

The Political State

“Nowhere is freedom more important than where our ignorance is greatest - at the boundaries of knowledge, in other words, where nobody can predict what lies a step ahead.”

Friedrich A. Hayek

Economics lies between two limits of sense: the non-rational fundamentals of the problems and the political consistency of the solutions. When contriving its content, the Economy does not operate with measures testable in the order of their certitude, and when it has to finalize the solution it gives way to political decision.

Nor at the micro or macro levels do things order differently. The solutions to the problems of production and of the producer or of consumption and of the consumer are preeminently subjective, as are the solutions to the problems of resource allocation, transfers, investments, exchange etc. Rational calculus is an almost ornamental supporting element in economic decision making. It is the jewel in the set of academic finickiness which the actors of economic life consider too old fashioned. They wouldn't bring it out not even when applying for an MBA degree or when obtaining their PhD in any domain!

Between the understanding of the problems of the economy solved by Economic Science and the solutions adopted in day-to-day business activity there is a huge gap not only of consistency but of vision, too. If theoreticians opt for highlighting the rational ingredients in economic processes, often resorting to the exhaustive observation of rules and regularity in a manner inspired by the successful epistemic adventure of Physics, the practitioners, as members of the business community, turn to inspiration, as well as to opportunity, conjuncture, show of force, crediting prestige, compensating sentimental failure, exerting authority, confirming power etc. In few cases, even as an exception, do they refer to the suggestions of scientific analysis, invoke the infallibility of concepts or choose among alternative solutions.

The only escape in the space of epistemic rationalization is the fall-back on guides for solving case studies, in the manner inspired by the tradition of jurisprudence, but which most of the time are influenced by particular perspectives, exaggerations of the perception, bearing the feel of the moment etc. The relative boom of the literature for practical advice in economy skews the rational determinants of the decision, creating an environment for inadequate solutions.

Especially because it is a human activity, the Economy does not have classifiable problems, with dictionary solutions, not even invariable methods. In fact, Economics is a science of the economical contexts, infinitely multiplied by the ineffable constant called man. This condition imposes non-determinist and non-rational behaviors to all possible variables, including to time by subjectivization.

He who expects exact solutions from Economics is bound to failure. He who intuits that Economics offers visions within the bounds of which problems are thought-of, the relations between variables are identified and the

effects of variations are approximated, will have a chance of success in the economical sense.

The temptation to physicalize Economics, to exaggerate with the virtues of empiricism, to standardize solutions and to believe in regularity traces in the history of science the path of sterile formalism. The ambition of reducing the Economy to a combination of quantitative factors and to help establish the fundamentalism of the efficiency is akin to reducing life to chemical formulas or to explaining human nature as an effect of the unification of the physical forces of the world.

Conceiving Economics as a science of exact mechanics is a prolongation of the propensity towards Utopia, meaning the sort of society in which human nature will not be different from the mother nature, will obey invariable laws, will not taint efficiency with sentiments.

In such a world the rational fundamentals of Economics and the mathematic solutions to the problems of the Economy will be possible. One essential thing won't be possible: the performance of human nature of being the source of change. And without change, incertitude and risk the Economy will be anything but a human activity: it will dispense of man or accept him as a consumable resource at most.

Economics is not, in the true sense of the word, a science, being in equal measure an art of rationalization, where meaning is born both by precision and approximation, probability and supposition, rigor and tolerance, certainty and expectance, primal cause and ultimate cause, the maximum and the minimum etc.

The economic calculus is exact only by chance and is imprecise in all other situations.

The transfer of the decision-making to the politics is not an abdication from the condition of science. It is, in the end, the only way of not dispensing with man by ceding the privilege of decision-making to man in his elevated state as the exponent of social interests. The political solving of economical problems saves Economics from losing itself among dilemmas such as efficiency versus equitability. In fact, in order to be a science in the modern sense, Economics should reduce human nature – as an universe of rationality and sentiments, to the human condition – as a work resource.

Because Economics dealt with problems with non-rational fundamentals (expectancies, hopes, ambitions, frenzies, identifying, compensations, etc.) it did not have any other choice than to admit the political consistency to the solutions of rationalization, choice, scarcity, optimizing, redistribution, etc.

As much as it is science the Economy is political. The rest is technology.

Marin Dinu

Contents

Mihail Manoilescu – Inspirational Even when He Is Not Right		A Transnational Analysis – Two Models: Migration and Employment across Europe. Academic Qualifications and Labor Market Needs	
■ Ion Pohoată	3	■ Cristina Iova	25
Shrinking Bureaucracy		Challenges of the Harmonization Process of the Fiscal Policies at the European Union Level	
■ George Moldoveanu, Octavian Thor Pleter	7	■ Larisa Elena Preda	35
The Estimation of the Cointegration Relationship between the Economic Growth, Investments and Exports. The Romanian Case		Techniques of Turnovers' Evolution and Structure Analysis Using SQL Server 2005	
■ Marius-Corneliu Marinaș	11	■ Alexandru Manole	41
Methodological Aspects Regarding the Process of Estimating the Reserve for the Un-cleared Damages		Real Options in Capital Budgeting. Pricing the Option to Delay and the Option to Abandon a Project	
■ Constantin Anghelache, Gabriela Anghelache	17	■ Nicoleta Vintilă	47

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Mihail Manoilescu – Inspirational Even when He Is Not Right

■

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***Abstract.** Mihail Manoilescu is part of the series of those economists criticized in different ways, from the exaggeratedly appreciatively reviews to those that do not recognize any of his merits. The success of an analysis to place him where he rightfully belongs is related to taking into consideration a criterion –that of historical time in which Mihail Manoilescu formed himself as a state man and a science man. Only like this, only when thinking about the inter-war period, of great creative effervescence, of real renaissance for Romania, of affirmation and consolidation of the economy and of the Romanian state, of his imposing in the world economy, we can understand better the logic of his starting premises and of his judgments he based his theory on.*



Key words: Classical school; international trade; productivity; polemic.

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Because the faith placed him in the middle of some crucial events for the history of Romania, whose evolution he partly influenced, since he took care of the central problems of the economy, as a science and phenomenon in itself, playing his whole native ingenuity and recognized polemic spirit, Mihail Manoilescu was and remains, through his work, an exhaustless subject of meditation, theoretical reflection and generous source of doctrinaire analysis. Engaged in the liveliest disputes of the time regarding crucial problems of the economy and economic politics and not only, Mihail Manoilescu is part of the series of those economists criticized in different ways, from the exaggeratedly appreciatively reviews to those that do not recognize any of his merits. We believe this is what happens with the great ravaging and inciting spirits, which try to change judgment registers and propose new paths where the fashionable paradigms does not leave room for the deviations from normality.

It is difficult to grasp, in few words and little sketches, the complexity of the phenomenon named Mihail Manoilescu. A rich critical Romanian and foreign literature has plentifully accomplished here, its duty. What I believe I must say here is that myself, the author of these lines, did not make exception and was one of the analysts who expressed opinions which could be placed both in the plusses and minuses rubric, continuing to believe that any stop, besides necessary, at his work, was of nature to engage but also to change opinions apparently consolidated.

Looking at things retrospectively, namely what Manoilescu represented for the Romanian and universal science, considering what others, including me, wrote about him, I *mainly* believe that the success of an analysis to place him where he rightfully belongs, in the gallery of great spirits of the Romanian people, is related to taking into consideration a criterion – that of historical

time in which Mihail Manoilescu formed himself as a state man and a science man. Only like this, only when thinking about the inter-war period, of great creative effervescence, of real renaissance for Romania, of affirmation and consolidation of the economy and of the Romanian state, of his imposing in the world economy, we can understand better the logic of his starting premises and of his judgments he based his theory on.

Allowing the historians explain his ideological brilliancies and his pirouettes to which the ingratitude of faith engaged him as a state man, we are only trying to review, more than succinctly, what Mihail Manoilescu represented for the *history of economic doctrines*.

From such a perspective, we consider necessary to emphasize that Mihail Manoilescu was himself vexatious and a source of confusion. In his paper with epistemological character *Attempts in the philosophy of economic sciences* he writes that, without his will to interpret that the “Purpose of the economic science can only be *knowledge*: fixing the notions and establishing the connections between them, meaning establishing laws.” In order to be science and if it is science, the political economy can only have as purpose knowledge (our emphasis) (Manoilescu, 1938, p. 65). It is difficult to mention how much Mihail Manoilescu believed in this affirmation under the conditions in which very few of the lines written by him remain at the positive floor of economical science, that of knowledge. Its fundamental theoretical construction, built on the idea of international changes, of protectionism, of industry development, of agriculture, trade, etc. is one which always refers to the normative floor, inspirer of economic and social politics. This is in our opinion one of the places generating false enthusiasms. If we took as credible his statement about the purely illuminist purpose, of disinterested knowledge of economic science, and if we accept, and we have reasons to do it, that Mihail Manoilescu made science, then its theoretical construction, unlike that referring to the international trade and protectionism, garnished with logical arguments situated in an impeccable causality relation, is impossible not to strike and enthuse. The same way in which, even if the comparison is forced, you can become enthused today of the impeccable logic that the author of the *Capital* exposed his theory with, considering even one of his statements as being valid. This until you remove the ideological shell and ascertain what the road end suggested by its delusional theoretical composition is. This is not the case for Mihail Manoilescu. Still, you cannot resist the temptation to ask yourself, today, which is, in his case, the road end suggested through the statements from the *Theory of protectionism and international trade*.

We admit that we cannot offer an answer, in totality, to such an audacious question. Throwing the glove, but not to anybody, but to the classical school logician David Ricardo, Mihail Manoilescu proposed himself to oppose him through counter-arguments and to divert his conclusions. If he managed, this only happened in the positive floor plan, which he pretended he served. As regards the normative-doctrinarian floor, the history of facts and the contemporary evolution of the world evolution find their correspondent and explanation in Ricardo’s statements rather than in Manoilescu’s ones.

Therefore, *it is difficult not to agree with the fact that:*

1. The merchandise is paid with other merchandise and that... it depends, thus, very much from the facility with which a country produces the necessary merchandise for exchange in order to decide if an exchange operation with foreign countries can be considered advantageous or disadvantageous (Manoilescu, 1987, pp. 179-180).

Here, the essence of a fundamental principle according to which the manner and efficiency with which you undertake exchange operations depend on the capacity and facility with which you are capable to create the buying power in production, is comprised. Starting from such a judgment, the criterion according to which a country-whose currency is not a means of solving the international obligations, must see in commerce a production problem – not only does it stand but also makes Manoilescu a revolutionary of the international trade theory. Too bad he did not stop to this criterion.

2. The productivity of work that sends to the *quality* of the method, in which the human energy is consumed, is a serious element in the analysis of economic results, including when they are obtained in the perimeter of international exchanges. Its calculations regarding the superiority, from this point of view, of the industrial activity compared to the agricultural ones, and, as a consequence, the transfer of occupations from agriculture towards the industry as bringing profit for the country, remain strong points of Manoilescu’s construction.

This thing occurs in the conditions in which the fashionable criterion operating was that of “equal work against equal work.”

3. The civilized countries of the world, France and England, were initially developed, based on a politics of protectionist type and only afterwards, after they created roots, they were opened to the free commerce. Moreover, the theorem according to which the protectionism will always exist because as he claims, a complete leveling of the work productivity will never be achieved in the interior of a country or between countries remains still valid.

These are not the only places where Manoilescu has to communicate today and where he is an inspirer.

At the same time, as we previously mentioned, there is also a normative floor and on this one, Mihail Manoilescu did not win the battle with the classical school, and especially with David Ricardo.

The fact that, here, its economic philosophy fades, is due, in our opinion, to *its starting premises*. What he considered a constitutive element of his methodological revolution placed his conclusions on a ground in disagreement with the realities of the contemporary world.

We know that the methodological system of Mihail Manoilescu starts by calculating "...each country as a distinctive unit in the international commerce..." (Manoilescu, 1987, p. 173). In other words, Manoilescu makes a distinction between the individual national and selfish gain, and from this idea, only the *nation*, the *state*, can be advantaged or disadvantaged compared to the foreign countries. Nobody can be bothered by the fact that the state, the nation welfare, is considered reference system in an economic analysis. Only that, in an economy that tends to be more and more globalized, or, after the inspired expression of Thomas Friedman in a "flat" world (Friedman, 2007), the actors of the economic life no longer seem to be the nation-villages, in Manoilescu sense.

Then, as we already mentioned, a fundamental methodological hypothesis meant, according to Manoilescu, to break down the system of classical judgment, is the quality of work, reflected in *productivity*. Manoilescu was not satisfied with the criterion according to which what is important is the conditions of efficiency in which the exchange merchandise are produced, to know whether your trade activity is favorable to you or not. Unfortunately, he completed his "revolution" introducing in the analysis the attractive and also the deceiving criterion of the *national labour productivity average*.

According to his opinion, it is good to produce and protect only those goods whose level of afferent productivity exceeds the national average. Proposing and sustaining such a criterion, Manoilescu:

A. *Condemned to isolation*, substituting the generous, the universal and the engaging principle of costs compared to that of "nationalism" of the afferent productivity. Based on the criterion proposed by Mihail Manoilescu you risk reporting yourself only to yourself: you risk living the disillusion of some "exceptional" achievements, but which are only absolute, purely Romanian, obtained only in report with yourself and not with others. When you find out what others do, it could be too late, the competition is already lost. We do not

hide the fact that such a criterion, narcissist through its nature, managed the Romanian politics from Mihail Manoilescu until today.

B. He proved to be the *artisan of a disintegrating vision about the structure and mechanism of national economy functioning*. Taking into account that, passing from agricultural occupations to the industrial ones, a country can only benefit from this, Mihail Manoilescu over-solicited this criterion. It was no news the ascertainment that the agriculture work is 4.35 times less productive than the one from industry. Despite all this, the civilized countries never thought of creating a hierarchy for the economic development problem starting from a certain principle. Moreover, the consecrated authors of the theory of property rights when trying to fix the beginnings of the economic increase in the world say that they are found in the Netherlands where the respective nations were equipped with a system of modern institutions capable to motivate and contribute to allocating resources, of capital and world, towards the most useful activities. And the most useful, not the most productive ones, proved to be the agricultural activities and not the industrial ones. In other words, it results that the industrial revolution, initiated by the Netherlands and... afterwards, England, was prefaced by the agricultural revolution and not the other way round (North, 2003). On the other hand, even if we follow Mihail Manoilescu's thoughts, the exodus of rural-urban population, desirable and easily ascertainable, it is the *result* of a natural evolution, from the interior, of what is produced in the interior national economy and not the end of road of any *planned project*. The agriculture in the advanced countries if left for 3-5 % of the population because the work productivity, here, increased so much as to make this thing possible.

