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Table of Contents



| | | |
|---|-----|------------|
| Ghorbel ACHRAF, Younes BOUJELBENE, Chouchene ISSAM | ... | 7 |
| <i>Volatility Spillover and Channels Transmission during Subprime Crisis: Empirical Study of USA Stock Market and other Developed Stock Markets</i> | | |
| Cristiana BOGDĂNOIU, Carmen Gabriela MIREA | ... | 22 |
| <i>Management Accounting From Theory to Practice</i> | | |
| Marian BONDREA | ... | 29 |
| <i>The Management of Performance Sports</i> | | |
| Nahil BOUSSIGA, Ezzeddine ABAOUB | ... | 34 |
| <i>International Financial Integration and Financial Soundness in Emerging and Developing Economies</i> | | |
| Luca GRILLI, Angelo SFRECOLA | ... | 44 |
| <i>Financial/Technical Analysis about Italian „IV Conto Energia” for Photovoltaic Energy: A Case Study</i> | | |
| Frantisek HUNKA | ... | 52 |
| <i>Power Types in Business Process Modeling</i> | | |
| Ladislau LUDVÍK, Jindra PETERKOVÁ | ... | 63 |
| <i>Specifics of Size Structure and Managing Role of the Large Companies in Enterprise Environment in the Czech Republic</i> | | |
| Rajmund MIRDALA | ... | 73 |
| <i>Lessons Learned from Tax Versus Expenditure Based Fiscal Consolidation in the European Transition Economies</i> | | |
| Vincent ŠOLTÉS, Beáta GAVUROVÁ | ... | 99 |
| <i>Application of the Cross Impact Matrix Method in Problematic Phases of the Balanced Scorecard System in Private and Public Sector</i> | | |
| Wadim STRIELKOWSKI | ... | 120 |
| <i>Economic Potential of Renitances Evidence from the South Asia Countries</i> | | |

VOLATILITY SPILLOVER AND CHANNELS TRANSMISSION DURING SUBPRIME CRISIS: EMPIRICAL STUDY OF USA STOCK MARKET AND OTHER DEVELOPED STOCK MARKETS

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Abstract

This paper proposes a framework to gauge the degree of volatility transmission during the subprime crisis of 2008 between U.S stock market and developed stock markets (France, Germany, United Kingdom, Japan) by deriving tests for conditional independence among daily volatility measures and identifies the important transmission channels on these macroeconomic variables (Real interest rate, Productivity index, Ratio of M2 to FER, Exchange rate, Terms of trade, account transaction). We use univariate and multivariate GARCH models to investigate the proprieties of conditional volatility and to estimate the volatility spillover effect by using specifically the Baba-Engle-Kraft-kroner BEKK-GARCH model and time varying correlation (DVEC). The GARCH model shows the volatility persistence of U.S and developed stock markets. Based on the BEKK-GARCH model, the estimation parameters result are statistically significant identifying the volatility spillover between U.S stock market and developed stock markets. The results of the time varying correlation show that correlation increased between U.S and developed markets during the subprime crisis period. These finding results prove the contagion effect of U.S financial crisis of 2008. The estimation results of time varying correlation and BEKK-GARCH between the macroeconomic variables of U.S and developed countries prove that the trade link as a pertinent channel transmission of Subprime crisis.

Keyword: Stock market, volatility spillover, subprime crisis, channels transmission, time varying correlation (DVEC), GARCH-BEKK.

JEL Classification: G01, G15

1. Introduction

From the beginning of July 2007 in the US under the name of "subprime crisis", economists say it was the worst crisis since the successive waves of financial crises that hit more clearly emerging countries (America Latin 94, 97 and Russia in Asia 98 ... than developed countries (the attack of the EMS 92-93, the bursting of the dotcom bubble in 2000). However, many remarkable features of these crises were how a first shock to a specific country (USA) was rapidly transmitted to markets of different sizes and structures.

One of the most phenomenal studies in the contemporary financial world is financial integration in the form of spillover effects and transmissions of volatility across markets. Some previous research showed the existence of return and volatility spillover. Eun and Shim (1989) analysed daily return in Australia, Hong Kong, Japan, and France, Canada, Switzerland, Germany, USA, and UK capital market. They found a substantial interdependence between each market with USA capital market the most influential. Hamao *et al.* (1990) used daily and intraday data from Japan (Nikkei 225), UK (FTSE 100), and USA (S&P500) for three years (from April 1985 to March 1988). They research price interdependency and volatility between three capital markets. Their research using GARCH-M (1,1) model. The result concludes that there is significant spillover effect from USA and UK capital market to Japan, but there is no significant spillover effect from Japan capital market to USA and UK. Shamiri and Isa (2009) examined volatility transmission across South East Asia and US

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stock markets using multivariate GARCH by adopting BEKK representation. Their result shows that influence of US stock market is important in South East Asia in term of return spillover.

Meanwhile, comparing to other stock market in South East Asia, Singapore, Korea, and Hong Kong stock market are the most influence stock market in term of volatility spillover as US investor hold of their market capitalization. Longin and Solnik find that international correlations have increased over the chosen time period and also that there exists a positive link between volatility and correlations. Le and Kakinaka (2010) has investigated transmission of mean return and volatility from US, Japan, and China stock market to Indonesia and Malaysia stock market using daily data from January 2005 to December 2007. By adopting GARCH model, they find that US stock market influence Indonesia and Malaysia stock market. The results also support significant feedback relationship in mean return between Japan and Indonesia, and between Japan and Malaysia. They also found significant level of mean and volatility spillover between China and Indonesia and Malaysia.

Existence of contagion and transmission of volatility has important implications. Because no open economy can insulate itself from what is happening in the rest of the world, to prevent contagious financial crises countries may need to adopt regionally or globally coordinated measures.

The main objective of this paper is to gauge the degree of volatility transmission during the subprime crisis between US stock market and developed stock markets (France, Germany, United Kingdom and Japan) by deriving tests for conditional independence among daily volatility measures and identify the channels transmission of subprime crisis. Theoretically, some authors, Forbes and Rigobon (2001), Gerlach and Smets (1995) and Corsetti *et al.* (2000), Rigobon (1998), Chari and Kehoe (2003) and Calvo and Mendoza (2000), Masson (1998) have identified the different propagation channels presented during previous crises (EMS, the Mexican crisis, Asian crisis, etc).

2. Related review of transmission channels

The definition of contagion could be marked by two important phases: the first refers to the notion of contagion in a broad sense, that is to say, it is enough that the transmission of the crisis to identify contagion regard less of the transmission channel; and the second highlights the contagion in its strict sense³, it seeks to distinguish the existing transmission channels independently of the crisis (contagion theory of non-contingent) of those whose existence and activity are conditioned by the crisis (theory contagion contingent).

Forbes and Rigobon (2001) summarize four transmission channels⁴ that contribute to contagion not contingent. The sales channel has been developed by Gerlach and Smets (1995) and Corsetti *et al.* (2000). The transmission channel of policy coordination implies that the pre-established agreements between two countries could engage one of them to follow the same policy in response to an economic shock.

Rigobon (1998), Chari and Kehoe (2003) and Calvo and Mendoza (2000) have helped to advance the fundamental resemblance of the channel. Masson (1998) discusses the mechanism of the effect of monsoon that a common shock (increase in interest rates, falling demand, a contraction of capital etc...) might affect the fundamentals of many economies experiencing the following crisis. These transmission channels are not conditioned by the occurrence of the crisis; there is no link between changing markets before and during the crisis.

Therefore, if transmission via these channels crisis, Forbes and Rigobon (2001) consider that there is no contagion in its strict sense, but only interdependence. According to these authors, three other channels could identify pure contagion. The first mechanism is these multiples equilibriums which based on investor psychology, Masson (1999). This shift in balance at poor balance due to the belief of investors may also be due to a memory effect developed by Mullainathan (2002): Shock could recall a crisis of the past for investors who anticipate a high probability of crisis even though the fundamentals are good. The second transmission mechanism of pure contagion is the endogenous liquidity shock developed by Valdes (1996).

³ Forbes et Rigobon talk about « shift-contagion » (Forbes & Rigobon, 2001).

⁴ Among these channels, there is the behaviour of international investor's respecting the economic fundamentals of a country or group of countries (Pritsker, 2001); the wealth effect and the liquidity channel (Dornbusch *et al.*, 2001).

Calvo (1999) distinguishes informed investors who undergo a real liquidity shock of uninformed investors who adopt follower behavior. The last channel is that of political contagion.

Drazen (1998) modeled the EMS currency crises by showing that the abandonment of fixed exchange rates by a first country reduces the political costs of the output of the fluctuation band of other members. All these mechanisms are conditioned by the occurrence of the crisis, and the link between markets is intensifying following the outbreak of these mechanisms, it is therefore of contagion.

Eichengreen (1996) conduct a significant rejection of the hypothesis of contagion and argue that trade linkages and macroeconomic similarities are the main sources of transmission of the shock.

Baig and Goldfajn (1998) lead to the acceptance of the hypothesis of contagion in foreign debt markets and financial markets and apart from the influence of the news and fundamentals. These authors used the VAR technique and function of shock response for a series of exchange rates and equity indices daily for a whole country of South East Asia for a period of 2 July 1998 to May 18. Edwards (1998) using monthly interest rates for a period from 1982 to 1998 supports the hypothesis of contagion from Mexico to Argentina and by applying the technique GARCH.

3. Empirical analysis

3.1 Methodology and data

In our empirical processes we mainly conduct an examination the channels transition during the subprime crisis. By Forbes and Rigobon (2000), it would be easier to identify the contagion in its broadest sense between two financial markets if we can detect a significant increase in correlation during the crisis episode. For the link between stocks markets quiet periods, the correlation coefficient is a good measure since no data is extreme, i.e. high volatility.

The importance of modeling the volatility effect in financial markets during the financial turmoil has increased significantly and there has been a correspondingly large amount of literature over time to address the issue. Currently, the ARCH/GARCH models are amongst the most popular econometric models being used in academic studies. On the one hand, we use the GARCH (Generalized Autoregressive Conditional Heteroskedasticity) model to estimate the persistence of volatility for US stock market and developed stock market (Japan, Germany, France and RU). Then, we examine the volatility spillover and time varying correlation between US stock market and developed stock market. On the other hand, we analyze the volatility spillover and time varying correlation between fundamentals variables of US stock market and developed stock markets. First, we use GARCH (1, 1) specification to estimate the persistence of volatility. We estimate the volatility persistence using the GARCH (p,q) model introduced by Bollerslev (1986) and is given by:

$$R_t = \mu + \varepsilon_t$$

$$\sigma_{it}^2 = \omega_i + \sum_{j=1}^p \alpha_{ij} \varepsilon_{i,t-j}^2 + \sum_{i=1}^q \beta_{ij} h_{i,t-j} \quad (1)$$

When α captures ARCH coefficients and β captures GARCH coefficients. The parameters in variance equation must be positive and $\alpha + \beta$ is expected to be less than unity. Second, we examine the volatility spillover between US stock market and international stock markets by using a multivariate BEKK-GARCH model. We start the empirical spillover specification with a bivariate VAR-GARCH (1,1) model that accommodates US index returns and the index returns of each stock market lagged one period. This model is as follow:

$$r_t = \mu + \lambda r_{t-1} + \varepsilon_t \quad (2)$$

$$\varepsilon_t / F_{t-1} \sim N(0, H_t) \quad (3)$$

$$r_t = \begin{pmatrix} r_{1,t} \\ r_{2,t} \end{pmatrix}, \mu = \begin{pmatrix} c_1 \\ c_2 \end{pmatrix}, \lambda = \begin{pmatrix} \lambda_{11} & \lambda_{12} \\ \lambda_{21} & \lambda_{22} \end{pmatrix}, \varepsilon_t = \begin{pmatrix} \varepsilon_{1,t} \\ \varepsilon_{2,t} \end{pmatrix}, H_t = \begin{pmatrix} h_{11,t} & h_{12,t} \\ h_{21,t} & h_{22,t} \end{pmatrix}$$

When, $r_{1,t}$ represents the daily US index returns and $r_{2,t}$ are international index returns. The element λ_{12} is the degree of mean spillover effects from the US market to each stock market. The vector of random errors ε_t represents the innovation for each market at time t with its corresponding conditional variance-covariance matrix H_t . The market information available at time $t-1$ is represented by the information set F_{t-1} . The vector μ represents the constant. The $h_{11,t}$ represents variance of US index $h_{22,t}$ is the variance of stock markets and $h_{12,t}$ represents the covariance between US stock index and each stock market. Given the above expression, and following Engle and Kroner (1995), the conditional covariance matrix can be written as:

$$H_t = C_0' C_0 + \sum_{i=1}^q A' \varepsilon_{t-1} \varepsilon_{t-1}' A_i + \sum_{i=1}^q G' H_{t-1} G_i \quad (4)$$

where:

$$C_0 = \begin{pmatrix} \omega_{11} & \omega_{12} \\ \omega_{21} & \omega_{22} \end{pmatrix}, A = \begin{pmatrix} \alpha_{11} & \alpha_{12} \\ \alpha_{21} & \alpha_{22} \end{pmatrix}, G = \begin{pmatrix} \beta_{11} & \beta_{12} \\ \beta_{21} & \beta_{22} \end{pmatrix}, H_t = \begin{pmatrix} h_{1t} \\ h_{2t} \end{pmatrix}$$

In the variance model, C_0 , A_i and G_i are $k \times k$ parameter matrices with C_0 is a lower triangular matrix. where ω_{ij} are elements of a symmetric matrix of constants C_0 , the elements α_{ij} of the symmetric matrix A measure the degree of market shocks from market i to market j , and the elements β_{ij} of the symmetric matrix G indicate the persistence in conditional volatility between market i and market j . For instant, β_{12} represents the volatility spillover from stock market. The conditional variance for each bivariate BEKK-GARCH (1,1) equation (excluding constants) can be written as:

$$h_{11,t} = \alpha_{11}(\alpha_{11}\varepsilon_{1,t-1}^2 + \alpha_{21}\varepsilon_{1,t-1}\varepsilon_{2,t-1}) + \alpha_{21}(\alpha_{11}\varepsilon_{1,t-1}\varepsilon_{2,t-1} + \alpha_{21}\varepsilon_{2,t-1}^2) + \beta_{11}(\beta_{11}h_{11,t-1} + \beta_{21}h_{21,t-1}) + \beta_{21}(\beta_{11}h_{12,t-1} + \beta_{21}h_{22,t-1}) \quad (5)$$

$$h_{22,t} = \alpha_{12}(\alpha_{12}\varepsilon_{1,t-1}^2 + \alpha_{22}\varepsilon_{1,t-1}\varepsilon_{2,t-1}) + \alpha_{22}(\alpha_{12}\varepsilon_{1,t-1}\varepsilon_{2,t-1} + \alpha_{22}\varepsilon_{2,t-1}^2) + \beta_{12}(\beta_{12}h_{11,t-1} + \beta_{22}h_{21,t-1}) + \beta_{22}(\beta_{12}h_{12,t-1} + \beta_{22}h_{22,t-1}) \quad (6)$$

$$h_{12,t} = \alpha_{12}(\alpha_{11}\varepsilon_{1,t-1}^2 + \alpha_{21}\varepsilon_{1,t-1}\varepsilon_{2,t-1}) + \alpha_{21}(\alpha_{11}\varepsilon_{1,t-1}\varepsilon_{2,t-1} + \alpha_{21}\varepsilon_{2,t-1}^2) + \beta_{12}(\beta_{12}h_{11,t-1} + \beta_{21}h_{21,t-1}) + \beta_{22}(\beta_{11}h_{12,t-1} + \beta_{21}h_{22,t-1}) \quad (7)$$

$$\text{when } h_{12,t} = h_{21,t}.$$

Equations (4), (5), and (6) represent how shocks and volatility are transmitted across stock markets. Also, we estimate the volatility spillover between fundamentals variables of US and each country for identifying the channels transition of the US financial crisis. Finally, we estimate the time-varying correlation with the Diagonal VEC (DVEC) model suggested by Bollerslev *et al.* (1988). The time-varying correlation between $r_{1,t}$ and $r_{2,t}$ is:

$$\rho_{12,t} = \frac{\sigma_{12,t}}{\sqrt{\sigma_{11,t}\sigma_{22,t}}} \quad (8)$$

When $\sigma_{1,t}$ and $\sigma_{2,t}$ are the standard deviation of US market and each international stock market, respectively.

The data used are daily returns of stock indices⁵ of five countries of the three different continents. The study period is separated into two sub-periods, the quiet period, which runs from 02/01/2002 to 31/07/2007, 1541 observations for each country. A period of stability and crisis that starts with the date of onset of the subprime crisis in the US stock market 01/08/2007 to 02/12/2011, about 1041 observations for stocks markets. Thus, we used quarterly data for the period 1.2.2002 to 12.2.2011 to identify the transmission channels of the crisis: macroeconomic⁶ variables (Real interest rate, index of productivity) and financial variables (Ratio of M2 to FER, spleen Exchange, Terms of trade, account transaction).

For each stock market returns are defined as the continuously compounded return on stock price index. The stock market returns are computed as follows: $r_t = \ln(p_t / p_{t-1})$

4. Empirical results

4.1 Descriptive statistics

Descriptive statistics examine normality of distribution. The series normality is tested by symmetry coefficients (Skewness) and flatness (kurtosis). Summary statistics for the return series are presented in Table 1 where indicates some statistical properties of the stock returns of the sample and of the two sub-periods.

These results, of stability period, reveal that United Kingdom is has the lowest mean (0.000142) whereas the highest mean is that of Germany (0.000264). But, the sample means are negative for all stock market indices in the crisis period. The standard deviations differences between the stability period and the crisis period are more visible. These latter increased during the crisis period. This increase in volatility is of (0.815%) for the US and (0.58%) for France and (0.68%), (0.306%) and (0.55%) respectively for Japan, Germany and United Kingdom. These statistics reveal a high depreciation of indices prices associated with an accrued volatility.

Table 1. Descriptive statistics stability period

| Financial Market | USA (S&P500) | France (CAC40) | Japan (Nikkei 225) | Germany (Mdax30) | United Kingdom (FTSE100) |
|------------------|--------------|----------------|--------------------|------------------|--------------------------|
| Mean | 0.000174 | 0.000150 | 0.000263 | 0.000264 | 0.000142 |
| Stan. Dev. | 0.009948 | 0.013266 | 0.012383 | 0.015012 | 0.010702 |
| Kurtosis | 6.075153 | 7.106323 | 4.343898 | 6.656713 | 7.532846 |
| Skewness | 0.133205 | -0.009101 | -0.242671 | -0.019109 | -0.208832 |
| ADF-t(c) | -41.397 | -40.022 | -38.682 | -41.235 | -25.665 |
| ADF-t(LT) | -41.399 | -40.045 | -38.670 | -41.321 | -25.703 |

Table 2. Descriptive statistics crisis period (continued)

| Financial Market | USA (S&P500) | France (CAC40) | Japan (Nikkei 225) | Germany (Mdax30) | United Kingdom (FTSE100) |
|------------------|--------------|----------------|--------------------|------------------|--------------------------|
| Mean | -0.000148 | -0.000551 | -0.000507 | -0.000233 | -0.000141 |
| Stan. Dev. | 0.018097 | 0.018994 | 0.019122 | 0.018081 | 0.016148 |
| Kurtosis | 9.339714 | 7.546443 | 10.84350 | 7.904023 | 8.484098 |
| Skewness | -0.325674 | 0.162672 | -0.510232 | 0.155771 | -0.056637 |
| ADF-t(c) | -26.433 | -33.601 | -21.404 | -31.803 | -15.537 |
| ADF-t(LT) | -26.476 | -33.600 | -21.407 | -31.808 | -15.530 |

⁵ <http://www.econstats.com/>

⁶ <http://stats.oecd.org:> <http://epp.eurostat.ec.europa.eu>

The returns of stock market are almost zero on average, we note also the coefficient of Kurtosis is very high (Kurtosis>3), it confirms a great probability the occurrence of the extreme values. The sign of the skewness vary with different indices. Moreover all return series are leptokurtic, which indicates all underlying data have fatter tails. Changes in the skewness and the kurtosis of this distribution therefore provide additional information.

This asymmetry results in the fact that volatility is lower after a rise than after a fall of profitability since a negative shock has more effect than a positive shock. In short, these statistics shows the existence of a leptokurtic form of the empirical distributions and that all these characteristics are specific to the financial variables at high frequencies.

ADF-test for increased study of the series of stock indices returns of developed countries, gives us a test statistic greater than 3 (absolute value) means that the whole series are stationary within two (no unit root). This allows us to estimate volatility.

4.2 The volatility persistence

Table 2 provides the results for the GARCH (1, 1) model for stock market index countries, *t*-statistics are reported in the parentheses. The volatility persistence is measured by the sum of the estimated coefficients $\alpha_1 + \beta_1$ gives an indication about.

Table 3. Estimated volatility persistence by GARCH (1, 1) model

| Financial Market | USA (S&P500) | France (CAC40) | Japan (Nikkei 225) | Germany (Mdax30) | United Kingdom (FTSE100) |
|----------------------|--------------------|---------------------|--------------------|--------------------|--------------------------|
| α_1 | 0.082* (11.069) | 0.100* (11.593) | 0.107* (12.819) | 0.096* (11.011) | 0.104* (10.844) |
| β_1 | 0.909* (115.35) | 0.893* (101.079) | 0.879* (89.475) | 0.896* (98.579) | 0.891* (96.236) |
| M.V. | 8142.191 | 7637.376 | 7517.77 | 7556.619 | 8186.76 |
| D-W | 2.081 | 1.964 | 2.0492 | 1.983 | 1.994 |
| $\alpha_1 + \beta_1$ | 0.991 | 0.993 | 0.986 | 0.992 | 0.995 |

Notes: *Significant at 1%, **significant at 5%

The sign positive of the ARCH and GARCH parameters suggests a tendency for shocks to increase over time, and that volatility has some memory for its historical levels. In this model the persistence of return volatility of equity indices is observed since $\alpha_1 + \beta_1$ is higher than 0.8 and approaches 1. With evidence of volatility persistence in stock markets, it is possible to proceed to the second step of the empirical analysis focused on the volatility spillover. The findings suggest that the model may be useful for analysis of the economic factors behind the observed volatility clustering in returns.

4.3 The volatility spillover

Table 4. Volatility spillovers stock indexes, BEKK-GARCH estimation results

| | Stability period | | | | Crisis period | | | |
|---------------|------------------|-------------------|------------------|------------------|--------------------|------------------|--------------------|-------------------|
| | CAC40 | Nikk225 | Mdax30 | FTSE100 | CAC40 | Nikk225 | Mdax30 | FTSE100 |
| α_{11} | 0.003 (0.088) | 0.190* (8.150) | 0.184 (25.48) | 0.152* (5.02) | 0.319* (13.241) | 0.088 (1.419) | 0.03*** (0.589) | 0.174* (5.590) |

| | Stability period | | | | | Crisis period | | |
|---------------|---------------------|--------------------|--------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| α_{12} | -0.449* (-9.725) | 0.233* (5.43) | -0.145 (-5.156) | -0.11*** (-1.88) | 0.129* (6.259) | -0.694* (-9.538) | -0.543* (-8.88) | -0.742* (-17.17) |
| α_{21} | 0.149* (7.934) | -0.064* (-3.75) | 0.030** (2.064) | 0.046 (1.14) | 0.031*** (1.645) | 0.127* (3.075) | 0.206* (4.071) | 0.065** (2.412) |
| α_{22} | 0.282* (9.298) | 0.208* (8.311) | 0.24 (12.41) | 0.361* (10.802) | -0.130* (-4.404) | 0.485* (8.577) | 0.418* (7.483) | 0.488* (15.66) |
| β_{11} | 0.998* (132.33) | 0.971* (160.07) | 0.978 (1152.0) | 0.986* (135.64) | 0.946* (121.75) | 1.061* (34.552) | 1.063* (35.771) | 0.971* (116.42) |
| β_{12} | 0.096* (6.57) | -0.056* (-3.83) | 0.048 (5.783) | 0.030** (2.03) | -0.105* (-11.38) | 0.339* (7.752) | 0.244* (5.564) | 0.198* (7.492) |
| β_{21} | -0.036* (-4.074) | 0.018* (2.977) | -0.011 (-3.309) | -0.014 (-1.05) | 0.068* (8.554) | -0.172* (-3.150) | -0.215* (-3.304) | -0.197* (-6.656) |
| β_{22} | 0.908* (70.784) | 0.956* (102.66) | 0.962 (181.57) | 0.922* (63.42) | 0.973* (160.64) | 0.544* (7.114) | 0.603* (7.279) | 0.335* (4.54) |

Notes: *Significant at 1%, **significant at 5% and ***significant at 10% level.

Table 3 reports the estimated coefficients in the variance-covariance of GARCH- BEKK model during US financial Crisis in two periods (stability period and crisis period). Firstly, the own-volatility spillover effects, namely, α_{11} , α_{22} in all markets ,except(NIKKEI 225) are large and significant in time of crisis.

The ARCH coefficients α_{12} and α_{21} document the presence of shock transmissions between stock markets. In time of crisis, both coefficient α_{12} and α_{21} are significant. This implies the existence of shock transmission from the US stock market to developed stock market. Thus, there is a significant relationship between the bidirectional US stock market and developed stock markets. The US stock market is a comprehensive source of exogenous shock. By focusing on GARCH parameters, we show that there is a strong evidence of significant transmission of volatility (β_{12}).

Also, volatility shocks are transmitted for all developed stock markets. The coefficient estimates of volatility transmission show that there is high transmission of volatility (> 1%) of the US stock market to all stock markets.

Furthermore, a significant transmission is medium low (<1%) of the volatility of other regions to the US stock market.

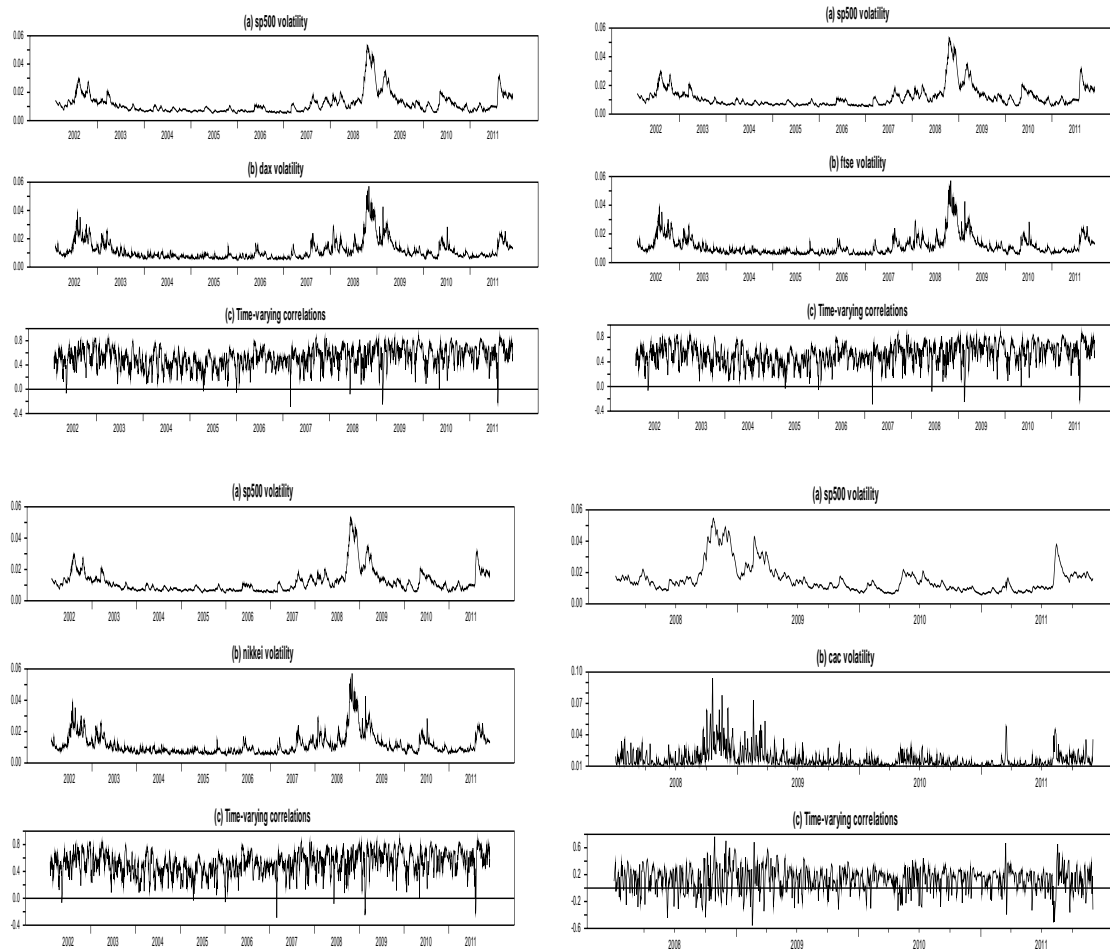


Figure1. Time varying correlation between US stock market and developed stock markets

5. Channels transmission during subprime crisis

(Real Interest Rate, Productivity index) are used to represent the macroeconomic transmission channels. In addition, (ratio of M2 to FER, spleen Exchange, Terms of trade, transaction account,) are added to identify financial channels. These variables in the literature are important to explain the fundamental relationships of previous crises. Real interest rate and Productivity indexes are variables to capture domestic and budgetary policies. Ratio of M2 to FER is a measure of reserve adequacy. In fact, it measures the potential amount of liquidity of monetary assets which the authorities can use to convert currency. Finally, the variables of various types of trade are indicators of competitively and external shocks. By Focusing on GARCH parameters, we show that there is a strong evidence of significant transmission of volatility of economic and financial variables (β_{12}).

Also, volatility shocks are transmitted for all stock Markets. Among the six possible channels of contagion considered, estimates tests in our paper reveal the importance of trade link as a channel of contagion relevant US to other markets. Thus, estimates show that the coefficients (β_{12}) Ratio of M2 to FER, real interest rate and term of trade are significant at the 1%. In addition, these variables better represent the channel to take account of the transmission of volatility. The channel productivities index is significant (1%) transmission of crisis in the home country of the subprime crisis (U.S) to other countries except Germany. In reverse, this channel is bidirectional and significant (β_{21}) 1%, 5% and 10% transmission of crisis countries (France, Japan, Germany, and United States) to the US market. In addition to the significant coefficient of the ratio of M2 to FER and the interest rate for the entire region (except Japan) is a transmission channel of crisis of USA. In the end, Exchanges and Budget balance reserves are of little interest to represent the transmission channels of subprime crisis.

Table 5. Productivity index, BEKK-GARCH estimation results

| | France | Japan | Germany | United Kingdom |
|---------------|---------------------|---------------------|--------------------|-----------------------|
| α_{11} | 0.268* (3.751) | 0.078** (0.836) | 0.461* (3.621) | 0.554* (4.366) |
| α_{12} | -0.825* (-3.102) | 2.931* (6.538) | 1.676* (5.95) | 0.051** (2.012) |
| α_{21} | 0.159* (3.671) | -0.103* (-3.985) | -0.195 (-4.618) | -0.385* (-3.355) |
| α_{22} | 0.393* (3.622) | 0.638* (7.667) | 0.332* (3.629) | -0.941* (-5.975) |
| β_{11} | 0.699* (5.386) | 0.726* (10.261) | 0.379** (2.188) | 0.640* (5.614) |
| β_{12} | 1.119* (3.727) | 1.582* (6.018) | -0.369 (-1.00) | -0.254 (-1.032) |
| β_{21} | 0.154*** (1.758) | -0.166* (-5.881) | 0.175* (2.95) | -0.327*** (-1.895) |
| β_{22} | -0.169 (-0.965) | 0.168*** (1.821) | 0.532* (3.646) | 0.0489 (0.217) |

Notes: *Significant at 1%, **significant at 5% and ***significant at 10% level.

Table 6. Ratio of M2 to FER, BEKK-GARCH estimation results

| | France | Japan | Germany | United Kingdom |
|---------------|---------------------|----------------------|---------------------|---------------------|
| α_{11} | 2.016* (10.324) | 0.397* (3.458) | 2.016* (10.324) | 0.410* (3.438) |
| α_{12} | -0.058 (-1.456) | -0.060* (-2.856) | -0.058 (-1.456) | 0.182* (3.781) |
| α_{21} | -0.072 (-0.607) | 0.075 (0.487) | -0.072 (-0.607) | 0.074 (0.550) |
| α_{22} | 1.181* (9.092) | 1.135* (9.658) | 1.181* (9.092) | 1.282* (7.274) |
| β_{11} | -0.232* (-2.99) | 0.706* (4.815) | -0.232* (-2.990) | 0.801* (12.994) |
| β_{12} | -0.079* (-4.026) | -0.019 (-0.321) | -0.079* (-4.026) | -0.083* (-3.441) |
| β_{21} | -0.097 (-1.513) | -0.214 (-0.959) | -0.097 (-1.513) | -0.020 (-0.317) |
| β_{22} | 0.396* (7.335) | -0.700* (-22.371) | 0.396* (7.335) | 0.379* (6.498) |

Notes: *Significant at 1%, **significant at 5% and ***significant at 10% level.

Table 7. Budget balance, BEKK-GARCH estimated results

| | France | Japan | Germany | United Kingdom |
|---------------|--------------------|---------------------|--------------------|-------------------|
| α_{11} | 2.016* (10.324) | 0.716** (2.837) | 1.004* (3.543) | 1.040* (3.735) |
| α_{12} | -0.058 (-1.456) | -1.981* (-4.727) | -0.129 (-0.165) | 0.433 (0.290) |
| α_{21} | -0.072 (-0.607) | 0.171*** (1.731) | 0.080 (1.105) | 0.044 (1.161) |
| α_{22} | 1.181* (9.092) | 0.647* (5.321) | 0.797* (4.305) | 0.024 (0.095) |

| | France | Japan | Germany | United Kingdom |
|--------------|---------------------|-----------------------|--------------------|----------------------|
| β_{11} | -0.232* (-2.99) | 0.007 (0.032) | 0.117 (0.643) | 0.260 (1.210) |
| β_{12} | -0.079* (-4.026) | 0.444 (1.335) | -0.005 (2.436) | -3.410** (-2.258) |
| β_{21} | -0.097 (-1.513) | -0.210 ** (-2.059) | -0.097 (-0.117) | 0.045** (1.730) |
| β_{22} | 0.396* (7.335) | 0.176 (1.088) | 0.606 (5.064)* | 0.657* (3.205) |

Notes: *Significant at 1%, **significant at 5% and ***significant at 10% level.

Table 8. Exchanged reserves, BEKK-GARCH estimated results

| | France | Japan | Germany | United Kingdom |
|---------------|------------------|---------------------|---------------------|---------------------|
| α_{11} | 1.302* 8.332 | 0.270 (1.027) | 0.108 (0.764) | 1.805* (11.502) |
| α_{12} | -0.027 -0.073 | -0.809* (-5.11) | -0.175 (-1.55) | 0.794* (3.036) |
| α_{21} | 0.568* 7.943 | -0.174 (-0.805) | -0.030 (-0.141) | -1.043* (-12.31) |
| α_{22} | 0.818 5.74* | 1.162* (7.336) | 0.289*** (1.847) | -0.669* (-4.873) |
| β_{11} | -0.008 -0.081 | 0.726* (11.07) | -0.006 (-0.011) | -0.085 (-0.637) |
| β_{12} | -0.137 -0.747 | 0.180* (4.306) | 0.022 (0.167) | 0.107 (0.491) |
| β_{21} | -0.058 -0.704 | -0.558* (-3.783) | -0.223 (-0.405) | 0.155* (3.176) |
| β_{22} | 0.339 1.057 | 0.318* (6.248) | 0.489 (1.118) | -0.190 (-0.500) |

Notes: *Significant at 1%, **significant at 5% and ***significant at 10% level.

Table 9. Terms of trade, BEKK-GARCH estimation results

| | France | Japan | Germany | United Kingdom |
|---------------|----------------------|----------------------|--------------------|---------------------|
| α_{11} | -0.029 (-0.44) | 0.391* (4.140) | 0.041 (0.705) | -0.121 (-1.139) |
| α_{12} | 0.236* (2.727) | -0.063 (-0.34) | 0.157** (2.043) | -0.444* (-3.566) |
| α_{21} | -0.03 (-0.426) | -0.151*** (-1.73) | -0.076 (-1.168) | -0.056 (-1.122) |
| α_{22} | 0.122*** (1.803) | 0.522* (2.936) | (0.314* 3.902) | 0.475* (5.090) |
| β_{11} | 0.741* (11.816) | 0.861* (11.34) | (0.953* 52.057) | 0.82* (9.810) |
| β_{12} | -0.780* (-11.411) | 0.517* (3.806) | (0.232* 7.321) | -0.618* (-6.805) |
| β_{21} | 0.617* (11.360) | -0.040 (-0.44) | -0.154* (-6.00) | 0.263* (5.46) |
| β_{22} | 0.662* (11.314) | 0.532* (2.808) | 0.95* (28.06) | 0.739* (12.00) |

Notes: *Significant at 1%, **significant at 5% and ***significant at 10% level.

Table 10. Real interest rate, BEKK-GARCH estimated results

| | France | Japan | Germany | United Kingdom |
|---------------|---------------------|--------------------|---------------------|---------------------|
| α_{11} | 1.030* (9.813) | 1.026* (6.536) | 1.030* (9.813) | 0.421* (4.831) |
| α_{12} | 0.190* (3.706) | -0.067 (-1.282) | 0.190* (3.706) | 0.172* (5.025) |
| α_{21} | 0.827* (3.278) | -0.063 (-0.819) | 0.827* (3.278) | 0.832* (4.861) |
| α_{22} | 0.710 (7.316) | 0.625* (5.517) | 0.710 (7.316) | 0.848* (6.566) |
| β_{11} | 0.169*** (1.710) | 0.325* (2.134) | 0.169*** (1.710) | 0.735* (9.377) |
| β_{12} | -0.349* (-9.112) | 0.046 (1.211) | -0.349* (-9.112) | 0.153* (3.432) |
| β_{21} | -1.383* (-10.46) | -0.031 (-0.500) | -1.383* (-10.46) | 0.530*** (1.758) |
| β_{22} | 0.146 (1.246) | 0.848* (19.191) | 0.146 (1.246) | -0.245 (-1.105) |

Notes: *Significant at 1%, **significant at 5% and ***significant at 10% level.

The time varying correlations for six new pairs is presented in Figures 2, 3,4,5,6. In all figures depicting the time varying correlations between stock market they appear to show an increase in correlations due to the market of subprime crisis 2007. These prove existence the phenomena of contagion during US crisis. As expected, the US has the highest correlation with the countries of the sample, which is followed by financial variables Real interest rate, specifically reserved exchanges in early crisis.

Also, in the last few years, due to the high correlation across markets and countries of financial turmoil's, there has been a growing interest in "contagion", broadly defined as the transmission of shocks (or crises) across markets (or countries). The time varying correlation is due to the links, economic ties and other, between the US stock market and the world. As well, we test for the argument that in recent years the lifting of the barriers in many countries has resulted in correlations increasing over time and hence if a trend exists, it should be a positive one.

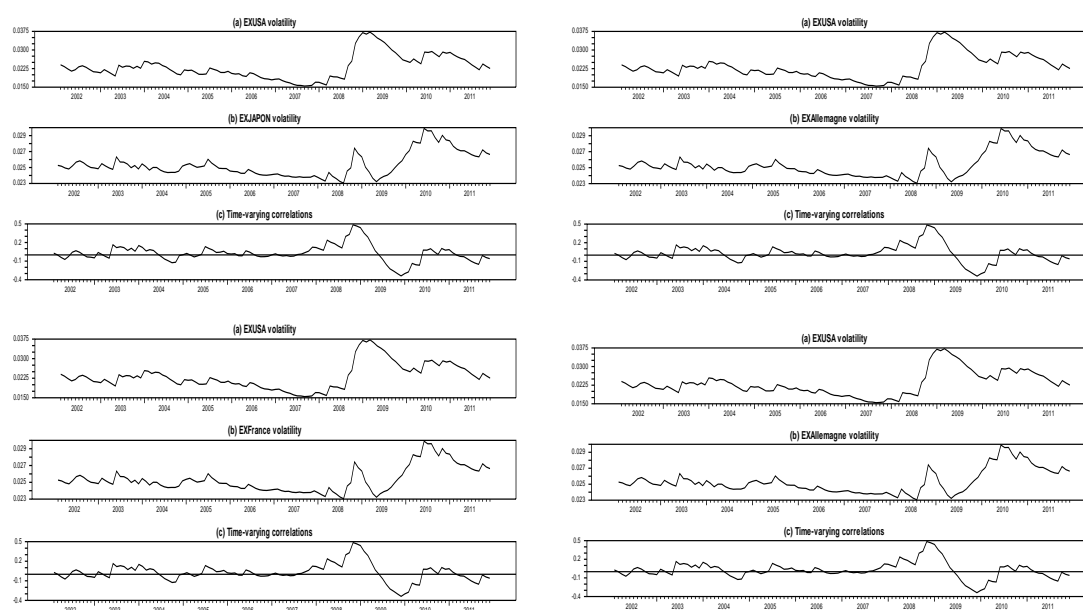


Figure 2. Time varying correlation of real interest rate between USA and developed countries

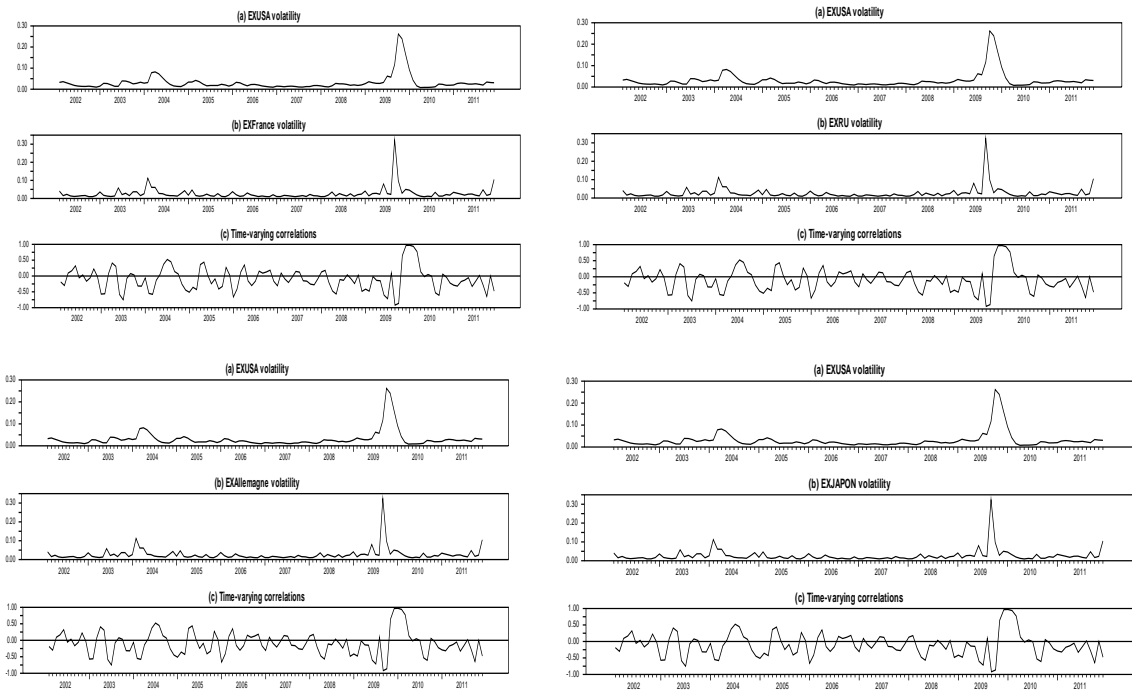


Figure 3. Time Varying Correlation of Exchanged reserves between USA and developed countries

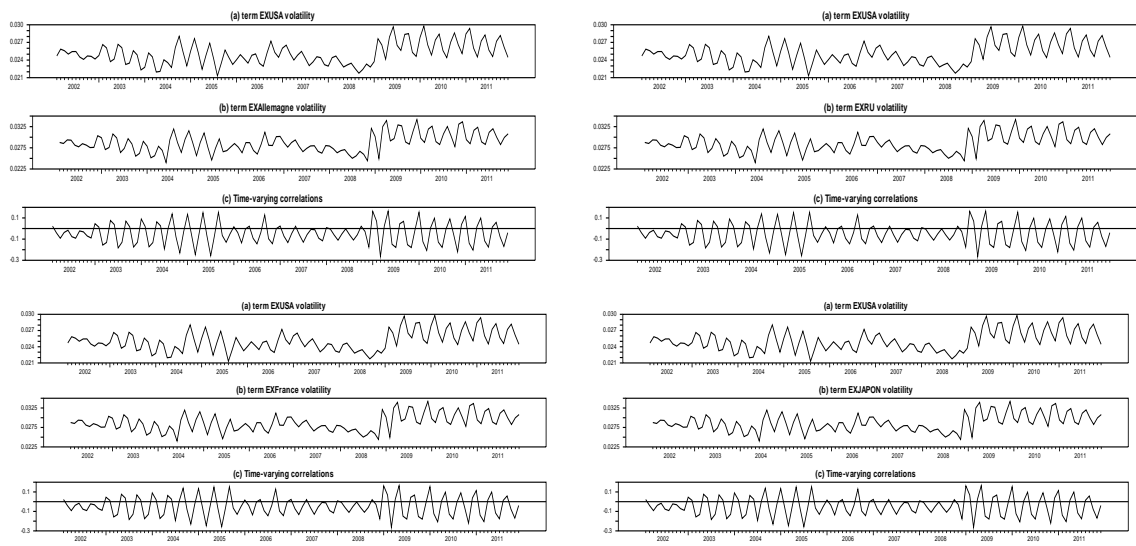


Figure 4. Time varying correlation of terms of trade between USA and developed countries

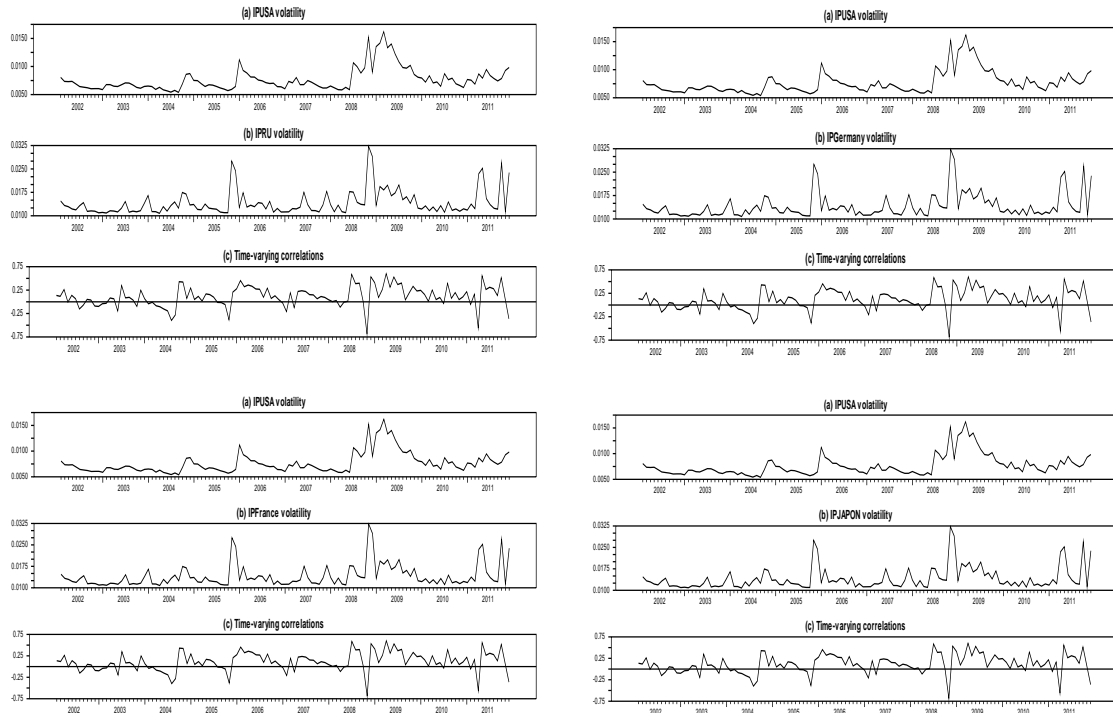


Figure 5. Time varying correlation of productivity index between USA and developed countries

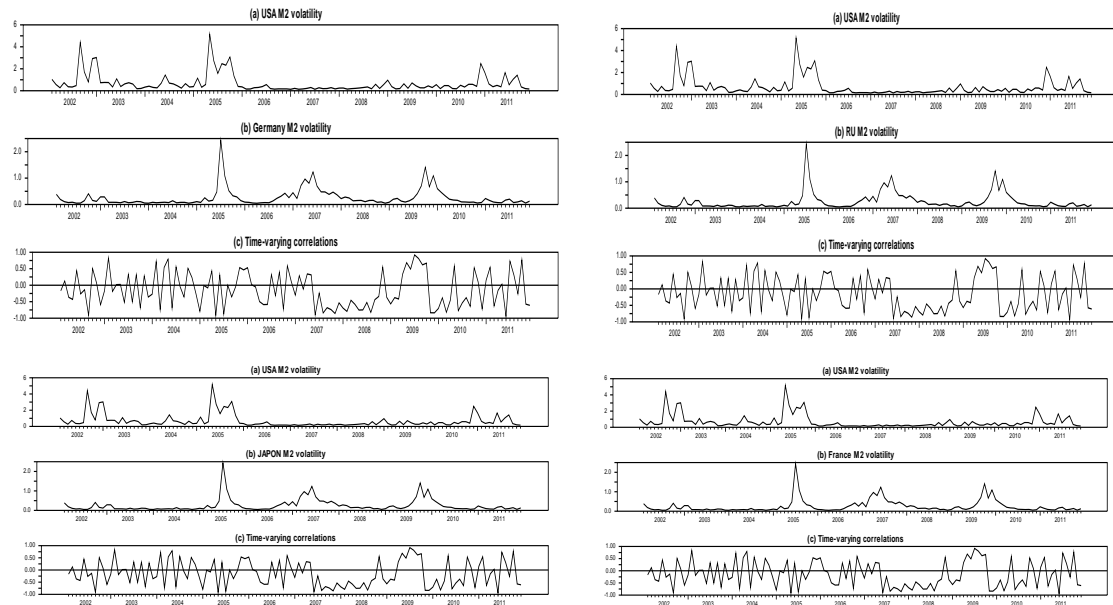


Figure 6. Time varying correlation of ratio of M2 to FER between USA and developed countries

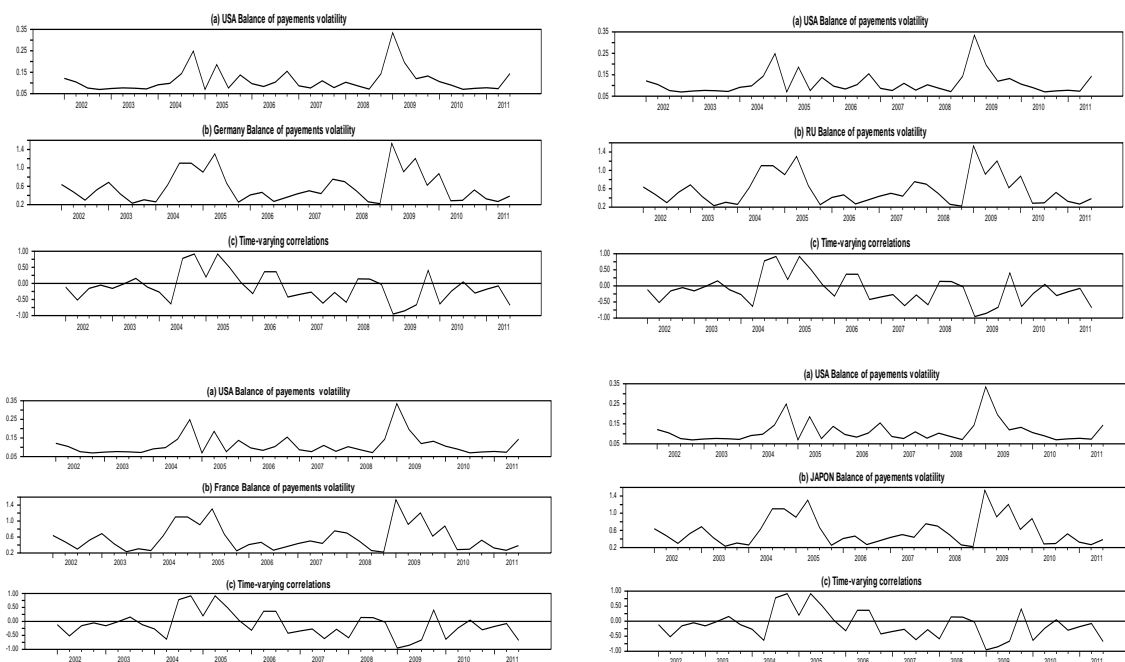


Figure 7. Time varying correlation of transaction balance between USA and developed countries

6. Conclusion

The main purpose of this study is to identify the contagion of US crisis in 2007, investigate the volatility spillover and identification of transmission channel of subprime crisis. The result, by time varying correlation, in times of crisis, suggesting evidence of contagion between stock markets considered. The empirical results from the BEKK-GARCH model supporting the presence of significant volatility spillover from stock market Countries. By focusing on GARCH parameters, we show that there is a strong evidence of significant transmission of volatility.

