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METHOD TIME DRIVEN ACTIVITY BASED COSTING – LITERATURE REVIEW

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Abstract:

This article presents a literature review of the method Time Driven Activity Based Costing, like an instrument to better assignment of costs to activities and their comparison with antecedent method Activity Based Costing. Paper shows the implementation of this method in the condition of manufacturing corporations, distribution centres, agriculture, but also in the field of services, especially in the hospitality. The article is trying to point out the benefits of this method for whole range of companies without difference to branch classification, determine base presumptions for implementation, but also disclose some drawbacks in the application of this new method in the practice with help of case studies, which have been published until this time. The aim of paper is to find out the base principles of method Time Driven Activity Based Costing in its right application.

Keywords: Activity Based Costing, Time Driven Activity Based Costing, time equations, customer profitability analysis, costs of processes

JEL Classification: L60, M10

1. Introduction

In contemporary high global competitive environment the knowledge of company's costs is a major driver of competitive advantage. Emphasis is putting to company's financial performance, quality of process ordering and innovation potential. Without detail understanding of true costs of services, manufacturing, delivery of products, the organizations will hardly survive in this competitive environment. The organizations must try to grasp, which customers are profitable and which are not and obtain valuable information that will be used to create successful managerial decisions and reach operational improvements. In order, Kaplan and Naraynan (2001) talk about increasing size of firms and organizational complexity, particularly in the area of services, it is necessary to understand customer profitability analysis (CPA). CPA enables to assign costs and obtain revenues to major customers or groups of customers rather than to organizational units, products or other objects. It is an application of segmented reporting in which a customer group is treated like a segment. Moreover, Cotton (2005) affirms that the efficient using of CPA enables firms to increase the customer satisfaction and increase their profitability.

Nevertheless, it is necessary to use proper cost system by using effectible cost techniques when one wants to receive accurate information about its customers and activities. However, the cost system used in many organizations is not assigned to activities. Contemporary calculation methods and formulas lack the ability to determine, how the processes, products and customers segments consume the sources and generating the revenues. As in the literature, Christopher (1998) sees the problems with traditional costs techniques in connection with a lack of understanding of types of customers, in the field of market segment; the costs are recorded in the high level of accumulation, the traditional system is functional in its orientation, but not in the output. This can lead to poor management decision making and misleading information. This weak point could be solved in the form of cost methods Activity Based Costing and their new version Time Driven Activity Based Costing. While Activity Based Costing found an application in practice itself, Time Driven Activity Based Costing has to seek the way to be used as a common method in the business practice. The main goal of article is to present TDABC like the instrument to evaluate costs of company's processes and identify the profitability group of customers.

2. Methods Activity Based Costing and Time Driven Activity Based Costing and their character

2.1. Method Activity Based Costing (ABC)

The method ABC was presented for manufacturing corporations in the half of 80's of the twentieth century in the USA. In fact, it was the reply to inaccurate American accounting standards. Kuchta and Troska (2007) maintained that ABC is a proper method for shaping of customers profitability. ABC also contributes to identify activities which produce the value and which do not. Although, it was argued that the information from ABC could boost up strategic and operational decisions. In order, Cooper and Kaplan (1992) claim that it still exists an empirical reason why the acceptance of this method has a big influence on the organization's performance. In addition Bogdanoiu (2009) claims ABC models the causal relationships between products and the resources used in their production and traces the cost of products according to the activities through the use of appropriate cost drivers.

ABC is proceeding in the two phases. Firstly, the costs of sources are assigned to activities by using cost factors. Then the costs of activities are divided to cost objects by measuring quantity and related cost drivers, which means that costs of activities are allocated to costs objects, which are based on the relevant cost factors (for instance the number of settings, number of customers visits). The method ABC uses causal relationship between costs objects and activities and between activities and sources.

According to Macurová (2009) the method ABC works with real costs and real occurrence of factors. The understanding of hierarchal level of costs enables a manager to recognize the costs reasons and then making better decisions and design better supply chain networks.

Method ABC assigns in good way the costs to particular activities, but on the other hand the application of method is linked with some problems. Particularly the upgrade of system is very time consuming, because for every variation of process separated activity is needed. ABC also used only one cost driver, worked with an average rate of costs to one occurrence of cost driver and high sophistication.

2.2. Method Time Driven Activity Based Costing (TDABC)

To overcome the difficulties inherent in traditional ABC, authors (Kaplan and Anderson 2004) presented a new method the Time Driven Activity Based Costing. This method was presented as a revolutionary method in the field of determined costs. On the other hand, (Adkins 2008) claimed that it is nothing new, but it is only an update of a traditional method ABC. Considering the assignment of sources to activities, a new version of ABC used time equations. The principle of this method is based on the transformation of cost drivers to time equation that express the time needed for performing of the activity as the function of sometime drivers. The characteristics are called 'time drivers', because they preside the consumption time of activity. But, Adkins (2008) proclaims, that any estimation process is prone to error. A one minute flaw in a time estimate multiplied by thousands of transaction can greatly skew results. In fact, such modest estimation error could possibly be greater than it would be under traditional method ABC. When multiplying the time needed for performing of the activity per unit of source, we could calculate the costs of individual activity and transaction. The required time for performing the activity is an estimate for every specific case. The time equations are modelling how time drivers managed the time that is consumed by activity. This way we could calculate an unlimited numbers of drivers. The time equations could cover up complication structure of activities. Having used TDABC, we could emphasize the cost of sub-tasks. The method needs to make an analysis of content of all activities in application. We must define all possible variations of running activities and their time factors. Thus we could estimate and determine the consumption of one factor from the computer's evidence by Enterprise Resource Planning (ERP) and Customer Relationship Management (CRM) or by time measuring. But in order, (Adkins 2008) suggests that only certain vendors can do TD-ABC. Several major costing software vendors can calculate costs through multiple assignment methods, which can either push costs based on collected driver quantities or pull through a cost model based on equations that reference automatically updated. Users have the option to choose method for different parts of their model.

- Application of method TD-ABC has the following steps according to (Brugemann 2005):
- A. Assessment the costs by particular spent sources on the one available capacity.
 1. Identification the group of sources, which have performed the activities.
 2. Estimation of costs on every group of sources.
 3. Estimation of practical time capacity of each group of sources.
 4. Calculation costs the group of sources by dividing total costs group of sources by their available capacity.
 - B. Assessment of time, which is needed for required variation of running activity.
 1. Identification of factors, which had influence on the time period of appropriate activity (time driver), when we determine the factors for every real variation of activity.
 2. Creation time equation, which express the dependence the time running of activity on all factors with next recognizing the values of factors and calculation total consumption of time for every concrete variation of activity.
 - C. Multiply the unit costs of particular sources by total consumption time of concrete variation of running process and summarizing the costs for every consumption sources.

The method TDABC has many advantages in comparison with traditional accounting techniques or with the antecedent method ABC. The method assigns the overhead costs only into the one time equations, which encompass all special aspects of choose activity in the firm's database of activities. TDABC allocates in better and fairly way the costs to the appropriate activity, customer, region or product. TDABC discovers the possibility of unused capacity, enables operational improvements, respects interaction between time drivers, detects the process without value in the way of trace of costs and changes in production, loading, delivering, storing etc. TDABC is good tool for design of new competitive strategy of supply chain not only with other members of chain, but also between particular company's divisions and as the instrument to identify the profitability of company's customers and new market opportunities.

2.3. Mathematical model used by TDABC

The whole model is built on the time equations. The mathematical formula depends on the characteristic of that specific activity in organizations.

$$\text{Cost of event E of activity A} = t_{A,E} * c_i \quad (1)$$

c_i – cost per time unit of resources
 $t_{E,A}$ – time consumed by event E of activity A

Source: (Brugemann 2005)

By using time equations, time consumed by event E of activity A can be expressed like a function of different characteristics, so called time drivers.

General time equation needed for event E of activity A with p possible time drivers X:

$$t_{E,A} = \beta_0 + \beta_1 * X_1 + \beta_2 * X_2 + \beta_3 * X_3 + \dots + \beta_p * X_p \quad (2)$$

$t_{E,A}$ – Time required to perform event E of activity A
 β_0 – Constant amount of time for activity A
 β_1 – Time consumption for one unit of time driver X_1
 X_1 – Time driver 1, X_2 - Time driver 2, X_p - Time driver p
 p – Number of time drivers that determine the time needed to perform activity A

Source: (Brugemann 2005), amended

2.4. Comparison of methods ABC and TDABC

We are not able to assert, which cost method is better, because it depends on the actual condition in the firm, legislation in the particular country, type of company, product, entrepreneurial environment. TDABC is building on the weaknesses of traditional ABC. The main differences are not only in the approach to state the costs of the activity, when TDABC is using time drivers, whereas traditional ABC used only one cost drivers, but also in the ability to identify an unused capacity (ABC is not able to identify unused capacity).

Traditional method ABC is more time consuming to update the system for new conditions in company's practice. TDABC is able to encompass all special aspects of particular activity into the one time equation and needs smaller requirements to accounting system.

However, TDABC is also under critique. TDABC is no suitable for actions demanding forethought and creative thinking. Also the accurate assessment of time consumption of activities is forceless property and in many cases, the estimation of time is based on the subjective judgment. In the Table 1 are summarized all main aspects of both methods in the mutual comparison.

Table 1. Comparison of methods ABC and TDABC in chosen aspects

View point of comparison	Method ABC	Method TDABC
Character of factors for assign of costs.	Cost drivers The method works with number of occurrence of factors (for example the number of set up).	Time drivers The method works with time of operating period, which resulting from incidence of factors (for example the time needed for set up).
The number of factors for assign of costs.	By every activity we can use only one factor.	By every activity the numbers of factors are unbounded. They indwell the relationship between factors and these relationships are respected.
The accuracy of method.	The method doesn't capture the specification of activity, which influenced the costs.	The method captures the assign of costs to activities in suitable way. The accuracy is better than by the method ABC.
Extensiveness of system for assign of costs.	Every difference in the fulfilment of the activity needed implementation of new separated activity.	For every activity we needed only one time equation, which captured all specification and variation of activity.
Time consumption for update of system.	System is high elaborateness in actualization of costs rates.	Relatively smaller elaborateness than method ABC, because the costs rates are set up per time unit.
The ability to captured unused capacity	No	Yes

Source: (Macurová 2003)

3. Summary findings about practical application of method TDABC

Meanwhile, consciousness about the method Time Driven Activity Based Costing is not extended in the practical area so much. The results of actual published application of Time Driven Activity Based Costing display that benefits of this method for fair assigning of costs could be very important. Not only TDABC helps in the design of new accounting and information system and better profitability, but also in all-day corporate function. In the Table 2 is summarized list of particular case studies with considering to the method TDABC.

Table 2. List of practical case studies

	Source	The section of application	Purpose of case study
1	Brugemann, Everaert, Anderson, Levant (2005)	Nameless distribution company in Belgium.	Improving the profitability of company – understanding of customer’s profitability. Comparison the costs allocation accuracy with ABC.
2	Dalci, Veyis, Kosan (2010)	Hospitality, Hotel in city Mersin, Turkey.	Understanding customer profitability analysis. Using TDABC in area of service organization.
3	Bryon, Everaert, Lauwers, Van Meensel (2009)	Agriculture, private farm, pig production, Belgium.	Appling the four- week batch farrowing system in comparison with the weekly farrowing with application of TDABC.
4	Demeere, Stouthuysen, Roodhooft (2009)	Outpatient clinic, medical sector. London hospital, Great Britain.	Improving medical service of hospital. Better supply chain in hospital.
5	Kaplan, Anderson (2004)	Dairy works, Kemps LLC, USA.	Improving sales system.
6	Hoozée, Brugemann (2010)	Belgian warehouses of nameless company.	How leadership, motivation, cognitive factors influenced application of TDABC and setting of time equations.

Source: Own elaboration

In the next section all findings of particular case studies will be analyzed with rough description of economic situation before application of method Time Driven Activity Based Costing into the firm’s practice.

3.2. Results and discussion in application of method TDABC in practice

1. Modelling logistics costs using TDABC

From application of case study of authors (Brugemann, Everaert, Anderson, Levant 2005), who wanted to explore method TDABC in the practice, exactly in the conditions of distribution organization resulted, that method, is also applicable in the service companies, because primarily the method TDABC is addressed to manufacturing companies. The nameless Belgian distribution organization was under big competitive pressure, with range scope of costumers, products and order lines. The management of firm wanted to improve profitability of company and compare method TDABC with traditional method ABC. The results were clear. The management of firm understood who is profitable and who is not considering assigning of costs by method TDABC and streamlining the planning of deliveries. Brugemann *et al.* proclaimed that TDABC is less exacting for update of data for calculation than traditional method ABC. TDABC is able to captures all difficulties of activities, strong diversity in resources consumptions by the various customers, orders, routes, that could be not capture by traditional method ABC. TDABC in nameless distribution firm confirmed next literature assumption, TDABC understand the interactions between activities and every activity in the firm’s database has own time drivers.

2. Customer profitability analysis with TDABC in hotel

The main assets from case study of Turkish authors (Dalci, Veyis, Kosan 2010) influenced from application of method TDABC in the unconventional business area, in the form of hospitality. Authors confirmed the range scope of application of method TDABC also in the service area. In the hotel was already used method ABC and authors focused to financial results, if managers decided to use new method TDABC. TDABC in the case study allow managers to design better cost system of theirs business activities with focused on the weak areas of their entrepreneurship and TDABC recognized that every customer’s group in hotel was profitable from aside to type of customers. In the case of used traditional method ABC, some groups of costumers were unprofitable. TDABC assigned costs to

groups in better and fair way than ABC. Next benefit, TDABC was able to identify unused capacity of personnel and on the base of stated results were design better recruitment and education systems of new employees and new marketing mix.

3. Time Driven activity Based Costing for supporting sustainability decisions in pig production

Belgian authors from university in Ghent (Bryon, Everaert, Lauwers, Van Meensel 2009) also decided to applied method in the agriculture. Method was tested in the conditions of one private farm in Belgium with production of pigs. The method TDABC was used like financial measure in the comparison of traditional system of farrowing with new approach of four-week farrowing. Experiences from this case study showed that TDABC could be used for decision problem of switching to batch farrowing. TDABC has shown like suitable measure for design a new approach (four week farrowing) to breeding of pigs. TDABC was able to decrease the labour of workers, which is needed for farming and common run of farm. TDABC assigned the costs to activities by better and fair way. The results were clear: decreased costs of labour, decreased costs of materials and better environments for pigs.

4. TDABC in an outpatient clinic environment: development, relevance and managerial impact

Next interesting case study was implemented in the one London hospital. The authors (Demeere, Stouthuysen, Roodhooft 2009) of this case study required to test method TDABC in the conditions of hospital environment. The management of this hospital was under pressure, because some detachment of clinic was forfeit. TDABC has shown like suitable cost system for clinic. The adaptability of this system was faster than traditional method ABC, the set up of method was simpler and TDABC has higher reflection of the complexity of the real world operations. In the Table 3 is described the particular steps of application in the clinic.

Table 3. Steps of application method TDABC in the clinic

Steps	Activity
1	Identify the various resource groups (departments)
2	Estimate the total cost of each resource group
3	Estimate the practical capacity of each resource group (e.g. available working hours)
4	Calculate the unit cost of each resource group by dividing the total cost of the resource group by the practical capacity
5	Determine the time estimation for each event, based upon the time equation for the activity and the characteristics of the event
6	Multiply the unit cost of each resource group by the time estimate for the event.

Source: Everaert *et al.* (2008).

Method TDABC identified and analyzed activities that drove the overhead costs. Needless activities were reduced and it was set up a new system with better communication between particular departments, secretaries were centralized to one place, telephone accessibility was improved through head-sets and voice recognition and management started frequently viewed interaction between accounting system of clinic with strategy. TDABC information clearly improved the communication system of clinic, increased the care of patient, and increased the value and effectiveness of clinic and better planning of suppliers and reserves in warehouse of hospital.

5. Strategic change at Kemps LLC

American authors (Kaplan, Anderson 2004) accomplished case study in full-line dairy company Kemps LLC in Minneapolis. The management of firm skirmished with problems of high competitive environment and decreased revenues of products. The direction of firms decided to applied new method TDABC. TDABC identified the main activities of company, packing (full stacks of six cases, individual cases), loading, routing, stocking, delivering (commercial carriers, own fleet) and method captured differences between system of accepted order to system (customer phone call, salesperson, fax, EDI, internet) and time spent by each driver to location.

Method TDABC helped to understand management of Kemps LLC to recognize the lost customers, disclosed the saves in daily operation and changed the price policy of firm. TDABC facilitated to identify who is profitable customer and who not and transformed these unprofitable customers into a profitable. Method design the new system of deliveries of product and made easy and fair relationship between Kemps LLC and suppliers and customers.

6. Identifying operational improvements during the design process of TDABC system: The role of collective worker participation and leadership style

The last case study, which interested in application of method Time Driven Activity Based Costing into the practice originated from Belgian authors (Hoozée, Brugemann 2010). In their case study is presented employee participation and leadership style like important instrument to successful implementation of method TDABC to company's common activities. The method was tested in nameless Belgian distribution centre, in the warehouses of this distribution centre. Authors focused to role of group discussions, attitude, ideas and leadership of managers of these warehouses to implementation of method TDABC in practice. More specifically, authors tell, that for operational improvements to materialize, the group discussion playing very important role, especially if discussion is convey by leader with appropriate management style. The participations could propose new ideas, improvements, requests and they can reach required aim. When the group discussion are dominated by an autocratic leader, operational improvements are in danger and TDABC like new system in business operation could be accept by workers as taint and not like a pony instrument for their daily work. In the cooperation with leadership style, which is an additional influencing factor in designing an accounting information system in which workers participate collectively, the managers with positively attitude to novelties and with more friendly-workers leadership have obliging access to implementation of method TDABC in theirs warehouses. In this case study we can talk about synergic effect of relationship between leadership and group discussion, because the suitable combination of these factors could carry positive ideas for next develop in practice.

4. Conclusion

The article is trying to give comprehensive picture about method Time Driven Activity Based Costing like suitable instrument for assignment of costs to firm's activities. It would be a mistake to comprehend method TDABC like multi-purpose instrument to solve every problems of assignment of costs to processes, customers, products, supply chains and routes. With respect to the ABC literature, the article presents the collection of all substantial knowledge from case studies and points attention on the pitfalls, which are linked with application of method in the different types of institutions.

The method Time Driven Activity Based Costing in the comparison with traditional method Activity Based Costing assigns the costs to activities by time drivers. These time drivers are insert in the time equations, which capture all differences of given activities. Method Time Driven Activity Based Costing is able to identify unused capacity of workers and these results could be used in the design of new recruitment system, workout, education or lead to the transfer of employee between particular departments.

The method is not so much demanding to update in comparison with traditional method Activity Based Costing, because we do not have to make next activity, if some change in the activity occurred, like in the method ABC. On the other hand TDABC is based on the presumption of estimated time. This is a weak point of method, because without ERP systems like SAP or ORACLE we are bequest to estimation or interviews with employees, which have subjective overtones. Then, if the wrong

assign of costs to products, customers groups or processes happened, it could result to the ‘domino effect’ of pitfalls.

TDABC is able to identify which customers are profitable and which are not, which has an impact on the negotiations with highly loss-making customers, changes the conditions (presentation of minimal order, maximal rebate policy) with these business partners. It also reflects in dealings with company suppliers in which can achieve the balance and a fair relationship among all members of the supply chain (win to win).

TDABC is suitable instrument to achieve operational improvements in practice, reduced useless activities and merge similar activities into to the one place. Although the application of method TDABC in practice is considered like target-setting process, it could be influenced by many factors, like group discussion, motivation, participation or leadership.

Finally it can be suggested that there are some potential areas for further researches. It would be useful to test methods in the public service, because the acts of clerks could comprehend like services or products and citizens like customers of particular municipality. Secondly, it would be valuable to study the relationship between leadership of managers and application of method Time Driven Activity Based Costing in practice with possible synergic effects. Thirdly try to prove the relationship between method TDABC and particular supply system in practice. And finally, it would be worthy to implement some surveys of method in the legislative and business environments in the countries of middle, east and south-east Europe.

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A QUALITATIVE ANALYSIS OF GREEK INNOVATION ACTIVITIES

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Abstract

This paper analyses the framework, the obstacles, the determinant factors and furthermore the role of female in the Greek entrepreneurship. Apart of presenting the empirical results relying on the analysis of the data collected by the survey we performed to the Greek enterprises, we use the collected variables in an econometric formulation adopting the logistic regression. So we are extracting the associated probabilities (Relative Risks) for implementing innovations. Specifically we find that the odds of implementing innovations are much higher for firms having an increase of more than 10% of its turnover and for firms having exportations and higher for firms having a higher average life of product as well as a high percentage of female workers.

Keywords: entrepreneurship, competitiveness, product-process innovation, risk

JEL Classification: C10, L26, O31, O32

1. Introduction

Innovation refers to a new or significantly improved product (good or service) introduced to the market. Innovations rely on the results of new technological developments, new combinations of existing technologies and production methods or the utilisation of other knowledge acquired by the firm during its operation. Specifically product innovation may take place with respect to its fundamental characteristics, its technical specifications, potential uses, or user friendliness. Innovation may also refer to the introduction within a firm of a new or significantly improved process. A process innovation includes new and substantially improved production technology, better and easier methods of supplying services and of delivering products.

The target of this paper is to analyse the framework, the obstacles, and the determinant factors and furthermore the role of female entrepreneurship in the Greek firms, under the Generalized Linear Models statistical framework. We rely on the results of a research project on women in innovation, technology and science, based on 372 questionnaires selected in a three years' time period 2004-2006. Concerning female participation in innovations a number of variables are used. Specifically, the total number of women employees by age, by education level, by firm size and by sector, as well as women in product and in process innovations, their position in the firm (owner, manager) and finally equality in job enrichment, in salary, in education–training and in promotion.

The structure of the paper is the following. Section 2 reviews the existing literature and Section 3 provides the theoretical background of the logit model, while Section 4 presents an empirical application in the case of innovation activities in Greece. In particular this section discusses the data used, the basic descriptive empirical findings and the results derived using a logistic regression formulation. Finally, Section 5 concludes the paper.

2. Literature Review

The emphasis in the existing literature is mainly on an increasing relevance of knowledge and innovation as an input to production and innovative processes (OECD 2001). OECD clarifies the terms used in describing the 'New Economy'. The increasing contribution of high-tech sectors (computers, electronics and aerospace) to GNP and employment as well as the recognition of the role of knowledge and technology in economic growth has led to the establishment of the term 'knowledge-based economy' (OECD 1996, 9).

In innovation management, the first explicit theory is the ‘technology push theory or engineering theory of innovation’, where basic research and industrial R&D are the sources of new or improved products and processes. The production and uptake of research follows a linear sequence from the research to the definition of a product and specifications of production. Alternatively and in the 1960s, the ‘market pull theory of innovation’ gave a central role to research as a source of knowledge to develop or improve products and processes.

The latter theory recognizes for the first time the organisational factors as contributors in innovation theory. Technical feasibility was still considered as necessary condition for innovation but no longer sufficient for successful innovation (Schmookler 1996, Myers and Marquis 1969). Here is where a new generation called the ‘chain-link theories’ of innovation emerged in order to explain that linkages between knowledge and market are not as automatic as assumed in the technology push and the market pull theories of innovation (Von Hippel 1994).

At the end of the 1980s and during the 1990s, a technological networks theory of innovation management was developed by a new group of experts as ‘systems of innovation’. According to Nelson (1993) and OECD (1999) this view emphasizes the significance of external to the firm information sources such as clients, suppliers, consultants, government laboratories and agencies etc. Finally, ‘the social network theory’ of innovation management may be considered which states that knowledge is crucial in facilitating innovation. According to Foray (2000) the increasing and steadily growing significance of knowledge as a production factor and as a determinant of innovation is explained by the continuous and rapid accumulation of technical knowledge through time, as well as by the use of communications technologies that facilitates this knowledge making it available instantly worldwide.

Michailova and Melnykovska (2009) discuss and emphasize the role of women political, economic, and social activity for lower corruption levels in transition economies. Similarly, Yordanova and Davidkov (2009) examine similarities and differences between Bulgarian female and male entrepreneurs in terms of personal characteristics, as well as characteristics of their environmental context in which they operate. They find differences in entrepreneurship similar to those reported in the literature in Western countries (Greene *et al.* 2003, Ahl 2002, Carter *et al.* 2001, Brush 1992). The authors propose, as suggested by Welter *et al.* (2006), that improvement of institutional environment and administrative capacity to cope with new and small firms will help both female and male entrepreneurship. They emphasize the need for special programs and policy initiatives as well as the improvement of social services to allow female entrepreneurs to combine family and business responsibilities, in order to make start-up resources more accessible for entrepreneurs. They also claim that more attention has to be paid in developing education and training initiatives for female entrepreneurs in order to help them improving their management skills.

3. The background of the binary regression

Let us now turn to the presentation of the proposed model. Consider a subject with attributes given by the covariate or input vector $X = (X_1, X_2, \dots, X_p)^t$. Then risk analysis, strongly related with the Binary Regression Analysis, concentrates interest on the parameter $p(x)$, i.e. the probability that this subject has a certain characteristic C , given that $X=x$. Therefore to estimate the proportional odds, known also as odds ratio, $p(x)/(1-p(x))$, the logit model has been suggested, since the pioneering paper of Berkson (1944). That is the log odds have been assumed linear i.e.

$$\log\{ p(x)/(1-p(x))\} = x^t\beta \quad (1)$$

with β being an appropriate vector of regression parameters. In principle a constant term is always assumed, i.e. $x^t\beta = \beta_0 + \beta_1x_1 + \dots + \beta_px_p$.

Then, from (1), considering the cumulative distribution function of the logistic distribution function, say, $\text{Logit}(z) = z/(1+e^z)$ we evaluate that

$$p(x) = \text{Logit}^{-1}(x^t\beta) \quad (2)$$

A very similar approach has been adopted by Bliss (1935) in his pioneering paper of Risk Analysis, where he considered the cumulative distribution function of the standard normal distribution

$$\varphi(t), \text{ say Normal}(z) = \int_{-\infty}^z \varphi(t)dt, \text{ and he let } p(x) = \text{Normal}^{-1}(x^t\beta) \quad (3)$$

This method is known as probit analysis, and it has been pointed out that, for values of $p = p(x)$ within $[0.2, 0.8]$, both methods are very close. Various extensions have been discussed by Aranda-Ordaz (1981), Taylor (1988), among others, and are usually related to the survival analysis (see Cox 1972, Kalbfleisch 1978, Mc Cullagh, and Nedler 1983), while an affine transformation of the logit model has extensively discussed by Kitsos (2007). We strongly believe that the risk theory, associated with the binary regression analysis, offers enough evidence on evaluating the economical risk to various real life problems, as it is discussed in the next session.

In principle a general binary regression model is considered in the form

$$F^{-1}(p(x)) = x^t\beta \text{ equivalent to } p(x) = F(x^t\beta) \quad (4)$$

for a given continuous cumulative distribution function (Halkos 2011).

If we assume that with the covariate $x_i, i=1,2,\dots,p$ are associated with n_i persons, then the maximum likelihood estimator (MLE) of β , say b , provides linear predictors x through the estimated probabilities $\pi_i, i=1,2,\dots,p$. Then we can evaluate the estimated expected information matrix $I(b)$, which, for the design matrix $D=(x_{ij})_{i=1,2,\dots,p, j=1,2,\dots,n}$ equals to

$$I(b) = D^tWD, \text{ with } W=\text{diag}(w_{ii}), w_{ii} = n_i\pi_i(1-\pi_i), i = 1,2,\dots,p \quad (5)$$

The variances can be evaluated, following Rao-Blackwell theorem, and approximated confidence intervals can be constructed.

Thus for the log-likelihood ratio statistic $\log L$ the deviance (Dev) is defined as $Dev = 2 \log L = 2 [l(b_{MLE}; Y) - l(b; Y)]$ and that $Dev \sim \chi^2_{n-p}$. Therefore, as the expected value of a chi-square is its degrees of freedom, in this case $n-p$, we can expect Dev to be close to $n-p$, when a good fit/description/presentation of the data by the model occurs.

The regression coefficients β 's of the proposed logistic model quantifies the relationship of the independent variables to the dependent variable involving the parameter called the *Odds Ratio* (OR). As odds for the event C we define the ratio of the probability that implementation will take place divided by the probability that implementation will not take place, recall (1).

Notice that (2) is linear not only for the coefficients, but for the input variables as well, with no cross terms. A typical case is the simple linear logit model. To choose $\text{logit}[P(Y=1)] = m_0 + m_1x + m_2x^2$ is quite different. If m_2 is essentially different than zero, the question is how 'robust' is the linear model. We shall avoid such limitations, and we shall restrict to linear model approximation of the logit transformation, for both the parameters and the input variables.

Now, let us focus on another useful issue. It is known that the percentile point L_p , for the cumulative distribution function $F(x)$ is defined as $F(L_p)=p$. Therefore for the simple logistic model

$$M = -\frac{\beta_0}{\beta_1} \text{ the median } M = L_{0.5} \text{ satisfies } 0.5 = [1 + \exp(-(\beta_0 + \beta_1 M))]^{-1}, \text{ therefore } \beta_1. \text{ In economic analysis the median } M, \text{ although a biased estimator, is sometimes, more useful than the unbiased mean, as it offers a better measure of the location.}$$

Median, even under the minimax criterion, is not selected compared to the mean. But as it remains invariant if the 'end-points' it can be proved a better location measure in many cases of economic data analysis. A typical χ^2 test of the null hypothesis $H_0: OR=1$ vs $H_1: OR \neq 1$ is identical to a test of the equality of the two proportions having or not having the characteristic C, i.e. $H_0: P_0 = P_1$ vs

$H_1: P_0 \neq P_1$. It is worth mentioning that odds ratio can be biased due to population heterogeneity caused by confounding factors associated with the response.

In the typical case, with the dichotomous variable $X=1$ for the high risk (characteristic C) and $X=0$ for the low-Risk (non-C), then $OR = \exp(\beta_1) = RR \cong \exp(\hat{\beta}_1)$. This compact discussion on the logit model is applied in the sequence to estimate the Relative Risk of the involved variables offering the appropriate interpretation of the Product and Process Innovation in Greece.

4. The greek innovation activities

To estimate the relative risk of a number of interesting variables involved in our study, the logit model as described above is used after discussing the innovation activities in Greece, due to a survey performed in the Greek firms.

4.1. Data

The target population of the survey was the total population of 63.000 firms, included in the database of ICAP SA (the largest Business Information and Consulting firm in Greece). The constructed questionnaire was based on the Community Innovation Survey (CIS) while the methodological basis of this survey is provided by the 'Oslo manual', a joint publication of Eurostat and OECD. The selection of the sample was based on proportional stratified random sampling. The analysis was focused mainly on the small and medium-sized manufacturing enterprises and on services enterprises employing 20 or more employees. To avoid any bias resulting from response behaviour, a non-response analysis followed up.

The main statistical unit for the survey was the enterprise. In general, innovation activities and decisions usually take place at the enterprise level, which leads to the enterprise being used as the statistical unit. The following industries were included in the core target population: NACE 15-37, 40-41, 45, 50-52, 55, 60-67, 71-73, 74.1-74.5. Following the European classification, the size-classes used were 20-49, 50-249 and 250+ employees. The time period covered by the survey was 2004-2006 inclusive. The reference period of the survey was the year 2006.

4.2. Empirical findings

In collecting primary data, we have used a questionnaire to several sectors in Greek enterprises. The dataset was collected from 372 Greek enterprises from the sectors referred above and several areas-prefectures of the country. From the data collected it can be seen that the R&D activities are mainly related to big firms.

