the form of team working which take in a number of teamworking organizations across the study to ascertain their similarities and differences.

The performance in team–based working also largely depends on the employee's authorities and function design [Doorewaard, Huys, and Van Hootegem, (2002)]; i.e. to which extent the planning, performing and controlling responsibilities integrated in the team tasks.

Delarue, Gryp & Van Hootegem [Delarue, Gryp, and Van Hootegem, (2003)] investigated the impact of specific structure team types on the performance of the organization, measured by labour productivity.

When a new project starts, one of the most difficult tasks is to choose the most suitable members of the work team. The most relevant factors may be grouped into three categories: I) Individual characteristics; II) Social characteristics; III) Temporal and economic costs [Moreno, Valls, and Marin, (2004)].

Advances in information technology have enabled new organizational forms and new ways to structuring work.

In the age of the knowledge economy, most tasks accomplished as part of one's job require some forms of communications [Watson–Manheim, and Belanger, (2002)].

For long, researchers have investigated organizational communications, both formal and informal. Yet, we still need to understand better how communication based tasks can be better supported to lead to efficiencies in an environment where individuals are distributed. Regardless of specific type of work environment, individuals must manage multiple relationships to work productively [Watson–

Manheim, and Belanger, (2002)].

Team can enable a company to execute more quickly changes, are made easily, allowing the company flexibility [Mohrman, Cohen, and Mohrman, (1995)].

Each member of a group adds more information, perspective, experience and competencies [Gmelch, (1984)].

Even organizations that are better served by a team model find disadvantages. These include an increase in time to communicate, poor communication between members and groups, poor coordination between group members and competing objectives [West, Borrill, and Unsworth, (1998)].

This paper is organized as follows, we explain the assumptions of the proposed model in section 2. Section three introduces the parameters, used in the model. Section four presents a model that can be used to determine the value of teamwork performance versus information technology and team size factors. Section five includes a sensitivity analysis to the model, based on information technology, and Section six summarizes the contribution of the paper.

2. The model assumptions

Although the model can be used for any team structure (with any division), in our proposed model we assume, there is a particular assembly line (Figure 1). Also it's assumed, teamwork size is n and divided in 4 parts: I) Assembly Line 1; with $\left(\frac{n-1}{3}\right)$ members (Group 1), II) Assembly Line 2, 3; each one with $\left(\frac{n-1}{3}\right)$ members (Group 2) and III) One supervisor for all above assembly lines' members.

Each assembly line has full information interaction between members separately and all members have information interaction with supervisor.

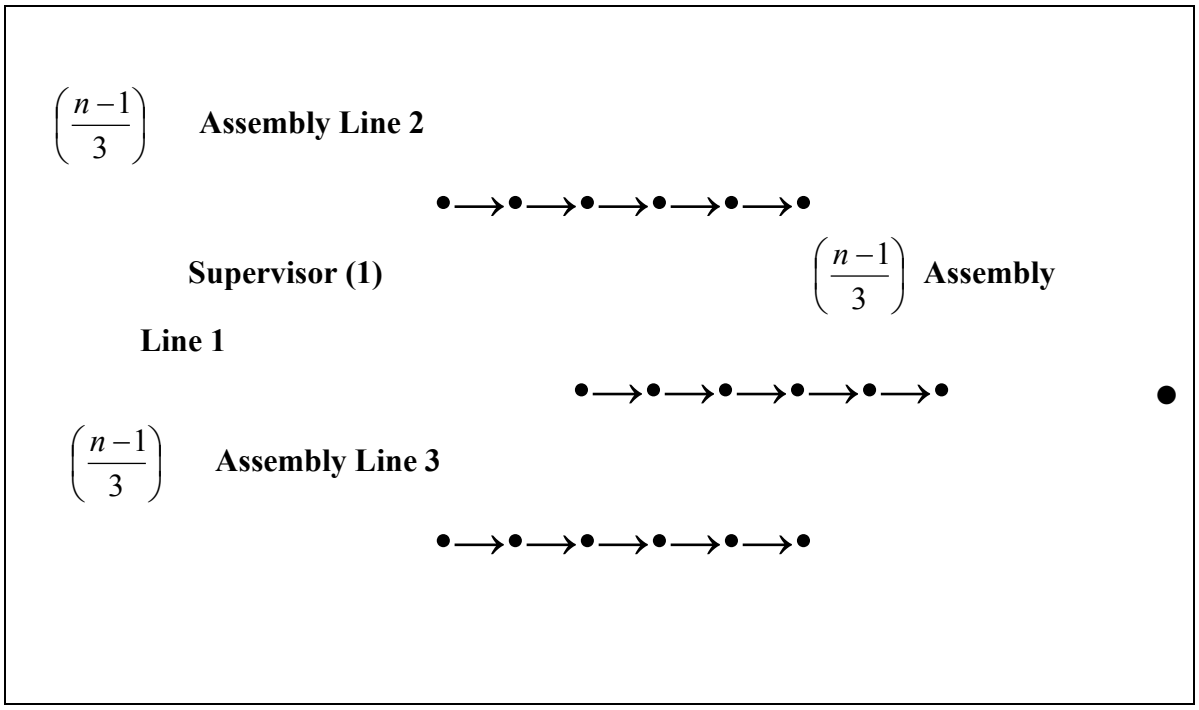

Figure 1 : An Assembly Line With star Structure

General assumptions

- An individual divides his/her time between production and information processing.
- If one unit is exclusively devoted to production, exactly one unit of output is generated.
- For each unit of output, there is also a unit of information generated.
- Each individual has to process all information received from the other team members in order to coordinate the team task.

- It takes less than one time unit to process one unit of information.

3. Parameters used in the considered model

n : The number of team members. Also,.3is multiplier of *1)–(n*and $n \geq 4$

α : The fraction of a time unit it takes to process a unit of information provided by other team members about their production. Also, $0 < \alpha < 1$.

$\Omega(n)$: The fraction of time an individual can spend on production after processing the information received from the other members.

$P(n)$: Output of team (Quantity of production).

a. The model

It is assumed that all received information must be processed, so the processing of information during one time period can be computed as follows:

(I) For each assembly line:

$\alpha\Omega_1(n)\left(\frac{n-1}{3}\right)$ units of each individual's time (1)

(Π) For supervisor:

$\alpha\Omega_2(n)(n-1)$ unit of individual's time (2)

The remaining fraction of the time period which can be spent on production, is given by:

For each assembly line:

$$\Omega_1(n) = 1 - \alpha\Omega_1(n)\left(\frac{n-1}{3}\right) \quad (3)$$

$$\Omega_1(n) = \frac{1}{1+\alpha\left(\frac{n-1}{3}\right)} \quad (4)$$

$$\Omega_2(n) = 1 - \alpha\Omega_2(n)(n-1) \quad (5)$$

For supervisor:

$$\Omega_2(n) = \frac{1}{1+\alpha(n-1)} \quad (6)$$

So equations (1) and (2) are equilibrium conditions on information generation and inf (7)
processing. As the size of team increases, each individual will spend a larger proportion of his
processing information provided by other team members and, hence, the time left for production is reduced. In practical terms, this implies that as the team size grows, the individual team mem
bers get saturated with information and productivity drops [Hilz, and Turoff, (1985)].