Also, volatility shocks are transmitted for all stock Markets. The coefficient estimates of volatility transmission show that there is high transmission of volatility ($> 1\%$) of the US market to developed stock markets. Moreover, there is a significant transmission medium low ($< 1\%$) of the volatility of other regions to the US market.

Finally, based on the BEKK-GARCH model to identify the transmission channels of the six possible channels of contagion considered, estimated tests in our paper prove the importance of trade link as a relevant channel of contagion from the US to other markets. The results show four significant variables i.e. ratio of M2 to FER (excluding Japan), real interest rate, term of trade and productivity index (except Germany). While reserves and budget balance are of little interest to represent the transmission channels of sub-prime crisis.

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MANAGEMENT ACCOUNTING FROM THEORY TO PRACTICE

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Abstract:

This paper describes the concept and characteristics of financial accounting, in general and particularly, it describes the concept and characteristics of management accounting, from the perspectives of various local and international authors. In the first part, the paper presents a brief history of the development of management accounting from the theoretical point of view and, in the second part, is a brief description of management accounting in practical terms.

Research in the history of accounting and management accounting was for some time considered to be of low value (because it isn't perceived to be made "scientific") or as an approach of finding practical answers to current problems.

Keywords: accounting, planning, control, management accounting systems, management accounting practice.

Jel Classification: M41

1. Introduction

„Accounting is in a period of fast transition and its environment has undergone great changes in recent decades and a rate of change is due to occur in the future”. (Glautier and Underdown, 2001)

Not much has been written about the history of management accounting and it tended to be seen as a dusty topic, with no relevance to current theory and practice. (Loft, 1991) „However, with management accounting history, as with general history, change is a permanent feature and without an understanding of its development, we are poorly equipped to understand or guide its direction.” (Shotter, 1999)

2. Brief history of management accounting

Very little has been written about the history of the use of accounting data in making decisions for the future. According to Vollmers (1998) the knowledge of history would help in guiding future decision making. Focusing on the history of management accounting is important current and past development of management accounting.

Studying foreign literature (Kinney, Raiborn 2011) we have seen that the concept of accounting it is also known as *the language of business*. Therefore, accounting can be seen as having different "dialects", like the financial accounting "dialect" that focuses on the processing of financial documents (balance sheets, profit and loss account, etc.) and the management accounting "dialect" which focuses on providing information within the organization, so that managers can plan, control the operations, make decisions and evaluate economic performance of that entity.

Accounting provides information for all ranges of users, internal and external, information on which basis, they base their decisions of resource allocation.

The existence of these two categories of recipients of accounting information led to the separation of accounting into two parts that meet the need for general and in detail information, namely: *financial accounting* and *management accounting*. An incursion in the history of financial accounting and most of all in management accounting is an important step.

The first accounting definitions were based generally on documentary evidence which was satisfied by the accountant. Thus, in 1941, accounting was defined as "*the art of recording, classifying and summarizing in a significant manner and in expression cash transactions, operations, events, facts*

which even partially, financial nature, as well as the interpretation of their results". (AICPA – American Institute of Certified Public Accountants).

In 1970, the American Institute of Certified Public Accountants stated that the role of accounting is to "provide quantitative information, mainly financial, regarding economic entities". Therefore accounting is "an information system that quantifies process and transmits financial information about an economic entity. This information allows users to choose rationally between alternative consumption of scarce resources in the process of carrying out the activities of production and trade "(American Institute of Certified Public Accountants). According to this definition, accounting links economic activities and decision makers.

In 1981, the National Association of Accountants in the United States defined management accounting as "the process of identification, measurement, accumulation, analysis, preparation, interpretation and communication of financial information used by management to plan, evaluate and control, within an organization, the responsibility of using resources based on performance criteria. Management accounting also requires the preparation of financial reports for external management groups, such as shareholders, those having claims against regulating organizations and tax authorities" (National Association of Accountants in the United States of America).

This definition shows that the purpose of management accounting is to work on product costs, rather than to make them known.

Management accounting is used to gather financial and non-financial information necessary for internal users and provides managers both historical information and forward-looking information. Management accounting information is rather for individual concerns than of those of the economic entity as a whole.

As companies have evolved and have organized multiple locations, financial accounting has become less close to meet management needs. For planning, control, performance evaluation and making more complex decisions, managers felt the need of future-oriented information than those offered by historical financial accounting.

According to the IFAC (International Federation of Accountants), the definition of enterprise financial management is embracing three broad areas: cost accounting, performance evaluation and analysis, planning and decision support and is represented in Figure 1.

Capron (1993) emphasize in the work *Accounting in perspective*, that "under the double effect of competitive pressure and the multitude of products and production processes, enterprises have felt the need to know better their costs, in order to determine as precisely as possible selling prices and achievable margins for each product. It was not only predictable, but the necessary means must have been given to monitor the implementation of decisions, so that explains the development taken nowadays by the management control and its privileged instrument, cost accounting, which an important business wouldn't lack at the present time".

Anthony, professor of Harvard University, explained the concept *management accounting* stating that it was invented to mark the opposition between the approach which argues that "people use numbers" and which seeks to influence managers behavior and which doesn't "deals only with numbers, mechanics, whose sole objective is to find the cost of industrial products".

The idea was taken up by Horngren, making *the accounting cost* the part of managerial accounting which interest financial accounting, because it evaluates certain items of financial documents synthesis.

According to Bouquin (2006) „management accounting is an accounting information system that aims at helping managers and influence behavior by modeling the relationships between the resources for consume and the pursued objectives”.

According to Iacob, presented in her paper in 2007, "now, internationally, there is a tendency for gradual opening of managerial accounting by observing changes taking place in the organization, customers and suppliers to reveal the sources of a better economic performance in order to transform classical organizations in "business' sustainable”.

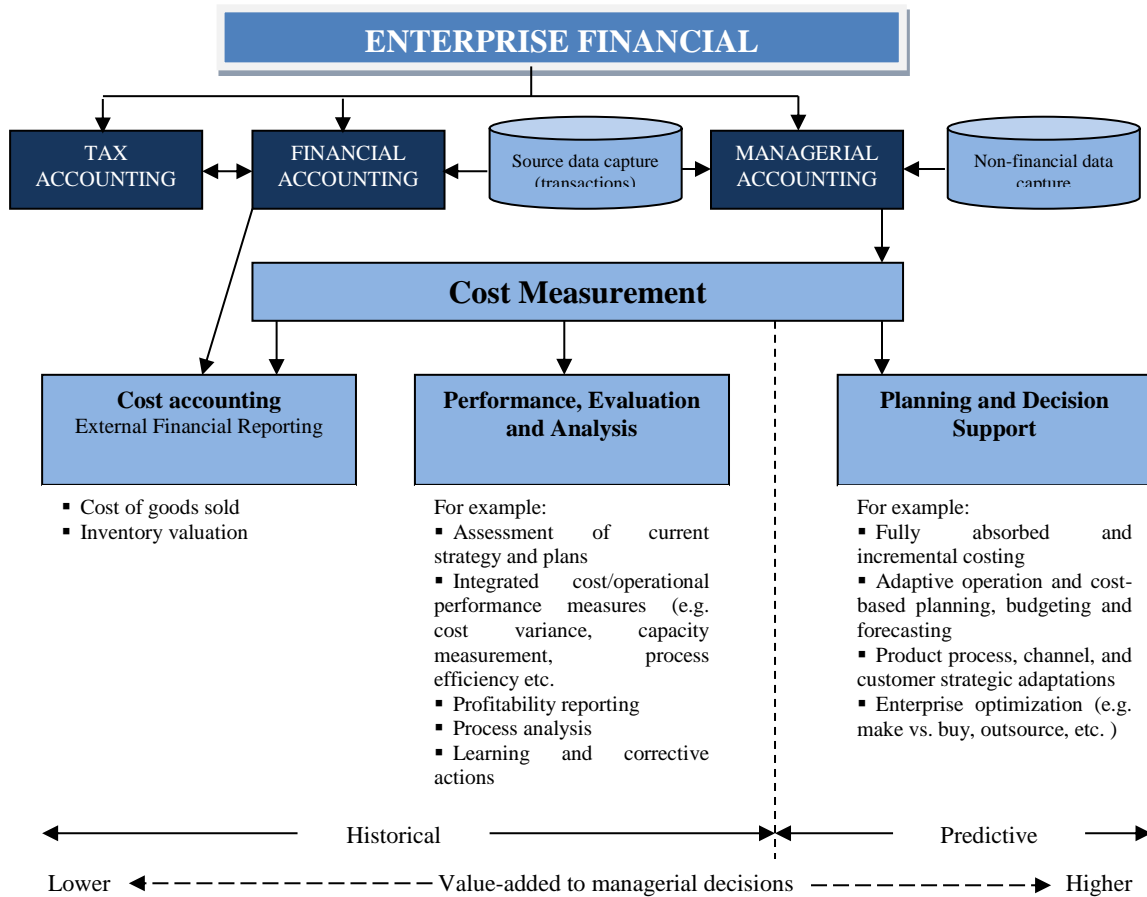


Figure 1. Enterprise financial management
Source: IFAC, July 2009

According to Drury “management accounting relates to the provision of appropriate information for decision making, planning, control and performance evaluation”. (Drury 2004, 20) and “is concerned with the provision of information to people within the organization to help them make better decisions and improve the efficiency of existing operations.” (Drury 2008, 7)

Maher states in his work in 2000 that “while management accounting concepts can be traced back at least to the beginning of the Industrial Revolution, management accounting as a teaching discipline appears to have got off the ground in the late 1940’s.”

In conclusion, management accounting is not just a simple calculation technique that is applied to objects, but a means of guiding people's behavior.

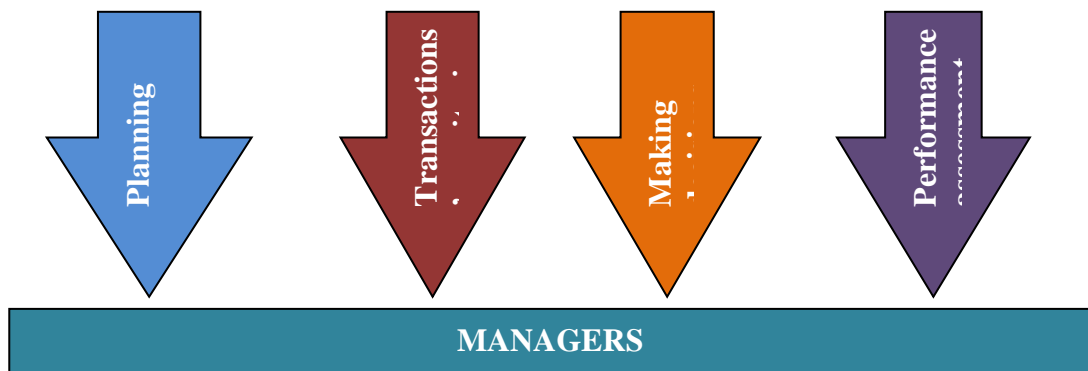


Figure 2. The role of managers according to management accounting
Source: own

According to some authors (Cavalluzzo and Ittner, 2003; Baines and Langsfield-Smith, 2003; Maiga and Jacobs, 2003) critique of conventional cost and management accounting practices for the lack of efficiency and capacity in relation to the requirements of a changing environment, it refers to the failure of such practices to provide comprehensive information on the activities needed by the organizations.

Changes caused by the Revolution of 1989 had an impact on the accounting life. Thus, appeared the Accounting Law no. 82/1991, which is a significant step in accounting, but from the point of view of management accounting this was not regulated, leaving it to each company how to organize it, managers and accountants considering it as not compulsory.

Passing from a monist type accounting to a dualist one, and practicing this type of system in post-revolutionary period involved a different treatment of the problems of management accounting and costing. In the early '90s the management accounting has undergone a full costing approach doubled at book in accounting with the help of class 9 of accounts, entitled *Management accounts* under the accounting regulations issued by the Ministry of Finance. This type of approach has been found in the work *Management Accounting* by Călin and Cârstea in 2002.

According to Ristea management accounting can be defined as "the process of identification, measurement, interpretation and communication of accounting information (financial and operational) used by management to plan, evaluate and control the enterprise and to ensure a better use of science resources." (Ristea 1999, 335)

Therefore "management accounting is an integral part of the management process and provides essential information for management in at least three directions" (Ristea 2003, 7):

- Management and control of the current activities of the economic unity;
- Planning strategies, tactics and future activities and direction of deviation from the plan;
- Choosing the best solutions to operational problems faced by the economic unit;
- Management accounting wants to link the economic resources of the enterprise of the purposes for which they are collected and consumed;
- Knowing costs is one of the basic imperatives of any decisions made in organizations, whether it is considering a business or not.

Summarizing all the aspects mentioned before, we can give the following definition of management accounting: *Management accounting is a system which calculates and analyzes the value of internal flows in enterprise. It must be adapted to activity, functional structure of the enterprise and requirements of the decision-makers to the economic and technological environment developments.* (Iacob, 2007)

3. Management accounting as practice

In our country, if management accounting has had a continuous evolution in theory, it can't be said the same in practice. There are still gaps in the organization of management accounting, which leads to not always fulfill the necessary information as a tool in decision making.

Accounting can be defined as "the process of identifying, measuring and communicating economic information to enable formulating assessments and decisions by users of information" (American Accounting Association)

This definition emphasizes the role of accounting for decision making and it applies in both financial and management accounting. This definition also encloses important implication that accounting information has no role except to help managers making better decisions.

Currently, the accounting is automated. The main problems of accounting system, in terms of management, are not technical or structural, but refer to the need for effective management accounting in terms of management. IT system is based on this process, providing information.

As influence of information technology on management accounting, we mention the followings:

- Joint management accounting systems strategy and action (Boitier, 2007);
- The transition from management accounting system, based on numbers generated by accounting, to a system based on non-financial numbers, operational (Dechow & Mouritsen, 2005);

- Remodeling management accountants' task, focusing mostly on analytical tasks (Davis & Albright, 2000);
- Remodeling knowledge which management accountants must acquire (Azan, 2009);
- Increasing the flexibility of information processing, thus integrating accounting information.

Since the 80s, a number of innovative management accounting techniques were developed such as the activities based on techniques (of calculating costs, budgeting and management), strategic management accounting and balanced scorecard. Changes in the business environment were almost always as an impetus for companies to implement more advanced practices and to adapt them to their management accounting system.

The International Federation of Accountants (IFAC) describes the development of management accounting as an evolution in four stages, namely:

- *Stage 1 – pre - 1950* – refers to cost determination and financial control;
- *Stage 2 - by 1965* – refers to provision of information for management planning and control;
- *Stage 3 - by 1985* – refers to reduction of resources waste in business process;
- *Stage 4 - by 1995* – suppose creation of value through effective use of resources.

„Each stage is characterized by adopting a number of new management accounting practices (MAPs) in addition to reshaping and adaptation of the old practices to fit with the new in addressing a new set of conditions in the business environment.”(Abdel-Kader, Luther 2006, 4)

Kaplan, in his review of *The Evolution of Management Accounting*, claimed that: “Virtually all of the (management accounting) practices employed by firms today and explicated in leading cost accounting textbooks had been developed by 1925 ... there has been little innovation in the design and implementation of cost accounting and management accounting control systems.” (Kaplan 1984, 390)

The stages of the evolution of management accounting described by the IFAC statement are illustrated in Figure no. 3.

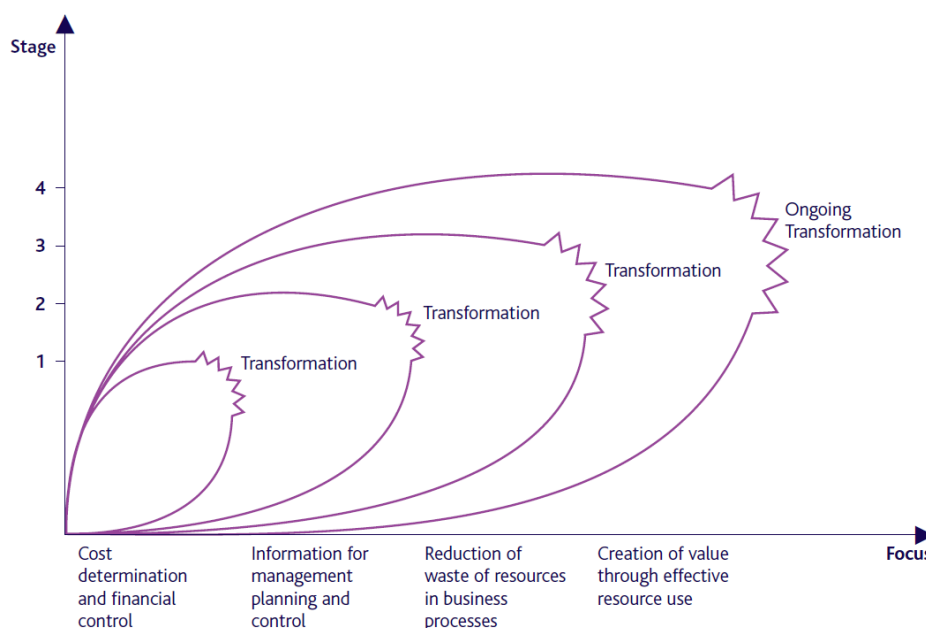


Figure 3. Evolution of management accounting

Source: IFAC (1998)

A difference between steps 2, 3 and 4 is represented by the change of focusing from providing information and to manage resources in the form of waste reduction, in step 3 and to create value in step 4. However, focusing on providing information in step 2 is not lost, but is restored in stages 3 and 4. The information becomes a source, along with other organizational resources. In stages 3 and 4, management accounting is seen as an integral part of the management process, as real-time information, in order to become available to manage directly. Focusing on the use of resources

(including information) to create value is an integral part of the management process in contemporary organizations.

4. Conclusions

In this paper we studied the history of management accounting in several countries and found that, although studies have been conducted on management accounting in our country and around the world, where each researcher has contributed to it, this looks alike and expresses the same thing.

Management accounting refers to the provision of appropriate information to people within the organization for decision making, planning, control and performance evaluation, as well as improving the efficiency of existing operations.

If in the first part we discussed about management accounting theoretically, in the second part of the article we discussed management accounting in practical terms.

Practice emphasizes how the interests and achievements are reported to each system involved in the control and management. Improving management accounting methods must have as basis, the analysis of real conditions and the benefits of various methods and techniques, while taking into account their effectiveness. It was observed that, over time, management accounting has evolved along with the development of enterprises. Because of this, it was necessary to constantly review existing information system, in order to include all the necessary information for the managers, aiming to correct economic decisions.

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- *** AICPA – American Institute of Certified Public Accountants.
- *** Association of American Accountants.
- *** National Association of Accountants in the United States of America.
- *** IFAC – International Federation of Accountants.
- *** American Institute of Certified Public Accountants.

THE MANAGEMENT OF PERFORMANCE SPORTS

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Abstract

As a genuine social phenomenon sport draws benefits from the system of contests and events that entails important economic sectors in the development of its material basis as well as in the increase of its scientific basis by the involvement of the research institutions in the sports issues.

The papers tackle the issue of performance in sports where professional sports are determining.

Keywords: managerial communication, public relations, sports organizations.

JEL Classification: L83, M12, J53.

1. Introduction

Performance, influenced by a combination of physiological, psychological, and socio-cultural factors, is defined as a thing done or carried through, an achievement, a deed, an act, especially an action of an elaborate or public character.

When it comes to sports, the definition of performance is related to skills - inclination - and physical activity - work - and the definition is: the carrying out of specific physical routines or procedures by one who is trained or skilled in physical activity. But these are barren, dull, technical definitions and we consider more appropriate to speak about sports performance as yesterday's work, today's outcome and tomorrow's sacrifice.

Representing a special value, which considerably hallmarks on man's spiritual physiognomy and personality, professional sports is now the subject of various scientific disciplines: philosophy, sociology, economics, psychology, pedagogy, biology, biochemistry, medicine and so on.

Nowadays, performance sport became a social, psychological, educational and cultural issue, which relates to the same extent to society and the individual. It concerns society as its progress and the progress of mankind depends on understanding international social relations, which sport influences; it concerns the individual as the his physical, mental, emotional and moral are influenced by the time spent to mould one's own person.

Today, professional sports actually turn into a unit of measure of social wealth and are an effective means for the harmonious development of personality and financial resources.

2. Fundamentals of performance sports theory

Due to its specific characteristics and importance sport is considered, at present, a genuine social phenomenon. Sport benefits from a complex system of contests and events that entails important economic sectors, industry first of all, in the development of its material basis as well as in the increase of its scientific basis by the involvement of the research institutions in the sports issues.

Besides a formative character sports has a prevailing competitive character. Competition renders the frame of manifestation for the efforts of overcoming one's limits or achievements, of the team spirit, of the fair-play, Olympic spirit. Nevertheless sports means more than participation in competition with self, it also means the attendance of a great number of people at these manifestations as audience.

Under the economic aspect, sports offer a large *field* for business. The motto *it is important to attend* turned into the slogan *it is important to win*.

The sports of nowadays is the professional sports where the outcome, success in competition, is essential determining the return after performance. Most professional teams, irrespective of field, are organized similarly to the industrial and commercial companies, as independent economic enterprises privately owned.

There also appeared, professional leagues as tutelary authorities that settle joint interests and, according to them, they decide upon the on-going activities. Professional leagues endeavour, first of all, to market the sports *product* proceeding from the prerequisite that the profit will be maxim.

3. Sports training

Training provides the development of the body ability to adapt to the specific effort requested by the field. The role of the sports manager is fundamental as he both assures the planning, organization, and the proper training and the general conditions of the activity pursuit.

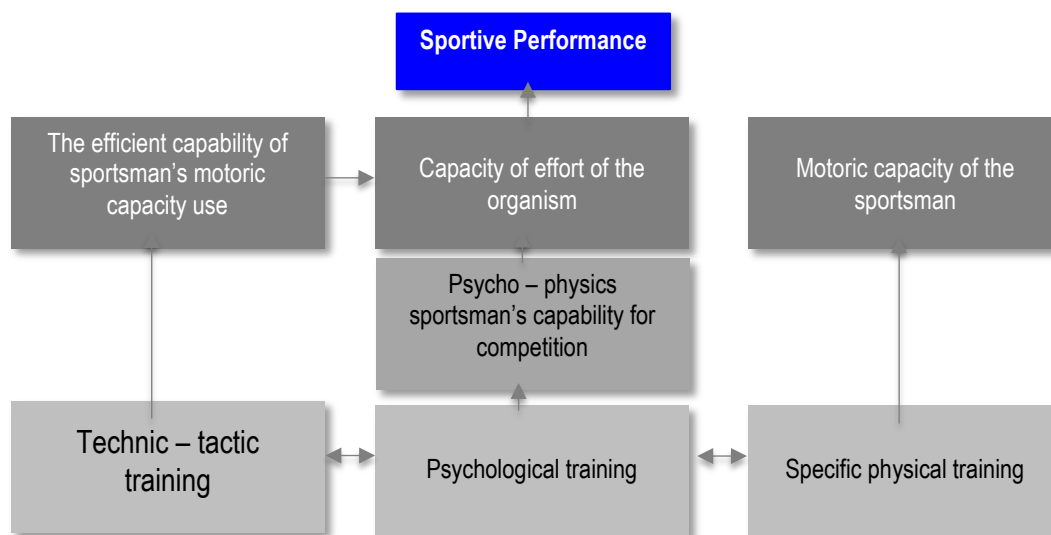


Figure 1. Fundamental factors which determine sportive performance

4. Training objectives

The training objectives aim to:

- achieve superior results by maximum capitalization of athletes qualities;
- inculcate moral qualities;
- consolidate and improve the basic and specific motive skills;
- develop the basic motive skills.

As an educational process meant to maximize the sportsman capabilities and skills, training is conceived as grounded on a series of general and particular principles whose purpose is to assure its proper organization and performance.

Sports training methodology refers to:

- future planning of athletes training;
- performing of training without interruptions for a whole year;
- progressive growth of workload;
- increase of effort intensity;
- increase of contests and events number;
- speed-up of the capacity to recover after effort.

The systematization of the training process is a managerial instrument that becomes crucial when it comes to providing the requisites necessary to achieve performance in due time and in accordance with utmost standards and requirements.

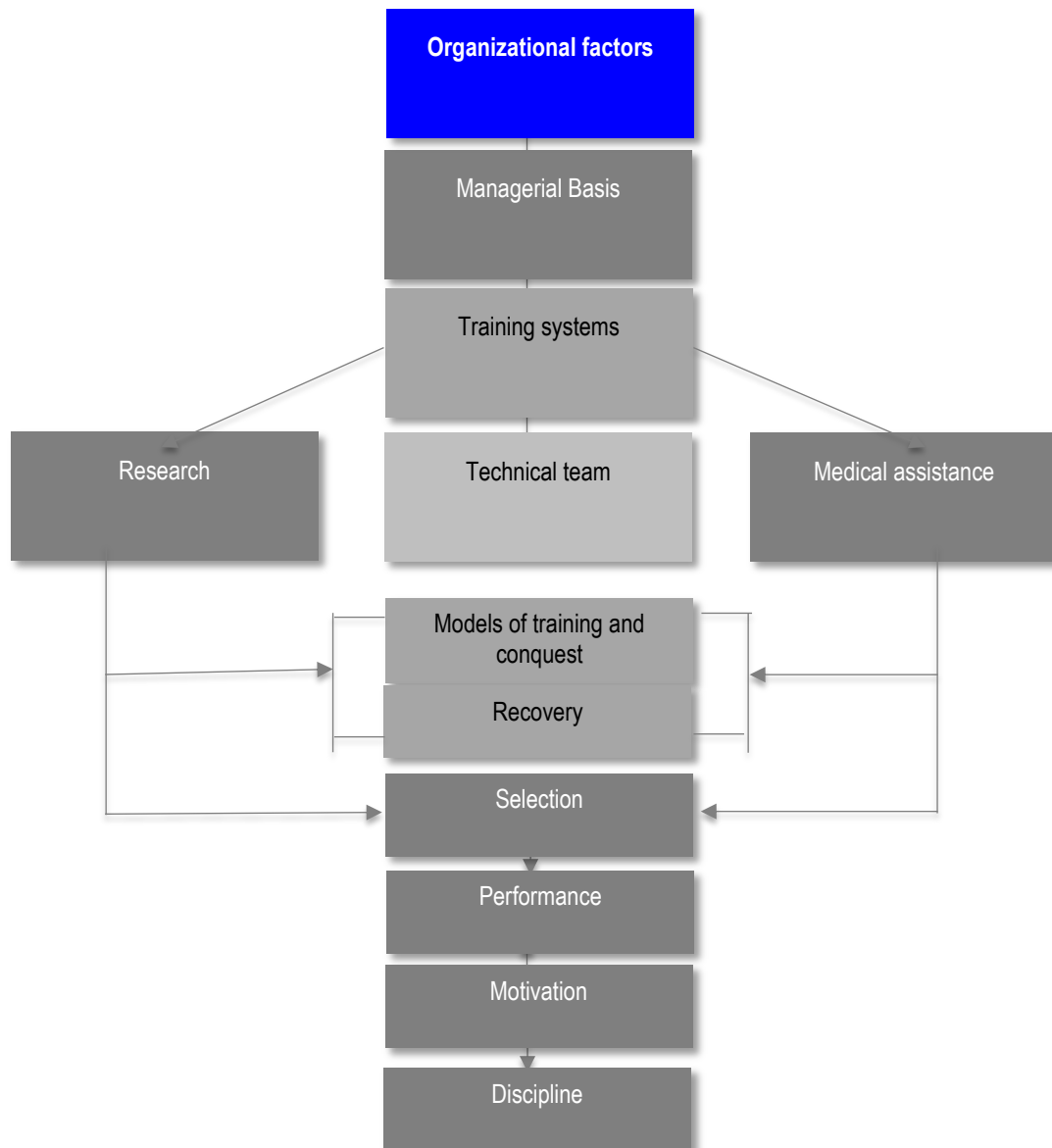


Figure 2. Scientific – managerial organization of sportive training

Sports management faces complex tasks as long as, in fact, it subsumes the whole range of activity from the:

- governing body;
- technical and medical staff;
- psychologist, information technology specialist, methodologist

to the

- strategy and training components;
- material resources that include outfit and equipment;
- selection terms and conditions.

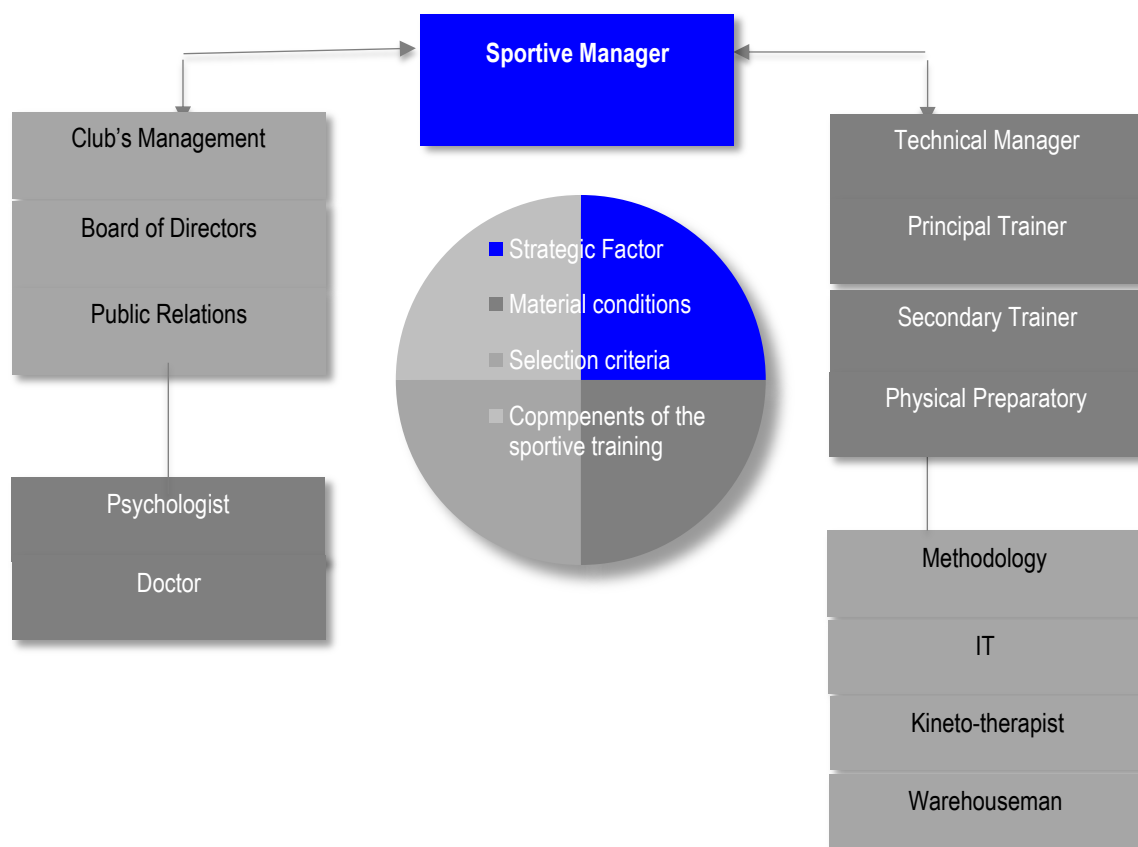


Figure 3. Technical team in sportive management

5. Selection for performance sports

Selection is the starting point when dealing with the capitalization of skills and it covers a complex founded on scientific medical, psychological, social and motive criteria which, if managed in a pedagogical, methodical and technical manner, result in practice and majoring in a sports field.

There are several stages of selection and several targets of the process of selection:

- Primary selection generally made when the subject is between 4 to 10 years old and when physical and psychical development alongside with family history is targeted;
- Secondary selection where the range of age varies between 11- 14 years and when the trainer pursues to increase the trainee's health status, physical and psychical progress, his/her effort endurance and volitional skills;
- Final selection refers to subjects past fourteen and it aims their effort endurance, motive abilities, individual performance.

The efficiency of the selection system depends on the setting out of the criteria, tests and norms for each phase of selection and on the management of this process. When making the selection the manager must take into consideration the following:

- precise assessment of the objectives pursued;
- training of all those involved in the process of selection;
- periodic analysis of the results obtained in selection and on the basis of this the setting of the measures that are to be taken.

The success of selection depends on the way a manager watches that the athlete's objective promotion in the performance teams to be made on the grounds of their meeting the standards set for each event or norm of control.

Table 1. Optimal age in sportive performance

| Sportive branch | Initial training | Special training | Performance training |
|-----------------|------------------|------------------|----------------------|
| basketball | 10 – 13 yo | 12 – 17 yo | 16 – 18 yo |
| box | 12 – 15 yo | 14 – 17 yo | 17 – 18 yo |
| rowing | 10 – 12 yo | 12 – 17 yo | 17 – 18 yo |
| football | 10 – 12 yo | 12 – 17 yo | 17 – 18 yo |
| gym | 6 – 9 yo | 8 – 13 yo | 13 – 17 yo |
| handball | 10 – 13 yo | 12 – 17 yo | 16 – 18 yo |
| swim | 7 – 10 yo | 7 – 14 yo | 12 – 17 yo |
| fencing | 10 – 13 yo | 12 – 17 yo | 16 – 18 yo |
| volley-ball | 10 – 13 yo | 12 – 17 yo | 16 – 18 yo |

6. Sports training planning

In sports, as in any other field, planning plays a decisive role. To plan a sports training implies the setting up of the direction, method of training so as to determine the melioration of the athlete's or team's capacity to make performance, for a fixed span.

Planning in sports falls under several categories:

- Long-term planning covers a period of three or four years when the training or competition method on several macro cycles (annually or biannually depending on the type of sports) is aimed.
- Current planning is usually made for a period of one year, for a micro cycle (several weekly cycles) and here is the training chart. Operational planning refers to training in weekly steps or stages (the number of trainings during a week) and this is a training lesson that includes the beginning, warming up or preliminary part.
- In planning one considers to correlate training with competition, to correctly time training with competition calendar. The competition season ends with an activity analysis the manager together with the technic staff make on the grounds of the results and the place on which a team or athlete comes.

It is compulsory that managerial activity at the level of sports clubs, besides training and planning, imply to produce record keeping of activity. Accounts constitute a real *data base* that give details about athletes, technical staff, facilities, equipment, funds resulted from trading athletes, technicians or sponsorship, salaries, compensations and so on.

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*** <http://dictionary.sensagent.com/sports+performance/en-en/>

INTERNATIONAL FINANCIAL INTEGRATION AND FINANCIAL SOUNDNESS IN EMERGING AND DEVELOPING ECONOMIES

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Abstract:

In this paper, we analyze the effect of international financial integration on financial soundness in emerging and developing economies. To measure financial soundness, we use Financial Soundness Indicators (FSIs) developed by the International Monetary Fund (IMF) with aim of assessing strengths and vulnerabilities of financial systems. To estimate financial soundness, we use a panel dataset of emerging and developing economies from six regions of the world over the period 2000-2010. We use the Generalized Least Squares Method for panel estimation. The results show that the degree of international financial integration increases financial soundness of emerging and developing economies. We also examine the effect of the interaction between international financial integration and crisis on financial soundness. We find that our results are not confirmed in crisis situation.

Keywords: International financial integration, financial soundness, emerging countries, crisis, panel data, generalized least squares method.

JEL Classification: F36, G01, G1, G2.

1. Introduction

Since the early 90s, emerging countries make a lot of efforts to attract foreign investors by deregulating their financial markets and eliminating restrictions on cross-border capital flows. In fact, the degree of international financial integration in emerging and developing economies has increased over the last two decades (Agenor 2003, Lane and Milesi-Ferretti 2003, Morrison and White 2004, Vo 2005b, Vo and Daly 2007).

Many researchers find that financial liberalization of emerging markets increased economic growth (Quinn 1997, Kose *et al.* 2008, Quinn and Toyoda 2008). Other studies show that international financial integration decreases the cost of capital in emerging economies (Miller 1999, Henry 2000, Errunza and Miller 2000). However, these markets are weakened by financial crisis where they are internationally integrated. For example, a higher international financial integration of capital markets increases the probability of capital flight in crisis situation. In this, paper we are interested in the effect of international financial integration on financial soundness of emerging and developing economies⁷. We also examine the effect of international financial integration on financial soundness in situation of crisis. To measure financial soundness, we use two FSIs of the core set; Nonperforming loans to total gross loans (npl) and Return on Equity (roe)⁸. The ratio of nonperforming loans to total gross loans indicates asset quality and the ratio of return on equity is an indicator of bank profitability.

2. Literature review

Financial globalization has certainly many advantages but it also incurs important costs including financial crises. Bank system vulnerability and bad regulation have contributed to exacerbate financial crises of the late 90s. Obadan (2006) emphasizes the necessity of good economic policies and adequate capital account liberalization in order to enable countries to make use of financial globalization at the lowest cost.

⁷ The distinction between emerging and developing countries is in accordance with the World Bank classification.

⁸ FSIs of the core set are detailed in Appendix A.

In fact, there are various economic policies that could help emerging and developing economies manage the process of financial globalization. Kose *et al.* (2010) argue that sound macroeconomic policies are a precondition to a beneficial financial integration. However, Kose *et al.* (2010) suggest that there is a complex relationship between financial integration and economic policies. In fact, economic policies often need to be adapted to country-specific circumstances to improve the risk-benefit trade-offs of financial integration.

Moreover, Edwards (2008) argues that the capital control relaxation increases the probability of crisis. The author suggests that “financial liberalization first” strategies increase the degree of fragility to crises. The author emphasizes that this is the case if the economy adopt a pegged exchange rate system and if it results in current account imbalances.

Over the last two decades, foreign banks have considerably increased their presence in emerging markets. Bourgain *et al.* (2012) analyze the effect the risk taking behavior of banks in emerging economies in the context of financial integration. The authors find that depositors can make pressure on banks to control risk taking. They argue that financial integration drives banks to take excessive risk.

The last two decades financial crises accelerated research on Financial Soundness Indicators (FSI). These indicators are used, since the late 90s, to supervise financial system. The International Monetary Fund (IMF) and the World Bank encouraged FSI use, especially under the Financial Sector Assessment Program (FSAP).

In this study, we focus on the effect of international financial integration on financial soundness of emerging and developing economies. Financial soundness is measured by Financial Soundness Indicators developed by the IMF.

In the third section of this article, we study the effect of international financial integration on asset quality. We examine the effect of international financial integration on bank profitability in the fourth section. Main conclusions are detailed in the fifth section of the article.

3. International financial integration and asset quality

3.1. Model formulation

We examine the effect of international financial integration on asset quality. If the ratio of nonperforming loans on total gross loans is higher (lower), asset quality is worse (better). Model 1 is written as follows:

$$npl_{i,t} = \alpha + \beta_1 IFI_{i,t} + \beta_2 inflation_{i,t} + \beta_3 unrate_{i,t} + \beta_4 trade_{i,t} + \beta_4 CC_{i,t} + \epsilon_{i,t} \quad (1)$$

with $i = 1, \dots, 59$ and $t = 2000, \dots, 2010$

To measure international financial integration, we use the ratio of (FDI net inflows + FDI net outflows)/GDP (Arfaoui and Abaoub 2010). We use data of nonperforming loans to total gross loans from IMF Statistics. Dependent variables used in the model are described in Table 1. To estimate asset quality we use panel data of fifty-nine emerging and developing economies over the period 2000-2010. The sample used in this estimation is diversified. In fact, it includes countries from Asia, Latin America, Commonwealth of Independent States, Central and Eastern Europe, Middle East and North Africa and Sub-saharan Africa. Figure 1 shows the weight of each region in the total sample. The diagram shows that the sample is equilibrated. Figure 2 shows the broad trend of nonperforming loans to total gross loans. We note that the ratio reaches a minimum in 2008.

Figure 3 exhibits the broad trend of nonperforming loans to total gross loans per region. The graph shows that Asia has the highest percentage of nonperforming loans over the period 2000-2002. We also note that Commonwealth of independent states has the most important proportion of nonperforming loans between 2008 and 2010.