The share of innovative enterprises in the service industry increased significantly from 11.1% in 2004 to 15.5% in 2005 and the 31.9% in 2006. The analysis of data from Greece and other European countries reveals that the development of innovations does not require the development of R&D activities within the enterprise. In Greece, 59.7% in 2004, 62.3% in 2005 and 64.7% in 2006 of the innovative manufacturing enterprises carry out R&D. In the service sector, the percentage is much lower. Specifically, 8.3% in 2004, 13% in 2005 and 16.1% in 2006 of the innovative enterprises with 10 or more employees carry out R&D.

Education is the main source for innovation activities in Greek enterprises accounting approximately to 48% while the introduction of innovation in the market accounts to approximately 27% and the planning for production-distribution and other activities to 25 % respectively.

The following findings are based on the analysis of the collected 372 questionnaires of our sample survey. Our empirical results concern the total number of women employees by age intervals (namely 20-30, 31-40, 41-50, 51-60 and more than 60), women in product innovation, women in process innovation, position in firm and equality in job enrichment, in salary, in education-training and in promotion. From Table 1 it can be observed:

- A small increase in the percentage of women in the workplace has occurred from 32% in 2004 to almost 37.5% in 2006.
- A small increase in the percentage of women graduates in the workplace has occurred from almost 33% in 2004 to almost 37% in 2006.

- Women employees between 20-30 ages (compared to 31-50 ages) are the majority of the women workforce and a small increase in the percentage has occurred from 59% in 2004 to 61% in 2006.
- The percentage of women as Top Managers remains almost unchanged, from 21% in 2004 to 20% in 2006 while the percentage of women as Managers is increased from 33% in 2004 to 38% in 2006.

Table 1. Women Profile: An overview (in %) for the years 2004-2006

Characteristics	2004	2006	Change (2006-2004)
Percentage of women employees	32,0	37,4	5,4
Percentage of women with a degree	32,8	36,7	3,9
Women by age			
20-30 years	58,8	60,6	1,8
31-40 years	20,7	18,5	-2,2
41-50 years	9,4	9,1	-0,3
51-60 years	2,2	2,2	0,0
>61 years	0,2	0,2	0,0
Position in firm			
Top management (Owner/CEO)	20,7	19,8	-0,9
Manager	33,0	38,0	5,0

Similarly from Table 2 it can be seen that:

- The percentage of women employees in product innovation development is bigger (40%) than the percentage in process innovation development (33%) and the percentage of women as Top Management in product innovation development is bigger (20 %) than the percentage in process innovation development (16%).
- The percentage of women as Managers in product innovation development is far smaller (29%) than the percentage in process innovation development (45%).

From Table 3 it can be seen that the percentage of the firms with innovation activities, concerning all the four variables of gender equality in the workplace (job enrichment, salary, training and promotion), appears to be smaller than the percentage in the total of the firms of the sample. For example, job enrichment appears to be around 37% in product innovation and 26% in process innovation compared to 71% of the total of firms (with and without innovation activities).

Table 4 presents the percentages of the sampled enterprises with product and process innovations. In total 48% and 37% of the enterprises sampled are with product and process innovations respectively. Similarly 18% and 16% are developed with other enterprises in terms of product and process innovations respectively. At the same time, 5.1% and 11% of the sampled enterprises didn't answer. These results extend the Fourth Community Innovation Survey (CIS4) where for Greece and for the period 2002-04 the corresponding percentages were the percentage of all enterprises with innovation activities were 36% and 24% of all types of cooperation with other enterprises or institutions (Eurostat, 2006). From the same source and for the EU27 42% of enterprises from industry and services reported some activity of innovation with the highest proportion of companies with innovation activity recorded for Germany (65%), Austria (53%), Denmark, Ireland and Luxembourg (52% each), Belgium (51%) and Sweden (50%). The lowest levels were recorded in

Bulgaria (16%), Latvia (18%) and Romania (20%). At the same time, 5.1% and 11% of the samples enterprises didn't answer.

The main implications for both small and medium firms for the products innovations is related to increase the range of commodities and less to improve the quality of commodities. Regarding the finance of innovations, a small part of Greek firms has been financed either by local-regional authorities or by the central government and the European Union. Specifically, around 18% of the Greek sampled firms have been financed for innovations from the EU while the other sources of finance, like the central government and the local-regional authorities correspond to very low levels of 6% and 3% respectively.

Table 2. Women in Innovation Development (in %) in 2006

Product Innovation	
Percentage of women participating	39,7
Position in firm	
Top management (Owner / CEO)	20
Manager	29,2
Other	54,2
Process Innovation	
Percentage of women participating	33,1
Position in firm	
Top management (Owner / CEO)	15,8
Manager	44,7
Other	44,7

Table 3. Gender equality in total by product and by process innovations (in %) in 2006

Gender equality in workplace	Total (Firms with and without innovation activities) ⁽¹⁾		Women (Firms with Product Innovation) ⁽²⁾		Women (Firms with Process Innovation) ⁽³⁾	
	Yes	No	Yes	No	Yes	No
Job enrichment	71,1	19,8	37,3 (4)	5,5 (4)	25,5	9,1
Salary	71,1	21,5	32,1	9,8	25	9,8
Education -Training	73,6	16,5	34,9	7,3	27,5	8,3
Promotions	67,8	23,1	32,7	9,1	25,5	10

Finally, looking at Table 5 and according to the collected data, the main obstacles in the development of innovations are presented for small, medium and large firms. These obstacles are related to the lack of appropriate financial sources for innovation activities, the high risk activities, lack of information on new technologies and for the markets, the lack of specialized staff and the managerial inflexibilities.

Table 4. Enterprises with product and process innovation

Enterprises involved in product and process innovation		
Product development	% of enterprises in product development	% of enterprises in process development
Developed within the enterprise	47,8	36,6
Women participation	30,9	27,7
Without women participation	16,4	8,6
General Manager	5,4	3,8
Manager	10,5	8,9
Other	15,1	13,2
Developed in co-operation with other enterprises or institutions	18,3	15,6
Women participation	13,2	9,4
Without women participation	5,6	6,5
General Manager	1,6	1,6
Manager	3,5	1,9
Other	7,3	4,6
Developed mainly by other enterprises or institutions	13,2	11,6
Women participation	7,8	7,8
Without women participation	5,4	4,0
General Manager	0,5	1,3
Manager	3,0	1,6
Other	3,5	4,6

Table 5. Percentage of Factors hampering innovation activities

Hampering factors	Small	Medium	Large
Excessive perceived economic risks	11,8	17,2	15,9
Innovation costs too high	12,1	19,6	16,1
Lack of appropriate sources of finance	11,6	14,8	17,7
Organisational rigidities within the enterprise	18,0	15,1	4,6
Lack of qualified personnel	17,2	14,5	6,5
Lack of information on technology	17,5	11,8	3,0
Lack of information on markets	16,9	11,3	3,0
Insufficient flexibility of regulations or standards	14,2	13,4	7,3
Lack of customer responsiveness to new commodities	14,5	15,3	7,0

4.3. The application of the logit models and the associated empirical results

As our main interest is in terms of the main effects we have ignored interactions. Only 3 and 4 out of the 12 explanatory variables were found to be statistically significant in influencing the implementation of product and process innovations respectively. Working with the most statistical significant variables we derive the logit form of the fitted model, which may be represented as

$$\text{logit} [\text{Pr}(Y=1)]=\beta_0+\beta_1*\text{TURN}+\beta_2 * \text{PAL} + \beta_3 * \text{PFW} + \beta_4* \text{EXP} + \varepsilon_t \tag{6}$$

where Y denotes the dependent variable as 1 for innovations and 0 for no innovations, the beta terms are the unknown linear coefficients needed to be estimated., and ε_t is the error term, assumed normally distributed with mean 0 and variance 1.

Specifically the dependent variable is the answer to the question of the influence of innovations to the products with answers ranging from high influence to no influence. The high and average influences were coded as 1 and the low and no influence as 0. The explanatory significant variables are

1. TURN the Turnover taking the value of 1 for a higher than 10% increase in the turnover for the period 2004-2006 and 0 in any other case.
2. PAL that is the *Product Average Life* which is the average life of the most important product of the firm before it is substituted or modified. It takes the values of 1 in case of less than a year, 2 in case of 1-3 years, 3 for 4-6 years, 4 for 7-9 years, 5 in case of more than 9 years and 0 if no answer).
3. PFW that is the percentage of female workers
4. EXP represents the exports. The results of the fitted models are presented in Table 6.

Based on the fitted model and the information provided, it can be seen that the estimated odds ratio equals to 3.219 and 1.897 for implementing product and process innovations respectively for firms which have a higher than 10% increase in turnover, with no control for the other explanatory variables. This adjusted odds ratios of 3.219 and 1.897 mean that the odds of implementing product and process innovations is about 3.219 and 1.897 times higher respectively for a firm which has an increase of more than 10% of its turnover than for a firm which has not. The Wald statistic is statistically significant, which indicates that there is statistical evidence in these data that for firms with turnover higher than 10% the probability of implementing innovation increases.

We may compute the difference $e^{\hat{\beta}_i} - 1$ which estimates the percentage change (increase or decrease) in the odds ratio

$$OR = \pi = \frac{\text{Pr}(Y = 1)}{\text{Pr}(Y = 0)}$$

for every 1 unit in X_i holding all the other X 's fixed.

The coefficient of average life of the product is $\hat{\beta}_2=0.413$, which implies that the Relative Risk of this particular variable is $e^{\hat{\beta}_2}=1.511$ and the corresponding percentage change is $e^{\hat{\beta}_2}-1=0.511$. This means that in relation to the average life of product the odds of implementing innovations increase by 51.1% ceteris paribus. In the case of process innovation the result is 1.271 implying a 27.1% increase. In relation to turnover the odds of implanting innovations increase by 221.9% and 89.7% for product and process innovations respectively keeping constant all the rest. Similarly, the coefficient of percentage of female workers is $\hat{\beta}_3 =-0.027$ and -0.014 for product and process innovations respectively, which implies that the Relative Risk of this particular variable is $e^{\hat{\beta}_3}=0.9733$ and 0.986 and the corresponding percentage change is $e^{\hat{\beta}_3}-1= -0.0267$ and -0.014 respectively. This means that in relation to the percentage female workers the odds of implementing innovations decreases by almost 0.03% and 0.015 all other remaining fixed.

The negative sign in the coefficient for the percentage of female workers variable requires some further thoughts. It could be explained as a higher percentage of female workers corresponding to a lower implementation of innovations. This can be considered in relation to other Departments in the firm like R&D as well as to the markets that the firm operates.

Table 6. The Logistic Regression results

Variables	Dependent: Product Innovations		Dependent: Process Innovations	
	Estimates	Odds Ratio	Estimates	Odds Ratio
Constant	0.483 (0.734) [0.391]	1.621		
TURN	1.169 (6.071) [0.014]	3.219	0.64 (2.895) [0.089]	1.897
PAL	0.413 (8.700) [0.003]	1.511	0.240 (4.403) [0.036]	1.271
PFW	-0.027 (6.510) [0.011]	0.973	-0.014 (3.028) [0.082]	0.986
EXP			1.139 (5.252) [0.022]	3.123
Hosmer Lemeshow	8.145 [0.37]		11.135 [0.47]	
Likelihood Ratio	18.121 [0.000]		28.016 [0.000]	

Where in () t-statistics and in [] P-values.

The individual statistical significance of the β estimates is presented in the column Wald (Chi-square). The significance levels of the individual statistical tests (i.e. the P-values) are presented in the column P-value and correspond to $Pr > \text{Chi-square}$. Note that the variable average value of product is significant in all the usual statistical levels (0.01, 0.05 or 0.1) while the variables turnover and percentage of female workers are statistically significant at $P = 0.05$ and $P = 0.1$, while the constant term is not statistical significant.

The model certainly fits the data well and provides evidence that the economic interpretation of the logit model, as the one adopted here, is among the most useful methods, when a qualitative approach is needed to explain economic datasets, involving proportions. Similar are the comments in the case of the process innovations where however the variable Exports seems to have a significant influence both in magnitude as well as in statistical terms.

To assess the model fit we compare the log likelihood statistic ($-2 \log \hat{L}$) for the fitted model with the explanatory variables with this value that corresponds to the reduced model (the one only with intercept). The likelihood ratio statistic for comparing the two models is given by the difference

$$LR = (-2 \log \hat{L}_R) - (-2 \log \hat{L}_F) = 18.121 \tag{7}$$

where the subscripts R and F correspond to the Reduced and Full model respectively. The corresponding value of the test in the case of the process innovations is 28.016. That is, in our case the overall significance of the model is $X^2 = 18,121$ and 28.016 with a significance level of $P = 0.000$ and 3 and 4 degrees of freedom for the cases of product and process innovations respectively. Based on this value we can reject H_0 and conclude that at least one of the β coefficients is different from zero. These values must be compared with $X^2_{0.05,3} = 7.815$ and $X^2_{0.05,4} = 9.488$, which implies again a rejection of H_0 .

Finally, the Hosmer and Lemeshow value equals to 8.145 (with significance equal to 0.37) and 11.135 ($P = 0.47$) in the case of product and process innovations respectively. The non-significant X^2

value indicates a good model fit in the correspondence of the actual and predicted values of the dependent variable.

5. Conclusions and policy implications

In this paper we discuss the Greek case of female participation in innovation activities of firms using the results of a research project on women in innovation, technology and science. Based on the fitted logistic models the estimated odds ratios imply that the odds of implementing product and process innovations are much higher for a firm which has an increase of more than 10% of its turnover and higher for a firm with higher average product life, higher percentage of female workers and for firms exporting its commodities.

Similarly, in relation to turnover the odds of implanting innovations increase by 221.9% and 89.7% for product and process innovations respectively *ceteris paribus*. We can say that in relation to the average life of product the odds of implementing innovations increase by 51.1% *ceteris paribus*. In relation to percentage of female workers the odds of implementing product and process innovations decreases by 0.03% and 0.015% respectively, all the other remaining fixed in each case. This certainly has as a result the fact that the percentage of the participating acting women does not influence the implementation of the innovation, in the Greek Entrepreneurship

Finally, the relationships were positive except in the case of the percentage of female workers where we have a negative relationship between implementation of innovations and female workers. This could be explained as a higher percentage of female workers corresponding to a lower implementation of innovations. This can be considered in relation to other Departments in the firm like R&D as well as to the markets that the firm operates.

Our results may be used in line with similar studies. Specifically, Stefanescu *et al.* (2008) show the need for new intellectual and financial resources, suggesting that reengineering as an original type of management, imposes the use of information technologies to create new organisational structures and the conduct of modern methods of administration. According to Stefanescu *et al.* (2007) reengineering is based on the assumption that in order to meet contemporary demands of quality, service, flexibility, and low cost, processes must be kept simple. The authors demonstrate how reengineering can be carried out in a variety of corporate settings. But although workers are the ones who need to be empowered to carry out reengineering, the authors are adamant that the process must start at the top. This is because it involves making major changes that are likely to cut across traditional organizational boundaries.

Radulescu (2008) shows that innovation may help companies to prevail over new markets or avoid competition and proposes that new ideas on strengthening the innovation process have to be investigated. The author claims that innovation will only be developed if markets allow it and emphasizes the potential contribution of e-government methods.

Greece, in order to develop future capabilities and make the necessary choice for technological priorities, needs a more comprehensive cooperative innovative effort. The most important factors influencing the incidence of innovation and the speed of its diffusion are:

- a. Technical applicability;
- b. Profitability;
- c. Finance,
- d. Size, structure and organisation and
- e. Management attitudes.

Additionally, some other important factors may be needed like R&D, easy access to available information and the labour market availability of certain skills.

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NEW FRONTIERS IN CREDIT RISK ANALYSIS

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Abstract:

The emergence of credit risks in recent years has burned the world economy leading to the onset of one of the toughest global economic crisis. Superficiality and incompetence demonstrated by the banking system in credit risk analysis has seen the highest peaks. Banks had as main objective winning new markets at any cost and risk management and banking marketing have known the most serious contradiction. On the one hand, sales of banking products at any price, on the other hand mitigation of banking risks. The paper aims to demonstrate that a new approach is needed in credit risk analysis.

Key words: credit risk, risk management, banking marketing, financial risk, performance indicators

JEL Classification: G32

1. Introduction

In recent years all banking was conducted under the separation of banking into two distinct sections: front-office and back-office (Mihai 2009). Risk management faced increasingly larger and more diversified risks, banking marketing as their main supplier (Mehta and Fung 2008). Contradictions between risk management and banking marketing have visibly affected traditional banks in their attempt of universalization of banking (Geyfman, and Yeager 2009). Under these conditions only a miracle could prevent the crisis on emerging markets (Boz 2009).

Contradictions between risk management and banking marketing were firstly generated by the different objectives they pursue and secondly by the quality of the human factor. Both cases ultimately lead to the degradation of quality in employee-customer relations (Bowen 2006). In connection with the human factor, some authors have extended the analysis on the differences in age (older performers - younger officers) and concluded that they contribute to the degradation of human relationships in an organization (Collins *et al.* 2009).

Much of the problems of 'enforceability' between risk management and bank marketing can be overcome by promoting a clever marketing (Ahnonen *et al.* 2005), making training to improve the quality of sales personnel (Gan *et al.* 2009) and by the application of an appropriate system of indicators with which to operate the internal quality audit.

2. Financial risk analysis in trade

The analysis was performed for a retail company using trial balances on 31.12.2007, 31.12.2008 and 31.12.2009.

Analysis of economic-financial balance sheet of assets and liabilities based on data drawn from trial balances on 31.12.2007, 31.12.2008 and 31.12.2009 reveals the situation in Table 1.

Table 1. Economic and financial analysis of assets and liabilities

Level	Assets	2007	2008	2009	Liabilities	2007	2008	2009
I	Fixed assets	32.900	78.800	48.373	Long-term liabilities	47.800	93.200	108.941
II	Realizable assets	104.100	191.000	226.140	Current liabilities with maturity <1 year	65.000	107.400	104.188
III	Positive Treasury	500	3.300	4.980	Negative Treasury	24.700	72.500	66.364
	TOTAL	137.500	273.100	279.493	TOTAL	137.500	273.100	279.493

Level I assets are covered by long-term liabilities throughout the period under review resulting in a positive net working capital of 14,900 lei at 31.12.2007, 14,400 lei at 31.12.2008 60,568 lei at 31.12.2009, amounts that contribute to Level II restructured balance sheet financing.

At level II, the realizable assets are superior to current debt with maturity less than one year, generating a positive working capital amounted to 39.100 lei at 31.12.2007, 83.600 lei at 31.12.2008 and 121.952 lei at 31.12.2009, which shows a lack of resources attracted on the short term, partially covered with a surplus of Level I and through bank loans.

At level III, the net treasury is negative throughout the period analysed and had the following values: -24.200 lei at 31.12.2007, -69.200 lei at 31.12.2008 and -61.384 lei at 31.12.2009.

The evolution of working capital, the need of working capital and net cash is shown in Figure 1.

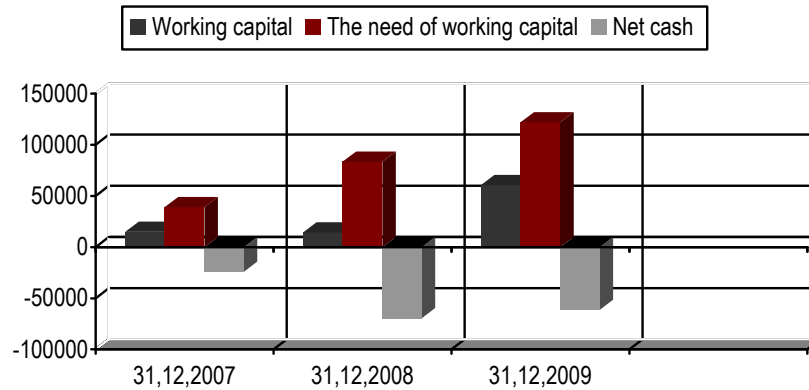


Figure 1. Evolution of working capital, the need of working capital and net cash

Regarding the patrimonial situation, the following considerations are made:

- Fixed assets during the period under review (2007-2009) developed fluctuating both in absolute and as share in total assets and have recorded the following values: 23.93% in December 2007, 28.85% in December 2008 and 17.31% in December 2009. On 31.12.2009 their absolute value was 48,373 lei. The increase of fixed assets with 44,700 lei at 31.12.2008 as opposed to 31.12.2007 was due to buying a car.

- Realizable assets recorded the following increases as a percentage of total assets during the period under review: 75.71% in December 2007, 69.94% in December 2008 and 80.91% in December 2009. On 31.12.2009 their absolute value was 226,140 lei. On active groups of assets, on 31.12.2009, we have the following structure:

- Stocks of goods for sale – 205 243 lei;
- Accruals and similar (prepaid expenses) – 20.897 lei.

- Positive treasury share in total assets during the period under review had the following increases: 0.36% in December 2007, 1.21% on 31.12.2008 and 1.78% on 31.12.2009.

Total circular assets on 31.12.2009 are worth 210,223 lei and represent 75.22% of assets.

On the liability side, in the period under review the following changes have occurred:

- Long-term liabilities the period under review were had an upward trend in absolute and total liabilities as a share had the following increases: 34.76% in December 2007, 34.13% in December 2008 and 38.98% in December 2009. On 31.12.2009 their absolute value was 108,941 lei, which is composed of:

- 200 lei in share capital;
- Reserves – 5628 lei;
- Retained earnings – 70,255 lei;
- Financial liabilities with a maturity greater than one year – 32,858 lei.

- Current debt with maturity less than one year had fluctuated in absolute size and decreasing share in total liabilities as follows: 47.27% in December 2007, 39.33% in December 2008, and 37.28% in December 2009. On 31.12.2009 their absolute value was 104,188 lei of which:

- Suppliers 55.809 lei.

▪ Other liabilities (fees, salaries, staff) 48 379 lei (the largest share is represented by VAT not due to the stock represented by existing freight on 31.12.2005 – 40.569 lei).

The company recorded outstanding debts to state budget (as the trial balance at 31.12.2009) in the amount of 3394 lei, of which:

- 12 lei payroll tax;
- 287 lei Insurance;
- 557 lei tax on profit;
- 2.503 lei payable VAT;
- 35 lei unemployment, special funds.

According to the tax attesting certificate 9874/06.04.2009 the recorded debts against the state budget in the amount of 3574 lei, and upon its release, increases in fines have been updated as well, penalties for failure to pay on term the obligations amounting to 997 lei and 321 lei. Given this situation the customer will pay the arrears to the budget in May 2009. Please note that the age profile to the state budget is up to 180 days.

Until now there haven't been enforcement orders in the client's account from the company's financial administration or creditors.

▪ The negative treasury on 31.12.2009 is 66,364 lei, consisting of the balance line of credit and more than a year from the leasing contracted by the company to purchase car.

Total liabilities on 31.12.2000 are in the sum of 203.410 lei and are 72.78% of the liabilities and are covered as a percentage of 103% of the company's circular assets.

The evolution of total debt relative to assets is shown in Figure 2.

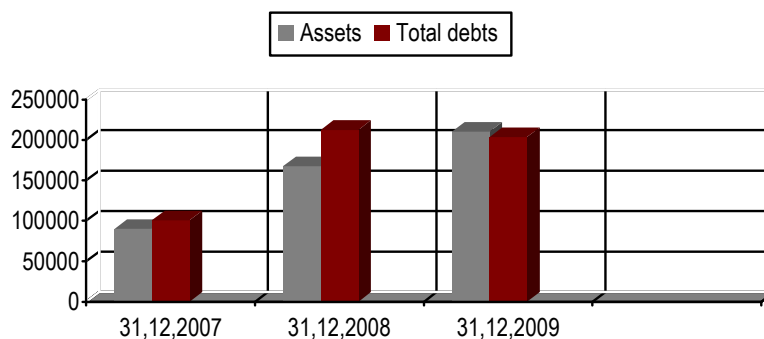


Figure 2. Evolution of total debt relative to assets

The indicators of the profit and loss (lei) in evolution are presented in Table 2.

Table 2. Indicators of the profit and loss

	31.12.2007	31.12.2008	31.12.2009
Turnover	181.900	312.500	371.560
production of the financial year + sales of goods	181.900	312.500	371.560
Added value	31.700	49.000	66.181
Operating income	181.900	314.100	372.400
Operating expenses	155.400	278.900	335.691
Operating results	26.500	35.200	36.709

	31.12.2007	31.12.2008	31.12.2009
Financial income	0	0	719
Financial expenses	3.800	6.800	11.267
financial results	-3.800	-6.800	-10.548
Total revenue	181.900	314.100	373.119
Total expenses	159.200	285.700	346.958
Gross profit	22.700	28.400	26.161
Income tax	2.700	4.700	11.194
Net income	20.000	32.100	14.967

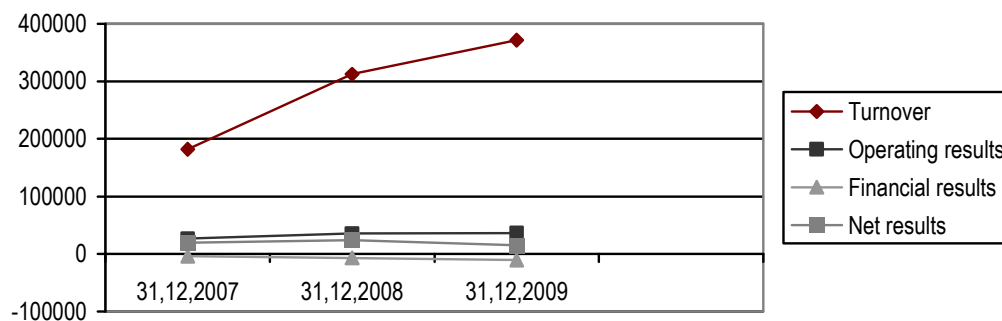


Figure 3. Evolution of turnover and results

From Table 2 it is clear that the company operates in terms of profitability, posting positive results from operations to cover losses from financial activity, achieving a profit. Composition and distribution of added value in the amount of 66,181 lei, made by the company on 31.12.2009, is reproduced below:

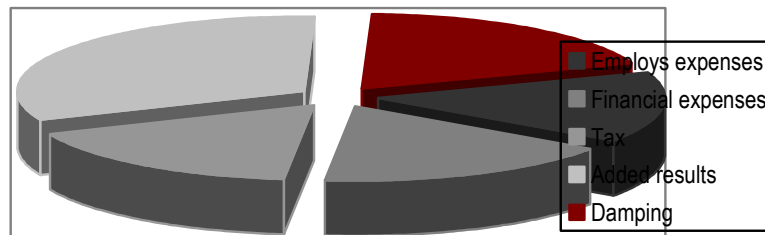


Figure 4. Composition and distribution of added value

Credit worthiness indicators record the values from Table 3.

Table 3. Creditworthiness indicators

		(%)	31.12.2007	31.12.2008	31.12.2009
1	Liquidity	(%)			
	a) immediate	(%)	0.56	3.50	2.92
	b) current	(%)	100.45	93.00	123.26
2	solvency	(%)	136.68	128.76	137.40
3	level of overall debt, financial indebtedness	(%)	272.63	347.70	267.35
		(%)	96.48	171.64	130.41
4	current assets turnover	(no of rot.)	2.02	1.87	1.77
5	profitability	(%)			
	a) operating	(%)	14.57	11.26	9.88
	b) economic	(%)	14.55	8.68	5.36
	c) financial	(%)	54.20	38.85	19.67
6	interest coverage	(%)	7.14	5.37	3.34
7	added value rate	(%)	17.43	15.68	17.81
8	dividend policy	(%)	-	-	-

‘A firm which obtains profit not always has a positive treasury because of the gap between the expenses and revenues recorded in accounting; the statistical records show that most bankruptcies are due to the weaknesses from treasury’s management’ (Georgescu 2010).

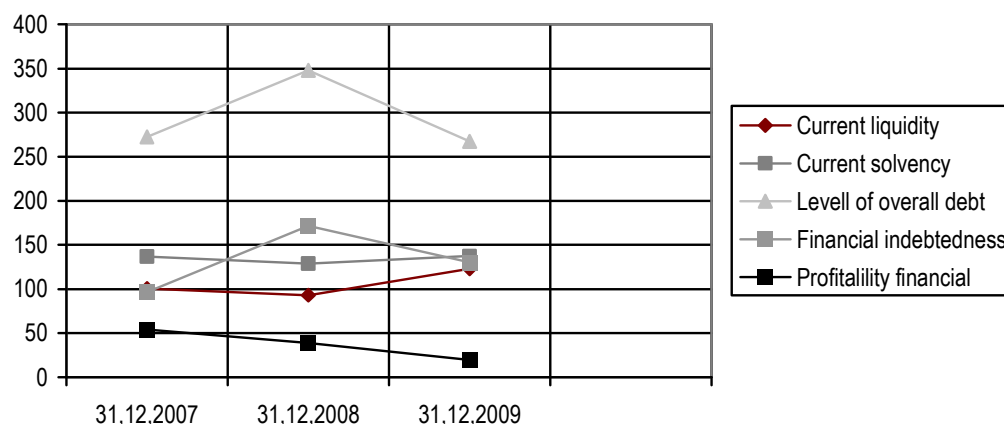


Figure 5. Creditworthiness indicators evolving

Analyzing the evolution of these indicators can be seen that:

- Current liquidity is good, assets being higher than the current debt with maturity <1 year;
- Solvency is high; the total asset value is greater than the total amount of debt registered by the trader;
- Degree of leverage is very good, borrowed financial resources (total debt) are worth 203,410 lei (31.12.2009), while at the same time; net equity in the strict sense has a considerable amount of 76,083 lei.

According to the response to the CRB in April 2009 the client does not record commitments to other banks and such incidents are not included in the CIP payment on checks, bills of exchange or promissory note.

3. Conclusions

Using indicators accompanied by a detailed analysis of the relationship between risk management and bank marketing, on the internal quality control line, can reveal the bank marketing incompetence, interest for earning extra commission, informing the customer clearly erroneous, and at the risk management incompetence, corruption, abuse of office etc.

With no claim to have presented all the indicators of financial risk analysis, we draw attention to the future implications they may have by ignoring them and not dealing with their evolving.

An assessment of results at a given moment is not only a cliché, a radiograph of the moment. A movie consisted of several clichés shows a history, a trend.

To compare the results of each year we must bring them to a common denominator to take into account the changes occurring to the national economy in terms of inflation, exchange rates, monetary policy measures etc.

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FINANCIAL AND CURRENT ACCOUNT INTERRELATIONSHIP: AN EMPIRICAL TEST

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Abstract

Theoretically, financial account (FA) serves as a means of financing deficit in a country's current account (CA). With the outburst of the rapid globalization and the liberalization of the capital markets, the function of FA could be a major cause of CA instability. This study empirically investigates the interrelationship between CA and the components of FA for the four crisis-affected Asian countries of Indonesia, Korea, the Philippines and Thailand. Empirical results show that deficit in CA mirror the surplus in FA supporting the theoretical foundation of balance of payment (BOP). We observed CA Granger causes FA suggesting that CA can be used as the control policy variable for the flows of capital in these countries. Therefore, the innovation of CA (whether deficit or surplus) would be important information for the liberalization and globalization of FA.