The total production of the team during one time period is the n:

$$\mathrm{P}(n) = \frac{n-1}{1+\alpha\left(\frac{n-1}{3}\right)} + \frac{1}{1+\alpha(n-1)} \quad (8)$$

Theorem 1: $P(n)$ is a concave, monotonically increasing function of n for all ۱ f
$0 < \alpha < 1$ and $n \geq 4$

Proof:

$$\frac{dP(n)}{dn} = \frac{1+\frac{\alpha}{3}(n-1)-\frac{\alpha}{3}(n-1)}{\left[1+\alpha\left(\frac{n-1}{3}\right)\right]^2} + \frac{-\alpha}{[1+\alpha(n-1)]^2} \tag{9}$$

$$= \frac{1}{\left[1+\alpha\left(\frac{n-1}{3}\right)\right]^2} - \frac{\alpha}{[1+\alpha(n-1)]^2} > 0 \qquad , \qquad 0<\alpha<1 \tag{10}$$

$$\frac{d^2P(n)}{dn^2} = \frac{\frac{-\alpha}{3}}{\left[1+\alpha\left(\frac{n-1}{3}\right)\right]^3} + \frac{2\alpha^2}{[1+\alpha(n-1)]^3} < 0 \qquad , \quad 0<\alpha<1 \quad \text{and} \quad n \geq 4 \tag{11}$$

Hence, $P(n)$ is a concave, monotonically increasing function in n .

Theorem 1 indicates that team output can be increased by adding members to the team. However, the marginal product of team members is decreasing due to the increased coordination effort required so that for each added team member, there is a smaller and smaller increase in output.

Beyond some value of *n*, the marginal cost of an additional team member exceeds the marginal value of the team's production.

Theorem 2: For any non zero α , $P(n)$ is a bounded function.

Proof: From theorem 1, $P(n)$ is a concave and monotonically increasing function of n . Also, $P(0)=0$.

$$\lim_{n\to\infty} P(n) = \lim_{n\to\infty} \frac{n-\mathbf{1}}{\mathbf{1}+\alpha\left(\frac{n-\mathbf{1}}{\mathbf{3}}\right)} + \frac{\mathbf{1}}{\mathbf{1}+\alpha(n-\mathbf{1})} = \frac{\mathbf{3}}{\alpha} \tag{12}$$

Hence, $P(n)$ is a bounded function.

The practical implication of Theorem 2 is that the maximum total production of a team during one time period depends on the speed at which the team members can coordinate their activities with their peers.

To increase the team's maximum production capacity, it is necessary to change the communication and processing technology (i.e. decrease the value of α) or, the work has to be reorganized so that each team member does not process all of the information provided by the other members.

Theorem 3: The marginal product of team size is asymptotically zero.

Proof:

$$\lim_{n\to\infty} \frac{dP(n)}{dn} = \lim_{n\to\infty} \frac{\mathbf{1}}{\left[\mathbf{1}+\alpha\left(\frac{n-\mathbf{1}}{\mathbf{3}}\right)\right]^2} - \frac{\alpha}{[\mathbf{1}+\alpha(n-\mathbf{1})]^2} = \mathbf{0} \tag{13}$$

Theorem 1 shows that the marginal product of team size is decreasing and theorem 3 states that the marginal product of team size is asymptotically zero. These two facts imply that for a one–period production effort, there is a single optimal team size if the cost per team member is positive and

marginally non–decreasing. This condition is equivalent to the well–known profit maximum condition that marginal cost equals marginal revenue in economic theory.

b. Sensitivity Analysis:

In the following the effect of changing information technology on team output is studied. An improvement in information technology implies that the time it takes to communicate and process a unit of information is reduced. Thus, as information technology improves the parameter α decreases.

Although information technology improvements are likely to occur in discrete increments, it is useful to study the first order derivative of the total team output.

Theorem 4: $P(n,\alpha)$ is monotonically decreasing function of α for all values of $0<\alpha<1$.

Proof:

$$0<\alpha<1\ ,\ \frac{\partial P(n,\alpha)}{\partial \alpha}=\frac{-(n-1)^2}{3\left[1+\alpha\left(\frac{n-1}{3}\right)\right]^2}+\frac{-(n-1)}{[1+\alpha(n-1)]^2}<0 \qquad (14)$$

Hence, $P(n,\alpha)$ is monotonically decreasing in α.

Thus, as information technology improves (α is reduced), team output increases. This result is consistent with expectation since less time spent on information processing implies more time spent on production.

Similarly, as information technology improves, so does the maximum output of the team. Let Δ be the reduction in processing time of one unit of information so that $\alpha'=\alpha(1-\Delta)$. Then, the increase in maximum team output is:

$$\frac{3}{\alpha'}-\frac{3}{\alpha}=\frac{3}{\alpha(1-\Delta)}-\frac{3}{\alpha}=\frac{\Delta}{1-\Delta}\frac{3}{\alpha} \qquad (15)$$

In marginal terms, there is a trade–off between adding manpower to a team and improving the information technology support to the team.

The following example will illustrate the concept. Consider a team with 22 members and information technology which allow team members to process information at a rate of 22 units per time period (i.e. $\alpha=0.05$). According to (8) the output of this team is 16.o5 per time period. If the team size is increased to 28 members it's output will be 19.05.

The same output per time period can be achieved by information technology improvement with rate of information technology processing (i.e. $\alpha=0.02$).

If the cost of 6 new team members is higher than the cost of upgrading the information technology, then an information technology upgrade is the best decision. If there is a number of technology improvement options, there may be a mix of technology improvement and team size increase that will yield the most cost efficient solution to increase team output.

Similarly, if demand for the organization output is fixed, the organization can achieve a productivity increase by investing in improved communication and processing technology and reduce the number of team members. If technology investments change the information processing rate (i.e. $\alpha=0.02$), In this Example, the team size can be reduced to 22 members without reducing production. Thus, by investing in communication and information processing technology, labor cost can be reduced by 21.5% considering the significant price reduction trends in communication and information processing technology, this explains the substantial reduction in team size, often referred to as corporate downsizing, taken in modern post–industrial economies.

4. Conclusions:

In this paper, a model has been presented that can be used to determine the value of teamwork performance versus information technology and team size.

According to this model, team output can be increased by adding members to the team. But beyond some value of team size, the marginal cost of an additional team member exceeds the marginal value of team's production. Also to increase the team's maximum production capacity, it is necessary to change the communication and processing technology.

If the cost per team member is positive and marginally non decreasing, there is a single optimal team size.

If there is a number of technology improvement options, there may be a mix of technology improvement and team size increase that will yield the most cost efficient solution to increase team output.

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ADVANCES IN DECISION ANALYSIS. EFFICIENT METHODS IN FINANCE

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Abstract:

Decision analysis offer workable solutions in domain such as the environment, health and medicine, engineering and operations research and finance. In finance area we can observe a big variety of method and techniques for research fluctuates from economy and financial date.

Most economic decisions are related to monetary variables. Since money has a capacity to connect the present and the future, conflicts among long–run and short–run economic goals and uncertainties of the future make economic decisions very complicated.

In this paper we will introduce some models to show how monetary variables can be investigated real aspects of economic development. We discusses problems encountered in financial models, describes efficient method and show how to apply them to practical problems in finance.

Key words: decision analysis, mathematical modeling, dynamic models, money.