Table 1 - Description of variables and expected effects

| Variable | Description | Expected effect | Explanation | Source |
|---|--|-----------------|---|---|
| International Financial Integration (IFI) | (FDI net inflows + FDI net outflows)/GDP (Arfaoui and Abaoub 2010) | - | - | World Bank database |
| Inflation | Inflation rate | Positive | Inflation decreases asset quality (Babihuga 2007). | World Bank database |
| Unemployment | Unemployment rate | Positive | Higher unemployment affects borrowers' ability to repay thereby affecting asset quality negatively (Babihuga 2007). | World Bank database |
| Trade | Net barter terms of trade index (percentage ratio of the export unit value indexes to the import unit value indexes, measured relative to the base year 2000). | Negative | An improvement in terms of trade has a positive effect on asset quality (Babihuga 2007). | World Bank database |
| Control of corruption | Reflects perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests. | Positive | More restrictive control of corruption reduces the percentage of nonperforming loans. Corruption increases nonperforming loans (Park 2011). | The Worldwide Governance Indicators (http://www.govindicators.org) |

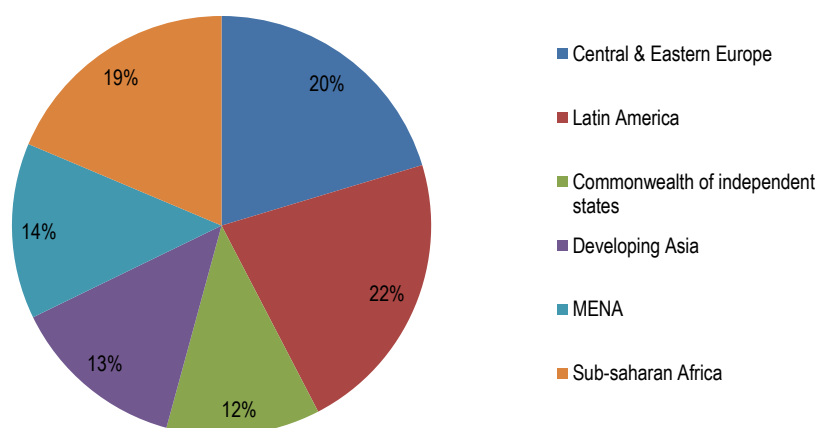


Figure 1 – Sample composition

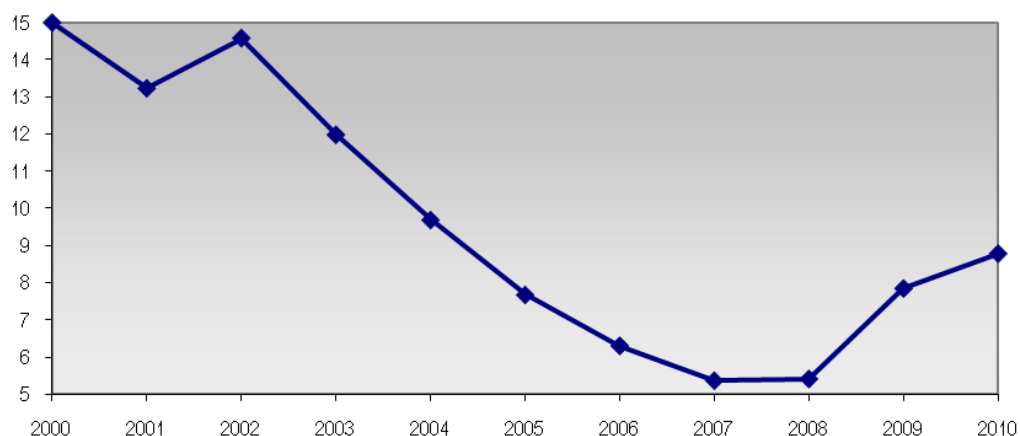


Figure 2 – Broad trend of Nonperforming loans to total gross loans

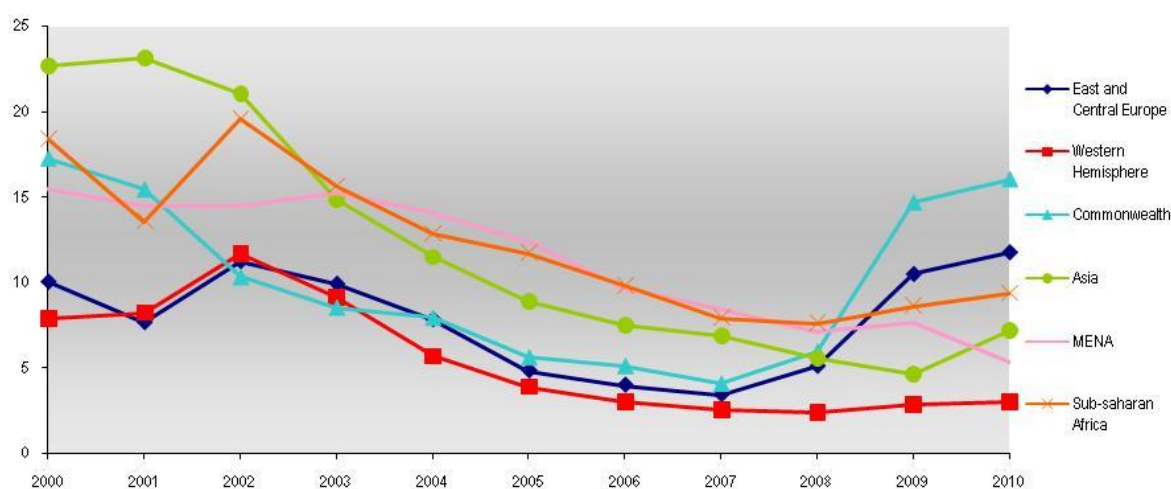


Figure 3 – Broad trend of Nonperforming loans to total gross loans per region

3.2. Data descriptive statistics and methodology

Table 2 exposes the summary statistics of the data used in Model 1. We examine minimum and maximum values and notice that there is an important variation of the variable npl across countries and over time. The minimum value of nonperforming loans to total gross loans is 0.5% (Latvia, 2006) and the maximum value is 57% (Rwanda, 2002) and the mean value is about 9.42%. There is also a considerable variation in inflation. The highest value is 168.62% (Belarus, 2000), the minimum value is -9.61% (Lesotho, 2001) and the mean value is about 7.64%.

Table 3 exposes the correlation matrix of the variables used in this analysis. It appears that there is a negative relationship between the proportion of nonperforming loans and international financial integration. Moreover, there is a negative relationship between unemployment rate and the proportion of nonperforming loans. We also note that the variable control of corruption is negatively correlated with the proportion of nonperforming loans.

Table 2 - Data descriptive statistics

| Variables | Mean | Median | Maximum | Minimum | S.D. |
|-----------|----------|----------|----------|----------|---------|
| npl | 9.4195 | 6.7000 | 57.0000 | 0.5000 | 8.0431 |
| IFI | 4.7145 | 3.6669 | 101.7779 | -68.2030 | 7.7393 |
| inflation | 7.6429 | 5.4628 | 168.6202 | -9.6161 | 10.6689 |
| trade | 110.0484 | 100.0000 | 266.4446 | 56.5591 | 30.2832 |
| unrate | 10.4428 | 8.6000 | 37.6000 | 0.8000 | 7.0005 |
| CC | -0.2905 | -0.3469 | 1.5492 | -1.4580 | 0.5637 |

Table 3 - Correlation matrix

| | npl | IFI | inflation | trade | unrate | CC |
|-----------|---------|---------|-----------|---------|--------|--------|
| npl | 1.0000 | | | | | |
| IFI | -0.1500 | 1.0000 | | | | |
| inflation | -0.0375 | -0.0123 | 1.0000 | | | |
| trade | -0.1605 | 0.0137 | 0.2039 | 1.0000 | | |
| unrate | 0.1151 | -0.0320 | -0.0442 | -0.0588 | 1.0000 | |
| CC | -0.2302 | 0.1706 | -0.2658 | -0.1799 | 0.0976 | 1.0000 |

Table 4 – Panel estimation of asset Non-performing loans

| Variables | Total sample | Sub-saharan Africa | Latin America | Asia | Central & Eastern Europe | Commonwealth | MENA |
|-----------|--------------|--------------------|---------------|---------|--------------------------|--------------|-----------|
| IFI | -0.0250** | -0.3353 | -0.1657 | -0.3097 | -0.0183 | -0.0224 | -0.3868** |
| inflation | 0.0188 | -0.0257 | -0.0160 | -0.0531 | 0.0697 | 0.3122* | 0.0837 |
| trade | -0.0269*** | 0.0728*** | -0.0429** | 0.0479 | 0.3249*** | -0.0587 | -0.0474** |
| unrate | 0.4156*** | 0.1663* | 0.5395*** | 0.4286 | 0.5633*** | -0.1378 | 0.8627*** |
| CC | -2.1441*** | -5.3574** | -2.6209*** | 2.6276 | 0.4332 | -10.1335 | -0.5187 |

***, **, and * : Significant at 1%, 5% and 10% respectively.

We use STATA 10 to estimate Model 1. First, we test for individual effects and we use the Hausman test to detect the nature of individual effects. The results show that there are fixed effects. Then we use the Breusch-Pagan test for heteroskedasticity. The results show the presence of heteroskedasticity. Finally, the test of Wald indicates that there is first-order autocorrelation. We estimate the model for the whole sample and per region. We use The Generalized Least Squares Method to estimate Model 1. The estimation results are exhibited in Table 4.

3.3. Results

We find that higher inflation and unemployment rate worsen asset quality by increasing nonperforming loans (Babihuga 2007). The estimated coefficient for the terms of trade is negative and significant at 1%. We deduce that an improvement in the terms of trade decreases nonperforming loans (Babihuga 2007).

The control of corruption seems to have a positive effect on asset quality. The estimated coefficient for the variable control of corruption is negative and significant at the level of 1%. The control of corruption decreases the proportion of nonperforming loans. This result corroborates that of Park (2011).

The estimated coefficient for international financial integration is negative and significant at 5% for the total sample (-0.025). For the six regions, this coefficient is negative. It is significant at 5% for MENA region. We conclude that international financial integration decreases the ratio nonperforming loans to total gross loans. In other words, higher international financial integration improves asset quality.

Our results show that international financial integration improves financial soundness of emerging and developing economies. However, these economies are generally weakened in times of crisis. Therefore, we examine the effect of international financial integration on asset quality in times of crisis. We add the dummy variable “crisis”; it takes the value of 1 if there is an economic or financial crisis and the value of 0 if not. We use data from Reinhart and Rogoff’s website⁹. Model 1 is modified as follows:

$$\begin{aligned}
 npl_{i,t} = & \alpha + \beta_1 IFI_{i,t} + \beta_2 inflation_{i,t} + \beta_3 unrate_{i,t} + \beta_4 trade_{i,t} + \beta_5 corruption_{i,t} \\
 & + \beta_6 IFI*crisis_{i,t} + \varepsilon_i
 \end{aligned}
 \tag{2}$$

for panel data $i = 1, \dots, 59$ and $t = 2000, \dots, 2010$

⁹ See <http://www.reinhartandrogoff.com/data/browse-by-topic/topics/7/>

The interaction term “IFI*crisis” affects negatively asset quality by increasing nonperforming loans. We deduce that, in crisis situation, international financial integration has a negative effect on asset quality.

The results, exposed in Table 5, show that international financial integration increases asset quality but not in situation of crisis. In the following section, we study the effect of international financial integration on bank profitability.

Table 5 - Panel estimation of asset quality in crisis situation

| Variables | Coefficient | p-value |
|------------|-------------|---------|
| IFI | -0.0389 | 0.307 |
| inflation | -0.0078 | 0.859 |
| trade | -0.0319 | 0.137 |
| unrate | 0.5782 | 0.000 |
| CC | -2.2164 | 0.017 |
| IFI*crisis | 0.0172 | 0.600 |

4. International financial integration and bank profitability

4.1. The model

In the second part of this study, we examine the effect of international financial integration on bank profitability. Model 2 is written as follows:

$$roe_{i,t} = \alpha + \beta_1 IFI_{i,t} + \beta_2 npl_{i,t} + \beta_3 inflation_{i,t} + \varepsilon_{i,t}$$

for panel data $i = 1, \dots, 65$ and $t = 2005, \dots, 2010$ (3)

We collected bank profitability data from the IMF statistics. The dependent variables used in Model 2 are described in Table 6. We use panel data of sixty-five emerging and developing economies over the period 2005-2010. The sample used in this estimation is represented in Figure 4.

4.2. Data descriptive statistics and methodology

Table 7 shows the summary statistics of the variables used in Model 2. While examining maximum and minimum values, we noticed that there is an important variation of the variable roe across countries and over time. The minimum value of roe is -41.6% (Latvia, 2009) and the maximum value is 60.8% (Mozambique, 2006) and the mean value is about 16.75%. There is also a considerable variation of the variable IFI. Curiously, the highest value is about 101.77% (Hungary, 2007), the minimum value is -68.20% (Hungary, 2010) and the mean value is about 5.74%.

Table 8 shows the correlation matrix of the variables used in the model. The matrix shows a positive relationship between international financial integration and bank profitability. We also note that nonperforming loans is negatively correlated with bank profitability.

We use STATA 10 to estimate Model 2. First, we test for individual effects and we use the Hausman test to determine the nature of individual effects. The results show that there are fixed effects.

Table 6 - Description of variables and expected effects

| Variable | Description | Expected effect | Explanation | Source |
|---|--|-----------------|---|---------------------|
| International Financial Integration (IFI) | (FDI net inflows + FDI net outflows)/GDP (Arfaoui and Abaoub 2010) | - | - | World Bank database |
| npl | Nonperforming loans to total gross loans | negative | Higher nonperforming loans proportion affects negatively profitability (Babihuga 2007). | IMF statistics |
| Inflation | Inflation rate | positive | Inflation increases profitability. Bank income can increase more with inflation than bank costs do (Babihuga 2007). | World Bank database |

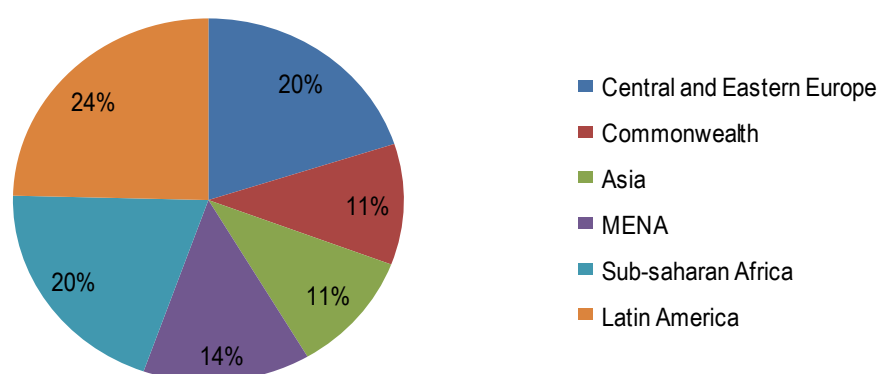


Figure 4 – Sample composition

Then we use the Breusch-Pagan test for heteroskedasticity. The results show the presence of heteroskedasticity. Finally, the test of Wald indicates that there is first-order autocorrelation. We estimate the model for the whole sample and per region. We use Generalized Least Squares Method to estimate Model 2. The results are exposed in Table 9.

4.3. Results

The results show that international financial integration affects positively bank profitability. In fact, the estimated coefficient for international financial integration is positive and significant at the level of 1% for the total sample (+0,0885). These results are confirmed for all of the six regions.

Table 7 - Data descriptive statistics

| Variables | Mean | Median | Maximum | Minimum | S.D. |
|-----------|---------|---------|----------|----------|---------|
| roe | 16.7406 | 15.7000 | 60.8000 | -41.6000 | 11.2910 |
| IFI | 5.7428 | 4.4651 | 101.7779 | -68.2030 | 9.6701 |
| npl | 6.2711 | 4.0000 | 29.1000 | 0.3000 | 5.5897 |
| inflation | 6.8496 | 5.9552 | 31.4406 | -1.4094 | 4.9041 |

Table 8 – Correlation matrix

| | Roe | IFI | npl | inflation |
|-----------|---------|---------|---------|-----------|
| roe | 1.0000 | | | |
| IFI | 0.0426 | 1.0000 | | |
| npl | -0.4504 | -0.1012 | 1.0000 | |
| inflation | 0.1121 | -0.0035 | -0.0817 | 1.0000 |

Table 9 – Panel estimation of bank profitability

| Variables | Total sample | Sub-saharan Africa | Latin America | Asia | Central & Eastern Europe | Commonwealth | MENA |
|-----------|--------------|--------------------|---------------|----------|--------------------------|--------------|------------|
| IFI | 0.0885*** | 0.4033 | 0.9176** | 0.3877** | 0.0052 | 0.6145* | 0.0505 |
| npl | -0.9454*** | -0.7577*** | -1.3266*** | -0.0466 | -1.4864*** | -1.5615*** | -0.5881*** |
| inflation | 0.1525** | 0.4537*** | 0.1728 | 0.0129 | -0.1809 | -0.1947 | -0.0414 |

***, **, and *: Significant at 1%, 5% and 10% respectively.

Moreover, the ratio of nonperforming loans on total gross loans has a negative effect on bank profitability. The estimated coefficient for nonperforming loans is negative and significant at the level of 1%. All estimated coefficients for npl in all regions are negative. Finally, inflation affects positively

bank profitability. The estimated coefficient for inflation is positive and significant at the level of 5%. Results of npl and inflation corroborate those of Babihuga (2007).

We add the interaction term “IFI*crisis” to model 2 in order to examine the effect of international financial integration in crisis situation.

$$roe_{i,t} = \alpha + \beta_1 IFI_{i,t} + \beta_2 npl_{i,t} + \beta_3 inflation_{i,t} + \beta_4 IFI*crisis_{i,t} + \varepsilon_{i,t} \quad (4)$$

For panel data $i = 1, \dots, 65$ and $t = 2005, \dots, 2010$

The results are exhibited in Table 10. The estimated coefficient for international financial integration is positive. The coefficient corresponding to npl is negative and significant at the level of 1%. Inflation affects positively bank profitability. The interaction term IFI*crisis affects positively bank profitability. We note that the estimated coefficient for the interaction term is low (+0.0034). We conclude that international financial integration has a positive effect on bank profitability. However, in crisis situation, international financial integration has a positive but small effect on bank profitability.

5. Conclusions

In this study, we are interested in the effect of international financial integration on financial soundness of emerging and developing countries. We find that higher degree of international financial integration decreases nonperforming loans, and consequently, increases asset quality.

Table 10 – Panel estimation of bank profitability in situation of crisis

| Variables | Coefficient | p-value |
|------------|-------------|---------|
| IFI | 0.0467 | 0.347 |
| npl | -0.4310 | 0.000 |
| inflation | 0.1619 | 0.023 |
| IFI*crisis | 0.0034 | 0.936 |

However, in crisis situation, our results show that the effect of international financial integration on asset quality becomes negative. We also examine the effect of integration on bank profitability. We find that higher degree of international financial integration increases bank profitability. However, in crisis situation, this effect is positive but small.

We draw attention to the fact that our results are robust because most of estimated coefficients are significant. We used Generalized Least Squares Method. We corrected for both heteroskedasticity and first-order autocorrelation.

Finally, this paper has policy implication for emerging and developing countries. Our results show that international financial integration has many advantages on emerging and developing economies if the governments of these countries provide sound macroeconomic policy and adapted institutional framework.

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APPENDIX A

| Indicator Name | Description |
|--|---|
| Nonperforming loans to total gross loans | This FSI is calculated by using the value of NPLs as the numerator and the total value of the loan portfolio (including NPLs, and before the deduction of specific loan loss provisions) as the denominator. This FSI is often used as a proxy for asset quality and is intended to identify problems with asset quality in the loan portfolio. |
| Return on equity | This FSI is calculated by dividing net income before extraordinary items and taxes by the average value of capital over the same period. Capital is measured as total capital and reserves as reported in the sectoral balance sheet; for cross-border consolidated data, Tier 1 capital can also be used. This FSI is a bank profitability indicator and is intended to measure deposit takers' efficiency in using their capital. |

Source: IMF (<http://fsi.imf.org/misc/FSI%20Concepts%20and%20Definitions.pdf>)

FINANCIAL/TECHNICAL ANALYSIS ABOUT ITALIAN “IV CONTO ENERGIA” FOR PHOTOVOLTAIC ENERGY: A CASE STUDY

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Abstract:

In this paper the authors analyse the Italian “IV Conto Energia” for the Photovoltaic in the light of the Ministerial Decree of 05th may 2011. In the first part of the paper the technical aspects of “Conto Energia” are dealt with, highlighting the major changes with respect to the past. The second part of the paper shows a financial analysis of an investment project for a photovoltaic 2kWp plant on a building. The authors consider cash inflows and outflows and they evaluate the discounted value of these flows at the plant commissioning date. The actual return on investment is therefore calculated according to the elementary principles of financial equivalence. The analysis highlights the critical consequences of the proposed cuts to incentives that will slash the return on investment by 60% as from 2012 compared to 2011.

Keywords: renewable energy, public incentives, photovoltaic, bootstrapping, discounted values.

JEL Classification: C54; C63; G17; G13; H23; Q28; Q48

1. Introduction

“Conto Energia” is a European incentive feed-in tariff policy for the production of electric energy through grid-connected photovoltaic plants. “Conto Energia” was introduced to Italy following a European directive on green energy (Directive 2001/77/CE), and it was implemented in the government decree DL n. 387 in 2003. A tax in the electric bills of all Italian power companies has been financing this plan since 1991. In this incentive mechanism the producer is paid for the generation of electricity but doesn't receive any funding to build the plant.

The power plants involved are grid-connected, so there is another aspect called “scambio sul posto” (on-site exchange): the surplus of electricity produced can be transferred to the power grid and this power can be taken from the grid whenever the plant doesn't supply enough electricity to meet the users' demand.

In Italy the chronological order of the “Conto Energia” is First “Conto Energia” (Ministerial Decrees DM 28th July 2005 and DM 6th February 2006), Second “Conto Energia” (DM 19th February 2007), Third “Conto Energia” (DM 6th August 2010) and Fourth “Conto Energia” (DM 5th May 2011) [1], [2].

Thanks to the first three “Conto Energia” plans 226,993 photovoltaic power plants have started operating in Italy, for an installed power equal to 6,778,267 kWp. The region with the greater installed power is Puglia, with 980,818 kWp.

The authors will analyze the returns of a 2 kWp plant using the principle of financial equivalence.

2. Choice of the plant

The fourth “Conto Energia”, as the previous ones, grants an incentive for the electric energy produced by photovoltaic power plants in accordance with the Ministerial Decree of 5th May 2011. This law provides for an installed power of 23,000 MW and expenditure between 6 and 7 billion euro. The DM of 5th May 2011 distinguishes between the various types of systems. There are three kinds of power plants, plants referred to title II of the DM, plants referred to title III of the DM and plants referred to title IV of the DM. The plants referred to title II are divided in two subtypes, plants installed on buildings and other plants.

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The highest incentive is granted for plants referred to title III; lower incentives are granted to plants referred to title II installed on buildings and to plants referred to title IV. The lowest incentives are granted to plants referred to title II that are not installed on buildings (also defined as “other plants”).

Incentives vary also according to the size of the plants: small plants are preferred to larger ones as the latter require more complex procedures. The above mentioned Ministerial Decree provides for a reduction in time of the incentives: the highest incentives were granted for plants that started operating just after this law was enacted.

The authors will study the financial performance of the investment on a 2 kWp photovoltaic power plant mounted on a building in accordance with title II.

The plant is made up of 18 modules of 125 Wp each in polycrystalline silicon and an inverter with a Wattmeter that can measure up to 2kW of energy produced. Considering the cost of wire connections and the cost of protection devices, for this plant we have a total cost of 10,000.00€. Figure 1 below shows the scheme of the plant we studied and the main elements that affects the cost of the investment.

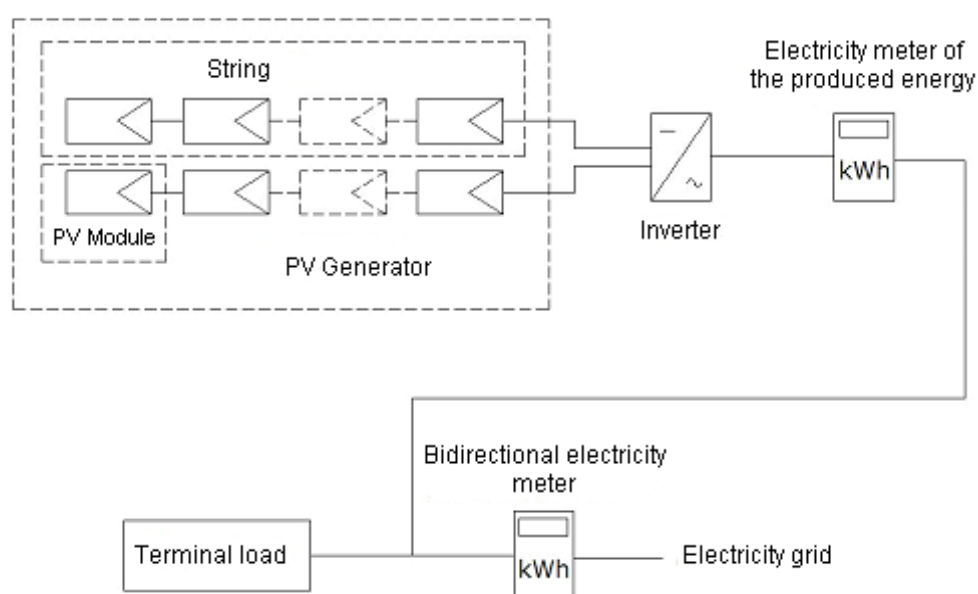


Figure 1 – Scheme of the photovoltaic plant studied

The authors suppose that for install the power plant in Foggia (Puglia, Southern Italy). Following UNI 10349 regulations, considering the efficiency of the inverter, the voltage drops across cables, the not perfect setting facing south with a tilt of 30 degrees with respect to the horizon, the authors consider reasonable a power output of about 1,400 kWh/kWp year ([6]). Therefore, under these conditions the plant produces 2,800kWh in one year.

3. Case study

In this section the authors consider a financial analysis about a photovoltaic plant with an installed power equal to 2kWp. The plant is installed on a building and for this installation the owner has been granted full funding.

The productivity of any plant changes is in relation to the site of the installation, so in the north of Italy (Milan's area) a plant produces approximately 2,200kWh per year, while in the south of Italy (Sicily) a plant produces approximately 3,000 kWh per year. In this study, therefore, the authors consider a photovoltaic plant installed in Capitanata (Foggia) where they estimate that it will produce 2,800kWh per year, and they suppose that all the energy produced will be used, without any energy surplus.

An initial form of profit emerges, thanks to the use of the energy produced that is not bought from any other energy supplier. If we consider an average cost of electric energy equal to 0.132

€/kWh, the saving is equal to $2,800 \times 0.132 = 369.60\text{€}$ per year. However, the photovoltaic plant needs maintenance, in this case the cost of maintenance is equal to 1.23% of the plant's value.

In this paper the authors consider a financial analysis based on the principle of financial equivalence, discounting all cash flows at the contract valuation's date. To this end, the authors employ the bootstrap method; starting from the market value of 16th June 2011, spot rates are firstly calculated and forward rates for Euribor 6 months, used as reference rate for the funding (figure 2), are then derived.

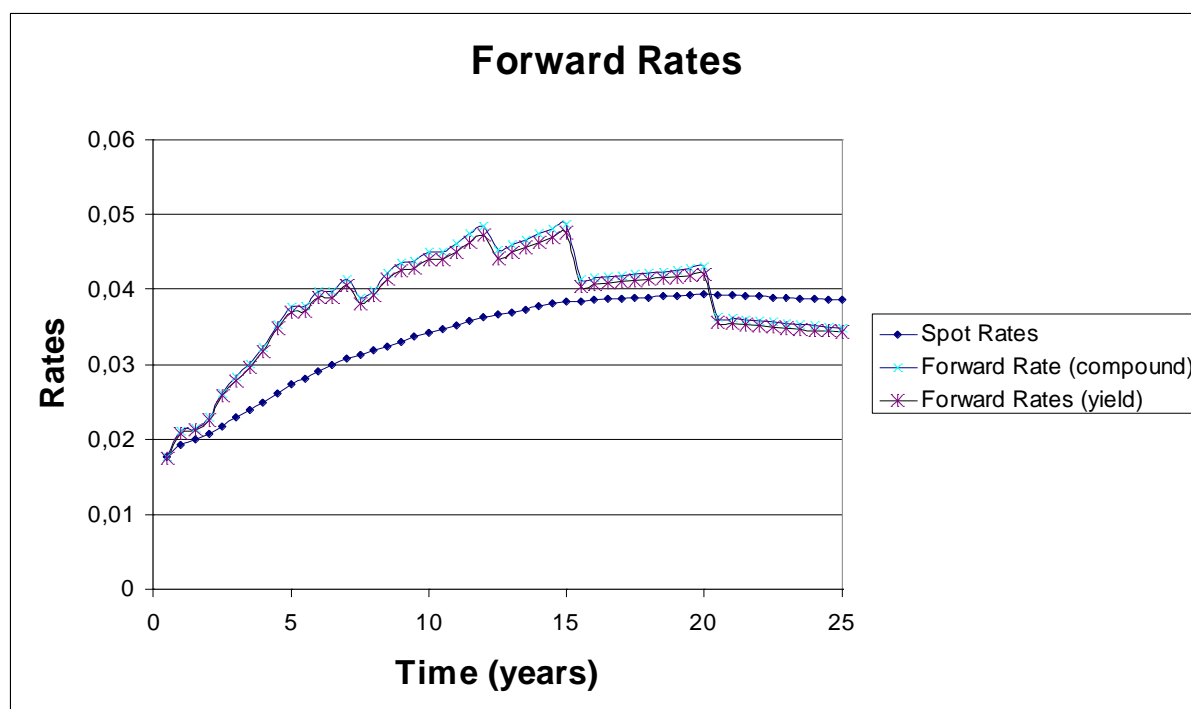


Figure 2 – Forward rates calculated from the spot rates by the technique of bootstrapping.

In this way it is possible to estimate all cash flows at the same instant of time and evaluate what can be considered as the NPV (Net Present Value) of the operation.

The authors consider two cases, the former involves a photovoltaic plant that came into operation in August 2011 and the latter involves a photovoltaic plant that came into operation in September 2012. The input data is the following:

Table 1 Case August 2011

| | | |
|---|-------------|----------|
| Plant's power | 2 | kWp |
| Plant's productivity (per year) | 1.4 | kWh/kWp |
| Energy produced per year | 2.8 | kWh |
| Energy used per year | 2.8 | kWh |
| Average energy price | 0.132 | €/kWh |
| Maintenance cost | 1.23% | Per year |
| GSE Incentive 2011 (within August 2011) | 0.368 | €/kWh |
| Value per unit in case of "Scambio sul Posto" (energy exchange on site) | 0.12 | €/kWh |
| Plant installation price (with VAT) | €10,000.00 | |
| Funding | € 10,000.00 | |
| Periodicity of instalments (months) | 6 | |
| Duration of funding (years) | 15 | |
| Reference rate | Euribor 6m | |
| Spread applied | 1.5% | |
| Number of instalments | 30 | |

The estimated rates for the installments of the funding are calculated using the forward rate curve.

Table 2 Forward Rate by 16th June 2011

| | | Forward Rates | Spread | Rates |
|--------------|------------|---------------|--------|--------|
| Funding date | 16/06/2011 | | | |
| Instalment1 | 16/12/2011 | 1.758% | 1.500% | 3.258% |
| Instalment2 | 16/06/2012 | 2.103% | 1.500% | 3.603% |
| Instalment3 | 16/12/2012 | 2.142% | 1.500% | 3.642% |
| Instalment4 | 16/06/2013 | 2.284% | 1.500% | 3.784% |
| Instalment5 | 16/12/2013 | 2.609% | 1.500% | 4.109% |
| Instalment6 | 16/06/2014 | 2.824% | 1.500% | 4.324% |
| Instalment7 | 16/12/2014 | 3.011% | 1.500% | 4.511% |
| Instalment8 | 16/06/2015 | 3.218% | 1.500% | 4.718% |
| Instalment9 | 16/12/2015 | 3.536% | 1.500% | 5.036% |
| Instalment10 | 16/06/2016 | 3.768% | 1.500% | 5.268% |
| Instalment11 | 16/12/2016 | 3.780% | 1.500% | 5.280% |
| Instalment12 | 16/06/2017 | 3.972% | 1.500% | 5.472% |
| Instalment13 | 16/12/2017 | 3.968% | 1.500% | 5.468% |
| Instalment14 | 16/06/2018 | 4.131% | 1.500% | 5.631% |
| Instalment15 | 16/12/2018 | 3.886% | 1.500% | 5.386% |
| Instalment16 | 16/06/2019 | 3.994% | 1.500% | 5.494% |
| Instalment17 | 16/12/2019 | 4.223% | 1.500% | 5.723% |
| Instalment18 | 16/06/2020 | 4.345% | 1.500% | 5.845% |
| Instalment19 | 16/12/2020 | 4.379% | 1.500% | 5.879% |
| Instalment20 | 16/06/2021 | 4.492% | 1.500% | 5.992% |
| Instalment21 | 16/12/2021 | 4.504% | 1.500% | 6.004% |
| Instalment22 | 16/06/2022 | 4.607% | 1.500% | 6.107% |
| Instalment23 | 16/12/2022 | 4.741% | 1.500% | 6.241% |
| Instalment24 | 16/06/2023 | 4.847% | 1.500% | 6.347% |
| Instalment25 | 16/12/2023 | 4.521% | 1.500% | 6.021% |
| Instalment26 | 16/06/2024 | 4.593% | 1.500% | 6.093% |
| Instalment27 | 16/12/2024 | 4.664% | 1.500% | 6.164% |
| Instalment28 | 16/06/2025 | 4.736% | 1.500% | 6.236% |
| Instalment29 | 16/12/2025 | 4.807% | 1.500% | 6.307% |
| Instalment30 | 16/06/2026 | 4.879% | 1.500% | 6.379% |

The following table is based on the rates calculated above and the funding instalments are calculated supposing a funding with fixed amounts for the repayment of the capital. The same instalments are discounted back to the date of commissioning of the plant (June 16th, 2011).

Table 3

| Date | Notional | Instalments | Discount factor | Discounted Instalments |
|------------|-------------|-------------|-----------------|------------------------|
| 16/12/2011 | € 10,000.00 | € 496.22 | 0.991325898 | € 491.91 |
| 16/06/2012 | € 9,666.67 | € 507.46 | 0.981065437 | € 497.85 |
| 16/12/2012 | € 9,333.33 | € 503.31 | 0.970722528 | € 488.57 |
| 16/06/2013 | € 9,000.00 | € 503.61 | 0.959823597 | € 483.38 |
| 16/12/2013 | € 8,666.67 | € 511.38 | 0.947543753 | € 484.55 |
| 16/06/2014 | € 8,333.33 | € 513.49 | 0.934442442 | € 479.83 |
| 16/12/2014 | € 8,000.00 | € 513.77 | 0.920684354 | € 473.02 |
| 16/06/2015 | € 7,666.67 | € 514.20 | 0.906217583 | € 465.98 |
| 16/12/2015 | € 7,333.33 | € 517.97 | 0.890609918 | € 461.31 |

| Date | Notional | Instalments | Discount factor | Discounted Instalments |
|------------|------------|-------------|-------------------|------------------------|
| 16/06/2016 | € 7,000.00 | € 517.70 | 0.874292284 | € 452.62 |
| 16/12/2016 | € 6,666.67 | € 509.32 | 0.858223734 | € 437.11 |
| 16/06/2017 | € 6,333.33 | € 506.61 | 0.841671626 | € 426.40 |
| 16/12/2017 | € 6,000.00 | € 497.38 | 0.825452535 | € 410.57 |
| 16/06/2018 | € 5,666.67 | € 492.87 | 0.808915226 | € 398.69 |
| 16/12/2018 | € 5,333.33 | € 476.97 | 0.793640581 | € 378.54 |
| 16/06/2019 | € 5,000.00 | € 470.69 | 0.778249585 | € 366.32 |
| 16/12/2019 | € 4,666.67 | € 466.87 | 0.762319226 | € 355.91 |
| 16/06/2020 | € 4,333.33 | € 459.98 | 0.746277063 | € 343.28 |
| 16/12/2020 | € 4,000.00 | € 450.92 | 0.730453877 | € 329.38 |
| 16/06/2021 | € 3,666.67 | € 443.19 | 0.714579164 | € 316.70 |
| 16/12/2021 | € 3,333.33 | € 433.39 | 0.699012096 | € 302.95 |
| 16/06/2022 | € 3,000.00 | € 424.94 | 0.683445986 | € 290.42 |
| 16/12/2022 | € 2,666.67 | € 416.54 | 0.667800573 | € 278.17 |
| 16/06/2023 | € 2,333.33 | € 407.38 | 0.65218306 | € 265.68 |
| 16/12/2023 | € 2,000.00 | € 393.54 | 0.637922334 | € 251.05 |
| 16/06/2024 | € 1,666.67 | € 384.10 | 0.623759825 | € 239.59 |
| 16/12/2024 | € 1,333.33 | € 374.43 | 0.60970305 | € 228.29 |
| 16/06/2025 | € 1,000.00 | € 364.51 | 0.595759241 | € 217.16 |
| 16/12/2025 | € 666.67 | € 354.36 | 0.581935346 | € 206.21 |
| 16/06/2026 | € 333.33 | € 343.97 | 0.568238024 | € 195.45 |
| | | | Net Present value | € 11,016.88 |

The cash inflows are calculated by considering the incentives from “conto energia” and the bill savings and the cash outflows are calculated from the payment of the instalments and the ordinary maintenance cost.

Table 4. The cash inflows

| Total cash flows | Inflows | | Outflows | |
|------------------|------------|-------------|-------------|--------------------|
| | Incentive | Bill saving | Maintenance | Funding Instalment |
| Year 1 | € 1,030.40 | € 369.60 | € 123.00 | € 1,003.68 |
| Year 2 | € 1,030.40 | € 369.60 | € 123.00 | € 1,006.92 |
| Year 3 | € 1,030.40 | € 369.60 | € 123.00 | € 1,024.87 |
| Year 4 | € 1,030.40 | € 369.60 | € 123.00 | € 1,027.97 |
| Year 5 | € 1,030.40 | € 369.60 | € 123.00 | € 1,035.67 |
| Year 6 | € 1,030.40 | € 369.60 | € 123.00 | € 1,015.93 |
| Year 7 | € 1,030.40 | € 369.60 | € 123.00 | € 990.25 |
| Year 8 | € 1,030.40 | € 369.60 | € 123.00 | € 947.66 |
| Year 9 | € 1,030.40 | € 369.60 | € 123.00 | € 926.86 |
| Year 10 | € 1,030.40 | € 369.60 | € 123.00 | € 894.12 |
| Year 11 | € 1,030.40 | € 369.60 | € 123.00 | € 858.33 |
| Year 12 | € 1,030.40 | € 369.60 | € 123.00 | € 823.92 |
| Year 13 | € 1,030.40 | € 369.60 | € 123.00 | € 777.65 |
| Year 14 | € 1,030.40 | € 369.60 | € 123.00 | € 738.94 |
| Year 15 | € 1,030.40 | € 369.60 | € 123.00 | € 698.32 |
| Year 16 | € 1,030.40 | € 369.60 | € 123.00 | |
| Year 17 | € 1,030.40 | € 369.60 | € 123.00 | |
| Year 18 | € 1,030.40 | € 369.60 | € 123.00 | |
| Year 19 | € 1,030.40 | € 369.60 | € 123.00 | |
| Year 20 | € 1,030.40 | € 369.60 | € 123.00 | |

Now we can consider the cash flows discounted to the date of stipulation of the contract, as follows:

Table 5. The cash flows discounted to the date of stipulation of the contract

| Total Discounted Cash Flows | Cash Net Profit | Discount Factor | Net Discounted Profit |
|-----------------------------|-----------------|-----------------|-----------------------|
| Year 1 | € 273.32 | 0.981065437 | € 268.15 |
| Year 2 | € 270.08 | 0.959823597 | € 259.23 |
| Year 3 | € 252.13 | 0.934442442 | € 235.60 |
| Year 4 | € 249.03 | 0.906217583 | € 225.67 |
| Year 5 | € 241.33 | 0.874292284 | € 210.99 |
| Year 6 | € 261.07 | 0.841671626 | € 219.74 |
| Year 7 | € 286.75 | 0.808915226 | € 231.96 |
| Year 8 | € 329.34 | 0.778249585 | € 256.31 |
| Year 9 | € 350.14 | 0.746277063 | € 261.30 |
| Year 10 | € 382.88 | 0.714579164 | € 273.60 |
| Year 11 | € 418.67 | 0.683445986 | € 286.14 |
| Year 12 | € 453.08 | 0.65218306 | € 295.49 |
| Year 13 | € 499.35 | 0.623759825 | € 311.48 |
| Year 14 | € 538.06 | 0.595759241 | € 320.55 |
| Year 15 | € 578.68 | 0.568238024 | € 328.83 |
| Year 16 | € 1,277.00 | 0.545661848 | € 696.81 |
| Year 17 | € 1,277.00 | 0.523795626 | € 668.89 |
| Year 18 | € 1,277.00 | 0.50262625 | € 641.85 |
| Year 19 | € 1,277.00 | 0.482140403 | € 615.69 |
| Year 20 | € 1,277.00 | 0.462324588 | € 590.39 |
| | | NPV | € 7,198.67 |

This analysis shows a positive NPV equal to 7,198.67€; this data represents the plant's profitability at the date in which the plant was put into operation.

In the next section the authors study the case of a plant that came into service in the second half of 2012. The input data is as follows:

Table 6. Case second half of 2012

| | | |
|---|------------------|----------|
| Power plant | 2 | kWp |
| Plant's productivity (per year) | 1400 | kWh/kWp |
| Energy produced per year | 2800 | kWh |
| Energy used per year | 2800 | kWh |
| Average energy price | 0.132 | €/kWh |
| Maintenance cost | 1.23% | Per year |
| GSE Incentive 2011 (within August 2011) | 0.252 | €/kWh |
| Value per unit in case of "Scambio sul Posto" (energy exchange on site) | 0.12 | €/kWh |
| Plant installation price (with VAT) | € 10,000.00 | |
| Funding | € 10,000.00 | |
| Instalment periodicity (months) | 6 | |
| Duration of funding (years) | 15 | |
| Reference rate | Euribor 6 months | |
| Spread applied | 1.5% | |
| Number of Instalments | 30 | |

Cash inflows and outflows (using the same forward rate as in the previous case) are the following:

Table 7. Cash inflows and outflows

| Total cash flows | Inflows | | Outflows | |
|------------------|-----------|-------------|-------------|--------------------|
| | Incentive | Bill saving | Maintenance | Funding Instalment |
| Year 1 | € 705.60 | € 369.60 | € 123.00 | € 1,003.68 |
| Year 2 | € 705.60 | € 369.60 | € 123.00 | € 1,006.92 |
| Year 3 | € 705.60 | € 369.60 | € 123.00 | € 1,024.87 |
| Year 4 | € 705.60 | € 369.60 | € 123.00 | € 1,027.97 |
| Year 5 | € 705.60 | € 369.60 | € 123.00 | € 1,035.67 |
| Year 6 | € 705.60 | € 369.60 | € 123.00 | € 1,015.93 |
| Year 7 | € 705.60 | € 369.60 | € 123.00 | € 990.25 |
| Year 8 | € 705.60 | € 369.60 | € 123.00 | € 947.66 |
| Year 9 | € 705.60 | € 369.60 | € 123.00 | € 926.86 |
| Year 10 | € 705.60 | € 369.60 | € 123.00 | € 894.12 |
| Year 11 | € 705.60 | € 369.60 | € 123.00 | € 858.33 |
| Year 12 | € 705.60 | € 369.60 | € 123.00 | € 823.92 |
| Year 13 | € 705.60 | € 369.60 | € 123.00 | € 777.65 |
| Year 14 | € 705.60 | € 369.60 | € 123.00 | € 738.94 |
| Year 15 | € 705.60 | € 369.60 | € 123.00 | € 698.32 |
| Year 16 | € 705.60 | € 369.60 | € 123.00 | |
| Year 17 | € 705.60 | € 369.60 | € 123.00 | |
| Year 18 | € 705.60 | € 369.60 | € 123.00 | |
| Year 19 | € 705.60 | € 369.60 | € 123.00 | |
| Year 20 | € 705.60 | € 369.60 | € 123.00 | |

Table 8 Total discounted cash flows:

| Total funding cash flow | Net profit | Discount factor | Net discounted profit |
|-------------------------|------------|-----------------|-----------------------|
| Year 1 | -€ 51.48 | 0.981065437 | -€ 50.50 |
| Year 2 | -€ 54.72 | 0.959823597 | -€ 52.52 |
| Year 3 | -€ 72.67 | 0.934442442 | -€ 67.90 |
| Year 4 | -€ 75.77 | 0.906217583 | -€ 68.67 |
| Year 5 | -€ 83.47 | 0.874292284 | -€ 72.98 |
| Year 6 | -€ 63.73 | 0.841671626 | -€ 53.64 |
| Year 7 | -€ 38.05 | 0.808915226 | -€ 30.78 |
| Year 8 | € 4.54 | 0.778249585 | € 3.53 |
| Year 9 | € 25.34 | 0.746277063 | € 18.91 |
| Year 10 | € 58.08 | 0.714579164 | € 41.51 |
| Year 11 | € 93.87 | 0.683445986 | € 64.15 |
| Year 12 | € 128.28 | 0.65218306 | € 83.66 |
| Year 13 | € 174.55 | 0.623759825 | € 108.88 |
| Year 14 | € 213.26 | 0.595759241 | € 127.05 |
| Year 15 | € 253.88 | 0.568238024 | € 144.26 |
| Year 16 | € 952.20 | 0.545661848 | € 519.58 |
| Year 17 | € 952.20 | 0.523795626 | € 498.76 |
| Year 18 | € 952.20 | 0.50262625 | € 478.60 |
| Year 19 | € 952.20 | 0.482140403 | € 459.09 |
| Year 20 | € 952.20 | 0.462324588 | € 440.23 |
| | | NPV | € 2,591.23 |

This analysis shows how a reduction of the incentives already foreseen in 2011 causes a drastic reduction of more than 60% of the performance of the financial investment. This result tends to get worse if we consider the expected cuts to the incentives contained in the decree DM May 5, 2011.

It is important to note that if we had conducted our financial analysis without using the principle of financial equivalence for 2012, the benefit/return for the investor would have been approximately € 5,200.00.

To the discouraging results of this analysis we must add the fact that PV systems do not benefit from the IRPEF tax deduction of 55%.