Keywords: current account, financial account, Asian, causality

JEL Classification: F21, F32, F41, C32

1. Introduction

Imbalances of current account in both developed and developing countries are of great analytical and empirical interest to the policy front. According to Eichengreen (2006), large and persistent US current account deficit (CAD) would distort the capital inflows, sharp compression of the US current account and eventually the global imbalances. Makin and Narayan (2008) on the other hand, provoked that the rise of the CAD in the US are strongly coincided with the saving rates in East Asian, especially in the post 1997 era. Further, concern raise up by Obstfeld and Rogoff (2004) and Blanchard, Giavazzi, and Sa, (2005) that unless major policy actions are taken, these imbalances would generate global financial turbulence and possibly, a world economic crisis as the world experiences now.

When this scenario persists, the probing question to the policy forefront is what are the sources of the current account imbalances? Literature addresses several sources such as twin deficit theory (*see* for example, Rosensweig, and Tallman 1993, Vamvoukas 1999, Piersanti 2000, Leachman, and Francis 2002, Baharumshah, and Lau 2007, Acaravci, and Ozturk 2008, Hakro 2009) which supports that a worsening budget deficit stimulates an increase in current account deficit. Some resort to the 'savings glut' phenomenon as source of this imbalance (Bernanke 2005, Dooley Folkerts-Landau, and Garber 2005) while others examined the sustainability of the CAD (Cashin and McDermott 1998; Fountas, and Wu 1999, Irandoust, and Boo Sjoo 2000, Lau, and Baharumshah 2005, Lau, Baharumshah, and Chan 2006, Kim *et al.* 2009, Christopoulos, and Leon-Ledesma 2010).

Rather than relied on these sources, this paper venture from the perspectives of the balance of payment (BOP), a fundamental relation in open economy macroeconomics¹. At the theoretical level, the interaction between the current account (CA) and financial account (FA) justified that capital flowing either in or out serves financially to fill the gap between domestic investments and savings or the CA. Experience from the developing countries especially the Latin America and Asian were at the receiving end of inflow of capital in the 1990s; however were allegedly not always used productively (Lahiri, and Mahbub-Morshed 2006)².

¹ The interrelationship between the component accounts in BOP would capture the reactions of the financial and real sectors to systemic disturbances and their interaction during the adjustment process (Fausten 1990).

² Since the late 1980s, the East Asian countries have been the largest recipients of capital inflows in the world (Grenville 2000). The investment boom during 1987–1997 was primarily led by foreign capital.

Although the interrelationship of CA and FA is dubbed as an identity in the BOP accounting, policy response adopted by the government toward capital inflows or outflows would transform the identity into causal relationship. Research attempt to tackle such issue were available in the literature although the insight is still pending and by no means inconclusive. Fry, *et al.* (1995) found that 17 countries with FA Granger-cause CA, 12 countries with CA Granger cause FA while 21 countries have no causal relationship while Wong and Carranza (1999) showed that, prior to 1989 when capital mobility was restricted, there is evidence that CA Granger-causes FA, while the direction of causality reversed when capital mobility was liberalized. Sarisoy-Guerin (2005) found that causality running from CA to FA in developed countries, while in developing countries causality going the other way around. Yan (2005) support this evidence using a collection of developed and developing countries but mixture of evidence was found in Yan (2007) and Yan and Yang (2008). In short, the direction of causality can go both ways.

Simply to attempt the question, the present paper empirically examines and draws some policy lessons on the relationship between FA and CA of the four crisis-affected countries (Indonesia, Korea, the Philippines and Thailand). This article differs from existing literature in the following ways. First, we observed that these countries recorded large CAD in the late 1980s and first half of the 1990s while sudden reversal into surpluses during the post 1997 crisis period³. In an advancement of previous work, we based our empirical analysis on recent developments in time-series econometrics methods and our sample period was extended to include the post 1997 crisis period that ended in 2006:Q4. Second, we disaggregate the FA into three sub-components of foreign direct investment (FDI), portfolio investment (PI) and other investment (OI). The causal direction between these variables may provide constructive information and policymaking guide as to which of the composition of capital flows may be able to offset the deficit in current account. Third, based on the experimental revelation, it would contribute to the financial account-current account literature, particularly for developing economies.

As such, the structure of this paper follows. Section 2 describes the current account and financial account intensities in the last two decades. Section 3 highlight the econometric strategy and data description adopted in the paper. Section 4 reports the empirical findings, while concluding remarks is presented in Section 5.

2. Empirical Strategy

2.1. Unit Root and Stationary Testing Procedures

We applied the Said and Dickey (1984, ADF), Elliott, Rothenberg, and Stock, (1996, DFGLS) and Kwiatkowski *et al.* (1992, KPSS) testing principles to test the existence of unit root for the variables under investigations. Briefly, the ADF and DFGLS tests for non-stationary (unit root) while KPSS examined the level or trend stationarity. The application of this methodology is by now becoming common in the literature of time series econometrics.

2.2. Cointegration Procedure

Johansen and Juselius (1990) multivariate cointegration test is adopted in this paper. One advantage of this approach is that the estimation procedure does not depend on the choice of normalization and it is much more robust than Engle and Granger (1987) test (see Gonzalo 1994). This test utilizes two likelihood ratio (LR) test statistics for the number of cointegrating vectors: namely the trace test and the maximum eigenvalue test. The Johansen procedure is well known in the time series literature and the detail explanation are not presented here.

2.3. Granger Causality Tests

If cointegration is detected, then the Granger causality must be conducted in vector error correction model (VECM), otherwise, the analyses may be conducted as a standard first difference vector autoregressive (VAR) model. VECM is a special case of VAR that imposes cointegration on its variables where it allows us to distinguish between short run and long run Granger causality. The

³ The selection of this group of countries is interesting as they possess similar contention due to the episodes of currency crisis over 1975-1997 period as identified in Glick and Hutchison (2005).

relevant error correction terms (ECTs) must be included in the VAR to avoid misspecification and omission of the important constraints. In this study, the five-dimensional VECM system as follows:

$$\begin{aligned} \Delta CA_t = & \alpha_0 + \sum_{i=1}^m \beta_{1,i} \Delta CA_{t-i} + \sum_{i=1}^n \beta_{2,i} \Delta FA_{t-i} + \sum_{i=1}^p \beta_{3,i} \Delta FDI_{t-i} + \sum_{i=1}^q \beta_{4,i} \Delta PI_{t-i} \\ & + \sum_{i=1}^r \beta_{5,i} \Delta OI_{t-i} + \mu_1 ECT_{t-1} + \zeta_{1t} \end{aligned} \quad (1a)$$

$$\begin{aligned} \Delta FA_t = & \delta_0 + \sum_{i=1}^m \phi_{1,i} \Delta CA_{t-i} + \sum_{i=1}^n \phi_{2,i} \Delta FA_{t-i} + \sum_{i=1}^p \phi_{3,i} \Delta FDI_{t-i} + \sum_{i=1}^q \phi_{4,i} \Delta PI_{t-i} \\ & + \sum_{i=1}^r \phi_{5,i} \Delta OI_{t-i} + \mu_2 ECT_{t-1} + \zeta_{2t} \end{aligned} \quad (1b)$$

$$\begin{aligned} \Delta FDI_t = & \chi_0 + \sum_{i=1}^m \gamma_{1,i} \Delta CA_{t-i} + \sum_{i=1}^n \gamma_{2,i} \Delta FA_{t-i} + \sum_{i=1}^p \gamma_{3,i} \Delta FDI_{t-i} + \sum_{i=1}^q \gamma_{4,i} \Delta PI_{t-i} \\ & + \sum_{i=1}^r \gamma_{5,i} \Delta OI_{t-i} + \mu_3 ECT_{t-1} + \zeta_{3t} \end{aligned} \quad (1c)$$

$$\begin{aligned} \Delta PI_t = & \eta_0 + \sum_{i=1}^m \rho_{1,i} \Delta CA_{t-i} + \sum_{i=1}^n \rho_{2,i} \Delta FA_{t-i} + \sum_{i=1}^p \rho_{3,i} \Delta FDI_{t-i} + \sum_{i=1}^q \rho_{4,i} \Delta PI_{t-i} \\ & + \sum_{i=1}^r \rho_{5,i} \Delta OI_{t-i} + \mu_4 ECT_{t-1} + \zeta_{4t} \end{aligned} \quad (1d)$$

$$\begin{aligned} \Delta OI_t = & \lambda_0 + \sum_{i=1}^m \tau_{1,i} \Delta CA_{t-i} + \sum_{i=1}^n \tau_{2,i} \Delta FA_{t-i} + \sum_{i=1}^p \tau_{3,i} \Delta FDI_{t-i} + \sum_{i=1}^q \tau_{4,i} \Delta PI_{t-i} \\ & + \sum_{i=1}^r \tau_{5,i} \Delta OI_{t-i} + \mu_5 ECT_{t-1} + \zeta_{5t} \end{aligned} \quad (1e)$$

where Δ is the lag operator, $\alpha_0, \delta_0, \chi_0, \eta_0, \lambda_0, \beta's, \phi's, \gamma's, \rho's$ and $\tau's$ are the estimated coefficients, m, n, p, q and r are the optimal lags of the series current account (CA), financial account (FA), foreign direct investment (FDI), portfolio investment (PI) and other investment (OI), ζ_{it} 's are the serially uncorrelated random error terms while $\mu_1, \mu_2, \mu_3, \mu_4$ and μ_5 measure a single period response to a departure from equilibrium of the dependent variable. Take for example, to test whether FA does not Granger cause movement in CA, $H_0 : \beta_2, i = 0$ for all i and $\mu_1 = 0$ in Equation (1a).⁴ In this sense, the F-test or Wald χ^2 of the explanatory variables (in first differences) indicates the short run causal effects ($H_0 : \beta_2, i = 0$ for all i) while the long run causal ($\mu_1 = 0$) relationship is implied through the significance of the lagged ECT that contains the long run information. The rejection implies that FA causes CA. Similarly, to test that CA does not Granger cause movement in FA the null hypothesis $H_0 : \phi_1, i = 0$ for all i and $\mu_2 = 0$ in Equation (1b). Also, we address the question of whether the disaggregated components of FA are interdependent or independent. Interdependence means that one or more FA components Granger-cause this CA. Independence means that neither of the FA components exerts any causal influence towards CA.

3. Data Description and Results

3.1. Data Sources

Quarterly data series of current account (CA), financial account (FA), foreign direct investment (FDI), portfolio investment (PI) and other investment (OI) that begins in 1987Q1 and ends in 2006Q4 were adopted in this paper. The data are obtained from *International Financial Statistics, IFS* (International Monetary Fund, IMF), expressed as ratio of the nominal Gross Domestic Product (GDP) in order to account for the economy’s growth and expressed in millions of US dollars prior to estimation.

3.2. Non-stationarity and Stationarity Tests

The results of ADF, DFGLS and KPSS tests suggest the existence of unit root or nonstationarity in level or $I(1)$ for CA, FA, FDI, PI and OI. For space consideration, the results are available upon request from the authors.

3.3. Cointegration Result

Results of the cointegration procedure are presented in Table 1. The null hypothesis of no cointegrating vector ($r=0$) in favour of at least one cointegrating vector is rejected at 5 percent significance level indicating that there is a significant long run relationship among these five variables [CA, FA, FDI, PI, and OI] in these countries. In other words, there is at least one stochastic trend shared among the five variables in the system for Korea, Indonesia, the Philippines and Thailand. We noted that both the trace and the maximum eigenvalue test led to the same conclusion—the presence of one cointegrating vector.

Table 1. Cointegration Results

Hypothesis		Indonesia	Korea	Philippines	Thailand
H_0	H_A	$k = 2, r = 1$	$k = 2, r = 1$	$k = 2, r = 1$	$k = 2, r = 1$
$\lambda - \max$					
$r = 0$	$r = 1$	47.641*	41.621*	44.581*	44.487*
$r \leq 1$	$r = 2$	22.714	20.782	21.609	24.587
$r \leq 2$	$r = 3$	8.357	10.640	14.297	10.093
$r \leq 3$	$r = 4$	4.955	7.514	3.861	7.158
$r \leq 4$	$r = 5$	0.633	3.053	2.642	3.311
Trace					
$r = 0$	$r = 1$	84.302*	84.611*	86.991*	89.637*
$r \leq 1$	$r = 2$	36.661	42.990	42.411	45.149
$r \leq 2$	$r = 3$	13.945	22.208	20.801	20.562
$r \leq 3$	$r = 4$	5.588	11.567	6.504	10.469
$r \leq 4$	$r = 5$	0.633	3.053	2.642	3.311

Notes: k is the lag length and r is the cointegrating vector(s). Critical values for both the trace and maximum eigenvalue tests are tabulate in Osterwald-Lenum (1992, Table 1, 468). Asterisks ** and * denote the statistically significance at 5% level.

3.4. Normalization of Cointegrating Equation

We proceeded with the estimation of the long run parameters of the model by normalizing current account (CA). There is only one significant vector detected in each case and so we do not have the problem of identification of the equation that represents the current account. Table 2 reports the long run parameters of the model. In general, the sign of the estimated parameter normalizing on CA is consistent with a priori expectation. First, we found negative relationship between CA and FA, supporting to the fact that current account deficit (surplus) would be accompanied with financial account surplus (deficit). The estimated coefficients of FA range from 0.182 (Philippines) to 0.662 (Thailand). The results suggest that FA contributes most to Thailand’s CA, whereas it contributes least to Philippines’s CA. Second, FDI appears to have a positive relation with current account. Yan (2007)

suggest that such a phenomenon exist if the FDI in the host country were concentrated in the export-oriented industries, enhancing the exports, which eventually bring about a current account surplus. Taking for example, one percent increase in FDI would contribute 0.843 percent in Korean CA. For Indonesia, the Philippines and Thailand the coefficients were at 0.751, 0.211 and 0.709 respectively. Third, we found that the portfolio investment (PI) and other investment (OI) have a negative impact on current account in all the studied countries, consistent with Kaminsky and Schmukler (2003), that unlike FDI which is more stable, PI (portfolio investment, consisting of both equities and bonds) and OI (other investments, mainly short term bank loans) are relatively volatile and played a role in the 1997 crisis.

Table 2. Normalizing the Cointegrating Vector

Country	Variables				
	CA	FA	FDI	PI	OI
Indonesia	1.000	-0.582 (-4.217)	0.751 (3.891)	-0.115 (-4.107)	-0.061 (-3.388)
Korea	1.000	-0.385 (-2.711)	0.843 (3.229)	-0.662 (-2.681)	-0.118 (-3.371)
Philippines	1.000	-0.182 (-2.843)	0.211 (5.411)	-0.123 (-4.921)	-0.032 (-2.667)
Thailand	1.000	-0.668 (-2.619)	0.709 (2.791)	-0.129 (-3.794)	-0.232 (-3.569)

Notes: The estimated coefficients were obtained by normalizing the current account variable from the Johansen’s multivariate cointegration tests. The number in the parentheses denotes the t-statistics.

3.5. VECM Results

Results for the pre-crisis period as depicted in Table 4 may be summarized as follow. First, short run channel of causality running from FDI and PI to CA are active for Indonesia while in the Philippines, PI and OI Granger cause CA. This finding concurs with the argument made by Bosworth and Collins (1999) and Wong and Carranza (1999) that the PI and CA are considered as complementary processes. The finding of FDI Granger cause CA brings the implication that that FDI inflows bring about the deficit in CA, consistent with the stylized fact of the dynamic behaviour of CA in these countries (Yan 2007). Second, there is a unidirectional relationship running from PI to FDI and OI in the short run for Korea and the Philippines. This confirms that the FDI and OI are endogenous because it may be explained by other variables in the system, suggesting that the monetary authorities in Korea and the Philippines cannot fully control the FA. Third, we found that CA Granger cause FA in all these countries. This may be interpreted when CA is in deficit (surplus) FA needs to be in surplus (deficit). In other words, the fragility of the influx of capital flows could be control by the performance in CA.

Fourth, FA appears to be insensitive in the system where it do not Granger cause other variables (namely CA, FDI, PI and OI) in all the countries. This highlights the importance of disaggregating the FA into individual component while indicating the different causality pattern. Without the disaggregating of the FA, the impact of each component would not be clear. Fifth, the error-correction term (ECT) is statistically significant and the burden of short run endogenous adjustment is beared by CA in these countries. Notice that the error correction term (ECT) carries the correct sign (negative) and is relatively small. For instance, in Indonesia and Thailand the speed of adjustment as measured by the ECT coefficient is 0.02 that need about 50 quarters to adjust to the long run equilibrium due to the short run adjustments. On the other hand, for Korea and Philippines, the speed of adjustment as measured by the ECT coefficient is 0.03 and 0.04; that need about 33.33 and 25 quarters respectively to adjust to the long run equilibrium due to the short run adjustments. The directions of causal relations from Table 3 are graphically summarized in Figure 1.

Table 4. Granger Causality based on VECM

Dependent variable	χ^2 – statistics (<i>P</i> – value)					Coefficients [t-statistics]
	ΔCA	ΔFA	ΔFDI	ΔPI	ΔOI	
Indonesia						
ΔCA	-	0.54 (0.76)	6.36 (0.03)**	8.57 (0.00)**	0.94 (0.62)	-0.02 [-2.43]**
ΔFA	6.61 (0.03)**	-	2.96 (0.22)	0.01 (0.99)	0.21 (0.91)	-0.32 [-0.42]
ΔFDI	0.71 (0.69)	0.09 (0.95)	-	1.31 (0.52)	1.49 (0.47)	-0.26 [-0.86]
ΔPI	0.41 (0.81)	2.18 (0.34)	3.46 (0.05)**	-	3.16 (0.05)**	0.01 [1.04]
ΔOI	1.25 (0.53)	0.86 (0.65)	4.47 (0.04)**	0.12 (0.94)	-	-0.12 [-0.58]
Korea						
ΔCA	-	0.21 (0.91)	0.51 (0.77)	0.95 (0.62)	0.69 (0.71)	-0.03 [-3.18]**
ΔFA	3.73 (0.05)**	-	0.81 (0.67)	0.47 (0.79)	2.38 (0.31)	-0.01 [-1.68]
ΔFDI	2.45 (0.29)	2.68 (0.26)	-	5.14 (0.04)**	2.56 (0.28)	-0.01 [-0.32]
ΔPI	1.83 (0.39)	1.22 (0.54)	1.05 (0.59)	-	0.14 (0.93)	0.01 [1.33]
ΔOI	9.48 (0.00)**	3.45 (0.05)	0.26 (0.88)	3.31 (0.05)**	-	-0.00 [-0.71]
Philippines						
ΔCA	-	1.51 (0.47)	0.17 (0.92)	6.67 (0.03)**	7.72 (0.01)**	-0.04 [-3.81]**
ΔFA	4.12 (0.02)**	-	2.81 (0.24)	1.21 (0.55)	2.71 (0.25)	-0.01 [-1.53]
ΔFDI	9.91 (0.00)**	1.14 (0.56)	-	4.11 (0.03)**	1.39 (0.49)	-0.21 [-0.66]
ΔPI	1.25 (0.53)	2.08 (0.35)	0.22 (0.89)	-	0.51 (0.77)	0.01 [1.98]
ΔOI	0.86 (0.65)	0.02 (0.99)	7.59 (0.01)**	3.63 (0.05)**	-	-0.01 [-1.09]
Thailand						
ΔCA	-	2.41 (0.31)	2.97 (0.23)	2.74 (0.25)	0.87 (0.64)	-0.02 [-2.23]**
ΔFA	6.23 (0.04)**	-	1.91 (0.38)	0.24 (0.88)	0.03 (0.98)	-0.21 [-0.26]
ΔFDI	0.23 (0.88)	0.93 (0.63)	-	2.34 (0.31)	2.68 (0.26)	0.17 [0.39]
ΔPI	0.35 (0.83)	1.21 (0.55)	0.57 (0.75)	-	3.01 (0.22)	-0.19 [-0.41]
ΔOI	9.31 (0.00)**	0.54 (0.76)	9.24 (0.00)**	2.38 (0.31)	-	-0.17 [-0.48]

Notes: All variables are in first differences with the exception of the lagged error-correction terms (ECT). Figures in the parentheses, () are the *P*-value and [] are the t-statistics. The χ^2 statistics tests the jointly significance of the lagged values of the independent variables. Asterisks ** and * denote the statistically significance at 5% and 10% levels respectively.

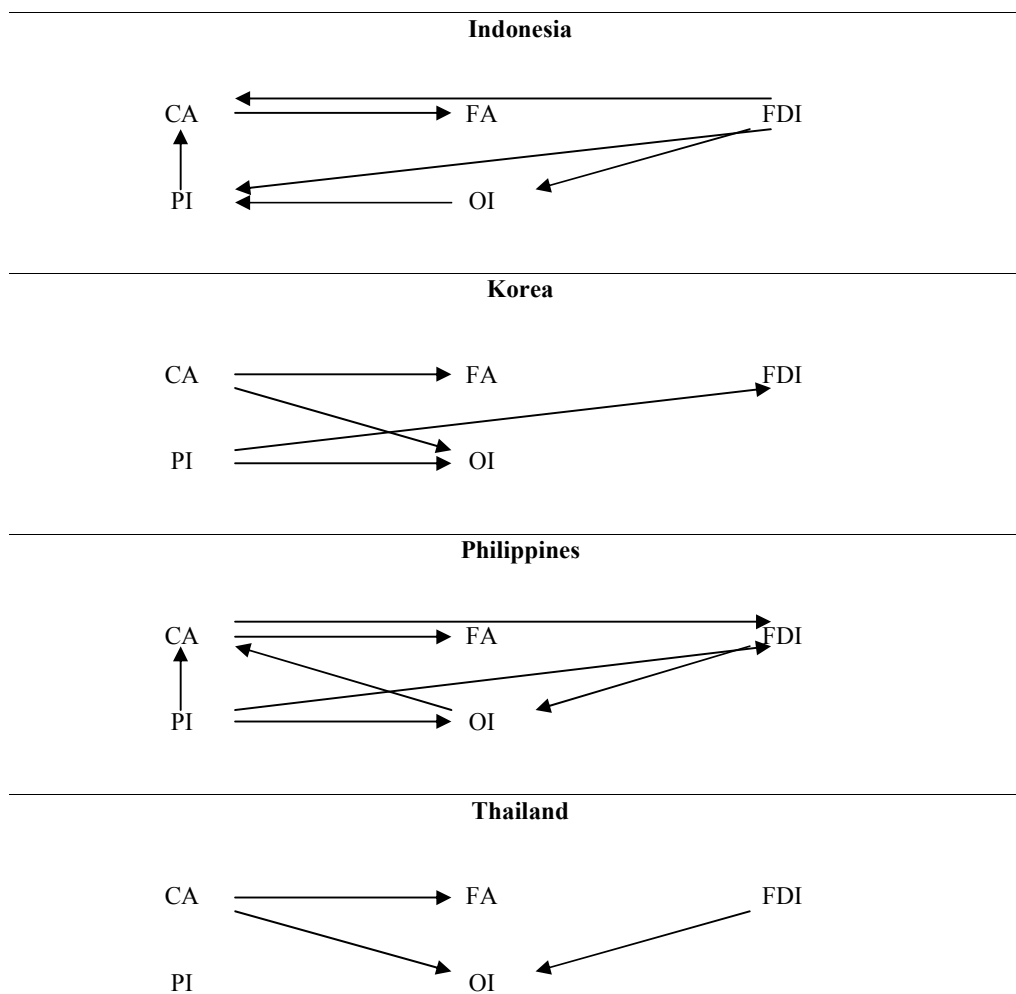
4. Concluding Remarks

This paper empirically analyses the causality pattern between CA and the components of the FA in the four crisis-affected Asian countries. The purpose is to identify the source of imbalance in one account (current or financial) to the other. Our key findings are as follows. First, we found evidence supportive of long run cointegration relationship between CA and FA for all the countries. Second, financial account (FA) and portfolio investment (PI) as well as other investment (OI) negatively impact current account (CA) throughout the estimation period, supporting the notion that in order to reduce deficit in CA, these components should remain surplus. On contrast, FDI is positively contributes to the current account (CA).

Third, CA Granger causes FA suggesting that CA can be used as the control policy variable for the flows of capital in these countries. Such an evidences brings implication that the innovation of CA (whether deficit or surplus) would be important information for the liberalization and globalization of FA. Edwards (2007) in his paper suggest that a higher CA deficit would increase the probability of a capital flow contraction, consistent with our empirical findings. Further, the decomposition of the FA helps to identified which of these components drive the current account the most while designing

appropriate policy impetus. Empirically, we found that $FDI \rightarrow CA$ in Indonesia while PI and $OI \rightarrow CA$ in the Philippines. From the policy perspectives, these disaggregated components could be the solution for the persistent current account deficits. Therefore, reformation, surveillance and strengthening of the financial architecture need to be instituted to ensure maximum benefits accrue to the countries in the region.

Figure 1. Short run lead-lag linkages summarized from VECM



Notes: $CA \rightarrow FA$ indicates that changes in CA contain leading information for changes in FA. $CA \leftarrow FA$ implies the reverse.

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MODELING & FORECASTING OF MACRO-ECONOMIC VARIABLES OF INDIA: BEFORE, DURING & AFTER RECESSION

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Abstract

This paper examines the state of the Indian economy pre, during and post-recession by analysing various macro-economic factors such as GDP, exchange rate, inflation, capital markets and fiscal deficit. We forecast some of the major economic variables using ARIMA modelling and present a picture of the Indian economy in the coming years. The findings indicate that Indian economy is reviving after a slowdown during the period of global recession. It is forecasted that GDP, foreign investments, fiscal deficit and capital markets will rise in 2010-11. Furthermore, the rupee-dollar exchange rates will not change much during the same period.

Keywords: ARIMA, Box-Jenkins, Indian economy, forecasting

JEL Classification: B22 E00 C22 E37 C01

1. Introduction

The beginning of the new financial year is always a good time to take stock- to look back and see where we have been, to look forward and prognosticate about future. The fiscal year 2009-10 closed on a relatively good note, amidst the pressures that emanated from the global economic crisis. Supported by stimulative monetary and fiscal policies, a recovery in economic activity was visible from the second quarter of FY10. Industrial production has started rebounding; consumers who had held back on spending out of fear of job loss have begun to spend more freely as they see jobs begin to take hold. Improvement in global demand is generating a robust demand for exports while the financial markets are in better shape as evidenced by continued rally in equities. A number of forward-looking indicators are also showing a marked improvement.

But how has this picture transformed over the past 6 years, is what we try and focus on in this paper. The recession caused by the sub-prime crisis originating in the US hit many developing economies in a hard way. After having near zero interest rates and relatively high levels of unemployment, the US has started showing signs of recovery in the past 3 quarters (FY 2010-11). India has also sprung back on to the road of recovery and is trying hard to reach its pre-recessionary levels of growth in the quickest time frame. But with the government deciding to slowly rollback the stimulus package and sops, will find it difficult to plough back soon. Faced by the horror of two digit inflation rates, the government is faced with the dilemma of continuing its spending extravaganza or practicing restraint. With this backdrop we try and see how the economy has shaped from the period before recession till now and what can we look at in the next couple of years.

2. Literature Review

Subbarao (2008) in his speech at the IMF-World Bank Annual Meetings 2008 highlighted a few concerns and possible solutions. The concerns include rising food price-led inflation, a surge in capital flows, monetary transmission mechanism as it evolves from the crisis period, return to fiscal consolidation and quality of fiscal adjustment and financial stability, financial inclusion and growth. In relation to food inflation, an early exit on inflation concerns runs the risk of derailing the fragile growth, while a delayed exit may engender inflation expectations. In relation to capital inflows he raises concerns and possible impact of volatile investments on exchange rate. The paper also discusses

the role of government and the ways in which the Indian government can influence parameters such as inflation. The following research findings are on macro-economic parameters such as GDP, FII, FDI, borrowing, exchanges and interest rates. We utilized the below findings to review and build our paper on the Indian economy.

Gross domestic product or GDP, tells us the country's current aggregate production of goods and services. It is often considered the best measure of how well the economy is performing. GDP summarizes the aggregate of all economic activities in a given period of time. Daga, Das and Maheshwari (2004), in their paper have tried to model the GDP trend equation and determine the main sectors of the economy responsible for that particular shape. They have tried to gauge the impact of economic reforms on GDP, verify whether these do make any significant difference in the long run and hence produce a model to forecast GDP growth rate.

Globalization and financial sector reforms have increased India's growth rate and put it amongst the largest and fastest growing economies of the world. An important indicator of the financial system of any country is the country's capital market as it mobilizes saving and channels them into productive purposes. Singh and Arora (2010) discuss the effect of interest rates on a country's stock market by exploring data in Asian markets, such as India, China and Japan. Their study found that there exist a significant correlation between Sensex and interest rate as well as Nikkei and interest rate. However, a similar correlation was not found in China and they state various reasons ranging from politics to economic reforms to explain this result.

India now grapples with the issues and challenges for sustaining the elevated growth momentum that it has achieved. This has assumed added contemporary significance in the wake of expected moderation in global growth due to a projected slowdown in the US and some other advanced economies. Mohan, Rakesh (2008) argues that India's growth has been largely enabled by the availability of domestic savings, which have increased steadily over the decades. Further, the efficiency of resource use has been high with a long-term incremental capital-output ratio of around 4, which is comparable to the best in the world. While private investment and corporate growth have been major factors in the recent growth upsurge, it is important to note that this period has also been marked by a relative decline in public investment. Rakesh concludes by saying that revival of public investment, accompanied by higher public savings, would be necessary to improve and expand public services.

India has over the recent years received a surge of FII and FDI funding. FIIs have been playing a significant role in the process of capital formation and economic growth of the country. There has been a dramatic increase in net FII flows to India over the period 2003-2007. One of the main reasons for the FII flows has been an increased recognition of the long-term growth potential of Indian economy. India offers favorable demographics and has quickly established its competitive advantage in many spheres including software. Indian entrepreneurs have been quite successful in launching businesses in India. FIIs have recognized the fact and unlike other countries where FDI has gained predominance, India has seen significant growth in FII investment. It is with this backdrop that Mishra, Das and Pradhan (2010) study the causality of the relationship between foreign institutional investment and real economic growth of India. The study provides evidence of bi-directional causality running from net FII flows to real economic growth. This shows that the real economic growth of India both determines and determined by the volume of portfolio institutional investments in the country.

Since 1997, East Asian Financial crisis, the relationship between Foreign Direct Investment (FDI), exports and economic growth has gained importance and attention among policy makers and researchers. Due to volatility experienced in the short term capital flows, developing and less developed countries shifted their focus from attracting short term capital flows to FDI, due to its long term effects. However, the understanding of the long term impacts and benefits of FDI is not clear as FDI is not attracted uniformly to each country, which makes it difficult to identify the impact of FDI on economic growth. Miankhel, Thangavelu and Kalirajan (2009) have tried to study this dynamic relationship for six emerging countries including India. In the long run, they have identified GDP growth as the common factor driving growth in other variables such as Exports in the case of Pakistan and FDI in the case of India.

Keshava, S.R. (2008) analyses the impact of FDI on growth in India, exports, GDI, FOREX and other macro variables. The paper also compares India's FDI with Chinese FDI and attempts to learn

from the Chinese experience. The paper distinguishes between hard factor that affect FDI and soft factors that affect FDI. Hard factors mainly include transportation, telecommunications, energy supply, public utilities and infrastructure. Soft factors include parameters related to political regime and culture. The paper concludes that India is far behind China in becoming an attractive FDI destination as it still suffers from power shortage, poor infrastructure, security consideration and the absence of an exit policy. If India has to reach its target of attracting more FDI for its development, aggressive third generation reforms are needed along with good planning and intentions.