JEL Classification: C6, E4

1. Decision analysis and mathematical modeling

The length or weight of the decisional problems is large enough, from quotidian ones of everyone, so with a particular value, to those of major importance, which are confronted by the ones skilled to lead and coordinate high level activities. In the last time, the efforts of the researchers are concentrated over the problems referring to the codification of the information and to structuralize a theory capable of to contribute to successful knowing and solving the complex decisional aspects, specific to the modern society. An unforgettable advantage can be that *the methodology of the decisional analysis* obligates the decider to see the problem as an organic whole and to surprise the information connections and fluxes between its elementary components, favoring the communication between specialists of diverse domains (engineers, economists, mathematicians, sociologists.) implicated in evaluating and solving particular segments of the problem, in which purpose they use a similar language and an advantaging ground or environment for obtaining realizable compromises between their opinions, which aren't always identical. More than that, the methodology mentioned before requests the decomposition of the problem examined, with precedence to the complex ones, in other more simple ones, concomitant with the logic synthesizing of the results obtained concerning the conception, projection and constructing an unitary and realist action program, viable under the report of the economical, technological, ecological and, why not, juridical economy.

Besides, such an analysis needs responses more clear and correct answers, without equivoque to the elementary or hypothetical problems. Sometimes, these are hard enough to solve, needing the explicitly of the points of view until the smallest details, confirming the conclusion in conform to which the "bet", the ambition of *the theory of decision* is that of quantifying the incertitude and the risks, the preferences and accepting the consequences in any situation, the efforts done by the researchers in the last years being a proof more than obvious, in this sense.

The continuous growth of diversity and complexity of calculation and modelation problems that were requested by the research activity, as a domain of avant–grade, in front of the scientists, has leaded lately to an explosive evolution of methods and ways of calculation. So, the dynamic modeling today is a discipline in full progress from the fame of the mathematic modeling and computer science but also a component that we find more and more in the everyday life, implicated in the industrial and social technology. It represents a distinctive, mature chapter of the competitional sciences which, by mathematical fine concepts and advanced informatics instruments with which they operate constitute a production force that is manifested with pregnancy in all the techno–scientific domain and economic activities.

Generally, as much as complex the activities are, in the same way the planning, the search for formal and systematic strategies and actions grow. The monetary domain is a domain in which the degree of incertitude and the risk is very high and where the planning plays a very important role in trying to reduce this incertitude. In essence, the elaboration of strategies in this domain purposes a clear and systematic structuring of the modes by which the followed objectives may be reached by a judicious allocation of resources on medium of high ground. In the frame of any development of this type there must be considered the most important aspects of planning.

Preoccupations of the economists concerning the international commerce and finances have appeared since the 14th century. These domains of economy, private in strengthened independency have stood in the view of some eminent scientific personalities, like: Adam Smith, David Hume and John Stuart Mill, which theories and concepts continue to be, in a large part, available today.

The analysis of economic relations, including those from the international currency transactions, by the prism of the creative methods (statistic, mathematical), concerning assuring a scientific rigor in the economic area as well as in the nature sciences, has started in the same century [Matei, (2004)].

The representative of the mathematical–political school (W. Petty, Gr. King, J. Grount etc.) has approached by the prism of the quantitative problems concerning the tax rate and money in the international commerce and finance. Later, in the 18th and 19th centuries, there are approached, under the quantitative aspect concerning the import and the export (Fr. Quesnay) or the request in report with the determinant facts (Ernst Engel).

In the starting of the 20th century, eminent scientists have given the economists methods of measuring and analyzing the level and intensity of the economic processes, like the grade of dependency between phenomenons. We remind, in the same sense K.Pearson, W. Pearson, I.Fisher, I. Hooker, M. Yule and M. Benini. The quantitative approaches purposed have vised the price dynamics domain, the imports and exports but also that of measuring connections between the economic processes in evolution (the correlation, the business cycle, the late effect, etc.)

Once the econometric society appeared (in 1930), this kind of preoccupations concerning the measuring and rigorous analyzing in economy by statistic and mathematical methods have took amplitude. The first models appeared (J. Tinbergen, L. Klein, J. Koopman etc.) which describe by an equation, or, especially, by an equation system of simultaneous equations of economical cause–effect type of relations. These type of models show schematically a sector of economy or national economy in ensemble (macroeconomic models), making possible the influence analysis, economic processes development prognosis, monetary politics simulation, representing an expression of progresses realized in analyzing and economic foresight in the modern and contemporary époque.

2. Efficient methods in finance

Just like the new telescopes enlarge our horizons without invalidating the discoveries did before from the close part of the universe, the mathematics show also new views, while it develops on existent knowledge. Perspectives may change, but not truths.

The new territories rediscover the reality of change. Time no longer represents the eternal repeat of some identical things, but becomes wearer of differences. This means that the status of a system at an ordinary moment is not contained in a previous state: between the first and second state there's a qualitative change. The sudden transactions, "catastrophic" bifurcations are not produced in an uncertain manner. On the contrary, they result from the conjunction of a multitude of facts that lead the system in one direction instead of another.

The dynamic models follow to make understood the temporal relations. The model operates with events and states that express the value of an attribute by which is identified the apparition of events. With the help of the data structures there are constructed transition diagrams of the states that indicate all the opinions specific to every type of object and corresponding class.

On this changing background of research facilities, the econometric studies have reoriented the analysis of periods by the dynamic models that can be studied by the new theories.

The model, as an instrument of scientific knowledge, is used in numerous theoretic and practice disciplines. The knowledge obtained from the work with methods and the try to apply them may discover new valuable concepts about a certain problem and with the type of decisions that are necessary. Simply knowing of the decision zones may be a major progress in some situations. Plus, using models, there can be recognized variables tat may be controlled for influencing the system's performance, the relevant

costs and their dimension as well as the correlation between costs and variables, including the options of important costs.

The modeling of an economic process constitutes a scientific way of unfolding the determinant factors that interfere in the frame of the respective phenomenon. In order to see the importance of these factors for the considered process it is necessary to introduce in the model constructed of the most important factors, so that, every time it is possible, there must be assured their possible quantification, which will permit the mathematical treatment.

Starting from the idea that any model is based on real data and parameters there is necessary to consider the fact of obtaining trustful data which will permit a good representation of the reality by the model. This way, when this is the case, the clinical or periodical aspect of the studied phenomenon is identified, implicitly the horizon of time it refers to.

From an econometric point of view, the classical methods based on continuity, linearity and stability have been proven unstable for representing economic phenomenon and processes with a higher degree of complexity. The researchers are obligated to follow these processes in a dynamic way, to study qualitatively the changes that interfere with the economic variables implicated as well as the results obtained with their help. Besides other characteristics, the mathematical models permit the introducing of a new isomorphism between the real economic system and the ideal one, represented as model. With their help it becomes possible to approach the instable components of different economic nonlinear systems accentuating more often the fact that linearity and stability are particular cases of economic growth.

The dynamic modeling is based on the fact that the functionality of a system is represented by the knowledge of interactions between the fluxes of information, commands, human resources, material resources etc. a dynamic model surprises the behavior of complex systems showing how their structure determinates the trajectory, respectively the behavior in time.

The apparition of the nonlinear dynamics theory has enabled the understanding and developing of some processes and methods that approach us more to reality. The development of the theory of singularities and the theory of bifurcation has completed the multitude of ways by which we dispose for analyzing and representing more and more complex, dynamics, giving the possibility of analyzing some systems which were hard, if not impossible to approach by traditional methods. The study of nonlinear dynamics is of maximum interest because the economical systems are by excellence nonlinear systems. Many of these contain multiple discontinuities and incorporate inherent instability being permanently under shock actions, extern and intern perturbations.