C. Although, implicitly and with vague contingences, he declared himself a liberal, the theoretical statements *do not make him a partisan of the free market*. Stopping only sporadically at Adam Smith to duel with Ricardo, Manoilescu did not understand that productivity is not a question of social engineering; that it is not necessary to trace directive lines so that work is consumed with great efficiency. In exchange, it is necessary to leave the market do its job. If you act like this, in full Smithian optics, the logic of exchange, derived from the work divisions, obliges each individual to use his hands or mind at producing those goods to which he has application, especially because "work as little and comfortable as possible", to enter into the possession of as many foreign goods as possible. In this way, Smith tells us, the work division deepens, the result being the increase of personal

and collective productivity and richness. In order for something like this to happen, we do not need illuminated despots or state planning organisms. The individuals must only manifest themselves freely on the market.

Then, also for supporting this statement, comes the weak preoccupation of *Mihail Manoilescu for the destiny of products*. Absorbed by the level of productivity as such and the necessary exodus of work towards the branches with high productivity, Mihail Manoilescu seems to forget the faith of goods achieved in the branches with a higher and higher productivity. Only when faced to a limit problem, only when he has to answer the phantom question, that will occur with the production if all the countries in the world will be obsessed by this chimera of continuous climbing on the productivity scale, only then does the episode remain singular, it says that “the regulation of quantities of goods necessary for the humankind is made automatically with the help of the constant mechanism of prices” (Manoilescu, 1987, p. 297).

D. He has built a theory of protectionism with values recognized universally, extraordinarily well connected and with arguments, a theory that cannot be avoided by any serious economist. Besides his theoretical percussion, the evolution of facts after this type of undifferentiated and unlimited protectionism, can only be damageable according to the example of Romania.

There is no doubt that the pros and cons at Mihail Manoilescu’s demarche still exist and that as long as it will be more and more thoroughly analyzed we will discover parts of his work less known to us. It is still suitable for us to think that a mind so natively endowed and open to the dialogue, if we could bring it today among us, could certainly reduce the series of arguments that are against him. In the lack of such a chance, we must remember that Manoilescu was and remains a great economist; that he opened bridges and directions of analysis in fields of great interest and that, when we are tempted not to give him justice, he remains the inspirer through live polemic dialogue he always engages us in.

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Shrinking Bureaucracy

■

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Abstract. *Bureaucracy and human creativity may be seen as the two extremes of a dimension when analyzing the continuous activity of organizations pursuing a goal or trying to achieve their objectives. The bureaucracy occurs and develops only if the outcome of the organizational activity is beneficial to both the consumers and the suppliers, or else this “organizational technique” should be shrunk using a managerial system in order that performances match the requirements of an open and democratic society.*

Key words: bureaucracy; bureaucratic behavior; activities structuring; concentration of authority; organizational control; functionality flaws; the firm model; the bureau model; the firm model.

JEL Classification: D02, D20, D23, D73, D74, H40 ■

1. The bureaucracy holism

Bureaucratic behavior prevails in most activity fields nowadays. The intensity of this behavior is differentiated between the private and the public sectors. Although there is little rationality in segmenting organizations as private vs. public, we may easily attribute the bureaucracy lead to the public sector, resulting in focusing the behavioral typology. Based on analysis, in this area we identified an organization system relying on strict rules, following the norm to the letter, excessive formalization, reduced innovation and relative change, all these aiming at an exact achievement of objectives.

Having no *a priori* conception, this system is rather an outcome of the confluence of the elements.

i. The behavior of public personalities and that of the direct subordinates, the technocrat type adhering to the oligarchy system, with essential values such as politics, hierarchy, excessive formalism, monopoly, etc. Motivation is rather inhibited and some confusing and even wrong perceptions and attitudes may be found;

ii. The group behavior of the public servants may be described as meticulous but limited to an “educated incapacity”, intimidated and dominated by law; the

leadership is stimulated as a thrust force of the organizational development;

iii. Organizational structures are often mechanical, tall, multilevel, “reversed hierarchy pyramids”; job and work specifications run short of clear definitions;

iv. The organizational processes in the public sector rely on strict procedures, as a chain of highly specialized functional departments; the decision making process uses a limited range of instruments, with partially defined problems and “invented” solutions to match the interests of the parties involved, based on negotiation and compromise.

This results in an organizational behavior dominated by impersonal rational rules. The work specialization gets priority over the value added goods, with a goal to implement legislation politics bottom lines, to increase the state power and interventionism, etc.

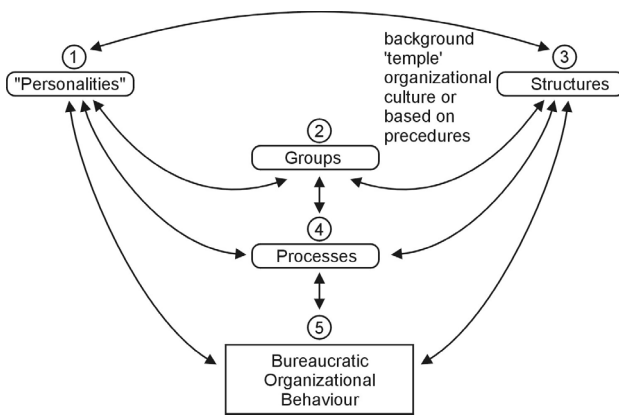


Figure 1. The Bureaucracy Holism

2. The intensity of the bureaucratic process

The intensity of the bureaucratic process is essential and may be revealed by a bi- or tri-dimensional variable system. Thus, in the first case, bureaucracy depends on two variables: the degree of activity structuring (S_a) and the degree of intensity concentration (C_a). Thus:

$$B = S_a \times C_a \quad (1)$$

Where bureaucracy B gets maximum intensity when both variables top; this is the case of *total bureaucracy*. The *personnel bureaucracy* represents a special situation when the structuring is low and the authority concentration high.

In the tri-dimensional system there is a new variable, the control (C_o), which takes values in the interpersonal-structured type range. Thus:

$$B = S_a \times C_a \times C_o \quad (2)$$

In this system, the high bureaucracy is caused by the high structuring, high concentration of authority and the impersonal control.

All the variables in the above formulas are expressed as cost quantities, using the TCR (Total Costs and Risks) method.

From Weber with his three dimensions: charisma, tradition and the legal-rational authority, to Mintzberg with his models: simple structure, bureaucracy machine, professional bureaucracy, divisional and operating adhocracy, as well as administrative, the whole literature on this subject presents various stages of bureaucracy with respect to time, type of activity and type of organizational theories (the contingency and the configurative theories).

In all this evolution, we follow the human relations school and its “iceberg”, Mayo, who offers a critical synthesis on the bureaucratic process.

3. The critics of bureaucracy

The critics of past, present and future bureaucracy (see the administrative adhocracy) may be presented as follows:

i. the strict specialization and the high activities structuring are incompatible to the need for human growth and development and contributes to the alienation of employees;

ii. the powerful dependence on the formal authority, correlated with the excessive centralism, eliminates the creative process;

iii. the strict impersonal rules lead to the minimum performance level;

iv. the strong specialization eliminates the vision on the organizational goals and favors confusions between objectives and instruments to achieve them.

Without eliminating the beneficial aspects of bureaucracy, especially with respect to the effectiveness, in the industrial era and in the times of the classic public administration, in the “bureau-shaping” model there are some flaws, such as:

i. the day to day stability breaking stress, equally identified in the public and in the business sectors;

ii. the lack of physical time, caused mainly by a poor documents management, which underlines the operational side if the information flows;

iii. the time wasted with excessive document approval formalities, leading to a “mountain” of paper instead of a true organizational resources management by many top and bottom level managers (see the practice in the human resources field).

The new organizational environment requires a transition from the “red tape of bureaucracy” to the

“optimal tape of bureaucracy”, where the processing time dimension cuts delays and creates human openings, reduces unreasonable rules, obstructive goals, rigidity, maximizing private interests to the expense of the organizational ones.

4. Shrinking bureaucracy

Based on the above, we advance the concept of *shrinking bureaucracy*, bureaucracy attenuation and not cancellation. For this purpose we prepared this list of ten points:

4.1. Extending the “firm model” to the “bureau model”, observing all particulars of the later. Both models share a fundamental logic, i.e. balancing demand and offer. In bureaucratic processes, the costs of the output is higher than the efficiency threshold, demonstrated by:

i. The minimum marginal output cost within the bureaucratic model $\left(\frac{\Delta c}{\Delta q}\right)$ is greater than the sponsored marginal value $\left(\frac{\Delta v}{\Delta q}\right)$ or put in a mathematical form:

$$\frac{\Delta c}{\Delta q} > \frac{\Delta v}{\Delta q} \quad (3)$$

ii. Also, the marginal cost of the public goods and services is greater than the marginal profit resulted from the activity of the bureau $\left(\frac{\Delta \pi}{\Delta q}\right)$ or put in a mathematical form:

$$\frac{\Delta c}{\Delta q} > \frac{\Delta \pi}{\Delta q} \quad (4)$$

The “profit” (social expectations) as a general notion represents the difference between the allocated budget and the marginal costs of the public goods or services. Financially, the marginal profit achievement or overtaking demands new lines of action, which are being simulated in the bureaucratic process, such as:

- the introduction of a competitive system in any activity, together with a strong stimulation of the work force;
- sound decisions based on the public market demands;
- modernization of the strategic process, allowing for quality goods and services at prices or tariffs accepted by the consumers, through finding ways

to cut costs; efficiency is achieved by the real trend to increase the “activity volume”.

4.2. Implementing the first point to the benefit of the consumer requires a change of the organizational system to a flat organic structure, and in the same time continuous balance between the number of managers and the number of employees, or between the later and the number of hierarchical levels, in a relative rather than absolute way, or else the hierarchy pyramids are “reversed”.

4.3. The use of the business managerial tools, such as MBP, MBE, TQM etc. Case studies show that MBO favors the derivation of objectives, to the expense of the correlation and the balance between the goals and the resources (all types), and in such a situations the targets are failed. Also, assuming objectives and the control (or the self-control, to be more accurate) are not to be identified at the first line operational levels, which makes MBE irrelevant.

4.4. Delegation and empowerment are separate ways due to their absence from the bureaucratic processes; the theory and case studies show that organizational systems may gain in strength and performance through “empowerment”, which is a trade-off between the lack of power and the abuse of power.

4.5. Limited differentiation on “class” like administration people (routine, mechanic jobs) and professionals (intellectuals) leads to a benefic group synergy, eliminates head to head conflicts, turning them into *win-win* ones. Thus, valuable specialists appear, adding to the effectiveness and to the efficiency.

4.6. Simplifying administrative procedures by a constant deployment of the IT (the electronic information transfer between the administrations and the citizen). Nonetheless, the electronic information processing reduces costs of the regular transactions for all parties involved and development if the on-line operations as a way to simplify procedures.

4.7. Training beginner and generalist administrators in the management and organizational analysis fields to facilitate behavioral change from bureaucratic to competitive. In the same direction we have the action of the recruitment system, with emphasis on university and post-university graduates, or the businessmen who may put their experience to work for a better framework to produce goods and services. Thus, a new ethos is established in the administrative systems, based on the human value.

4.8. Shifting of the organizational culture from the “temple” bureaucratic and procedure based area towards the matrix or “load” culture area, at least for the processes of some public projects. To the same purpose, we believe in a stronger link between the two sides of the organizational culture iceberg, the formal part (strategy, objectives, structures, procedural systems, artificial systems, human resources, management, etc.) and the informal one (values, attitudes, beliefs, leadership style, informal groups, conflicts, etc.). Finally, we need to implement organizational excellence in the administrative sector as well, as a superior level of a positive and powerful culture.

4.9. The introduction of a management certificate in the public sector, based on a performance criteria system

- “public benchmarking”. Hence, the European Award for Quality offers enough criteria like: general management, human resources, planning and strategy, resources, processes, customer satisfaction, the social impact and results.

4.10. Based on the above, the public sector behavior may turn from bureaucratic to competitive, where employees show a high degree of rationality, effectiveness and efficiency. The problem is only when, as the classic public sector (the “milk cow”) is on verge to disappear. Moreover, the environment for every organization is turbulent, highly changeable and difficult to predict. In this case, the bureaucracy patterns become obsolete.

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The Estimation of the Cointegration Relationship between the Economic Growth, Investments and Exports. The Romanian Case

■

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Abstract. *This paper attempts to analyze the relationship between exports, investments and economic growth in Romania. For the search of this relationship I use a multivariate autoregressive VAR model. The results of cointegration analysis showed that there is one cointegrated vector among exports, investments and economic growth. Granger causality tests based on error correction models (ECM) have indicated that investment and export influences the steady-state level of GDP.*

Key words: exports; economic growth; investments; error correction model; Granger causality.

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Starting with 2000, Romania has registered a medium growth rate of almost 5%, which determined the slow decrease of income differences by comparison to the medium level that exists in the European Union (from almost 25% in 2001 to 32% in 2006 from GDP/inhabitant EU-15). Two of the real convergence sources were exports and investments. Thus, between 2000 and 2005, the exports have increased with almost 170% (in real terms), and the investments rate has increased from 18, 5% to 23% from GDP. The rise of the real GDP was of almost 45% in the same period. Romania has registered a rise of the economic opening degree as well as a reorientation of the commercial exchanges towards the European Union, aspects which explain the dynamic of the exports.

The economic theory suggests that the expansion of the exports generates an improvement of the efficiency in allocating the productive resources and a rise of the production volume by accumulating capital (Romer, 1989, Edwards, 1992). According to Edwards (1997), the export rise determines the increase of the degree of economic openness, thus those economies will be able to absorb faster (by imitation) the technologies of the more advanced countries. Thus, a rise of the total factor productivity will

result, which will positively influence on the long-run the economic growth.

According to the neoclassical theory of international commerce, the commercial integration process will induce in the case of the Central and Eastern Europe countries (characterized by a low capital stock and a cheap labour force) a decrease in the relative prices for the intensive goods and an increase in the export weight of the capital intensive goods. This approach is replenished by the new theories of the economic growth, according to which the commercial exchanges influence the economy through the scale economies and through a more efficient use of resources. Commerce allows the more rapid access of technologies, which is an important factor for the sustainable economic growth. Ben-David and Loewy (1998) have proven the positive impact of modifying the export structure of a country over its real convergence.