Another area that can have a critical effect on a country's ability to grow is borrowing. Capital inflows are critical for an emerging economy to grow, however extensive levels can increase the transaction exposure of a country and thereby cause harm in the long-run. Virmani, Arvind (2008) in his paper addresses the issue of increase in capital inflows into an open emerging economy, such as the current Indian economy. The paper recommends the introduction of an auctioning mechanism for the right to incur foreign debt. The auction will act as a variable tax that tax short term flows at a higher rate and adjusts to changing environment. This mechanism will in effect correct for the negative externalities arising from cross-border debt, given the possibility of sharp reversals arising from global external developments and global shocks.

Fiscal deficit influences various parameters including growth and inflation. A study by Sah (2005) empirically examines the impact of fiscal deficit on the major macroeconomic variables. Variables used for the study included monthly data on gross fiscal deficit, weighted average call money rate, net FII investment, wholesale price index, reserve money, index of industrial production and new capital issue by non-government public limited companies. The study concluded that fiscal deficit significantly affects all macroeconomic variables. However, crowding-out of private investment is not supported by the data.

Real and financial crowding out can critically affect the rate of growth of an economy. Chakraborty (2006) analyses the real and financial crowding out in India during 1970-71 to 2002-03. She concludes that a complementary relationship exists between public and private investment. The dynamics of financial crowding out is captured through the dual transmission mechanism via real rate of interest. The study reinforced previous findings in the area that there is no financial crowding out in India.

Apart from the FII, FDI, GDP and fiscal deficit, parameters such as industrial production, interest rates and exchange rates have a significant effect on a nation's performance. Garg, Agrawal, Rajesh (2005) in their paper discuss the causal relationship between industrial production, interest rates and exchange rates in India. The study used various tests including Granger's Causality test and Vector Auto Regression technique on monthly IIP (Index of Industrial Production), exchange rate, and interest rate for the period April 1992 to March 2004. The results show that interest rate and IIP depend on the exchange rate and there is no relationship between interest rate and IIP.

These macroeconomic parameters through financial sector reforms have had a profound effect on the Indian stock market. The Indian stock market has witnessed metamorphic changes as regards to the size, structure and turnover. With more than 4700 listed companies, 2 crore shareowners and a market capitalization of ₹30,257,720 million (in 2005-06) developments in Indian stock markets are now comparable to those in other mature markets. Tripathi, Vanita (2009) examines the relationship between various company fundamentals and equity returns in the Indian stock market in this changed regime and tests for the economic feasibility of fundamentals based investment strategies in the advent of technological up gradation. The results of her study conclude that Indian market is still not semi-strong efficient as publically available information can be used to earn extra returns.

The movement of stock indices is highly sensitive to the changes in fundamentals of the economy and to the changes in expectations about future prospects. It is assumed that domestic economic fundamentals play a determining role in the performance of stock market. However, in the globally integrated economy, domestic economic variables are also subject to change due to the policies adopted and expected to be adopted by other countries or some global events. Recently, it is observed that contagion from the US sub prime crisis has played significant movement in the capital markets across the world as foreign hedge funds unwind their positions in various markets. Other burning example in India is the appreciation of currency due to higher inflow of foreign exchange. Rupee appreciation has declined stock prices of major export oriented companies. Ahmed, Shahid (2008) investigates the nature of the causal relationships between stock prices and the key macro-

economic variables (index of industrial production, exports, foreign direct investment, money supply, exchange rate, interest rate) representing real and financial sector of the Indian economy. The study indicates that stock prices in India lead economic activity except movement in interest rate which seems to lead the stock prices.

A defining characteristic of developing Asia as an economic entity is the acute intraregional heterogeneity that exists among Asian economies in terms of levels of economic development, rates of economic growth, and economic structures. A similar degree of heterogeneity is apparent in the types of exchange rate regimes officially operated by Asian central banks. For instance, China and Malaysia maintained firm US dollar (USD) pegged regimes until July 21, 2005, and Hong Kong continues to do so. Korea, Philippines, Thailand and Indonesia officially operate inflation targeting regimes with the interest rate as the monetary policy instrument. Cavoli and Rajan (2006) examines the degree of de facto exchange rate flexibility for India over the last two decades. While the Reserve Bank of India (RBI) is commonly believed to target the real effective exchange rate (REER), the results in this paper indicate that the Indian rupee is predominantly influenced by the US dollar, with the euro slowly gaining in significance as well.

In order to evaluate India's performance before, during and after the economic recession, we analyze in Section 1 the performance of various macro-economic indicators from a period of 2003-09. In Section 2, we discuss the methodology used to forecast the coming years. Finally in Section 3, we try and forecast some of the major guiding parameters of India's economy and project India's growth pattern in the coming fiscal periods. Hence, through this paper we try and present a comprehensive picture of the Indian economy during the past 6 years and how may it shape up during the fiscal 2010-11.

3. Analysis of Economic Variables

3.1. GDP

Since 2003, the GDP growth rate had averaged around 8.4% per year till 2007-08. Economic growth decelerated in 2008-09 to 6.7 per cent. This represented a decline of 2.1 per cent from the average growth rate of 8.8 per cent in the previous five years (2003-04 to 2007-08). Significant decline in growth rate was seen in the second half of 2008-09 following the financial crisis that began in 2007 in the industrialized nations. The real turnaround came in the second quarter of 2009-10 when the economy grew by 7.9 per cent. Recovery in the global economy picked up momentum in the fourth quarter of 2009.

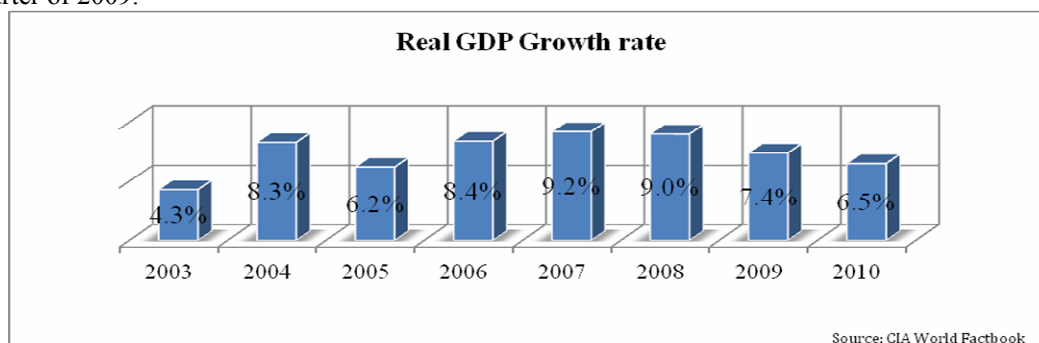


Figure 1. Real GDP Growth Rate

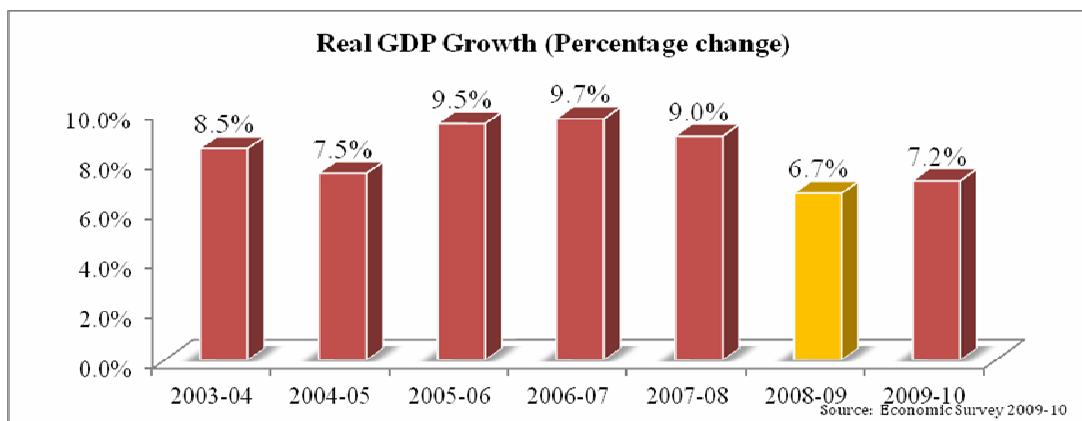


Figure 2. Real GDP Growth (Percentage change)

The speed of recovery, however, remains significantly divergent. The projections for global output for 2010 generally point to consolidating recovery, led by the Emerging Market Economies (EMEs). The WTO projects world trade to stage a strong recovery in 2010. The risks to the overall global macroeconomic environment have, however, increased because of large public debt in advanced economies, on the back of concerns relating to reduction in potential output, high unemployment rates, impaired financial systems and premature exit from the policy stimulus. As per the advance estimates of GDP for 2009-10, released by the Central Statistical Organization (CSO), the economy is expected to grow at 7.2 per cent in 2009-10, with the industrial and the service sectors growing at 8.2 and 8.7 per cent respectively. The professional forecasters' survey conducted in March 2010 by RBI shows overall (median) growth rate for 2010-11 at 8.2 per cent. Main driving factors include increased private consumption expenditure growth and relatively increased industrial activity in the first half and pick-up in services in the second half. The Industrial Outlook Survey conducted by the Reserve Bank shows improvement in the sentiments in the manufacturing sector, in continuation of the trend seen in the previous survey. Stronger growth impulses now coexist with significant acceleration in headline inflation in recent months. While the recovery in growth is expected to further firm up in 2010-11 over the preceding year, headline inflation could be expected to moderate over the next few months.

In the medium term it is reasonable to expect that the economy will go back to the robust growth path of around 9 per cent that it was on before the global crisis slowed it down in 2008. To begin with, there has been a revival in investment and private consumption demand, though the recovery is yet to attain the pre-2008 momentum. Second, Indian exports have recorded impressive growth in November and December 2009 and early indications of the January 2010 data on exports are also encouraging. Further, infrastructure services, including railway transport, power, telecommunications and, more recently but to a lesser extent, civil aviation, have shown a remarkable turnaround since the second quarter of 2009-10. The favorable capital market conditions with improvement in capital flows and business sentiments, as per the RBI's business expectations survey, are also encouraging. Finally, and even though it is too early to tell if this is a trend, the manufacturing sector has been showing buoyancy in recent months rarely seen before. The growth rate of the index of industrial production for December 2009—the latest month for which quick estimates are available - was a remarkable 16.8 per cent. There is also a substantial pick-up in corporate earnings and profit margins. Hence, going by simple calculations based on the above-mentioned variables, coupled with the fact that agriculture did have a set-back this year and is only gradually getting back to the projected path, a reasonable forecast for the year 2010-11 is that the economy will improve its GDP growth by around 1 percentage point from that witnessed in 2009-10. Thus, allowing for factors beyond the reach of domestic policymakers, such as the performance of the monsoon and rate of recovery of the global economy, the Indian GDP can be expected to grow around 8.5 +/- 0.25 per cent, with a full recovery, breaching the 9 per cent mark in 2011-12.

3.2. Capital Markets

In September 2008, volatility in the S&P 500 spiked to levels not seen since the 1987 stock market crash. At the end of 2008 equity prices in the United States, as Standard & Poor's 500 index, were lower by around 39 per cent as compared with its level at end of 2007. The Indian equity markets have declined sharply during 2008, reflecting the volatility in international financial markets and foreign institutional investment outflows. With the revival of foreign institutional investors' (FIIs) interest in emerging market economies including India, the equity markets gained strength during May-July 2009. Despite the spectre of inflation and interest rate hikes looming large in 2010, foreign investors and analysts are bullish on India, betting on economic expansion, acceleration in company earnings, and revival of capital expenditure and capacity building. The movement in equity indices in the Indian capital market was in line with trends in major international equity markets, a sign of increasing integration. Against the backdrop of these trends in Indian equity markets, the regulatory measures initiated during the year were clearly in the direction of introducing greater transparency, protecting investors' interests and improving efficiency in the working of Indian equity markets, while also ensuring the soundness and stability of the Indian capital market.

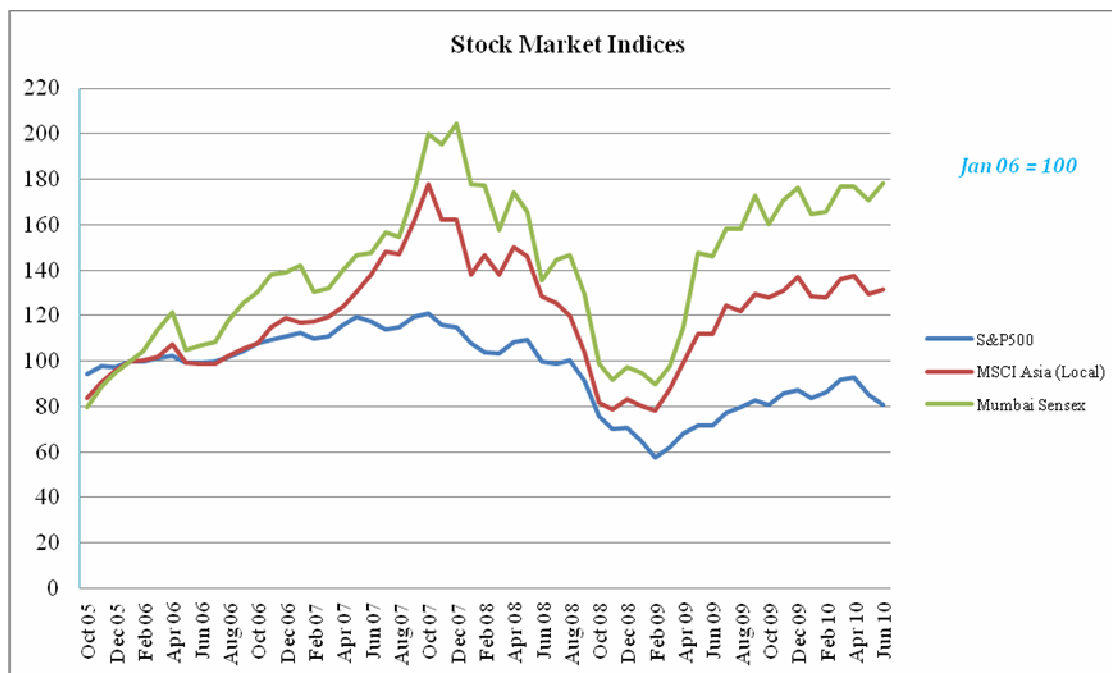


Figure 3. Stock Market Indices

During 2009, the Asian stock markets were on a recovery path. The cumulative change in global indices in end-December 2009 over the end- December 2003 level revealed a significant rise in these indices across countries. The Jakarta Composite index (Indonesia) registered a rise of 264.1 per cent to 2,510 at end-December 2009, while the BSE Sensex was up by 199.1 per cent to 17,465 in end-December 2009. Nikkei 225, Japan, however remained lower than its end – December 2003 level. Notwithstanding an improvement in global stock indices during the year, they were still lower than the levels reached in 2007.

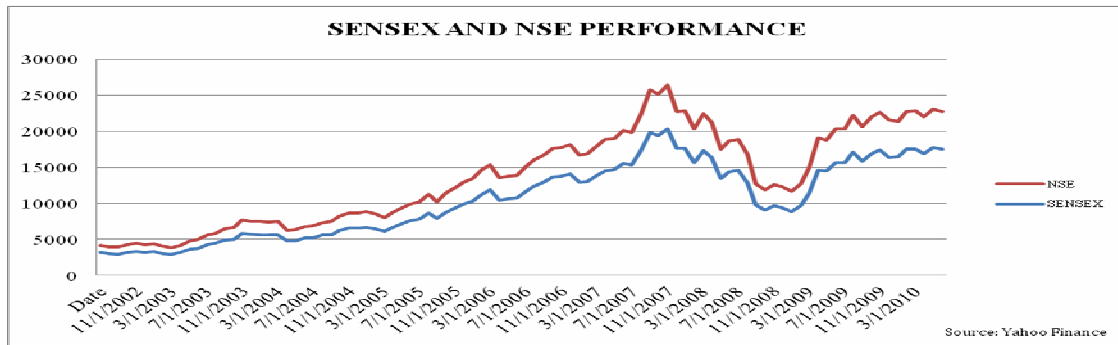


Figure 4. Sensex and NSE Performance

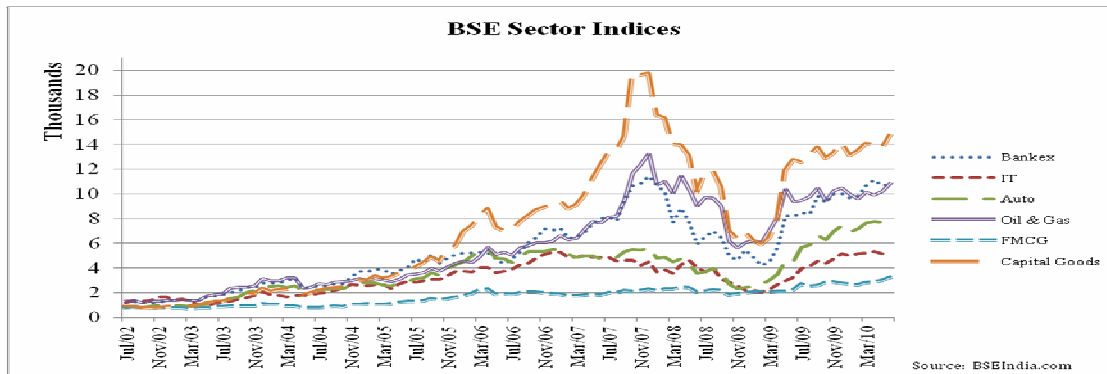


Figure 5. Stock Market Indices

3.3. Exchange Rates

The annual average exchange rate during 2008-09 worked out to Rs. 45.99 per US dollar compared to Rs. 40.26 per USD in 2007-08 which is the biggest annual loss for the rupee since 1991 crisis. Capital outflows during 2008 and early part of 2009 significantly weakened currencies in India. Reflecting the easing supply conditions in the market led by capital inflows, dollar exhibited declining trend during the early half of 2009-10, on account of underlying demand conditions. In fiscal 2008-09, the rupee depreciated against major international currencies, except the pound sterling, due to deceleration in capital flows and widened trade deficit. The annual average exchange rate of the rupee in 2008-09 was Rs 45.99 per US dollar, Rs 64.98 per euro and Rs 46.22 per 100 yen, indicating depreciation by 12.5 per cent, 12.2 per cent and 23.5 per cent respectively over the annual average exchange rate during 2007-08.

However, annual average exchange rate of the rupee per pound sterling of 78.29 in 2008-09 indicated appreciation by 3.2 per cent over 2007-08. In fiscal 2009-10, with the signs of recovery and return of FII flows after March 2009, the rupee has been strengthening against the US dollar. The movement of the exchange rate in the year 2009-10 indicated that the average monthly exchange rate of the rupee against the US dollar appreciated by 9.9 per cent from Rs 51.23 per US dollar in March 2009 to Rs 46.63 per US dollar in December 2009, mainly on account of weakening of the US dollar in the international market.

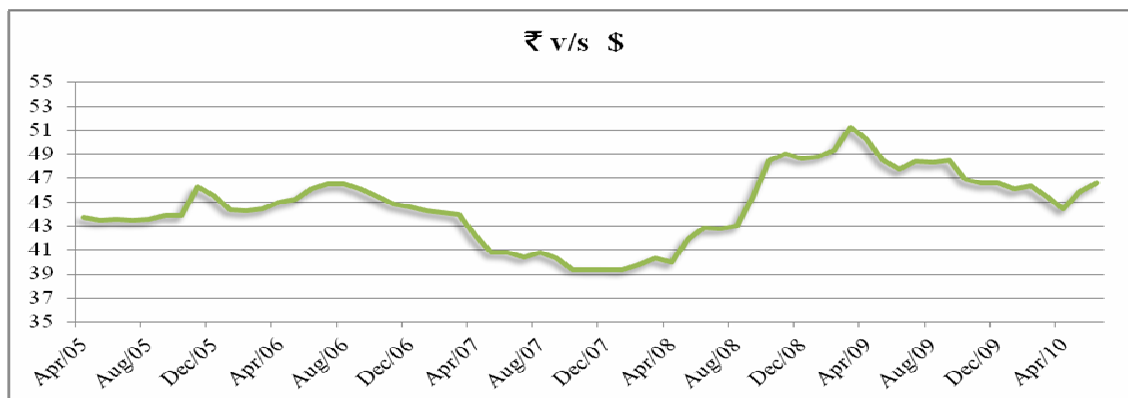


Figure 6. Rupee V/S Dollar

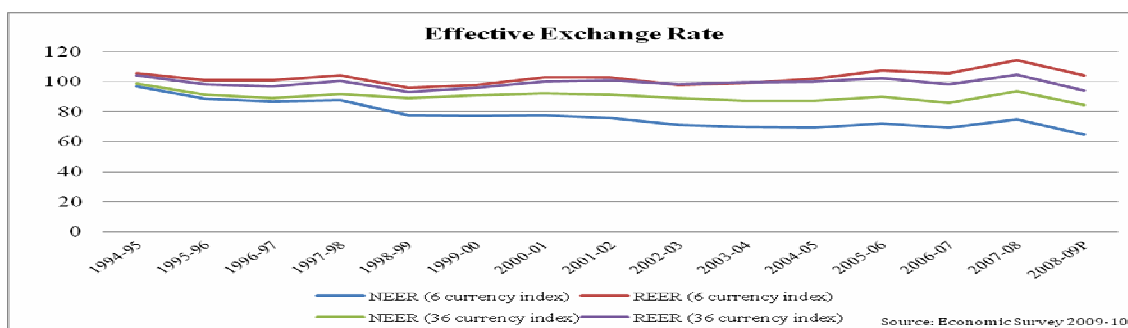


Figure 7. Effective Exchange Rate

The nominal effective exchange rate (NEER) and real effective exchange rate (REER) indices are used as indicators of external competitiveness of the country over a period of time. NEER is the weighted average of bilateral nominal exchange rates of the home currency in terms of foreign currencies. REER is defined as a weighted average of nominal exchange rates adjusted for home and foreign country relative price differentials. REER captures movements in cross-currency exchange rates as well as inflation differentials between India and its major trading partners. The RBI has been constructing six currency (US dollar, euro for eurozone, pound sterling, Japanese yen, Chinese renminbi and Hong Kong dollar) and 36 currency indices of NEER and REER. The rupee appreciated against the US dollar by 10.0 per cent during 2009-10 till November 2009. The rupee appreciation was, however, modest at 3.23 per cent against the six-currency trade-weighted NEER during 2009-10 (March to November 2009). The average six-currency trade-weighted REER (base:1993-94=100) increased from 98.58 in April 2009 to 104.94 in November 2009 mainly on account of appreciation of the rupee against the US dollar and increase in inflation differentials between India and its trading partners. The appreciation of the rupee against the US dollar and increase in inflation differentials between India and its trading partners during the year led to appreciation of the real exchange rate. On balance of payments basis (i.e., excluding valuation effects), the foreign exchange reserves increased by US\$ 11.3 billion during April-December 2009 as against a decline of US\$ 20.4 billion during April-December 2008. The valuation gain, reflecting the depreciation of the US dollar against the major international currencies, accounted for US\$ 20.2 billion during April-December 2009 as compared with a valuation loss of US\$ 33.4 billion during April-December 2008. Accordingly, valuation gain during April-December 2009 accounts for 64.1 per cent of the total gross increase in foreign exchange reserves.

3.4. Investments

Gross domestic capital formation(GDCF) at current prices (adjusted for errors and omissions) increased from Rs18,65,899 crore in 2007-08 to Rs19,44,328 crore in 2008-09 and at constant (2004-05) prices, it decreased from Rs16,22,226 crore in 2007- 08 to Rs15,57,757 crore in 2008-09. The rate of gross capital formation at current prices rose from 32.7 per cent in 2004-05 to 37.7 per cent in 2007-08 before declining to 34.9 per cent in 2008-09. At sectoral level, the rate of gross capital formation or simply the investment rate has increased in both the public and private sectors. In the former it rose continuously from 7.4 per cent in 2004-05 to 9.4 per cent in 2008-09, whereas in the latter, it increased from 23.8 per cent in 2004-05 to 27.6 per cent in 2007-08 before falling to 24.9 per cent in 2008-09. Between 2007-08 and 2008-09, the investment rate for the private corporate sector declined significantly from 16.1 per cent to 12.7 per cent, whereas that of the household sector increased from 11.5 to 12.2 per cent.

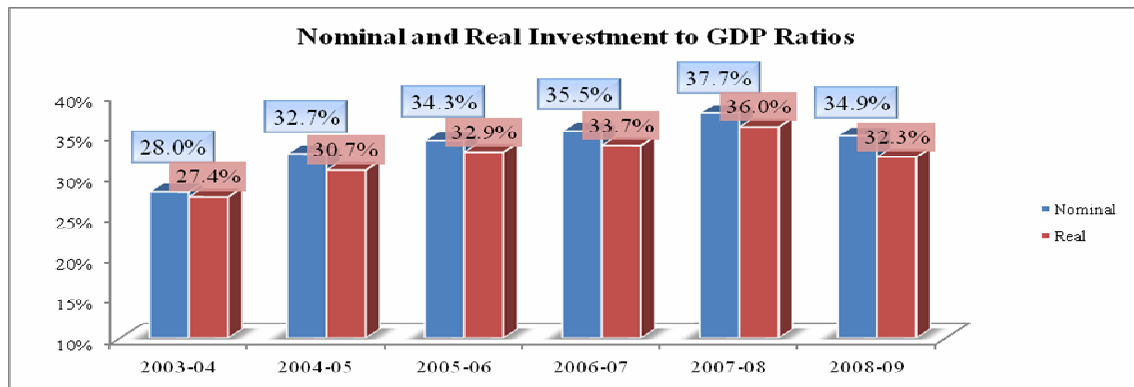


Figure 8. Nominal and Real Investment to GDP Ratios

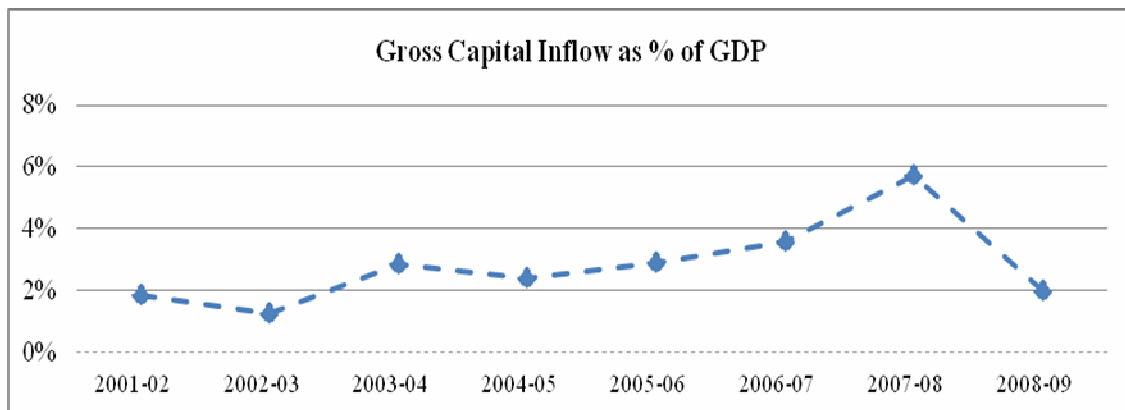


Figure 9. Gross capital inflow as a percentage of GDP

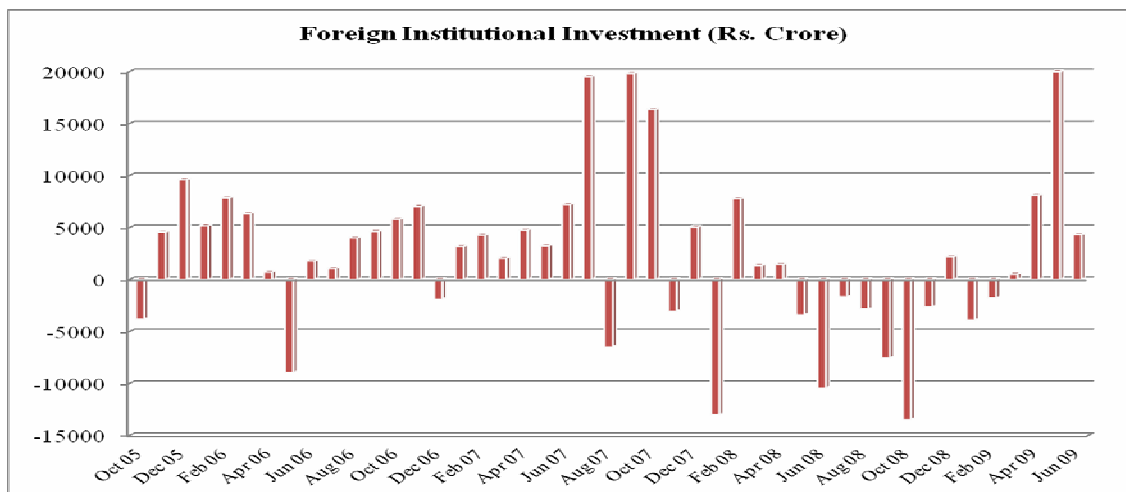


Figure 10. FII

The number of registered FIIs rose to 1,706 at the end of 2009 from 1,594 in 2008. The number of sub-accounts also increased to 5,331 from 4,872 during the same period. The FII in the spot market increased to Rs 83,424 crore in 2009 as compared to withdrawals of Rs 52,987 crore in 2008. Further, net investment in debt was lower at Rs 4,563 crore in 2009 as compared to Rs 11,772 crore in 2008. Total net investment by FIIs in equity and debt markets taken together, increased considerably to Rs 87,987 crore in 2009 compared to a net decline of Rs 41,216 crore in 2008

3.5. Trade

With the deepening of the global recession, the beginning of 2009-10 saw acceleration in the fall of export growth rate. The upwardly revised export figures for the first half of 2008-09 also contributed to the faster decline in the growth rate. While the export growth rate was a negative 22.3 per cent in April-November 2008-09, in November 2009, it became a positive 18.2 per cent after a 13-month period of negative growth. This significant turnaround is due to the low base figures in November 2008 (at \$11.2 billion compared to \$14.1 billion in October 2008 and \$13.4 billion in December 2008). The export growth rate in November 2009 over October 2009 was marginally positive at 0.04 per cent. In December 2009 the recovery in export growth has continued with a positive year-on-year growth of 9.3 per cent and a growth of 10.7 per cent over the previous month.