The application of dynamic methods represents mainly an exercise of simulation. Indifferent if someone studies the clinic behavior, alternative politics, history interpretation, model error evaluation or anything else, the numeric simulation is the correct instrument for this. For the small or linear systems, to many of these questions can be directly answered in the frame of the analytic work, many times by forms including mathematical expressions, but for the general cases, especially in the case of the large proportion used today, the numeric simulation represents the only method that is possible to use. However, "of all the types of simulation of the model, one is considered "queen" – presage"[Ungureanu, (2004)].

3. Same mathematical models used in finance

In economic science, especially in the organizational and leading disciplines, the models are used in all the diversity of types that exist. In the last decades however, there is a more and more tendency of using, in these disciplines, the mathematical type models, especially because of their capacity to condensate rigorously the essential, and also their possibility to be programmed with the help of computational techniques, forming together an instrument of scientific investment of an unknown power until the present, a prodigious "extension" of human intelligence.

3.1 Theoretic model of fiscal evasion (Allingham and Sandmo, 1972)

The high tax rates, the controller fragility and the gentle fines in the case of fiscal fraud unveiling has contributed to stimulating people to try their chances of not being discovered when a fiscal evasion strategy is applied. The tax and tax rates payer's problem is in maximizing the total income waiting utilities in case he adopts the fiscal evasion.

In the frame of this model [Albu, (2002)], it is considered the situation in which a tax payer with risk aversion receives the possibility to declare to the fiscal a smaller sum than its real income, X. The declared income $X_n > 0$ is imposited with a constant rate, $\theta > 0$, while the undeclared income $X - X_n$ is taxed, if detected, with a larger rate π. The contributable chooses X_n^* for maximizing his expected utility.

$$E[U] = (1-p)U(Y) + pU(Z)$$

where p is the possibility of detection (hexogen data) and $Y = X - \theta X_n$, $Z = X - \theta X_n - \pi(X - X_n)$ represents its income in case of detected and respectively undetected. The ordinal condition first for maximizing E[U] is

$dE[U]/dX_n = -\theta(1-p)U'(Y) + (\pi - \theta)pU'(Z) = 0$ from where the response of the tax payer at a change of θ may be determined by the derivation of

$$dX_n^*/d\theta = -D^{-1}(1-p)U'(Y)\{\theta X_n[R_A(Z) - R_A(Y)] - \pi/(\pi - \theta)\}$$

where $D = \theta^2(1-p)U''(Y) + (\pi - \theta)^2 pU''(Z) < 0$ represents the second order condition for maximization and $R_A(I) = -U''(I)/U'(I)$ is the Arrow–Pratt measure of the absolute aversion to risk. The model is discussed depending on the $dX_n^*/d\theta$ sign, considering the cases where the aversion with absolute risk is in diminution, constant or growing.

3.2 The dynamic model of Dornbusch – the exchange rate and monetary politics (1975)

This model is given by [Dameron, (2001)]

$$p_{t+1} - p_t = \pi\delta(e - p_t)$$

$$e_{t+1} - e_t = \frac{\alpha}{\beta}e_t - \left(\frac{\alpha}{\beta} - \frac{1}{\lambda}\right)p_1 - \frac{1}{\lambda}m - i$$

Where e_t represents the logarithm of the p_t exchange rate, it is the price index number logarithm, i is the intern rate of the mortgage, m the logarithm of the quantity of monetary offer, and π is the adjusting coefficient, and the parameters verify the inequalities $\alpha > 0$, $\beta > 0$, $\lambda > 0$, $\alpha > 0$, $\beta > \alpha\lambda$.

3.3 The deflation spiral (Groth (1993) and Krugman (1999))

The model presented forward constitutes a try to model the economic recession from Japan and SUA from the last years. All the variables from the model, excepting the inflation and mortgage rates are under the logarithmic form. The model is described by equation [Krugman, (1999)].

$$c = a + b(1 - t_1)y,$$

$$i = i_0 - h(r - \pi^e),$$

$$y = c + i + g,$$

$$m^d = ky - ur,$$

$$m^s = m - p,$$

$$m^d = m^s,$$

$$\pi = \alpha(y - y_n) + \pi^e,$$

$$\dot{\pi}^e = \beta(\pi - \pi^e)$$

where c is the real consummation, y the real income, i real investments, r nominal mortgage rate, π^e prognosed inflation, g governmental spending, m^d real request of money, m^s real money offer, m the nominal stock of money, p the price level, g, y_n, a, i_0 and m are supposed constants, the parameters

b, t_1, h, k, u, α and β are positive, and $bt_1 < 1$. The dynamic of the model is analyzed in report with the real money offer and the forecasted inflation rate.

3.4 IS–LM model with tax rate incomes (Cesare and Sportelli, 2005)

We present a model where the real money offer m^s is variable in time, so $m^s = m(t)$, and which considers, at the same time, the incomes from taxes.

In formulating the model, it is purposed for the incomes from taxes $T(t)$ to represent the sum between a component from the current income and one from the past income, so that

$$T(t) = (1-\varepsilon)\tau Y(t) + \varepsilon\tau Y(t-\theta),\ 0 \le \varepsilon < 1,$$

where τ is the medium rate of tax rates, and θ is a constant lateness in collecting taxes.

The IS–LM model with a collection lateness of tax rate payments purposed in [Cesare, and Sportelli, (2005)] is written under this form

$$\begin{aligned}
\dot{Y}(t) &= \alpha\left[I(Y(t), r(t)) + G - S(Y^d(t)) - T(t)\right], \\
\dot{r}(t) &= \beta\left[L(Y(t), r(t)) - M(t)\right], \\
\dot{M}(t) &= G - T(t).
\end{aligned}$$

α and β are coefficients of positive adjustment, $Y^d(t) = Y(t) - T(t)$ is the real income available.

The third equation refers to the governmental budget constraint and expresses the necessity for the government to supply money for financing its deficit or to retreat money in case of surplus from taxes.

The system's dynamic is very complex, putting in evidence stable or unstable regions, limited cycles generated by the Hopf bifurcation, limited cycles existent simultaneously.

4. Study of case. The inflation evolution in Romania

In this section we extend the Tobin's model [Zhang, (1990)]. We will study the case in which the markets are cleared and expectations are fulfilled in every period of time.

The model is given by

$$\begin{cases} \dot{x} = x\{z - \alpha[x - g(q)]\} \\ \dot{q} = \beta\{\alpha[x - g(q)] - q\} \end{cases}$$

where x is real per capita money holdings, q is the expected inflation rate, z is the constant proportional rate of increase in the nominal stock of money (is fixed by the government), β is the "expectation coefficient" (introduced by Cagan, 1956) and α is a positive constant parameter.

It is assumed that the expected inflation rate may be different from the actual inflation rate.

4.1 Equilibrium points

The equilibrium for this model is given by

$$\begin{cases} x\{z - \alpha[x - g(q)]\} = 0 \\ \beta\{\alpha[x - g(q)] - q\} = 0 \end{cases}$$

whose solution is denoted $(x_0, q_0) = \left(\frac{z}{\alpha} + g(z), z\right)$. The Jacobian matrix is given by $A = \begin{pmatrix} -\alpha x_0 & \alpha x_0 g'(q_0) \\ \alpha\beta & -\alpha\beta g'(q_0) - \beta \end{pmatrix}$ and we obtain $\det A = \alpha\beta x_0$, $trA = -\alpha\beta\left(\frac{x_0}{\beta} + \frac{1}{\alpha} + g'\right)$.