4. Conclusion

The case study discussed in this article shows the effects that the incentive mechanism provided for in the Fourth “Conto Energia” has on the profitability of a plant. The gradual reduction of incentives for photovoltaic energy, and in general for the production of energy from renewable sources, is witnessed in all Europe (in France they were even suspended) and it is the natural consequence of the reasons that are behind such incentives. The incentive mechanism, in fact, must be interpreted as a support to the cost of a technology that is not ripe yet and is therefore still expensive, and not as a form of financial speculation. The building of a photovoltaic system should not be seen as a speculative financial investment in order to make a profit but rather as a purely financial investment, supported by an incentive, which is aimed at the development of a technology considered as "green." Moreover, we should not underestimate that the cost of these incentives affects significantly the energy costs of all consumers.

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POWER-TYPES IN BUSINESS PROCESS MODELING

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Abstract:

The paper deals with the application of power-types in business process modeling, particularly within Resource-Event-Agent (REA) business ontology. This ontology, which originates from accounting information systems, has gradually extended into full-fledged tools for business processes and information systems modeling. To cope with the rules imposed by standards and budgets and to integrate concepts of planning into the business process model, REA ontology introduces power-types as part of the REA value model (business process). These models can be arranged into an REA value chain which can then comprise the whole application. However, relations between individual REA value models within the REA value chain do not currently meet all modeling requirements. The aim of the paper is not only to describe but also to reveal all of the variations of power-type utilization within REA value models and to extend these possibilities so that they may be applied to the REA value chain concept.

Keywords: power-types, business process modeling, REA ontology, REA value model, REA value chain.

JEL Classification: L15, L23, M11, O21

1. Introduction

We ourselves mostly apply classification and composition to organize our knowledge. But grouping the objects by categories or types is closer to our natural perception of the real world. The idea of power-type, originally introduced by (Odell 1994) is a construction that uses two different object oriented constructs simultaneously: generalization and instantiation. It is thus a hybrid, using as it does both metamodeling ideas (an object is an instance of a type) and object-oriented modeling ideas, whereby a class can be thought of as a subtype of another class; see (Gonzalez-Perez 2008).

This abstraction is useful for these reasons; see (Martin 1997). Firstly, it indicates that each type e.g. Flight Type possesses unique properties, such as its indicative e.g. *source location*, *destination location*, *time of departure*, etc. Secondly, the Flight Type type provides a mechanism for maintaining an organized collection of flight types. For instance, if a new Flight Type is identified, it becomes a member of the Flight Type type. If a Flight Type is removed, it is deleted as a member. Furthermore, changing a list does not require us to change the class diagram. Finally, indicating that individual flights are classified by types, without listing every possible type, is graphically economical. Instead of thinking of this partition as a set of subtypes, think of it as a collection of objects. The underlying theme of this partition would be that it contains types of Flights; see Figure 1.

2. Classification and composition

Grouping the objects by categories, or types, is an important technique that complements traditional tools for hierarchical organization of concepts and phenomena, classification and composition. Classification and composition are a means of organizing complexity with regard to hierarchies. These abstractions are often used in two different, but complementary ways. Composition is a semantic abstraction that describes a composite object (whole) in terms of the objects of which it consists (parts).

Composition is used to associate different properties of a class, to associate instances of different classes by physical containment and to depict group-member association. Classification is the means by which we form and distinguish between different classes of phenomena. That is we form concepts. Having identified phenomena and their properties and concepts, we group similar phenomena and concepts. When classification is applied repeatedly, classification hierarchies may be obtained.

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A power-type concept also includes power-type relationships that are expressed between two types. However, since relationship types can be treated as types of objects, they can also have power-type associations; see (Odell 1994). In business process modeling, the Bill of Material (BoM) concept is frequently used. The ability of power-types to treat relationship types as types of objects is important and can be utilized for BoM modeling both as a component category and as an aggregation of component parts. The BoM concept is an example of power-type associations in business process modeling. It will be described in section 4.3.

There are a number of methods that deal with business process modeling. Currently the most important methods are IDEF0; see (IDEF0 1993), Business Process Modeling Notation, flowcharts, use cases and data models. The approaches described above, model the business processes using general-purpose concepts such as activities, data entities, etc., with or without only poorly defined rules for formulating well-formed models of enterprise processes. These methods usually cannot offer an answer to questions such as how activities serve to increase the value of an enterprise's resources, and consequently, these models cannot answer the question as to why the enterprise performs its activities.

Research initiatives in the domain of accounting information systems have resulted in proposals of new data models in accounting, especially in models focusing on the modeling of the resource value. New modeling and system design techniques are required for information technologies that can support the enterprise in achieving and sustaining necessary flexibility. However, traditional process models do not depict resource control and value flows. This is the domain particular to value modeling ontologies. Currently, the most popular approaches within the area of enterprise ontologies are e^3 -value; see (Gordijn 2010), and the REA ontology for enterprise processes; see (Geerts 2000; Geerts 2006).

The e^3 -value ontology stipulates that the actors exchange value objects by means of value activities. The value activity should yield profit for the actor. Deeper insight in e^3 -value modeling such as (Gordijn 2010) shows that this method only covers the exchange and trade processes but leaves out production and conversion processes. The state-of-the-art e^3 -value model only focuses on the operational level (what has happened) but not on management policies (what could or should happen).

The REA model is the first semantic, application-independent data model which utilizes an object-oriented perspective. The REA model originated from the accounting domain; see (McCarthy 1982) and matured to a conceptual framework and ontology for Enterprise Information Architectures; see (Geerts 1997; Geerts 2000; McCarthy 2003). The REA model focuses on the core economic phenomena and abstracts from technical and implementation details. The REA model provides concepts to store past and future data thereby consistently utilizing the power-type mechanism. This feature of the model will be discussed broadly in the next section, which deals with the REA ontology itself.

Four kinds of using power-types can be distinguished in the REA ontology. First, it is the traditional categorization of concepts. It includes all basic concepts at the operational level to have types at the policy, especially, *resource-resource type*, *agent-agent type*, *event-event type*. Second, it is the area that includes planning (future action), which also includes *commitment* and *event* concepts. A commitment concept is a promise for some future action. An event concept represents either an increment or a decrement in the value of economic resources. Both these concepts are originally associated with the fulfillment relationship that hides power-types. Third, it is power-types on relationships. This area explains and describes the BoM concept as a component category and as an aggregation of component parts. Finally, the REA value chain structure is also indirectly influenced by power-types abstraction. Power-types in this case enable the full-fledged connection of REA value models into an REA value chain.

The ensuing structure of the paper will be as follows: Section 3 shortly describes power-types abstraction. Section 4 presents an overview of REA ontology with a focus on the REA value model and REA value chain. Section 5 is dedicated to power-types in REA ontology. Section 6 explains and describes utilization of power-types in the REA value chain concept. Section 7 discusses the results achieved. Section 8 marks the conclusion of the paper.

3. Power types

Power-types as a conceptual notion for the categorization of objects was introduced into object oriented modeling by (Odell 1994). It is defined as types whose instances are subtypes of another type; see (Martin 1997). Figure 1 illustrates the whole example of power-types that was shortly described in the previous text of the paper. This example demonstrates the classes *Flight_Type* (power-type) and *Flight* (partitioned type). The *Flight_Type* class is used for categorization of the *Flight* class.

The relationship between these two types has a classificatory nature. Power-type and corresponding partitioned type (*Flight_Type* and *Flight*) was described as a power-type pattern; see (Gonzalez-Perez 2008). Power-type and partitioned type are related indirectly through the entities that are instances of the power-type and, at the same time, subtypes of the partitioned type. *Flight_Type* describes all properties that can be determined beforehand such as *source*, *destination*, *arrival Time*, etc. These properties often represent scheduled properties. *Flight*, on the other hand, delineates properties that are unique to each instances of the *Flight* such as *actualDepartureTime*, *departureDelay*, etc. The *Flight_Type* class is supposed to be used for modeling entries in a flight timetable.

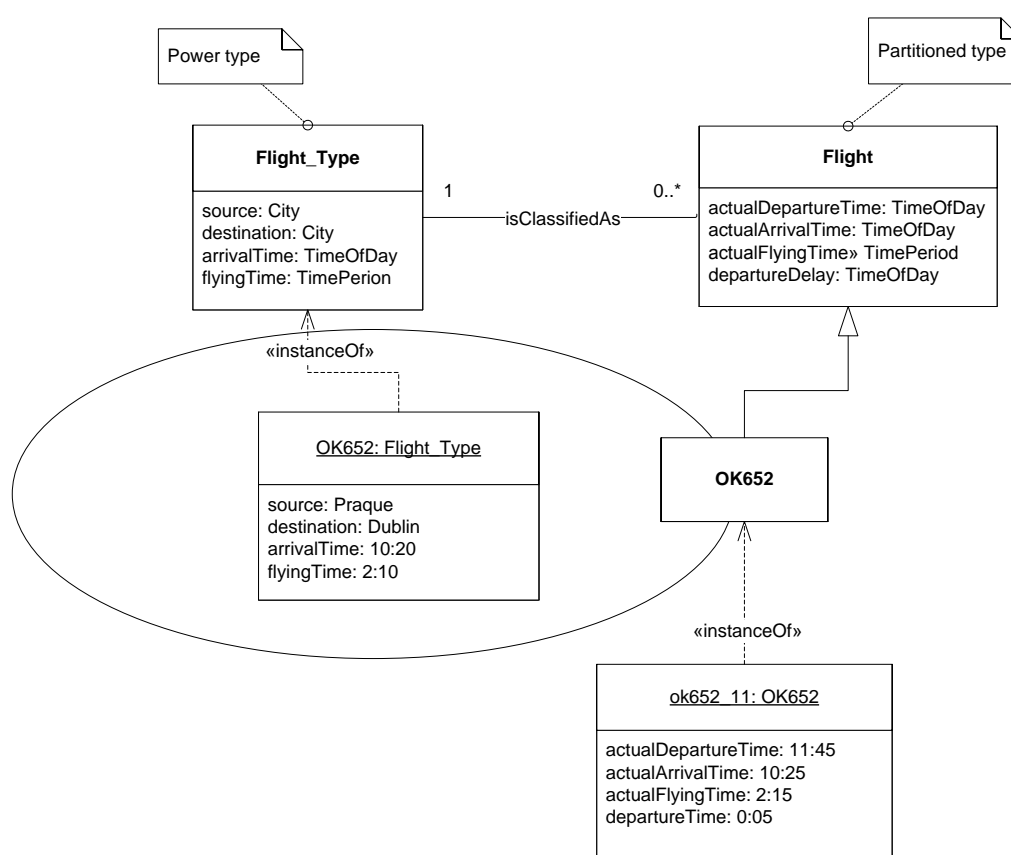


Figure 1. *Flight_Type* is a power-type of *Flight* and *Flight* is a partitioned by *Flight_Type*. The ellipse denotes the “class object”, which represents both class and object. Source: adopted from (Gonzalez-Perez 2008).

For each entry in the timetable there is an instance of the *Flight_Type* class; such an instance represents flight entries like *OK652*. The flight *OK652* between Prague and Dublin actually takes place most days of the year. The flight *OK652* must contain an entry for each day the flight takes place. Each such entry should have actual information taking place specific to each flight. The instance *ok652_11* contains actual information e.g. for the 11th flight in the current year.

The partitioning that the power-type exerts over the partitioned type is not random, but rather adheres to a well-defined criterion that uses the discriminator property. The partitioned rule is clear and unambiguous such that each element belongs to one and only one partition.

A discriminator property is normally an attribute of a Boolean type in the sense of a given kind of resource but can also represent another type of value. In this case, a specific flight from one destination to another is utilized as a discriminator property.

Unlike generalization, power-types enable so-called *dynamic specialization*; see (Gonzalez-Perez (2008), which means that not all subtypes need to be predefined, they can be added later dynamically. In other words, from an instance of Flight_Type, instances of Flight can be created in “run time”.

4. Resource-Event-Agent ontology

The REA enterprise ontology views enterprises at four levels of detail; see (Dunn 2004). An *REA value system* level that forms the first level focuses on the resources that are exchanged between an enterprise and its various external business partners. The second level of this view is created by an *REA value chain* level that pays attention to the resource flows of interconnected business processes. The third view level is formed by the *REA value model* (business process). This is implicitly done by the concepts and relationships that the REA model provides. The REA value model is defined by related economic events and the REA value chain is specified by related REA value models. The fourth level is an *REA task* level that deals with individual steps of the REA value model. These individual steps used to be naturally dependent upon the implemented platform. The principal levels that the paper will explore are the second level – REA value chain and the third level – REA value model (business process).

4.1 Resource-Event-Agent value model

The REA value model is further specified as an exchange or conversion. The REA exchange process models resource value exchange, the REA conversion process models conversion of resources to another kind. The REA value model is basically composed of two levels, the *operational level* which deals with activities within the period of the past and near present time and the *policy level* which deals with activities within the period of future time, especially those activities that should, could and must happen; see (Geerts 2006).

The operational level is created with three kinds of entities, an economic resource, an economic event and an economic agent. An *Economic Resource* is a thing of given value that is scarce, and has utility for economic agents. In business applications, economic resources are changed or converted for another economic resource. Examples of economic resources are products and services, money, raw materials, and labor. An *Economic Agent* is an individual or organization capable of having control over economic resources, and transferring or receiving the control to or from other individuals or organizations. Examples of economic agents are customers, employees, vendors, and enterprises. An *Economic Event* represents either an increment or a decrement in the value of economic resources that are under the control of the enterprise.

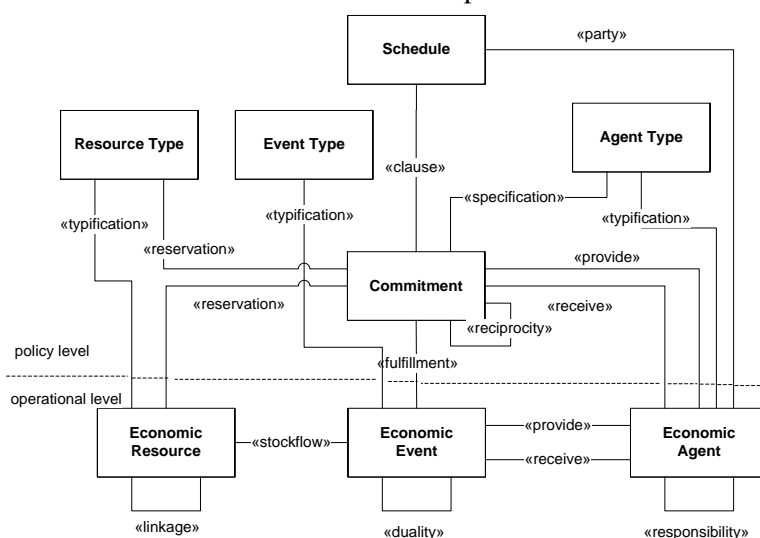


Figure 2. Basic structure of the REA conversion value model

Some economic events occur instantaneously, such as the sale of goods; some occur over time, such as rentals, labor acquisition, and the provision and use of services. Apart from entities, the REA value model declares relationships between both different entities and between entities of the same type. The most important of these relationships is the duality relationship that links decrement events with an increment event. The policy level of the REA conversion value model is created with a *Schedule*, *Commitment*, *Resource type*, *Event type*, and *Agent type*.

The *Commitment* is a promise or obligation of economic agents to perform an economic event in the future. Examples of commitments in conversion processes may be a promise or obligation to use, consume or produce an economic resource. Each commitment is related to an economic event through a fulfillment relationship. Decrement commitments relate to increment commitments by the reciprocity relationship and bear semblance to the duality relationship among different events. A schedule is a series of things or activities that should be done during a given time interval. More specifically, a schedule is a collection of increment and decrement commitments. The basic structure of the REA value model is illustrated in Figure 2.

4.2 Resource-Event-Agent value chain

The value chain concept, developed and introduced by (Porter 1980), can be arranged as a series of input-output business processes with resource flows between them; see (Dunn 2004). A fundamental notion in value chain analysis is that a product gains value as it passes through a stream of production within the chain in an enterprise. If a resource flow is created by REA resources and business processes are modeled by the REA exchange or conversion value models, the REA value chain arises; see Figure 3.

An REA value chain is a network of business processes whose purpose is to directly or indirectly contribute to the creation of the desired features of the final product or service, and to exchange it with other economic agents for a resource that has a greater value for the enterprise; see (Geerts 1997; Snapka 2012).

While the business processes are bound together by duality relationships, the value chain model is woven together by resource inflow and outflow relationships. Value chain theory includes *primary* value activities that consist of events that ‘directly’ add value to the product or service and *support* value activities that facilitate the accomplishment of the primary activities see (Porter 1980; Dunn 2004). The support value activities can be further classified e.g. as enterprise infrastructure activities. This overall result is that the value chain does not contain support/infrastructure processes such as planning, monitoring or controlling.

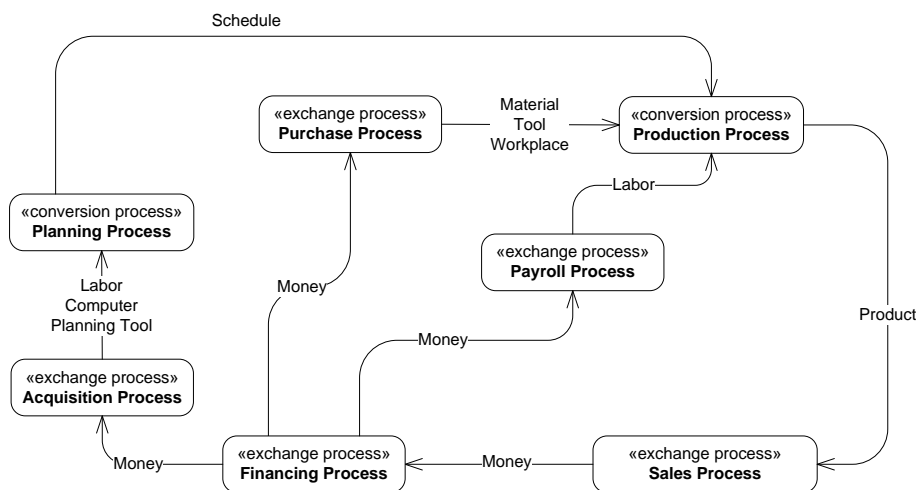


Figure 3. REA value chain

There is a discrepancy in the ability of modeling business processes between the REA value model and REA value chain. The REA value model can work with all kinds of processes, including processes that directly add value to the output resource and processes which do not or do so indirectly. On the other hand, value chain concept and the REA value chain concept are primarily focused on

resources that add value to the final product. They neglect support/infrastructure processes such as planning, monitoring and so on.

5. Power-types in Resource-Event-Agent ontology

Power-types can be found in three different parts of the REA ontology. Firstly, power-types are utilized in typification relationships. These relationships explicitly create the categorization of corresponding entities. Secondly, they are employed in the fulfillment relationships that link the Commitment entity with the Event entity. In this case, the paper introduces some adaptations that help to transform the fulfillment relationship into the typification relationship. Finally, power-type associations are applied in the Bill of Material concept.

5.1 Typification relationship

The typification relationship directly uses the power-types abstraction between the entities at the policy and the operational level of the REA value model; see (Geerts 2006). This semantic abstraction is established between the principal entities of the REA value model: *Resource type – Resource*, *Event type – Event*, *Agent type – Agent*. The entities and the relationships are illustrated in Figure 2. The policy level of the REA value model describes what should, could or must occur sometime in the future. The typification relationship that relates *category items* at the policy level to *physical items* at the operational level is a very powerful tool for business process modeling.

It also defines constraints and guidelines which have to be followed during the execution of the business process. These constraints and guidelines are expressed by (Geerts 2006) as three different types of policy definitions: knowledge-intensive description, validation rules and target description. A *knowledge-intensive description* defines characteristics of a concept that apply to a group of objects. Such characteristics can have the form of a unit price that is applied on all objects belonging to the same category. *Validation rules* represent permissible values and a common application of validation rules in enterprise systems. For example, the salary for an employee should be validated against the salary range defined for his or her employee type. *Target descriptions* are applied in two different forms: standards and budgets. While standards often refer to engineering information, budgets provide quantified performance measurements most often related to a specific time period.

5.2 Fulfillment relationship

By its character, the fulfillment relationship that relates Commitment entities with Event entities is semantically very close to the typification relationship in the REA value model. Properties (data attributes) of the Commitment entity inherently express “scheduled values”. This issue was described in (Hunka 2009). In the same way, properties of the Event entity describe “actual values”. In short, a Commitment entity in its essence represents a collection of planned events. Of course, the REA value model also provides the Event type – Event typification relationship. But this relationship makes categories of different events and semantically differs from the fulfillment relationship that relates the Commitment entity with the Event entity.

The reason, why the fulfillment relationship was introduced, is in the cardinality of both mentioned relationships. In the typification relationship, the partitioned type has a cardinality of “0..*”, the power-type has a cardinality of “1”; see Figure 1. In the fulfillment relationship, the Commitment entity has a cardinality of “0..*” and event entity has a cardinality of “1..*”, which is illustrated in Figure 4.

This ambiguity between the Commitment and Event entities requires some specific solution in the form of unambiguous relationships that can be utilized in implementation.

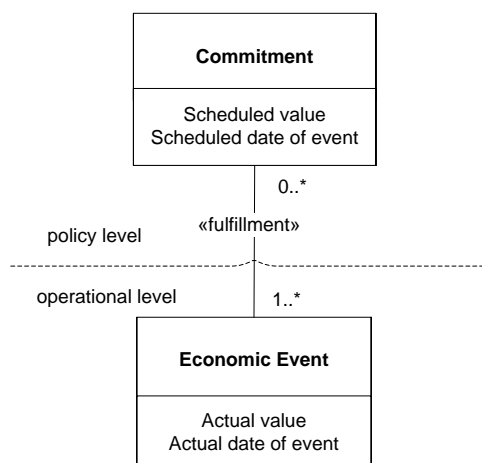


Figure 4. Commitment and economic event relationship

From the previous description it emerges that the fulfillment relation encompasses two cases that do not occur simultaneously. The first case happens when a Commitment entity is performed by one or more Event entities. An example of which may be a payment order (Commitment), by which a number of trade documents (invoices - Events) can be paid.

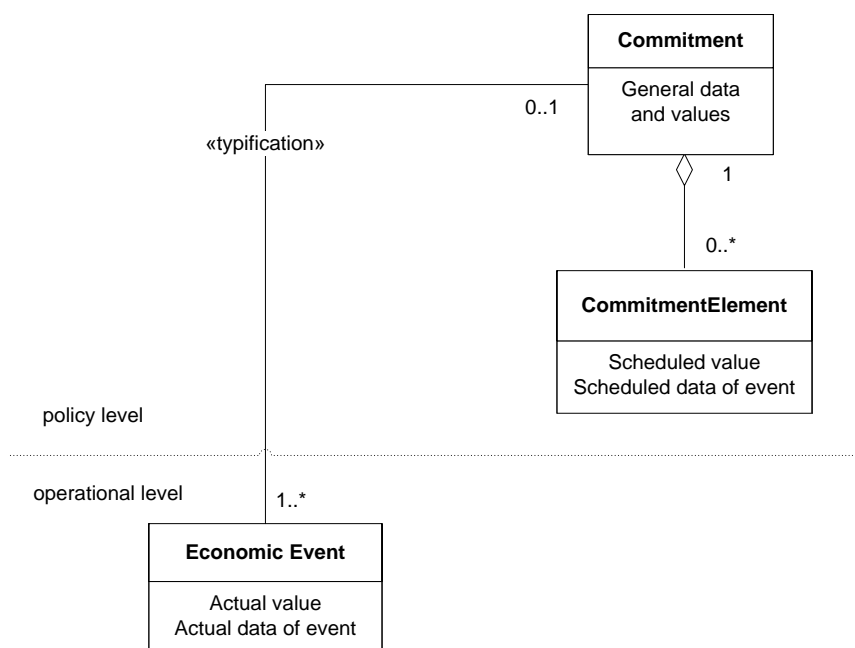


Figure 5. Modification of the fulfillment relationship

In this particular case, the fulfillment relationship can be replaced by the typification relationship without any difficulties. This case is illustrated by the typification relationship in Figure 5.

The second case happens when the Event entity is performed by more Commitment entities. An example of which may be a payment of one trade document (invoice - Event) that pays a number of payment orders (Commitments). To make the relationship unambiguous, an auxiliary entity has to be added to the current structure. In this case, the *CommitmentElement* entity is used to divide the Commitment entity into smaller parts so that each part corresponds to only one Event entity. The proposed solution is illustrated in the Figure 4. Commitment entity contains a container where individual CommitmentElements are stored. This entity also contains methods that on demand calculate all required values, stored in particular CommitmentElements. For example, sum of all

scheduled values or an overview of all scheduled data of events. An Economic event related through a typification relationship with the Commitment entity and can access not only aggregated data in the Commitment entity but can also access the CommitmentElements within the container itself. The detailed description is a question of implementation.

Of course, the question still remains concerning the first case where there is only one Commitment entity that fulfills several events. In that case, the container of CommitmentElements contains only one element which can also be indicated in the Commitment entity itself. This proposed solution would simplify and clarify the whole model.

5.3 Power-Types on relationships - bill of material

So far, the power types are described as a relationship between two types, the power-type and the partitioned type, see Figure 2.

However, since both of these types can be treated as types of objects, they can also have power-type associations; see (Martin 1997). It means that both types can aggregate parts from which they are composed. In business process modeling, the Bill of Material (BoM) entity is frequently used. This entity expresses the fact that a given entity can be recursively composed of the entities of the same type. The BoM entity is described as a Recursive pattern in (Batra 2005).

This pattern depicts a recursive *m:n* relationship between instances of the same entity. However, this pattern takes only physical items into account. From the view of the REA value model, this pattern considers only the operational level and does not include the policy level. The other authors describe the BoM as a recursive composition of category items which also includes the way, in which a finished product will be manufactured (target description); see (Geerts 2006). This description includes only the policy level of the REA value model. However, this does not comply with power-types on relations by (Martin 1997). Only the solution in the form of a design pattern, referred to as a Linkage pattern, proposed by (Hruby 2006), meets all the features intended by (Martin 1997).

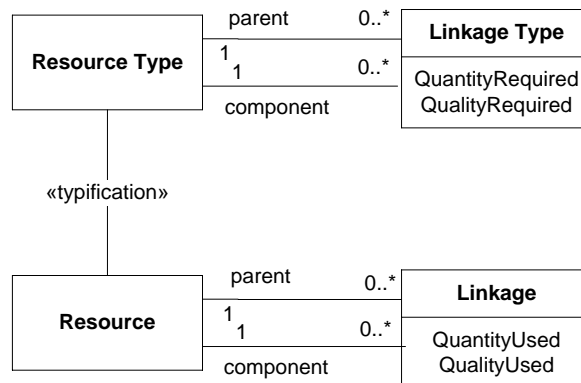


Figure 6. Linkage pattern
Source: (Hruby 2006)

The linkage relationship exists at two levels of abstraction in accordance with the original Odell description; see Figure 4. The *linkage type* relationship between *Resource types* specifies the component category structure and the *linkage* relationship between *Resources* specifies the component part structure. The *Quantity and Quality Required* property of linkage type specifies how many components of which quality a parent should consist of, and the *Quantity and Quality Used* property of linkage specifies how many components of which quality the parent actually consists of.

As was mentioned earlier, the BoM entity is a principal input entity of the planning process. Being organized in two levels, it represents both a listing of all the assemblies, subassemblies, parts and raw materials that are needed to produce one unit of a finished product and also defines the way, in which a finished product will be manufactured; see (Geerts 2006). Thus the BoM entity creates the core input entity for the traditional planning process model. Of course, the Linkage pattern can be redrawn in a more general way, see Figure 7.

6. Utilizing power types in the Resource-Event-Agent value chain concept

REA value chain joins all corresponding processes into a chain usually in the form of transactional cycles. However, the current concept of the REA value chain allows only resource flows; see (Hunka 2010). This comes from the original idea of a value chain concept, which enables only those processes that add value directly to the final product to be included in the value chain. All other processes, which are regarded as support or support/infrastructure processes were excluded from the value chain concept. This fact rather restricted the possibilities of value chain to model the whole application, as it is inevitably connected with the support/infrastructure processes, too.

Involving power-types abstraction into the REA value chain concept helps to solve the problem. Support processes such as planning outputs not only *Resource* but also outputs “*information*” entity such as a Schedule. The term “*information*” entity is used in general for entities at the policy level that contain information. The *Resource* that outcomes simultaneously from the planning process expresses the amount of *Resource* value, which had to be used or consumed to produce the corresponding „*information*” entity. In economic terms, the resource expresses so called indirect costs. A similar procedure can be used for other „*information*” entity creation e.g. the BoM or *Contract*.

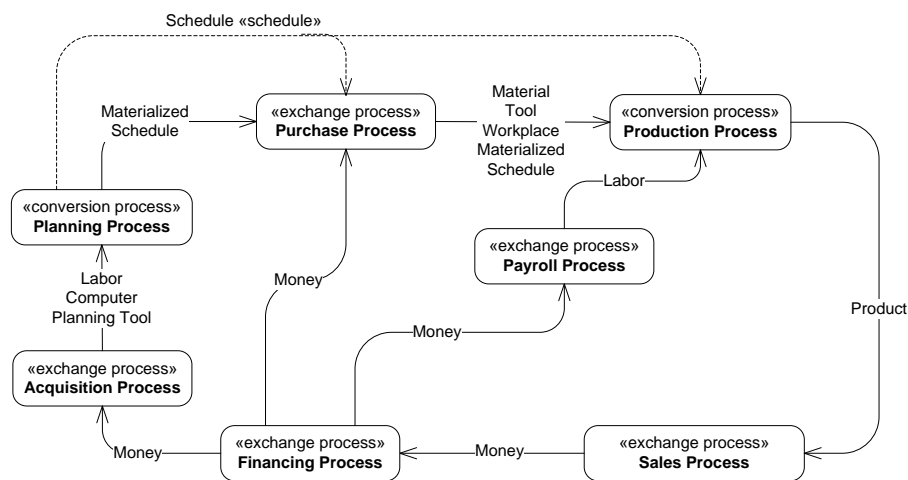


Figure 7. Extended REA value chain

A traditional REA value chain is interwoven by resource flow. To cope with the proposed solution, an extended REA value chain was proposed. This extended REA value chain originated from the REA value chain and enables not only Resource flow but also “*information*” entity flow between the REA value models. This flow is graphically symbolized by dotted line. In short, a Resource flow is supplemented by an “*information*” entity flow. A description is illustrated in Figure 7. In this figure, the planning process outputs a *Schedule* (*information* entity) which is used as an input in the purchase and production process. The purchase process is responsible for arranging for all necessary resources for the subsequent production process. The production process needs the *Schedule* for the production of the final product. The planning process also outputs a *Materialized schedule* which is a *Resource*, expressing the costs (overhead costs) of the *Schedule*. The proposed extended REA value chain can also include other support processes such as a *Contract* creation process or the BoM creation process.

7. Discussion

One of the significant advantages of the REA ontology is the implicit utilization of the power-types abstraction in the REA value model (business process). As the paper describes, this abstraction is utilized in three kinds of relationships inside the REA value model. This abstraction enables to create consistent models of activities within the period of past and near present time, and activities within the period of future time, especially those activities that should, could and must happen. Next application of power-types abstraction is employed in the proposed concept of the extended REA value chain that joins the individual business processes into the whole application.

The REA value model provides two modeling levels that are bound together by power-type associations, the operational and the policy level. The operational level of the model is primarily designated for the exchange or conversion of resources which means that this level models day-to-day events during which resources are exchanged or converted for/into desired ones. Value modeling, by which the ontology is classified, takes place at the operational level. The operational level works with physical items or with entities that semantically represent physical items e.g. money, labor or an employee. The policy level contains entities that govern future events and provides rules that guide the structure and behavior of the entities at the operational level.

Typification and fulfillment relationships relate entities on each level of the REA value model. The typification relationship directly implements power-types semantic abstraction, examples of which are in relations such as *resource type – resource*, *agent type - agent*. These entities express the need for categorization which is carried out by this relationship. The fulfillment relationship relates the planned commitment to the event(s), which performs the obligation. As was described in the paper, the fulfillment relationship can be implemented in the same way as a typification relationship despite its different cardinality.

In addition, a linkage pattern in the REA ontology is an implementation of the power-type associations. Its resource type *component category mapping* expresses permissible aggregations for the resources (parts) and resource *component mapping* defines a configuration of resources within a whole.

The above described processes are included into the extended REA value chain. Its core functionality remains the same as the original REA value chain. Each process flows out or flows in resources whose values are changed inside the processes. The extension of the functionality represents the additional introduction of information entity flow between the processes. Currently, the real applications based on the REA ontology either utilize only one REA value model or if they are composed of more REA value models and create REA value chain, only resource flows between REA value models are possible. The result is that any entities at the policy level of the REA value models have to be added from the outside of the REA value models. The aim of the paper is to show, how power-types abstraction can be also beneficial in the creation the whole application within the extended REA value chain without any necessity to add entities from outside of the extended REA value chain.

8. Conclusion

In the background of the REA ontology that is primarily designed for business process modeling and for information system design, the paper deals with the possibilities of employing power-types abstraction in the REA value model, which also results in the extended REA value chain concept. This abstraction not only enables the categorization of the entities but can be also inherently applied in the planning activities of the business processes. Power-type abstraction enables consistent storing of past and future data provide for the REA framework to exert large potential in the modeling of business applications. This abstraction allows for the modeling of support/infrastructure processes and to include them in the extended REA value chain. Full development of the power-type abstraction enables the creation of more effective business applications.

Acknowledgements

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SPECIFICS OF SIZE STRUCTURE AND MANAGING ROLE OF THE LARGE COMPANIES IN ENTERPRISE ENVIRONMENT IN THE CZECH REPUBLIC

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Abstract:

Enterprise size structure is understood from historical point of view. Today enterprise size structure is connected with better capture of global market. For evaluating sizes of companies the basis is very simple classificatory point of view – number of employees.

In the Czech Republic 1,1 million enterprises realize active entrepreneurial activity. The most common legal form of business is micro-firm (nearly 95%). Number of large enterprises is much lower – it is only 0.2% and they realize about half of the Czech economy. These enterprises have decisive influence on real economic and business processes. Our analysis brought approximate profile of large enterprise in the Czech Republic (according to the number of employees, legal form of business, branch, owner, localization). By realizing insight into selected large enterprises in the Czech Republic there come out externally important questions that concern their capital ties, managing and decision-making practice in the Czech Republic.

Keywords: Analysis, enterprise size, enterprise structure, large enterprises, management, strategy.

JEL Classification: L26, L21, L14, M10, M21

1. Introduction

Period, in which we live, brings many problems, surprises, conflicts, paradoxes and also many challenges. It can be observed how enterprises try to solve their existential, strategic and also everyday problems in many ways. Some enterprises derive their benefits from their size, others look for the way of using their innovative potential, and others decide to realize marketing, organizational and other similar steps. Nevertheless only a few of them significantly grows.

Analytical-statistical insight into enterprise size structure and its changes can provide certain reflection concerning this evolution. By this we can uncover aspects that are worth of more attention from the point of view of entrepreneurial developing trends, overcoming contemporary barriers, increasing company competitiveness, reaching social and ecological sustainability due to entrepreneurial activities etc. Deeper analysis can uncover risks that are connected with certain types of enterprises and their size structure.

We can meet with the ideas of ongoing polarization of enterprise size structure. On one side many enterprises are seen to be stronger and more dominant. They purposefully use possibilities that contemporary findings about enterprise management provide. On the other side small enterprises are seen to accept more and more conditions of strong enterprise subjects. It is apparent that small firms and micro-firms significantly lose their competitiveness. Only a few of them will succeed and get to higher enterprise levels.

Considering size structure of enterprises in the Czech Republic authors of this paper focus on numerically small but as for performance strong group of enterprise subjects. It is a group of large enterprises.

2. Methodology and aim

Methodology was focused on three following steps. Firstly it was methodology question associated with aspect of enterprise size and its classification point of view. Approach commonly used in the case of public support of small and medium sized enterprises was partly used. Our effort

was to use as easy expression of this parameter as it is possible. The second step was obtaining and analyzing statistical data about enterprise size structure and its evolution. Data publicly available (Czech Statistical Office) was used. When working with statistical data there were used common mostly descriptive analytical-statistical methods and techniques for time series and for evaluating size structure (significant divergences, growth rate etc.). Attention was paid mainly to analysis in group of large enterprises. The third step was concerned to look inside the real conditions of chosen large enterprises in the Czech Republic in context with capital link. The main purpose was reaching information and findings that would help to clarify trends in enterprise size structure in the Czech Republic.

Aim of the paper is to identify typical large enterprise in general attributes in context with size structure of enterprises in the Czech Republic and to look inside austere statistic characteristics.

3. Enterprise size structure in the Czech Republic

3.1 Enterprise size

Size is one of the parameters for characterizing enterprises. There exist many reasons for being concerned with enterprise size. The reasons can be only practical entrepreneurial (recognition of business partner or competitor). The reasons can be also methodical and statistical (comparability of statistical data). Regulation reasons are important (tax collection, business and investment incentives) etc. From our research intention the reason is to recognize and identify better phenomena and processes in enterprise sphere that significantly influence growing and developing trends of enterprises.

Notion enterprise size is understood relatively. It has originated in the past and it has been still developing. During the past hundred years the measure for evaluating large enterprise increased in sales from 1 billion USD at the beginning of the 20th century to 200 billion USD at the end of this century (Jirásek 2006). Size and enterprise growth has its reason. Economic law of concentration of production has appeared here. With growing number of repeated production the price of unit declines. Large-scale production and trade is more profitable from the price and profit point of view. Increasing size of enterprise is connected with possibility of combining material resources, techniques, capital, people, new research findings etc. It brings the advantage of using progressive technology, of involving qualified people in creative work and of having the most competent people in leadership and management. It gives a chance to sustain partial and temporary losses. Economic power is the base of political influence and control. It is a mean of meeting human needs.

Nowadays enterprise size is connected with having control over the global market. It is estimating that more than 50 thousands of enterprises participate in global operations. Only one fifth of them is classified as dominant enterprise. They are great in their remarkable size or peak intellectual and innovative output. These enterprises are great in creating transnational networks and chains. They involve a lot of time in questions of managing including creating new enterprise models with the aim of success in competition (Kuratko 2009), (Vochozka 2011).

So called small enterprises bring chance of individual realization of people in enterprise process. They represent local owner's relations. The effects from entrepreneurship usually stay in particular region that is more tightly connected with concrete enterprise. These enterprises are known in their environment and they are under public control. They complete urbanism of towns and villages and recover area. Generally they can bring innovations of lower level. Their characteristic is their effort to satisfy individual customer needs. Mostly owner of this enterprise is at the same time a manager and efficient worker.

Small enterprises generally cannot accept big projects. They cannot employ highly qualified people. They cannot use reputable consulting and advisory services in the field of managing. But at the same time they cannot stand apart from changes that appear in entrepreneurial environment (Veber, Šrpová 2005).

For our research project we have chosen very easy point of view of enterprise size. This is number of employees in enterprise. We have come out from direction of small and medium sized enterprises in European Union. So, we recognize micro-firms (0 – 9 employees), small enterprises (10 – 49 employees), medium sized enterprises (50 – 249 employees), large enterprises (250 employees and more). The last group is structured into 10 size categories.

3.2 Size structure of enterprises

In the Czech Republic about 1,1 million enterprises realize active entrepreneurial activity (year 2011). It means one enterprise for 10 residents. In one enterprise there is employed on an average 3.3 employees.

In the last 5 years (2007 – 2011) the number of active enterprise subjects increased by almost 24%. Statistical distribution of enterprises according to size is very unequal (see Table 1). Most numerous groups are group of micro-enterprises (nearly 95%). Small enterprises (10 – 49 employees) represent approximately 4%, medium sized enterprises 1%. Only two enterprises from thousand belong to so called large enterprises. In the last 5 years the biggest growth was noticed in a group of micro-enterprises (more than 25%) and in this group there appeared many new firms without employees (33% growth). Other groups were more or less without change.

Group of micro-firms, small and medium sized enterprises (abbreviation SMEs) represent 99.8% of all enterprises in the Czech Republic. Besides its` great number and diversification this group has more specific characteristics. From the social and economic point of view very important characteristic is share in employment. This group creates approximately 60% of all jobs. It creates about 54% of value added, 50% of performance, 50% of export etc. (data from year 2011).

Table 1. Development of number of companies according to size structure

| Enterprises According Size | | Number of Active Enterprises in Particular years | | | | |
|---------------------------------|------------------------|--|------------------|------------------|------------------|------------------|
| | | 2007 | 2008 | 2009 | 2010 | 2011 |
| Micro-firms | 0 – 9 employees | 862 171 | 999 377 | 1 031 711 | 1 059 092 | 1 082 453 |
| Small enterprises | 10 – 49 employees | 46 239 | 47 692 | 46 790 | 45 966 | 45 341 |
| Medium sized enterprises | 50 – 249 employees | 11 709 | 12 088 | 11 658 | 11 656 | 11 548 |
| Big enterprises | 250 employees and more | 2 143 | 2 181 | 2 063 | 2 160 | 2 220 |
| CR TOTAL | | 922 262 | 1 061 338 | 1 092 222 | 1 118 874 | 1 141 562 |

Source: Own investigation by using statistical data from Czech Statistical Office

Large enterprises that represent only 0.2 % of all enterprises realize approximately half of the Czech economy. According to the numbers this group is very small, but it significantly influences real economic and entrepreneurial processes. These enterprises are able to have a part in transnational operations and use them. That is why in the following text we will focus on analysis of structure of big enterprises.

3.3 Large enterprises

Structure analysis of large enterprises in the Czech Republic was realized on the basis of Business Register provided by Czech Statistical Office in 2011. From the whole number 2,133 of economic subjects over 250 employees there were chosen only those subjects that are active and are not financial subjects. The number of these subjects was 1,685 in 2011.

Structure of large enterprises was analyzed from several points of view such as number of employees, legal form of business, branch, form of ownership and regional localization.

- Number of employees

The biggest number of large enterprises was in category from 250 to 499 employees (976 enterprises) that represents 58% of all large enterprises. Category with enterprises that have from 500 to 999 employees represents 27% of all big companies. Both these categories make up 85% in the whole structure of large enterprises. Only 8 companies had 10 thousands employees (it means 0.5% of big enterprises). With growing size of enterprises according to number of employees the percentage of number of companies declines (see Figure 1).

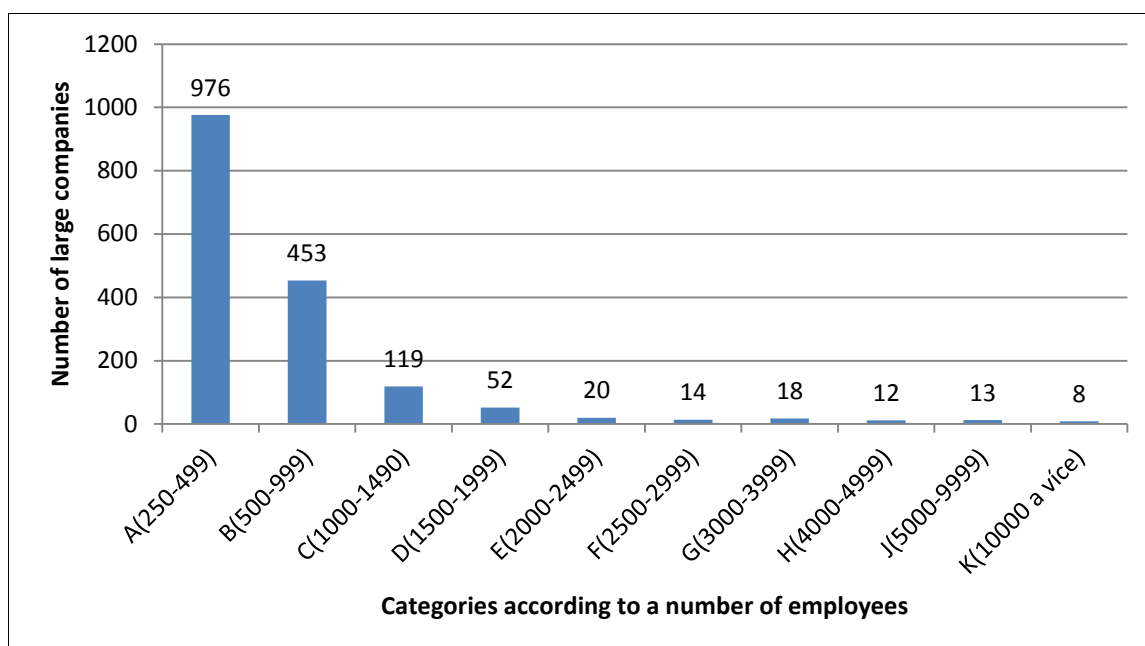


Figure 1. Structure of large companies according to number of employees

Source: own research investigation based on data from Czech Statistical Office and Business Register

- Legal form of business

From this point of view the biggest number of enterprises are Limited Liability Companies (881 companies, it means 52 % of all big enterprises). The second biggest group is group of the joint-stock companies (696 enterprises, it means 41%). Other legal forms of business are less often (see Figure 2).

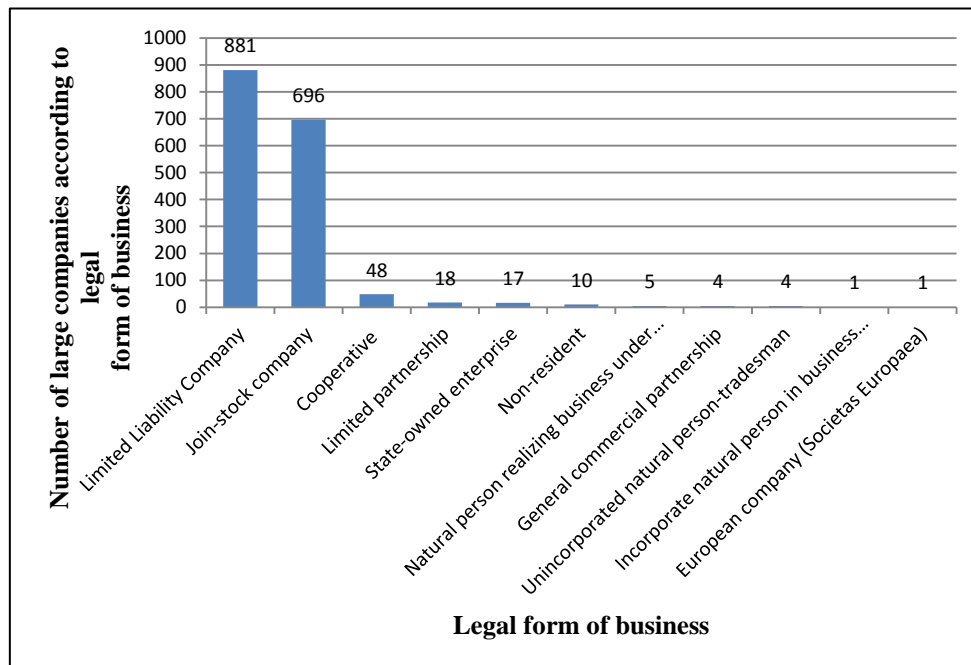


Figure 2. Enterprise structure according to legal form of business

Source: Own research investigation based on data from Czech Statistical Office and Business Register

- Branch (Economic activity)

In the case of large enterprises according to Classification of Economic Activities (CZ-NACE) most of the companies realize their activities in manufacturing industry. The number of enterprises in

this branch is 853 (it means 51% in the whole structure of large enterprises). The second biggest group of enterprises according to Classification of Economic Activities (CZ-NACE) is wholesale and retail. This group consists of 201 enterprises (12%). Other branches have significantly smaller percentage – see Figure 3. In the branch of manufacturing industry there was the biggest number of companies (101) in section producing equipment and other parts for motor vehicles.