A series of empirical studies have tested both the correlation between the export dynamics and the process of economic growth, and the methods of transmitting the effects between the two variables. In order to detect the causal relation between them, Pereira and Xu (2000) used the causality concept in the Granger thinking. According

to it, exports sustain economic growth, the estimation of the increase variable being improved by including the export as lagged variable. Likewise, the economic growth is a cause for the export variable if the latter's estimation contains a decrease of the forecast error by including the economic growth, as lagged variable.

Subasat (2002) has shown that exports are a source for economic convergence, the countries with a medium development level and an export expansion increase faster than those less orientated towards export. For the economies that are at a reduced/high level of development, there is no significant connection between the export increase and economic growth. Also, Sarkar (2002) has shown that only for the countries with a medium level of development there is a significant correlation between the degree of economic openness and the economic growth. Dritsakis (2004) analyzed the relationship between economic growth, investments and exports in Romania and Bulgaria's case. The results suggest both the existence of a cointegration relationship between the three variables, as well as the positive impact of the exports and investments over the real GDP.

As far as the investments are concerned, the neoclassical theory suggests the importance of the capital stock increase for the countries that are at a reduced level of economic development. The influence over the economic growth will be only on a medium term, which is until the steady-state level of income is reached. The investments' sources refer both to the increase of the saving rate and to the direct foreign investments flow. If the latter suppose a technological transfer, the real convergence process will be a sustainable one. For the new EU member countries, FDI have supported the economic growth process, two of the transmission channels being represented by investments and exports. This is due to the fact that the FDI beneficiary countries have registered both an increase of the degree of economic openness and an increase of the capital stock.

By analysing the impact of modifying exports and direct foreign investments over the real GDP in Romania (1991-2005), it has been observed the conclusive influence of the FDI over the economic growth process:

$$\text{RGDP} = -3.0465 + 0.118 \times \text{Rexp} + 0.883 \times \text{RFDI};$$

(-0.460) (1.261) (7.255) – t statistic;
R² = 0.955

The three variables have been calculated based on the increase rates, and the annual data has been taken from The National Statistics Institute. The FDI elasticity is almost 0.88, thus at a rise of 10%, GDP (in current prices) has increased with 8.8%. By comparison to exports, the elasticity was only 11.8% (being statistically insignificant),

which reflects its low contribution to the calculation of the GDP.

The purpose of this study is to estimate the long term relation of the evolution between the real GDP, the gross capital formation (as investment proxy), and the degree of economic openness.

For this objective I have used the quarterly available data of Eurostat for the period 1999:1 and 2006:4, the variables being expressed in constant prices (euro million, 1995). As temporal series are concerned, I have used statistical data expressed in logarithm. To eliminate the influence of seasonal factors, I preferred to un-season these variables (based on the Tramo/seats function from Eviews). As introduction, I have made a short presentation of the used econometric method, after which I have investigated the stationary variables using the Dickey-Fuller test. Next, I have used the Johansen procedure of variable cointegration which allowed me to apply the corresponding VAR model. In the end, I have tested the Granger causality between these variables.

Model presentation

In order to establish the causality relationship between the three variables I used the VAR model in the form: $U(\text{VAR}) = (Y, \text{INV}, \text{EXP})$. Its advantage is that it allows the interpretation of any variable as a possible endogen one and that it explains the variation through previous personal values and those of the model. This model is applied to the stationary series of data that are not cointegrated. Not respecting these conditions was solved by introducing a term of error correction (EC) (Engle, Granger, 1987), to the initial VAR model, thus resulting a new model known as error correction vector – VECM. The cointegration is the property of two or more temporal series of having the same long term stochastic trend. The non-stationary is characterized by the presence of at list one unit root in the initial presence of the autoregressive vector.

A VAR type non stationary model with three variables and a deterministic term can be written as follows:

$$U_t = A_0 + A(\text{Log})U_t + e_t,$$

where:

$A(\text{LOG}) = [a_{ij}(\text{Log})]$ is a 3x3 matrix of the polynomial $a_{ij}(\text{Log}) = \sum a_{ij1} \text{Log}^1$, and a_{ij} is the polynomial's degree;

$A_0 = (a_{10}, a_{20}, a_{30})$ is a constant, and e_t is a 3x1 vector of the random error.

The VAR model can be written as a VECM, assuming the existence of at least one cointegration vector

$$\Delta U_t = A_0 + A(\text{Log})\Delta U_{t-1} + \delta \text{EC}_{t-1} + \mu_t, \quad (1)$$

where:

μ_t is a 3x1 vector of „noise errors”, $E(\mu) = 0$ and $(\mu_t \mu_{t-1}) = \Omega$, for $t = s$ and zero, in the other cases.

After identifying the parameters for the cointegration vector, the economic increase equation can be written as follows:

$$\ln Y_t = \beta_1 \times \ln \text{INV}_t + \beta_2 \times \ln \text{EXP}_t \quad (2)$$

The error correction term can be obtained from the previous equation:

$$\text{EC}_t = \ln Y_t - \beta_1 \times \ln \text{INV}_t - \beta_2 \times \ln \text{EXP}_t \quad (3)$$

Including the economic increase equation in model (1) we obtain:

$$\Delta \log Y_t = a_0 + \sum a_{1j} \Delta \log Y_{t-j} + \sum a_{2j} \Delta \log \text{INV}_{t-j} + \sum a_{3j} \Delta \log \text{EXP}_{t-j} + \delta \text{EC}_{t-1} + e_t \quad (4)$$

where EC_{t-1} represents the equilibrium departure in the t period, and the δ coefficient refers to the adjustment speed of the dependent variable towards its long term equilibrium.

The methodology of testing the causality in Granger thinking assumes initially testing the stationary using the unit root test. If there is at least one unit root, than the model is not stationary and the cointegration test are applied (Johansen). Otherwise, VAR can be used for the stationary model. If the presence of cointegration is discovered, VECM representation will be obtained, to which the causality test is applied. If there is no cointegration relation between the variables, a representation by differentiating the initial VAR model (VARD) will be done, after which the Granger test will be used.

a) *The determination of the unit roots*

In order to test the analyzed stationary variables, I have applied the Dickey-Fuller (ADF) test, based on the following regression:

$$\Delta X_t = \delta_0 + \delta_1 t + \delta_2 X_{t-1} + \sum_{i=1}^k \alpha_i \Delta X_{t-i} + u_t$$

The ΔX_{t-1} variable, expressed in logarithm, refers to the first difference with k lags; the u_t variable adjusts the autocorrelation error. The $\delta_0, \delta_1, \delta_2$ and α_i coefficients are initially estimated. The hypothesis of an existing unit root for X_t variable are:

$$H_0: \delta_2 = 0; H_e: \delta_2 < 0.$$

If H_0 is accepted, than the model is non-stationary. If the null hypothesis applied to the values of the differentiated model of 1st order is rejected, then that variable is a unit root and its integration order is 1. If the null hypothesis is accepted, and the one applied to the differentiated model of the 2nd order is rejected, then the integration order of the variable is 2 and so on. The hypotheses are tested by using the statistic test t for the δ_2 coefficient.

Before verifying the stationary, we must establish the number of lags of the model, on the basis of the minimum values for the Akaike (AIC) and Schwartz (SC) criteria, which are calculated as follows:

$$\text{AIC} = [2k/T] + \ln (\text{the square remainder sum}/T),$$

$$\text{SC} = [k \ln T/T] + \ln (\text{the square remainder sum}/T).$$

where k – number of the estimated parameters, and T – observations number.

I have observed that the minimum values of the two criteria are different, so I have reached Canova’s (2006) conclusion, according to which for a number higher than 20 quarter observations, the Schwartz criteria is a consistent one, and the AIC is not consistent.

The stationary research assumes the existence of an unit root. Its number gives also the integration order for each variable. Table 1 presents the results of applying the ADF test for Romania.

The model’s stationary variables

Table 1

LogY						
Initial structure			The first difference			Integration order (I)
ADF Test – 4 difference lags			ADF Test – 3 difference lags			
-3,326023	1% critical value	-4,3382	-3,476322	1% critical value	-3,6959	I = 2 (1%)
	5%	-3,5867		5%	-2,9750	I = 1 (5%)
	10%	-3,2279		10%	-2,6265	I = 0 (10%)
LogEXP						
Initial structure			The first difference			Integration Order (I)
ADF Test – 4 difference lags			ADF Test – 0 difference lags			
-3,15241	1% critical value	-4,3382	-4,967172	1% critical value	-3,6651	I = 1 (1%; 5%; 10%)
	5%	-3,5867		5%	-2,9627	
	10%	-3,2279		10%	-2,6200	
LogINV						
Initial structure			The first difference			Integration order (I)
ADF Test – 4 difference lags			ADF Test – 0 difference lags			
3,938837	1% critical value	-3,6959	-5,899291	1% critical value	-3,6661	I = 1 (1%; 5%; 10%)
	5%	-2,9750		5%	-2,9627	
	10%	-2,6265		10%	-2,6200	

The results show that the investments and exports variables expressed in logarithm become stationary (for 1%, 5% and 10% critical value) by transformation with the first difference. In the case of the economic growth variable, the null hypothesis of the existence of a unit root is rejected at 5% and 10%, but it is accepted at 1%; so, it is non-stationary at 1% for the first difference but stationary for the other two significance levels. The integration order (I) of the three variables has been determined according to the number of the unit roots.

b) *The cointegration study*

If the data series are non-stationary in the initial form, they can be cointegrated, that is there is at least one linear combination between them that is stationary. The cointegration condition (that is the existence of a long term linear relation) is respected, because the variables have the same integration order. The applied methodology is the one proposed by Johansen (1990), according to which the null hypothesis of the cointegration non-existence shall be tested.

VAR U p-dimensional vector is constructed and k lags:

$$U_t = A_1 U_{t-1} + \dots + A_k U_{t-k} + e_t,$$

where the U vector includes the three non-stationary variables of the 1st integration order (for 5% critical value) and it has p dimension.

This model can be re-written in an error correction form as follows:

$$\Delta U_t = \Gamma_1 \Delta U_{t-1} + \dots + \Gamma_{k-1} \Delta U_{t-k+1} + \Pi U_{t-k} + e_t,$$

where Γ and Π matrix are given by the relations:

$$\Gamma_i = - [I - \sum_{i=1}^{k-1} \pi_i] \text{ și } \Pi = - [I - \sum_{i=1}^k \pi_i].$$

Under the cointegration hypothesis, the p dimension matrix contains information regarding the long term relation between the U vector variables. This hypothesis is influenced by the r grade of Π matrix. Three situations are taken into account:

a) r can be completed, in other words the r grade of the Π matrix is p. In this case, all the variables from the U vector are stationary. Generally, this situation will not appear as long as one or more variables have the integration order 1;

b) r is zero, in other words Π is the null matrix. In this case, there is no long term relation between the variables and the VAR must be estimated in differences;

c) $r < p$ and it represents the number of the cointegration vectors between the variables of the U vector. This implies the fact that the $p \times r$ α and β a matrix so that $\Pi = \alpha \beta'$, where β is the matrix of the cointegrated vectors and α is the

adjustment coefficient matrix. Even if the U elements can not be stationary, the cointegration vectors are linear stationary combinations of these elements, that is $t \beta' X$ is stationary.

With the help of Eviews I have tested the hypothesis referring to the grade of Π matrix, using *trace test* option. The null hypotheses are the one of the inexistence of a cointegration relation between the variables. It is validated if $\lambda_{\text{statistic}} < \lambda_{\text{critic}}$ (for 1% and 5% significance levels), the λ values being generated by the Eviews program. The Johansen procedure offers information only regarding the number of cointegration relations inside a model, not regarding the variables that are cointegrated.

Between the three variables there is one cointegration relation, at the significance levels 1% and 5% (I have taken into account the cointegration based on a deterministic linear trend – table 2).

The number of cointegration relations inside the model

Table 2

Values of Π matrix	$\lambda_{\text{statistic}}$	$\lambda_{\text{critic}} (5\%)$	$\lambda_{\text{critic}} (1\%)$	Results comment
0.695555	45.01871	29.68	35.65	Trace test indicates one cointegration relation at 1% and 5% levels (45.01871 > 29.68 and 45.01871 > 35.65).
0.198880	9.340743	15.41	20.04	
0.085715	2.688399	3.76	6.65	

The cointegration relation obtained by normalizing the coefficients shows a positive correlation on a long term between the economic growth, on one hand, and investments, exports, on the other hand.

$$\text{LogY} = 0.49\text{LogINV} + 0.18\text{LogEXP} + 3.60.$$

According to the above mentioned relation, the real GDP on the long term in relation to the investments modification is 0.49%, which means that at a 10% increase, the economic growth rate will be 4.9%. The elasticity according to the export variable is 0.18, thus its increase of 10% will have as an effect a growth rate 1.8% higher than in the previous period.

The relative low contribution of the exports comes against the vision according to which they were the growth engine in Romania starting with 2000. But, by calculating the GDP as sum of the added gross values, by the internal economic agents, a possible explanation is obtained. The added value contained in exports is a reduced one, limiting mainly to the workers' salaries from those activity sectors. The structure of the exports from the analyzed period is characterized by increased Lohn weight (almost 40% from the exports). According to the content of the cointegration notion, the above relation can be interpreted by simultaneous evolution of increase, investments and exports towards the long term equilibrium of the real GDP. But this result does not reveal anything regarding causality

because common evolution does not assume a causal relation between them. The next step assumes the estimation of the ECM vector for causality testing.

c) *VAR model with the error correction mechanism (VECM)*

The error correction model is used to investigate the causal relations between the three analyzed variables. The values obtained by applying this model will be introduced in equation (4), as follows:

$$\Delta \text{Log} Y_t = -0.33 \Delta \text{Log} Y_{t-1} - 0.05 \Delta \text{Log} \text{INV}_{t-1} + 0.07 \Delta \text{Log} \text{EXP}_{t-1} - 0.13 (\text{Log} Y_{t-1} - 0.49 \text{Log} \text{INV}_{t-1} - 0.18 \text{Log} \text{EXP}_{t-1} - 3.60).$$

Granger causality assumes the existence of a transmission mechanism for the influences over the dependent variable $\text{Log} Y$, by the adjustment coefficient $\hat{\alpha}$. Because it is significantly different from zero and negative, than VECM contributes to maintaining the long term equilibrium of the real GDP variable (13% from the deviation of the GDP modification is explained by the error correction vector). This value of 13% is seen as the convergence speed of the real GDP to its stationary level inside the model that includes investments and exports. In Solow model, the convergence speed assumed an inverted relation between the real GDP growth and its previous level.