A necessary and sufficient condition for stability of the equilibrium is that $\det A > 0$ and $traceA > 0$. We will do a local analysis for this model.

4.2 Local analysis. The stability of the model

Theorem 4.1 a) If both α and $\beta \to \infty$, then the model is locally unstable,

b) Even if neither α or $\beta \to \infty$, if money is a perfect substitute for capital, the model is locally unstable.

Theorem 4.2. a) The model is locally stable if and only if: $g/\beta + 1/\alpha + g' > 0$;

b) If $\beta \to \infty$, $\alpha < \infty$, then the condition of stability is: $\alpha < -1/g'$;

c) If $\alpha \to \infty$, $\beta < \infty$, then the condition of stability is: $\beta < -g/g'$;

We will determine the function g from the date who we found of the BNR site. We use the date of the December 2005 – June 2008 period.

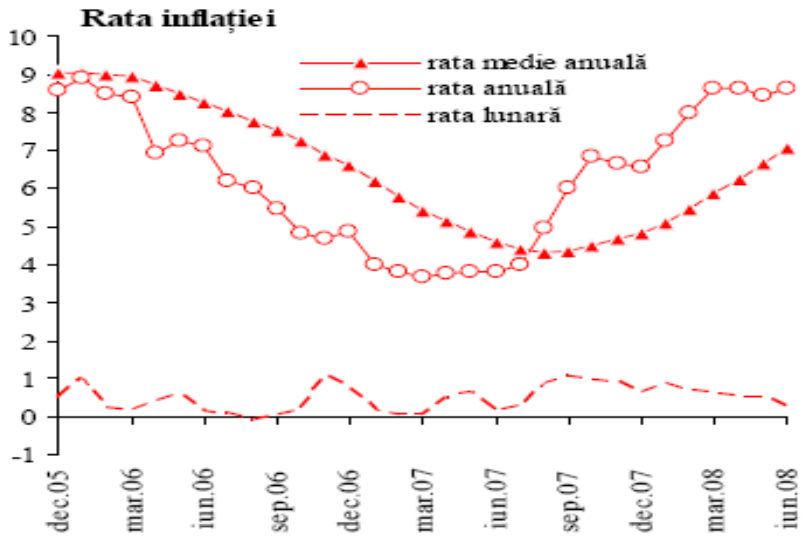

Figure 1. The inflation rate in December 2005 – June 2008 period **Source**: INS, National Bank of Romania

That observes g have a sinusoidal form, approaching or declining to the increase line witch represented the target of inflation ($d: 3{,}7x + 40y - 30 = 0$). We propose for the g function the form $g = \frac{\sin\frac{x}{2}}{x} + 8$. We deduced this expression utilized the classic method from prevision the method "the littlest squares". Its graphic is in figure 2.

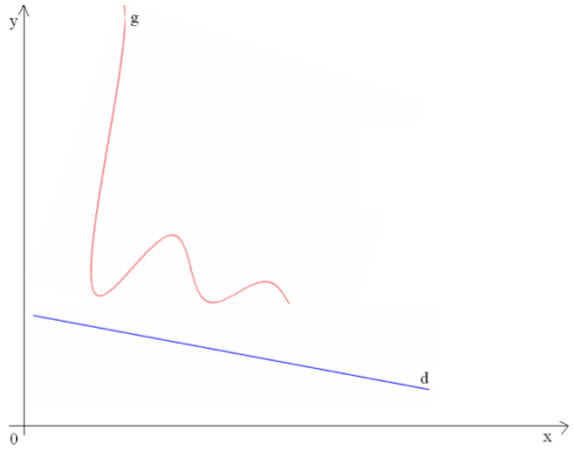

Figure 2. Graphic representation for curves g and d

Theorems 3.1 and 3.2 imply that the equilibrium may be either stable or instable; this is independent on the parameter values.

Consider the phase plane of this dynamics. First we can show that along $\dot{x} = 0$ the following result holds

$$dx / dq = g' - 1/\alpha < 0,$$

i.e. $\dot{x} = 0$ is a downward–sloping curve. Moreover, above the curve $\dot{x} = 0$, $\dot{x} < 0$ and below it $\dot{x} > 0$.

We can similarly examine the properties of $\dot{q}$. The behavior is illustrated in Figure 3.

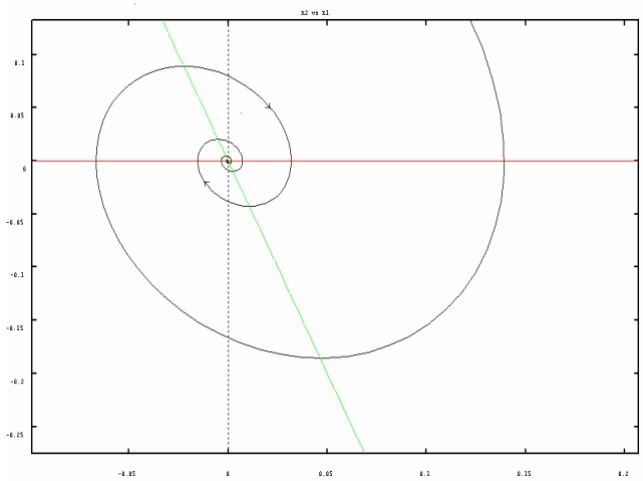

Figure 3. The Case of Stable Focus in x–q plane

5. Conclusion: recent and future development in the modeling of financial date

The relation between the degree of financial development of an economy (measured by the extent in which constraints to credit exist) and fluctuations affecting the trend of economic growth, is a relevant theme of discussion in macroeconomics.

The base element of a decision that determinates it's content, realism and efficiency, is constituted by its scientific fundament, no dissident will be able to adopt a correct decision basing only on intuition, by an empirical way, without a rigorous evaluation of the objective and subjective conditions of its implementation. The scientific foundation structure constitutes the result of some logic and exact methods to lead to the stabilizing of a more efficient decision.

In the last years, we can observe an impressive growth of interest of the scientific community for analyzing the nonlinear systems. The research of such systems, emerged by the studies realized by the mathematic and natural sciences domain researchers, has lead to the development of some new fundamental methods and concepts. Although their application in the frame of the economic science is still in the beginning phase, there have already been obtained some remarkable results of big interest for the economists. There are various economic domains and contexts in which the nonlinear methods can be proven very useful, as well as the behavior of the capital and exchange rate markets, the extern debt problems, economic depressions, hyperinflation and bank risk etc. It is clear that developing concepts and nonlinear methods represents a product of the computer era. Most of the studies from incipient phases have started with numeric analysis of very simple nonlinear methods, which today represent only the base of data editing and calculation by PC. This way it has been discovered that event the most simple nonlinear methods are capable to reproduce a large variety of properties. For example, there has been discovered that very small changes of the parameter values produce surprising results, like even the case of some classic simple methods, which in the past have been considered to have a clear cyclic behavior and easily predictable.

The open character of the national economy in the monetary politics context attest the fact that for reaching and maintaining successfully the macroeconomic stability, a multitude of circumstances in

the frame of which there are implemented the politics and financial–banking institutions are developed must be considered.