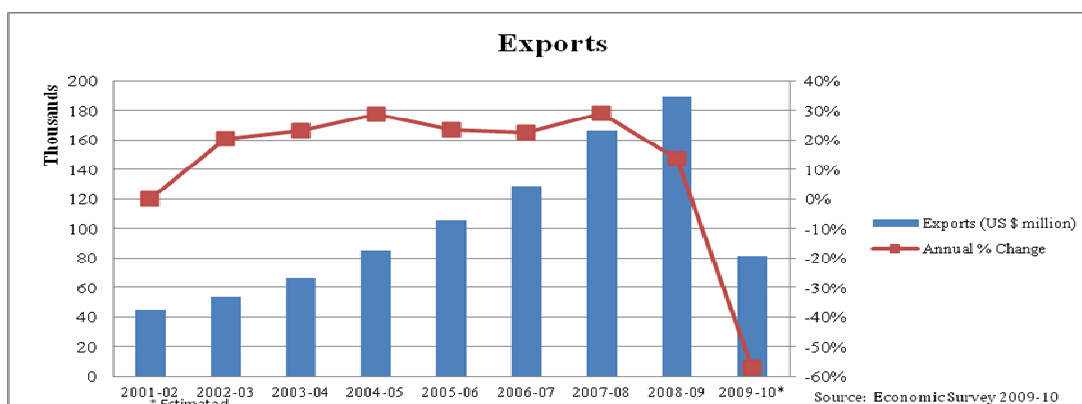


Figure 11. Exports

Net exports (of goods and services) contributed positively (20.4 per cent) to GDP growth in 2009-10, as against a negative contribution of around 36.2 per cent in 2008-09. This revival in the

pattern in the first three quarters of 2009-10 was on account of sharper contraction in imports than in exports, even though in absolute terms, imports continued to exceed exports, thereby yielding negative net exports. Export growth continued to be negative in Q3 of 2009-10, but the rate of contraction had declined over the preceding quarters, indicating signs of recovery in external demand

3.6. Fiscal Deficit

The fiscal expansion undertaken by the Central Government as a part of the policy response to counter the impact of the global economic slowdown in 2008-09 was continued in fiscal 2009-10. The expansion took the form of tax relief to boost demand and increased expenditure on public projects to create employment and public assets. The net result was an increase in fiscal deficit from 2.6 per cent in 2007-08 to 5.9 per cent of the revised GDP (new series) in 2008-09 (provisional) and 6.5 per cent in the budget estimates for 2009-10 (as against 6.8 per cent of the GDP on the old series, reported earlier). Thus the fiscal stimulus amounted to 3.3 per cent of the GDP in 2008-09 and 3.9 per cent in 2009-10 from the level of the fiscal deficit in 2007-08

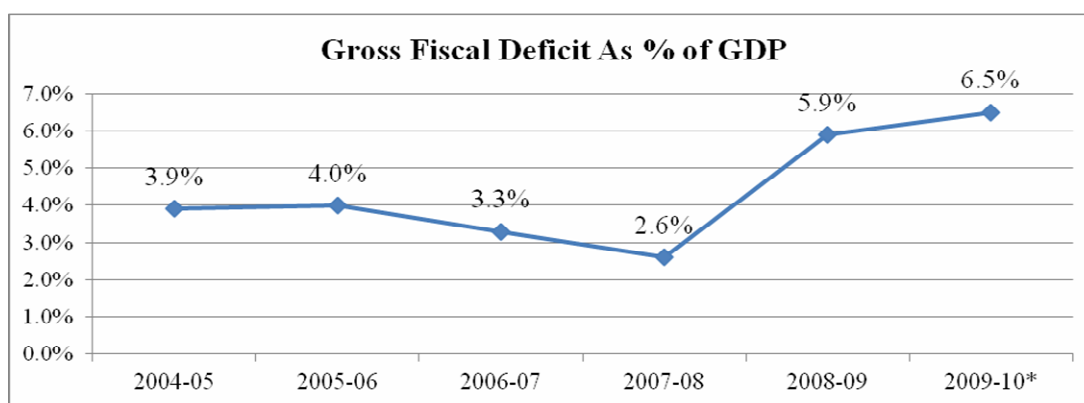


Figure 12. Gross Fiscal Deficit as a percentage of GDP

3.7. Inflation

A major concern during the year 2009-10, especially in the second half, was the emergence of high double-digit food inflation. On a year-on-year basis, wholesale price index (WPI) headline inflation in December 2009 was 7.3 per cent but for food items (primary and manufactured) with a combined weight of 25.4 per cent in the WPI basket, it was 19.8 per cent. Thus, unlike the first half of 2008-09 when global cost-push factors resulted in WPI inflation touching nearly 13 per cent in August 2008, with inflation in primary and manufactured products just below the overall average and that in the fuel and power group at over 17 per cent, the upsurge in prices in the second half of 2009-10 has been more concentrated and confined to food items only. As of the week ending January 30, 2010 the inflation in primary food articles stood at 17.9 per cent, and that in fuel, power light and lubricants at 10.4 per cent.

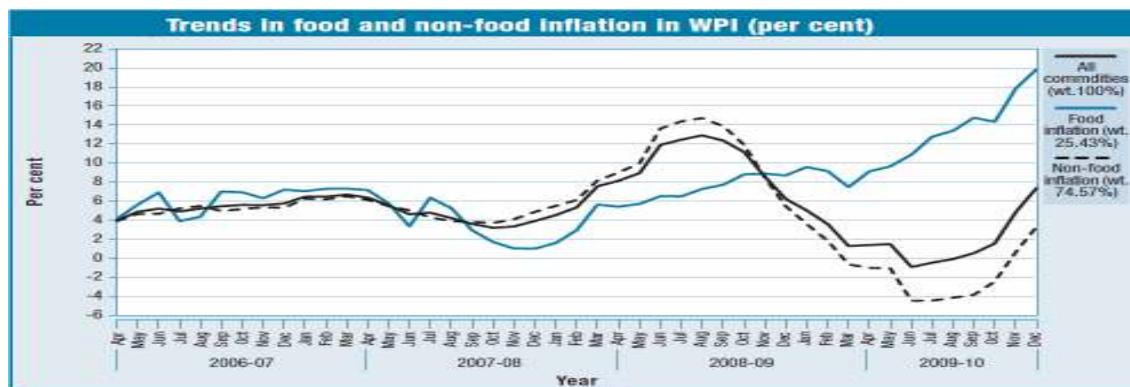


Figure 13. Trends in Food and Non-Food Inflation

A significant part of this inflation can be explained by supply-side bottlenecks in some of the essential commodities, precipitated by the delayed and sub-normal southwest monsoons. Since December 2009, there have been signs of these high food prices, together with the gradual hardening of non-administered fuel product prices, getting transmitted to other non-food items, thus creating some concerns about higher than- anticipated generalized inflation over the next few months. The skewedness of inflation that has been observed—some sectors are facing huge inflation, some no inflation and some deflation—is rather rare in the country’s history. For instance, in 1973-74 food inflation was 22.7 per cent and nonfood 36.4 per cent, in 1980-81 food inflation was 11.4 per cent and non-food 11.9 per cent, in 1986-87 food inflation was 10.2 per cent and non-food 11.4 per cent, in 1991-92 food inflation was 20.2 per cent and non-food 18.0 per cent, and there are several other years where the pattern was the same. The current inflation is of a different kind. It stands out for its lopsidedness across sectors. In 2009-10 (April- November), food inflation was 12.6 per cent and nonfood inflation minus 0.4 per cent. If we look at India’s inflation history from 1971, this kind of inflation, where food inflation is above 10 per cent and non-food inflation is negative, has happened only twice before– in 1992-93 and 1996-97. And food inflation of over 10 per cent, non-food inflation negative and fuel, power, light and lubricant (FPL&L) inflation less than 10 per cent has never occurred refer Appendix VIII: Inflation).

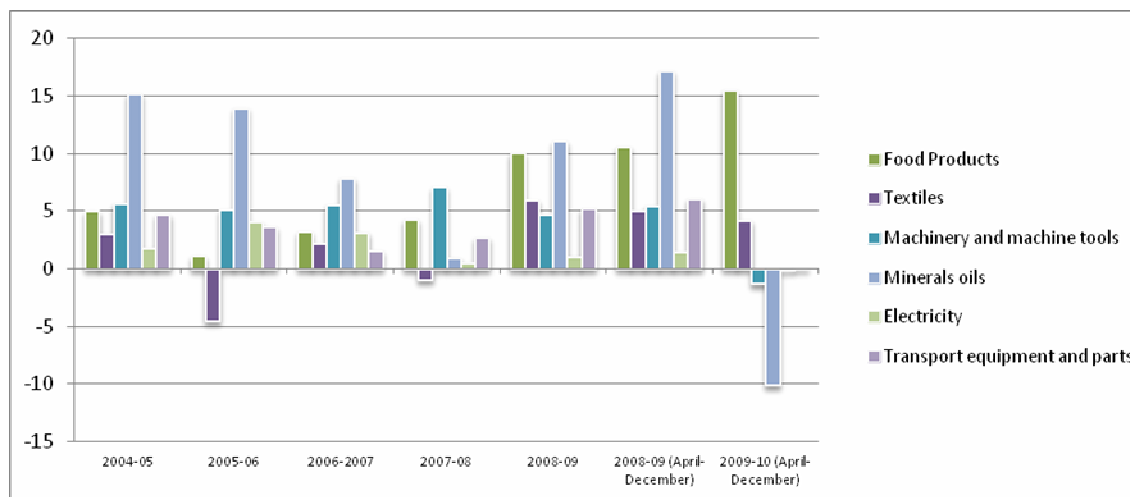


Figure 14. Inflation by category

Inflation can be expected to moderate over the next few months, from the peak levels seen in recent months. There are, however, upside risks to inflation. First, international commodity prices, particularly oil, have started to increase again. In several commodities, the import option for India to

contain domestic inflation is limited, because of higher international prices. Second, the revival in private consumption demand and the bridging of the output gap will add to inflationary pressures. Finally, it is important to guard against the risk of hardening of inflation expectations conditioned by near double digit headline WPI inflation.

Through the decades, inflation has steadily increased from the 1950's to the 1980's. However, since the deregulation of sectors, privatization and liberalization in the early 1990's, WPI has seen a significant decrease from an average of 7.8% to an average of 5.2% from 2001-02 to 2008-2009. From this trend, we can forecast that inflation will further decrease over the course of the next decade, despite the recent downturn in the economy due to the sub-prime crisis.

3.8. Corporate Indicators

Profit after tax has performed radically over the last decade and half. In contrast, sales growth has varied between 25% and 0% over the same duration. Negative profits after tax were observed during the recession of 2001-02 and recent subprime crisis. Companies, such as TVS motors and Yes Bank have in recent months reported positive returns and thereby positive return are projected in the coming years, i.e. 2009-10.

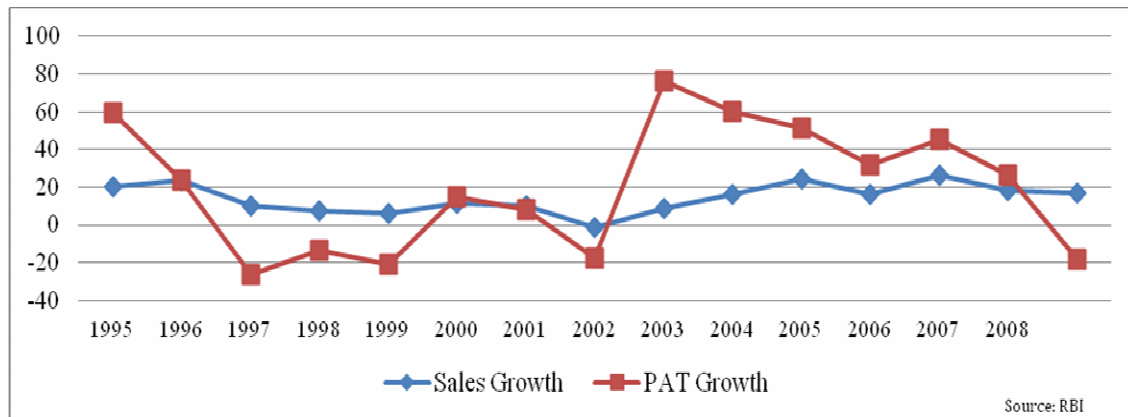


Figure 15. Corporate Indicators

4. Data & methodology for forecasting

The data for the following factors has been collected in the context of the Indian Economy - GDP growth rate, major stock market and sectoral indices, exchange rate, nominal and real investments, exports, fiscal deficit, corporate indicators such as sales growth and PAT, inflation, food production consumption gap, capital inflows and foreign institutional investments from various sources, including Economic Survey, Reserve Bank of India, World Bank, Securities Exchange Board of India and Foreign Exchange Dealers Association of India for the period 2003-09.

The main economic indicators that have been forecasted using ARIMA (*Auto Regressive Integrated Moving Average*) methodology are GDP, sensex, fiscal deficit and FII. These series were first checked for stationarity and then various models were fitted. Using Box-Jenkins methodology, the best model for each variable was chosen and used for forecasting.

5. Forecasted Results & Conclusions

5.1. Real GDP Growth Rate

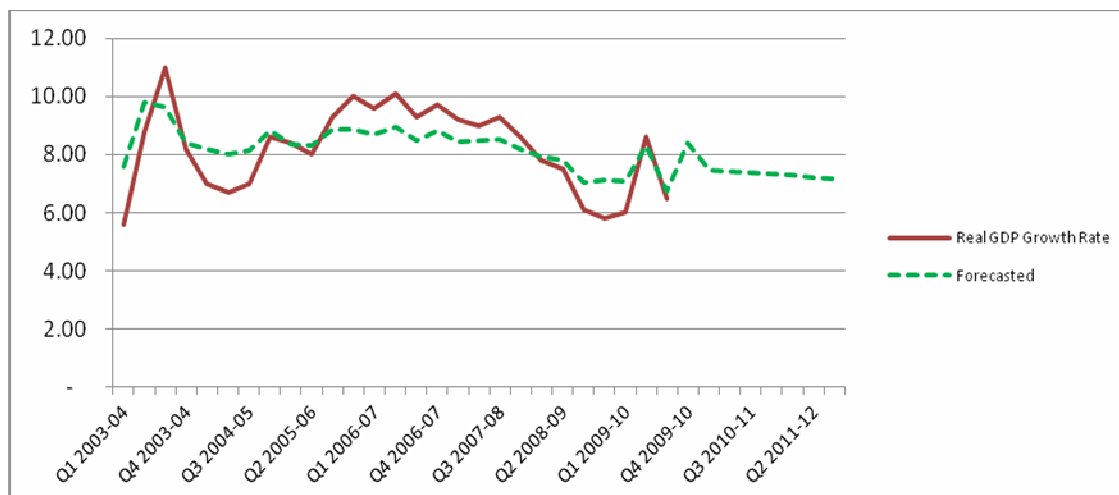


Figure 16. Forecasted Real GDP Growth Rate

India seems like the last man standing around in this world, with the kind of robust domestic consumption and GDP growth. The economic growth in India is for real and what is really working in India's favor is the rising domestic demand. The growth is driven by robust performance of the manufacturing sector on the back of government and consumer spending. Economic activities which showed significant growth rates in 2009-10 over the corresponding period last year were mining and quarrying (10.6 per cent), manufacturing (10.8 per cent), electricity, gas and water supply (6.5 per cent), construction (6.5 per cent), trade, hotels, transport and communications (9.3 per cent), financing, insurance, real estate and business services (9.7 per cent), community, social and personal services (5.6 per cent). India's industrial output grew by 17.6 per cent in April 2010. The manufacturing sector that accounts for 80 per cent of the index of industrial production (IIP) grew 19.4 per cent in April 2010, as against 0.4 per cent a year-ago. Capital goods production grew by 72.8 per cent against a contraction of 5.9 per cent a year ago. Consumer durables output continued to grow at a fast pace of 37 per cent, mirroring higher purchase of goods such as televisions and refrigerators. Also positive responses from the foreign investors have reflected in the gains in the capital markets and strengthened the country's position on the world economic front.

In spite of all these numbers in favor of the economy, one area where India needs to keep an eye on is the current account deficit. If you look at India's imports over exports, they are running at \$150 billion negative which means that we are consuming a lot more from imports than we are able to export. Combine this with the fact that the import intensity of the economy is going up as domestic consumption is rising. And, as prices move up, it has an impact on salaries and real estate. Another big factor plaguing India's growth rate has been our execution and implementation of projects. All these will put pressure on economy's growth as a whole.

Keeping in mind these factors, we would like to believe that we can grow between 7.6% - 8.0 % for the next few quarters and thereafter India should be poised to return back to its path of sustained high growth rates of 9.0 % and above.

5.2. Exchange Rate

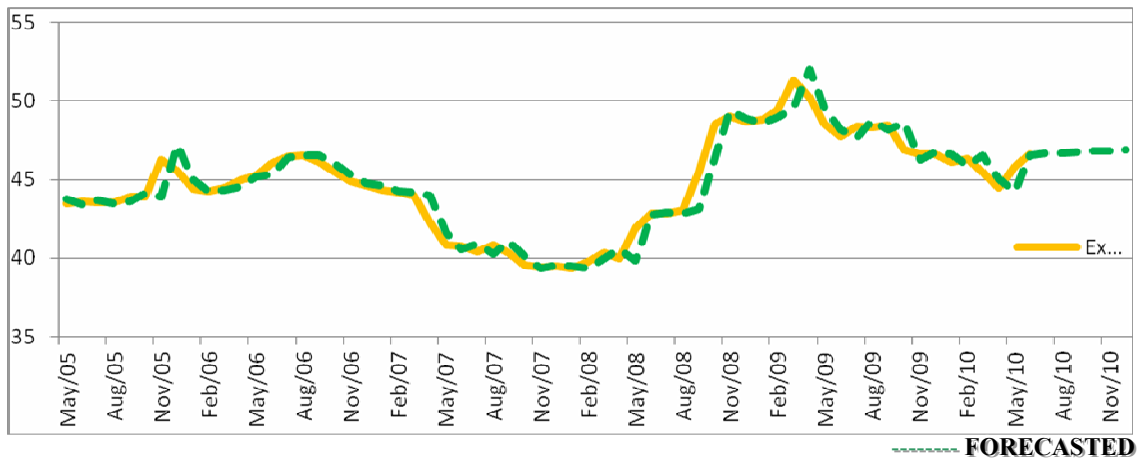


Figure 17. Forecasted Exchange Rate

The exchange rate is forecasted to fluctuate between 46Rs/\$ to 47Rs/\$ till December 2010. The rupee should fundamentally, depreciate as a result of the significant current-account deficit, which tracks trade and investment flows. India’s trade deficit widened to \$118.4 billion in the fiscal year ended March 31, from \$88.5 billion a year ago. Further dampening the current-account deficit is the fact that India’s economy has been growing at better rates than countries in North America and Europe, leading to a reduction in exports and a stable growth imports.

However, an improving economy should bring capital inflows, which in turn should hedge the downward pressure. India’s GDP is projected to grow at 7.1% in the coming year and thereby attract FDI and FII flows. An increase in demand for the currency should avoid the currency from reaching the 50Rs/\$ mark.

5.3. Sensex

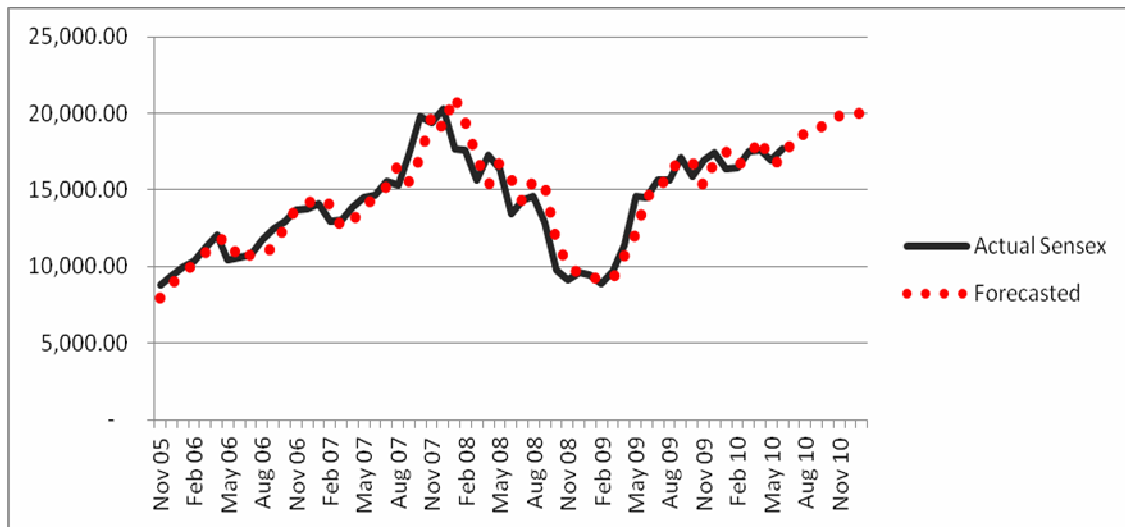


Figure 18. Forecasted BSE Sensex

We forecast the BSE Sensex to cross the 20,000 level by January 2011. This increase will be a result of positive macroeconomic outlooks, persistent FII inflows, and healthy corporate profits. These factors should also create an optimistic market sentiment and further the ongoing trend.

Many institutions and analysts have recently raised India’s growth forecast for 2010. International Monetary Fund raised its forecast to 9.5% from 8.8% in July this year. The Prime

Minister of the nation, Manmohan Singh has also recently stated that the country's economy should grow by 8.5% for the financial year ending March 31, 2011. The prime reason cited by institutions and analysts for their optimistic projections has been favourable financial conditions in the Indian market. These forecasts are due to have a ripple effect on institutional investors and the stock market.

Furthermore, strong buying by foreign funds has further boosted market sentiments. FIIs had made 80% or \$59.66 billion of the total net investments, in last seven years since 2003. The Bombay Stock Exchange (BSE), Sensex has appreciated over 400% over the course of the same period. Furthermore, FIIs have accounted almost 14% market share of the total market capitalization of the BSE. They equity shares are valued at Rs 822,497 crore in more than 1,000 Indian companies. Over the next few fiscal years, we project these investments to further increase and affect the BSE in a similar vein to that it has had since 2003.

Corporate profits released in quarter 1 and 2 this year have sustained the positive outlook and direction of the market. Bloomberg has projected 72% of India's companies to yield increased profits. These profits and outlooks have not only assisted other sectors, including, real estate in recovering from the downturn, but also attracted companies such as Volkswagen and Ford to setup operations in India.

5.4. Investments

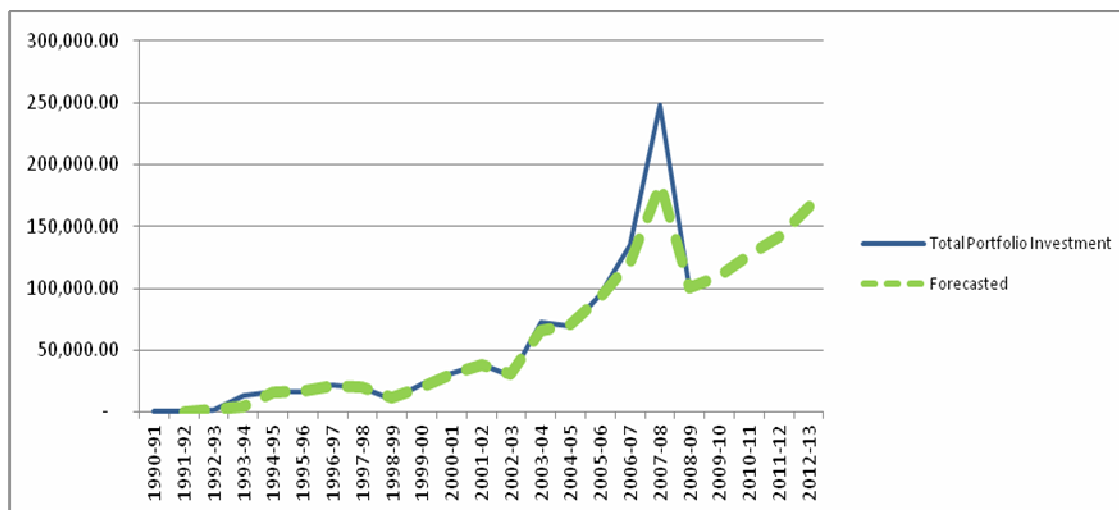


Figure 19. Forecasted Total Portfolio Investments

India and other emerging markets were relative to developed countries in Europe, such as Portugal, Greece and Spain less affected by the US credit crisis and were quick to recover from the aftermath of the recession. These economies as a result, have seen significant fund inflows. In March this year, data released by SEBI showed that FII inflows in equity markets in India at \$75.12 billion. This shows strong economic fundamentals of the country, as well as confidence of the foreign investors in the growth and stability of the Indian market. We forecast investments to continue to increase in the coming fiscal years to 165,778.86 crore rupees in 2012-13.

5.5. Fiscal Deficit

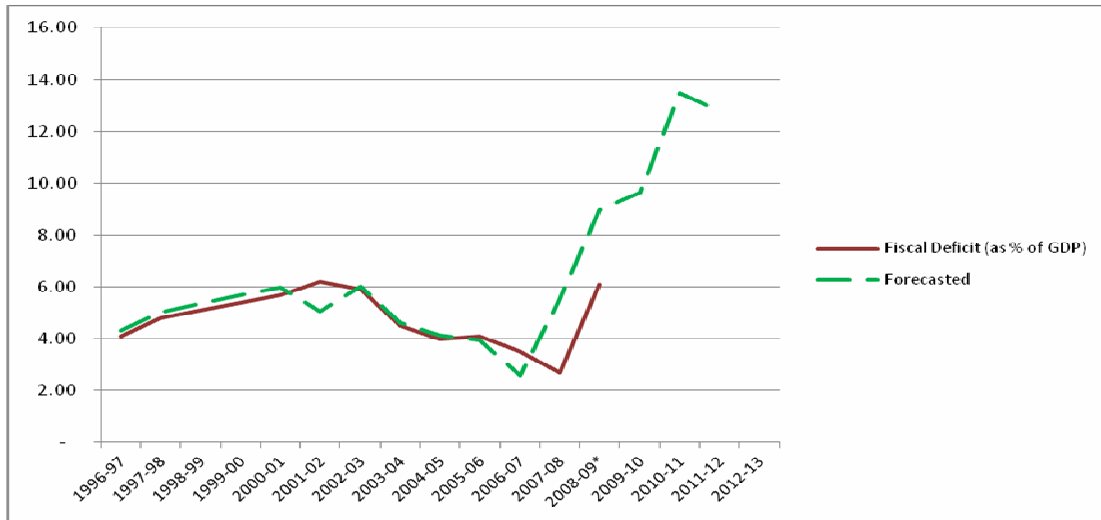


Figure 20. Forecasted Fiscal Deficit

Our results forecast fiscal deficit to increase to 13.5% by 2011-12. The increase will be a result of increased government spending towards infrastructure facilities and government initiatives to stimulate demand after the recession. In 2012-13, fiscal deficit as a percent of GDP is forecasted to decline from 13.5% to 12.8%.

In the first ten months of this fiscal year, India's fiscal deficit soared by 34 per cent to Rs 3.5 lakh crore against Rs 2.62 lakh crore a year ago, mainly on account of the stimulus measures taken by the government to revive the economy. These measures have included massive spending programs and easing duties in three stages from December 2008. An increase in the coming fiscal year is also in line with the Government's budget planning as the fiscal deficit for the current fiscal is pegged at 6.9 percent, 0.1 percent higher than last year. A further increase in deficit over the next few years will be a result of an increase in spending on higher wages and unemployment benefits as well as a large increase in the government's interest burden.

4. Conclusion

Given this background, in our view, with the economy returning to normal conditions, government would lift most of the sops provided to various sectors to stimulate demand and expenditure. Any big rebound expected in the overall GDP could be dampened by the high rates of inflation persisting today. But still with the confidence in the developing economies reviving after a period of global recession, foreign investments in the country are set to rise and thus we could see rising levels of industrial production in the coming couple of years. The main elements that would support the growth in industrial production include the prospect of a rebound in investment activity, increased thrust of the government on infrastructure projects and the renewed growth of exports. We expect consumption demand to be the major contributor to GDP growth in the coming fiscal, which in turn will augment investment demand. The impetus to consumption demand will come from healthy growth in income levels as job creation gathers pace.

Adding all this up together, though the country has bounced back at a quick pace, it should still take a couple of years to become steady on its path of sustained growth.

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THE IMPACT OF OVERCONFIDENCE BIAS AND DISPOSITION EFFECT ON THE VOLUME OF TRANSACTION AND THE VOLATILITY OF THE FRENCH STOCK MARKET¹

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Abstract:

The volume of transaction varies according to several factors. Of a point of view of the behavioural finance, a high level of this last can be assigned to a phenomenon of overconfidence or a disposition effect. This paper studies these two phenomena as well as the one of the asymmetry of the volatility on the French stock market. The objective of this paper is to introduce explanations of the behavioural finance in the sources of variation of the transaction volumes. The adopted methodology is based on VAR analyses, T-GARCH regressions and time series regressions.

Keywords: Trading volume, return, overconfidence, disposition effect, volatility, French stock market.

JEL Classification: E44, G1

1. Introduction

The volume of transaction is a variable whose movement depends on many factors. Several researchers tried to determine the reasons of its variation in the time. Smidt (1990) assigns the increase of the transaction volume to the reduction of the transaction costs and to the big institutional investor influence on the operations of purchase and sale of the stocks. Glaser and Weber (2006) show that the transactions for motives of liquidity are not necessarily irrational and are not satisfactory to explain the volumes of exchange raised. They also invite to include the human psychology in the determination of the variation of the transaction volume.

Other researchers studied the effect of the seasonality on the movement of the exchange volume. In this sense, Jain and Joh (1988) show that the day of Monday records the less the volumes of transaction and that Thursday and Friday also present weak transaction. Mai and Tchameni (1996) find the same results for Monday but they note that Friday marks strong transactions. They also notice that an effect of January exists on the volumes of transaction. Indeed, the transactions of the month of January and February are meaningfully superior to those in the middle of the year (March - October)³.

Some studies, leaning on the human behaviour, find that the growth of the transaction volume is bound to a behavioural bias, to know the overconfidence of the individuals. Indeed, Kyle and Wang (1997) and Odean (1998a) defined the overconfidence as being an overestimate of the degree of precision of the signals of information that the investors possess and foresee that the volumes of transaction increase according to the overconfidence. Daniel, Hirshleifer and Subrahmanyam (1998) specify that the raised returns of the market entail a high volume of transaction because of the overconfidence of the individuals. However, they don't indicate the degree of delay in the relation between the returns of stock and the volume of transaction.

Glaser and Weber (2006) determine that the overconfidence can appear through four tablets: the bad calibration, the effect of better than the average⁴, the illusion of control and the unrealistic optimism. However, most researchers define the overconfidence by the tendency of the individuals to overestimate the degree of precision of their private information. Statman, Thorley and Vorkink (2004) find a small difference, in the implications of the models of the transaction volume, between

¹ I thank professors Mondher Bellalah, Fathi Abid, Mohamed Triki, Pascal Grandin and Jacques Hamon for their commentaries and discriminating advices about this theme.

³ In the appendix, we test the existence of a January effect on the volumes of transaction of the French market and we find that the volumes of exchange don't change the month of January meaningfully in relation to the other months of the year.

⁴ The individuals think that they achieve some performances the average above.

the bad calibration and the effect of best that the average. They drive the tests that don't distinguish between these two versions.

The literature on the overconfidence of the individuals is essentially based on two hypotheses. The first consists to an overestimate of overconfident investors of the degree of precision of their private information and the second stipulates that the bias of auto-attribution makes vary the degree of overconfidence according to the achieved returns. Therefore, overconfident individual is less averse to the risk and makes more aggressively of the transactions what brings to increase the volume of transaction.

Statman and Thorley (1999) stipulate that the bullish markets entail an increase in the volumes of transaction. Gervais and Odean (2001) develop a model at several periods, and consider that overconfident individual assigns the past and elevated returns of the markets to their expertise in the selection of the stocks. Therefore, the excess of confidence returns the investors less averse to the risk and more aggressive in their negotiations insofar as they make more frequent transactions in subsequent periods. It can generate an excess of transaction volume. Gervais and Odean foresee, otherwise, that the losses of the market reduce the overconfidence of the investors and thereafter the volume of transaction decreases subsequently. They assign consequently a positive relation between the volume of transaction and the delayed returns of the market. However, this positive relation is asymmetric.

In this sense, Black (1976) watch that the returns of the stocks are joined negatively to the changes in the volatility (effect of lever). Indeed, the bad news have more important effects on the volatility that those of the good news. The impact of news is then asymmetric. The reduction in volume of transaction following losses is superior in absolute value to the increase in volume following gains. Of this fact, the relation between the current transaction volume and the delayed volatilities of the returns is negative.