In order to discover the necessary period to reach half of the gap between the present level and the stationary level of the GDP, I used the following relation:

$$\text{Time} = \ln(2) / \text{adjustment speed} = \frac{\ln(2)}{0.13} = 5.33 \text{ quarter.}$$

It results that in almost 10.6 quarters (that is in the II quarter of 2009); the real GDP will reach its stationary level, in the absence of the increase of the total factor productivity.

In order to test the causality in the Granger thinking between these variables, I have retained 4 lags because the influence over the dependent variable assumes a certain temporal difference (in the conditions of quarterly data). The null hypothesis (H_0) is one of the inexistence of a Granger causality (table 3).

Granger causality between the model's variable (Romania's case)

Table 3

H_0 :	Observations	F-Statistics	Probability
LogINV is not a cause for LOGY	27	3.48233	0.02833
LogY is not a cause for LogINV		0.76032	0.56453
LogEXP is not a cause for LogY	27	4.78151	0.00834
LogY is not a cause for LogEXP		0.75265	0.56920
LogEXP is not a cause for LogINV	27	0.19195	0.93947
LogINV is not a cause for LogEXP		0.66594	0.62382

The hypothesis according to which investments do not influence the growth is rejected, so it is considered that the real GDP prediction is increased by using the investments variable. Thus is validated the role of the capital accumulation in the real convergence process of the Romanian economy. Another valid hypothesis is the causality between exports and growth in the Granger thinking. Most of the exports had as source foreign direct investments which support also the process of recuperating the development gaps. As a conclusion, the accuracy of the estimation for the future growth rate will be higher if the investments and exports variables are exogen inside the model. According to Granger methodology we can not verify the influence of the GDP growth over the investments that is the existence of the accelerator.

I have used the Sims causality (1980) whose significance is the following: if the future values of y variable allow the explanation of the current values of the x variable, then x is considered to be the cause of y. Thus, if the future investments values (differenced by specific lag, in the conditions of some quarterly series of data) influence the growth in the present than the real GDP is the cause of the gross capital formation (the essence of the accelerator).

$$\text{Log} Y = -0.06 \times \text{Log} \text{INV}(-1) + 0.83 \times \text{Log} Y(-1) + 0.15 \times \text{Log} \text{INV}(3) + 0.89.$$

According to the previous estimation, the real GDP modification in the t quarter will positively influence the investments in t+3.

d) *Reviewing the model. Inclusion of economic openness degree (EOD)*

To capture the influence of imports over the long term economic growth, I have replaced exports with degree of economic openness, calculated as the ratio between the exports, imports sum and GDP. The available data are quarterly for the period 1999:1–2006:4, and their source is Eurostat.

This variable is non-stationary at its initial level, having the 1st order of integration for 5%, 10% significance and 2nd order for 1% significance. In the initial model I have replaced the exports with the new variable. After identifying the parameters for the cointegration vector, the economic growth equation becomes:

$$\ln Y_t = \beta_1 \times \ln \text{INV}_t + \beta_2 \times \ln \text{EOD}_t.$$

The correlation term for the error can be obtained from the previous equation:

$$\text{EC}_t = \ln Y_t - \beta_1 \times \ln \text{INV}_t - \beta_2 \times \ln \text{EOD}_t.$$

Including the economic growth equation in the form of model (4) is obtained:

$$\Delta \log Y_t = a_0 + \sum a_{1j} \Delta \log Y_{t-j} + \sum a_{2j} \Delta \log \text{INV}_{t-j} + \sum a_{3j} \Delta \log \text{EOD}_{t-j} + \delta \text{EC}_{t-1} + e_t \quad (5)$$

Between the three variables there is one cointegration relation at the significance level of 1% and of 5% (I have taken into consideration the cointegration based on a linear deterministic trend – table 4).

The number of cointegration relations inside the EOD model

Table 4

Matrix Π values	$\lambda_{\text{statistic}}$	$\lambda_{\text{critic}} (5\%)$	$\lambda_{\text{critic}} (1\%)$	Results comment
0.694180	47.12126	29.68	35.65	The trace test indicates one cointegration relation at the levels of 1% and 5% (47.12126 > 29.68 and 47.12126 > 35.65).
0.250175	11.57846	15.41	20.04	
0.093382	2.941007	3.76	6.65	

The cointegration relation obtained by normalising the coefficients shows a positive correlation on the long term between the economic growth, on one side, and the investments, EOD, on the other side.

$$\log Y = 0.41 \log \text{INV} + 0.28 \log \text{EOD} + 5.74.$$

According to the above relation, the real GDP elasticity on the long term by comparison to the investments modification is 0.41%, which means that at a 10% growth, the economic growth rate will be 4.1%. Elasticity according to the openness degree is 0.28, so its increase with 10% will cause a growth rate of 2.8%. The obtained results suggest a higher elasticity of the GDP than EOD by comparison to that of the exports. It results that increasing the commercial deficit

(evolution induced by the EOD growth) will have positive effects over the real GDP evolution. The previous conclusion, although surprising at first, can be explained by the effect brought by the imports over the Romanian economy.

The realisation of the error correction model shows the following causality relation between the three variables:

$$\Delta \log Y_t = -0.21 \Delta \log Y_{t-1} - 0.04 \Delta \log \text{INV}_{t-1} + 0.03 \Delta \log \text{EOD}_{t-1} - 0.11 (\log Y_{t-1} - 0.41 \log \text{INV}_{t-1} - 0.28 \log \text{EOD}_{t-1} - 5.74).$$

The above equation shows that the enclosure of the EOD variable leads to the decrease of 0.02 percentage points of the adjustment speed of real GDP towards its stationary level (from 13% in the exports model to 11% in the EOD model). To discover the period necessary to reach half of the gap between the GDP current and its steady-state level, I have used the following relation:

$$\text{Time} = \frac{\ln(2)}{0.11} = 6.30 \text{ quarters.}$$

It results that in almost 12.6 quarters (that is in the first quarter of 2010) the real GDP will reach its stationary level, which anticipates a decrease of the economic growth rate, in the absence of the increase of total factor productivity. The real GDP long term equilibrium is reached faster when using exports variables than in including EOD; the explanation refers to greater lag of transmission for the imports effects over the economic growth.

In conclusion, the error correction vector is a valid model for analyzing the long term relation between the real GDP, investments, exports, economic opening degree. The increases of these variables are able to generate positive effects over economic growth, a superior influence having the investments.

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Methodological Aspects Regarding the Process of Estimating the Reserve for the Un-cleared Damages

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Abstract. *This article emphasizes a series of aspects concerning the estimation of the reserve for the un-cleared damages. Such an activity is of an actuarial nature as it implies a present evaluation of future uncertain phenomena. Here we have the methods being used for the damages estimation, stressing out the individual estimation, the statistical methods which are used, the method of the average cost per damage, the method of the damage rate or the reserve estimation for the damages which are occurring without being yet reported.*

The analyzed theoretical aspects are accompanied by empirical examples meant to give the researcher (reader) the opportunity of a clearer understanding the mechanism in discussion. The examples are of a scholastic nature to the extent they are aiming a more explicit approach of the used mechanism only, without representing elements of a case analysis.

Key words: estimation; damage; damage rate; average cost; run-off triangle.

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An insurer is bound in any moment to un-cleared liabilities in connection with damages, which occurred without being yet sorted out. The estimation of the reserves meant to cover the un-cleared damages is therefore an activity of an utmost importance for each and every insurer. Meantime, it is an actuarial activity as it implies a present evaluation of future uncertain phenomena.

There are two separate methods, which can be used for this kind of estimations:

- *The individual estimation* of the liabilities for each un-cleared damage;
- *Statistical methods*, in order to estimate the total value of the payments to be made for the whole portfolio of un-cleared damages.

The individual estimation is based on the individual calculation, case after case, of all the files of un-cleared damages. Each file is successively analyzed by a person from the damages department. A person of adequate

expertise will take into account all the necessary elements and will credit a specific value to any damage. The amounts required by the payment of the direct expenses, connected to the respective damage, are to be added to this specific value. Eventually, there is only an adjustment to be made, respectively the future inflation of the damages, which has to be considered, depending on the forecasted moment of the damages settlement.

However, the method of the individual estimation has certain disadvantages, i.e.:

- It does not allow the estimation of the reserve for damages which although occurred are not yet reported (not notified) (RDAN) or for damages which may be re-opened;
- The estimation is based on the skill and judgment of some persons. Different person may reach different results;

- It is a method which is hard to verify;
- In the case of certain classes of insurances it may happen that there are thousands of damages, which implies a big amount of person-hour for the individual estimation of each damage.

But the method of the individual estimation offers also a number of advantages, i.e.:

- It is the sole approach allowing all the information regarding the un-cleared damages to be taken into consideration;
- There are many qualitative factors influencing the size of this damage. An experienced person would be capable to use all these factors when estimating the size of a damage;
- The method may be used even in the situation when the statistical methods cannot be utilized.

In the case of applying the *statistical methods*, it is necessary that more detailed information are available in order to divide the data by homogenous groups. What is fundamental when utilizing the statistical methods is the experience of enough information meant to allow the division of the damages in any possible subgroups.

There are different statistical methods which can be used for the estimation of the reserve for the un-cleared damages, each of them leading to different outcomes in most of the cases. The statistical methods are implying the fact that in the past there has been a stable evolution of the procedure of clearing the damages and that this stability is going to last for the future as well.

Most of the statistical methods may be divided in the following main groups:

- The chain-ladder method;
- The average cost per damage method;
- The damage rate method;
- Combinations or variations of these methods.

Basically, the variations are linked to the following:

- Adjustments depending on the previous inflation;
- Selection of the occurred damages or of the compensated damages;
- Selection of the damages cohort;
- Selection of different factors of development;
- Selection of the exposure or of the damage rate being used.

Before discussing the main statistical methods, it is necessary to underline a number of definitions:

A *damages cohort* is a group of damages which have a common origin period.

Usually, the origin period is a calendar year but it can be shorter, a month or a trimester for instance.

Generally speaking, there are three ways of grouping the damages:

- Depending on the *year when the event (the damage) arouse*, leading to the damage occurrence. By using this

method, all damages due to certain events which arouse within one year time (or the corresponding period, if this one differs) are grouped, irrespectively the fact that they have been reported or compensated by the time of the analysis and irrespectively the year the insurance started to count. The advantage of this kind of grouping consist of the fact that the damages are due to the same period of exposure to risk, even if they are due to polices subscribed under different conditions. The damages occurred but not reported, the amounts to be received from re-insurances and the re-opened damages are included in the damages cohort due to the year they have occurred. The estimation and the projection of the future development of the damages in this form will allow the automatic inclusion of the damages occurred but not reported, of the amounts to be received from re-insurances and the re-opened damages belonging to the respective cohort.

- Depending on the *starting year of the insurance or the subscribing year*: all the damages due to polices starting within a 12 months period, irrespectively the date of the damage occurrence during the current year or the next year. Using this definition, it may happen that damages occurring two consecutive years are belonging to the same year of subscription. The disadvantage of the grouping is connected to the large duration of occurrence of damages due to a particular year of subscription, as well as to the duration regarding their reporting. The damages occurred but not reported, the amounts to be received from re-insurances and the re-opened damages are automatically included, provided they are allocated to an insured damage.

- Depending on the *reporting year*: all damages which are reported to the insurer within a 12 months period are grouped, irrespectively the year the event generating them occurred. An apparent advantage of the method consists of the fact that no more damages are added to the cohort after the end of the reporting year covering the respective cohort. A major disadvantage of this grouping consists of the fact that the projections will not include the damages occurred but not reported as well as the re-opened damages. The estimation of the un-cleared damages by using this grouping allows the estimation of the reported un-cleared damages. This cohort of damages is typical to the methods of estimating the damage reserves for the insurers of the Republic of Moldova, in accordance with the legal regulations in force.

Contrary to the individual estimation method, the purpose of the statistical method consists of the evaluation of the un-cleared damages for different classes of insurances without the analysis of every file of un-cleared damage individually considered.

The majority of the statistical methods imply the presentation of the data in form of table of the kind: *development table*; *run-off triangle*.

The detailed model of the data presentation depends on the definition of columns and rows of the table. Usually, the rows are indicating the year (or month, or trimester, etc.) of origin, while the precise definition depends on the definition used for the damages cohort. The columns are indicating the damages development or their reporting and may cover either cumulated damages or non-cumulated damages.

Let's assume that the data are presented as a development table.

The development table of damages grouped according the origin year

Table 1

Origin year	Delay in clearing, as years (development year)			
	0	1	2	3
1995	D _{95,0} ✓	D _{95,1} ✓	D _{95,2} ✓	D _{95,3} ✓
1996	D _{96,0} ✓	D _{96,1} ✓	D _{96,2} ✓	D _{96,3} ✓
1997	D _{97,0} ✓	D _{97,1} ✓	D _{97,2} ✓	D _{97,3} ✓
1998	D _{98,0} ✓	D _{98,1} ✓	D _{98,2} ✓	D _{98,3} ?
1999	D _{99,0} ✓	D _{99,1} ✓	D _{99,2} ?	D _{99,3} ?
2000	D _{00,0} ✓	D _{00,1} ?	D _{00,2} ?	D _{00,3} ?

In the above table, there is the assumption that all the damages are cleared within maximum three years as from the occurrence of the event generating them.

For the cells marked as „✓” the value is known. For every cell bearing the symbol „?” the value is unknown and represents the amounts to be paid in the future (assuming that the table is drawn up by 31.12.2000).

The following statements should be obvious:

- D_{97,2} represents the damages compensated in 1999 as a result off events occurring back in 1997;
- D_{97,0} + D_{97,1} + D_{97,2} + D_{97,3} represents the total compensations paid as a result of events occurring in 1997;
- D_{00,0} + D_{99,1} + D_{98,2} + D_{97,3} represents damages compensated in 2000;
- D_{00,3} represents damages to be paid in 2003 for events occurring in 2000;
- The total of the cells marked „?” represents the total amount which will be paid in the future due to the events occurring up to 31.12.2000. In fact, this total is the total of the un-cleared damages by 31.12.2000.
- If the damages are presented in a cumulated form, then D_{98,2} represents the damages compensated before 2000 and during 2000 as a consequence of the events occurring in 1998.

The presentation of data as a run-off triangle implies the use of the data influencing the current year (year 2000).

Run-off triangle

(damages compensated depending on the origin year)

Table 2

Origin year	Delay in clearing, as years (development year)			
	0	1	2	3
1997	D _{97,0} ✓	D _{97,1} ✓	D _{97,2} ✓	D _{97,3} ✓
1998	D _{98,0} ✓	D _{98,1} ✓	D _{98,2} ✓	D _{98,3} ?
1999	D _{99,0} ✓	D _{99,1} ✓	D _{99,2} ?	D _{99,3} ?
2000	D _{00,0} ✓	D _{00,1} ?	D _{00,2} ?	D _{00,3} ?