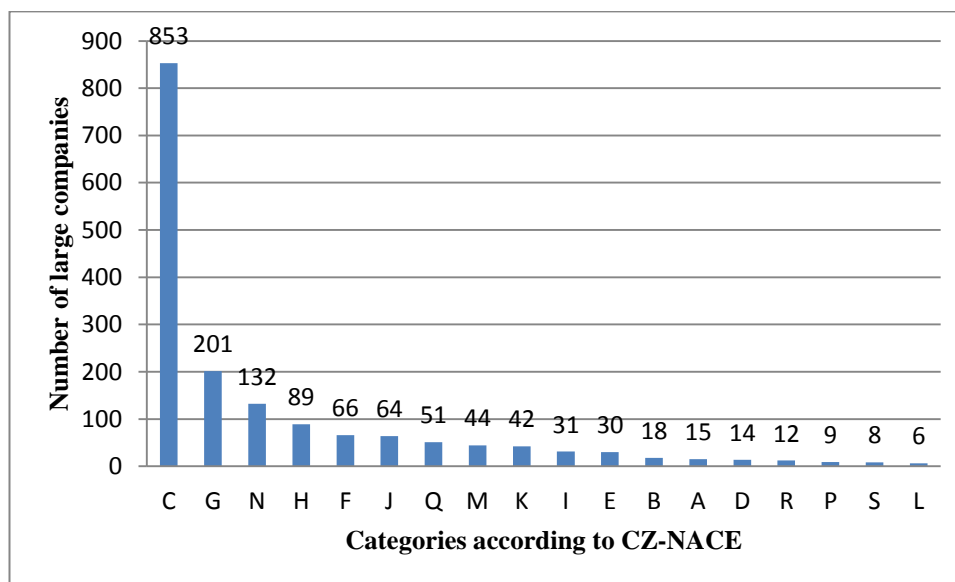


Figure 3. Structure of large companies according to Classification of Economic Activities (CZ-NACE)

Source: Own research investigation based on data from Czech Statistical Office and Business Register

Legende: **A** – Agriculture, forestry and fishing, **B** – Mining and quarrying, **C** – Manufacturing, **D** – Electricity, gas, steam and air conditioning supply, **E** – Water supply, sewerage, waste management and remediation activities, **F** – Construction, **G** – Wholesale and retail trade, repair of motor vehicles and motorcycles, **H** – Transportation and storage, **I** – Accommodation and food service activities, **J** – Information and communication, **K** – Financial and insurance activities, **L** – Real estate activities, **M** – Professional, scientific and technical activities, **N** – Administrative and support service activities, **O** – Public administration and defense, compulsory social security, **P** – Education, **Q** – Human health and social work activities, **R** – Arts, entertainment and recreation, **S** – Other service activities, **T** – Activities of households as employers, undifferentiated goods and service-producing activities of households for own use, **U** – Activities of extraterritorial organisations and bodies

▪ *Form of ownership*

From the whole number of large enterprises 42% of all companies (it is 1, 685 companies) is owned by foreign owner and 20 % of companies is owned by both foreign as well as domestic capital. So that 62% of big enterprises is controlled by foreign owner. The smallest group of large enterprises is owned by state (see Figure 4).

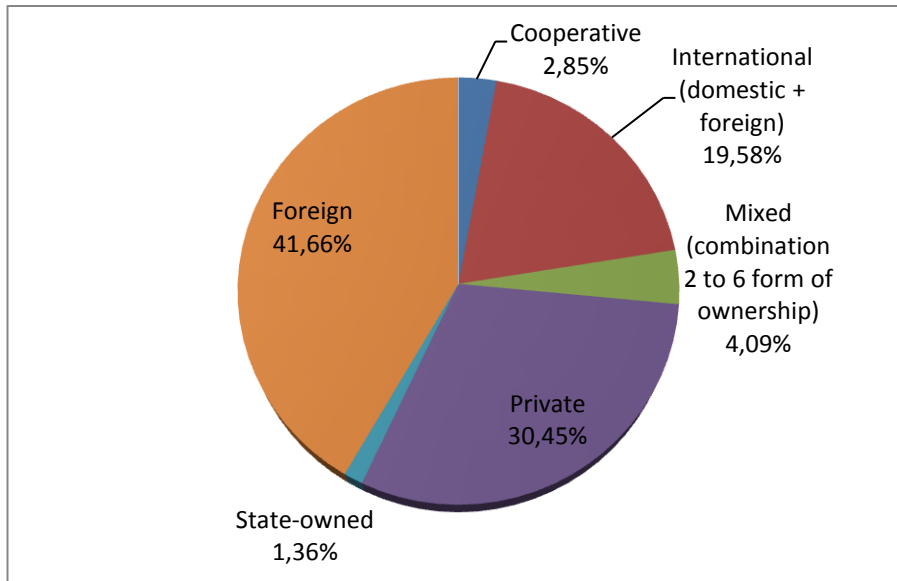


Figure 4. Structure of large enterprises according to form of ownership

Source: Own research investigation based on data from Czech Statistical Office and Business Register

▪ *Regional localization*

From the whole number of enterprises (1,685) the biggest number of companies is registered in Prague (457 companies, it means more than quarter of all big enterprises in the Czech Republic). With a little distance three regions follow: Moravian-Silesian Region, Central Bohemian Region, and South Moravian Region. The smallest number of enterprises is registered in the smallest region in the Czech Republic which is Karlovy Vary Region, see Figure 5. In the case of Prague there appears influence of metropolis, in the case of other regions we can notice another factors such as historically developed production base, infrastructure and investors` interest.

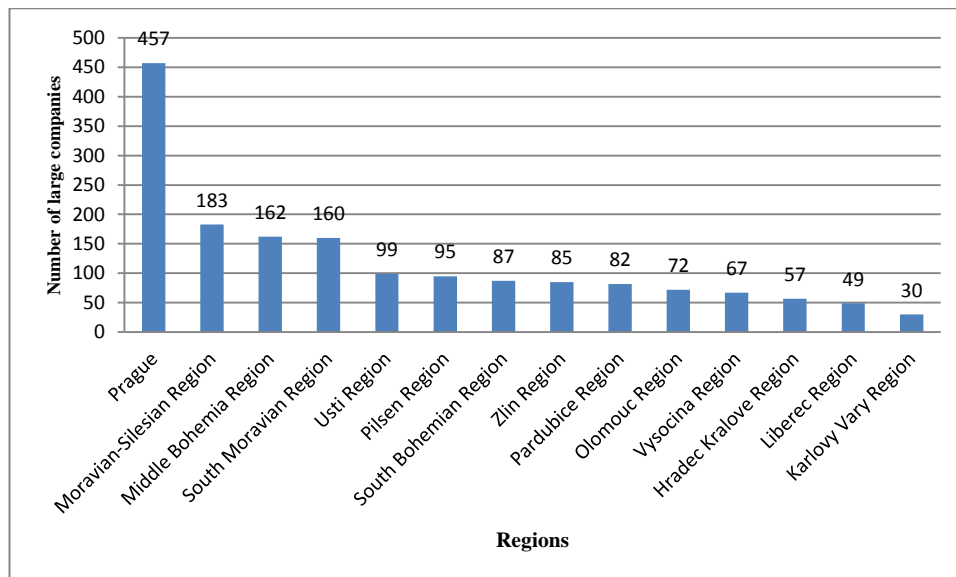


Figure 5. Structure of large enterprises according to regional localization

Source: Own research investigation based on data from Czech Statistical Office and Business Register

3.4 Characteristics of typical large enterprise in the Czech Republic

Based on the results from realized analysis we can settle approximate characteristics (profile) of typical large enterprise in the Czech Republic (see Table 2). We found out that the biggest number

of enterprises has from 250 to 499 employees. The most common legal form of business is Limited Liability Company. According to Classification of Economic Activities (CZ NACE) the biggest number of enterprises is active in manufacturing industry. At the same time the most of these companies are controlled by foreign owner. From regional point of view the biggest number of large companies is situated in Prague. Obviously the real enterprises will differ more or less from these characteristics.

Table 2. Characteristics of typical large enterprise in the Czech Republic

| Number of employee | Legal form of business | Branch | Form of ownership | Regional localization |
|--------------------|---------------------------|------------------------|-------------------|-----------------------|
| 250 – 499 | Limited Liability Company | Manufacturing industry | Foreign owner | Prague |

Source: Own research investigation

Table 2 will help us at choosing concrete large companies in which we want to look inside especially into organizational, managing, decision-making activities - it means under statistical data.

4. Short case studies – findings from selected large companies

Selected companies represent large companies with more over 250 employees, their legal form of business is Limited Liability Company and they are owned by foreign owner. At the same time these companies realize their activities in the field of manufacturing industry. The two of them are enterprises from manufacturing industry and pharmaceutical industry. The first one is Bidvest Opava, ltd. and the second one is Teva Pharmaceuticals CR, ltd. Both of these enterprises are a part of transnational companies that are active at global markets. They differ in the way of managing, power to take decisions and ability to make decisions about their entrepreneurial future. Information about these companies were gathered by interview with managers, by own previous practice in these companies and publicly presented information.

4.1 Bidvest OPAVA, Ltd.

Bidvest OPAVA, ltd. is primarily Czech company Mrazírny Opava, that was established in 1951. After that this company was changed into Slezské mrazírny Opava, folowed by Nowaco Mrazírny Corp. Majority owner became a Danish resident Nilsen Preben (1997). Finally there comes another foreign owner South African company Bidvest.

Bidvest Opava, Ltd. is a member of controlling company Nowaco Group in Czech Republic as well as division Bidvest Foodservice Group in controlling company Bidvest Group Limited. Nowaco Group (8 companies at whole) is a group of distributional and production companies in area of the Czech and Slovak Republics that cooperate together. NOWACO Group is dominant firm in the market of gastronomy and at the same time the biggest producer of ice-cream, ready-made-dishes and vegetable. Annual sales are over 8 billion CZK. Distribution of food and non-food goods to subjects in gastronomy and retail belongs to core business as well. In both countries the Czech Republic and Slovakia this company employs more than 1,800 employees.

Bidvest Foodservice Group is one of 4 divisions of controlling company. The controlling company deals with distribution and production of food, works in Europe, Asia, Australia and South Africa. Since 2011 this company has been working also in South America in Chile. The controlling company employs more than 105 thousands employees and its` sales are 118 billion rands¹². The Bidvest Group Limited was established in 1988 and nowadays consists of 4 main divisions: Bidvest Foodservice (distributor and producer of food working in Europe, Asia, Australia and South Africa and since 2011 it has been working also in South America and Chile) Bidvest South Africa (this company realize its` enterprise activities in sea and automobile transport, in the field of finance – it owns banks and exchange offices, properties, hotels, wash houses and also runs a business in the field of paper industry), Bidvest Namibia (focused on fishing industry and accompanying products), a

¹² Rand is South African currency. Average Exchange rate is 1 ZAR = 2,4 Czech crown.

Bidvest Corporate (settle strategies of managing and investment). Organizational chart is divisional – see Figure 6.

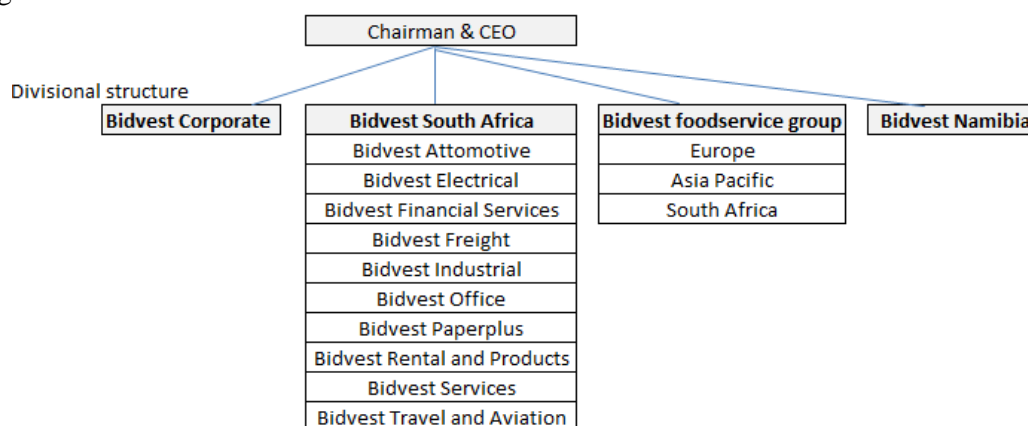


Figure 6. Organizational structure of Bidvest Group Limited
Source: <http://www.bidvest.co.za/>

Bidvest Group Limited is transnational company realizing polycentric strategy. Managing is decentralized on particular divisions. Management of division in particular country is responsible for chosen strategy, production and marketing so that they should be consistent with strategy conception of the whole company. Entrepreneurial portfolio is diversified in several different branches. It has character of conglomerate.

4.2 Teva Pharmaceuticals CR, Ltd.

Teva Pharmaceuticals CR, Ltd. is originally Czech company Galena. History of this company started in 1883. It was established with the help of apothecary Gustav Hell. Galena was one of the prestigious pharmaceutical companies producing original pharmaceuticals for the Czech market as well as for export (for example to Russia, Poland, Romania etc.). Beside the others this company produced also syrup Kofola. In 1994 American company IVAX Corporation became majority owner. In 2002 this company is 100 % owner. Company originally named Galena has changed its name and new name is IVAX Pharmaceuticals Ltd.

This change was followed by other changes, company has changed its manufacturing programme from producing original pharmaceuticals to producing generic pharmaceuticals. It is production of remedial preparation after patent protection of original remedial preparation. It is connected with cutting research and development costs. In this period syrup Kofola was sold. In 2006 another important change was realized. IVAX Corporation and Teva joined so that IVAX Pharmaceuticals Ltd. became subsidiary company and in 2009 this company was renamed, its new name is Teva Czech Industries, Ltd. Controlling company is Teva Pharmaceutical Industries Ltd. Placed in Israel. This is the place where strategies including research and development are settled. Subsidiary company is fully subordinated to central. Any diversion from recommendation is considered to be infraction of rules in managing.

History of controlling company started in 1901. It is transnational corporation focused on generic pharmaceuticals and active substances, especially on producing pharmaceuticals from the sphere of cardiology, oncology and over-the-counter pharmaceuticals. This company belongs to 15 the most important pharmaceutical companies in the world. It employs about 46 thousands employees. More than 80 % of sales is realized in North America and Europe. In 2011 the total sales were about 18.3 billion USD. They produced 71 billion tablets. In USA this company is working in 9 states (sales are 8.8 billion USD), in Europe in 31 states (51 billion USD), in Asia in 5 states and in EMIE (east Europe, Israel, Near east and Africa) in 8 states. Company organizational chart is in the Figure 7.

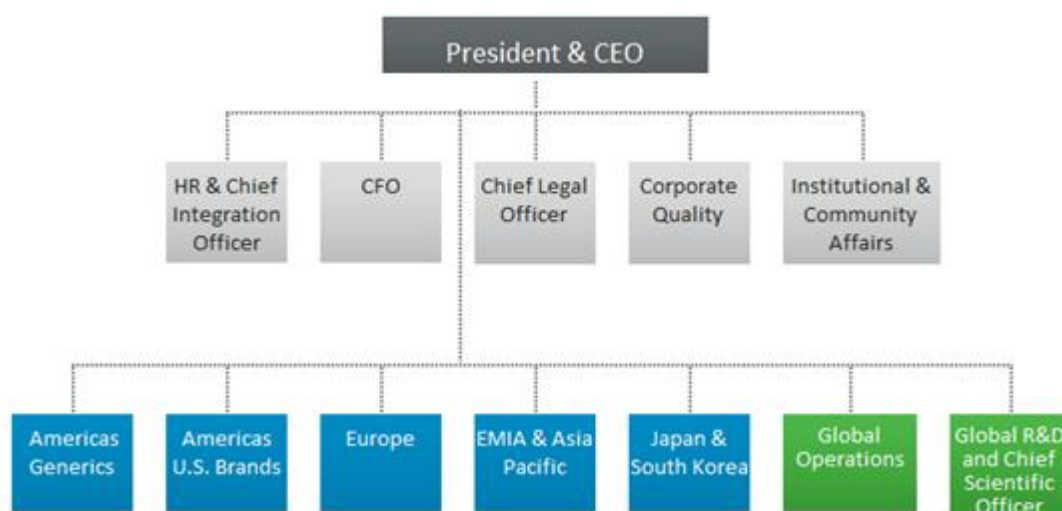


Figure 7. Organizational structure of company TEVA

Source: <http://www.tevapharm.com/About/Pages/Organizational-Structure.aspx>

Controlling company has transnational features. Its` entrepreneurial portfolio is diversified in related branches. Managers realize defensive innovative strategy, use findings from new active components development after the date of expiration of patent license. This company is therefore generic producer of pharmaceuticals.

Chosen strategy towards subsidiaries is ethnocentric. It means that controlling company decides about strategy, production, marketing including investment in research and development. Management of particular host country does not have strategic decision making competences, but it only implements instruction given by controlling company. Subsidiary activities are mainly in the hands of controlling company.

5. Conclusion

From analysis of statistical data in years 2007 – 2011 resulted that number of active entrepreneurial subjects increased and in 2011 it reached 1,1 million enterprises. The most remarkable increase appeared in group of micro-firms (over 25 % in 5 years). In the whole size structure of enterprises micro-firms generate approximately 95 % share. In remaining size groups (small, medium-sized and large firms) there was not registered significant change. However there was observed rather stagnation in their quantity. We suppose that the main reason of increasing number of micro-firms is extension of so called “Schwarz system” (increasing number of self-employed) and also decreasing number of employees in large companies more than higher tendency to do business in economically active age.

In the whole structure only 0.2% is classified as large firm. Regardless they realize half of the Czech economy performance and significantly influence entrepreneurial environment. Resulting from deeper analysis of large firms there was proposed general profile of large company in the Czech Republic: such enterprise has 250 – 499 employees, its` legal form of business is limited liability company, field of interest is manufacturing industry, it is owned by foreign owner and is registered in Prague.

From short case studies result some specifics from managing practice in large firms – subsidiary companies under property control of foreign owners. Studied firms were subsidiaries of large transnational controlling companies. They differed in owners` strategy plans respectively in the way of managing (ethnocentric and polycentric). One of these enterprises is fully under strategy leadership of controlling company; it does not make decisions in the sphere of production type and quantity as well as profit figure and allocation. It loses own possibility to make decisions in own development. On the other side the other firm has possibility of decision making in the field of sort of goods and quantity of production. Own decision making competency underlies economic criteria of

owner, required level of profit, that has to be reached by subsidiary company. Profit allocation is in this case on the side of controlling company.

Limited or even none decision making competencies of these companies lead to reducing investments in research and development. It reflects on nonsufficient innovative potential. Own research and development disappears from companies. Demand for labor force has been changed, high qualified workers loose sense. Property cohesion become primary and has new features of company size as well as concentration of decision making competencies.

Finally there appears a question how many such really large dominant companies in the Czech Republic really exist. Probably it is not a big number. Our hypothetical estimation is from 6 to 10 dominant companies that factually influence fundamental economic processes in entrepreneurial environment in the Czech Republic.

Acknowledgement

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LESSONS LEARNED FROM TAX VERSUS EXPENDITURE BASED FISCAL CONSOLIDATION IN THE EUROPEAN TRANSITION ECONOMIES

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Abstract:

European Union member countries are currently exposed to negative implications of the economic and debt crisis. Questions associated with disputable implications of fiscal incentives seem to be contrary to the crucial need of the effective fiscal consolidation that seems to be necessary to reduce excessive fiscal deficits and high sovereign debts. While challenges addressed to the fiscal policy and its anti-cyclical potential rose steadily but not desperately since the beginning of the economic crisis, the call for fiscal consolidation became urgent almost immediately and this need significantly strengthen after the debt crisis contagion flooded Europe.

In the paper we provide an overview of main trends in public budgets and sovereign debts in ten European transition economies during last two decades. We identify episodes of successful and unsuccessful (cold showers versus gradual) fiscal (expenditure versus revenue based) consolidations by analyzing effects of improvements in cyclically adjusted primary balance on the sovereign debt ratio reduction. We also estimate VAR model to analyze effects of fiscal shocks (based on one standard deviation in total expenditure, direct and indirect taxes) to real output. It is expected that responses of real output to different types of (consolidating) fiscal shocks may vary and thus provide more precise ideas about a feasibility (i.e. side effects on the macroeconomic performance) of expenditure versus revenue based fiscal consolidation episodes. Economic effects of fiscal consolidating adjustments are evaluated for two periods (pre-crisis and extended) to reveal crisis effects on fiscal consolidation efforts.

Keywords: fiscal policy adjustments, fiscal consolidation, cyclically adjusted primary balance, government expenditures, tax revenues, unrestricted VAR, Cholesky decomposition, SVAR, structural shocks, impulse-response function.

JEL Classification: C32, E62, H20, H50, H60

1. Introduction

European Union member countries are currently exposed to negative implications of the economic and debt crisis. Questions associated with disputable implications of fiscal incentives seem to be contrary to the crucial need of the effective fiscal consolidation that seems to be necessary to reduce excessive fiscal deficits and high sovereign debts. As a result, governments tend to reduce public expenditures and raise taxes during the periods lagging recession and thus cooling down economies. However, an appropriate composition of fiscal incentives without direct negative effect on the public budget and its revenue and expenditure sides may help to reduce negative budgetary pressures through increased tax capacity of the economy followed by stronger growth of real output.

While challenges addressed to the fiscal policy and its anti-cyclical potential rose steadily but not desperately since the beginning of the economic crisis, the call for fiscal consolidation became urgent almost immediately and this need significantly strengthen after the debt crisis contagion flooded Europe.

The overall success of the fiscal consolidation may seem to differ across countries reflecting the overall burden of sovereign debt and associated costs of debt service. Significant reduction in primary budget deficit (aiming to primary surplus during a reasonable period) is the only way to reduce a negative impact of sovereign debt on economic growth. While the need to reduce a fiscal imbalance is clear, the composition (expenditure versus revenues based consolidation) and nature (gradual or sharp consolidation) of fiscal consolidation, together with the role played by accompanied policies (quantitative monetary easing, exchange rate internal versus external devaluation, reforms of fiscal institutions, etc.), seems to be quite disputable (Barrios - Langedijk - Penc 2010).

In the paper we provide an overview of main trends in public budgets and sovereign debts in ten European transition economies during last two decades. We identify episodes of successful and

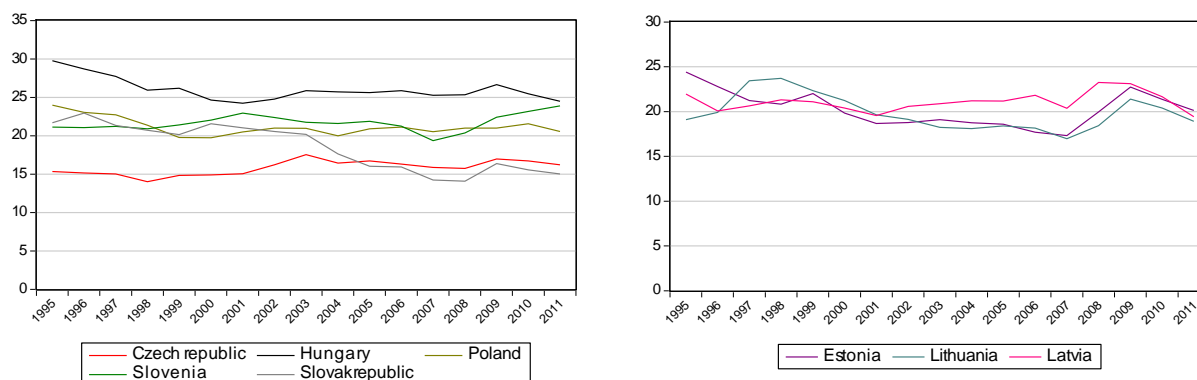
unsuccessful (cold showers versus gradual) fiscal (expenditure versus revenue based) consolidations by analyzing effects of improvements in cyclically adjusted primary balance on the sovereign debt ratio reduction. We also estimate VAR model to analyze effects of fiscal shocks (based on one standard deviation (fall) in total expenditure and (rise) in direct and indirect taxes) to real output. It is expected that responses of real output to the different types of (consolidating) fiscal shocks may vary and thus provide more precise ideas about a feasibility (i.e. side effects on the macroeconomic performance) of expenditure versus revenue based fiscal consolidation episodes. Economic effects of fiscal consolidating adjustments are evaluated for two periods (pre-crisis and extended) to reveal crisis effects on fiscal consolidation efforts.

Following the introduction, we provide some stylized facts about fiscal stance in the European transition economies over the period of last two decades. We emphasize main trends in the evolution of government consumption, rate of secondary redistribution, total expenditures and total revenues, fiscal deficit and sovereign debt. In the third section we provide an overview of current empirical evidence about fiscal consolidation and fiscal policy shocks. Wide range of causal effects and implications of expenditure and tax revenue based fiscal adjustments as well as their size and durability seem to be well documented in papers published in last two decades. Fourth section begins with some methodological remarks to fiscal consolidation and cyclically adjusted primary balance. Subsequent analysis of fiscal consolidation episodes provides an in-depth insight into the degree of success of expenditure and tax revenue based fiscal adjustments in the view of a sustainable sovereign debt reduction in the European transition economies. In section five we deal with fiscal policy shocks trying to provide some alternative guideline for evaluation of side economic effects related to expenditure and tax based fiscal adjustments on the real output performance.

2. Overview of fiscal stance

Budgetary development in the European transition economies did not follow the same trend, though some common patterns seem to be present. In general, relative share of total government consumption on overall aggregate expenditures seems to be quite low during last two decades (see Figure 1).

However, there seem to be notable differences among countries especially if we emphasize a relative importance as well as the overall trend in the development of general government consumption. At the beginning of the observed period the overall share of the government consumption in Bulgaria and Hungary nearly doubles the share in the Czech republic and Romania, leaving remaining countries somewhere in the middle. While in Bulgaria the overall share of government expenditures dropped dramatically soon after 1996-1997 financial crisis as a result of implemented reforms, the situation in Hungary improved gradually and slow. The overall share the general government consumption on the total output remained quite different even at the end of the observed period though it seems that effects of economic crisis contributed to slight reduction in this gap in the whole group of countries. At the same time we emphasize a relatively persistent decreasing trend in the Estonia, Lithuania, Romania and the Slovak republic, especially since the beginning of the 2000s till the end of the pre-crisis period.



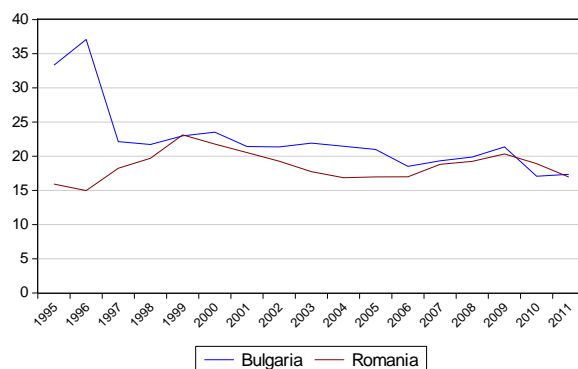


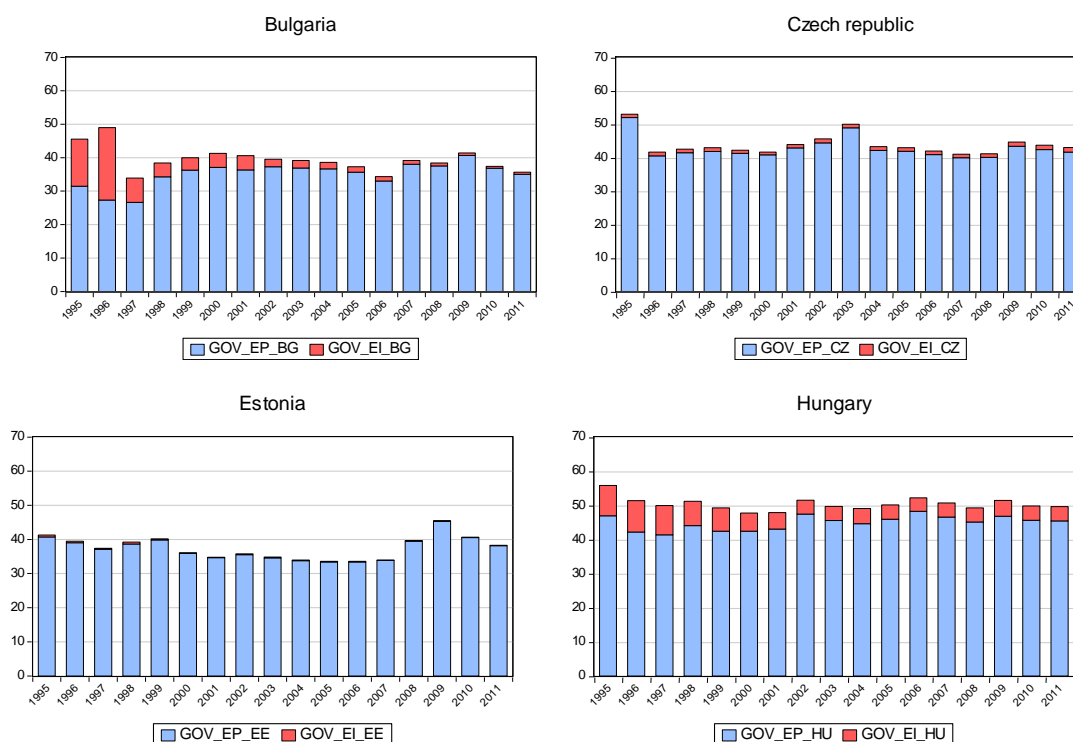
Figure 1. General Government Consumption (1995-2011)

Note: General government consumption is expressed as a percentage shares on GDP.

Source: Compiled by author based on data taken from Eurostat - Government Finance Statistics (October 2012) and IMF - International Financial Statistics (March 2013).

Rate of the secondary income redistribution represents one of the most crucial indicators of the government size (Figure 2). It is also convenient to emphasize the size of payable interests to calculate primary government expenditures to express a structural fiscal stance of the government.

The size of the government in the European transition economies seems to be quite stable with generally positive (decreasing) long-term trend during last two decades. However, we have also observed few sub-periods of relatively sharp decreasing trend in the rate of secondary income redistribution in each particular country: Bulgaria (1996-1997 and 2004-2006), the Czech republic (1995-1996, 2003-2004), Estonia (1999-2001), Hungary (1995-1997 and 2002-2004), Latvia (1999-2001), Lithuania (1997-1998 and 2000-2003), Poland (1996-2000), Romania (2000-2003), the Slovak republic (1997-1998, 2001-2007) and Slovenia (2006-2007). At the same time we have experienced a sub-periods of relatively sharp increase in primary government expenditures share only in Bulgaria (1995-2000).



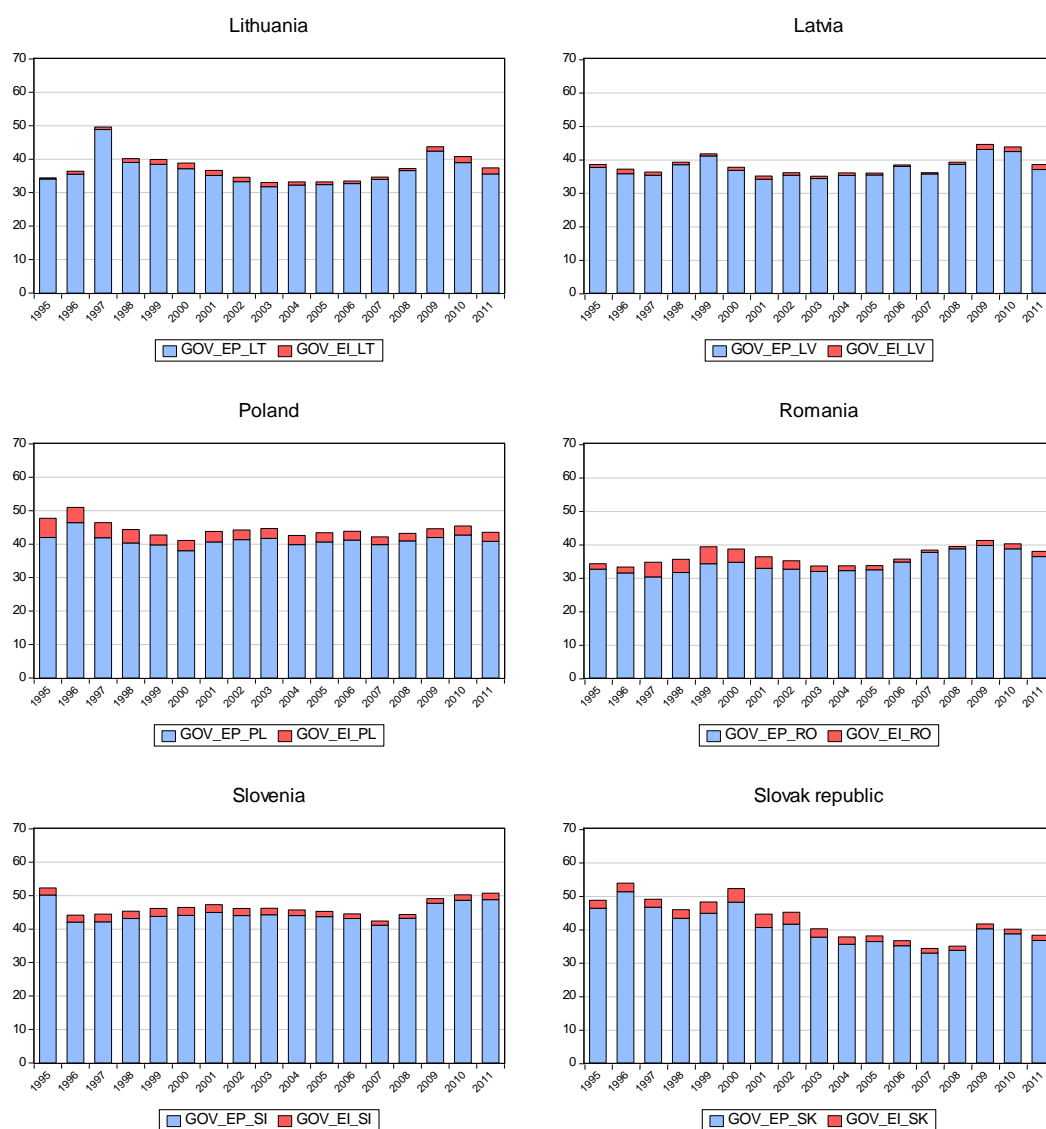


Figure 2. Size of Government - Rate of Secondary Income Redistribution (1995-2011)

Note: Variables - primary government expenditures (GOV_EP) and payable interests (GOV_EI) as a percentage shares on GDP.

Source: Compiled by author based on data taken from Eurostat - Government Finance Statistics (October 2012) and IMF - International Financial Statistics (March 2013).

Alongside mostly positive development of the government presence in domestic economies in the selected group of countries that we have observed from the analysis of the public expenditures ratio, a sovereign debt to GDP ratio did not provide clear information. While in the Czech republic, Hungary, Poland and Slovenia the ratio steadily rose (though at different rates) since the beginning of the previous decade till the end of the pre-crisis period reflecting persisting pressures in the fiscal stance as a result of prevailing mismatch in government expenditures and revenues, in the rest of countries from the group the ratio remained stable or steadily decreased (most notably in the Slovak republic).

We suggest that the main cause of this negative trend is associated with the structural inconsistency between shares of expenditures and revenues on the GDP in the public sector (Table 1) reflecting frequent changes in fiscal stance originated in discrete adjustments quite sensitive to changes in the political cycle.

Table 1. Total Revenues and total expenditures (1995-2011)

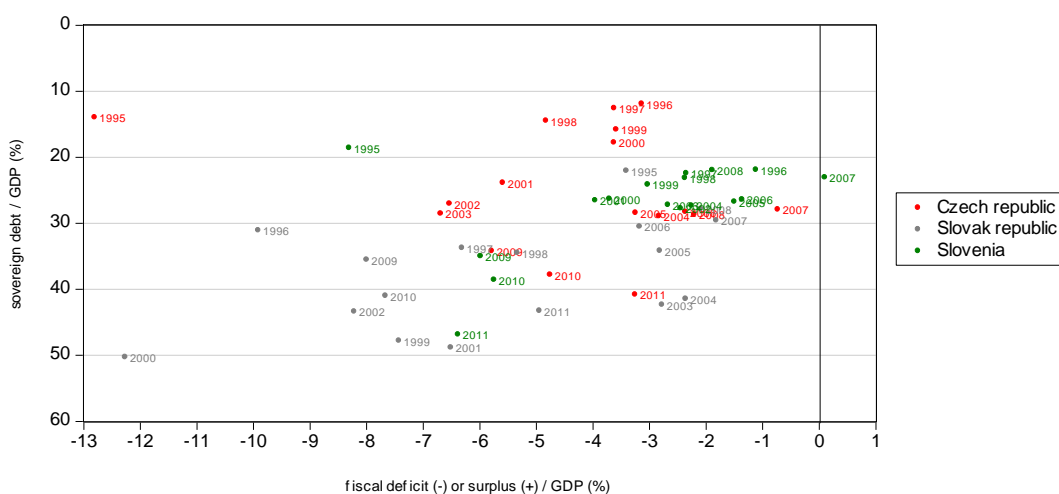
| | Total expenditures | | | | Total Revenues | | | |
|-----------------|--------------------|-----------|-----------|-----------|----------------|-----------|-----------|-----------|
| | 1995-1998 | 1999-2002 | 2003-2006 | 2007-2011 | 1995-1998 | 1999-2002 | 2003-2006 | 2007-2011 |
| Bulgaria | 41.72 | 40.34 | 37.34 | 38.42 | 37.44 | 40.20 | 38.43 | 37.09 |
| Czech republic | 45.05 | 43.34 | 44.56 | 42.72 | 38.96 | 38.51 | 40.78 | 39.38 |
| Estonia | 39.33 | 36.71 | 34.00 | 39.62 | 39.88 | 35.84 | 35.85 | 39.37 |
| Hungary | 52.08 | 49.08 | 50.25 | 50.16 | 45.48 | 43.72 | 42.48 | 47.45 |
| Latvia | 37.68 | 37.55 | 36.24 | 40.31 | 37.56 | 34.83 | 35.35 | 35.14 |
| Lithuania | 40.14 | 37.50 | 33.24 | 38.76 | 35.26 | 34.65 | 32.30 | 33.46 |
| Poland | 47.38 | 42.97 | 43.65 | 43.81 | 42.83 | 39.01 | 38.83 | 38.63 |
| Romania | 34.34 | 37.25 | 34.04 | 39.33 | 31.05 | 33.60 | 32.51 | 33.33 |
| Slovak republic | 49.27 | 47.44 | 38.08 | 37.76 | 43.03 | 38.84 | 35.30 | 32.86 |
| Slovenia | 46.59 | 46.55 | 45.46 | 47.37 | 43.05 | 43.27 | 43.52 | 43.36 |

Note: Fiscal indicators are expressed as a percentage shares on GDP.

Source: Compiled by author based on data taken from Eurostat - Government Finance Statistics (October 2012) and IMF - International Financial Statistics (March 2013).

As a one the most crucial aspects representing key features of the general government financial stance overview we emphasize risks of increasing sovereign debt burden associate with fiscal deficits that European transition economies are experiencing during the whole period of last two decades (Figure 3).

Relatively high rates of the real output growth (especially since the beginning of the 2000s) helped European transition economies (with exception for Hungary and Poland) to stabilize shares of severing debt and nearly to stop its increasing burden till the end of pre-crisis period. However, a positive trend in the fiscal deficit reduction during the near pre-crisis period was associated with significantly improved ratio of sovereign debt to GDP only in Bulgaria, the Slovak republic and Lithuania. At the same time, Baltic countries (with exception for Lithuania during the period 1999-2003) were able to maintain generally low level of sovereign debt (under 20 percent) during whole pre-crisis period. As a result, more comprehensive analysis of the budgetary stance is needed to identify the overall potential as well as effectiveness of a fiscal consolidation to successfully reduce a sovereign debt burden provided that debt constraints strengthened during the crisis period.



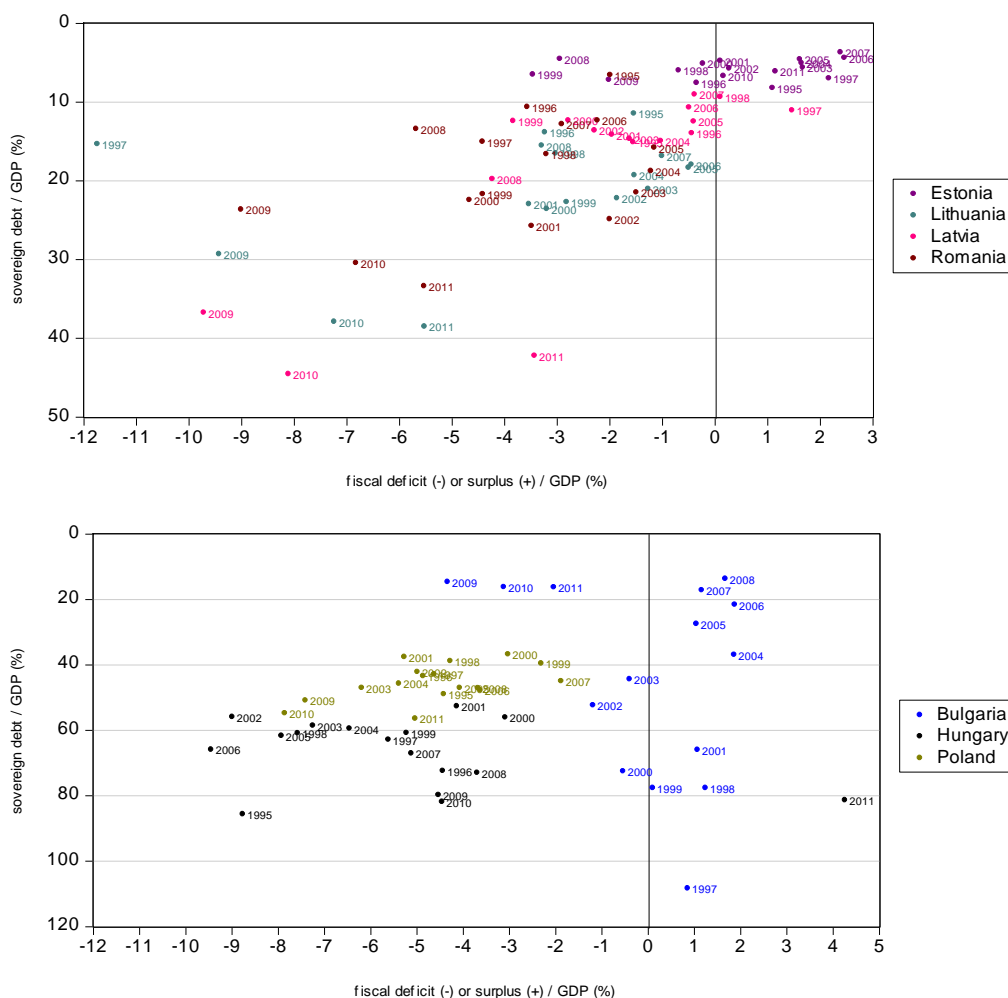


Figure 3. Fiscal Deficit and Sovereign Debt (1995-2011)

Note: All fiscal indicators are expressed as a percentage share on GDP.

Source: Compiled by author based on data taken from Eurostat - Government Finance Statistics (October 2012) and IMF - International Financial Statistics (March 2013).

Fiscal implications of the economic crisis vary across European Union member countries provided quite differing financial discipline of fiscal authorities (levels of fiscal budget balance and sovereign debt), overall macroeconomic performance and high level of heterogeneity of individual markets that in common conjunction affects overall costs of fiscal consolidation (European Commission, 2012).

The problem of say about a permanent deficiency of the general government budgets stresses many “old” (Austria, France, Greece, Germany, Great Britain, Italy, Portugal) as well as “new” (Cyprus, Czech republic, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovak republic, Slovenia) European Union member countries (of course we consider the period before the economic crisis put a stress on revenue and expenditures sides of national fiscal budgets). Lack of fiscal discipline in many European Union member countries revealed a crucial need of a fiscal consolidation during the crisis period due to a sharp acceleration in sovereign debt burden.

3. Overview of the literature

Fiscal consolidation based on tax increases and expenditures cuts is well documented in empirical literature. Tsibouris, Horton, Flanagan and Maliszewski (2006) provided an overview of the experience of countries that have challenged large fiscal adjustments in the last three decades. By identifying periods of successful and unsuccessful fiscal consolidations authors provide operational guidance to policymakers related to various aspects of fiscal adjustments, including common policy

approaches, institutional arrangements and causal implications of various fiscal decisions. Barrios, Langedijk and Pench (2010) from estimated econometric models revealed determinants of successful fiscal consolidation while considering large scale of preconditions, including impacts of financial crisis, debt and deficit levels, real exchange rate adjustments, effects on economic growth as well as types of fiscal consolidation. Alesina and Perotti (1997) analyzed how the composition of fiscal adjustments (gradual versus sharp consolidation, expenditures versus tax revenues based consolidation) influences their likelihood of success in the view of long lasting deficit reduction, and their macroeconomic consequences. Overall success of fiscal consolidation is also evaluated concerning initial fiscal stance. Briotti (2002) analyzed the fiscal consolidation process in EU countries over the 1990s. From observed periods of fiscal adjustments authors highlight that revenue based adjustments have generally preceded expenditure based adjustments. Alesina and Ardagna (2009) examined the evidence of fiscal stimuli and fiscal adjustments episodes in OECD countries from 1970 to 2007. Authors discuss effects of adjustments on the spending and revenues sides concluding that tax cuts seem to have higher expansionary potential than spending increases while spending cuts associated with fiscal adjustments are more appropriate for stabilizing the sovereign debt than tax increases while having less deteriorating effect on the real output performance.