Black (1986) specifies that the cognitive mistakes and the emotions are motives of transactions. Shefrin and Statman (1985) model the impact of the emotions of pride and regret on the transactions. They stipulate that if the investors achieve some gains on individual stocks, they are proud of their realizations and offer to sell their stocks. The volume of transaction increases consequently. On the other hand, if these last achieve some losses, they regret their executions and delay the losing stock sale. Of where, the volume of transaction decreases. These emotions of pride and regret are called *disposition effect*. An empiric evidence of this effect is confirmed by Lakonishok and Smidt (1986), Ferris, Haugen and Makhija (1988), Odean (1998b), Heath, Huddart and Lang (1999).

Statman, Thorley and Vorkink (2004) notes that the hypothesis of overconfidence must be studied on the global level of the market, while the hypothesis of the disposition effect must refers to the individual stocks of the portfolio. Of where, there is a necessity to differentiate between the two hypotheses. Indeed, the empirical implications of the bias of overconfidence and the disposition effect defer the some of the other.

First, the disposition effect explains the incentive to make transactions of only one side. Indeed, the desire to sell some stocks after an achieved gain is expressed by the negotiation with other investors who don't have this bias. Therefore, this fact can affect the equilibrium prices of the stocks. The disposition effect can slow down the speed of reaction of the prices to the new information. Grinblatt and Han (2002) find that this effect is the main reason of the anomaly of momentum, developed by Jegadeesh and Titman (1993). However, the overconfidence can explain the two sides of a transaction. Indeed, the common difference in the opinions of two investors, drag a transaction that doesn't include other traders of liquidity or the rational investors. It being noted, that it cannot affect the equilibrium prices.

Then, the disposition effect is generally admitted like a reference to the investor's attitude opposite a specific stock in his portfolio. Of this fact, recent studies on the disposition effect used some databases on the individual investor transactions instead of aggregating the volume of transaction (Odean 1998b, Rangelova 2001, Dhar and Zhou 2002). However, the overconfidence affects the market in general. Indeed, if the investors are overconfident, then they are going to treat the same way all stocks in their portfolios without distinguishing between the winners and the losers. Therefore, the test of the hypothesis of overconfidence can be on the aggregated level of the transaction volume.

Several studies on the volume of transaction show that this last is joined to the current returns of the stocks and those retarded (Karpoff 1987, Stoll and Whaley 1987, Gallant, Rossi and Tauchen (1992), Bessembinder and Seguin 1993, Bessembinder, Chan and Seguin 1996, Chordia, Roll and Subrahmanyam 2000, Lo and Wang 2000). Ying (1966) argues that a weak transaction volume (vs. important) is accompanied often of a decrease (vs. growth) of price. He finds that the volume and the variation of price are positively correlated.

Of other recent research as those of Llorent, Michaely, Saar and Wang (2002), and Gervais, Kaniel and Mingelgrin (2001) examine the capacity of the volumes to foresee the returns. Besides, another shutter of research is interested in the relation between the volume of transaction and the current and retarded volatility of the returns (Harris and Raviv 1993 and Shalen 1993). In our survey, we try to study the relation in general between the returns, the volume of transaction and the volatility of the stocks and the market.

This paper is organized like follows: the section 2 consists in a description of the data. The section 3 is dedicated to the development of the research hypotheses. The section 4 proposes a presentation of the research methodology. The section 5 presents the results of research as well as their interpretation and the section 6 conclude the paper.

2. Description of the data

The sample is constituted of the stocks of the firms quoted on the French market (first market, second market and new market). In order to avoid the survivor's bias in the sample, we included the returns of the stocks that disappeared of the market or that are not quoted anymore. Our sample is composed of 527 firms for what all variables of the model are available. The data are extracted of the database of DataStream on one period going from the 01/06/1988 to 01/03/2004. The data on the volume of transaction before the 01/06/1988 didn't exist. The variables that we are going to use are the following:

- The returns of the stocks, noted, R_i
- The return of the market portfolio weighted by the value, noted, R_m
- The volume of transaction of the individual stocks, noted, T_i

This variable is defined by the report between the number of stocks exchanged⁵ relative at a firm (i) and the total number of the stocks⁶ of the firm (i), at given one month.

- The volume of transaction of the market, noted, T_m

This variable is defined by the report between the number of stocks exchanged on the market and the total number of the stocks that exists on the market, at given one month.

- The dispersion of the return of the market, noted, $ETCT_m$ is defined by the standard deviation of cross sectional returns of the month (t) weighted by the value. It represents the variation in cross section of the returns of the stocks.

Either,

w_i – The weight of the stock (i) in the market portfolio

σ_{it} – The standard deviation of the stock return (i) at the month (t)

$$ETCT_m = \sum_{i=1}^{527} w_i \sigma_{it} \tag{1}$$

- The standard deviation of the market return, noted, $ETST_m$ is defined by the standard deviation of the market return in time series of the month (t). It measures the inter-temporal change in the return of the market.

Either:

r^j – the return of the market at the month (j)

⁵ This variable is extracted from the Datastream database. It is expressed in thousands of local monetary units. The daily numbers are adjusted of the capital changes.

⁶ It presents the total number of ordinary stocks that represents the capital of the enterprise. This variable is extracted from the Datastream database. It is expressed in thousands of local monetary units.

J – the total number of the studied months (190 months)

$$ETST_m = \sum_{j=1}^{190} \sigma(r_j)^2 + 2 \sum_{j=1}^{190} \text{cov}(r_j, r_{j-1}) \quad (2)$$

All data are monthly.

3. The hypotheses of research

To show the relation between the parameters of transaction volume, returns and volatilities of the French market of the stocks, is formulate the following hypotheses:

H1: Hypotheses on the volume of transaction:

H1.1: The current market volume of transaction is joined positively to the delayed returns of the market. This hypothesis is justified by the fact that the bullish markets increase the overconfidence and the overconfident investors that are irrational make transactions in an aggressive manner. Of this fact, we foresee an elevated transaction volume following gains achieved by the market. This hypothesis is also mentioned by Odean (1998a) and Gervais and Odean (2001).

H1.2: The current volume of transaction is joined negatively to the delayed standard deviation (in cross section and in time series) of the market returns.

H2: Hypothesis on the volatility: the relation between the current transaction volume and the delayed returns of the market is asymmetric. This hypothesis is justified by the fact that the reductions in the volume of transaction of the market following undergone losses (bad news) are superior in absolute value to the increases of the volume following gains (good news). This hypothesis is also advanced by Black (1976). It is joined to the biased behavioural of aversion to the sure losses (loss aversion).

H3: Hypothesis of Disposition-Overconfidence: The volume of transaction of the individual stocks increases at a time with the return of the stocks and the delayed returns of market. This hypothesis is justified by the fact that the disposition effect implies an increase (vs. reduction) of the transaction volume of the winning (vs. losing) stocks in the past. It has an impact on the individual stocks. However, the effect of overconfidence foresees an increase in the volume of all stocks (winning and losing). It has an impact in general on the return of the market. Our hypothesis distinguishes between the effect of overconfidence and the one of disposition and combines them at the same time. The hypothesis of disposition is also defended by Odean (1999).

4. The methodology of research

4.1. Methodology for the test of the hypotheses on the volume of transaction

To test the hypotheses on the volume of transaction, we first adopt the gait of the causality test between the volume of transaction of the market T_m ; the return of the market portfolio weighted by the value R_m , the dispersion of the market return $ETCT_m$ and the standard deviation of the market return $ETST_m$.

The market transaction volume is caused by the returns of market and the variables of control ($ETCT_m$ and $ETST_m$) to the sense of Granger, if these last help towards the forecasting of the transaction volume.

Then, we lead a VAR⁷ analysis with (22)⁸ delays for the endogenous variables and (2)⁹ delays for the exogenous variables. This analysis is often used to study the interaction between two or several variables. The regression is described like follows:

⁷ VAR: Vector Autoregression.

⁸ The choice of the number of delay equal to 22, for the endogenous variables, is justified by the test of the verisimilitude report presented in the appendix.

⁹ The choice of the number of delay equal to 2, for the exogenous variables, is justified by the fact that we try to study the effect of the retarded volatility (of the month (t-1) and (t-2)) on the volume of transaction and the stock returns of the month (t).

$$\begin{bmatrix} T_{mt} \\ R_{mt} \end{bmatrix} = \begin{bmatrix} a_0 \\ b_0 \end{bmatrix} + \begin{pmatrix} a_1^1 & b_1^1 \\ a_1^2 & b_1^2 \end{pmatrix} \begin{bmatrix} T_{mt-1} \\ R_{mt-1} \end{bmatrix} + \dots + \begin{pmatrix} a_{22}^1 & b_{22}^1 \\ a_{22}^2 & b_{22}^2 \end{pmatrix} \begin{bmatrix} T_{mt-22} \\ R_{mt-22} \end{bmatrix} + \begin{pmatrix} c_0^1 & d_0^1 \\ c_0^2 & d_0^2 \end{pmatrix} \begin{bmatrix} ETCT_{mt} \\ ETST_{mt} \end{bmatrix} \\ + \begin{pmatrix} c_1^1 & d_1^1 \\ c_1^2 & d_1^2 \end{pmatrix} \begin{bmatrix} ETCT_{mt-1} \\ ETST_{mt-1} \end{bmatrix} + \begin{pmatrix} c_2^1 & d_2^1 \\ c_2^2 & d_2^2 \end{pmatrix} \begin{bmatrix} ETCT_{mt-2} \\ ETST_{mt-2} \end{bmatrix} + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \end{bmatrix} \quad (3)$$

If the delayed coefficients of the return of the market and standard deviations, in cross section and in time series, are meaningful in the regression of T_{mt} , then these variables are bound to the volume of transaction of the market and permit to foresee its future values.

Otherwise, we verify the sign of these coefficients to see the sense of variation of the transaction volume according to the other variables.

4.2. Methodology for the test of the hypothesis on the volatility of the returns

To test the hypothesis on the volatility of the returns, we use an autoregressive conditionally heteroskedastic model and more specifically the T-GARCH model. The choice of this last is justified by the fact that it allows an asymmetric answer of the conditional variance to the different shocks.

The conditional variance is expressed like follows:

$$\sigma_t^2 = w + \alpha \varepsilon_{t-1}^2 + \gamma \varepsilon_{t-1}^2 d_{t-1} + \beta \sigma_{t-1}^2 \quad (4)$$

With:

$d_t = 1$ if $\varepsilon_t < 0$, and $d_t = 0$ otherwise.

In this model, the good news ($\varepsilon_t > 0$) and the bad news ($\varepsilon_t < 0$) have a different effect on the conditional variance.

The good news ($d_t = 0$) has an impact of (α) and the bad news ($d_t = 1$) have an impact ($\alpha + \gamma$)

If (γ) is meaningfully different from zero, then the impact of news is asymmetric.

4.3. Methodology for the test of the hypothesis on the disposition effect and the overconfidence

To establish a relation between the stock transaction volume's of a firm, its returns and those delayed of the market and to test the disposition effect and the overconfidence, we are going to establish some regressions in time series of the current volume on the current and retarded returns.

The regression is described by:

$$T_{it} = \alpha + \sum_{j=0}^4 \beta_{mj} R_{mt-j} + \beta_{5-10,m} \sum_{j=5}^{10} R_{mt-j} + \sum_{j=0}^4 \beta_{ij} R_{it-j} + \beta_{5-10,i} \sum_{j=5}^{10} R_{it-j} + \varepsilon_t \quad (5)$$

T_{it} – the monthly transaction volume (at the month t) of the stocks of the firm (i)

R_{it} – the monthly return of the stocks of the firm (i)

R_{mt} – the return of the market portfolio weighted by the value

β_{mj} – indicate the impact of the delayed market returns during (j) month on the current transaction volume.

β_{ij} – indicate the impact of the returns of the stocks of the firm (i) retarded during (j) month on its current transaction volume.

$\beta_{5-10,m}$ – indicate the global effect of the delays (5 to 10) of the delayed returns of market during (j) month on the current transaction volume.

$\beta_{5-10,i}$ – indicate the global effect of the delays (5 to 10) of the stocks returns of the firm (i) retarded during (j) month on its current transaction volume.

5. The results of research and interpretations

5.1. The descriptive statistics of the variables

The table below describes statistics of the variables R_m , DT_m ¹⁰, $ETCT_m$ and $DETST_m$ ⁴ as: Their averages, their maximums, their minimums, the coefficients of skewness and kurtosis among others.

Table 1. The descriptive statistics of R_m , DT_m , $ETCT_m$ and $DETST_m$

	Average	Median	Max	Min	Std error	Skewness	Kurtosis	J-Bera	Prob	Obs
R_m	0,015	0,014	0,147	-0,057	0,023	0,939	7,459	185,359	0	190
DT_m	3E-04	-7E-05	0,309	-0,314	0,068	0,692	9,570	355,121	0	189
$ETCT_m$	5E-04	4E-04	0,006	1E-04	4E-04	8,979	104,934	84813,18	0	190
$DETST_m$	-1,8E-05	-3E-05	7E-04	-6,3E-05	6E-05	9,578	112,636	97548,74	0	189

According to this table and the tables A1, A2, A3 and A4 presented to the appendix, we notice, first, that the monthly average market return is equal to 0,015. It reaches its maximum in February 1990 (0,147) and its minimum in September 1990. Besides, the distribution of the returns doesn't follow a normal law.

Then, about the variation of the volume of transaction of the market, we note that this last has an average value of 3E-04. It reaches its maximum in August 1991 and its minimum in December 1991.

Otherwise, the standard deviation of cross sectional returns has a minimum of 1E-04 (in December 2003) and a maximum of 0,006 (in February 1990).

Concerning the first difference of the standard deviation of time series returns, we see that it reaches its minimum of -6,3E-05 in October 1988 and its maximum of 7E-04 in January 1990.

5.2. The test of the hypotheses on the volume of transaction of the market

To test the hypotheses on the volume of transaction of the market, we first adopt tests of causality to the sense of Granger to study the sense of the relation between the first difference of the transaction volume (DT_m) and the other variables (R_m , $ETCT_m$ and $DETST_m$). The following tables summarize the results of these tests:

Table 2. The tests of causality of Granger; Period of survey: 1988:06 2004:03; delays: 21

Null Hypothesis:	Obs	F-Statistic	Probability
R_m doesn't cause to the sense of Granger DT_m	168	2,358	0,001
DT_m doesn't cause to the sense of Granger R_m		0,616	0,899

¹⁰ According to the tests of stationarity relative to the time series of T_m (to see the appendix), we notice that T_m is not stationary. Therefore, we are going to use in what follows its first difference noted by DT_m

⁴ According to the tests of stationarity concerning the time series of $ETST_m$ (to see the appendix), we note that $ETST_m$ is not stationary. Of this fact, we will adopt thereafter its first difference noted by $DETST_m$.

Table 3. The tests of causality of Granger; Period of survey: 1988:06 2004:03; delays: 21

Nul Hypothesis:	Obs	F-Statistic	Probability
$DETST_m$ doesn't cause to the sense of Granger DT_m	168	3,902	$8,7^E-07$
DT_m doesn't cause to the sense of Granger $DETST_m$		2,016	0,009

Table 4. The tests of causality of Granger; Period of survey: 1988:06 2004:03; delays: 21

Nul Hypothesis:	Obs	F-Statistic	Probability
$ETCT_m$ doesn't cause to the sense of Granger DT_m	168	2,418	0,001
DT_m doesn't cause to the sense of Granger $ETCT_m$		1,159	0,29

According to these tables, we note that the hypotheses stipulating that the variables: R_m , $ETCT_m$, $DETST_m$, don't cause DT_m to the sense of Granger are rejected (for a delay of 21). Therefore, these last causes T_m to the sense of Granger. On the other hand, T_m doesn't cause these variables to the sense of Granger, with the exception of $DETST_m$.

Then, we adopt a VAR analysis to determine the nature of the relation between DT_m and $(R_m, ETCT_m, DETST_m)$ and we find the following results (estimators of VAR).

Table 5. The results of the VAR estimation

	DT_m	R_m		DT_m	R_m
$DT_m (-1)$	-0,685***	0,003	$R_m (-1)$	0,540**	0,412***
T-stat	(-7,773)	(0,101)	T-stat	(2,236)	(4,539)
$DT_m (-2)$	-0,142	0,047	$R_m (-2)$	-0,337	-0,158*
T-stat	(-1,289)	(1,136)	T-stat	(-1,353)	(-1,688)
$DT_m (-3)$	0,323***	0,030	$R_m (-3)$	0,052	-0,013
T-stat	(3,012)	(0,768)	T-stat	(0,270)	(-0,183)
$DT_m (-4)$	0,115	0,009	$R_m (-4)$	0,349*	0,109
T-stat	(1,154)	(0,247)	T-stat	(1,819)	(1,520)
$DT_m (-5)$	-0,144	0,029	$R_m (-5)$	0,203	-0,026
T-stat	(-1,474)	(0,790)	T-stat	(1,038)	(-0,354)
$DT_m (-6)$	-0,198**	0,009	$R_m (-6)$	0,098	-0,004
T-stat	(-2,016)	(0,268)	T-stat	(0,495)	(-0,064)
$DT_m (-7)$	-0,159	0,067*	$R_m (-7)$	-0,163	-0,147*
T-stat	(-1,552)	(1,739)	T-stat	(-0,794)	(-1,913)

Continuation of the table no 5 (the results of the VAR estimation)

$DT_m (-8)$	-0,066	0,005	$R_m (-8)$	-0,141	0,017
T-stat	(-0,629)	(0,142)	T-stat	(-0,710)	(0,231)
$DT_m (-9)$	0,164	0,003	$R_m (-9)$	-0,054	-0,085

T-stat	(1,608)	(0,082)	T-stat	(-0,275)	(-1,151)
DT_m (-10)	0,069	-0,001	R_m (-10)	-0,204	0,126*
T-stat	(0,681)	(-0,034)	T-stat	(-1,091)	(1,798)
DT_m (-11)	0,029	0,021	R_m (-11)	-0,434**	0,057
T-stat	(0,292)	(0,564)	T-stat	(-2,308)	(0,815)
DT_m (-12)	-0,013	0,024	R_m (-12)	-0,022	0,008
T-stat	(-0,132)	(0,651)	T-stat	(-0,116)	(0,118)
DT_m (-13)	-0,080	-0,025	R_m (-13)	-0,038	0,187***
T-stat	(-0,805)	(-0,681)	T-stat	(-0,200)	(2,581)
DT_m (-14)	-0,030	0,012	R_m (-14)	0,431**	-0,151**
T-stat	(-0,304)	(0,325)	T-stat	(2,225)	(-2,075)
DT_m (-15)	0,078	-0,002	R_m (-15)	0,282	-0,149
T-stat	(0,782)	(-0,050)	T-stat	(1,403)	(-1,970)**
DT_m (-16)	0,107	0,046	R_m (-16)	0,288	0,105
T-stat	(1,109)	(1,264)	T-stat	(1,482)	(1,445)
DT_m (-17)	-0,017	0,046	R_m (-17)	-0,546***	-0,083
T-stat	(-0,182)	(1,299)	T-stat	(-2,813)	(-1,146)
DT_m (-18)	-0,045	-0,007	R_m (-18)	0,284172	0,063413
T-stat	(-0,488)	(-0,222)	T-stat	(1,423)	(0,844)
DT_m (-19)	-0,071	-0,019	R_m (-19)	0,641***	0,069
T-stat	(-0,777)	(-0,562)	T-stat	(3,336)	(0,957)
DT_m (-20)	-0,024	0,023	R_m (-20)	0,240	-0,085
T-stat	(-0,268)	(0,682)	T-stat	(1,207)	(-1,135)
DT_m (-21)	-0,067	0,037	R_m (-21)	0,562***	0,030
T-stat	(-0,754)	(1,097)	T-stat	(2,714)	(0,394)
DT_m (-22)	0,121	0,053*	R_m (-22)	-0,589***	-0,142*
T-stat	(1,581)	(1,859)	T-stat	(-2,777)	(-1,788)
C	-0,025	0,003			
T-stat	(-1,214)	(0,505)			
$ETCT_m$	41,440*	40,030***	$DETST_m$	32,018	-79,333
T-stat	(1,823)	(4,687)	T-stat	(0,173)	(-1,146)
$ETCT_m$ (-1)	-35,896	-23,381**	$DETST_m$ (-1)	151,091	92,668

T-stat	(-1,439)	(-2,494)	T-stat	(0,831)	(1,356)
$ETCT_m (-2)$	13,939	-0,372	$DETST_m (-2)$	-509,661***	1,649
T-stat	(0,549)	(-0,039)	T-stat	(-2,798)	(0,024)
R²	0,677	0,459	F-statistic	4,883	1,975
Adjusted R²	0,539	0,227	p-value	8,571E-10	8,7E-03

- The sign (*) in the table designates that the coefficient is meaningfully different from zero for a level of confidence 10%.
- The sign (**) in the table designates that the coefficient is meaningfully different from zero for a level of confidence 5%.
- The sign (***) in the table designates that the coefficient is meaningfully different from zero for a level of confidence 1%.
- The t of Student is given by the indicated in brackets value.

This table indicates the coefficients of the VAR estimation, their t-statistical, the coefficients of linear adjustment R^2 and adjusted R^2 , the F-Statistical and the probability associated.

According to the results of the table, we note that the volume of transaction of the market is auto-correlated to its first and third retarded value (with meaningful coefficients to the threshold of probability of 1%), and to its sixth retarded value (with a meaningful coefficient to the threshold of probability of 5%).

Besides, in accordance with our forecasting for the hypothesis of overconfidence, most meaningful coefficients, of the delayed values of R_m in the regression of T_m , are positive.

- Two, among them, are meaningful to the threshold of probability 1%. Indeed, $R_m (-19)$ has a coefficient of 0,641 with a t-statistical equal to 3,336. In the same way, the coefficient of $R_m (-21)$ is equal to 0,641 with a t-statistical of the order of 2,714;

- Two, among them, are meaningful to the threshold of probability 5% (the coefficient of $R_m (-14)$ has a t-statistical equal to 2,225 and the t-statistical associated to the coefficient of $R_m (-1)$ is equal to 2,236);

- One, among them, is meaningful to the threshold of probability 10% (the coefficient of $R_m (-4)$ is associated to a t-statistical equal to 1,819).

Therefore, the hypothesis of overconfidence of the individuals is true for some delayed values of R_m . It means that the variation of the volume of transaction of the market increases following the realization of the important returns in the past. Indeed, the success of the market can provoke the overconfidence of the investors and the increase of the transaction volumes consequently. These results are compliant with those found by Odean (1998a), Gervais and Odean (2001) and Statman, Thorley and Vorkink (2004).

Otherwise, we note that the exogenous variables or of control ($DETST_m$, $ETCT_m$) influence the volume of transaction of the market slightly. Indeed, most there current and retarded values have non-meaningful coefficients in the regression of T_m (with the exception of $ETCT_m$ and $DETST_m (-2)$ that have meaningful coefficients in the threshold of probability 10% and 1% respectively).

In accordance with the results found by Karpoff (1987), the variation of the current transaction volume is joined positively to the current volatility of the returns. We also note that the H1.2 hypothesis, that foresees a negative relation between the current volume of transaction of the market and the delayed standard deviations, is only verified for $DETST_m (-2)$ in the regression of DT_m . These results are not compliant to those found by Statman, Thorley and Vorkink (2004).

The volatilities of the returns (in cross section and in time series) are included in the model to control the alternative explanations of the transaction activity. However, their integration doesn't change the results of the functions of the impulse answers for the endogenous variables that we are going to develop farther. Finally, we note that:

- The delayed coefficients of the returns of the market portfolio: $R_m(-1)$ and $R_m(-13)$ are meaningful to the threshold of probability 1%;
- The coefficients of $R_m(-14)$ and $R_m(-15)$ are meaningful to the threshold of probability 5%;
- The coefficients of $R_m(-2)$, $R_m(-7)$, $R_m(-10)$ and $R_m(-22)$ are meaningful to the threshold of probability 5%.

This observation implies that the returns of the market at (t) can be explained by the returns at (t-1), (t-2), (t-7), (t-10), (t-14), (t-15) and (t-22).

However, the delayed values of DT_m cannot foresee R_m since their coefficients in the regression of R_m are only meaningful for the case of the coefficient of $DT_m(-7)$ and of $DT_m(-21)$ to a threshold of probability 10%. These results confirm those found by Chen, Firth and Rui (2001), but invalidate those found by Cooper (1999), Lee and Swaminathan (2000) and Gervais, Kaniel and Mingelgrin (2001) revealing that the past volume can predict the future returns.

We also notice that most coefficients of the control variables are not meaningful in the regression of the returns R_m (with the exception of the coefficient of $ETCT_m$ and $ETCT_m(-1)$). Besides, they have a negative sign in the case of $DETST_m$, $ETCT_m(-1)$ and $ETCT_m(-2)$ and positive for the rest.

In what follows, we are going to establish another test of the hypotheses on the volume of transaction of the market while basing us on the functions of the impulse answers.

We will study the effect of the endogenous variable variations one on the other and test the hypotheses on the volume of transaction and the one of the overconfidence. Our objective is to determine the impact of the changes in the return of the market on the volume of transaction and vice versa. The tables represent the functions of the impulse answers below while using a VAR estimation. These functions retrace the effect of a shock in the standard deviation of a variable on the current and future values of the endogenous variables.

Figure 1. answer of DT_m to the innovation in standard deviation of DT_m

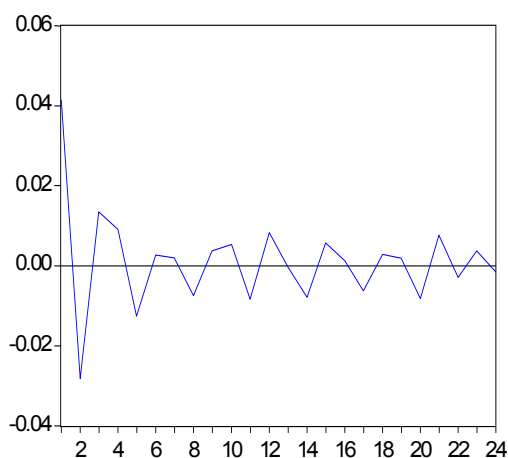
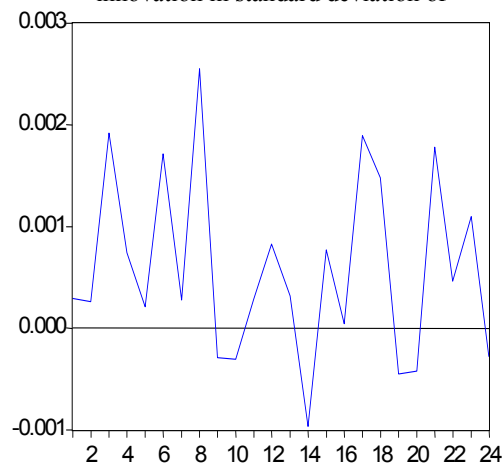
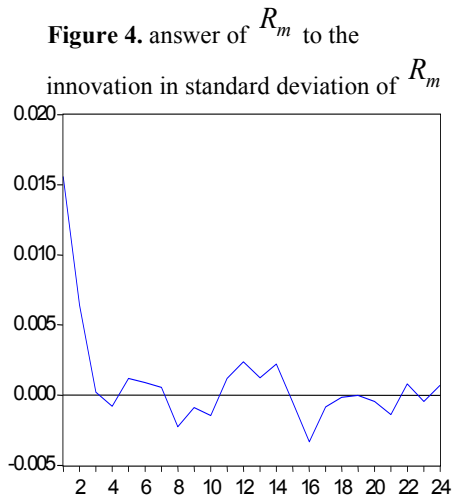
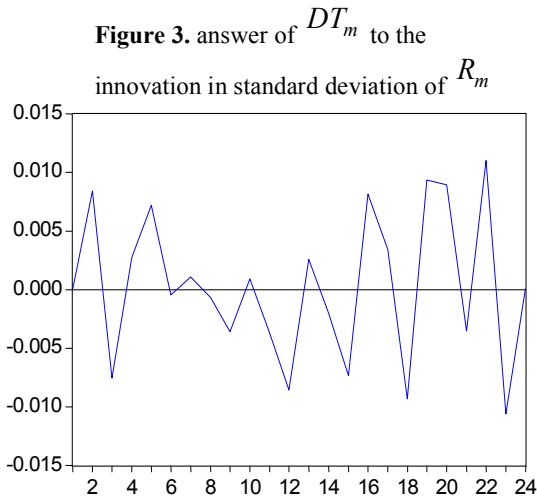


Figure 2. answer of R_m to the innovation in standard deviation of DT_m





The figures 1 and 2 represent the answers of DT_m and R_m to an innovation in standard deviation of DT_m . The vertical axis in the figure1 measures the percentages of increase of DT_m relative to the level of the variation of the transaction volume before the shock. In the figure 1, the function of impulse answer indicates that a shock in the standard deviation, the variation of the transaction volume on the variations of the future volumes of transaction drag an increase in the volume of 4% the first month and a reduction of 3% the second month. The figure 2 indicates that an innovation in standard deviation of DT_m increases a way import the returns during the months after the shock.

The Figures 3 and 4 represent the answers of DT_m and R_m to an innovation in standard deviation of R_m . The Figure 3 shows an important and positive answer of DT_m to an innovation in standard deviation for the first two months after the shock. This observation is in favour of the hypothesis of overconfidence. Indeed, the variation of the transaction volume increases following a shock caused by the return of the market portfolio. The Figure 4 indicates that an innovation in the standard deviation some returns has a weak impact on the future returns safe for the first and the second month according to the shock.

5.3. The test of the hypothesis on the volatility of the return of the market

We use a T-GARCH model (1,1) for monthly returns of the market to identify the effect of asymmetry in the process of volatility. The following table summarizes the results of the test of the hypothesis on the volatility of the market return:

Table 6. The results of the test of the hypothesis on the volatility of the market return

Dependant Variable: R_m				
Equation of variance				
	Coefficient	Standard deviation	Z-Statistic	Probability
ω	4,77E-06	4,47E-06	1,067	0,285
α	0,041*	0,022	1,823	0,068
γ	-0,098**	0,035	-2,790	0,005
β	0,968***	0,014	65,380	0,000

▪ The sign (*) in the table designates that the coefficient is meaningfully different from zero for a level of confidence 10%.

▪ The sign (**) in the table designates that the coefficient is meaningfully different from zero for a level of confidence 5%.

▪ The sign (***) in the table designates that the coefficient is meaningfully different from zero for a level of confidence 1%.

We note that the parameter (α) relative in the ARCH effect is meaningful to the threshold of probability 10%. However, the coefficient (β), relative in the GARCH effect, is positive and meaningful to the threshold of 1%. The coefficient (γ) is negative and meaningful to the threshold of 5%, what shows an effect of lever. In other words, the bad news have more impact on the volatility that the good news. The good news doesn't have a big impact on the volatility (α is non meaningful to the threshold of 5%), however the bad news has a negative impact on the volatility of -0,098 ($\alpha + \gamma$). The bad news have more impact on the volatility that the good news. Therefore, the bias of aversion to the sure losses is verified.