The data corresponding to the origin years 1995, 1996 are ignored (these damages are considered as being cleared). The value D_{97,3} covers the estimation of the values for D_{98,3}, D_{99,3}, D_{00,3}.

The statistical methods based on the run-off triangle are using in calculation a basic principle, which is presented by the following figure.

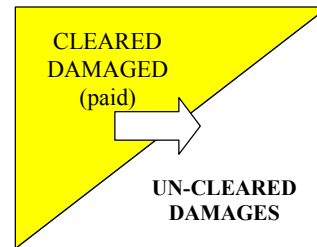


Figure 1. Basic principle for run-off triangle

On the basis of the known information as to the cleared damages (the hatched area), it is possible to predict the un-cleared damages corresponding to the un-hatched area of the square. The un-cleared damages are estimated by the statistical methods described below.

2. *The Chain-Ladder method* is based on the computation of the development factors and their application to the cumulated damages, which served to their calculation. More accurately, the basic chain-ladder method is applying to the development of the *compensated damages* but not adjusted to the inflation, using the damages cohort based on the origin year of the events.

The development factors are reports on the value of damages during successive years of development (or other successive periods of development: month, quarter, half-year).

For a better understanding of the basic chain-ladder method, we use the run-off triangle.

Further on, we shall present the stages needed in order to estimate the reserve for the un-cleared damages (RDN) by 31.12.2000.

Stage 1. Out of the initial table we calculate the cumulated damages for each origin year of the events, as they arise at the end of each year of development.

Run-off triangle (cumulated damages)

Table 3

Origin year	Delay in clearing, as years (development year)			
	0	1	2	3
1997	D _{97,0}	D _{97,0} + D _{97,1} =D _{97,0-1}	D _{97,0} + D _{97,1} + D _{97,2} =D _{97,0-2}	D _{97,0} + D _{97,1} + D _{97,2} + D _{97,3} =D _{97,0-3}
1998	D _{98,0}	D _{98,0} + D _{98,1} =D _{98,0-1}	D _{98,0} + D _{98,1} + D _{98,2} =D _{98,0-2}	
1999	D _{99,0}	D _{99,0} + D _{99,1} =D _{99,0-1}		
2000	D _{00,0}			

Stage 2. We calculate the development factors, which are computed as *modification indices* in form of ratios:

$$i_{1/0} = \frac{D_{97,0-1} + D_{98,0-1} + D_{99,0-1}}{D_{97,0} + D_{98,0} + D_{99,0}};$$

$$i_{2/1} = \frac{D_{97,0-2} + D_{98,0-2}}{D_{97,0-1} + D_{98,0-1}}; i_{3/2} = \frac{D_{97,0-3}}{D_{97,0-2}}.$$

Stage 3. Using the development factors, we estimate the un-cleared damages cumulated for each origin year:

year 2000:

$$D_{00,0-1} = D_{00,0} \times i_{1/0};$$

$$D_{00,0-2} = D_{00,0} \times i_{1/0} \times i_{2/1};$$

$$D_{00,0-3} = D_{00,0} \times i_{1/0} \times i_{2/1} \times i_{3/2}.$$

year 1999:

$$D_{99,0-2} = D_{99,0-1} \times i_{2/1};$$

$$D_{99,0-3} = D_{99,0-1} \times i_{2/1} \times i_{3/1}.$$

year 1998:

$$D_{98,0-3} = D_{98,0-2} \times i_{3/2}.$$

Stage 4. We fill in the run-off triangle (cumulated damages) with the values obtained out of the previous stage. Consequently, we get the following table of cumulated damages:

Compensated and estimated damages depending on the origin year and the run-off triangle (cumulated damages)

Table 4

Origin year	Delay in clearing, as years (development year)			
	0	1	2	3
1997	$D_{97,0}$	$D_{97,0-1}$	$D_{97,0-2}$	$D_{97,0-3}$
1998	$D_{98,0}$	$D_{98,0-1}$	$D_{98,0-2}$	$D_{98,0-3}$
1999	$D_{99,0}$	$D_{99,0-1}$	$D_{99,0-2}$	$D_{99,0-3}$
2000	$D_{00,0}$	$D_{00,0-1}$	$D_{00,0-2}$	$D_{00,0-3}$

Stage 5. The reserve for the un-cleared damages, which should be set up and kept by 31.12.2000 can be calculated as follows:

RDN = the sum of the differences between the cumulated damages by the end of the last year of development and the last known cell of the development triangle for that origin year.

The sum is to be calculated for all the values corresponding to the origin years for which the estimation has been made.

Thus, RDN by 31.12.2000 is:

$$RDN = (D_{00,0-3} - D_{00,0}) + (D_{99,0-3} - D_{99,0-1}) + (D_{98,0-3} - D_{98,0-2})$$

The difference between the cumulated damages by the end of the last year of development and the last known cell of the development triangle for the respective origin year represents the un-cleared cumulated damages for that origin year.

The main hypothesis at the basis of the underlying chain-ladder method assumes that the evolution of the development of damages is stable.

This method is not issuing any explicit hypothesis concerning the damages inflation. The essential distinction between the *Chain-Ladder method modified to inflation* and the previous method consists of the following aspect:

- There is an inflation index applying to the previous damages in order to let them become comparable, in monetary terms, with the damages of the last year;
- A predicted index for the future inflation is applied to the estimated damages.

The *Chain-Ladder method modified to inflation* is similar to the basic method excepting the fact that there are more calculations being needed.

- The initial data concerning the damages, presented in the form of a run-off table depending on the origin year/year of development, are converted into constant monetary terms, most probably those of the last origin year (the damages are multiplied by the inflation index). For this operation, it is necessary that the best estimations for the previous inflation of the damages are available;
- After cumulating the damages for each origin year, the basic chain-ladder method is used on the basis of the table modified by the inflation index, in order to estimate the cumulated damages to be paid during every subsequent origin years/years of development. These amounts will be expressed in constant monetary terms;
- The amounts estimated for being paid during every subsequent year (but not the cumulated one) are then calculated. The predicted future inflation is then added to these amounts in order to convert the sums of every cell corresponding to the subsequent origin year/year of development into the monetary values corresponding to the respective year (the product between the future inflation index and the estimated amounts to be paid).

Using the Chain-Ladder method modified to inflation requires information about the previous rate of inflation of the damages or about the inflation rate of the previous years, in case there are not information concerning the

damages inflation. The inflation over the following years can be set up depending on the previous inflation or can be predicted. Since there is the assumption that the damages are uniformly distributed over the year duration, the calculation takes into consideration a monthly average rate of inflation.

3. The method of the average cost per damage

This method takes into consideration two separate key-elements of the damages, respectively: *the number of damages (n) and the average damage (\bar{D})*. This method requires a development table for both the damages value and the number of damages. Using these tables of development, there is another table being built up, namely the table of the average values of the damages, which is obtained by dividing the values of the corresponding cells of the first two tables. The next step consists of getting estimations for both the average values of the damages and the number of damages by multiplying, for each origin year, the estimated value for the average damage by the number of damages.

The reserve for the un-cleared damages is calculated as the difference between the final estimated damages (cumulated) and the compensated (paid) damages by the time of the evaluation.

Synthetically, the above discussion may be presented as in the following figure:

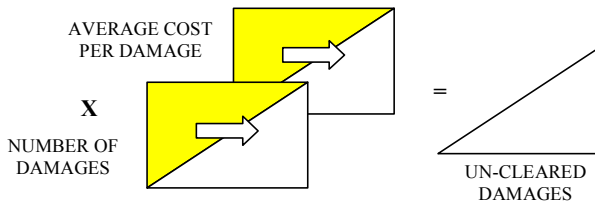


Figure 2. Average cost per damage estimation

The method of the average cost per damage is not defined in a unique manner. The method applies to damages cohorts based on the origin year, the damages being either paid damages (DP) or occurred damages (DA), or to a cohort based on the reporting year. Consequently, it is very important to keep the relationship between the types of damages, paid or reported, and the number of damages either cleared or reported. Consequently:

- The paid damages are connected to the number of cleared damages;
- The occurred damages are connected to the number of reported damages.

The situation gets somehow more complicated due to the spread out payments (partial payments) or to the damages which, although cleared up, are not backed by any payment. Changes the treatment of these damages may lead to disturbances as far as the application of this method is concerned.

The table of the number of damages can contain various information regarding the damages. This information may refer to:

- The number of the cleared damages;
- The number of the reported damages.

The method, as described above, is ignoring any adjustment to inflation. Such an adjustment may be done in a similar way with the one applied to the basic chain-ladder method. In practice there is an adjustment which is applied in order to take into account the inflation, both the previous and the predicted one.

The stages being required for the estimation of RDN through the method of average cost per damage, modified to inflation, are the following:

Stage 1. The procedure starts from the usual triangle of the damages paid depending on the origin year and the year of development.

Stage 2. As well as in the case of the chain-ladder method modified to inflation, the amounts out of the table are converted into constant monetary amounts, by using the estimations for the previous inflation of the damages or the estimations for the previous rate of inflation, corresponding to each previous year.

Stage 3. The triangle of the number of recorded damages is then formed depending on the origin year and the year of development. There are now two corresponding triangles: one of them containing the value of the damages and the other containing the number of damages.

Stage 4. The value of the damages is divided to the corresponding number of damages in order to get the third triangle, the triangle of the average damages.

Stage 5. Working out with the triangle of the average damages, we can calculate the average damage for each year of development.

Stage 6. The basic chain-ladder method is then applied in order to estimate the number of damages accounted for every origin year/year of development.

Stage 7. The value of the average damage for every year of development (as calculated by the stage 5), is multiplied by the estimated number of damages (as calculated by the stage 6), in order to get the estimated value of the damages for every subsequent origin year/year of development.

Stage 8. The estimated damages are then adjusted to the future inflation, in order to convert them into estimated monetary values.

4. The method of the damage rate

The damage rate (RD) is the ratio between the occurred damages (DA) and the cashed premiums (PI), calculated for a given period of time. The analysis of the damage rate for each of the origin years should indicate a certain stability, assuming that there were no disturbing effects and that, basically, there were not significant alterations of the premium tariffs.

A typical example of disturbing effect is a disaster (calamity). The issue may be sorted out by not including the calamity damages in the damages used for the calculation of the damage rate. The insurer's cycle is another example of disturbing effect for the damage rate. The damage rate would change along the cycle, depending on the evolution of the premium tariffs, i.e., increasing or decreasing tariffs.

Consequently, the damage rate, based on the evolution of the previous data, on the opinion of the persons carrying out the subscribing activity or based on the data out of the insurances market, can be used as a basis for estimating eventual losses and, hence, the un-cleared damages.

The type of premium used for calculating the damage rate must be in accordance with the damages cohort. The cashed premiums are in accordance with a cohort based on the year the event arouse, while the subscribed premiums are in accordance with the cohort of damages based on the subscription year. A cohort of damages based on the reporting year is difficult to use by this method.

The estimation of the reserve for un-cleared damages using this method is based on the hypothesis that the damage rate is a correct one. This is an over-simple hypothesis but, even thus, the method is providing useful information which can be used for comparing the results with the outcomes produced by more sophisticated methods.

In its most ordinary form, the methods is applied as follows:

- The damage rate for a class of insurances is estimated by prediction;
- The cashed premiums (PI) for each origin year are multiplied by the damage rate (RD), in order to get the occurred damages (DA) for each origin year.

$$DA = PI \times RD;$$

- The updated paid damages are then deducted in order to get the reserve for the un-cleared damage:

$$RDN = DA - DP.$$

The damage rate can be estimated out of the previous data but it can also be calculated or can include the subjective judgment of the persons who concludes and subscribes insurance contracts.

5. The method of estimating the reserve for damages occurred but not reported (RDAN)

The reserve for damages occurred but not reported (RDAN) must be estimated and accounted because of the following main reasons:

- Evidencing the technical reserves by categories offers more information to the decisional factors and helps the management decisions to be taken;

- The separate evidence is necessary also for the financial annual reporting to the supervision authority;
- It may happen that the method being used for calculating the reserve for the un-cleared damages produces an outcome which is not including the RDAN.

The majority of the statistical methods utilized for calculating the reserve are estimating the final total value of the un-cleared damages. In this case, by deducting the updated paid damages we get the reserve for the un-cleared damages, including RDAN as well, while by deducting the updated reported damages we are in the position to calculate the RDAN.

The reserves calculated by using the individual estimation of the liabilities for each un-cleared damages would not include, by definition, the RDAN.

The purpose of this method consists of the estimation of the size of damages to be finally paid out for the events occurring till the end of the financial year without being reported until the end of the financial period.

There are different statistical methods used for estimating the RDAN separately of the total value of the reserve for un-cleared damages. The choice of the method depends on the tendency (short or long) as well as on the relative size of the insurances class.

For the insurances class of short tendency, as well as for the relatively small insurances classes, the insurer may use simple methods as RDAN is not significant and there is a smaller uncertainty.

More detailed methods are used for insurances classes of long tendency as well as for relatively large insurances classes.

The basic methods used for the estimation of the RDAN are the following:

1. the method based on a simple proportion;
2. the method of the delaying table;
3. the projection method.

The method based on a simple proportion assumes the estimation of RDAN as a percentage of an objective value. For instance, we may use a percentage of:

- the cashed premiums;
- the reported damages;
- the un-cleared damages.

Corresponding to a certain class of insurances. Each one of these values can be obtained out of the annual accounting documents or, typically, out of the monthly or quarterly internal situations. The applied percentage can be obtained out of the previous experience of the respective class of insurances. This method may be used in the case of:

- an insurances class which is not important as size comparatively to other classes of insurances;
- a class of insurances of a very short tendency;

- using it as an approximate method of checking in the case of using a method of calculation much more complex.

However, the methods based on simple proportions are not very solid. A slight change of the working hypothesis may invalidate the estimations being done. For instance, the methods based on the cashed premiums are dependent on a stable damage rate. The methods based on the damages utilization are probably better but they can be disturbed also by slight changes of the damages experience.

The *delaying table method* assumes the estimation of the number of damages occurred but not reported after t months from their occurrence as well as of the average damage occurred but not reported.

The number of damages occurred but not reported is estimated by using previous data in order to set up the cumulated percentage of the damages which are reported after certain periods of time and by following up the evolution of these percentages over years or over periods within a year. The periods of development may be measured in weeks, months or quarters of the year, depending on the tendency of the class of insurances.