Implications and expected success of fiscal consolidation is largely dependent on effects of tax (revenue) and expenditure based adjustments in the government budget on the overall macroeconomic performance. Contribution of fiscal policy shocks to i.e. slowdown in real output growth rates may provide useful information about contrary effects of fiscal consolidation and thus a convenient prospect about more feasible composition of fiscal policy arrangements.

Effects of fiscal policy shocks are also well documented especially on a sample of developed countries. Blanchard and Perotti (Blanchard and Perotti, 1999) used mixed structural VAR/event study approach to identify the automatic responses of taxes and government spending to economic activity. They also argued that positive government spending shocks have a positive effect on output, and positive tax shocks have a negative effect, while the multipliers for both spending and tax shocks are typically small.

Perotti (Perotti, 2002) implemented SVAR approach in order to analyze the effect of fiscal policy on GDP, prices and interest rates in five OECD countries. The results we may conclude as follows: 1) The effects of fiscal policy on GDP and its components have become substantially weaker in the last 20 years; 2) The tax multipliers tend to be negative but small; 3) Once plausible values of the price elasticity of governments spending are imposed, the negative effects of government spending on prices that have been frequently estimated become positive, although usually small and not always significant; 4) Government spending shocks have significant effects on the real short interest rate, but uncertain signs; 5) Net tax shocks have very small effects on prices; 6) The US is an outlier in many dimensions; US responses to fiscal shocks are often not representative of the average OECD country included in this sample.

Giuliodori and Beetsma (Giuliodori and Beetsma, 2004) also implemented few identifications schemes using VAR methodology to analyze the (spill-over) effects of fiscal policy shocks in European economies. Their analysis is focused on the indirect channel of transmitting the fiscal policy shocks that affect an import of the country. They also emphasized a necessity of enhanced fiscal coordination at the macroeconomic level.

Romer and Romer (Romer and Romer, 2007) analyze the causes and consequences in the level of taxation in the postwar US. Their results indicate that tax changes have very large effects on output. At the same time output effects are very persistent. Authors argue it is due to the strong response of investments to the tax burden decrease.

Caldara and Camps (Caldara and Camps, 2008) provide an empirical evidence on the response of key macroeconomic variables to government spending and tax revenue shocks for the US over the period 1955-2006. Authors implemented four approaches (the recursive approach, the Blanchard-Perotti approach, the sign-restrictions approach and the event-study approach) to identify their system based on the VAR methodology. While there is the empirical evidence that the positive responses of private consumption and the real wage are very persistent, authors argued that the most current-generation DSGE models consistent with an increase in these variables predict that the responses turn negative already about one year after the government spending shock occurs. They also find strongly diverging results as regards the effects of tax shocks depending on the identification approach used,

with the estimated effects of unanticipated tax increases ranging from non-distortionary to strongly distortionary.

4. Fiscal consolidation

4.1 Methodological notes to fiscal consolidation

Fiscal consolidation is usually addressed to the set of fiscal arrangements on the side of revenues and/or expenditures of the government budget in order to reduce a burden of sovereign debt via improved fiscal stance. As a result, crucial fiscal adjustments are employed relying primarily on expenditures cuts (especially in the area of government consumption and social security transfers) and much lower portion is based on tax increases (Alesina and Perotti, 1997). Another type of fiscal adjustments rely especially on the tax and social contributions increases. While the first type of fiscal adjustments is expansionary and usually has longer durability, second type of fiscal adjustments is restrictive, having contractionary effects on the economy and thus representing risks associated with future reductions in the tax capacity of the country.

There seems to be several approaches to measure fiscal consolidation and to evaluate a success of fiscal consolidation episode. For example, Alesina and Ardagna (2009) identify three types of fiscal adjustment episodes. For the purpose of our study we employ two of these measures slightly revised by Barrios, Langedijk and Pench (2010): (1) Fiscal consolidation is the year at which CAPB improves by at least 1.5 percent of GDP (so called *cold shower*) or (2) takes the place over three years provided CAPB will not deteriorate by more than 0.5 percent of GDP (so called *gradual consolidation*).

Considering both definitions, cold showers (consolidations during one year) are recognized as full episodes of fiscal consolidation and each year of gradual consolidation are considered as episodes on their own. The last measure reflects the overall success of fiscal consolidation. Fiscal adjustments are evaluated according to their effects on sovereign debt and fiscal CAPB ratios to GDP and real output performance. (3) Fiscal consolidation is revealed as successful provided it helps to reduce sovereign debt to GDP ratio by 5 percent during three subsequent years after we have recognized an initiation of the fiscal episode. At the same time, successful fiscal consolidation is considered to be an effective only if it is able to bring down a debt ratio while not having deteriorating effect on real output.

4.2 Cyclically adjusted primary balance

To assess detailed overview of fiscal consolidation effects it is necessary to estimate an influence of fiscal adjustments based on tax and/or expenditures changes on fiscal balance. However, it seems to be necessary to reveal changes on revenues and expenditures sides of government balance associated with automatic effects induced by changes in macroeconomic environment and effects of discretionary fiscal policy actions. In first case, i.e. a cool-down of real output growth may be followed by a cut in government revenues (due to reduced tax capacity of an economy in the time of crisis) and an increase in government expenditures (i.e. due higher unemployment benefits). As a result, deterioration of a fiscal balance will occur. At the same time, similar effects on the fiscal balance will be followed by discretionary taxes cuts or expenditures increases. A fiscal stance of a government budget may thus reflect mixed effects of automatic changes in budgetary revenues and expenditures associated with business cycle fluctuations as well as discrete changes on both sides of government budgets associated with discrete fiscal policy actions.

To eliminate effects of a business cycle to the fiscal stance of a government budget it is necessary to eliminate influence of cyclical movements of fiscal variables. As a result of filtered business cycle impacts, together with some other adjustments (i.e. exclusion of interest payable on the side of government expenditures), cyclically adjusted primary balance (CAPB) will be calculated. Empirical literature provides many approaches to calculate CAPB. In general, main algorithm follows the same procedure: (1) estimation of the potential GDP, (2) determination and calculation of key revenues and expenditures categories responses to the fluctuations in cyclical GDP, (3) adjustments in budgetary revenues and expenditures according to the cyclical effects in both sides of government budget. As a result we obtain cyclically adjusted structural or primary balance. On the other hand we have found some differences in step (2) in current empirical literature reflecting relative diversity in approaches employed to estimate income elasticities of main budgetary variables (on both revenue and

expenditure sides). At the same time, most studies calculated cyclical component in real output by estimating potential output (and output gap) using simple HP filter¹³ or potential employment based on detrending NAIRU calculations.

Bouthevillain *et al.* (2001) calculated fiscal elasticities using econometric regressions or derivation from tax or expenditures laws and from detailed information on the distribution of income and revenue. Altâr, Necula and Bobeica (2010) estimated tax and revenues elasticities by applying methodology similar to that employed by OECD and by the European Commission. Authors decomposed main components of revenue and expenditure budgetary sides using linear system of equations. Girouard and André (2005) calculated income elasticities of four different types of taxes while on the expenditure side there is only single item - unemployment related transfers - that authors treated as cyclically sensitive.

Günaydın and Uğraş Ülkü (2002) employed vector-error correction (VEC) model to estimate income elasticities of budgetary components. Provided there is a long-run equilibrium (cointegration) between GDP and budgetary variables, expected elasticity coefficients are represented by normalized cointegrating coefficient derived from cointegrating equations.

To cyclically adjust a government budget, that is to estimate the underlying fiscal position when cyclical and/or automatic components are removed we follow a VEC methodology implemented by Günaydın and Uğraş Ülkü (2002).

Cyclically Adjusted Primary Balance (CAPB) is calculated by subtracting the cyclical component (B^C) from the primary government balance (PB):

$$CAPB_t = PB_t - B_t^C = PB_t - \sum_{i=1}^n B_{t,i}^C \quad (1)$$

where (PB) represents actual government budget balance (B) less interests payable (E^I):

$$PB_t = B_t - E^I \quad (2)$$

and ($B_{t,i}^C$) represents a cyclical component of each of n revenue and expenditure budgetary categories included in the model given by the following equation:

$$B_{t,i}^C = B_{t,i} \cdot e_i \cdot Y_t^{gap} \quad (3)$$

where (e_i) represent individual elasticities of each particular budget category (that responds automatically to real output fluctuations) included in the model and (Y^{gap}) represents output gap expressed as a percentage of GDP.

4.3 Income elasticities of budgetary categories

In our model we include three types of budget revenues (revenues from direct taxes, indirect taxes and social contributions) and one budget expenditure category (unemployment related transfers) that seem to respond to short-run (cyclical) movements in real output. As a result, we expect that selected fiscal variables automatically respond to the cyclical fluctuations in real output.

To estimate income elasticities of budgetary categories we expect that there is a long-run equilibrium relationship (cointegration) between each included fiscal variable and real output.

¹³ Despite a wide criticism of HP filter for inducing a spurious cycle in the time series (i.e. it cannot reflect an impact of structural breaks) as well as for poor approximation near the endpoint (so called endpoint bias), it still represents one of most frequently used filter in the current empirical literature.

Cointegration methodology introduced by Johansen (1988, 1991) and Johansen and Juselius (1990) will be employed to estimate the long-run equilibrium relationships between different types of budgetary variables and real output in the European transition economies. Johansen method is applied to the unrestricted vector autoregression (VAR) model that can be written by the following moving average representation of n non-stationary variables containing p lagged values:

$$Y_t = \mu + A_1 Y_{t-1} + A_2 Y_{t-2} + \dots + A_p Y_{t-p} + \varepsilon_t \quad (4)$$

where Y_t is a $n \times 1$ vector of the contemporaneous endogenous variables, μ is a $n \times 1$ vector of the constants, A_i are $n \times n$ polynomial variance-covariance matrix, $\varepsilon_t \sim N_n(0, \Sigma_\varepsilon)$ ¹⁴ is a $n \times 1$ normalized vector of exogenous shocks (innovations) to the model representing unexplained changes in the variables.

If at least two of the variables are cointegrated of the order one (I(1)) the VAR representation in the equation (4) can be rewritten by subtracting Y_{t-1} to the following vector error correction model (VECM):

$$\Delta Y_t = \mu + \Pi Y_{t-p} + \sum_{i=1}^{p-1} \Gamma_i \Delta Y_{t-i} + \varepsilon_t \quad (5)$$

where ΔY_t is a $n \times 1$ vector of the first differences of stochastic variables Y_t , $\Pi = \sum_{i=1}^p A_i - I$,

$\Gamma_i = -\sum_{j=i+1}^p A_j$, I is $n \times n$ identity matrix.

Presented VECM contains information on both short-term and long-term adjustments to changes in Y_t included in estimated Γ and Π respectively. Γ is a $n \times n$ matrix that represents the short-term dynamic - adjustments to changes in Y_t . Π is a $n \times n$ matrix consisting of the long-run coefficients - the cointegrating relationships (cointegrating vectors) and of the error correction term. Π can be decomposed as follows:

$$\Pi = \alpha \beta' \quad (6)$$

where α represents $n \times r$ a loading matrix containing coefficients that describe the contribution of the r long-term (cointegrating) relationships in the individual equations and denotes the speed of adjustment from disequilibrium, while β is a $n \times r$ matrix of long-run coefficients and represents the r linearly independent cointegrating vectors (each column of β is the cointegrating vector). The number of cointegrating relations among variables of Y_t is the same as the rank (r) for the matrix Π . If it has a full rank, the rank $r = n$ and it means there are n cointegrating relationships and that all variables are I(0). If a vector Y_t is a vector of endogenous variables that are I(1), then all terms in equation (5) are I(0), and ΠY_{t-1} must be also stationary for $\varepsilon_n \sim I(0)$ ¹⁵ to be white noise. If the matrix Π has reduced rank, $r < n$, there are $n-1$ cointegrating vectors and even if all endogenous variables in the model are I(1), the level-based long-run component would be stationary. VECM requires there exists at least one cointegrating relationship.

¹⁴ Exogenous shocks are normally distributed with zero mean and variance Σ_ε .

¹⁵ Exogenous shocks are stationary (null hypothesis of a unit root presence can be rejected) and thus integrated of order 0.

In order to find a presence of cointegrating (long-run) relationships, we use the trace test and maximum eigenvalue test. Determination of rank and estimation of the coefficients are computed as maximum likelihood estimation. The corresponding likelihood-ratio test statistics are:

$$\lambda_{trace}(r) = -T \sum_{i=r+1}^n \ln(1 - \hat{\lambda}_i) \quad \lambda_{max}(r, r+1) = -T \ln(1 - \hat{\lambda}_{r+1}) \quad (7)$$

where r is the number of cointegrating vectors under the null hypothesis and $\hat{\lambda}$ is the estimated value for the i th ordered eigenvalue from the Π matrix. Under the trace statistic, the null hypothesis that the number of cointegrating vectors is less than or equal to r , is tested against the alternative that there are more than r vectors. Whereas under the maximum eigenvalue test the null hypothesis that there are r cointegrating vectors is tested against the alternative of $r+1$ cointegrating vectors.

Provided that time series for direct tax revenues, indirect tax revenues, social contributions, unemployment related transfers and real output are $I(1)$ ¹⁶ we estimate four different VEC models employing quarterly data for the period 2000Q1-2012Q3 (51 observations) for government expenditures, real output, inflation, tax revenues and short-term interest rates drawn from Eurostat - Government Finance Statistics (October 2012) and IMF database (International Financial Statistics, March 2013). Time series for direct tax revenues, indirect tax revenues, social contributions, unemployment related transfers and real output were seasonally adjusted. Tests for the cointegration were computed using two lags as recommended by the AIC (Akaike Information Criterion).

Results of both Johansen cointegration procedures (trace statistics and maximum eigenvalue statistics) confirmed our hypothesis about existence of one long-run equilibrium (cointegrating) relationship between each fiscal variable and real output. Normalized cointegrating coefficients derived from each cointegrating equation represent elasticity coefficients of each fiscal category with respect to real output.

4.4 Episodes of fiscal consolidation

The Figure 4 reveals identified episodes of fiscal consolidation in the European transition economies as well as the degree of their success since 2000. It seems that individual countries experienced several episodes of fiscal consolidation that in total represents 37 episodes of both types - one year consolidation (30) and gradual consolidation (7). However, we have assessed only 26 percent success in one year episodes of fiscal consolidations (8 *cold showers* succeeded). We have investigated only one successful gradual consolidation (14 percent degree of success). Our results are contrary to conclusions assessed by i.e. Barrios, Langedijk and Pench (2010) performed investigation about a degree of fiscal consolidation success on the sample of EU15 countries since 1970. It seems that governments in our sample of countries significantly seek an effort to undertake gradual multi-year fiscal consolidations and thus strengthen financial discipline during a significant period of their political cycle. At the same time, none of six gradual consolidations (only one of them was successful) undertaken during the pre-crisis period was associated with deteriorating effects on the overall macroeconomic performance, revealing wasted chance of potentially effective fiscal consolidation.

¹⁶ Detail results of unit root test are not reported here to save space. Like any other results, they are available upon request from the author

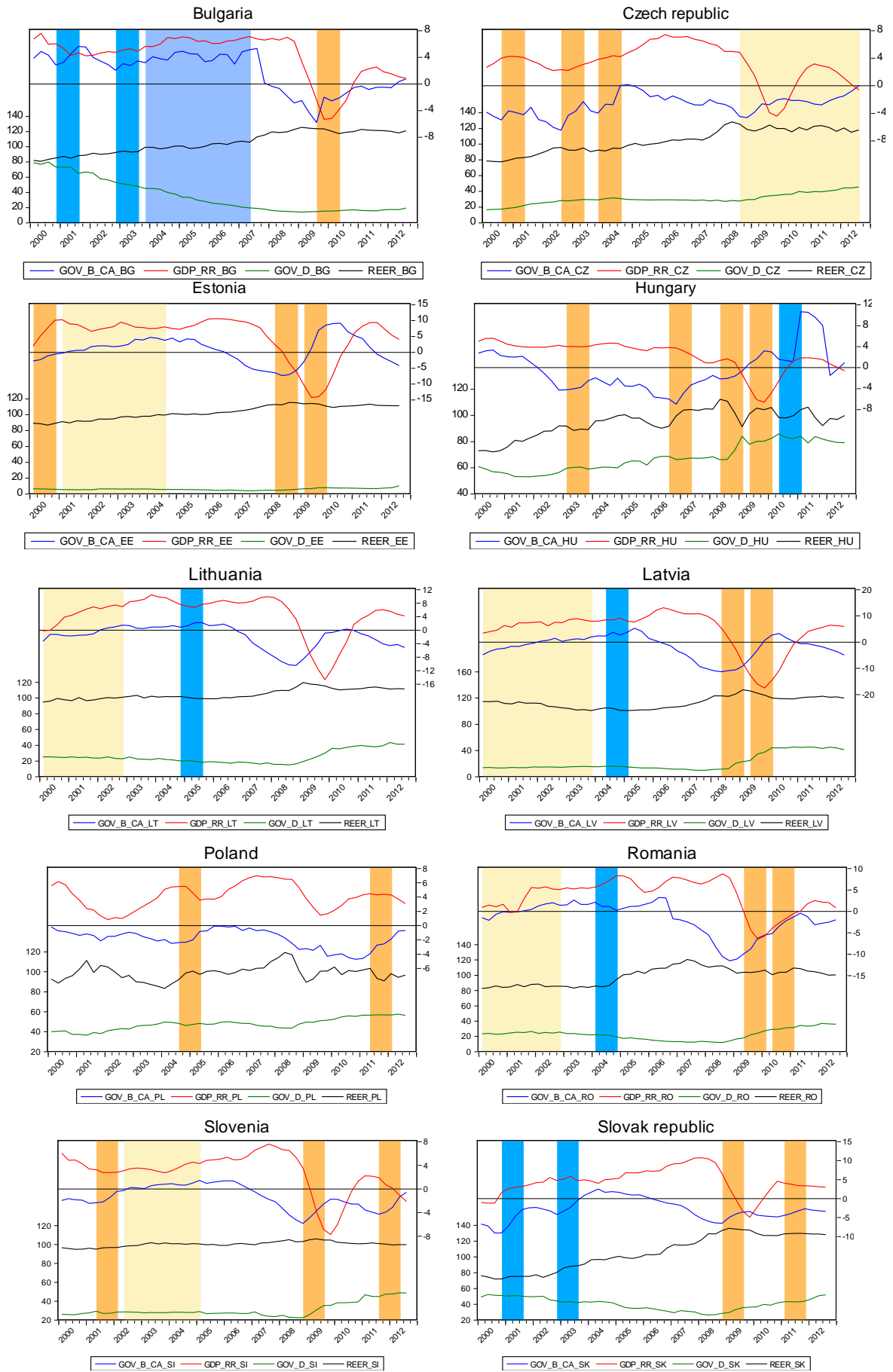


Figure 4. Fiscal consolidation episodes (2000Q1-2012Q3)

Note: Variables - cyclically adjusted primary balance - CAPB (GOV_B_CA), annual rates (on quarterly basis) of real GDP growth (GDP_RR) and annual rates (on quarterly basis) of real effective exchange rate fluctuations (REER) are expressed in percentage (right axis in figures). Sovereign debt (GOV_D) is expressed as percentage shares on GDP (left axis in figures).

 unsuccessful one year consolidation unsuccessful gradual consolidation
successful one year consolidation successful gradual consolidation

Source: Authors calculation.

Bulgaria experienced four fiscal consolidations. *First*, one-year successful consolidation (2000Q4-2001Q3) seems to be revenue based, as it was associated with sharp increase in budgetary revenues (revenues (especially from direct taxes) rose faster than expenditures¹⁷). However, it doesn't seem to be effective because during this period the rate of a real GDP growth decreased. During this period REER appreciated and thus weakening consolidation effort. *Second*, one-year successful consolidation (2002Q4-2003Q3) seems to be both revenue and expenditure based and main contribution refers to an increase in indirect taxes and minor decrease in the government consumption. It also seems to be effective because the rate of a real GDP growth during this period slightly increased. Rate of REER appreciation nearly stagnated and thus not weakening consolidation effort. *Third*, gradual successful consolidation (2003Q4-2007Q2) seems to be revenue based and main contribution refers to an increase in indirect taxes. It also seems to be effective because the rate of a real GDP growth during this period slightly increased. During this period REER followed appreciation trend and thus not contributed to the consolidation effort. *Forth*, one-year consolidation (2009Q3-2010Q2) seems to be unsuccessful despite a decrease in government expenditures as well as government consumption, revenues from direct and indirect taxes also decreased. During this period the real output growth rate decreased (not effective) and REER depreciated (contributive).

Czech republic experienced four fiscal consolidations. *First*, one-year consolidation (2000Q3-2001Q2) seems to be unsuccessful despite a slight decrease in government expenditures as well as government consumption, while revenues from both direct and indirect taxes also decreased. During this period the real output growth rate increased (effective) and REER appreciated (not contributive). *Second*, one-year consolidation (2002Q3-2003Q2) seems to be also unsuccessful as it was associated with an increase in government expenditures as well as government consumption, while revenues from both direct and indirect taxes increased. During this period the real output growth rate increased (effective) and REER slightly depreciated (contributive). *Third*, one-year consolidation (2003Q4-2004Q3) seems to be also unsuccessful though it was associated with a decrease in government expenditures as well as government consumption and revenues from both direct and indirect taxes slightly increased. During this period the real output growth rate increased (effective) and REER appreciated (not contributive). *Forth*, gradual consolidation (2008Q3-2012Q3) seems to be also unsuccessful as it was associated with an increase in government expenditures, though government consumption decreased and revenues from direct taxes decreased, while revenues from indirect taxes slightly increased. During this period the real output growth rate significantly decreased (ineffective) and REER depreciated (contributive).

Estonia experienced four fiscal consolidations. *First*, one-year consolidation (2000Q1-2000Q4) seems to be unsuccessful despite a decrease in government expenditures as well as government consumption, while revenues from direct taxes slightly decreased and revenues from indirect taxes slightly increased. During this period the real output growth rate significantly increased (effective) and REER did not change (neutral). *Second*, gradual consolidation (2001Q1-2004Q3) seems to be also unsuccessful though it was associated with a slight decrease in government expenditures as well as government consumption and revenues from direct taxes slightly increased, while revenues from indirect taxes decreased. During this period the real output growth rate decreased (ineffective) and REER appreciated (not contributive). *Third*, one-year consolidation (2008Q2-2009Q1) seems to be also unsuccessful as government expenditures and government consumption increased, while revenues from direct taxes slightly increased and revenues from indirect taxes slightly decreased. During this period the real output growth rate significantly decreased (not effective) and REER slightly appreciated (not contributive). *Fourth*, one-year consolidation (2009Q2-2010Q1)

¹⁷ Development of budgetary components in this section is evaluated according to their share in GDP.

seems to be also *unsuccessful* as government expenditures slightly increased though government consumption decreased and revenues from both direct and indirect taxes increased. During this period the real output growth rate slightly decreased (ineffective) and REER slightly depreciated (contributive).

Hungary experienced five fiscal consolidations. *First*, one-year consolidation (2003Q1-2003Q4) seems to be also *unsuccessful* despite a decrease in both government expenditures and government consumption, while revenues from direct taxes slightly decreased and revenues from indirect taxes slightly increased. During this period the real output growth rate almost did not change (neutral) and REER depreciated (contributive). *Second*, one-year consolidation (2006Q3-2007Q2) seems to be also *unsuccessful* despite a decrease in government expenditures as well as government consumption, while revenues from both direct and indirect taxes slightly increased. During this period the real output growth rate decreased (ineffective) and REER significantly appreciated (not contributive). *Third*, one-year consolidation (2008Q2-2009Q1) seems to be also *unsuccessful* as government expenditures slightly increased though government consumption slightly decreased, while revenues from direct taxes slightly increased and revenues from indirect taxes slightly decreased. During this period the real output growth rate decreased (ineffective) and REER significantly depreciated (contributive). *Fourth*, one-year consolidation (2009Q2-2010Q1) seems to be also *unsuccessful* despite a slight decrease in government expenditures though government consumption increased, while revenues from direct taxes decreased and revenues from indirect taxes increased. During this period the real output growth rate decreased (ineffective) and REER appreciated (not contributive). *Fifth*, one-year consolidation (2010Q2-2011Q1) seems to be *successful* and especially revenue based though government expenditures slightly decreased too, while government consumption slightly increased. Despite revenues from both direct and indirect taxes decreased, overall government revenues significantly increased (due to nationalization of private pension-fund assets). During this period the real output growth rate significantly increased (effective) and REER appreciated (not contributive).

Lithuania experienced two fiscal consolidations. *First*, gradual consolidation (2000Q1-2002Q4) seems to be *unsuccessful* though it was associated with a significant reduction in government expenditures, while government consumption increased and revenues from both direct and indirect taxes also decreased. During this period the real output growth rate significantly increased (effective) and REER appreciated (not contributive). *Second*, one-year consolidation (2004Q4-2005Q3) seems to be *successful* and both revenue and expenditure based as it was associated with a slight reduction in government expenditures and government consumption slightly increased and revenues from both direct and indirect taxes slightly increased too. During this period the real output growth rate almost did not change (neutral) and REER depreciated (contributive).

Latvia experienced four fiscal consolidations. *First*, gradual consolidation (2000Q1-2003Q4) seems to be *unsuccessful* though it was associated with a significant reduction in government expenditures, while government consumption increased and revenues from direct taxes almost did not change, while revenues from indirect taxes decreased. During this period the real output growth rate significantly increased (effective) and REER depreciated (contributive). *Second*, one-year consolidation (2004Q2-2005Q1) seems to be *successful* and revenue based as it was associated with a slight increase in government expenditures and government consumption, while revenues from direct taxes slightly increased and revenues from indirect taxes slightly decreased. During this period the real output growth rate slightly decreased (not effective) and REER depreciated (contributive). *Third*, one-year consolidation (2008Q2-2009Q1) seems to be *unsuccessful* as government expenditures significantly increased though government consumption slightly decreased, while revenues from direct taxes slightly increased and revenues from indirect taxes increased. During this period the real output growth rate significantly decreased (ineffective) and REER appreciated (not contributive). *Fourth*, one-year consolidation (2009Q2-2010Q1) seems to be also *unsuccessful* as government expenditures slightly increased though government consumption decreased and revenues from direct taxes decreased while revenues from indirect taxes increased. During this period the real output growth rate decreased (ineffective) and REER depreciated (contributive).

Poland experienced two fiscal consolidations. *First*, one-year consolidation (2004Q3-2005Q2) seems to be *unsuccessful* as government expenditures slightly increased though government consumption slightly decreased, while revenues from both direct and indirect taxes increased. During

this period the real output growth rate decreased (ineffective) and REER appreciated (not contributive). *Second*, one-year consolidation (2011Q2-2012Q1) seems to be also *unsuccessful* though government expenditures slightly decreased, while government consumption slightly increased and revenues from both direct and indirect taxes slightly decreased. During this period the real output growth rate decreased (ineffective) and REER depreciated (contributive).

Romania experienced four fiscal consolidations. *First*, gradual consolidation (2000Q1-2002Q4) seems to be *unsuccessful*, though it was associated with a significant reduction in government expenditures, while government consumption increased and revenues from both direct and indirect taxes also decreased. During this period the real output growth rate significantly increased (effective) and REER appreciated (not contributive). *Second*, one-year consolidation (2004Q1-2004Q4) seems to be *successful* and revenue based as it was associated with a slight increase in government expenditures, though government consumption slightly decreased and revenues from direct taxes increased, while revenues from indirect taxes decreased. During this period the real output growth rate increased (effective) and REER appreciated (not contributive). *Third*, one-year consolidation (2009Q2-2010Q1) seems to be *unsuccessful* as it was associated with an increase in government expenditures, while government consumption decreased and revenues from direct taxes increased, while revenues from indirect taxes decreased. During this period the real output growth rate decreased (ineffective) and REER appreciated (not contributive). *Fourth*, one-year consolidation (2010Q2-2011Q1) seems to be also *unsuccessful*, though government expenditures and government consumption slightly decreased, while revenues from direct taxes decreased and revenues from indirect taxes increased. During this period the real output growth rate increased (effective) and REER appreciated (not contributive).

Slovenia experienced four fiscal consolidations. *First*, one-year consolidation (2001Q2-2002Q1) seems to be *unsuccessful*, though government expenditures decreased, while government consumption slightly increased and revenues from direct taxes did not change, while revenues from indirect taxes increased. During this period the real output growth rate decreased (ineffective) and REER appreciated (not contributive). *Second*, gradual consolidation (2002Q2-2005Q1) seems to be *unsuccessful*, though it was associated with a reduction in government expenditures, while government consumption increased and revenues from direct taxes increased, while revenues from indirect taxes slightly decreased. During this period the real output growth rate increased (effective) and REER appreciated (not contributive). *Third*, one-year consolidation (2008Q4-2009Q3) seems to be *unsuccessful* as it was associated with an increase in government expenditures and government consumption, while revenues from both direct and indirect taxes decreased. During this period the real output growth rate significantly decreased (ineffective) and REER appreciated (not contributive). *Fourth*, one-year consolidation (2011Q3-2012Q2) seems to be *unsuccessful*, though it was associated with a decrease in government expenditures and government consumption, while revenues from both direct and indirect taxes decreased. During this period the real output growth rate decreased (ineffective) and REER slightly depreciated (contributive).

Slovak republic experienced four fiscal consolidations. *First*, one-year consolidation (2000Q4-2001Q3) seems to be *successful* and expenditure based as it was associated with a significant decrease in government expenditures, though government consumption slightly increased and revenues from direct taxes slightly increased, while revenues from indirect taxes decreased. During this period the real output growth rate increased (effective) and REER appreciated (not contributive). *Second*, one-year consolidation (2002Q4-2003Q3) seems to be also *successful* and both revenue and expenditure based as it was associated with a decrease in government expenditures and government consumption and an increase in revenues from both direct and indirect taxes. During this period the real output growth rate did not change (neutral) and REER significantly appreciated (not contributive). *Third*, one-year consolidation (2008Q4-2009Q3) seems to be *unsuccessful* as it was associated with an increase in government expenditures and government consumption, while revenues from both direct and indirect taxes decreased. During this period the real output growth rate significantly decreased (ineffective) and REER slightly appreciated (not contributive). *Fourth*, one-year consolidation (2011Q1-2011Q4) seems to be *unsuccessful*, though it was associated with a slight decrease in government expenditures and government consumption, while revenues from both direct and indirect taxes slightly increased. During this period the real output growth rate decreased (ineffective) and REER did not change (neutral).

5. Fiscal policy shocks

5.1 Econometric model

Understanding effects of fiscal policy shocks (negative government expenditure shock, positive direct and indirect tax revenue shock) on real output would help us to assess an impact of an initiation of the fiscal consolidation episodes. As a result, we should be able to reveal an appropriateness of fiscal revenues and expenditures based adjustments in each particular economy. Comparison of results for pre-crisis and extended period seems to be convenient to identify effects of the crisis period on particular fiscal adjustments feasibility.

Approach we use in our analysis to estimate effects of fiscal policy shocks is based on the vector autoregressive (VAR) methodology. In order to recover the structural shocks that affect the endogenous variables of the model we implement two identification approaches. First approach is based on the recursive Cholesky decomposition of the variance-covariance matrix of the model residuals. The recursive identification approach also considers the causal ordering of the variables. Second approach is based on the identification scheme that imposes long-run restrictions on the variance-covariance matrix of the model residuals. Nevertheless both approaches uses different scheme to recover structural shocks we expect they both provide comparable results of the effects of the fiscal policy shocks in the selected group of transition economies.

True model is represented by the following infinite vector moving average representation:

$$A_0 Y_t = A(L)Y_{t-1} + B\varepsilon_t \quad (7)$$

where Y_t is a $N \times 1$ vector of the endogenous macroeconomic variables, $A(L)$ is a polynomial variance-covariance matrix (represents impulse-response functions of the shocks to the elements of Y) of lag-length l , L is lag operator and (ε_t) is a $(k \times 1)$ vector of identically normally distributed, serially uncorrelated and mutually orthogonal white noise disturbances (vector of true structural shocks in elements of Y):

$$E(\varepsilon_t) = 0, \quad E(\varepsilon_t \varepsilon_t') = \Sigma_\varepsilon = I, \quad E(\varepsilon_t \varepsilon_s') = [0] \quad \forall t \neq s \quad (8)$$

The vector Y_t of the endogenous variables of the model consists of the following five elements: government expenditures (g_t), real output ($y_{r,t}$), tax revenues (t_t), inflation (p_t) and short-term interest rates (i_t). In our five-variate model we assume five exogenous shocks that determine endogenous variables - government expenditures shock ($\varepsilon_{g,t}$), demand shock ($\varepsilon_{y_{r,t}}$), tax revenues shock ($\varepsilon_{t,t}$), inflation shock ($\varepsilon_{p,t}$) and monetary policy shock ($\varepsilon_{i_{m,t}}$).

By multiplying equation (7) by an inverse matrix A_0^{-1} we obtain the reduced-form of the VAR model (this adjustment is necessary because the model represented by the equation (7) is not directly observable and structural shocks cannot be correctly identified):

$$Y_t = A_0^{-1} A(L)Y_{t-1} + A_0^{-1} B\varepsilon_t = C(L)Y_{t-1} + u_t \quad (9)$$

where $C(L)$ is again a matrix representing the relationship among variables on the lagged values and u_t is a $N \times 1$ vector of normally distributed shocks (shocks in reduced form) that are serially uncorrelated but can be contemporaneously correlated with each other:

$$E(u_t) = 0, \quad E(u_t u_t') = \Sigma_u = \begin{pmatrix} \sigma_1^2 & \sigma_{12} & \sigma_{13} \\ \sigma_{12} & \sigma_1^2 & \sigma_{23} \\ \sigma_{13} & \sigma_{23} & \sigma_1^2 \end{pmatrix}, \quad E(u_t u_s') = [0] \quad \forall t \neq s \quad (10)$$

Equation (9) reveals the relationship between reduced-form VAR disturbances u_t and structural disturbances (ε_t), that is given by

$$u_t = A_0^{-1}B\varepsilon_t \text{ or } A_0u_t = B\varepsilon_t \quad (11)$$

As we have already mentioned we implement an identification scheme based on two approaches. The first, recursive approach, is based on the Cholesky decomposition of innovations that allows us to identify structural shocks hitting the model. Cholesky decomposition of variance-covariance matrix of VAR residuals defines the matrix A_0 as a lower triangular matrix and matrix B as k-dimensional identity matrix.

The lower triangularity of A_0 implies a recursive scheme among variables that has clear economic implications and has to be empirically tested as any other relationship. Identification scheme of the matrix A_0 implies that some structural shocks have no contemporaneous effects on some endogenous variables given the ordering of the endogenous variables.

At the same time the off-diagonal elements of B are all zero, implying that we do not allow for the structural shocks to be mutually correlated. This assumption is consistent with empirical results - the correlation between government spending and tax revenue shocks is not statistically different from zero.

The equation (11) we can now rewrite to the following form:

$$\begin{bmatrix} 1 & 0 & 0 & 0 & 0 \\ a_{21} & 1 & 0 & 0 & 0 \\ a_{31} & a_{32} & 1 & 0 & 0 \\ a_{41} & a_{42} & a_{43} & 1 & 0 \\ a_{51} & a_{52} & a_{53} & a_{54} & 1 \end{bmatrix} \begin{bmatrix} u_{g,t} \\ u_{y,t} \\ u_{p,t} \\ u_{i,t} \\ u_{in,t} \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} \varepsilon_{g,t} \\ \varepsilon_{y,t} \\ \varepsilon_{p,t} \\ \varepsilon_{i,t} \\ \varepsilon_{in,t} \end{bmatrix} \quad (12)$$

The ordering of the variables reveals following relations among them:

- Government expenditures don't respond contemporaneously to the shock from any other endogenous variable of the model;
- Real output doesn't respond contemporaneously to inflation, tax revenues and interest rates shocks, while it is contemporaneously affected only by the government expenditure shock;
- Inflation doesn't respond contemporaneously to the tax revenues and interest rates shocks, while it is contemporaneously affected by the government expenditure and the real output shocks;
- Tax revenues don't respond contemporaneously to the interest rates shock, while it is contemporaneously affected by the government expenditure, the real output and tax revenues shocks;
- Interest rates are contemporaneously affected by the shocks from all of the endogenous variables of the model.

It is also necessary to emphasize that after the initial period the endogenous variables of the model can interact freely without any restrictions.

The second approach, structural VAR (SVAR) approach, is based on decomposing a series into its permanent and temporary components. It imposes long-run restrictions to the reduced-form VAR model. Identification scheme in the SVAR models reflects a long-run neutrality assumption so that we expect the cumulative effect of a certain shock on the certain endogenous variable development is zero. The equation (11) we can now rewrite to the following form:

$$\begin{bmatrix} 1 & 0 & 0 & 0 & 0 \\ a_{21} & 1 & 0 & a_{24} & 0 \\ a_{31} & 0 & 1 & a_{34} & 0 \\ 0 & a_{42} & a_{43} & 1 & 0 \\ a_{51} & a_{52} & a_{53} & a_{54} & 1 \end{bmatrix} \begin{bmatrix} u_{g,t} \\ u_{y,t} \\ u_{p,t} \\ u_{t,t} \\ u_{i,t} \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} \varepsilon_{g,t} \\ \varepsilon_{y,t} \\ \varepsilon_{p,t} \\ \varepsilon_{t,t} \\ \varepsilon_{i,t} \end{bmatrix} \quad (13)$$

In order to correctly identify the model we impose following long-run restrictions:

- Government expenditures do not have a permanent effect on tax revenues.
- Real output does not have a permanent effect on government expenditures and inflation.
- Inflation does not have a permanent effect on government expenditures and real output.
- Tax revenues do not have a permanent effect on government expenditures.
- Interest rates do not have a permanent effect on any other endogenous variable of the model.

Both systems are now just-identified and can be estimated using vector autoregression. From both identified true models we compute impulse-response functions to estimate the responses of the real output to the one standard deviation fiscal shocks. Effects of fiscal consolidating adjustments on the real output are calculated for two periods (pre-crisis with data 2000Q1-2007Q4 (model A) and extended with data 2000Q1-2012Q3 (model B)) to reveal crisis effects on fiscal consolidation efforts. Effects of shocks in each particular fiscal variable (negative (decrease) government expenditure shock ($\varepsilon_{g,t}$) and one standard deviation positive (increase) direct tax ($\varepsilon_{dt,t}$) and indirect tax ($\varepsilon_{it,t}$) revenues shocks) on the macroeconomic performance were computed from separately estimated VAR models. As a result, three models were estimated with following endogenous variables:

- model A1, B1 ($Y_t = [g_t, y_{r,t}, p_t, t_t, i_{n,t}]$);
- model A2, B2 ($Y_t = [g_t, y_{r,t}, p_t, dt_t, i_{n,t}]$);
- model A3, B3 ($Y_t = [g_t, y_{r,t}, p_t, it_t, i_{n,t}]$);

Impulse-response functions calculated from estimated VAR models with true shocks identified employing both identification schemes (based on Cholesky factorization and structural factorization) provided very similar results that is why we present results from structural VAR models (estimated results from models identified by recursive identification scheme are available upon request from the author). However, under Cholesky identification structure, the real government spending is not contemporaneously (within the same quarter) affected by changes in the real economic activity. That is the reason why government expenditure shock is considered as a discretionary fiscal adjustment. On the other hand, tax revenues are contemporaneously affected by the changes in the real economic activity and thus respond automatically to the real output adjustments.

As a result, structural VAR models seem to be more convenient for estimation of discrete fiscal shocks (both expenditure and revenue based) because recursive approach is sensitive to variables ordering and thus it has impact on shocks interpretation. In our model, tax revenues are positioned behind real output. As a result, associated changes in tax revenues could be interpreted as automatic response to changes in real output (due to cyclical adjustment) and operating more as automatic stabilizers while it rules out any impact response out real output to a revenue shock (Blanchard and Perotti, 2002).

5.2 Data and results

In order to estimate our model represented by five endogenous variables for each country from the group of European transition economies (Bulgaria, Czech republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovak republic and Slovenia) we employ quarterly data ranging from 2000Q1 to 2007Q4 (32) for model A and quarterly data from 2000Q1 to 2012Q3 (51 observations) for model B for the government expenditures, real gross domestic product, inflation, tax revenues and short term interest rates (Figure 5). Time series for endogenous variables were drawn from Eurostat -

Government Finance Statistics (October 2012) and IMF database (International Financial Statistics, March 2013).

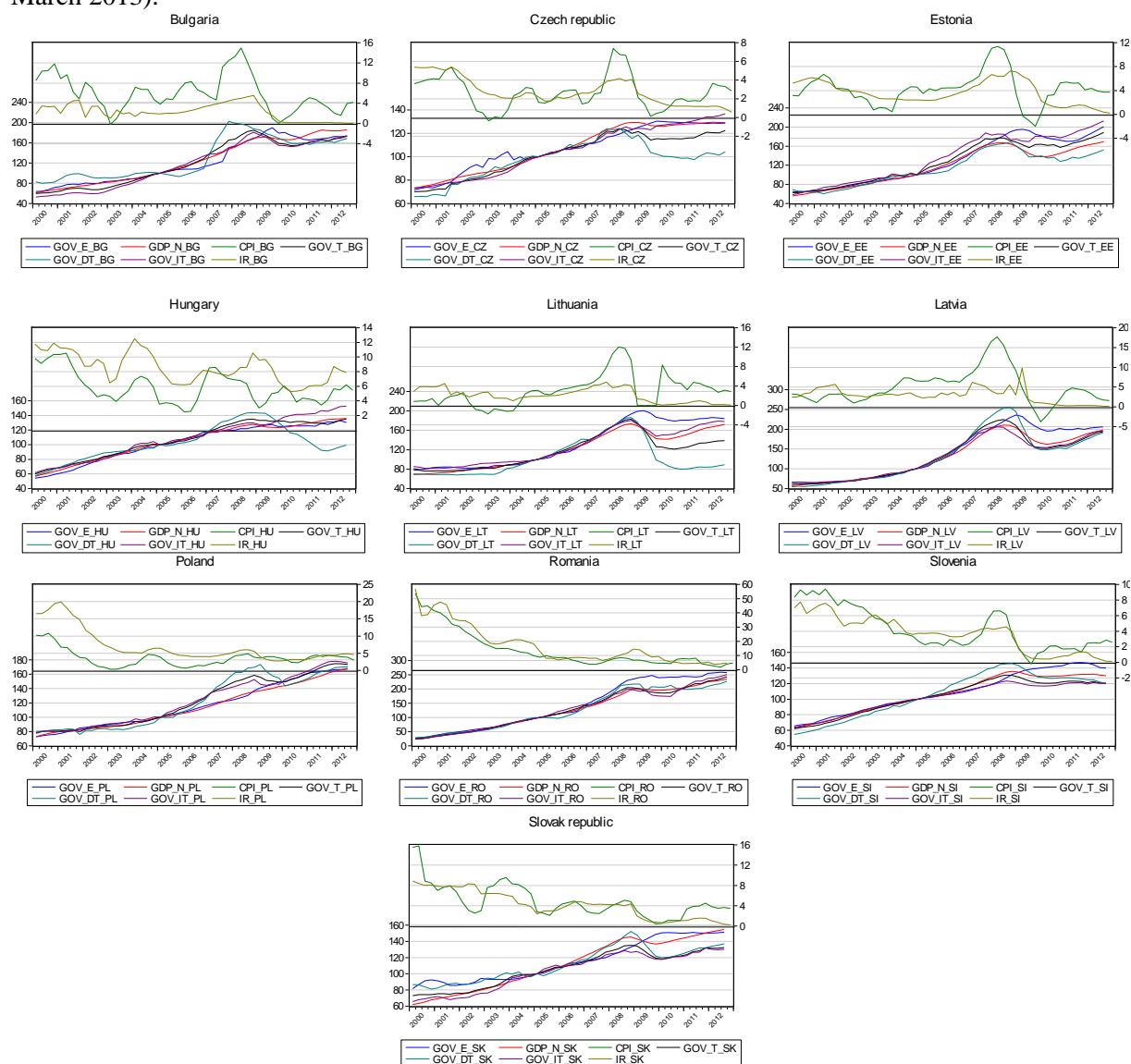


Figure 5. Government expenditures, real output, inflation, tax revenues and interest rates in the European transition economies (2000q1-2012q3)

Note: Endogenous variables - government expenditures (GOV_E), real output (GDP), tax revenues (GOV_T), direct tax revenues (GOV_DT) and indirect tax revenues (GOV_IT) are expressed as indexes (left axis in figures) (2005 = 100). Inflation (CPI) and interest rates (IR) are expressed in percentage (right axis in figures).

Source: Compiled by author based on data taken from Eurostat - Government Finance Statistics (October 2012) and IMF - International Financial Statistics (March 2013).

Time series for the quarterly government expenditures, real output and tax revenues were seasonally adjusted. Time series for the nominal government expenditures and tax revenues were deflated using gross domestic product deflator. As an inflation indicator we used core inflation without food and energy. As a short-term interest rates indicator we used national interbank offered rates for the deposits with 3 months maturity.

Before we estimate the model it is necessary to test the time series for stationarity and cointegration. The augmented Dickey-Fuller (ADF) and the Phillips-Perron (PP) tests were computed to test the endogenous variables for the existence of unit roots. Both ADF and PP tests indicate that most variables are non-stationary on the values so that the null hypothesis of a unit root cannot be

rejected for any of the series. Testing variables on the first differences indicates the time series are stationary so that we conclude that variables are $I(1)$.

Because most of endogenous variables had a unit root on values it is necessary to test time series for cointegration using the Johansen and Juselius cointegration test (we found it reasonable to include variables $I(0)$ for testing purposes following economic logic of expected results). The test for the cointegration was computed using two lags as recommended by the AIC (Akaike Information Criterion) and SIC (Schwarz Information Criterion). The results of the Johansen cointegration tests confirmed the results of the unit root tests. Both trace statistics and maximum eigenvalue statistics (both at 0.05 level) indicate that there is no cointegration among endogenous variables in most of estimated models (trace statistics reported a presence of single cointegrating equation in some models). However, increasing the lag length to three quarters resulted in the loss of long-run equilibrium among variables. The results of unit root and cointegration tests are not reported here to save space. Like any other results, they are available upon request from the author.

To test the stability of the VAR model we also applied a number of diagnostic tests. We found no evidence of serial correlation, heteroskedasticity and autoregressive conditional heteroskedasticity effect in the disturbances. The model also passes the Jarque-Bera normality test, so that errors seem to be normally distributed. The VAR models seem to be stable also because the inverted roots of the model for each country lie inside the unit.