The monetary policy has a impact over the output and the workforce occupation on short term, but not for long term, being necessary here to contribute with the real economy. So, the monetary policy is a combination of a target–inflation chosen and a discrete response to certain shocks. These shocks are the ones to which the central bank can respond before the private sector adjusts its activity.

The monetary policy is under the influence of a multitude of hexogen factors, so any prognosis of it hare a high degree of incertitude. However, the monetary authority can purpose certain targets (inflation reduction, choosing the exchange rate course of the national coin) and model its policies in a manner to permit their reaching. Because the prices answer with a certain delay any economic shock, the objective of price stability implicates the debt rate growth immediately after the shock and not waiting for the prices to grow.

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NATURE OF THE FIRM: A STUDY ON DEVELOPERS IN CHINA AND HONG KONG

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Abstract:

In Hong Kong, dwellings are fitted with neat and tidy paintings, well decorated floor and wall tiles. Equipped with world–renowned kitchen and bathroom appliance, housing owners can move in with a bag of cloths. Builders in China, however, only provide fundamental elements such as windows, doors, ironmongery and grayish wall. By the time home purchasers receive their dwellings, they need to do a lot of shopping before they can move in. They need to buy water closet, tiles, towel rings and so on. Scope of services provided by Hong Kong developers is much wider than those in China's. Ronald Coase, Nobel economist 1991 addresses two questions in his 1937 paper: why firms exist and what determines their scale and scope. What are the major determining factors which affect the size of the developers and their scope of services? Few or even no paper has studied this issue. This paper reviews that unpredictable rules and regulations couple with poor law drafting decrease firms' incentive in vertical integration.

Keywords: firm, developers, Hong Kong, China

JEL Classification: K40, L16, L22

1. Introduction

Close–to–ideal fully–equipped dwellings have provided much convenience to busy nest–builders in Hong Kong. It is not unusual to find the first hand dwellings in Hong Kong with creamy white, tiled floor, floor–to–ceiling windows for unobstructed harbor views, quality appliances and fittings in kitchen and bathroom from renowned manufacturers. Fitted with high technology, residents can operate electrical appliance via PDA. There is, however, a complete different scenario in China. Builders only provide flats with no wall and file tiles and coverings for the electric socket. One of the major differences lie in the developers of two places is the scope of services provided or the size of the firms. Developers in Hong Kong provided a wide scope of services, such as provisions of painting services, decoration services etc. Developers in china simply provide concreting and steel services and nothing else. Internal contract of developers in Hong Kong is much more complicated than those in China. "Size" of the developers in Hong Kong is also larger. The question lies here is: what determine the size of scope of services of the firm? While Nobel winner Coase provided an explaination as "differences in transaction costs", this paper will try to shed light on how differences in legal regulations and perspective on laws and regulations affect the costs of transactions and size and scope of the firms in turn.

2. Bare residential units in Hong Kong, Shanghai and Haerbin: a general overview

While most of the dwellings in China are bare flats without any fittings, all the residential units are well–equipped with fittings. The table below illustrates the percentage of bare flats in Shanghai and Haerbin, two major provinces in China and Hong Kong.

Table 1. Percentage of bare flats in Shanghai, Haerbin and Hong Kong

	% of bare flats in Shanghai	% of bare flats in Haerbin	% of bare flats in Hong Kong
2001	84.8	100	0
2002	81.4	100	0
2003	79.3	93.8	0
2004	78.3	78.3	0
2005	82.9	89.2	0

Source: (Li, 2008b)

3. The nature and size of the firm

Coase comments in his recent paper "*The firm …is very extraordinary given that most resources in a modern economic system are employed within firms, with how these resources are used dependent on administrative decisions and not directly on the operation of a market. Consequently, the efficiency of the economic system depends to a very considerable extent on how these organizations conduct their affairs, particularly, of course, the modern corporation* [Coase, (2008)]." The existence of firm has arose interests of many economists, the classical economists, neo institutional economists, resource based economists and so on. While Milton Freidman has stated the importance of free to choose, why would there be some individuals would like to give up the precious opportunity to be the director of resources but choose to be directed, supervised or monitored instead?

Clues might be able to find in Adam Simth's first chapter in Wealth of Nation "*First, the improvement of the dexterity of the workman necessary increases the quantity of the work he can perform; and the division of labour, by reducing every man's business to some one simple operation, and by making this operation the sole employment of his life, necessarily increases very much the dexterity of the workman …Secondly, the advantage which is gained by saving the time commonly lost in passing from one sort of work to another…*"[Smith, (2000)] From Smith's perspective, the establishment of firm can be explained by the merits provided by the division of labour: time saving and learning by doing.

Other classic economists such as Adam Smith and Alfred Marshall have agreed that firm is a legal entity whose law prescribes its boundaries. Smith is aware of the impact of legal regulations on the nature of the firm: he has includes a section in wealth of nation where he compares the minimally regulated joint–stock companies of his time and the corporations. Clearly, Alfred Marshall holds the view that legislation in 19th century had facilitated its joint stock company's capacity to obtain capital for investment. Early institutional economists include John Commons also shed light on the importance of legal foundations on the firm.

In 1937, Coase has written a paper which proposes that differences in costs of operating institutions lead to the emergence of a firm which supersedes the market. While transactions in market involve products or commodities, transactions within a firm involve factors of production. By replacing of a product market by a factor market, Firm can save much costs of transaction. Nevertheless, Coase has never defined the term "firm" nor provide "a clear distinction between factor and product market [Coase, (1937)]. The most obvious of transaction by means of market is costs of *discovering the relevant prices.* In the absence of a firm, each input owner needs to find the price for every single component. If that is the case, costs of the final product will be enormously high. One of the possible ways to solve the problem is the emergence of a central agent who is responsible for contracting each input owners. This agent, in return, receives a price for his hard work. All these many contracts are then reduced into one single contract [Cheung, (1983)].

Based on Coase's paper, Steven Cheung in 1983 suggests that each input owners of productive input has the option of (1) producing and selling goods by himself, (2) selling his productive inputs entirely, or (3) giving up his use of his input and entering into a contractual arrangement with an agent in exchange for his income. Firm is a typical example of the third option. It emerges when the entrepreneur who holds a limited set of use rights by contract directing the production activities without immediate reference to the price of every single economic activity.

Have there been no private property rights and therefore none of the above choices are available, it is easy to realize why the worker or a resource owner is directed by a firm owner instead of market prices. Nevertheless, by the time there are private property rights – which really exist in our society; the question has become difficult to answer: nobody would like to give up his individual' rights in exchange for supervised, directed and pushed by the employer at all. What is resource owner's motivation behind to surrender his own right? To reduce transaction costs [Cheung, (1983)].

Steven Cheung proposes that there is a second factor which apparently have not considered by Coase is the information cost of knowing a product. It is often difficult for a layman to know the usage of each component or part. As Cheung comments "*[r]eaching agreement on the price of a spring inside a camera incurs a proportionately higher cost than does the camera. Although the consumer has the final say in assessing the worth of the whole product, he cannot be expected to recognize the value of each component part–he may not even know what some of them are or even that they exist. It simply costs too much to learn about everything in every commodity we buy…for a component which by itself has no readily identifiable value, agreement on price is less costly between specialists and input owners*

than it would be between input owners and consumers or between specialists and consumers. The one who produces component parts tends to know more about them than the one who consumes" [Cheung, (1983)].