Suppose $N_{i,t}$ as number of the damages occurred in the month i and reported after t months from the occurrence. We can use a function U_d , which represents the cumulated ratio of the damages reported after d months from their occurrence:

$$U_d = \frac{\sum_{t=0}^d N_{i,t}}{\sum_{t=0}^{\infty} N_{i,t}}$$

For the classes of short tendency, U_d is tending rapidly towards one if d increases. After setting up the cumulated ratio, the number of the damages occurred but not reported after t months from the occurrence can be calculated as follows:

$$N_{DAN,t} = \frac{N_{DR,t}}{C_d} - N_{DR,t}$$

where:

N_{DAN} – number of damages occurred but not reported;

$N_{DR,t}$ – number of damages reported on the account of the damages occurred t months earlier;

C_d – the cumulated percentage of the damages reported until the month d .

The number of damages occurred but not reported thus obtained is multiplied by the average damage or by the average cost of a damage occurred but not reported, getting thus finally the RDAN, namely:

$$RDAN = N_{DAN} \times \overline{DA_N}$$

where:

$\overline{DA_N}$ – average cost of a damage occurred but not reported.

The average cost of the damages occurred but not reported may be estimated taking into account the evolution of the size of the notified damages and the previous relation between the RDAN and the size of the reported damages.

For classes of long tendency, the method of the delaying table is not offering trustful results. In its most ordinary form, the projection of the non-cumulated occurred damages does not differ as against the method of the delaying table.

The *projection method* may be used by deducting the damages occurred and reported out of the total value of the un-cleared damages obtained by using a statistical method. Hence, if the reserve of the un-cleared damages, calculated by the chain-ladder method is set up in dependence with the cohort of damages after the year of the event occurrence (the origin year of the damage) or after the year the insurance started, then it includes in its amount both the reserve for damages reported but un-cleared (RDRN) and the reserve for damages occurred but not reported (RDAN).

The reserve for damages occurred but not reported (RDAN), calculated by the projection method, can be set up if data concerning the reserve for damages reported but un-cleared (RDRN) are available, distributed for each origin year of the damages.

If we consider the previous example, on the basis of the information we get the following results:

Reserves for un-cleared damages, reported but non un-cleared damages and for occurred but not reported damages

Table 5

Origin year	Known (paid) cumulated damages	Calculated (estimated) cumulated damages	Reserve for un-cleared damages (RDN)	Reserve for reported but un-cleared damages (RDRN)	Reserve for occurred but not reported damages (RDAR)
0	1	2	3	4	5 = 3 - 4
1998	$D_{98,0-2}$	$D_{98,0-3}$	$RDN_{98} = D_{98,0-3} - D_{98,0-2}$	$RDRN_{98,2}$	$RDN_{98} - RDRN_{98,2}$
1999	$D_{99,0-1}$	$D_{99,0-3}$	$RDN_{99} = D_{99,0-3} - D_{99,0-1}$	$RDRN_{99,1}$	$RDN_{99} - RDRN_{99,1}$
2000	$D_{00,0}$	$D_{00,0-3}$	$RDN_{00} = D_{00,0-3} - D_{00,0}$	$RDRN_{00,0}$	$RDN_{00} - RDRN_{00,0}$
TOTAL	Suma coloanei	Suma coloanei	Suma coloanei	Suma coloanei	Suma coloanei

The reserve for occurred but not reported damages by 31.12.2000 is given by the total of the column 5.

When establishing the methodology of calculating the reserves, it is necessary to consider the characteristics of the insurances classes (the damage type, the tendency of the insurance class, the quantity and the quality of the statistics being available), for which the reserves are calculated and set up. Consequently, it is to assume that different methodologies are applied to different insurances classes subscribed by an insurer. Meantime, it is possible

that various methods are applied to different parts of the same insurances class. For instance, the reserve of premiums for policies of short or long duration would be separately set up as well as the reserve for damages of short tendency or long tendency.

The outcomes of any method of setting up the technical reserves must be analyzed and verified in comparison with the reserves set up through a different method.

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A Transnational Analysis – Two Models: Migration and Employment across Europe. Academic Qualifications and Labor Market Needs

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***Abstract.** Supporting sustainable development should remain a permanent concern, especially focus on increasing resources efficiency should be the first priority in order to ensure balance and flexibility for growth and more and better jobs creation. Investments in human resources represent a key factor in supporting economic development. The most important investment for HRD is the investment in human capital, and, mainly, in education. The quality and labor force qualification should be promoted by encouraging people to participate in education. Education institutions should participate to the gaps identification given the labor market demands, to create an educated labor force with the right qualifications. At the same time, companies should be encouraged to invest in their employees training, through the job training or lifelong education. All these in supporting the knowledge promotion, because the knowledge, as is defined by the Nobel Price laureate, Herbert Simon, became “the element number one of economic growth ...”.*

Key words: GDP per capita; employment; migration; training; qualifications needs.

I. Migration and employment across Europe

I. 1. Introduction

One of the major objectives of the European Union is the promotion of employment, improvement of living and working conditions, proper social protection, dialogue between management and labor, the development of human resources with a view to lasting high unemployment and the combating of exclusion. All these should be regarded in connection to educational process, considering that the linkage between these two systems is essential for developing a sustainable development framework.

An important fact that should be mentioned is that the labor policies gained importance year by year; some significant facts in sustaining the previous idea could be made as follows:

- only few consideration in what regards the labor market policies were considered in The Treaty of Rome, the main accent being put on the economic policies;
- until 1972 the social policy was mainly led by the functioning of the market economy and the measures considered were pointing to the functioning of the European Social Fund;
- only in 1974 the First Programme of Social Action was adopted in the field of employment protection, health and safety and employees participation;
- The Social Charter from the early '90s represented a major moment for emphasizing the importance of the social and employment policies;

- The Treaty of Maastricht promoted this policy field as one among the major ones and a Protocol and Agreement on social policy were added to the new Treaty;
- The Amsterdam Treaty and The Nice Treaty brought more refinements in the previous actions in the field of social inclusion.

It is obvious today that the problem of employment and labor policies as well as educational policies represent major pillars around which the European Union's policies turn around.

I. 2. Migration-GDP per capita analysis

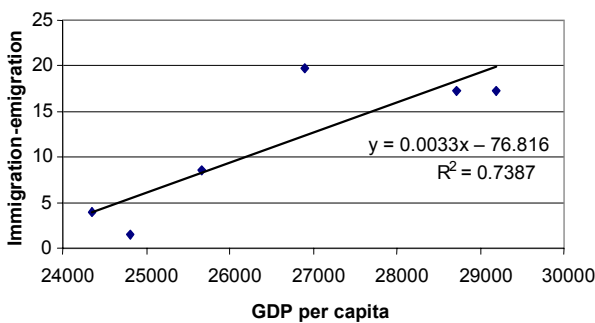
The construction of the model describing relationships between migrations and GDP was based on values of the net migration compared to GDP per capita. Unfortunately, data referring to migration processes are presented differently in studied countries. Data obtained from the same statistical methods are available only for Austria, Lithuania, Poland, Slovenia and Sweden, where the net migration indicator (named net migration in further discussion) is defined as:

$$\text{net migration} = \text{immigration} - \text{migration}$$

and refers to the same periods (net migration in a given year is equal to the difference of the immigration and the migration in this year).

With regard to the above-mentioned lack of comparable data for all European countries, it is also impossible to assign the general indicator of the migration relevant to EU-15 or EU-25 countries. Some data are accessible from 1990 to 2002 (excepting Austria: 1996-2001). The size of immigration as well as the range of migration is measured in thousands of persons and GDP per capita is quantified in USD.

The relationship between GDP per capita and net migration in Austria takes the following form (Figure 1):



Source: www.euridice.org, Eurostat.

Figure 1. The relationship between GDP per capita and net migration in Austria

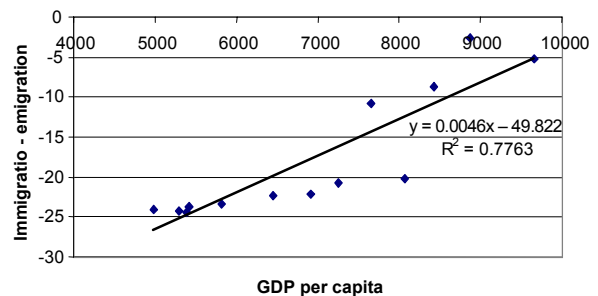
The growth of GDP per capita causes the inflow of people to Austria and the migration is overcome. According to the slope coefficient an increase in GDP per capita equal to one USD gives an average growth of net migration equal to three persons.

The relationship between the two discussed indicators in Lithuania is presented in Figure 2. In Lithuania the relationship between variables is also positive (like in Austria) but the values of the net migration are negative, i.e. the migration exceeded the immigration in the whole analyzed period. Another rule appears: the larger GDP per capita the smaller the difference between the immigration and migration. According to the slope coefficient an increase in GDP per capita equal to one USD causes an average growth of net migration equal to almost five persons.

The dependence between GDP of the migration was also analyzed for Poland (Figure 3).

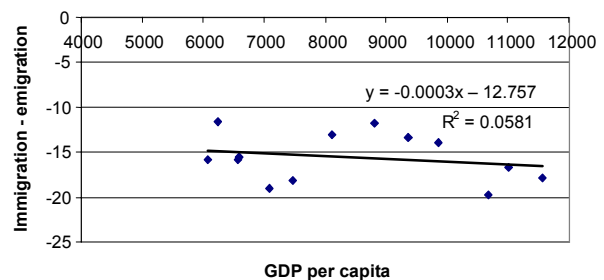
According to data from years 1990-2002 a constant tendency towards the migration exists in Poland irrespective of changes in GDP per capita. The migration exceeds the immigration in all studied years.

A similar situation was observed in Slovakia - Figure 4.



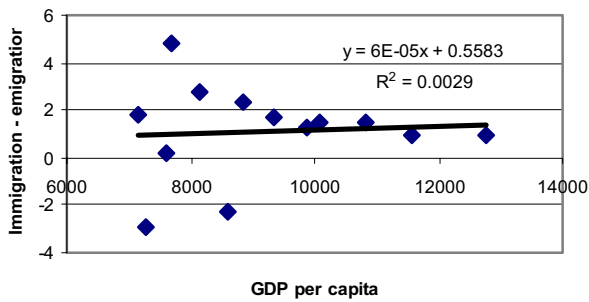
Source: www.euridice.org, Eurostat.

Figure 2. The relationship between GDP per capita and net migration in Lithuania



Source: www.euridice.org, Eurostat.

Figure 3. The relationship between GDP per capita and net migration in Poland

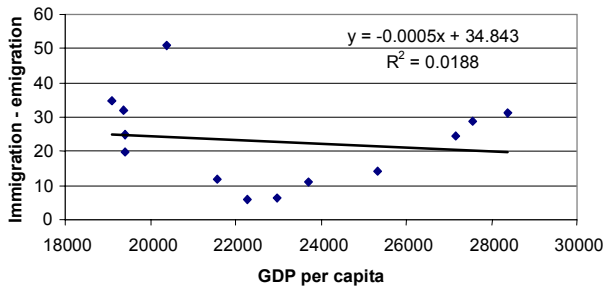


Source: www.euridice.org, Eurostat.

Figure 4. The relationship between GDP per capita and net migration in Slovakia

The size of the immigration is higher than the size of the migration in Slovakia in all years.

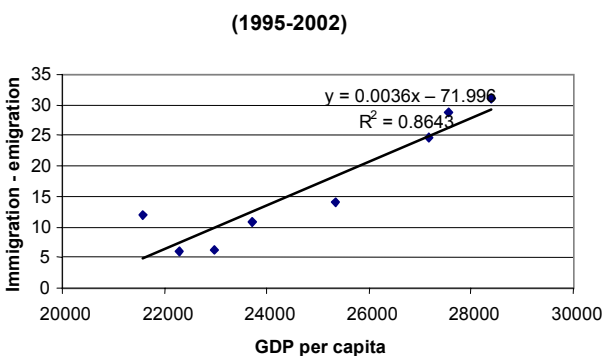
In Sweden the rise of GDP per capita is followed by the drop in migration (Figure 5).



Source: www.euridice.org, Eurostat.

Figure 5. The relationship between GDP per capita and net migration in Sweden (all observations)

After rejecting the observations from first years, i.e. 1990-1994, when minimum values of GDP per capita occurred in Sweden, a relationship can be derived (Figure 6) reflecting a higher inflow of people exceeding the migration.



Source: www.euridice.org, Eurostat.

Figure 6. The relationship between GDP per capita and net migration in Sweden (chosen observations)

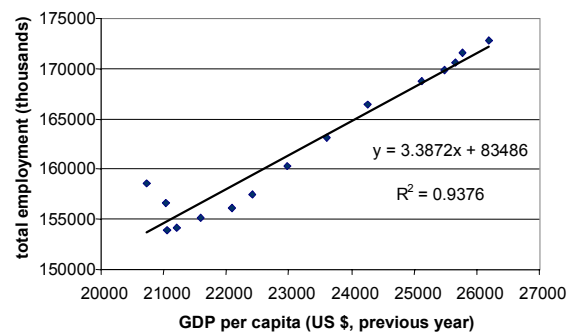
I.3. Employment and GDP per capita analysis

The relationship between the size of employment and GDP per capita was studied assuming that the effects caused by changes of GDP are not immediately perceptible. The dependence was analyzed on condition that the earliest changes are noticeable after one year from recording a particular value. Let Y_t denote total employment (t is the current period) and X_t denote GDP per capita, the proposed model is represented by the following equation:

$$Y = f(X_{t-1}, \varepsilon)$$

where ε denotes the disturbance.