Our hypothesis on the asymmetry of the volatility is validated. Our results are compliant to those of Black (1976). Besides, the hypothesis on the volume of transaction foresees that the elevated past returns entail an increase in the future volume of transaction. It can suggest that the volatilities of the prices raised (vs. low) are followed by reductions (vs. increases) in volume of transaction. Of this fact, the relation between the retarded return volatility and the current transaction volume is meaningfully negative. The asymmetric effect shows that the negative returns, associated to a volatility of the returns raised, are followed by a reduction in the volume of transaction. This last is more important in absolute value that an increase of the volume following elevated past returns (in the same way magnitude) partners with a low volatility. This hypothesis shows an interrelation between the determinants of a financial market (returns, volatility and volume of transaction)

5.4. The test of the joint hypothesis on the effect of disposition and overconfidence

$$T_{it} = \alpha + \sum_{j=0}^4 \beta_{mj} R_{mt-j} + \beta_{5-10,m} \sum_{j=5}^{10} R_{mt-j} + \sum_{j=0}^4 \beta_{ij} R_{it-j} + \beta_{5-10,i} \sum_{j=5}^{10} R_{it-j} + \varepsilon_t$$

The model: establishes a relation between the volume of transaction of a stock (i), its retarded returns and the delayed values of the return of the market. We apply it on all firms of our sample (527 enterprises) on the period going from June 1988 to March 2004. The data are monthly.

In what follows, we are going to present some results of the test of hypothesis of the effect of disposition-overconfidence on ten most representative firms on the French market in term of market value MV (MV > 10000 millions of euros): France télécom, BNP Paribas, l'Oréal, Sanofi, Carrefour.

In the following tables, the sign (*) designates that the coefficient is meaningfully different from zero for a level of confidence 10%⁵, the sign (**) watch that the coefficient is meaningfully different from zero for a level of confidence 5%⁶ and the sign (***) signals that the coefficient is meaningfully different from zero for a level of confidence 1%⁷.

Table 7. The results of hypothesis test of disposition-overconfidence on France Télécom

Variables	Coefficient	Standard deviation	t-Statistic	Probability
C	0,076***	0,012	6,122	0
R_m	0,470	0,421	1,115	0,269
$R_m (-1)$	1,152***	0,397	2,900	0,005
$R_m (-2)$	0,590	0,398	1,479	0,145

⁵ The coefficient is meaningful to the threshold of probability 10% if its t - statistical has a value = to 1,64.

⁶ The coefficient is meaningful to the threshold of probability 5% if its t - statistical has a value = to 1,96.

⁷ The coefficient is meaningful to the threshold of probability 1% if its t - statistical has a value = to 2,57.

Variables	Coefficient	Standard deviation	t-Statistic	Probability
$R_m (-3)$	0,753*	0,387	1,942	0,057
$R_m (-4)$	0,454	0,377	1,202	0,234
$R_m (-5)$	0,153	0,386	0,396	0,693
$R_m (-6)+ R_m (-7)+ R_m (-8)+ R_m (-9)+ R_m (-10)$	-0,122	0,153	-0,796	0,429
R_i	-0,047	0,036	-1,308	0,196
$R_i (-1)$	-0,134***	0,036	-3,713	0,000
$R_i (-2)$	-0,062*	0,035	-1,754	0,085
$R_i (-3)$	-0,068**	0,034	-1,978	0,053
$R_i (-4)$	-0,055	0,034	-1,604	0,114
$R_i (-5)$	-0,069**	0,034	-1,986	0,052
$R_i (-6)+ R_i (-7)+ R_i (-8)+ R_i (-9)+ R_i (-10)$	-0,063***	0,016	-3,952	0
R^2	0,543	Adjusted R^2		0,417
F-statistic	4,333	Probability (F-statistic)		0

Concerning the society France Télécom, the hypothesis of overconfidence is only verified for the first delay in the threshold of 5% and for the third delay to the threshold of 10%. On the other hand, the hypothesis of disposition effect is verified for the retarded values $R_i (-1)$ and ($R_i (-6) + \dots + R_i (-10)$) to the threshold of 1% as well as for $R_i (-3)$ and $R_i (-5)$ to the threshold of 5% and finally for $R_i (-2)$ to the threshold of 10%.

Table 8. The results of hypothesis test of disposition-overconfidence on BNP Paribas

Variables	Coefficient	Standard deviation	t-Statistic	Probability
C	0,119***	0,009	12,442	0
R_m	0,428	0,340	1,257	0,211
$R_m (-1)$	0,097	0,351	0,278	0,781
$R_m (-2)$	-0,375	0,350	-1,072	0,286
$R_m (-3)$	0,320	0,342	0,936	0,351
$R_m (-4)$	0,022	0,339	0,067	0,946
$R_m (-5)$	-0,250	0,331	-0,755	0,451

Variables	Coefficient	Standard deviation	t-Statistic	Probability
$R_m (-6)+ R_m (-7)+ R_m (-8)+ R_m (-9)+ R_m (-10)$	-0,043	0,113	-0,381	0,703
R_i	0,035	0,063	0,561	0,575
$R_i (-1)$	0,004	0,064	0,064	0,948
$R_i (-2)$	0,043	0,063	0,674	0,501
$R_i (-3)$	0,069	0,063	1,090	0,277
$R_i (-4)$	0,116*	0,063	1,827	0,070
$R_i (-5)$	0,115*	0,063	1,823	0,071
$R_i (-6)+ R_i (-7)+ R_i (-8)+ R_i (-9)+ R_i (-10)$	0,107***	0,028	3,817	0
R ²	0,251	Adjusted R ²		0,145
F-statistic	2,375	Probability (F-statistic)		0,006

According to this table, we notice that for the society BNP Paribas, the hypothesis of overconfidence is not verified (all relative coefficients to the delayed values of R_m are not meaningful), but the one of the disposition effect is verified for the delayed values of the stock returns (delay 6 until 10) to the threshold of 1% and for $R_i (-4)$ and $R_i (-5)$ to the threshold of 10%. We also note that the hypothesis of uselessness of all coefficients in the regression is rejected (F - Statistical has a weak probability of the order of 0,006 < 1%).

Table 9. The results of hypothesis test of disposition-overconfidence on L'Oréal

Variables	Coefficient	Standard deviation	t-Statistic	Probability
C	0,106***	0,018	5,761	0
R_m	0,484	0,564	0,858	0,392
$R_m (-1)$	-0,226	0,596	-0,380	0,704
$R_m (-2)$	0,607	0,588	1,031	0,304
$R_m (-3)$	0,512	0,590	0,867	0,387
$R_m (-4)$	0,479	0,586	0,817	0,415
$R_m (-5)$	0,929	0,564	1,644	0,102
$R_m (-6)+ R_m (-7)+ R_m (-8)+ R_m (-9)+ R_m (-10)$	0,551***	0,202	2,723	0,007
R_i	0,126	0,146	0,864	0,389
$R_i (-1)$	0,339**	0,153	2,215	0,028
$R_i (-2)$	0,356**	0,150	2,368	0,019
$R_i (-3)$	0,318**	0,148	2,150	0,033
$R_i (-4)$	0,322**	0,145	2,220	0,028

Variables	Coefficient	Standard deviation	t-Statistic	Probability
$R_i (-5)$	0,372***	0,140	2,643	0,009
$R_i (-6)+ R_i (-7)+ R_i (-8)+ R_i (-9)+ R_i (-10)$	0,284***	0,079	3,599	0
R ²	0,476	Adjusted R ²		0,420
F-statistic	8,524	Probability (F-statistic)		0

For the society L'Oreal, the hypothesis of overconfidence is verified well for the delays 6 to 10 of the return of market in the threshold of 1%. Besides, the hypothesis of the disposition effect is validated for all delayed values of the stock returns of this society.

Table 10. The results of hypothesis test of disposition-overconfidence on Sanofi

Variables	Coefficient	Standard deviation	t-Statistic	Probability
C	0,151***	0,042	3,536	6E-04
R_m	0,331	1,054	0,314	0,753
$R_m (-1)$	0,462	1,085	0,426	0,670
$R_m (-2)$	0,193	1,083	0,178	0,858
$R_m (-3)$	0,791	1,081	0,731	0,465
$R_m (-4)$	-1,364	1,085	-1,256	0,211
$R_m (-5)$	0,389	1,065	0,365	0,715
$R_m (-6)+ R_m (-7)+ R_m (-8)+ R_m (-9)+ R_m (-10)$	1,462***	0,424	3,444	8E-04
R_i	0,464	0,298	1,555	0,122
$R_i (-1)$	0,440	0,292	1,503	0,135
$R_i (-2)$	0,650**	0,289	2,243	0,026
$R_i (-3)$	0,612**	0,290	2,105	0,037
$R_i (-4)$	0,332	0,285	1,162	0,247
$R_i (-5)$	0,139	0,282	0,494	0,621
$R_i (-6)+ R_i (-7)+ R_i (-8)+ R_i (-9)+ R_i (-10)$	0,437***	0,128	3,418	8E-04
R ²	0,224	Adjusted R ²		0,142
F-statistic	2,715	Probability (F-statistic)		0,001

For the Sanofi society, the hypothesis of overconfidence is verified for the delays 6 to 10 of the market return. Indeed, these last have a meaningful coefficient in the threshold of probability of 1%. However, the hypothesis of the disposition effect is only verified for the following retarded values R_i

(-2), R_i (-3), R_i (-6-10) having meaningful coefficients in the threshold of 5% for the two first and 1% for the last. We note otherwise that the hypothesis of uselessness of all coefficients in the regression is rejected to the threshold of 1% since F - Statistical has a probability lower to 1%.

Table 11. The results of hypothesis test of disposition-overconfidence on Carrefour

Variables	Coefficient	Standard deviation	t-Statistic	Probability
C	0,219**	0,089	2,447	0,015
R_m	-0,815	2,406	-0,339	0,735
R_m (-1)	1,355	2,486	0,545	0,586
R_m (-2)	-0,341	2,480	-0,137	0,890
R_m (-3)	3,928	2,464	1,593	0,113
R_m (-4)	0,612	2,383	0,256	0,797
R_m (-5)	4,176*	2,317	1,802	0,073
R_m (-6)+ R_m (-7) + R_m (-8) + R_m (-9) + R_m (-10)	1,918**	0,892	2,149	0,033
R_i	0,810	0,575	1,409	0,161
R_i (-1)	0,223	0,573	0,389	0,697
R_i (-2)	0,508	0,571	0,889	0,375
R_i (-3)	0,626	0,566	1,106	0,270
R_i (-4)	0,857	0,563	1,520	0,130
R_i (-5)	0,391	0,568	0,688	0,492
R_i (-6)+ R_i (-7) + R_i (-8) + R_i (-9) + R_i (-10)	0,576**	0,266	2,166	0,032
R ²	0,236		Adjusted R ²	0,159
F-statistic	3,060		Probability (F-statistic)	0

For the society of Carrefour, we conclude that the hypothesis of overconfidence is verified for the delays 6 to 10 of the market return, to the threshold of probability 5% as well as for R_m (-5) to the threshold of 10%. However, the hypothesis of the disposition effect is verified for the retarded values (R_i (-6) +... + R_i (-10)) to the threshold of probability of 5%. We notice otherwise, that the hypothesis of uselessness of all coefficients in the regression is rejected (the probability of F - Statistical is equal to zero).

In conclusion, we can affirm that our results confirm in part those found by Odean (1998a), Gervais and Odean (2001) and Statman, Thorley and Vorkink (2004). Indeed, these last show that the raised returns in the past make some investors overconfident, less averse to the risk and more aggressive in their transactions. Therefore, the volume of transaction increases on the global level of the market. On the other hand, the results that we marked validate in part the existence of a disposition effect at the French investors. We recall that this effect is developed in the first place by Shefrin and Statman (1985) and suppose that the investors have the tendency to keep the losing stocks and to sell

those winners in the past. It being noted, the current transaction volume, of some specific stocks, increases with their retarded returns. In general this evidence validates the fact that the cognitive biases, specifically the overconfidence and the effect of disposition, affect the investor's behaviour and increase the volume of transaction consequently on the French market.

6. Conclusion

We tried in this paper to study the phenomenon of the overconfidence, the effects of asymmetry and disposition on the French stock market.

We found that a relation exists between the volume of transaction of the market and the behaviour of overconfidence of the individuals. Indeed, the elevated past returns entail an increase in the volume of transaction. What shows that the investors are overconfident? In other words, the gains of the market incite these last to make some transactions more than usually.

It can be explained by the fact that: when the market achieves some gains, the investors assign them to their capacity of selection of the titles (stock picking) and their faculty to really interpret the available information. Thereafter, they make some transactions more aggressively and the volumes of transactions increase consequently.

We measured successes by the returns raised of the market while establishing a test of causality of Granger, a VAR analysis and of the functions of the impulse answers to study the relation between the passed returns of the market and the current volume of transaction of the market and us found that this last is joined positively to the past returns. What is in favour of the hypothesis of overconfidence?

On the other hand, we tested the hypothesis of asymmetry of the market volatility return's and we found that the bad news have more impact on the volatility that the good news. Indeed, the negative past returns increase the volatility of the market of a bigger magnitude than the one relative to the reduction of the volatility of the market following positive past returns.

Therefore, the bullish markets have the tendency to reduce the volatility of the market and to increase the future volume of transaction.

Otherwise, we tested the effect of disposition⁸ and overconfidence (at the same time) on individual stocks and we found that this joint hypothesis is verified for some societies, as Carrefour, Sanofi and l'Oréal.

⁸ The investors have the tendency to sell the stocks that achieved previous gains to feel proud and to keep the losing stocks in the past not to feel the regret.

APPENDIX

A1. Tests of stationarity of variables $R_m, T_m, ETCT_m, ETST_m$

A1.1. The tests of unit root

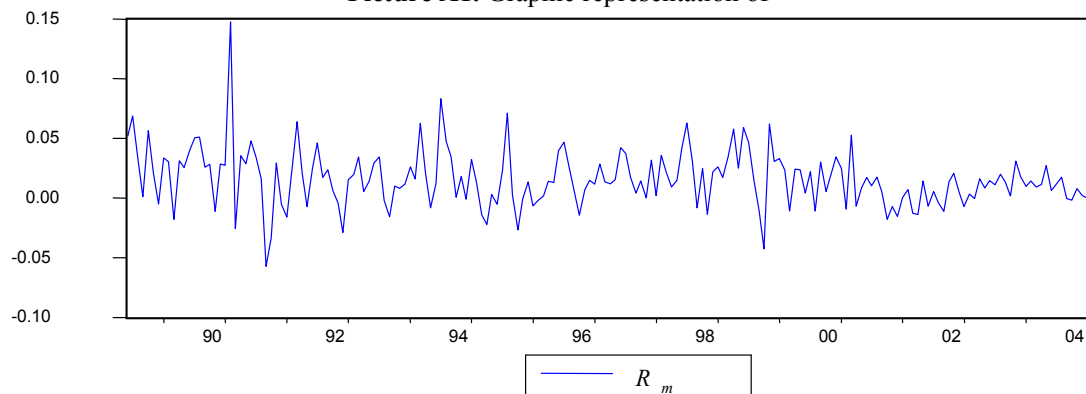
We apply the tests of stationarity of ADF (Augmented Dickey-Fuller) and of PP (Phillips - Perron) on the time series of the variables $R_m, T_m, ETCT_m$ and $ETST_m$

Table A1. The tests of ADF and PP

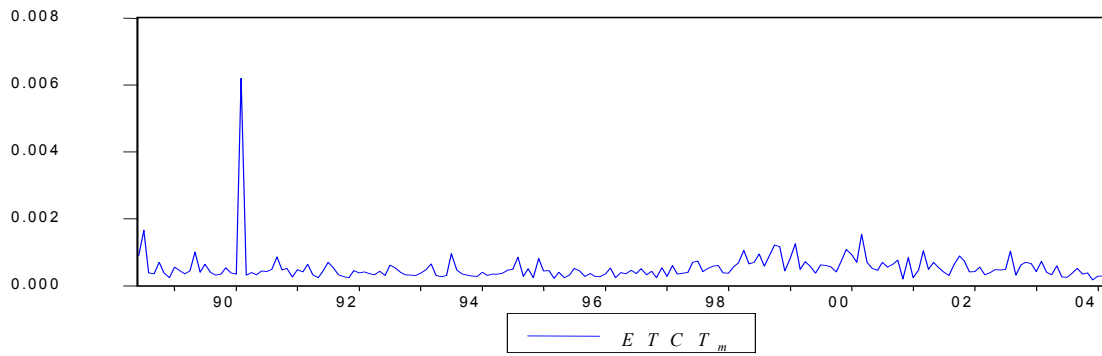
	TEST ADF		TEST PP	
	Level	First difference	Level	First difference
R_m	-5,961	-	-12,034	-
T_m	-2,714	-6,554	-3,79	-24,763
$ETCT_m$	-5,565	-	-13,611	-
$ETST_m$	-2,644	-6,715	-2,473	-13,262

The table A1 presents the two tests of ADF and PP. We adopt some tests with constant and tendency and we consider a number of delays equal to four. The critical value of MacKinnon, that rejects the null hypothesis of unit root with presence of tendency to the level of confidence 1%, is (-4, 011) for the ADF test (-4,009 for the PP test). The two tests reject the unit root existence hypothesis with tendency for the variables R_m and $ETCT_m$. Therefore, they are stationary through the time. However, the variables T_m and $ETST_m$ have the values of ADF and PPS superior to the critical value. Of where, they are not stationary through the time and we must use their differences first. Indeed, with the differences first of these variables, the null hypothesis is rejected and differentiated series are stationary. These results are confirmed by the graphic representations of $R_m, ETCT_m$, the difference first of T_m (DT_m) and of $ETST_m$ ($DETST_m$).

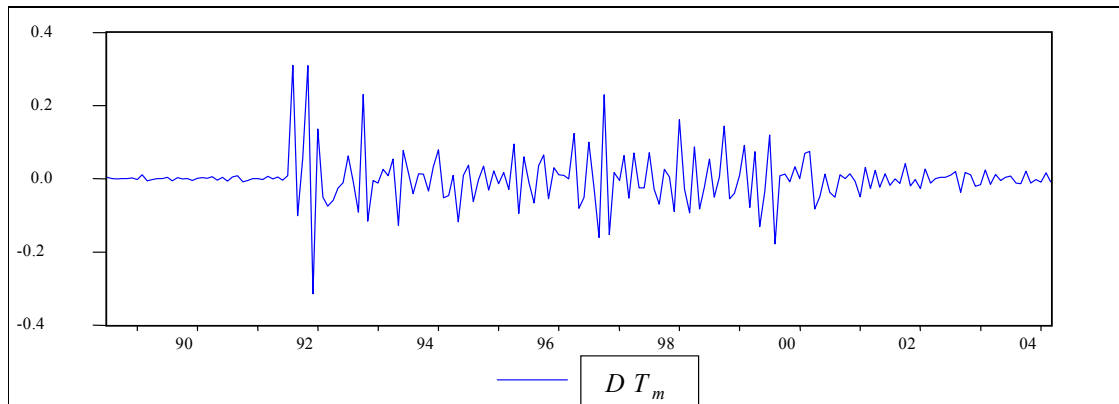
Picture A1. Graphic representation of R_m



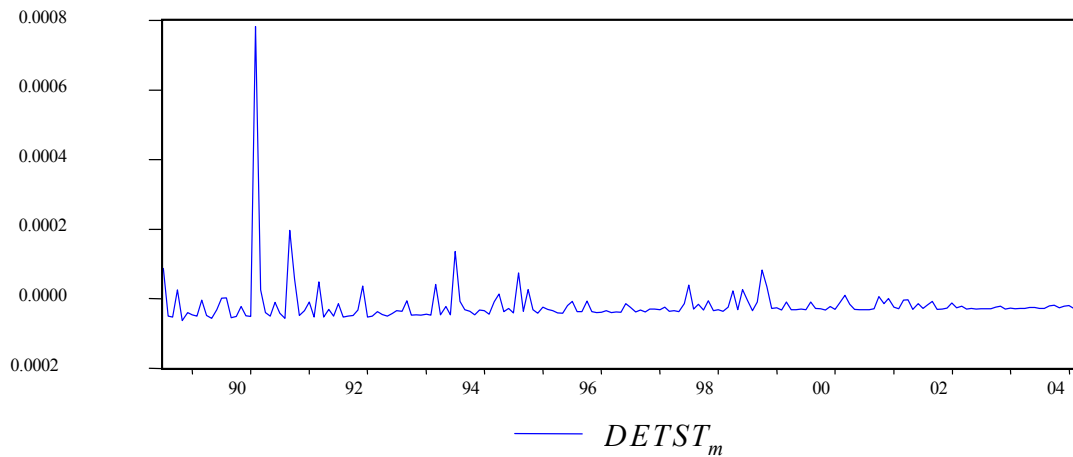
Picture A2. Graphic representation of $ETCT_m$



Picture A3. Graphic representation of DT_m



Picture A4. Graphic representation of $DETST_m$



Indeed, the graphic representations of the sets R_m , $ETCT_m$, DT_m and $DETST_m$ show that these last are stationary.

A1.2 The tests of White noise of Ljung-Box (1978)

Table A2. Tests of White noise of Ljung-Box (1978)

	AC	PAC	Q-Stat	Prob
R_m	0,158	0,158	4,768	0,029
T_m	-0,488	-0,488	45,71	0
$ETCT_m$	0,023	0,023	0,105	0,745
$ETST_m$	0,014	0,014	0,036	0,848

The table A2 presents the white noise test developed by Ljung - Box (1978). The first two columns report the functions of autocorrelation and the partial autocorrelation. The last two columns give the Qs - Statistical of Ljung – Box and their p values. The Q - Statistical of k delay is a statistical test of the null hypothesis that supposes that there is not an interrelationship superior to the fixed order. We fix the number of k delays to 1.

We compare the Q - Statistical to χ^2 (1; 1%) that is equal to 6,635 and we conclude that T_m is not a white noise and that R_m , $ETCT_m$ and $ETST_m$ are white noises.

A2 Justification of the choice of the delay 22 in the VAR process through the test of the likelihood report

Table A3. Criteria of selection of the order of delay in the VAR process

Endogenous variables: DT_m, R_m		
Exogenous variables: C, $ETCT_m, ETCT_m(-1), ETCT_m(-2),$ $DETST_m, DETST_m(-1)$ et $DETST_m(-2)$		
Period: 1988M07 2004M03		
Included observations: 166		
		Report of likelihood: LR=-2((Log L) ₀ -(Log L) ₁)
Delay	Log L (Log of likelihood)	
0	620,510	
1	649,919	55,63004
2	662,244	23,016
3	668,927	12,318
4	672,019	5,624
5	677,243	9,378
6	678,413	2,072
7	683,113	8,211
8	687,413	7,407
9	688,772	2,308
10	691,479	4,533
11	694,235	4,549
12	695,363	1,834
13	699,229	6,194
14	705,379	9,706
15	712,224	10,639
16	714,673	3,746
17	718,954	6,447

18	720,102	1,701
19	729,909	14,296
20	732,852	4,219
21	738,119	7,424
22	747,710	13,288*
23	753,766	8,245
*Indicate the order of delay chosen by the LR criteria		
The test of statistic LR (at the level of 5%)		

According to this able, we note that the report of likelihood: LR has an optimal value for the delay 22. Therefore, we keep a number of equal delay to 22 in the VAR process to endogenous variables: DT_m and R_m and to exogenous variables: C , $ETCT_m$, $ETCT_m(-1)$, $ETCT_m(-2)$, $DETST_m$, $DETST_m(-1)$ et $DETST_m(-2)$.

A3. Test of causality of Granger for the variables R_m and DT_m in the VAR processes

Table A4. Test of causality of Granger for the dependent variables in the VAR processes with 22 delays

Period: 1988M07 2004M03			
Included observations: 167			
Dependent variable: DT_m			
Excluded	χ^2	Delay	Prob
R_m	60,587	22	0
all	60,587	22	0
Dependent variable: R_m			
Excluded	χ^2	Delay	Prob
DT_m	22,770	22	0,414
All	22,770	22	0,414

According to this table, we note that in the VAR process, R_m causes DT_m to the sense of Granger. However, DT_m does not cause R_m .

A4. Survey of the January effect on the volume of transaction (DT_m)

In what follows, we study the existence of a January effect in the set of the variable DT_m , for this reason, us establish the regression of the difference first of the transaction volume on an indicatory variable or dummy, noted (JAN) that takes the value 1 if the month is January and 0 otherwise. The regression has the following shape:

$$DT_m = \alpha + \beta JAN_t + \varepsilon_{mt}$$

With:

JAN_t is a binary variable.

ε_{mt} is a term of mistake..

The results of the regression are summarized in the following table:

Table A5. Survey of the January effect in the set of the transaction volume

Period: 1988M07 2004M03				
Included observations : 167				
Dependent variable: DT_m				
Variable	Coefficient	Standard error	t-Statistic	Probability
α	-0,001	0,005	-0,223	0,824
JAN_t	0,018	0,018	0,992	0,322

This table shows that the coefficient of the indicatory variable is not meaningful to the level of confidence of 5%. Therefore, we conclude that there is not an effect of January in the set of the transaction volume.

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THE MANAGEMENT OF SCIENTIFIC RESEARCH AND ITS PLACE IN THE UNIVERSITY ACTIVITY

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Abstract

In the last two decades, the research in general and in particular the universities research has gained a special importance. The competition for the resources and in particular for the human resources, the higher education transformations in recent years which have adapted to the globalization have increased the importance of the research from the universities

The view that a university of a global relevance is one that makes the intense research representing the traction force of the economy and society is more fully supported. For this reason a policy of any state to encourage and support the development of research in the universities is a prerequisite for the development of any nation.

If the research has its well defined role and place in the economic and social plan, the research of excellence is for many institutions a desirable goal, a goal for which there are required the mobilized significant financial resources and especially the highly qualified human resources, well organized and complete directed.

Keywords: research, excellence, university, human resources, higher education, Lisbon Strategy

JEL Classification: I2, I21, I28

1. Introduction

We go through a period in which the European higher education is engaged in the most comprehensive and significant reform process which is started by the 'Bologna Declaration' of the education ministers of the European countries. The primary objective of this process without precedent in history is the improvement of graduate education, of excellence in the scientific research, in the spirit of performance and global competitiveness. The New Europe is committed to building a knowledge-based society and economy, where the education and the scientific research have a primordial role, and the universities have an active contribution. A strong company needs the strong universities. To achieve this goal, the education ministers from the countries participating in the 'Bologna Process', effectively and continuously supported by the European Commission, the European University Association (EUA) and the governments of these countries were firmly committed to creating a European Higher Education Area (EHEA), based on university autonomy, academic freedom, the equal opportunities and democratic principles, to facilitate mobility, increasing employment, to enhance competitiveness, to foster creativity and innovation, to develop consistency and comparability of educational systems to promote student-centered learning, to create learning culture (Monacciani 2010).

As a natural extension, in April 2007, the European Commission presented its ideas on creating a European Research Area (ERA), a concept launched in Lisbon since 2000, a space that is estimated to hold the greatest potential of knowledge of Europe.

2. The excellence research in the higher education

We agree with the view expressed by Harvey L., that the excellence is defined as being that institution in which an entity meets a number of features at a very high level, therefore, cannot be achieved by any entity (Harvey 2004, 9).

Reuben Brent (Brent 2007) from Rutgers University, proposes the following framework for achieving excellence in the higher education (Figure 1)

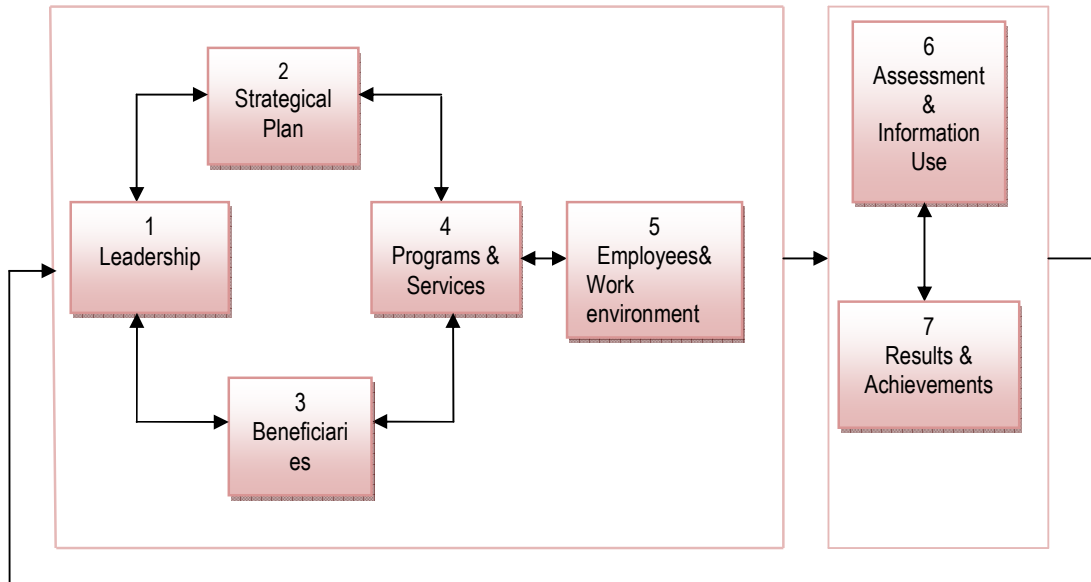


Figure 1. Proposal for a framework for achieving excellence

Source: Adapted from Brent (2007, 4).

Ruben’s model is based on the certain essential elements of excellence:

- leadership - defining, communicating and shaping the vision and values to which the organization aspires, including the focusing on the needs of beneficiaries and of the community in general;
- strategic planning – it translates the aspirations into plans with the clear objectives and monitors their implementation;
- beneficiaries – it listens and understands the needs and the perspectives of the group of beneficiaries that it serves, developing an ethics service to the organization level, it identifies and corrects the potential errors.
- programs and Services – it identifies, analyses, standardizes and continuously improves the quality and the efficiency of programs, services and associated processes to ensure the highest standards;
- employees and work environment – it creates a culture that encourages excellence, performance, involvement, professional development, loyalty and pride to be part of that organization; it rewards and recognizes the performance and synchronizes with the individuals’ objectives with the objectives of the organization;
- evaluating and using information – it assesses the quality and the effectiveness of programs and services which are essential to the mission and to the other areas of the organization; it effectively shares information, knowledge and expertise within the organization and outside it;
- results and achievements – it gathers the necessary information to assess the progress and results and it uses the information to guide the daily decisions and improvements. It compares their achievements and results with the other similar institutions, competitors and leaders from the same field, and it communicates the results and the achievements to many receivers.

Indicators, depending on which one can evaluate the excellence, are the author’s vision, the following:

Table 1. Indicators for assessing the excellence in the higher education

<p>Key processes Effectiveness Efficiency cyclical Cost reduction</p> <p>Foreign Relations Students Industry Administration Collaborators/Partners Suppliers/Dealers potential students</p> <p>Satisfaction Experience change Contributions to the local community and to the national level</p>	<p>Support Activities IT Services Adequate support services downtime response time Users' satisfaction Financing Operational costs</p> <p>Human Resources Services Information Fluidity Response time Users' satisfaction Technology use</p>	<p>Satisfaction to the place of employment Degree of attraction Degree of fluctuation/retention Compensations system Climate work environment</p> <p>Professional Development Courses/offered Programs Students' satisfaction degree Needs Learning outcomes Adequate support services</p> <p>Financial aspects Financing level Incomes Operational costs</p>
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Source: Adapted from Brent (2007, 6).

The universities play a key role in the training of the young researchers, through doctoral, three educational cycles, and their main role is to make the scientific research in high-risk areas and to contribute to the knowledge development. The public investment in research – development is essential for the formation of the human capital, for creating the public-private partnerships and strengthening the research infrastructure.

Across the EU, the research institutions must be viewed from a holistic perspective, namely in the economic and social context in which it performs; the research institutions (including the universities) should be able to interact constantly with the business field and engage in the durable public-private partnerships. Such partnerships should be at the center of specialized ‘clusters’⁹, being widely interdisciplinary, to attract a critical mass of human and financial resources from all over the world.

The Commission supports the extension of these clusters through the virtual integration, rather than the geographic concentration.