He then continues to elaborate on the reasons for a firm to emerge" measurement costs. Whether the deal is between and an input owner and his agent, an agent and a customer, or a customer and input owner, some attributes or characteristics or must be measured in every transaction. Generally speaking, there are 3 circumstances which the presence of firm is much more efficient: **1.** some of the activities to be performed cannot be predetermined in advance conveniently; **2.** the activities performed by an input owner vary frequently or 3) change greatly, it then becomes more economical to surrender any direct measurement activities, substitute another measurement to serve as a proxy [Cheung, (1983)].

On top of the aforementioned reasons, there is also a problem of separating contributions generates cost in reaching price agreement. By the time input owners work together, contribution of each may not be easily delineated in some situations. It is also likely that each of them may claim more than he deserves. Although competition among resource owners lowers all the unnecessary excessive claims, the problem cannot be totally eliminated. An agent who hires workers may therefore offer a salary for each on all or nothing basis by a proxy measurement instead of contributing itself [Cheung, (1983)].

This, however, is heavily criticized by Hodgson (1988): "*The nature of the firm is not simply a minimiser of transaction costs, but a kind of protective enclave from the potentially volatile and sometimes destructive, ravaging speculation of a competitive market . . . Habits and traditions within the firm are necessarily more enduring because they embody skills and information which cannot always or easily be codified or made subject to rational calculus. What the firm achieves is an institutionalization of these rules and routines within a durable organizational structure. In consequence they are given some degree of permanence, and guarded to some extent from the moody waves of speculation in the market*" [Hodgson, (1988)].

Powell (1990), on the other hand, argues that "transactions that involve uncertainty about their outcome, that recur frequently and require substantial "transaction–specific investments" of money, time or energy that cannot be easily transferred are more likely to take place within hierarchically organized firms. Exchanges that are straightforward, non–repetitive and require no transaction– specific investment will take place across a market interface. Hence transactions are moved out of markets into hierarchies as knowledge specific to the transaction (asset specificity) builds up. When this occurs, the inefficiencies of bureaucratic organization are preferred to the relatively greater costs of market transactions.

There are two reasons for this: **1.** bounded rationality – the inability of economic actors to write contracts that cover all possible contingencies; when transactions are internalize, there is little need to anticipate such contingencies since they can be handled within the firm's" governance structure"; and **2.** opportunism – the rational pursuit by economic actors of their own advantage.

Conner and Prahalad (1996) suggests that one of the major differences between firm and market is the existence of employer–employee relation or the so–called authority, the existence of authority in the employer over his employee. In firm the latter gives up his right of autonomy and are directed by the former one.

As early as 1957, Simon suggests that we are all under the constraint of bounded rationality; nobody has got perfect information and knowledge. In market individuals are directors of their own. Transactions between them imply an establishment of a market contract which lists out the compensations and obligations of both parties. Once the contract terms are established, both parties are obliged to fulfill them.

(a) Market Contracting (b) Firm Organization

Source: (Conner and Prahalad (1996)

Figure 1 Market contracting and firm organisation.

In firm, relations between the two parties are different. Z has become the employer of Y. Z has become the legal owner of the firm. On the other hand, it is also natural to consider Z as the legal owner of the firm. Z can be the sole shareholder in case the firm is a corporation or the owner given that the firm is a sole proprietorship. Hence, we may concede that Z is the residual claimant of a firm.

On top of the prevailing view of transaction costs reduction, the emergence of firm – rather than market transactions – according to Cordes et al (2008) is to internalize scale economies as well as to reduce post–contractual hazard. Kay (2000) argues instead that the character of decisions that influences and defines nature of firms.

Apart from the nature of the firm, it has also been long regarded as "chronic puzzle" to an explanation on the limits of firm size: why couldn't we find one single giant firm does everything but a collection of small firms? We all know that bulk purchase can enable us to obtain a bargain price. It is natural, therefore, to see someone who buys a pack of six bottles lemon tea instead of one single bottle even they do not drink all at once. Large firms are in a relatively strong position in seeking source of finance for their operations. In sharp contrast, small firms often face difficulty in securing external finance [Pollard, (2003)]. One of the various obvious reasons for limited firm size can be explained by the concept of efficiency as Knight Comments:

"The relation between efficiency and size is one of the most serious problems of theory, being in contrast with the relation for a plant, largely a matter of personality and historical accident rather than of intelligible general principles…the possibility of monopoly gain offers a powerful incentive to continuous and unlimited expansion of the firm, which force must be offset by some equally powerful one making for decreased efficiency (in the production of money income) with growth in size, if even boundary competition is to exist"[Coase, (1937)].

Whilst Knight views the size of firm is determined by efficiency of the organization, Coase shares similar idea "The reason for an organization of the business unit which, the business unit, I said in exist when anyone produced to sell in the market. This implied exchange and exchange specialization. But this specialization is a specialization of the business unit – it needs imply no specialization within the business unit…Why there are two separate firms? Two reasons – 1.Increasing cost for each additional market transaction until cost of organizing marginal market transaction was equal to marketing cost that of organization. 2.That as transaction increased, might not carry out its object of reproducing market conditions [Coase, (1988)]."

Cordes et al. (2008), on the other hand, proposes firm size is determined by opportunistic behavior. If the costs of opportunistic behavior are low, *relatively few cooperative employees can support a large firm*. It is only via monitoring combined with employment contracts that appeal to an agent's self interest that shirking may be mitigated. When firm size keeps small, a higher level of cooperation can be maintained inside the group.

4. Legal system in China and Hong Kong: a general overview

"If we move from a regime of zero transaction costs to one of positive transaction costs, what becomes immediately clear is the crucial importance of the legal system in this new world. I explained in "The Problem of Social Cost" that what are traded on the market are not, as is often supposed by economists, physical entities, but the rights to perform certain actions, and the rights which individuals possess are established by the legal system [Coase, (2008)]."

China has drafted and implemented laws and regulations to govern the construction activities. It mainly consists of the laws and regulations at three levels. The highest levels of laws which govern the construction industry include the Construction Law 1997 and the Bidding and Tendering Law 1999, two laws laid down by the People's Republic of China.

The Construction Law 1997 is the most important law among all laws and regulations which concern about construction industry. It provides legal framework for construction activities and its legal effect overrides all the other construction rules and regulations.

The Construction Law is consisted of 8 chapters and 85 articles which mainly concern about bidding. The administrative regulations (*xingzheng fagui*) belongs to the second level of laws concerning are the disseminated by the State Council of PRC. They are mainly concerned about several important issues, e.g. registered architects regulations, construction project quality management and so on. At the

third level, departmental regulations and rules about human relations are deal. They are promulgated by the Ministry of Construction.