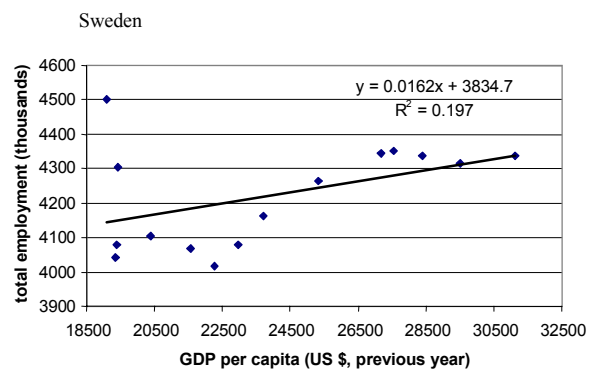
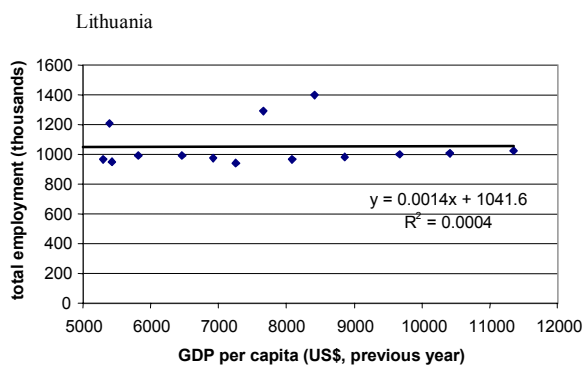
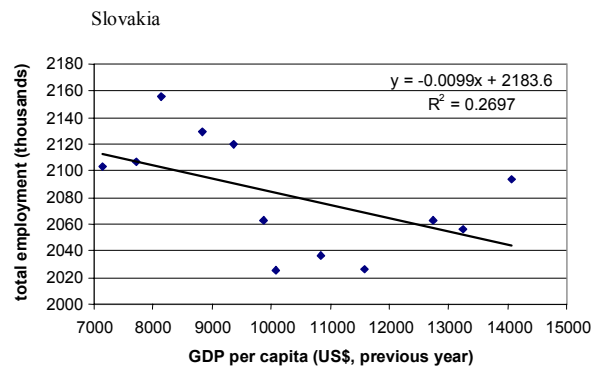
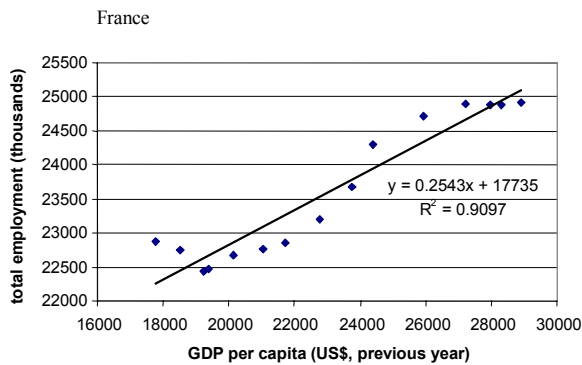
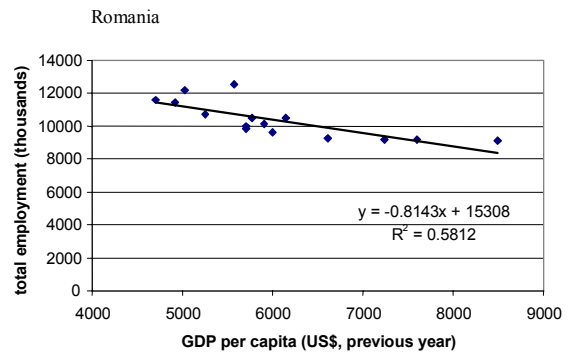
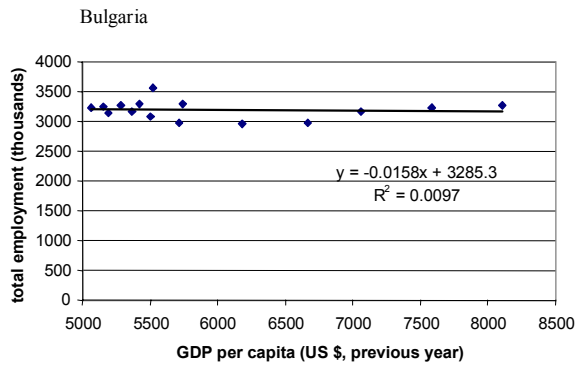
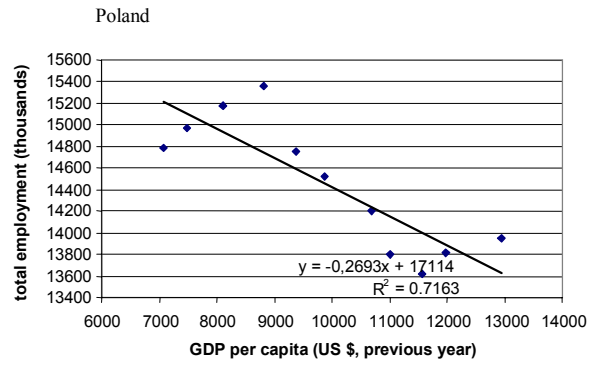
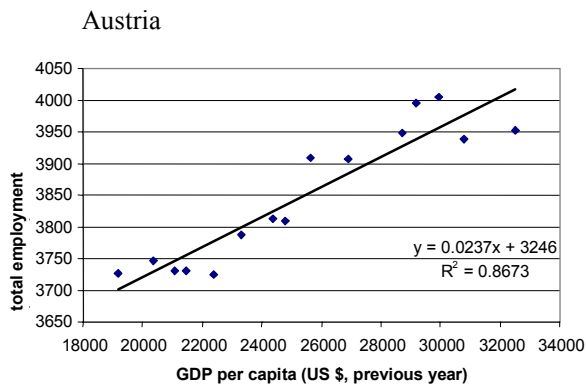
The linear dependence of variables was imposed on all models in order to compare conclusions drawn from observed relationships. The choice of the function was made after finding the best mapping with respect to the goodness of fit for EU-15 model. The increase in size of employment accompanying the growth GDP per capita (in the previous period) was revealed in the group of EU-15 countries (Figure 7).



Source: www.euridice.org, Eurostat.

Figure 7. Dependence of total employment from GDP per capita in EU-15, 1990-2005

The linear relationship between regarded variables is not the best solution for all examined countries (Figure 8). It would be very difficult to determine any other function in case of Bulgaria and Lithuania, because the impact of changes of GDP per capita on employment is not detectable. A worrying tendency could be identified in Poland, Romania and Slovakia as the increase of GDP per capita in a particular period does not have positive influence on the size of employment in the next period (the decline is discerned).



Sursa: www.euridice.org, Eurostat.

Figure 8. Dependence of total employment from GDP per capita in chosen European countries

I.4. Conclusions

The present paper tries to offer an overview on employment in the European Union, the relation between employment and GDP per capita and the relation between migration and GDP per capita. Another step for further

research will be to realize the connection between these two analyses in order to develop an integrated econometric model which will be able to analyze the relationship between migration employments across Europe.

II. Academic qualifications and labor market needs

II.1. Introduction

The general objective of the research was to establish the special demanded needs of the labor market regarding the visible results of the national educational systems through qualifications.

The present proposal makes an original contribution to the present status at national level, by developing both bottom-up and top-down research in Europe in order to identify a common denominator for the process of ensuring Transparency of Academic Qualifications and Competences (TAQC) in connection to Mobility of Labor in Europe (MOLE). Another original contribution is that of bringing together not only specialists from the Ministries for Education, but also to involve in the process researchers in the field, representatives of students, graduates, unemployed on the one hand and representatives of European and international organizations in the field of employment, SMEs organizations representatives because we consider that ensuring the transparency of TAQC is unfeasible unless we involve the representatives from the labour market in the research process for identifying the correct needs for high-skilled labour force at European level.

II.2. Description of the methodology

A questionnaire was design in order to obtain adequate data concerning the general structure of a qualification in the partners' countries. The questions refer to the basic components of the qualification, in various fields of training and activity, according to the new initiatives at European level, namely the ones referring to European Qualification Framework. The scope is to identify the essential characteristics of a qualification, which will permit, by generalization, the transparency and its general acceptance from the labor market.

The questionnaire does not address the specific knowledge or competences of a sector or an activity following the general principles or features that must govern the issue of a valid qualification. This research aims to identify a general, common structure of a qualification, existed or required, adequate for all areas and for all countries involved in this project and not to identify some specific training elements that are missing from a qualification.

In this way the information gathered offers an image of the state of art of a qualification, the adjustments required by the labor market and the essentials characteristics of qualification in all countries participant to the research.

Most of the questions of this questionnaire are pair-questions addressed in the same time to the employees and employers in order to observe the differences or the similarities. The pair-questions will give the opportunity to analyze the same matter from two different sides: the point of view of the offer – education and the opinion of the demand – labor market.

There were two different interview templates addressed to each group of respondents:

- A. Graduates, employees of a company (450 answers);
- B. Employers, companies' owners (450 answers).

II.3. Qualifications needs

The information is presented starting from the four elements of the qualification definition of the European Commission document referring to European Qualification Framework: knowledge, general competences, professional competences and personal skills development which cover the entire area of competences that a person must obtain in order to perform an activity.

II.3.1. The general importance of the education level

Below, there is presented a general opinion of respondents on the received level of education comparing to the one required on the labor market. The following pair-questions were asked:

- *“For your job position, the degree or qualification that you obtain during your education is mandatory?/This specific job position requires the degree or the qualification that your employee attended during the education period?”*
- *“How you will appreciate the relevance of your qualification for performing the actual job?/ How you will appreciate the degree in which your employee qualification corresponds to his/her job?”*
- *“Have you taken into consideration other documents referring to the educational background of the employee?”*

For the first pair of questions the answers of employers/ companies' owners and of the employees are quite similar. Both groups recognize the importance of the degree as a mandatory condition for acceding to a job and a need for a rather high level of general knowledge and competences. More company owners demanded for employees with better degree.

The respondents appreciated that there is conditionality between the qualification obtained during the education and a specific job position.

The mandatory aspects

Table 1
%

Country	Graduates' answers	Employers' answers
Austria	75	93,5
Bulgaria	74	90
France	76,5	92,4
Lithuania	73	73
Romania	97,3	100
Slovakia	89,3	86,7

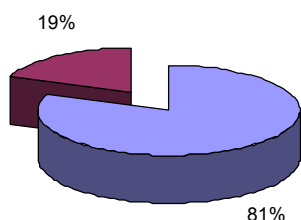


Chart 1. Employees- mandatory aspects

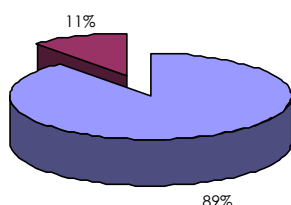


Chart 2: Employers – mandatory aspects

In the Chart 1, 81% of interviewed employees appreciate as mandatory for their actual job position the qualification degree that they have obtained.

In the Chart 2, 89% of the interviewed employers recognize that the qualification obtained during the educational system guide them to choose their staff. Even if they mentioned in various occasions that the “diploma” is not a key factor, only 11% do not take into consideration this aspect when decides to employed a person.

From the table it is obvious that in all partners, from Eastern countries or from Western group of partners, the employers and employees are agreeing with respect to the importance of an adequate qualification/diploma for acceding to a job. The minor difference in figures between the two groups of respondents has in reality a meaning more profound. Even both groups express dissatisfaction of the current level and way of organization of the educational system in the country and its relevance to the changed needs of the labor market, the labor market is relying on the educational system in almost 90% being in fact the central element on which depend the professional lives of a graduate. On the other hand, the employees seemed not to be entirely aware of the degree in which their diplomas have decided their acceptance for a job.

The question referring to the relevance of the education acquired for the current job revealed other differences between employees and employers.

In total, the number of employers appreciating as relevant the formation of their employees is bigger than the number of the employees who consider their formation relevant for the activities they have to perform. Like in the case of previous question, it seemed that the employees are not aware of their value on the labor market, the percentages indicating an undervaluation of their qualifications relevance for the actual job position.

If we analyze the answers on the 1-5 scale the situation changes: the employers seemed to be satisfied with the qualifications of their employees at an average level while employees consider the relevance of their qualification as rather high and very high.

II.3.2. Detailed analysis of the qualifications needs

Apart from the general question concerning the qualification status there is a need for an in-depth analyze of the competences needs and the gap between their level offered by the education system and the one required by the labor market. One of the most important questions from the questionnaire refers to the assessment of the qualification level (acquired or needed) from the point of view of its four components: knowledge, general competences, professional competences and personal skills development.

The following pair-questions were asked:

- “What level of qualification did you acquired during your education program?/Please, try to assess what level of needed qualification you think your employee acquired during the education program?”
- ”How big is the gap, in each of the qualification element, between what is required of you to know in your current job and what you learned during your education period?/How big is the gap, in each of the qualification element, between what is required of employee to know in his/her current job and what he or she learned during your education period?”

There are obvious national differences reflecting the characteristics of national education systems and the specificity of the requirements of the labor markets.

In general, knowledge and general competences are the elements often mentioned at “rather high” and “very high” level, while professional competences and personal development are in the average level.

The first element – the Knowledge

More than 70% of employers appreciate the knowledge of their employees at “very high” and “rather high” level while only 60% of interviewed employees shared the same opinion.

We have to mention Lithuania, where 100% of the employers are very satisfied with the knowledge acquired by their employees. It is followed by Bulgaria with 76% of employers appreciating a “very high” level of the knowledge of their employees and by Slovakia with 56%.

In Austria and France case the answers are more moderate the majority indicating a “rather high” level and Romania with an “average” level.

For all the level the percentages indicate that the employees wanted more from the education system in terms of knowledge even if their employers are rather satisfied.

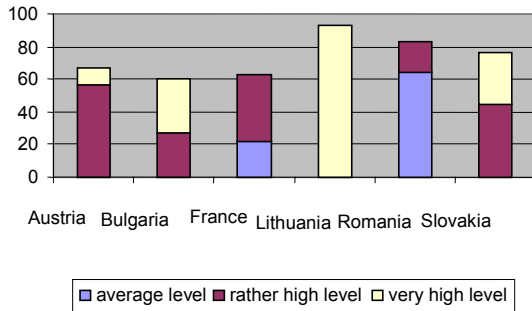


Chart 3. Employees – knowledge level

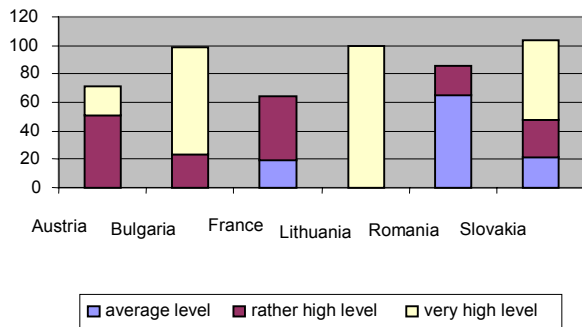


Chart 4. Employers – knowledge level

The second element - General competences

For this component of a qualification the percentages indicate a similar trend towards the “rather high” and “very high” levels with the difference that the biggest percentage indicates the “rather high” level and only in the second position the “very high” level.

The national disparities are not so important and the gap between percentages is more reduced. Except Bulgaria, where the majority of both groups indicated the “very high” level, and Romania, with an “average” level, the countries’ respondents appreciated a “rather high” level of the general competences followed by important numbers for the “average” level.