Before we estimate VAR model we have to solve some model specification issues. In section 4.3 we have estimated four bivariate models consisting of one particular fiscal variable and real output considering that there exist long-run equilibrium relationships in each model. Existence of cointegrating relationship (assumption widely confirmed by many empirical studies) was required to calculate income elasticities of budgetary categories. Presence on one cointegrating equation in each model was confirmed by Johansen cointegrating test statistics. Thus, we have estimated VEC models.

However, testing five-variate models in section 5.2 for cointegration revealed ambiguous results. While trace statistics mostly confirmed the presence of single cointegrating equation, maximum eigenvalue statistics reported no cointegration in majority of countries (both at 0.05 level). Despite possible candidates for cointegration (fiscal variables and real output) we may find another potential couple of variables for cointegration - tax revenues and government expenditures, though according to Blanchard and Perotti (2002) the imposition of a cointegration between government expenditures and tax revenues leads to very similar results in estimated effects of fiscal shocks (as a result such an expected cointegration may be confusing in estimating the cointegration rank). At the same time, Caldara and Camps (2008) suggest that in order to avoid imposing a wrong cointegration rank (in systems with just one ambiguous cointegration it seems to be quite disputable) it may be convenient to estimate unrestricted VAR models instead of VEC models.

Following the results of the stationarity and cointegration tests we estimate three SVAR models for pre-crisis (2000-2007) and extended period (2000-2012) for each country from the group of European transition economies using the variables in the first differences to calculate impulse-response functions of government expenditures, direct taxes and indirect taxes (responses of the real output to a negative one standard deviation government expenditures shock and positive one standard deviation tax revenues shocks). Estimated responses of the real output fiscal shocks help us to evaluate macroeconomic effects of revenue and expenditure based fiscal adjustments and thus assess indirect costs of fiscal consolidation. At the same time, by estimating models for pre-crisis and extended period we evaluate crisis related costs of fiscal adjustments.

In Figures 6, 7, 8 we summarize the responses of the real output to the negative (decrease) government expenditure shock and positive (increase) direct and indirect tax revenues during the pre-crisis period (model A1 with data 2000Q1-2007Q4) in the European transition economies. In figures 9-11 we summarize the responses of the real output to the negative (decrease) government expenditure shock and positive (increase) direct and indirect tax revenues during the extended period (model B1 with data 2000Q1-2012Q3) in the European transition economies.

In the Figure 6 we summarize responses of the real output to the one standard deviation government expenditures for the model with time series for the pre-crisis period (model A1) in the European transition economies.

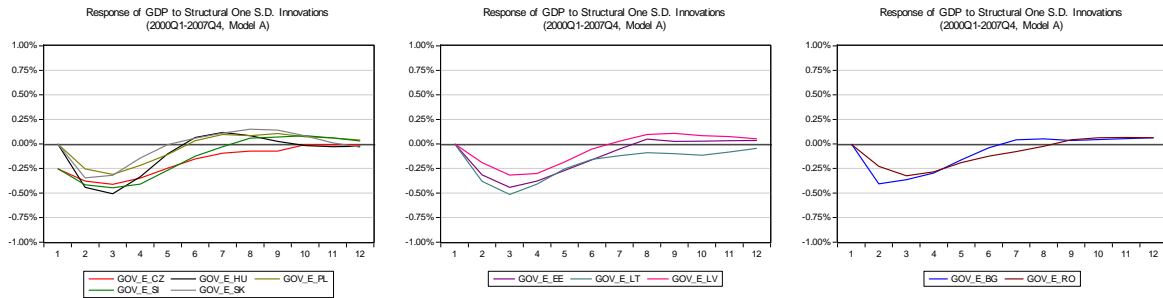


Figure 6. Responses of real output to the negative government expenditures shock (2000Q1-2007Q4) (Model A)
 Source: Author's calculations.

Negative shock (decrease in) government expenditures shock was followed by the real output decline in all countries from the group. Despite some differences in the intensity of the shock it seems that the negative effect culminated within first year after the shock and steadily died out with next two years. Government expenditures shock seems to be neutral in the long-run and not affecting leading path of the real output.

In the Figure 7 we summarize responses of the real output to the one standard deviation shock of direct tax revenues for the model with time series for the pre-crisis period (model A1) in the European transition economies.

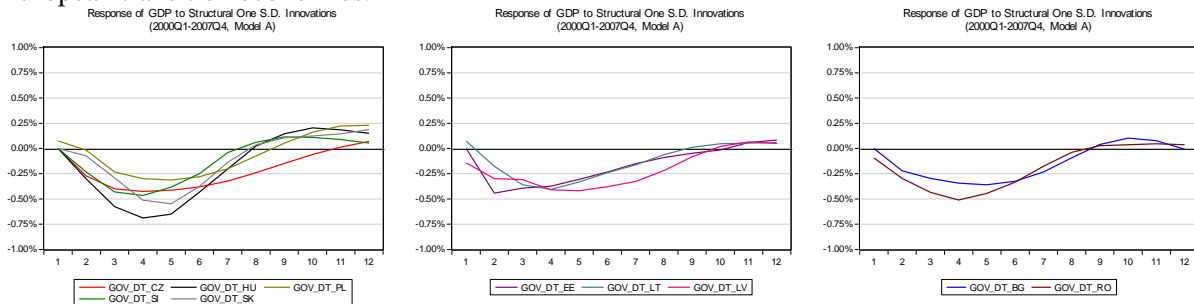


Figure 7. Responses of real output to the positive direct tax revenues shock (2000Q1-2007Q4) (Model A)
 Source: Author's calculations.

Positive (increase in) direct tax revenues shock had negative impact on the real output in all countries from the group. In comparison with government expenditures shock it seems that negative effect of the shock was slightly higher and reached its peak with little time shift. As a result, the negative shock in direct revenues caused a real output decline during 4-6 quarters following initial impulse. Negative effect of the shock died out during the third year after the shock and as a result, the shock seems to be neutral in the long run. Despite quite similar features of the real output responses in all countries from the group we have revealed some differences in intensity as well as durability of the shock.

In the Figure 8 we summarize responses of the real output to the one standard deviation shock of indirect tax revenues for the model with time series for the pre-crisis period (model A1) in the European transition economies.

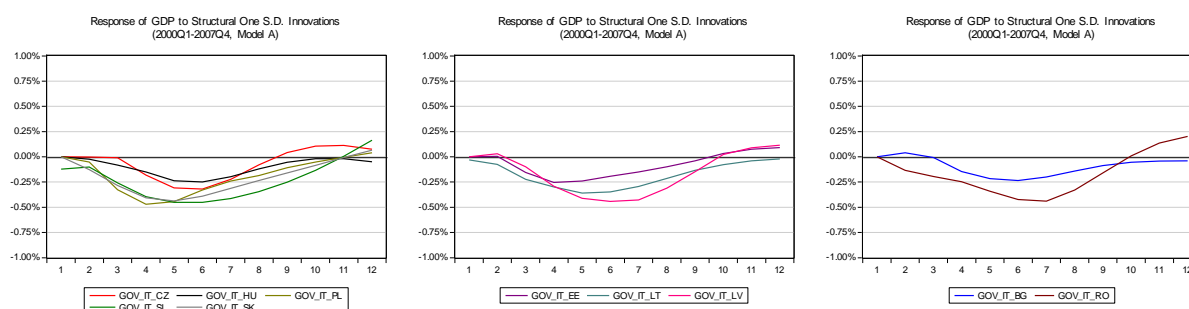


Figure 8 Responses of real output to the positive indirect tax revenues shock (2000Q1-2007Q4) (Model A)
 Source: Author's calculations.

It seems to be clear that the positive (increase in) indirect tax revenues shock was followed by the real output decline. However, we have observed a slightly delayed negative response of real economic activities. Despite some differences identified across individual countries it seems that a negative effect of the shock culminated during the second year after the shock. At the same time, initial response of the real output is mostly weak and moderately increase over the time. Negative effect of the shock seems to be neutral in the long run as its impact of the real output died out during the third year after the shock.

Analysis of effects of fiscal policy shocks during the pre-crisis period revealed interesting implications about side (macroeconomic) effects of fiscal adjustments associated with tax and expenditure based fiscal consolidation in the European transition economies. Both, government expenditures reductions and tax revenues increases were followed by real output declines. However, effects of expenditure based adjustments seem to be more significant within the same fiscal year (effects of the shock culminated during first four quarters). As a result, expenditure based approach seems to be more convenient (effective) for episodes of gradual fiscal consolidations provided that distortionary effects on the real output tend to be reduced during the year following fiscal adjustment. On the other hand, effects of adjustments in both direct and indirect tax revenues were largely distributed across several years (with slightly reduced deteriorating effect during the first year in most countries) and thus revenue based fiscal adjustments seem to be more appropriate for episodes of one-year fiscal consolidations.

In the Figure 9 we summarize responses of the real output to the one standard deviation government expenditures for the model with time series for the extended period (model B1) in the European transition economies.

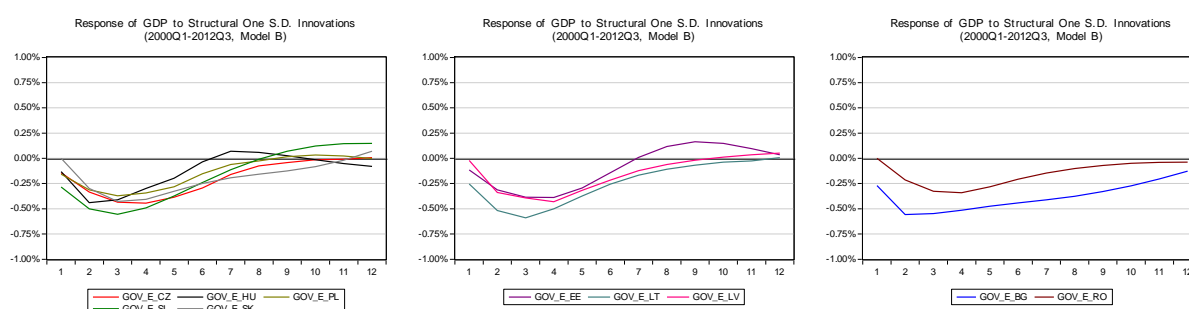


Figure 9. Responses of real output to the negative government expenditures shock (2000Q1-2012Q3) (Model B)
 Source: Author's calculations.

Crisis period affected responses of real output to the negative (decrease in) government expenditures shock across individual countries with a different manner. Despite questionable effects on changes in intensity of the deteriorating impact it seems that durability of the negative real output response slightly increased though overall effect in the long run remained neutral (and effect of the shock died out within three years period). Thus, crisis period seem to extend negative effects associated with government expenditures adjustments. As a result, time vulnerability of real output to expenditure based fiscal adjustments during the crisis period increased.

In the Figure 10 we summarize responses of the real output to the one standard deviation shock of direct tax revenues for the model with time series for the extended period (model B1) in the European transition economies.

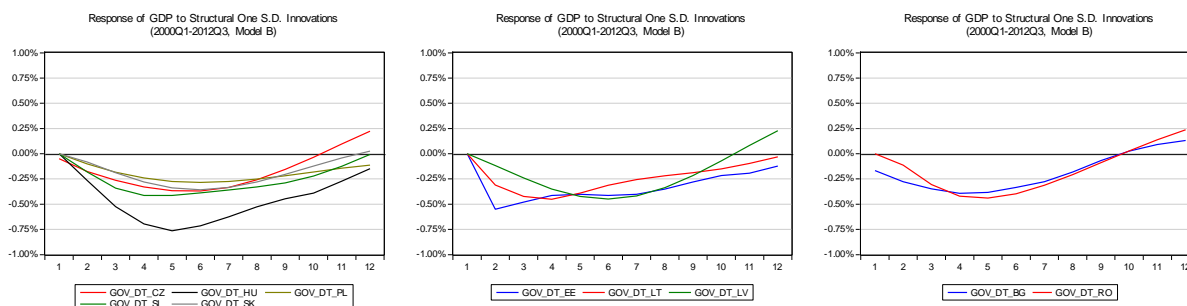


Figure 10. Responses of real output to the positive direct tax revenues shock (2000Q1-2012Q3) (Model B)
 Source: Author’s calculations.

Due to crisis period we have examined slightly changed responses of real output to the positive (increase in) direct tax revenues shock in all countries from the group. It seems that not only increased durability of the deteriorating effects on the real output occurred but also overall drop in the real output increased. Although overall effect of the shock seems to be neutral in the long run, its effect died out till the end of the fourth year. As a result, real output became more vulnerable (as of intensity as well as durability of the effect) to direct tax based fiscal adjustments during the crisis period.

In the Figure 11 we summarize responses of the real output to the one standard deviation shock of indirect tax revenues for the model with time series for the extended period (model B1) in the European transition economies.

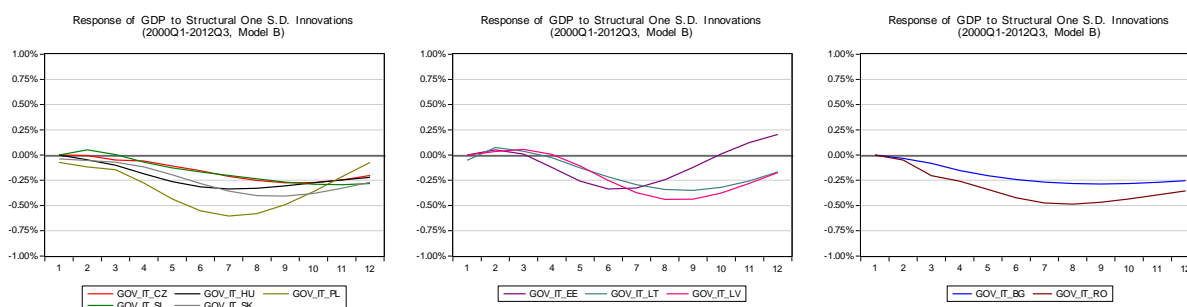


Figure 11. Responses of real output to the positive indirect tax revenues shock (2000Q1-2012Q3) (Model B)
 Source: Author’s calculations.

Analysis of the real output responses to the positive (increase in) indirect tax revenues shock revealed quite similar results in comparison with effects of the direct tax revenues shock. Despite quite similar intensity of the real output decline, all countries from the group have experienced higher persistence of the deteriorating effect of the shock. As a result, the negative effect of the tax revenues shock on the real output endured around 3-5 years and thus significantly prolonged side effects of the indirect tax (revenue) based fiscal adjustments during the crisis period.

Crisis period accelerated negative side (macroeconomic) effects of fiscal adjustments associated with tax and expenditure based fiscal consolidation in the European transition economies. Generally, we emphasize increased durability of deteriorating effects of fiscal adjustments (both revenue and expenditure based) on the real output. Provided that a degree of success of fiscal adjustments during the crisis period is reduced due to excessive pressures on both revenues and expenditure sides it seems, that increased durability of real output deterioration, followed by tax and/or revenue based adjustments, significantly reduced a degree of success to perform an effective (without deteriorating side effects on real output) fiscal consolidation.

6. Conclusion

In the paper we have analyzed main trends in the financial stance of general governments in ten European transition economies during last two decades. Brief overview of main trends in selected fiscal indicators and rapid deterioration in the fiscal policy stance during the crisis period revealed a crucial need of fiscal consolidation as it became urgent almost immediately after the debt crisis contagion flooded Europe.

We have identified episodes of successful and unsuccessful (cold showers versus gradual) fiscal (expenditure versus revenue based) consolidations by analyzing effects of improvements in cyclically adjusted primary balance on the sovereign debt ratio reduction. It seems that individual countries have experienced several episodes of fiscal consolidation that in total represents 37 episodes of both types - one year consolidation (30) and gradual consolidation (7). However, we have assessed only 26 percent success in one year episodes of fiscal consolidations (8 *cold showers* succeeded). We have investigated only one successful gradual consolidation (14 percent degree of success). It seems that governments in our sample of countries significantly seek an effort to undertake gradual multi-year fiscal consolidations and thus strengthen financial discipline during a significant period of their political cycle. At the same time, none of six gradual consolidations (only one of them was successful) undertaken during the pre-crisis period was associated with deteriorating effects on the overall macroeconomic performance, revealing wasted chance of potentially effective fiscal consolidation.

We have also estimated VAR model to analyze effects of fiscal shocks (based on one standard deviation (fall) in total expenditure and (rise) in direct and indirect taxes) to real output. Both, government expenditures reductions and tax revenues increases were followed by real output declines. However, effects of expenditure based adjustments seem to be more significant within the same fiscal year (effects of the shock culminated during first four quarters). As a result, expenditure based approach seems to be more convenient (effective) for episodes of gradual fiscal consolidations provided that distortionary effects on the real output tend to be reduced during the year following fiscal adjustment. On the other hand, effects of adjustments in both direct and indirect tax revenues were largely distributed across several years (with slightly reduced deteriorating effect during the first year in most countries) and thus revenue based fiscal adjustments seem to be more appropriate for episodes of one-year fiscal consolidations.

Crisis period accelerated negative side (macroeconomic) effects of fiscal adjustments associated with tax and expenditure based fiscal consolidation in the European transition economies. Generally, we emphasize increased durability of deteriorating effects of fiscal adjustments (both revenue and expenditure based) on the real output. Provided that a degree of success of fiscal adjustments during the crisis period is reduced due to excessive pressures on both revenues and expenditure sides it seems, that increased durability of real output deterioration, followed by tax and/or revenue based adjustments, significantly reduced a degree of success to perform an effective (without deteriorating side effects on real output) fiscal consolidation.

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APPLICATION OF THE CROSS IMPACT MATRIX METHOD IN PROBLEMATIC PHASES OF THE BALANCED SCORECARD SYSTEM IN PRIVATE AND PUBLIC SECTOR

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Abstract:

Company performance measurement using profit indicators seem to be overcome. Currently, the tendency to apply new synthetic metrics involving actual activities into future results of a company has occurred. One of more and more popular methods of performance measurement and management is the Balanced Scorecard (BSC) the use of which has increased significantly over the past 10 years. In response to the contradictive opinions on the BSC this paper presents findings during the period of 2008-2011 on implementation of the BSC in Slovak companies. Key problematic issues of the BSC system implementation were identified and possible solutions were suggested. The emphasis is on the MICMAC (Matrice d'Impacts Croises Multiplication. Appliquee a un Classement, angl. Cross-Impact Matrix) method to point out its broad use within the strategic management. The analysis is based on a non-functionality of the BSC if the system does not meet all requirements. Hence, the proper knowledge of the factors influencing the BSC is essential.

Keywords: performance management, Balanced Scorecard, structural analysis, MICMAC method.

JEL Classification: M10, M19, M29

1. Introduction

Development of performance measurement systems is influenced by a rapidly changing competitive environment. A success of a company strategy is determined by using of proper methodology and metrics respecting characteristic features of production systems and management criteria (e.g. Zachar *et al.* 2011, 199). The strategy design requires the consideration of the economical, political and social instability and in the same time forecasting as closer as possible to the real life (Doval 2010, 317). Strategy development starts from the identification and comprehension of true consumer needs (e.g. Ward 2009, 441; Zgodavová and Bober 2012, 59). Quality of the performance measurement and management process depends on the mutual symbiosis of financial and nonfinancial indicators. This issue has been an object of continuing discussions of domestic and foreign experts searching for the possibilities to create an efficient managerial tool supporting systematic improvement of the performance measurement system. An ambition of advisory and consulting companies to implement new performance measurement and management methods into practice has been a significant contribution. With respect to the intensive competition and globalization processes, the above mentioned companies have become centers of expert knowledge of various managerial disciplines combined with rich practical experience and access to the primary company data. They provide relevant information from the subjects disposing of valuable experience with performance measurement and management system implementation and utilization.

The strategic oriented Balanced Scorecard (BSC) represents a new approach to the company performance measurement, because it enables decomposition of the strategy to measurable objectives and their consequent connection to performance indicators. The BSC puts emphasis on drivers of success within four main perspectives: finance, customers, internal company processes and learning & growth. The current business environment is characterized by continuous performance monitoring and efficiency of organizations (e.g. Gavurová and Klepáková 2012, 23; Kiauta 2012, 103). The competitiveness of organizations, regions and countries is significantly determined by the innovation activities (Szabo *et al.* 2013). Recent research studies in Slovakia confirm that only a negligible part of Slovak managers is familiar with the BSC, and therefore its practical application encounters many

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barriers. The system encompasses the complex economic activity of a company using the quantifiable (financial) and unquantifiable (nonfinancial) indicators. Slovak managers unlike managers in developed western countries have little experience with the BSC system. It is caused by the level of company strategic management itself, which often stays within the limits of traditional way of thinking. It is not only important to succeed in technical part of strategic management, but also to manage changes in a company culture, changes in employees' remuneration systems¹⁹ and to set new evaluation systems. Different criteria for employee evaluation can be set (Závodský and Závodská 2011, 49). The paper points out several problematic aspects of the BSC system implementation in Slovak companies, reveals many issues and problems to be handled in a business practice. These aspects create a platform of our research problem. We aim at finding possibilities to solve the problematic issues applying selected structural analysis method.

2. Research activities within the balanced scorecard sphere

Since the first introduction of the BSC method by its authors Kaplan and Norton in 1990s, many various papers have been published (Kaplan and Norton 1996, 71). We focus on a review of studies on this issue and on the first realized Slovak research in the area of the BSC implementation in the period of 2008-2011. We have summarized strengths and weaknesses of all research activities and provided some recommendations for the further works.

With respect to the research subject, research studies can be divided into the following categories:

- Research studies by advisory companies and professional associations;
- Research studies by academic institutions.

3. Research studies of commercial institutions

The differences between the two groups are mostly in the contents of their researches and in the size of the research sample. The researches of advisory companies examine what types of subjects use the BSC and how, what the benefits of the BSC for the companies are and if they are satisfied with the system. Questionnaires specified for the geographical area of an advisory company are the standard method. Among these studies, especially works published by companies aimed exclusively at the BSC application issues, such as Palladium Group, Inc., Balanced Scorecard Interest Group or Balanced Scorecard Institute, represent highly specialized source of knowledge. A significant strength of many studies is availability and comparability of data from different periods. Some of them are realized repeatedly in certain time intervals. The review of the research works realized by commercial institutions after the year 2000 is presented in the Table 1.

Table 1 - Research studies of commercial institutions

| Title of the study | Author | Year | Object of the study |
|---|---|------|---|
| PWC German Revision. The Balanced Scorecard in practical test: How satisfied are the users? | PriceWaterhouseCoopers | 2001 | Evaluation of the BSC utilization, satisfaction with the BSC, BSC benefits. |
| Performance Measurement: Implementing the Balanced Scorecard | American Productivity & Quality Center (APQC) | 2002 | Good practice principles connected to the BSC implementation. |
| The Balanced Scorecard Institute Best Practices Poll 2008: So...How did you measure up? | Balanced Scorecard Institute | 2008 | Evaluation of the BSC utilization and benefits in the US companies. |
| Balanced Scorecard Study | Horváth&Partners | 2004 | Evaluation of the BSC benefits and the satisfaction of the companies with the system. |

¹⁹The relationship between the performance measures and employee effort is analyzed in more details by Schulz *et al.* 2010, 17.

| Title of the study | Author | Year | Object of the study |
|--|------------------------|------|--|
| European Corporate Performance Management Survey: How do you manage your business? | PriceWaterhouseCoopers | 2009 | Extent, way and content of the performance management in the European company practice. |
| Performance Management Matters: Sustaining Superior Results in a global economy. | PriceWaterhouseCoopers | 2009 | Extent, way and content of the performance management in the Canadian company practice. |
| Management Tools and Trends 2009 | Bain&Company | 2009 | Evaluation of the utilization and benefits of the 25 most used managerial tools (incl. the BSC). |

Source: PriceWaterhouseCoopers 2001, 2009; American Productivity & Quality Center 2002; Balanced Scorecard Institute 2008; Bilodeau and Rigby 2009.

Research studies of academic institutions

In comparison to the studies of commercial institutions, academic works are narrowly specified; they usually focus on specific research problem and given scientific hypotheses. The mostly used methods of data collection are research questionnaires or personal interviews. Nevertheless, studies based on experiments (e.g. Lipe and Salterio 2000, Strohhecker 2007) or case studies (Ittner *et al.* 2003, 715) also occur.

The Table 2 provides a review of selected research studies by the academic institutions realized after the year 2000. Presented works have been selected based on their relevant connection to the own realized research aimed at the BSC implementation. They differ in their focus and used methodology.

Table 2 Research studies of academic institutions

| Author | Year | Object of the study | Conclusions |
|----------------------------|------|--|--|
| Hoque, Z. - James, W. | 2000 | Examining the relationship between the size of an organization, the phase of the product lifecycle, the market position, the BSC utilization and the organization performance. | Larger companies use the BSC to a greater extent. Companies with larger proportion of new products in their portfolio tend to adjust their measures to these products. No connection between the market position and the BSC utilization was confirmed. However, there is confirmed positive relationship between the BSC utilization and the company performance. |
| Lipe, M. G. - Salterio, S. | 2000 | Evaluating performance within the four BSC perspectives. | The BSC perspectives are significant for managers, as they enable them to consider potential relationships between the measures within one category and react to them. |
| Malmi, T. | 2001 | Identification how and why the BSC method is implemented in companies. | The BSC method is used in two ways: Within the so called “management by objectives” and in a form of a managerial information system. Some shortcomings in understanding and implementing cause and effect relationships between the indicators were identified. |

| Author | Year | Object of the study | Conclusions |
|--|------|---|---|
| Malina, M. A. - Selto, F. H. | 2001 | Evaluating the BSC efficiency as a managerial communication and control tool. | The BSC is efficient managerial control tool. The study points out the conflicts between the top and the middle management regarding specific aspects of the BSC as a managerial communication tool. The relationship between efficient control, motivation, strategic harmonization and positive effects of the BSC was confirmed. |
| Sim, K. L. - Koh, H. C. | 2001 | Comparing traditional performance measurement systems based on the financial indicators and the BSC system and their influence on a company performance. | Positive influence of the BSC and of performance measurement systems connected with the company strategy and objectives on the improvement of a company performance. |
| Rigby, D. | 2001 | Examining the extent of the utilization of 25 managerial tools and satisfaction of companies with them. | The satisfaction with the BSC is on the level of 3.85 on a scale of 1-5 (1 – unsatisfied, 5 – satisfied). |
| Olson, E. M. - Slater, S. F. | 2002 | Examining the relationship between an individual application of the BSC, the company strategy and its performance. | The performance improvement depends on the harmonization of the BSC measures with the company strategy. |
| Buckmaster, N. | 2002 | Verifying an existence of the relationship between performance measures based on the accounting data and measures based on other data (relationship between financial and nonfinancial measures). | 3 groups of companies were identified: In 9 subjects, a positive relationship, in 3 subjects, a negative relationship, and in 6 subjects, an unidentifiable relationship between the two types of measures was confirmed. |
| Ittner, C. D. - Lacker, D. F. - Meyer, M. W. | 2003 | Examining the ways of weights assigning to measures in the BSC used to evaluate and to motivate a human factor. | Human resources performance measurement and remuneration using the BSC is influenced both by psychological and economic factors. The effect of psychological factors is equal or larger than the effect of economic factors. |
| Speckbacher, G. - Bischof, J. - Pfeiffer, T. | 2003 | Various characteristics connected to the BSC utilization. | Conclusions connected to the utilization of the BSC as a performance measurement tool (1 st type), as a tool for strategy implementation via cause and effect relationships (2 nd type) and as a tool for strategy implementation via communication and action plans (3 rd type) were presented. |
| Ittner, C. D. - Lacker, D. F. - Randall, T. | 2003 | Relationship between the BSC utilization, satisfaction with the performance measurement systems and the company performance. | The BSC is connected to the larger satisfaction with the performance measurement. However, it does not lead to a higher performance reflected on the stock exchange. |
| Maiga, A. S. - Jacobs, F. A. | 2003 | Relationship between the ABC (activity based costing) and the BSC approach with respect to the performance of a production unit. | Influence on the performance was partially confirmed – in cases of certain measures of the learning & growth perspective. |

| Author | Year | Object of the study | Conclusions |
|---|------|---|--|
| Braam, G.J. M., Nijssen, E.J. | 2004 | Examining the relationship between the extent of the BSC utilization, way of its utilization, a strategy, a product, a market dynamics and the company performance. | Critical success factor of the BSC is the way of its application and utilization. The necessary condition is the harmonization of the performance measures with the strategy. |
| Bryant, L, Jones, D.A., Widener, S.K. | 2004 | Examining the relationships within each BSC perspective and between all the perspectives. | The measures of perspective of internal processes are drivers of the measures of customer and financial perspectives. The measures of the customer perspective are drivers of the measures of the financial perspective. |
| Davis, S. - Albright, T. | 2004 | Examining differences between values of key financial indicators of the affiliated branches which have implemented the BSC and those which have not, in one bank institution. | The study provided a proof of better financial performance of the branches with implemented BSC system. |
| Strohhecker, J. | 2007 | Examining the influence of the BSC on the company performance. | Utilization of the BSC influences the company performance positively. |

Source: authors

From the presented papers, the study by Davis and Albright (2004) should be pointed out. It analyzes data over the longer period but with limited number of subjects (9 subjects). An advantage of this study is the unique comparison of data of subjects with applied BSC system with data of subjects not using the BSC. Our own empirical research presented in the following subsection is a contribution to existing works and expands the knowledge on the BSC utilization in Slovakia.

Implementation of the BSC System in Slovakia – empirical research

The research conducted in Slovakia so far has showed that only few Slovak managers are aware of the BSC. Therefore, its practical application faces many barriers. Some of the most important problems are insufficient information about the system and insufficient belief about its necessity. Under the conditions of the Slovak Republic, no complex study devoted to the implementation of the BSC as a system for the company strategy implementation was realized till 2008. The amount of empirical evidence about the number of companies using the BSC and the form of its implementation in the Slovak Republic was also small.

Therefore, the aim of the above mentioned research conducted in the period of 2008-2011 in Slovak companies was to systemize, to examine and to evaluate selected attributes of the BSC application, to identify problematic issues of the system implementation and to suggest the possibilities of their solution. In the beginning of the research, the following problems have occurred:

- Definition of the BSC implementation in Slovak companies: “What constitute an implementation of a BSC?”;
- Problems with identification of the research sample. (See the next subsection).
 - Regarding the BSC definition, we have considered the following characteristics:
 - Consistency of the system name in a company with the name in a theory – the “Balanced Scorecard”;
 - Interconnection of the vision and the strategy with the tactical and operative objectives;
 - Balanced assignment of the objectives to selected perspectives;
 - Existence of the cause and effect relationships between the objectives;
 - Each objective is measured at least by one indicator;
 - Personal responsibility is assigned to each objective;
 - Balance of executive and result measures;
 - Harmonization of all the BSC levels to maximize the organization performance;

- Informing about the strategy in each time on each organizational level;
- Significant support of the communication about strategic issues in each time on each organizational level.

Research methodology – identification of the research sample

Studies have showed that BSC system is often implemented by the advisory and consultant organizations and companies specified in information systems and information technologies (IS/IT). Further information about the companies was provided on their websites or via telephone interview or email. 40 companies were selected at first, only 20 of which have really implemented the BSC. 16 out of the 20 of the BSC firms were interested and involved in the research²⁰. Each of the selected companies was visited in order to realize a half-structured interview. Based on their references we have consequently identified our second sample consisting of companies using the BSC. Considering the above mentioned facts it is possible to conclude that the research sample contains two groups. For more exact identification, we have named them “BSC implementers” (16 companies) and “BSC users” (16 companies).

The process of the BSC implementation and the process of the BSC utilization are clearly distinguished. The BSC implementation is a one-time process with a character of an investment project. The BSC utilization is a continuous process realized cyclically which thus requires participation of implementers to align the system during the whole period of the system utilization. With respect to this, the results of both groups blend together and it is impossible to distinguish them. To conclude, here presented research outputs are related to all 32 companies. Characteristics of the companies implementing the BSC: The first research sample contained advisory and consulting companies existing for 3-19 years (the major part – 37.5% - was on the market for 12 years). The majority of the sample was represented by the micro-companies (62%), 25% of the companies were small companies and 12.5% of them were middle-sized companies.²¹

Characteristics of the companies using the BSC: The second sample included middle-sized and large companies of at the age of 8-14 years (the major part – 37.5% - exists in the industry for 10 years). 75% of respondents orient their activities both to the Slovak and to the foreign market. This fact is also influenced by the 38% share of the foreign majority owner in the companies. 38% of the companies have 5-year experience with the BSC, the same share of the companies (25%) use the BSC for 4 and 6 years, respectively. 13% of participants in the research is in the phase of the BSC implementation or of the pilot project. The BSC system was mainly implemented in the sphere of business and industry (71%), 29% of companies were active in a health care sector.

Partial results of the research and recommendations

The research has showed that problematic phases of the BSC implementation are the process of the strategy creation, a consequential process of creating a strategic map, key performance indicators (KPI) and critical success factors (CSF) and the BSC expansion to lower hierarchical levels. KPI as a problematic area in the performance management systems is also described by the Závadská *et al.* (2013, 113). We have also identified an insufficient level of knowledge and experience with the strategic analysis methods. Their imperfect use can significantly lower the quality of the implemented BSC or to worsen the system functionality. Moreover, problematic issue is also to define exact performance measures and consequently to assure their balance, as well as the absence of measures of certain strategic objectives. The analysis of customer value is precondition for the BSC to support a useful and efficient business strategy (Klepáková 2011).

These shortcomings restrain defining relationships between indicators and their connection to the perspectives. A methodology to set proper KPIs as a lead within the process of defining suitable measures with respect to strategic objectives also absents. The difficulties of the Slovak companies to

²⁰ It is necessary to emphasize that 16 companies present 80% of all companies implementing the BSC in the Slovak Republic. With respect to the study realized in the USA by an organization specialized on the BSC research which was applied to 45 companies (Balanced Scorecard Institute 2008), this research is more than proportionally comparable considering the geographical and economic context of the Slovak Republic and of the USA.

²¹ The mentioned classification of firms according to their size respects the classification of the European Commission (EC 2006).

connect the formal system of remuneration with the BSC measures are analogous to those of the foreign companies. In many cases, primary BSC measures do not respond to objectives, short-term measurement results are not consistent with long-term objectives; some measures are not selected correctly or are based on unreliable data. Moreover, through detailed analysis of examined issues, used methodology, ways of research results elaboration and their generalization, we have identified the most severe constraints and weaknesses of the existing studies.

Based on this knowledge, we have considered and eliminated following shortcomings in our research:

- *Comparison of general measures:* The authors Hoque and James (2000) and Maiga and Jacobs (2003) have used 20 general performance indicators in their studies. There is a discrepancy in their approach and in the work of Kaplan and Norton (1996). The BSC system and all included measures are adjusted to the individual company conditions. Hence, appropriate general performance measures do not exist, as neither company activities nor strategies are unified.
- *Conclusion for our own research:* We have avoided using questions about the utilization of general measures. On the contrary, we put the emphasis on conducting the in-depth interviews analyzing company strategies, strategic objectives, individual state and development of performance and influence of the BSC method on the company performance.
- *Artificially created conditions:* Experimental studies of the authors Lipe and Salterio (2000) and Strohhecker (2007) include creation of partially artificial (laboratory) conditions which influence behavior of examined subjects during the experiment and consequently the results. The authors admit the impossibility of excluding the influence of controlled behavior of the subjects and to some extent the distortion of the results.
- *Conclusion for our own research:* We do not realize an experiment. However, we admit the endeavor of examined subjects to adjust their answers in questionnaires in a positive way. We have tried to reveal these answers by using control questions at a personal interview (e.g. to use an example) and by repeated and linked questions in different part of the questionnaire (the consistency of answers was expected).
- *Mediated information and subjective evaluations:* This constraint refers to the generality of studies using questionnaires as a data collection method. They usually do not announce what persons were included in the research. Therefore, it is impossible to exclude an influence of subjective judgments, evaluations or interpretations on the answers.
- *Conclusion for our own research:* Despite the risk of response biases, we believe the method of a questionnaire to be more appropriate for our research than creation of artificial experimental conditions. The combination of the questionnaire and a personal interview, as well as thorough selection of respondents (emphasis is on top managers or persons directly responsible for the BSC system) may be considered as an endeavor to minimize the influence of subjective evaluations on the research results. Yet, subjective effect cannot be absolutely excluded.

Structural analysis using the MICMAC method

Structural analysis is used to identify key determinants of the system and its most sensitive parameters. Its essence is the assessment of relationships between variables and the simplification of the system by selection of the most influential external variables and the most sensitive internal variables (key variables).

Structural analysis method in general

The first phase of the structural analysis is elaboration of as accurate list of strategic variables (do not have to be quantifiable) as possible in order to gain a complex view of the system representing analyzed events. In this phase, an expert group method should be applied. Within this method, several experts of the issue specify factors influencing an observed object. Variables are divided into two main groups: internal and external and are eventually described into details enabling to catch whole content of each variable. The second phase consists in identification of key system determinants and its most sensitive factors. This phase includes an analysis of the key variables using the MICMAC method (A method based on use of the cross-effect matrix was introduced by J.C. Duperrin and M. Godet in 1972-1974, French: *Matrice d'Impacts Croises Multiplication Appliquee a un Classement* (Duperrin and Godet 1975, 302)).

Firstly, a group of experts solve the question of an existence of relationship between two variables. They analyze the following relationships:

- Does the variable i influence the variable j or is the relationship reversed?
- Does only i influence j or is there a third variable k influencing both i and j ?
- Is the relationship between i and j direct or mediated by another variable r ?

This analysis verifies the existence of the causality between the variables and its direction. The relationships are presented in a form of the structural analysis matrix (see Figure1).

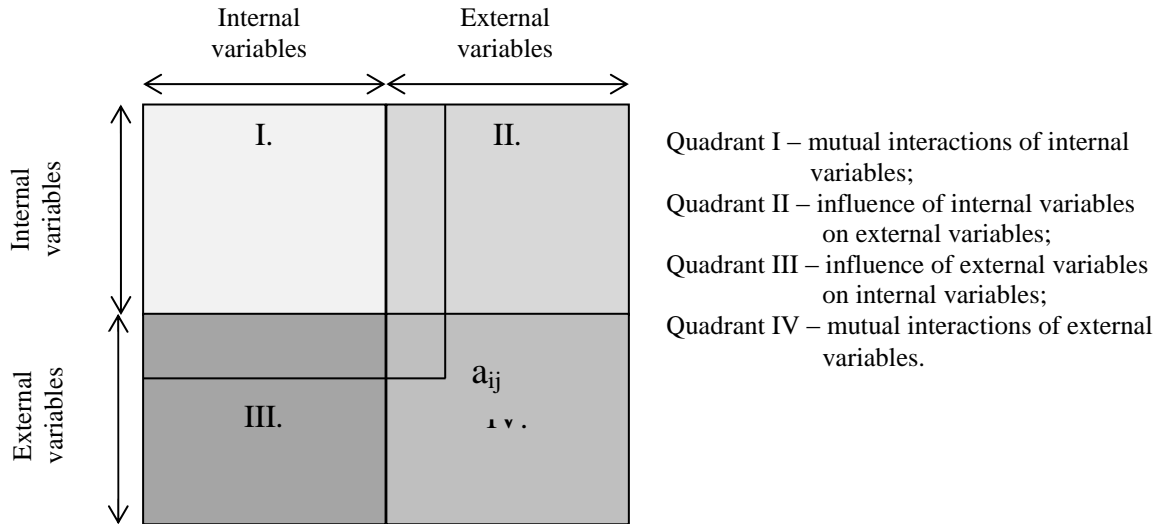


Figure 1 - Structural analysis matrix
Source: According to Gervais *et al.*, 1999

Each element a_{ij} of the matrix has the following value:

- $a_{ij} = 1$, if the variable i influences directly the variable j (to distinguish a strength of a relationship, values 1 for the weakest, 2 for medium and 3 for the strongest link can be used),
- $a_{ij} = 0$ in case of no link between the variables i and j .

The sum of the elements of the row i of the matrix expresses the number of situations when the variable i influences the system. It is an indicator of influence of the variable i . The sum of the column j represents the number of situations when the variable j is influenced by other variables. It is an indicator of dependence of the variable j . We apply the structural analysis on the solution of the BSC problematic issues. However, its broad utilization also enables the system to be used to realize a marketing analysis, to identify the influence and dependence of factors affecting market shares or positions.

MICMAC Method

The MICMAC method expands the outputs of the structural analysis. Beside the direct relationships, it also provides valuable information on indirect links between variables and on their hierarchy (Gervais *et al.* 1999). The MICMAC principle consists in multiplying the structural analysis matrix by itself. The square of the A matrix (the structural analysis matrix) is given by the equation (1):

$$A^2 = A \times A = \{a_{ik}^1 \times a_{kj}^1\} . \tag{1}$$

If at least one a_{ij} satisfies equation $a_{ij}^2 = 1$, there exists at least one k such that $a_{ik}^1 \times a_{kj}^1 = 1$. This means there is at least one connecting variable k such that the variable i influences k ($a_{ik}^1 = 1$) and simultaneously k influences j ($a_{kj}^1 = 1$). We say the way of the order 2 going from i to j exists.

If $a_{ij}^2 = N$ there are N links of length 2 going from i to j passing through N connecting variables. Moreover, A^3, A^4, \dots, A^n express the number of links of order 3, 4, ..., n connecting the variables with each other. In the each iteration we get new hierarchy of the variables ordered according to indirect influences on other variables. From a certain power upwards, the hierarchy does not change any more, it stays stable. The aim of the MICMAC method is to find this hierarchy. The variable must be included into an explicative analysis. After its realization and ordering the variables we gain:

- The hierarchy of external variables which is a function of their direct and indirect influence on other variables,
- The hierarchy of internal variable according to their sensitivity to the development of external environment.

According to their influence and sensitivity (based on indirect links), it is possible to distinguish four categories of variables (See Figure 2).

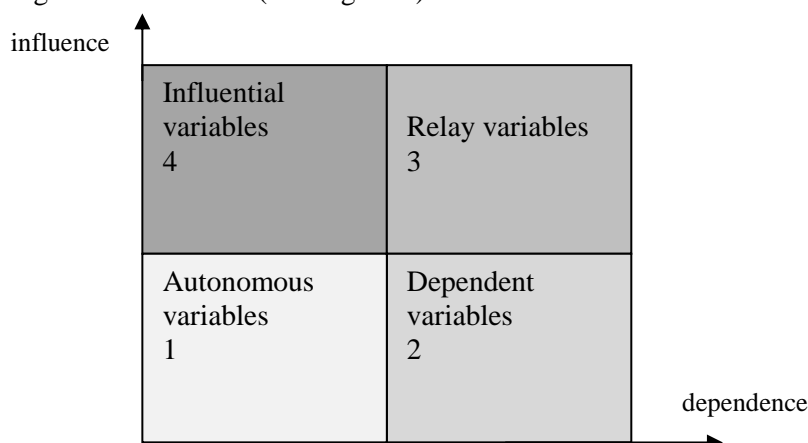


Figure 2 - Matrix of influence and dependence
Source: According to Gervais *et al.* 1999

The variables in the first quadrant are factors relatively excluded from the system. They have low influence and low dependence with respect to relationship dynamics in the system. Their relative autonomy and independent development prevent them from being driving powers. We can observe two situations:

- Disconnected variables close to the origin of axes [0,0] have almost no influence on the system;
- So called Secondary levers located above the diagonal are more influential than dependent.

The variables in the second quadrant are result parameters whose development depends on the explicative variables in the third and the fourth quadrant. The variables in the third quadrant require special attention. They are very influential and yet very sensitive. They are linkage variables whose essence is instable.

Each effect on some of these variables also influences other variables and evokes the backward reaction to the variable itself leading to the strengthening or weakening of the primary impulse (Godet 1982, 293). In this quadrant, two special cases need to be taken into account:

- Variables located around the diagonal are potential breakpoints of the system because of their instability,
- Variables located under the diagonal are rather dependent than influential. They are considered to be objectives of the system. Unlike variables close to the diagonals, these can be managed in a desired way.

The variables in the fourth quadrant have large influence and low dependence. They affect the dynamics of the whole system. Variables located around the central point of the diagram are called regulating variables. The advantage of the matrix of influence and dependence is the possibility to structure the analyzed problem better and to verify if a variable a priori considered as explained is dependent and a variable considered as explicative is a driving power.

Methodology of the research problem

With respect to the given objective, the MICMAC method is used to conduct the structural analysis of problematic issues of the BSC. Partial objectives of this research problem are:

- To systemize main BSC principles and to identify problematic issues of the BSC implementation in Slovak organizations,
- To realize the structural analysis of BSC functionality factors using the MICMAC method and to characterize their effects of the BSC system,
- To evaluate the utilization possibilities of the proposed analytical method in order to improve the BSC system in a Slovak business practice.

Following the fundamental performance principles, such as targeting, finality, activation and self-reflection (Wagner 2009) and the above mentioned results of our own research, we have formalized nine BSC principles. Their application is a condition for achieving expected contributions of the BSC system.

The BSC principles are as follows:

1. *Strategic Focusing (SF)*

The first principle comprises the base of the BSC system. It includes a mission, a vision and a strategy of a company, which are translated into the conception of strategic maps as a basic component of BSC. If the system does not have a strategic platform, it cannot be a tool of strategic management and it is randomly selected set of benchmarks.

2. *Strategy Operationalization (SO)*

This principle closely relates to the first principle, in this point the strategic basis is being transformed to concrete everyday activities, which are priority for strategy implementation and reaching the targets.

3. *Cascading and Harmonizing (CH)*

The third principle is closely linked to the first two. It emphasizes the importance of influence of lower organizational levels in a company on its results. The absence of this process isolates BSC system on the highest managing level and avoids the possibility of intentionally influence the results at lower levels, which ultimately suppresses strategic performance in a negative direction.

4. *Significance and Balance (SB)*

Balance is a main characteristic, which is distinguishing the BSC method from other scorecard managerial methods. If there is an absenting effort in finding a balance in the system, reaching of nature of BSC method is unfulfilled.

5. *Causal Relationships (CR)*

Defining and verifying of subsequently causal relationship between the variables of the system is necessary for achieving objectives and to predict the development of the company.

6. *Measurability (ME)*

Within this principle, the focus is on the primary indicators providing clear and complex information. Focusing mainly on well quantifiable factors, leads us to the imbalance and distortion of desired outcomes. It is important to focus on priority indicators to avoid congestion of many measures which complicate their mutual aggregation and interpretation of results.

7. *Link to Sources of Funding (SF)*

Strategic priorities should be reflected in a creation and utilization of the funds.

8. *Sustainability and Feedback (SU)*

BSC system has cyclical character and therefore interruption of the process in one of the subsequent steps (strategy - benchmarks - evaluation - strategy etc.) negatively affects the functionality of the system and affects the results.

9. *Strategy Autoevaluation (SA)*

Self-assessment is one of the basic principles of strategic management in case of performance improvement, as well as for strategy implementation. Self-assessment system helps to assess the benefits and functionality which has a direct impact on the quality of information for strategic decision making.