According to the report of the European Commission (EC 2005 - Mobilising the brainpower of Europe: Enabling universities to make full Their Contribution to the Lisbon strategy, 2005)¹⁰, Europe has too few centres of excellence, and the universities are not encouraged to promote the specific added value that they made in the society.

Although the Commission underlines the absence of diversity, however, it recognizes the limitations of this: ‘European higher education system must remain diverse in terms of linguistic, cultural, systemic perspective and traditions. At the same time, it requires a compatibility of the various national regulations to avoid excessive confusion in the system, rather than creating the real opportunities of choice and mobility for its citizens’ (Huisman, van Vught 2009). Thus, the institutional diversity is supported at the Community level, as it does not reduce the degree of convergence which regards the fragmentation diminution of the education system of higher education

⁹ In 1990 Professor Michael Porter, from who the term ‘cluster’ became popular, and who invented it, defines ‘cluster’ as geographical focus of interconnected companies and institutions in a particular field.

¹⁰ http://ec.europa.eu/education/policies/2010/doc/comuniv2005_en.pdf accessed on 05.04.2011 In 1990 Professor Michael Porter, from who the term ‘cluster’ became popular and who invented it, defines a ‘cluster’ as geographical focus of interconnected companies and institutions in a particular field. <http://ec.europa.eu/education/policies/2010/doc/comuniv2005en.pdf> accessed on 05.04.2011.

in Europe. According to the principle of 'unity in diversity', the diversity and the harmonization seem to remain two key goals of the European system, these goals that are difficultly translated into reality.

In view of the EU, the European higher education system is too traditional, too egalitarian, too devoid of orientation towards excellence. Moreover, this system is too fragmented in the small and medium sub-systems with the national legislation, too isolated of industry, too dependent on public sources of funding, inefficient, inflexible, affected by the excessive regulation and underfinanced.

3. The excellence as a distinctive feature of the doctoral training

The excellence is not a destination, but a continuous way, which can always be improved.

The excellence universities are almost universally defined in literature as the research universities (Hazelkorn 2008, Mohrman, Ma and Baker 2008, Atlbach 2003). In this context, the organization of the research schools, as centres of development of the human resources for the research excellence, is extremely important

The Doctoral Training is very fragmented in Europe, which counts over 1,000 universities conferring the doctoral degree certificates.

Furthermore, although the number of doctoral graduates in Europe is much more than that of the persons who have the doctoral degree certificate in the US, the percentage of researchers in the active force of working is much lower in Europe than in the US and Japan. In the US, four of five researcher's works in the industry, but in the EU only one from two do so. The vast majority of doctoral graduates in Europe are employed in academia, where the conditions, both in terms of conditions and salary research, often do not meet the expectations for the peak performance.

Since the organization of the doctoral and research training in Europe is very fragmented, the energy and the funds disperse, so their impact is small compared to the US. If Europe wants to remain internationally competitive in a knowledge-based economy, the high level research and the doctoral training must become focused and targeted. From this perspective, and taking into account the rising costs of high-level research infrastructure, the cooperation between the institutions may create more favourable opportunities for the doctoral programs through the initiatives as network.

Also, in a more diversified system, the consortia and the networks which are based on the proximity, being geographical or thematic - can strengthen the research and the knowledge transfer at the regional, national and international level. The interregional and international connections and cooperation's have grown rapidly in the recent decades, as part of the growing influence that the greater European integration process has on the institutions of higher education.

To ensure the European doctoral training at the highest level, LERU makes a series of recommendations on three levels: European, national, institutional.

At European level:

- the recognition of the specificity of doctoral training, which is basically linked to the research process, compared with the first and second cycle in the Bologna process;
- the use of excellence, both of candidates and 'history' of research of the host institution, as primary criterion for the financing for the doctoral programs of research;
- the decisions at the European level should not over-regulate the doctoral training, but its attempt to achieve the comparability of this. There is not indicated a European system of doctoral , and the definitions of the study fields, in terms of duration, organizational structure and criteria for admission should be left to the individual institutions;
- the support of a cooperation and of a international mobility which are better in the doctoral training programs at European level;
- the promote and the support of dialogue, interaction and exchange of researchers between the universities and the business environment.

At national / government level:

- the integration of quality assurance for the process of doctoral training in the regular evaluation exercise of the institutions granting the doctoral degree certificates. The insurance of the quality should be based on the quality of coordination, the high percentage of successful completion of the PhD and a reasonable time of their discharge. They are actually the key parameters for the successful doctoral program rather than a bureaucratic monitoring;
- to ensure that the terms and the conditions for PhD students are generally attractive and the general offer of doctoral training are congruent with the established goals by the Lisbon agenda;

- the removing of the obstacles from the way of the mobility, such as the difficult procedures of conferring the visa, as the strict definitions of areas of studies or the insufficient funds;
- where it contributes to the work and researcher's development, the portability of EU grants for doctoral students should be allowed;
- the admission of the excellent candidates, with the research potential, the desire for knowledge and the constant support of their talents in a stimulant environment of research;
- the strengthen of the networking between the research activities to ensure that the doctoral training takes place in a strong research environment;
- the implementation of principles of the standards management and of the academia quality in the doctoral training;
- facilitating dialogue, interaction and exchange with the business environment and the industry;
- the promotion of the value of doctoral training to the public and private employers and to the community at large, and the vital role of Ph.D. graduates in the development of a knowledge-based society.

Regarding the current concerns for supporting the mobility of researchers at the European and world level, it should be noted that for countries like Romania the maintaining in the country of the elite researchers remains a major challenge. Unlike richer countries, Romania cannot count on attracting in a massive way the research forces which are formed outside. As long as a valuable human potential can not be held in Romanian universities and research institutions, it is anticipated in a difficult way the fact that the preconized measures should have the desired results. There is imposed the focusing of the research in some centres, taking into account the factors such as tradition, the existence of cores of performing researchers, infrastructure and international contacts.

One of the most important strategic projects for Romanian Higher Education is the Doctorate in Schools of Excellence (DSE). The project aims to test and implement an evaluation methodology to ensure international evaluation of the research quality in the universities, the supporting of the schools of excellence and the increasing of the capacity of scientific publishing at the institutional and individual level, with the impact on the quality of doctoral programs.

The evolution of the higher education system in Romania highlights the important progress in many areas of science, there are at present in Romania, the groups of researchers, the laboratories and the research competitive centres at European level. This can be highlighted through the results which are obtained by the researchers in the capitalization of the results and, in particular, by increasing significantly the number of scientific articles which are published in the journals with high impact factor.

The accumulations in time, since 1997, have led to increase the material base for the research in the universities, there are at present in many institutions the university programs to support the research and organization infrastructure in the knowledge clusters, so that an increasing number of more research teams to become competitive.

During 2001-2006, the National Council of University Research (NURC) has developed the identification, assessment and recognition process of the scientific research centres, resulting 38 centres which were recognized for excellence in all the scientific fields.

NURC initiative aimed at the research organization in the centres with the potential to become the centres of excellence, thus identifying, on the one hand, the collectives of researchers, on the other hand, the research infrastructure and the institutional framework for obtain the performance in the scientific research. Thus, these centres have been identified, recognized as centres of research with the real potential to become the excellence centres. It was a first stage of assessment of the research in the Romanian universities.

The second stage referred to the assessment of the research quality and at the allocation of financial resources to support the research performance, the indicator IC6¹¹ being a 2nd item that allows an assessment of research performances in the universities.

Since 2009, through the doctorate project in the Schools of Excellence, started to assess the research in Romanian universities in the fields of science. Such an evaluation will reveal the

¹¹ IC6 indicator is designed to evaluate the quality of the activity of scientific research in the universities in 2008, being one of the indicators taken into account in determining the basic financing of the state universities for 2009.

performing clusters of knowledge and we hope an adequate supporting of these for being competitive at the European level.

During this process there has been redesigned the evaluation system of the research centres, the emphasis is only on those centres that have proven the performances and the viability as future centres of excellence. The assessment was achieved by using peer-review system (peer review), there is also proposed an assessment of foreign experts, without excluding the performing experts from Romania.

4. The universities of world relevance

In the definition of the peak performance of the universities can be seen highlighting the concept of 'excellence, closely linked to the WCU' World Class University'. We subscribe to the view which is expressed by Hazelkorn under which the research universities are the universities which have as priorities in the development the creation of high-level knowledge, the involvement in the social and economic life through this and which attaches a great importance to increase the research role, inclusively the development of the doctorates (Hazelkorn 2008, 193-216).

World Class University and the excellence concept appeared in the last years in the public debate concerning the higher education policies.

Philip Altbach (Altbach 2003, 5-9) has defined since 2003, the meaning of the concept of World-Class University. Writer's opinion, the term WCU is closely linked to stimulation of the knowledge at the highest level (so-called 'frontier research').

This, however, recognizes the author, it cannot be achieved only through the research activity, but also by the creation of the conditions which assure this type of activity.

Between these there are illustrated:

- the assurance of a environment and of the conditions for attracting and retaining the academic staff of the highest quality;
- a policy to encourage the innovation and the exceptional research, the adequate infrastructure (from the physical infrastructure to the libraries and the data access)
- a governance to ensure the control of the academic staff and students, to a certain extent, the essential decisions regarding the organization of the university;
- the diversified and sufficient financing which allows the performance of the activities as a high standard;
- the academic freedom and an atmosphere that encourages the intellectual emulation are the elements that, in the author's opinion, are central to defining a university of world relevance.

We see the complementary points of view which are expressed by Mohrman, Ma and Baker which do not contradict the basic idea of the analysis, in terms of excellence in the universities. They preferred the term somewhat similar, but perhaps elitist, of *university of research* (Mohrman, Ma and Baker 2008, 5-27)

The authors identify an emerging model of university, elite, which has a strong orientation towards the research and its mission is aimed at creating the valuable knowledge. The authors identified eight characteristics of this model which are closer to the definition of a university of world relevance:

- the mission which is oriented towards the research to extend the frontiers of worldwide knowledge;
- there are the universities of intensive research (research-intensive universities)
- the role of the academic staff orientates more towards the integration in the transdisciplinary and global teams, the teams which are concerned to meet the needs of the real world;
- the financing of these universities is diverse, in order to support the costs of performance, they are translated, in addition to the public financing and the fees, the private financing, the grants of research and the business activities (spin-off);
- a social and economic role of the university is to collaborate with the business environment and the government to solve the problems of the society;
- the recruitment of staff and students is international (academic head-hunting)¹²

¹² Head-hunting is a relatively new concept in the local market of recruitment and of consultancy, being known as 'executive research'. According to George Butunoiu, there are two slightly different views of this notion. There are people who consider only the head-hunting only as informal activity of the 'executive search',

- the adaptation of infrastructure, academic programs and research centres for the interdisciplinary studies
- the active participation in the creation of policies and international instruments for governing the academic community.

In the definition of an university of excellence at the world level, Jamil Salmi, World Bank Coordinator for the Higher Education, proposed a model based on three key factors (Salmi 2009, 32): the concentration of talents, the abundant resources and adequate governance.

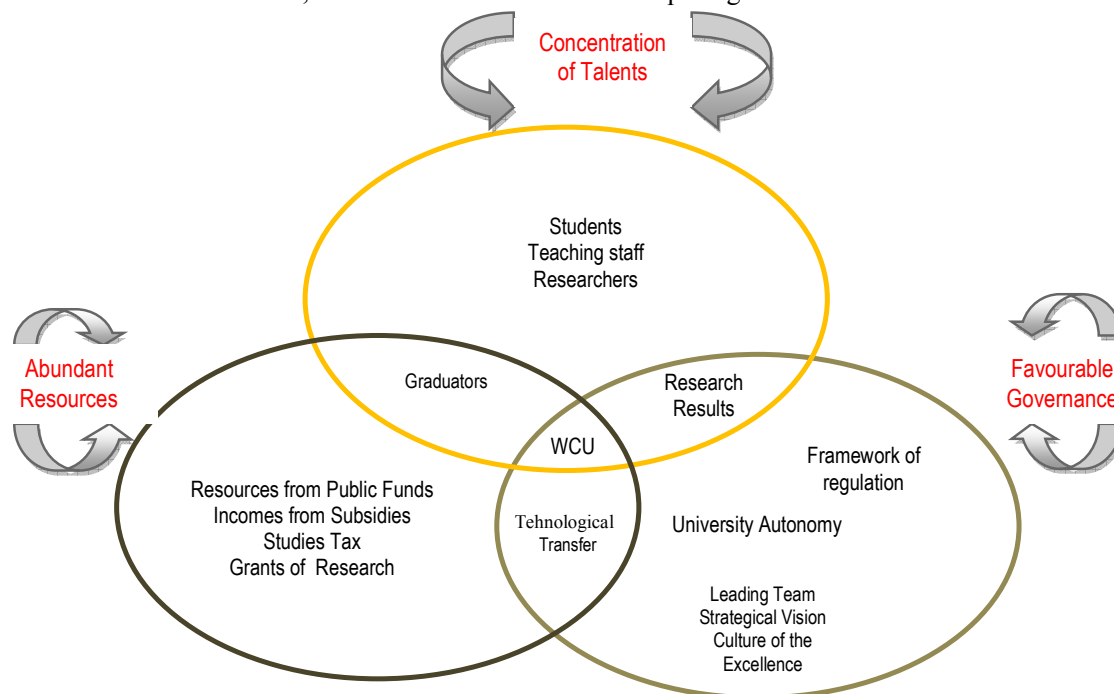


Figure 2 Model of Excellence

Source: Salmi (2009, 32).

Salmi analyses the development of the university in the world relevance in terms of national policies and institutional strategies. The development of the universities of world relevance without the development of relevant national policies in support of excellence is difficult to be achieved, because – the price of such universities, as noted in the international experience, is huge, in financial and human terms.

The author also notes that the different approaches of the national policies, combined with the specific features of the institutional and political culture of each country, have led to better results which are determined in terms of the development of the universities of world relevance.

China, for instance, is characterized by the massive pumping of funds and by the creation of the necessary infrastructure for the cutting-edge research, but in the author's view, the universities which are supported by the national policies and programs of supporting of the excellence confront with the deficiencies regarding the internationalization, the best students' retention, the free and open academia environment to allow the innovation, the incentive scheme, the deficiencies which led to the good performances, but not to the excellent performances of the universities of Chinese top.

In France, according to the author, the relevance and the international recognition are constrained by the atypical French university system, which consists, on the one hand, the comprehensive universities receiving egalitarian treatment in the French research policy and, on the

and there are the recruiting managers exclusively through the direct approach, and people who see only the head hunting process when hiring a particular person who is designated by the customer.

other hand, the 'Grandes Ecoles'¹³, which are promoted as elite institutions, but which have a strong professional focus, being less research-oriented. Therefore, the institutional solution of France to support the excellence was the development of the new structures, which appeared as investments of the institutions of prestige education and which have the designation to promote the excellence.

In some cases, in the major universities in Latin America, for instance, the author points to self-sufficiency and the approach without international perspective of the universities as that of Sao Paulo which, although it is most important in Brazil, with an impressive number of students is not sufficiently in step with the international research, remaining somewhat isolated, with a tiny percentage of foreign students and teaching staff and modest quotations in the international rankings.

We can say that the excellence supposes vision, strategy, planning, organization, control / correction and is supported by staff and good quality infrastructure and adequate financing. It follows that the university research has a leading role in directing the top research. The mission assumed to the research university supposes a coherent organization of PhD organization, support of researchers, sufficient resources for the development of valuable researches.

However, the excellence of the research in the universities is not always considered identical with the university excellence, especially in the French area, which is tributary to the specific organization of the 'Grands-écoles', although it appears largely that the research at the excellence level involves a superior quality of the educational process, an increased internationalization and a better training of students. An excellence program of research in the Romanian universities will have to take account of these aspects.

An approach which is exclusively oriented to the research and the top performance, which is promoted in the international standards and policies, is an issue that must to be gradated. A first observation is that not all the universities can be internationally relevant; moreover, it is not necessary that all the universities have this mission. The universities can be directed to training very well the students to enter in the labour market, to be involved in the resolution of the problems at the regional or national level, etc.

An example is Germany in this sense. In early 2000, when all the 88 public universities which were funded from the federal funds and the lands budgets were equally treated, including concerning the financing, an analysis of the international rankings concluded that none of the German universities – although in Germany there is a tradition of the research universities – was not in any top of the international hierarchy.

The decision, initially controversial and contested, of the German Government, was to differentiate the universities in terms of performance, potential and mission to create the top performance – In other words, excellence.

In this context Europe is in a position to have to make decisions to maintain and accelerate the frontier research, on the one hand, and to maintain the accessibility to the academic studies.

Also, we must not ignore the dangers in the 'running after the world relevance: one of them is that the universities focus on research and 'hard' sciences (hard sciences), easier to quantify as 'excellent in the international rankings, thus creating large the very big imbalances between the fields, at the system level.

Another danger is the fogging of the elitist sense of the word, in the context of the multiplication of the international rankings (made based on the criteria more or less subjective, under the circumstances more and more universities being entitled, more and less legitimate, as universities of world relevance (Birnbaum 2007, 7-9).

Also, not all universities in the world can reach to be classified in that way, and not all the universities should have this goal.

The choose to be the university of world relevance is primarily a matter of definition in real and realistic terms of the university mission – if it wants to perform to the global level, if he wants a national impact or concentrates more on the regional needs. Also, the support for the universities of excellence requires the significant resources, both financial and human, which can lead to the question

¹³ There is no a standard definition of the Grandes Ecoles. Legislation involving the term Grandes écoles (in French 'high schools' or 'elite schools') generally uses the word 'Classe préparatoire aux Grande Ecoles'. It has, in general, the phrase 'Écoles supérieures' to indicate the higher education institutions which are not universities.

how many excellence universities, can promote a state; an answer can be the higher education system which is stratified after the American model.

5. The European research policies

In recent years, the Community research policies have been felt ever more strongly to the research level of each country. We are thus in a situation of a Europe with a converged research, but still very differentiated, diversified and fragmented.

Regarding the university research, the university research support policies are more heterogeneous, due to the different higher education systems across Europe. However, the convergence which is induced by the policies already implemented by the EU for many years, both in research and higher education system is felt in the university research level on the entire continent, the European research agenda is a landmark in defining the strategies and the intervention lines which are necessary for the support of the university research.

At EU level, the research policy was developed as a concept in the 70s (European Commission 2007, 13); the European research has become a real community dimension once with the E.C. initiatives of the 80s, such as ESPRIT program – the first community program to support the research at the policy level, through the Single European Act, which stressed the importance of the science and the research as the areas of Community responsibility.

In the 90 years, Maastricht Treaty has called into question the importance of the research at European level. With the establishment of the general goals of the Lisbon Strategy, the achievement of a knowledge-based Europe was closely linked to the setting - the ERA, which has become an essential component of the Lisbon Agenda (2000).

The European Council in Barcelona in 2002 gave a strong political signal of support. For the education, the research and for the innovation and goal setting, at the community and national level, of allocation of 3% of GDP for the research, of which two thirds of private funds.

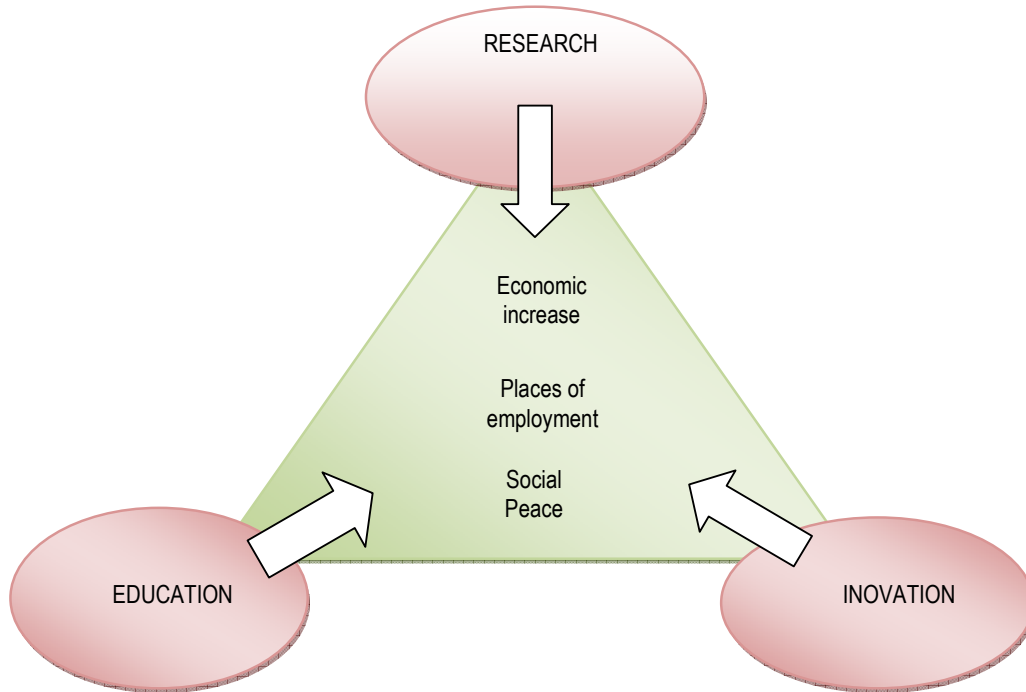


Figure 3. The pillars of the Lisbon Strategy

Source: Adaptation: Paul Jamet, quoted in PNCDI 2007-2013

In the pragmatic document from 2007, *The European Research Area: New Perspectives* {SEC (2007) 412}, the European Commission expresses its vision of ERA, the prospect of entry into the second cycle of implementation of the Lisbon Strategy and sets out the main responses to the fundamental questions about the future of the European research within the timeframe left for the current programming period in 2013. The document also draws attention to the slow pace of research to adapt to the new requirements of the postmodern world, so that Europe can remain and develop as a top of the global knowledge, especially in the context of extraordinary development, in the recent years, of the research environment in the Asian countries and of the continuing US in the tops of the hierarchy.

The Commission document makes clear the existing concern at Community level, in respect of achievement of the goals which are established in the strategy which had as time horizon 2020, and mainly those related to the research development so that Europe can become a leader in the world research (European Comision 2007).

The ERA achievement mainly targets the following goals:

- the creation of a coherent and effective research policy at the European level and the diminution of the weak points in the science and technology field. The Member States have their own policies and structures of research, but at European level this fragmentation leads to the inefficient use of resources. European Research Area, designed as an extensive integrated network of research involves the creation of interactions between the policies regarding research, carried out at EU level and those which are implemented at the national level in the member states;

- an adequate flow of competent researchers. The researchers should be stimulated by a single labour market with the attractive working conditions for both sexes, involving mainly the absence of financial barriers and / or administrative obstacles to the transnational mobility. Academic research stations, and national research programs across Europe should be completely open, with a predominant trend to recruit the researchers at the international level, and with an increased mobility between the disciplines and the public and private sectors – a such mobility becoming a standard characteristic of a successful career in the research;

- the infrastructure of world research / research of global relevance. The main infrastructures should be built and operated jointly at European level. These should be accessible to the teams of researchers from the entire Europe;

- the institutions of excellence research. In the EU, the various and diverse research institutions should be integrated into the social and economic life. They should be able to interact constantly with the business world and to engage in the durable public-private partnerships.

- the effective knowledge sharing. This consists of: open and free access to the public knowledge base; a simple and harmonized regime of the intellectual property rights, including an effective patent system in terms of costs, and the shared principles for the knowledge transfer and the cooperation between the public research and the industry;

- the research programs and the better coordinated priorities. These should include planning, implementation and common evaluation of public research investments at European level regarding the aspects that go beyond the individual capabilities of each country. The common priorities should be identified by common estimations involving scientific community, society and industry, decisions and measures taken jointly. In these and other fields, the programs of national and regional research should offer the certitude that the main principles which govern the applications for the research funds are comparable in the entire Europe, and it assures the highest degree of quality.

- a wide opening of ERA to the world. It is extremely important the participation of regions neighbouring the EU, and the development of the multilateral initiatives to answer to the global challenges with the EU partners.

The specific, horizontal goals:

- the enhance of the excellence research in the areas of public major interest;
- the areas mentioned by the Commission are health, energy and climate changes;
- the stimulation of the competition in the European research for the excellence stimulation, without ignoring the cooperation between the different research structures in Europe;
- the support of the European diversity, through the development of the specific specializations for every region or country of Europe.

The overriding goal in the basic research in EU countries is to increase the knowledge degree, which implies a sustained financing of the universities, which are ‘the locomotives’ of the basic research.

The university research is a much stronger element in the research in Europe, to other key actors of the world (USA, Asian countries). According to the E.C., 36.6% of EU research expenses is concentrated in the universities, which represents more than twice the weight of the same indicator in the US.

The specific goals of the Commission focuses on two levels: the support of the university research, with the other research institutions, and, secondly, the stimulation of the national policies which govern the university research regarding:

- the observance of the university autonomy;
- the financing of the university research in terms of the output from the system (direct results of research, or indirect results, such as international partnerships, the partnerships with the industry)
- the professionalization of the university management and the creation of research management tools;
- the support of the innovation capacity of the university research.

The universities as entities are invited to participate in creating the European Research Council, to accelerate the increase of the weight of the financing of the university research from the European funds from 50% to 75%.

The governments encourage the development of closer relationships between the higher education institutions and the society as its whole. The adopted measures in this area are designed to encourage the scientific achievements and the opportunities arising from these to a greater audience. Another priority is to link the research with the national economy and the social imperatives, including here the specific and regional needs. To this goal, the central authorities are trying to simplify the cadre which regulates the use of the research results and it offers the financial support for the universities for initiating the different forms of partnership.

According to the legal legislation in the countries such as Belgium, Holland, Finland, Sweden and Norway, the cooperation with the society is one of three main tasks of the higher education. Law

University of Denmark says that one of the goals of the university as a central institution of knowledge and as depository of the culture is to work with the society. In Iceland, the official policy is that the universities should be actively engaged in the dissemination of the results of the academia activities and of the technological developments towards the society.

Many governments specifically promote and co-finance the creation of the multilateral partnerships and the consortia between the higher education institutions, the research institutes, the regional authorities and / or the private companies. Moreover, the central authorities in several countries (Estonia, France, Italy, Portugal, Finland and Sweden) continue to provide the financial and other nature incentives to increase the regional cooperation between the higher education institutions, the companies and the local authorities.

We noted however that the results so far indicate that there is a university Europe with the lower performances than the US academia field that may be the effect of the fragmentation of the European academic field, yet unable to concentrate and connect its resources to achieve the top research.

The summary of positive aspects and vulnerabilities which are contained in the European Research Area, as part of the Lisbon Strategy is provided in Table 2.

Table 2. The strong and weak points of the ERA

Strong points	Weak points
The reviving debate about the ERA underlined the urgent need to allocate more European funds for the research	
The European Universities are a central point in building the ERA, having an essential role in the improvement of the economic competitiveness of Europe.	
The universities are a unique field , in which there are developed the interdisciplinary competences which allow the approach of the complex problems from all the fields of the human activities.	
	Innovation will not truly be realized if all its cultural and social aspects are not fully understood and addressed accordingly.
ERA Vision recognizes the universities as key stakeholders in achieving the ERA.	
Recognizing the need for the university autonomy in the management of research mission. The universities with a greater autonomy and a greater attraction which will be up to the expectations contained in the Lisbon agenda regarding the development and the jobs.	
	The under-funding problem is not sufficiently asserted. If until 2015 there are not implemented the measures which are stipulated in the E.C. according to which 3% of GDP should be devoted to the universities and the research, the structural actions proposed in the vision is not likely to be achieved.
	The ERA vision does not give an enough priority to the importance of basic research and the need to strengthen the role and the resources which are available to the ERC (European Research Council) to improve the university excellence in Europe and to enable the universities to recruit and retain the highly-qualified researchers. The research in the universities also needs the financing schemes with the rich resources at the national level, for maintaining and strengthening the

Strong points	Weak points
The reviving debate about the ERA underlined the urgent need to allocate more European funds for the research	research capacity in the new and already known areas.
	The ERA vision was not referring to the full financing of the research which was supported by the external agencies as an essential condition for the sustainability of the research mission of the universities.
	We urgently need a link between ERA and EHEA*, especially in terms of mobility of the researchers. There must be obtained a maximum synergy between the Bologna process and the EHEA building and the ERA development.
	The ERA vision was to have closer links with other reforms from the higher education sector which are already in performance, especially since the Bologna process integrated the third cycle of studies, namely the doctorate.
Universities recognize the need to create the research environments where the talented researchers can achieve a balance between the interests of doing the basic research and the development of successful partnerships with the external partners from both public and private sector.	

*EHEA – European Higher Education Area, in Romanian – Spațiul European pentru Învățământul Superior (SEIS) in which the education systems and the certificates are harmonized and which represent the main goal of the Reform of Bologna.

Source: European University Association (EUA), 2010

From the presented aspects in the table, the way in which the universities are involved in the research process and the conditionality's which can stimulate or stop the good performance and the finalization of a top research.

6. Conclusions

The knowledge-based society has as mission the knowledge generation, the dissemination of this knowledge through the education and the training, their diffusion and efficiency through the innovation and the technological development. Moreover, the investments in research, innovation and technological transfer ensure the economic development of the society. To some measure, these goals are achieved by the role played by the higher education, generally, and through the university research, in particular.

The increase of the role of research and development and innovation, in the current context of social development, characterized by high rates of change, fierce competition, globalization and other adverse effects on quality of economic and social life, imposed the development of the scientific and technological potential in the universities and, especially, the improvement of the performances of the university research.

In connection with these requirements, we can talk about the scientific research of excellence. The phrase 'excellence research' was introduced in the last decade, meaning the scientific research with high-performances.

Worldwide, the universities are the important components of the national systems of innovation, research and development and signing up among the factors with a great research potential. The research activity from the institutions of higher education trains primarily the teaching staff, but also

the students, the Ph.D. students and the other categories of staff, whose involvement in the scientific research is governed by the national laws and the internal regulations.

The relevance of the human resource is growing exponentially in a university institution where the affirmation and development engine is the innovation at the spiritual and material level, where the opening of the new fields of investigation, the approach of phenomena and new processes, the formulation of theories and hypotheses, measures and solutions for the needs of the immediate practice become the sine qua non conditions of the performance and of the worthiness.

The increase of the role of research and development and innovation, in the current context of social development, characterized by high rates of change, fierce competition, globalization and other adverse effects on quality of economic and social life, imposed the development of the scientific and technological potential in the universities and, especially, the improvement of the performances of the university research.

The increase of the capacity of the university to gain the knowledge, the results and the experience in the areas of high technological and scientific level and to ensure the transfer and their dissemination to the society to support the social and economic progress; the increasing of the visibility of the scientific research in the universities and of their ability to integrate themselves in the national and international networks and the protection of the scientific and technical values from the university heritage, are just some of the specific goals of the universities regarding the achievement of the excellence in the scientific research.

The practice shows that there cannot be achieved the high levels of performance in the scientific university research without the involvement of the top management, which includes the establishment of the university strategy regarding the scientific research and its implementation.

In Romania, we need to create a climate of excellence, which is not only in the Romanian universities, or, in any case it is less present; we need to create a critical mass of excellence staff and a crisis to shake the Romanian university and cause the reforms of substance.

There is stressed the importance of research and training in the higher education field, the promotion of interdisciplinary in maintaining and improving the quality of this education and in ensuring the competitiveness of European higher education.

It is necessary to apply a policy to support the excellence in the Romanian universities, this policy which should lead to the international visibility and to the genuine creation of knowledge, the economic increase, the social quality.

In this way, a development policy of the excellence in the university research would be congruent with the Research Strategy for 2007-2013 and with the Romania aspirations to be a respected member of the EU.

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