Although China has drafted, enacted and implemented numerous laws, rules and regulations, nearly none is enforced completely [Luo, (2007)] There are several characteristics in Chinese legal rules and regulations: **1.** Flexibility: In China, the major objective for legal rules and regulations is to develop the market economy by increasing certainty. By improving the certainty in legal rules, more foreign investors come to invest and speed up the economic progress in turn. Some researchers in law in China concede that it flexibility allows officials to deal with different local circumstances. Nevertheless, because of such flexibility, it brings preferential treatment by human connections and corruption [Lam, and Chen, (2004)]. **2.** Fragmentation of regulatory departments and bureaus: Usually, before a piece of legislation is put into practice in China, the Central government chooses some areas for testing the effectiveness of the new law and delegate authority to these local officials so that they can flexibly exercise the power according to local circumstances. Nevertheless, it is also Because of such flexibility, laws become uncertain. **3.** Ambiguity in regulations and laws drafting: to meet the fast growing economy in China, legal drafters have to draft laws quickly for business activities. Nevertheless, also because of this reason, they do not have enough time to consider every facet in laws and regulations. Legal rules and regulations were often drafted ambiguously. There is only a general overview without detail consideration. Making every piece of legislation can be explained in two ways [Lam, and Chen, (2004)]. **4.** Legal rules are swords of the central government, instead of shields of the general public. Similar to the traditional emperors, Marxist rulers only consider laws as a tool which help achieve the goal of certain policy enforcement and targets of the Chinese Communist Party. This is in sharp contrast to the role of law in UK and some other countries: laws are not instruments to restrain state power, but an instrument of it [Zhao, and Fu, (1999)].

There is, however, a complete different story in Hong Kong. Although Hong Kong has a relatively short history, her legal system is well–developed. It follows common law system, i.e. any precedents in court become the future legal rules. Any ambiguity in rules and regulations can be clarified by way of this. Fragmentation of legal rules never exists in Hong Kong. Largely because of its small geographical areas, it is unnecessary to further divide this tiny dot into different small pieces of area for ruling. Interpretation of laws and regulations were never in hand of politicians and ruling body, but in the hand of judges who are well–trained in law with years of experiences in handling court cases. After all, legislations, rules and regulations in Hong Kong are not the swords of the high rank rulers, but the shields of the general public. From this aspect, it is quite similar to the idea of provisions of laws in many European countries.

Failure of the legal systems can be explained by both the inherent problem in legal system as well as the informal system "*law serves a social order, i.e. the relations between individuals, and actions which affect nobody but the individuals, who perform them ought not to be subject to the control of law, however strongly they may be regulated by custom and morals*" [Hayek, (1979)].

Construction laws and practices in China have also been influenced heavily by its unique culture [Lam and Chen, (2004)]. Confucianism Chinese culture has been predominately major thought for most of the time in Chinese history. Although Confucian has brought along many good aspects to Chinese, e.g, it has build up the foundation of good human relations between friends, sons and fathers, employers and employees and so on. Confucian's thinking has under valued the importance of law. Chinese kids were told that ethical rules are more important than laws compliance [Viet, (2005)].

Laozi said" the more restrictions and prohibitions there are in the world, the poorer the people will be the more laws that more promulgated, the more thieve and bandits there will be" [Gunde, (2002)].

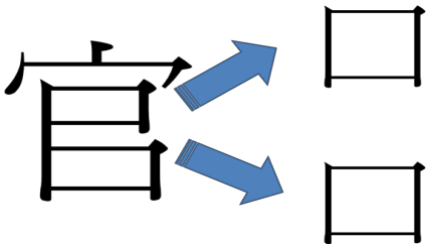
In most of the villages in China, whenever there is some crimes happen. The one who is caught usually will not be sent to the police station first but to the village leader. The village leader and/or senior village members will decide the method of punishments. Besides, they are also of the view that "the law is dead, human are alive", laws have to be adjusted according to different situations [Bhatia, (1974)]. In view of all the aforementioned characteristics, people seldom treat the terms as in contract seriously. Contracts between contractors and developers are of no exception. Not only the home buyers find the quality of the final products unacceptable, the developers also can hardly accept the workmanship of the contractors.

Traditionally, government officials have the highest and absolute power. The officials have "two mouths" while the ordinary citizen has one mouth only. "Shuo Wen Jie Zi", the first and the most famous

books written to interpret the origin of Chinese words, suggests that all the words are developed from pictures with a meaning. An intrinsic meaning from these words can be discovered by looking at the words. Below is a Chinese word of "government officials" in China, there is a "宀" part which visualises the hat of the government officials (government officials in the past need to wear hat to work every day and their hats represent the position of their job), two "口" are the mouths of the officials. While the ordinary person only has one mouth, these officials have two mouths. Such word does reveal the absolute power of officials: they voices override all those general public [Li, (2008a)]. Vague terms in laws in China allow the officials to insert their own interpretation and the general public have no say at all. The toughest battle that most plaintiffs face is persuading the court to accept the case. Citizens in China cannot sue the Party committee or secretary [O'Brien, and Li, (2005)].

All they can do is to follow the instructions from these officials for most of the time. Developers are not of exceptions. In view of the ever changing markets in China, the central government has often inserted new rules and laws suddenly.

For instance, by the time Olympic Games was held, some of the residential owners were forced to sell their units to the central government and some shop sellers were forced to close their shops. Laws were the tools of the ruling body in achieving certain objectives only. In view of the ever changing, unpredictable rules and regulations, reduction in contracting with too many contractors are one of the ways to decrease the risks in doing their business.



Source: (Li, 2008a).

Figure 1. The Chinese word of government officials "Guan" on the left and two Chinses words "mouths" "*kou*" on the right.

There is a totally different story in Hong Kong. It usually takes more than a year to pass a piece of legislations. Have there been any sudden changes in rules, politicians will help these shops and sellers to voice the problem. The power of the government is also limited by Basic Law, common law and legislations. Rules and regulations, from this perspective, are highly predictable. Black box decisions on legislations never happen in Hong Kong at present, all the legislators' opinions are recorded in black and white and uploaded on the web of the Hong Kong Legislative Council. Rules and regulations, certainly override the ethical rules in case of contradictions.

5. Implications

Because of these inherent problems in legal drafting, highly unpredictable rules and regulations, information costs in knowing and predicting the future change in regulations is high. Developers in China protect themselves by lowering the number of contracts with different contractors to decrease their risks. Have they provided wall paintings, floor tiles, washing basins, kitchen TV etc, they have to supervise them closely — contractors can easily find ways to escape their responsibilities — developers have to spend an enormously high supervision costs to ensure contractors' workmanship are up to standard. Scope of services provided by these developers has been limited by the risks and uncertainty, costs of predicting the quality of the final products. If we consider Steven Cheung's idea that the firm is a kind of contractual relation, size of the developers in China is relatively small – limited on the contract with the steel and concrete suppliers only.

Developers in Hong Kong, however, are highly protected by law. By the time the contractors fail to do an up–to–standard piece of work. There are many ways to sue or get back the money from these contractors. Purchasing kitchen TV, washing basin, PDA facilities, contracting with wall and floor tiles contractors etc are not regarded or treated as a high risk activities from developers' perspectives, cost of

knowing the final product provided by contractors are low. Rather, it is a good marketing strategy to attract potential buyers and a good opportunity to capture any potential gain from these commercial activities. Therefore, they are willing to provide a wide scope of services. "Size" of the firms is therefore larger.

6. Conclusions

The nature and size of the firm has arose the interests of many economists. Adam Smith provided the first explanation by the benefit in division of labor. Hundred years later, neo–institutional economists shed light on transaction costs. Such explanation also opens the door for identifying reasons for "several small firms" instead of "one single giant firm". Whilst previous literature suggests that choice of firm instead of market rests in the existence of costs of knowing the product, measurement and discovering the relevant price, this paper advocates that costs of predicting and interpreting legal rules and regulations limit the size of the firm. To avoid unnecessary losses, developers reduce the number of contracts with suppliers and contractors.

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