The relationship between the fundamental principles of a performance and the BSC principles is obvious. The targeting is given by the strategy formulation itself and by strategic and tactical objectives. Therefore, it is recommended to quantify the targeting, using the criteria connected directly to the strategy. Within the BSC system the targeting is included in the principles Strategic Focusing, Significance and Balance and Strategy Operationalization. The finality comprises final interpretation of the performance. The BSC system includes it in its principles Measurability, Cascading and Harmonizing and Causal Relationships. The activation represents an influence of the performance monitoring results on its further development and is involved in the following principles: Cascading and Harmonizing and Links to Sources of Funding. An ability of self-reflection is rather known from the sphere of individual and team management. Nevertheless, it also is very appropriate with respect to the whole company. The BSC system decomposes strategic objectives and indicators to the level of employees. Hence, each individual knows his contribution to the objective achievement; can measure and evaluate his performance and consequently improve it if necessary. The auto-reflection is expressed through the principles Sustainability and Feedback and Strategy Autoevaluation.

The following figure (Figure 3) presents problematic issues of the BSC system, proposed supporting methodologies and the BSC principles

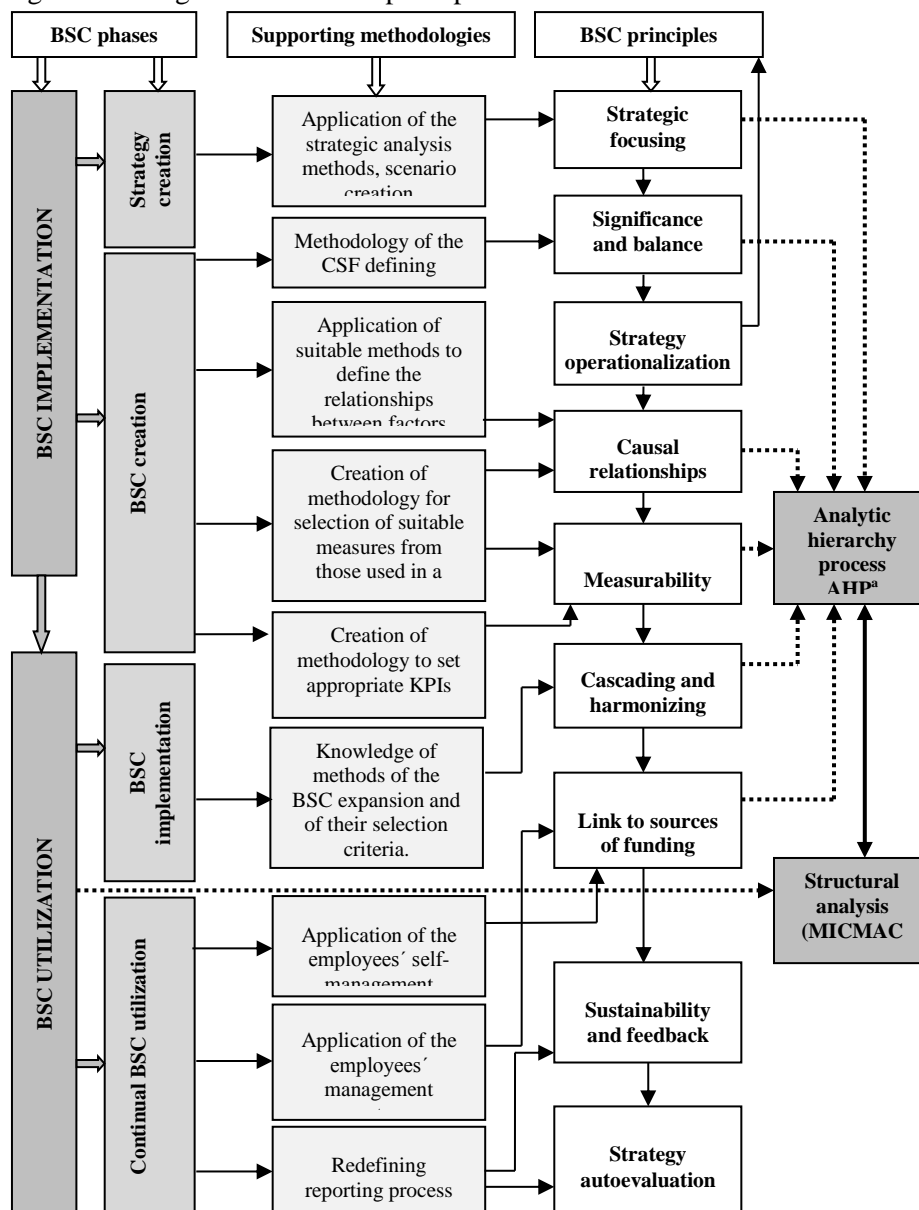


Figure 3 - Analyzed relationships: problematic issues of the BSC, supporting methodologies, the BSC principles
Source: authors

^a Beside the MICMAC method, the figure presents also the Analytic Hierarchic Process (AHP). The analysis of this process is not a content of this paper. For further details on the method, see Saaty 2008, Ramik 2000). However, its importance is emphasized in a discussion of this paper.

The compliance with the principles or their violation influences the efficiency of the BSC system. Therefore, evaluation of the principles' implementation, analysis of shortcomings and identification of possible impacts on the strategic management outcomes stand in the center of attention.

Practical application of the MICMAC method

To assess the character and the intensity of the links between the analyzed BSC principles and their accordance with the structural analysis methodology (Arcade *et al.* 2009) we have applied the expert group method. Various questions divided into several groups have been answers by 11 participating experts. The aim was to achieve a consensus of opinions. The group of experts consisted of 4 academics and 7 representatives of business practice (advisory and consultant companies and companies with relevant experience with the BSC utilization). Realization of the method requires difficult preparatory phase and significant knowledge of the moderator.

Phases of the MICMAC application

1. Construction of the basic diagram

Basic diagram (only outlined by experts) depicts mutual direct links between defined variables and their direction. We have applied the following sequence of steps:

All the BSC principles were presented in two columns. The experts decided (achieving a consensus) about the existence and the direction (which variable is influencing and which is influenced) of the relationship between all possible pairs of principles. Any potential existence of the relationship was marked by a dashed arrow and discussed in later phases of the analysis.

2. Creation of the input structural analytic matrix

The second step of the analysis has been a creation of an input structural analytic matrix (See Figure 4). The rows of the matrix are the BSC principles in a position of influencing variables. The matrix columns comprise the BSC principles as influenced variables. Taking the basic diagram from the previous phase into account, we have examined the intensity of relationships going from an influencing variable to an influenced variable (The question we have asked was as following: How does the variable A influence the variable B?).

In case of no link between principles, we have entered 0 into the matrix. The existence of a relationship was represented by a solid arrow and points (1 = weak relationships, 2 = middle-strong relationship, 3 = strong relationship) depending on the strength of the link. Any potential relationship from the previous step was corrected and points of 0, 1, 2 or 3 were assigned to it. The main diagonal consists only of zero values (relationship of a variable with itself).

| | 1 : ST | 2 : SB | 3 : SO | 4 : ME | 5 : CR | 6 : CH | 7 : SF | 8 : SU | 9 : SA |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 1 : ST | 0 | 3 | 1 | 1 | 2 | 2 | 1 | 2 | 2 |
| 2 : SB | 2 | 0 | 1 | 2 | 1 | 1 | 1 | 2 | 2 |
| 3 : SO | 3 | 2 | 0 | 2 | 1 | 2 | 2 | 3 | 2 |
| 4 : ME | 2 | 2 | 2 | 0 | 3 | 2 | 3 | 2 | 3 |
| 5 : CR | 3 | 2 | 2 | 1 | 0 | 2 | 1 | 2 | 2 |
| 6 : CH | 2 | 1 | 1 | 1 | 2 | 0 | 1 | 1 | 2 |
| 7 : SF | 2 | 2 | 1 | 2 | 2 | 2 | 0 | 2 | 2 |
| 8 : SU | 3 | 2 | 2 | 3 | 1 | 2 | 2 | 0 | 2 |
| 9 : SA | 2 | 2 | 2 | 3 | 1 | 2 | 2 | 2 | 0 |

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Figure 4 - Input structural analytic matrix
Source: authors

3. Evaluation of given causal relationships

Within the third phase, the relevancy and complexity of values in the structural analytic matrix has been verified. The experts have examined a bidirectionality and intensity of the relationships going from an influenced variable to an influencing one. They have asked the question: How is the variable B influenced by the variable A? Points assigned in the previous phase have been reevaluated and, based on consensus, approved or corrected.

Afterwards, the group work was interrupted and structural analysis using the MICMAC method was elaborated. The results were presented to experts to be discussed and changed when needed with respect to their realness, validity and relevancy. No objections have arisen and the results have been approved.

4. Software solution of the MICMAC analysis

To elaborate the data, we have used the software LIPSOR MICMAC. The structural analytic matrix has been multiplied by itself until the order of the factors was stable in two consecutive iterations. The pre-set number of iterations was 9. In our case, the stable factor order has been achieved in the second iteration. In other words, from the second power within the multiplication process the order does not change any more. We have got a structural analytic matrix representing all (incl. indirect ones) links between analyzed factors.

Consequently, the variables have been placed in a diagram of influence and dependence according to their position in the matrix. The x axis stands for the level of influence of the variables (the sum of the links in columns of the matrix) and the y axis represents the level of dependence of variables (the sum of links in rows).

The diagram (see Figure 5) is divided into four quadrants responding to the classification of variables. The positions of the variables in the diagram reflect their mutual relationships influencing the dynamics of the system. As the variables are not ordered in a form of letter L, with respect to the relevant methodology (Arcade *et al.* 2009), we have come to a conclusion of instability of the system.

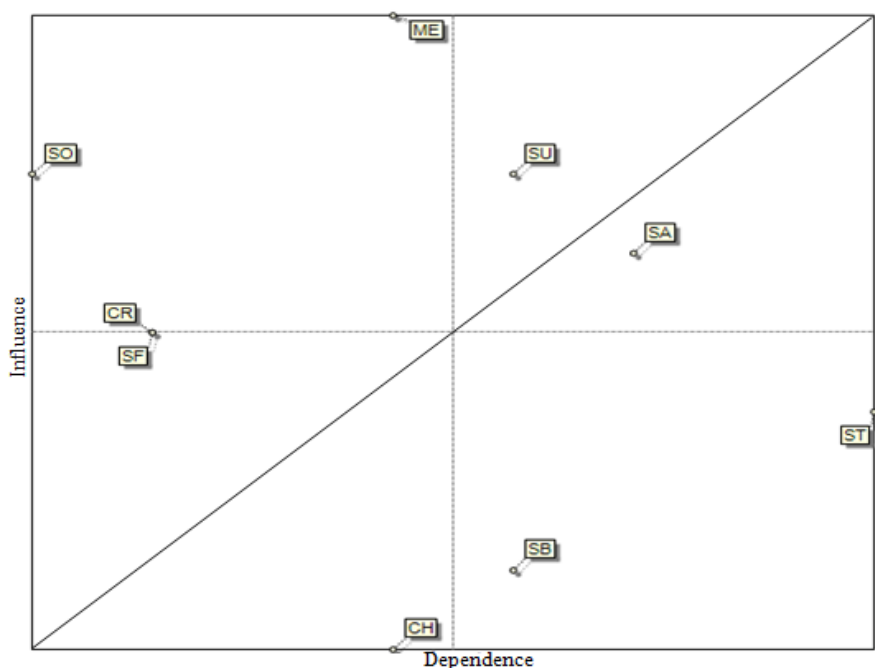


Figure 5 - Diagram of influence and dependence
Source: authors

1. Results of the MICMAC analysis

Characteristics of the four quadrants

- First quadrant – None of the analyzed variables is located close to the origin, thus, all of them influence the system. Moreover, the variable Cascading and Harmonizing can be found under the diagonal which signifies higher dependence than influence.

- Second quadrant – This quadrant comprises the variables Significance and Balance and Strategic Focusing.
- Third quadrant – Two variables, the Strategy Autoevaluation and the Sustainability and Feedback, are located in this quadrant. None of them is positioned around the diagonals. However, the Strategy Autoevaluation is placed under the diagonals and, thus, considered to be a target variable of the system.
- Fourth quadrant – Four variables, the Measurability, the Strategy Operationalization, the Causal Relationships and the Link to Sources of Funding are located in the fourth quadrant. The latter two lie on the border to the first quadrant, however, they are still significantly more influential than dependent.
- Central point of the diagram – no variables are located around the center.

After defining positions of the variables, we have created a scheme of the general model of the BSC dysfunctionality causes, or the model of the BSC functionality factors, respectively. The following figures (Figure 6 and Figure7) present the links of direct and indirect relationships between variables with respect to their direction and intensity.

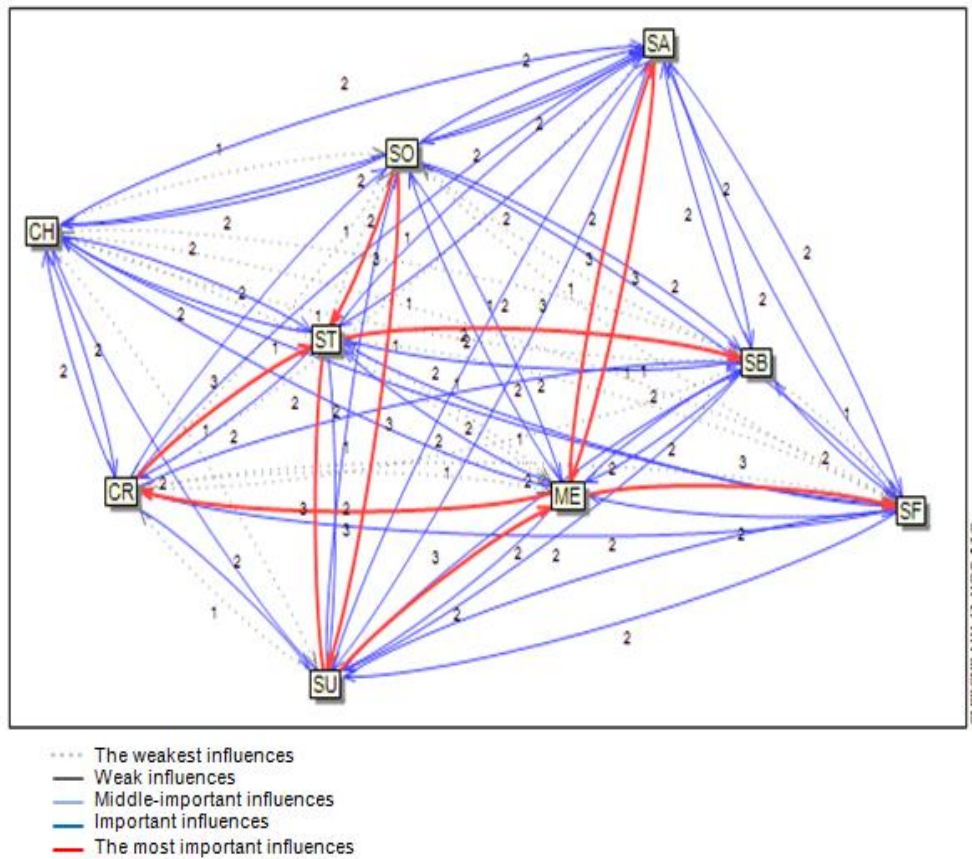


Figure 6 - Graph of the direct influences
Source: authors

The most significant influence has been identified between the variables: Causal relationships, Link to Source of Funding, Measurability, Strategy Operationalization. This corresponds to the diagram of influence and dependence, in which these three variables are the most influential and the least dependent.

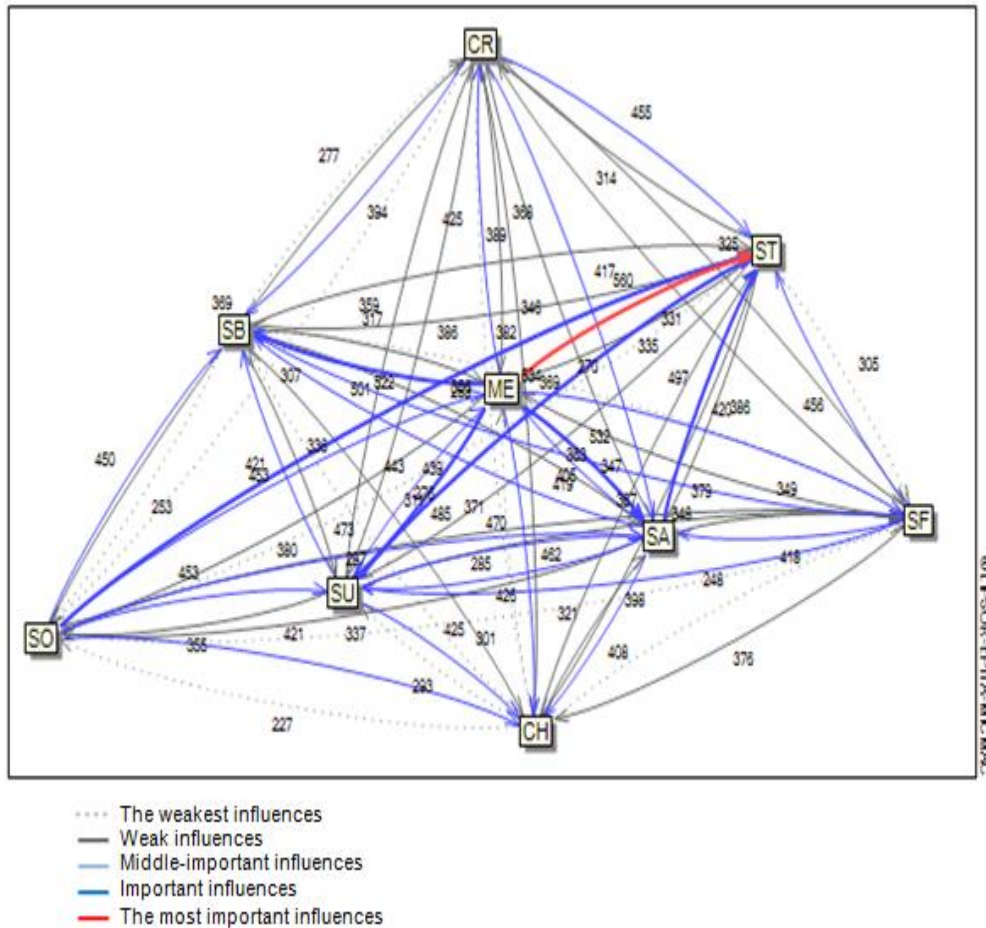


Figure 7 - Graph of the indirect influences
Source: authors

Consequently, we have compared the graph of direct and the graph of indirect links. Within the quadrants, the variable did not change their position at all or only minimally. The most significant change has occurred by the variable Causal Relationships. In the diagram of direct links, it was located at the same place as the variable Link to Sources of Funding. However, in the graph of indirect relationships, it gains the position of a secondary autonomous variable (more influential than dependent, above the diagonal).

The following figure (Fig8) presents the order of significance of variables according to their influence. Direct (left column), indirect (middle column) and potential (right column) links are considered.

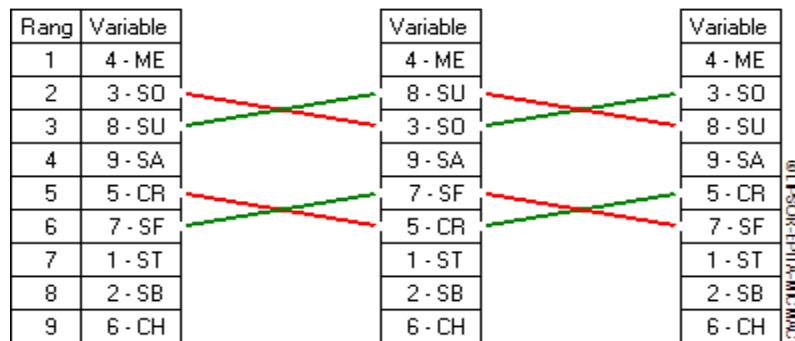


Figure 8 - Classification of analyzed variables according to their influence
Source: authors

Beside the pairs Strategy Operationalization – Sustainability and Feedback and Causal Relationships – Links to Sources of Funding, the order of analyzed variables is stable. Although the variables Strategy Operationalization and Causal Relationships have lower position within indirect relationships in comparison to their position within the direct links, within the potential relationships, they are on equal position to the one within the direct links. Same situation occurs also in case of variables Sustainability and Feedback and Links to Sources of Funding. The Figure 9 classifies the variables according to their dependence.

| Rang | Variable |
|------|----------|
| 1 | 1 - ST |
| 2 | 9 - SA |
| 3 | 2 - SB |
| 4 | 8 - SU |
| 5 | 4 - ME |
| 6 | 6 - CH |
| 7 | 5 - CR |
| 8 | 7 - SF |
| 9 | 3 - SO |

| Variable |
|----------|
| 1 - ST |
| 9 - SA |
| 2 - SB |
| 8 - SU |
| 4 - ME |
| 6 - CH |
| 5 - CR |
| 7 - SF |
| 3 - SO |

| Variable |
|----------|
| 1 - ST |
| 9 - SA |
| 2 - SB |
| 8 - SU |
| 4 - ME |
| 6 - CH |
| 5 - CR |
| 7 - SF |
| 3 - SO |

Figure 9 - Classification of analyzed variables according to their dependence
Source: authors

Considering the direct (left column), indirect (middle column) and potential (right column) relationships, the order of variables stays unchanged.

Interpretation of results

To conclude the analysis, the critical functional factors of the system are: Measurability, Causal Relationships, Links to Sources of Funding and Strategy Operationalization (the fourth quadrant of the diagram). The most influential variable is Measurability.

Very critical issues of the BSC system are measures. Except for those of the financial perspective it is very difficult to define them. Therefore, they are often ambivalently or too complexly defined, their number is insufficient or redundant providing irrelevant information. Their structure is another problem. Practice declares many dependent and uninfluenceable (external) measures. In order to make the system work as a driving power, the measures should be independent and influenceable (by managers). Significance and Balance is the third most dependent criterion of the BSC system. Measures should be set with emphasis on the balance of financial and nonfinancial, verbal (soft) and numerical (hard), long-term (strategic) and short-term (operative), internal and external (e.g. Prídavok and Delina 2013, 35; Janke 2011), leading (ones of performance) and lagging (ones of result) measures. Moreover, measures regarding qualification of employees, their satisfaction, motivation or loyalty are missing. Furthermore, business ethics is within the BSC system also neglected. The rules of business ethics do not penetrate into managerial methods and analyses, are not a criterion in decision-making processes.

Kaplan and Norton (2001) consider moral responsibility, customer relationships and image and reputation within the customer perspective as activators of driving powers. However, most of the authors do not pay sufficient attention to the business ethics. As a consequence, any systematic solution of mutual connections of the above mentioned categories within strategy objective and strategic maps absent.

Further topic of the expert team discussions was also barriers of the measures determination for the strategic purposes. No methodology serving as a lead for this process exists. Slovak companies use many diagnostic and strategic measures, although optimal number is rather small, 2-4 measures per one strategic objective. Moreover, many of the objectives are defined too vaguely what leads to ambivalent result interpretations. Measures often have operative character (do not measure strategic performance) or target values are wrongly assigned. Another problem is nonexistence, intransparency and inconsistency of necessary data.

Currently, authors have been mostly discussing the issue of leading and lagging performance indicators. Parmenter (2007) presents a new way of performance measurement and abstracts from the classification of indicators to lagging and leading. He defines three types of indicators: key performance indicators (KPI), performance indicators (PI) and key result indicators (KRI) which replace lagging indicators. KRI are suitable for those who are not involved in everyday managerial activity.

Wrong proportion of leading and lagging indicators causes imbalances of the system. Vysuřil (2004) supposes 22 indicators to be the optimal amount as 4-7 indicators are necessary for each perspective. In comparison to the diagnostic indicators implemented in a company this number is neglectable. Kaplan and Norton (2001) also advise 4-7 indicators for each perspective and approximately 25 for the whole system. Some experts, however, consider lower number of indicators (5-7 for the whole system) to be optimal. They are convinced the BSC should consist only of “life important” indicators to bring real change in the company performance. If a company needed to increase the number of indicators, it would mean an inconclusive situation.

Causality is another critical issue of the BSC system. There is no methodology describing creation of the strategic maps including the causal relationships. The largest barriers are the following:

- Ignorance of methods and methodologies in a process of strategic map creation,
- Not understanding of the essence of graphical presentation of cause and effect relationships,
- Endeavor to analyze all possible relationships leading to aggregation of all links and consequently to creation of too complex and confusing matrices,
- Endeavor to find an algorithmic logic in the cause and effect chains and repressing intuition and experience,
- Tendency to apply correlation analysis to verify the strategy determined in cause and effect chains.

It is necessary to add that cause and effect relationships in the BSC system are a significant reduction of a causal analysis. Hence, an identification, defining and verification of causal relationships between the BSC components (strategic objectives, measures, target values, strategic initiatives) are important factors influencing general BSC functionality and the quality of information on performance using the BSC.

Significance of critical factors of the system functionality may also be analyzed in broader context within the performance measurement and management systems. Our ambition was to interconnect the factors with fundamental performance principles.

Discussion

The BSC system is a complex, difficult, structured, variable and individual system which thus provides many possibilities to apply multicriterial methods. One of them is Analytic Hierarchical Process (AHP). It presents a framework for efficient decision-making. It is a method creating a hierarchical system of any problem by decomposition of a difficult unstructured situation to simpler components.

Possibilities to use applied methods in order to eliminate critical issues of the BSC system are presented in the following table (Table 3).

Table 3 - Possibilities of the AHP and the MICMAC use within problematic BSC issues

| Aspect | Critical issue | Proposal of a method |
|--|---------------------------------------|--|
| Selection and construction of measures | Number of Redundant measures | Brainstorming, Expert group method |
| | Number of Insufficient measures | |
| | Balance of measures | AHP with respect to previously realized expert group method. |
| | Financial – Nonfinancial | |
| Links between | External – Internal | Attention on the first phase of group |
| | Leading – Lagging | |
| | Strategic - Operative | |
| | Absence of Target values not based on | |

| Aspect | Critical issue | Proposal of a method |
|------------------------------------|---|---|
| measures | logical links | mathematical and statistical models, outcome of intuition, negotiation and consensus of management. |
| | Absence of methodology and historical data | Incorrect identification of causalities if not verified by historical data. |
| | Correct identification of strategically significant relationships in strategic maps | Difficult causal links between perspectives, objectives, measures and activities, difficult causal links between measures and objectives and only between measures. |
| Target and critical values setting | | expert method and the structure of the group (criteria: age, experience, profession, a level of organizational structure a member works on, sphere etc.). MICMAC with respect to previously realized expert group method. |
| | Construction and character of measures | Too complex measures to assure the system reliability. Preference of transparent measures to increase motivation and more precise interpretation of results. |
| | Dissemination and cascading process – roll-out. | Dissemination of complex measures to lower levels and backward result aggregation. |
| | | Expert group method – selection of possible strategic trajectories, elimination of duplicate links, cascading strategic links to lower levels. AHP – hierarchy of causal links between components of the BSC systems. MICMAC – determining critical components of the system, considering them by strategic map creation. |
| | | Brainstorming with a goal to eliminate the use of easily quantifiable measures and to find important measures for management. |
| | | AHP with a goal to cascade objectives and measures in order to eliminate redundant measures destroying links of responsibility and leading to problematic backward aggregation of results. |

Source: authors

This essence makes the AHP method another appropriate approach to solve problematic BSC issues and to realize strategic Benchmarking. We propose to use the BSC principles presented earlier in this paper as a basis for the AHP. It can be efficiently used in the following areas:

- Review of the BSC system balance and determining the balance of its components positively influencing reliability of information provided by the BSC system, determining the balance between perspectives, objectives, measures and activities.
- Revaluation of the causal relationships in the BSC system and examining causalities between system components. Causalities have mainly logical character and put emphasis on cause and effect relationships. Therefore, their reliability is based mostly on the intuition and experience of management.
- Review of cascading and harmonizing the BSC system to lower hierarchical levels.

Conclusion

Analyzing performance and efficiency of organizations is typical for present business environment. Performance measurement and evaluation is beside really achieved outputs significantly influenced by applied methods. One of the successful systems for performance measurement and management and strategy implementation is the BSC system. Its essence is harmonizing and realizing a strategy by its transformation into particular objectives and indicators within a company. By providing a group of indicators, the BSC system has become a relevant basis for difficult strategic Benchmarking.

We have applied the structural analysis method MICMAC and thus proposed a model of potential disfunctionality causes of the BSC system and classified the variables according to their influence and dependence on specific categories. Early and proper diagnosis of critical factors of the system may reveal significant functionality deficits and enable its continuous improvement.

To conclude, we consider important for subjects with implemented BSC system to analyze and evaluate its theoretical and methodological platform. Moreover, it is necessary to verify if specific characteristics of each business subjects have negative impact on reliability of information for strategic decision-making.

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ECONOMIC POTENTIAL OF REMITTANCES: EVIDENCE FROM THE SOUTH ASIAN COUNTRIES

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Abstract

This paper describes the economic potential of remittances, especially in comparison with the Official Development Assistance (ODA) in selected South Asian countries.

It appears that remittance transfers contribute to the increase of GDP per capita in South Asian countries and beat the ODA both in absolute values and in the effectiveness.

The results of the empirical model that employs seemingly unrelated regressions demonstrate the importance of remittances over ODA, and support the implementation of targeted development policies devised by the West in order to support efficient remittance transfers which represent one of the best ways how to promote development and growth in less-developed economies.

Keywords: remittance transfers, economic development, Official Development Assistance, seemingly unrelated regressions, international economics.

JEL Classification: F22, J61, O55, P45

1. Introduction

The main purpose of Official Development Assistance was to fight poverty and enhance economic development in the Third World. However, the effectiveness of ODA for the last five decades, particularly in the least-developed countries (LDCs), is unsatisfactory (see e.g. Charron, 2011). This is reinforced by the low market dynamics in emerging economies (see e.g. Karadagli and Omay, 2012) and the negative impact on environment due to the poor environmental standards and the pursue of rapid capital accumulation neglecting the environmental concerns (see e.g. De Santis, 2012).

For instance, the success of poverty alleviation at the global level as the most important goal of development interventions is, above all, based on the rapid long-term economic growth in China and India in the last few decades, as well as the implementation of other quantitative targets within the framework of the Millennium Development Goals (Cuong, 2011). The global measures are not very useful in this context simply because of the significance of China and India in these figures (Collier, 2007; Posso, 2012). It might be that several developed countries are beginning to re-think their emphasis on poverty alleviation as a primary development strategy.

De Haas (2012) shows in his paper that remittances beat ODA in terms of amounts that are transferred to low-income and middle-income countries. According to the World Bank (2012) from 55 billion USD in 1990, the ODA decreased to 50 billion USD in 2000 and reached 100 billion USD in 2008, while at the same time remittances to low and middle-income countries constituted a mere half of ODA in 1990 (23 billion USD), reached 60 billion USD in 2000 and 243 billion USD in 2008 (Figure 1).

Cruz Zuniga (2011) shows that one of the reasons why the remittance transfer peaked was probably due to both the structural increase of South-North and East-West migration over the past twenty years or so, and due to the rapid decrease in the price of financial products (opening and maintaining a bank account, using traveler's cheques, using cheap and sufficient money transfer agencies to send money abroad) and technological progress allowing the use of safer channels for transferring money (Internet and telephone banking).

Recent experience of some EU countries (Germany or Austria) with Turkish workers in the 1960s and 1970s represents a good example of how these trends evolved (Glazar and Strielkowski, 2010).

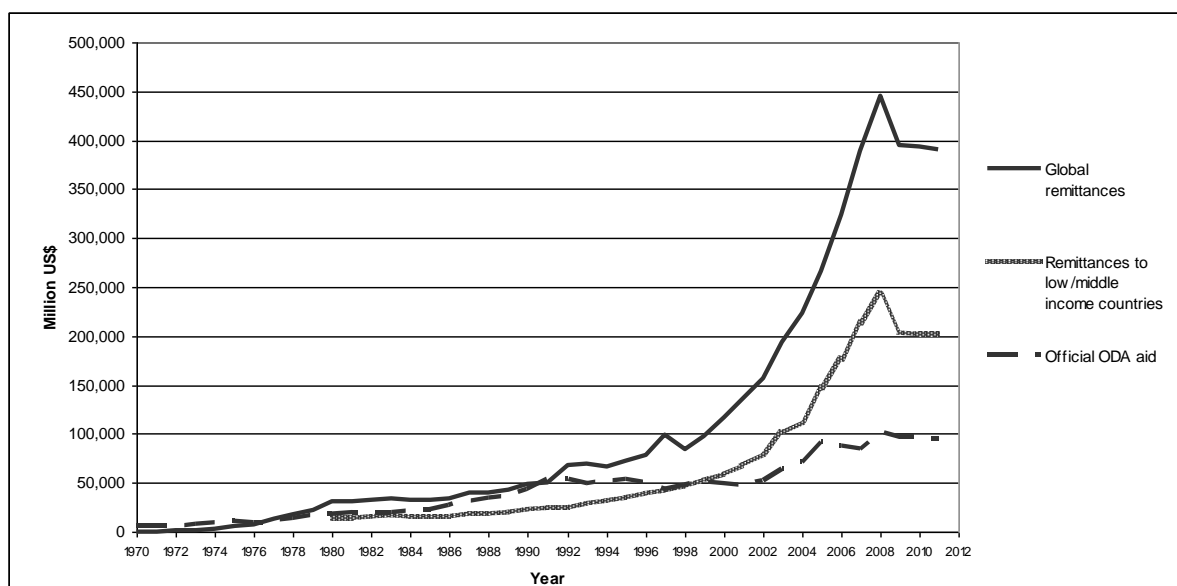


Figure 1: Global remittances and official ODA (1970–2011)
Source: World Development Indicators database, World Bank (2012)

2. Remittances in economic literature

One of the most noticeable effects of migration on the source country is represented by remittances. Remittances that are defined as “*transfers of money (or in kind transfers) that migrants send back to the country of their origin directly to families they left behind*” (IMF, 2008) usually constitute enormous inflows of foreign money for receiving countries. In 2010, remittance flows are estimated to more than USD 440 billion, from which amount USD 325 billion is received by developing countries. As remittances often flow via informal channels (see further in this section), the amount could be much bigger than remittances officially registered. Top recipient countries in 2010 were India, China, Mexico, the Philippines and France. Probably more striking statistics of remittances is their share on GDP, reaching enormous values in developing countries. Top recipients in this category in 2009 were Tajikistan (35%), Tonga (28%), Lesotho (25%), Moldova (31%), and Nepal (23%). Among the countries that are source of remittances there are mainly US, Saudi Arabia, Switzerland and Russia (World Bank, 2011).

Remittances transfers usually take place between family members and close relatives, so the motives behind them are personal and depend on human behavior. One of the motives described in the literature is *pure altruism*. Migrants simply care about their families that are left behind drives flow of money. Economic theory copes with altruistic motives to remit with incorporating the consumption level of remittances as the argument in the utility function of the migrant (Chami *et al.*, 2008). However, the problem is more complex and also other motives stemming from households arrangements that do not have to appear obvious for the “first sight” are probably present as well (Lucas and Stark, 1985).

According to Rapoport and Docquier (2005) and Lucas and Stark (1985), the main motives of remittance behavior might be: exchange, inheritance, pure self-interest, loan (debt) repayment or insurance. In addition, Massey, Durand, Pren (2011) state that, primarily, remittances as an alternative stream of earnings are sent to diversify risk to households’ income.

Bougha-Hagbe (2004) researched motivations of remittance senders in Morocco and found that altruism and the “attachment” to the home country is considered as the main long-run determinants and motives of remittances. The same conclusion was supported by Schioppa and Siegfried (2006) who found that altruism is the main motive for remittances as the GDP differential between source and destination country determines to the amount remitted. The investment motive that is also investigated in the study is not as significant. Remittances of Pakistani migrants are most likely driven by altruistic motives but sometimes co-insurance and investment motive play the role (Anwar and Mughal, 2011).

The motives of migrants to remit funds back home can also affect the relationship of remittances to economic cycle: pure altruistic motive – to help your friends and family – can make remittance flows countercyclical as the amount of money sent is higher in the time of economic slowdown. If the motive is to invest, then the amount is lower under the fear of the unstable economy; hence remittances could be pro-cyclical (Vargas-Silva, 2011).

In searching for determinants of remittances researchers are usually interested in demographic characteristics of migrant and his family and financial information. Carling (2008) provides an overview of main potential determinants: i) personal characteristics of migrants, ii) migrants' incomes (positive or no relationship with remittances), ii) level of education (also might imply possible motive of loan repayment).

From the recipient' side, household income seems to be one of most important determinants of remittances (negative relationship meaning altruistic motive). The fluctuations and volatility of household income (insurance motive) was found as a determinant by Lucas and Stark (1985) during Botswana's drought. The presence of close family in the host country also reduces remittances. Further, the quality of transmitting services, the rural vs. urban status of family or nationality and ethnicity affect remittances in various countries.

Massey, Durand and Pren (2011) found that odds of remitting rise with age, number of minors in household, years of prior experience with migration, physical capital ownership, wages of migrant and odds is higher if migrant is a male, whereas presence of spouse or family in the country of destination lowers odds of remittances. Anwar and Mughal (2011) used similar approach and came to the conclusion that gender of the household head, number of household members, family income, urban and rural settings are strong predictors of remittances, whereas education and wealth of the family are not among significant predictors.

3. The role of remittance transfers in economic development

The development potential of remittances depends on their continuous flow and may be limited by local market imperfections, such as underdeveloped or absent rural credit markets (Posso, 2012). In this case, recipients would be constrained to borrow against remittances or use them as collateral. Inefficient rural credit markets would also hamper the channeling of savings from households with remittances to those desiring to invest them in productive activities (Katseli *et al.*, 2006).

Adams and Page (2005), Ozden and Schiff (2006, 2007) base their studies on macro-data comparison and demonstrate that international migration and remittances significantly reduce the level, depth, and severity of poverty in low-income and middle-income developing countries. A similar increase in per capita official international remittances will lead, on average, to a 3.5 per cent decline in the share of people living in poverty. However, the study also claims that poor people, especially poor people from countries located near major labor-receiving regions, are more likely to remit through informal channels (Adams and Page, 2005).

It becomes apparent that remittances are capable of fostering development. However, it also pays off to look at the linkage between remittances and poverty. For example, Skeldon (2002) shows that this relationship is not as straightforward as one might think. The main issue is that sometimes it is not quite clear what kind of people send remittances to the countries of their origin. In order to answer this question, one should turn to migration literature. The thing is that there is a conventional idea that extremely poor people generally do not migrate (except in the cases of displacement or involuntary migration) because migration always involves some transportation costs and the abandonment of many of the few possessions the poor might have. Nevertheless, Skeldon (2002) points us to the fact that the poorest of the poor cannot afford either risk or movement and the majority move locally and for short periods of time.

4. Empirical model: ODA or remittances?

In order to show the importance of remittances for the economic growth of less-developed countries represented in this study by selected South Asian countries, we employ the econometric techniques used by Boeri and Brücker (2000) and Alvarez-Plata, Brücker and Siliverstovs (2003).

The theoretical framework of the model is based on the assumption that expectations regarding the future income in the target (host) country and source (home) country are formed on the basis of all available information and data. The values of remittances or expected ODA are also projected from these expectations. The differences in the past values of those incomes are creating individuals' expectations about the future possible income. GDP per capita of a country is thus taken as a proxy for individuals' incomes both in source and target countries (the selection of GDP per capita can be justified by limited data sources available for other variables). The average employment rate in both target and source country is taken as a proxy for the labor market conditions. More precisely, individual probability of finding a job and being able to send remittances back home is rising with higher employment and vice-versa. The lagged GDP per capita and ODA stocks serves as a proxy for herding effects.

If economic growth subjected to remittances or ODA is based on expectations about past variables that mean present values are influenced by past values (Hatton, 1995) thus it should be first-order autoregressive process (AR (1)). Therefore, a simple error-correction model can be constructed in the following way:

$$\begin{aligned} \Delta \ln(\text{GDPgr}_t) = & \beta_1 * \Delta \ln(\text{REM}_t) + \beta_2 * \Delta \ln(\text{ODA}_t) + \beta_3 * \Delta \ln(\text{GDPppt}_t) + \beta_4 * \Delta \ln(\text{S}_t) \\ & + \beta_5 * \Delta \ln(\text{O}_t) + \beta_6 * \Delta \ln(\text{Inf}_t) + \varepsilon_t \end{aligned} \quad (1)$$

where:

- GDPgr_t - the economic growth (the logarithm of the growth rate of GDP per capita);
- REM_t - the natural logarithm of remittances as a percentage to GDP;
- ODA_t - the natural logarithm of the net ODA received (in current US\$);
- GDPppt_t - the natural logarithm of GDP per capita (in current US\$);
- S_t - the savings (in current US\$);
- O_t - the natural logarithm of exports plus imports as a percentage of GDP;
- Inf_t - the annual percentage change in the GDP deflator (inflation rate);
- t - the time period.

An error-correction model is a dynamic model in which the movement of the variables in any periods is related to the previous period's gap from long-run equilibrium (for more details see Baltagi, 2005).

Variables enter the equation presented in (1) both as steady levels and as variables' differences. Variables' differences show the short term reaction of migration to these fluctuations, on the other hand the levels of the variables determine the long-run relations between migration stocks and appropriate variables. We test our model using the data obtained from the World Bank database (World Bank, 2011) and covering all specified variables for Bangladesh, India, Nepal and Sri Lanka throughout the period of 1960-2010.

In order to formulate the error correction model shown in equation (1), it has to be proved that all variables have to be cointegrated in order to form a dynamic long-term equilibrium (Johansen, 1991). To achieve that a two-stage cointegration test was performed and it was proved that the available data constitute cointegrated set. This makes it possible to continue with testing the main model without any restrictions.

5. Empirical model estimation

A part of cointegration might involve further restrictions that may cause problems to the regression results. From the assumptions presented here it appeared that the most efficient estimator in this framework was the Seemingly Unrelated Regression (SUR). However, it also appeared relevant to estimate the model using classical panel data Least Squares (PLS) and General method of moments (GMM).

The results of the separate estimations for Bangladesh, India, Nepal and Sri Lanka are shown in Table 1. Estimators rejected the null hypothesis of insignificance of all variables at the 1 % level, with the exception of income differential in PLS that was significant on the 5 % level and insignificant in GMM estimator. The results confirm that SUR estimation is the most powerful one here due to the Hausman test that could not reject the null hypothesis (Hausman, 1978). A short notion should be made on the use of estimators: in our model SUR estimator with the best forecasting performance was applied. This is in accord with the similar studies (see Alvarez-Plata, Brücker and Silverstovs, 2003).

Table 1: Panel data estimation results: Bangladesh, India, Nepal and Sri Lanka (1960-2010)

| | <i>Bangladesh</i> | <i>India</i> | <i>Nepal</i> | <i>Sri Lanka</i> |
|--------------------------|-------------------|--------------|--------------|------------------|
| C | -16.287 *** | -19.768 ** | -5.552 *** | -4.543 ** |
| REM_t | 0.337 * | 0.567 ** | 0.244 * | 0.672 ** |
| ODA_t | 0.323 | - 0.106 | - 0.956 | 0.003 * |
| GDPp_{pt} | 2.578 ** | 4.335 ** | 1.545 ** | 2.889 ** |
| S_t | -0.827 | -0.941 | 0.455 * | -0.528 |
| O_t | .738 *** | 1.226 *** | .635 * | .445 ** |
| Inf_t | -0.158 * | -0.445 * | -0.221 * | -0.556 * |
| R-squared | 0.77 | 0.66 | 0.53 | 0.45 |
| N | 27 | 31 | 16 | 15 |

***, **, * coefficients are significant at 1, 5 and 10 % level, respectively

Source: own calculations

The correlation of error terms across countries that could be caused by common stocks were tested by Wald test that rejected the null hypothesis about the errors being serially uncorrelated against the alternative one that they were correlated. Hence, the common shocks were present in the data. This finding was in line with the expectation that the variables used in the model fit into the global economic framework and therefore were not independent.

The estimated models are based on SUR regression due to the results of Hausman test with fixed cross section effects. The redundancy of fixed effects and presence of random cross section effects were tested for. The Likelihood ratio that uses sum-of-squares (F-statistic) was applied and the statistic value and an appropriate ρ -statistics strictly rejected the null hypothesis of redundancy of fixed effects. Stability of coefficients was also made by using a classical F-test with X^2 distribution.

The main results of the models reported in detail in Table 1 can be summarized as follows:

- In accordance with preliminary expectations remittances have positive and significant impact on economic growth in all 4 countries in question. 1 % increase in the income differentials leads to the 0.3 %, 0.5%, 0.2% and 0.6% increase in economic welfare in Bangladesh, India, Nepal and Sri Lanka, respectively.
- The ODA coefficient in all four countries is positive but insignificant (with an exception of Sri Lanka) and has a negative sign in India.
- GDP per capita has positive and significant signs in all countries leading to the conclusions that the growth in the disposable income and wealth would also likely to increase economic growth and well-being.
- Savings are negative and insignificant with an exception of Nepal (the coefficient is positive and the variable is significant).
- Openness of the economy (sum of exports and imports) is positive and significant in all four countries in question (with the highest coefficient for India) leading us to the conclusion that openness to international trade would increase economic well-being.
- Inflation came through as negative and significant in all four cases.

Overall, it can be stated that the results of our empirical model show that remittances appear to be a more significant and decisive tool for increasing economic growth and well-being in developing economies represented here by Bangladesh, India, Nepal and Sri Lanka. All four economies (except, perhaps, with the exception of Sri Lanka) would be better off if remittances were to take place of international development aid.

In addition, the model suggests that openness to the international trade and orientation of the economy on exports and imports might also contribute to the economic well-being constitutes one of the main pillars of the development in the Third World.

6. Conclusions

This paper demonstrates that remittances might have a higher development potential than ODA. This happens not only due to the fact that remittances beat ODA in absolute values but also because remittance transfers are more effective. Administrative and other related costs deplete about 50 per cent of ODA while remittances are fully absorbed and properly used. Remittances might also represent a more stable and reliable source of income than ODA.

The empirical model presented in this work based on seemingly unrelated regressions that use the data for selected South Asian countries supports the evidence from migration and remittances literature and shows that remittances have a larger net effect on economic growth expressed as the annual growth of GDP per capita. Our model reveals some general trends that are worth taking into account when comparing the effects of remittances and ODA in LDCs. Surely, ones should not underestimate the importance of ODA the crucial role of international organizations in bringing aid to the people in need. However, it might be useful for the policy-makers and stakeholders in the Western countries to realize that there are other possibilities for development in LDCs that might be more useful and effective.

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