As in the previous case, the employers have a better opinion than their employees on the level of general competences. This survey detected a positive trend with regard to the knowledge and general potential of the labor force.

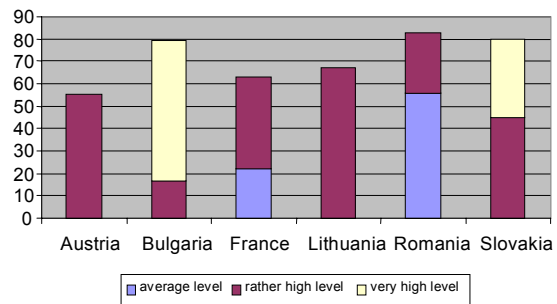


Chart 5. Employees – general competences level

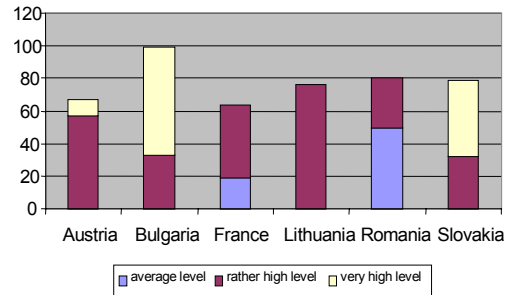


Chart 6. Employers – general competences level

The third element - Professional competences

The survey revealed the fact that professional competences are not the strong elements of an acquired qualification. Only 30% considered as attain a “very high” level of professional competences, approximately 25% “rather high” while 20% indicate an “average” level.

The national differences are again very well underlined (Lithuania with 91% of employees and 96% of employers declaring a “very high” level of professional competences or Romania with 56%, respectively 40% indicating an “average” level).

In total, both employees and employers shared the same opinion regarding this set of competences. Even if the number of employers surpasses the one of the employees on every level the difference is negligible.

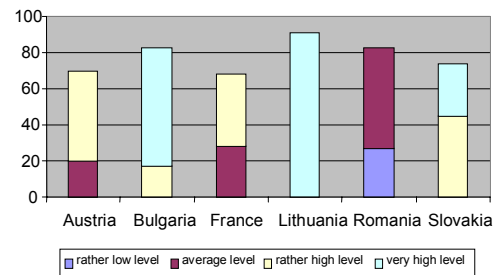


Chart 7. Employees – professional competences level

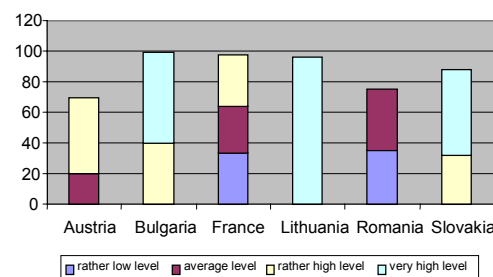


Chart 8. Employers – professional competences level

The fourth element - Personal skills development

The figures demonstrate that the adjustments in response to the new business environment requirements, especially in recent years, were less developed by the educational systems. It is obvious that this element of a qualification is less acquired/accomplished, from both point of view of employees and employers. The smaller percentages, except employees from Bulgaria, indicated for “very high” level sustains this idea.

This type of competences of labor force is recognized as insufficient and inappropriate for the existing demands. The opinions are divided between “average” level and “rather high” level: employees 31%, respectively 30%, and employers 23%, respectively 39%.

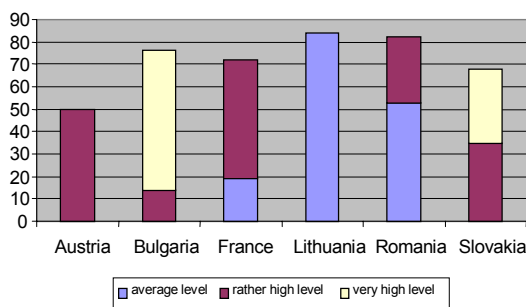


Chart 9. Employees – personal skills level

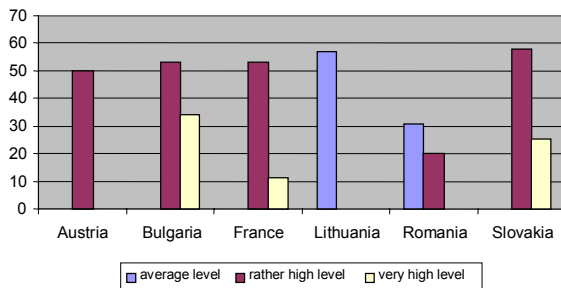


Chart 10. Employers – personal skills level

Except Lithuania, with a “very high” gap in the case of personal skills development, the respondents do not underline the existence of very important gaps for none of the four component elements of a qualification. Even in Romania’s case, with an “average” level of satisfaction concerning the qualification level, the gaps do not exceed the 25% for a “rather high” gap for knowledge and 49% “average” gap for personal skills development.

Slovakia states that there is a relationship between the qualification for the labor market and the field of study confirming the existing discrepancies that can be explained only by national differences or, inside an education system, by differences of competences for various field of activity.

Majority of education systems laid stress on knowledge and general competences of students but they did not pay enough attention on the last two elements: professional

competences and personal development. Professional competences and personnel skills are mentioned as less proved by the graduates or young employers.

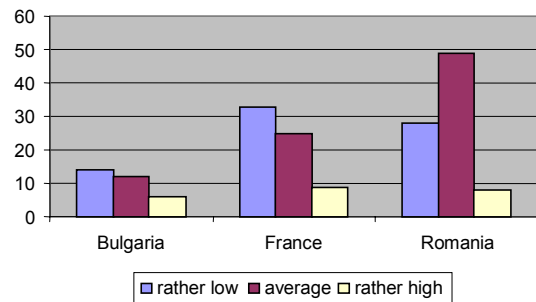


Chart 11. Gaps for personal skills

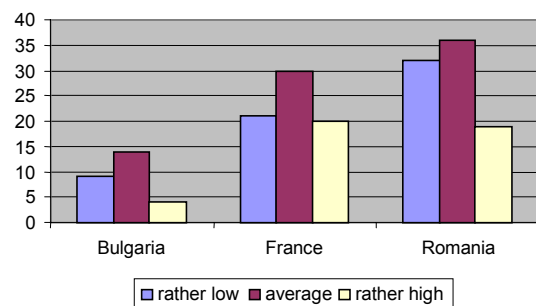


Chart 12. Gaps in professional competences

II.3.3. The most necessary personal and professional skills

The evaluation of qualification level was made in principal in accordance with the level of comfort in performing specific job activities and performance achievements in this job, followed by level of performance in specific courses.

Romania also mentioned (28%) the feedback from previous jobs.

It is worth mentioning also the France case, where the HR opinion is crucial for evaluating the qualification level of an employee and increasing the importance of the professional and personal skills development as ability to integrate into a team, sense of autonomy and responsibility, ability to integrate and acquire new skills.

Group A: Graduates, young employees

According to the respondents the most necessary personal skills is *communication* and *responsibility*. Personal characteristics which are also important are: flexibility and teamwork capacity. Such person should also have the leadership ability, persevering and rigorous person and be able to take decision in short time.

The most important professional skills are: *language knowledge* and *computing competences*. There were also mentioned such traits as leadership, education profile and communication skills, conflict management.

Also, in terms of professional skills the most common were knowledge in a field. It seems that those who are preparing the students underestimate the management skills in comparison to others. In general the skills possessed by most of respondents were on average level.

Group B: Employers, company owner

From the companies’ owners’ point of view the employee should be: *communicative, open minded, ambitious, and well-organized.*

As far as the professional skills of such person are concern, the most often mentioned were: *knowledge and good professional qualifications, able to analyze, sense of synthesis and discernment.*

In companies’ owners’ opinion, their young employees possess the highest level of knowledge (70%) and the lower level of personal skills.

To sum up the level of competences possess by young employees, their level of qualification is a bit higher than the average level. The competences which are more developed were knowledge and general competences, while both young employees and employers considered having small access to professional and personal skills.

II.4. Training of graduates/ young employees

Group A:

Almost 66% respondents have participated in the professional training and more that 75% declared acquiring additional knowledge. Among those who have taken part in such trainings the most popular ones were: informal or formal on the job training with an accent on specific courses provided by the company, management trainings, administration courses.

The most often mentioned reasons why people didn’t participate in the trainings were: the incipient stage of their activity in the company.

It seems that among the respondents there is a rather high need for trainings. The gaps mentioned by this group underline *the highest need for those contents in the trainings from the area of: personal skills development, professional competences but general competences as well* (please see the Table 4 for details). As far as the *needs of training are concerned*, more than 50% of the respondents mention to acquire additional knowledge relevant for their job position.

Group B:

Most of the companies’ owners have organized professional training for their employees. The content of the trainings was diverse and referred to the specific of the company, management, use of the ICT etc.

Both groups see the advantages which came with the participation in the training.

The average participation in training of the competences is higher than the average estimation of existing gaps. There were some skills, which – in employers’ opinion – they had in lower level so the offer for training those skills was bigger. The highest discrepancies, which can be interpreted as *the need for training those skills, were in the professional competences and personal skills development.*

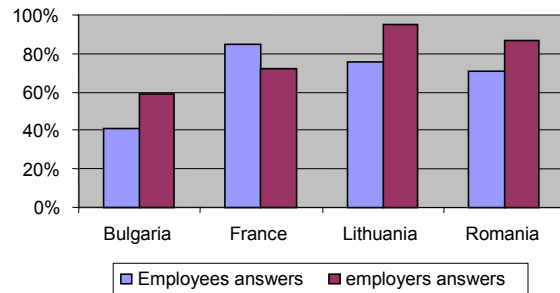


Chart 13. Participation in trainings

II.5. Educational system

Despite the appreciation concerning some of the competences of their employees, in general, the employers are satisfied with the overall preparation of their employees.

Every country mentioned as the most “critical” problems of national education systems *“to cross over theory to reach practice”* or *“connecting theory with practice”*.

Other issues were:

- To train students in team management;
- To develop communicative skills;
- To develop the students’ sense of analyze, foreign languages;
- Management skills, planning skills.

There is a growing concern of the employers to encourage the personal skills development of their employees, the majority wishing that higher education will focus on personal skills also.

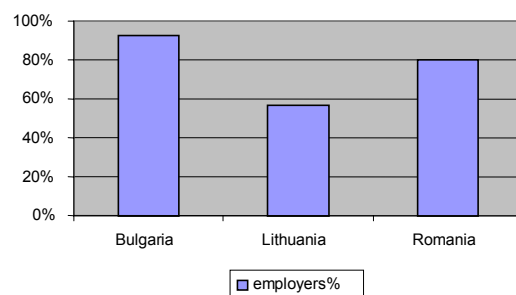


Chart 14. General opinion

Both groups express dissatisfaction of the current level and way of organization of the educational system in the country and its relevance to the changed needs of the labor market, in particular to obtaining practical skills and the

so called 'soft skills' (for example, the skills to communicate effectively with colleagues and managers, to work as part of a team, to present ideas and arguments in a clear, grounded and unbiased way), as well as business skills (such as entrepreneurial skills, performance management, awareness and understanding of market trends, etc.). At the same time, there were expressed opinions about the fact that the system of education and training is proved to be very difficult to influence, neither directly or indirectly, and to foster the change and adaptation of curricula and the quality of service delivered.

II.5. Conclusions

The level of employee qualification has an important impact on the quality of both the company and employee job performance. From this point of view awareness of a company's competences need is a starting point for the design of labor force development strategies.

The present survey focuses on more detailed analysis of graduate competences in terms of how they are obvious for possible employers and how they are actually taken into account in the workplace. The majority of the employers stated that personal skills of an employee play in our present a crucial role in the labor market.

Almost 80% of employers considered the continuous development of competences as a company responsibility, investing in training and acquisition of supplementary competences of their staff. The percentage of employers assuming the responsibility for staff training is significant. Still, the employers believe that skill development must

be also a responsibility of education system. Nevertheless, private employers rely on the educational system and on the employees' qualifications. The „official” documents of a qualification being „mandatory” for a job position in many fields of activities.

The main finding of this survey is that labor force has confidence and relies on national education system. Often, employers do not require additional documents, certificates basing their decision on the relevance of different diplomas. There is obvious a discrepancy between the perceptions of employers on the one hand and graduates/employees on the other hand concerning the levels of different elements of a qualifications. The need of better visibility of the learning results may be a key factor for bringing together the two groups and diminishing the gaps between the expectations of each other.

In all cases, both surveyed groups feel the pressure of an increased competition is a globalized economy and the necessity to learn more and be more flexible and adaptable to different cultures and mentalities and market demands. This also entails the necessity of building team-playing skills and a sense of corporate identity through communicating of ideas and sharing common development goals.

The long-term objective of the survey and the project as a whole is communicating the findings and make a positive change in order to fill the gap between the higher education and the labor market.

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Challenges of the Harmonization Process of the Fiscal Policies at the European Union Level

■

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***Abstract.** In the domain of the fiscal politics characteristic to the unionist entities, the challenges of the harmonization process are multiple. The American model, which has situated the idea of the development of the federal state on the established principles of the participative federation, has represented the first step in this direction. The apparition of the European Union represents a new challenge in the domain of the state suzerainty and common politics. The article tries to answer to the question related to the possibility of application of a coherent fiscal policy at federal level.*

Key words: tax harmonization; tax competition; coordination; fiscal disparities; stabilization policy.

■

The necessity of tax harmonization of the fiscal politics at European level is indisputable, but the problem is often wrongly approached because there is a tendency to confuse the harmonization with uniformization. The adversaries of the European cause invoke the fiscal disparities existent between different countries to affirm that the process of integration would be impossible. The example of the federal systems as it is the one in the United States shows however that a unique market and a unique currency are completely compatible with the important differences that exist between the politics from the Member States.

In the domain of the fiscal policy, and also in the distribution of competences between the European Union and the Member States, we must mention the principle of subsidiary as well as the tax identification which necessitate a more ample harmonization. According to the principle of subsidiary, the Community must only interfere if the objectives of the aimed action cannot be realized by the Member States. In fact, the dimension of the public sector and of the social protection systems vary a lot from one country to another, for example the level of mandatory sampling reached 33.4% from the GIP (Gross Internal Product) in Portugal, respectively 51.9% in Denmark.

With all that, when the necessity of the tax harmonization is not contested, the harmonization of the social protection systems (constitution of a “social European space”) is often considered premature. On the other side, the application of the Monetary and Economical Union which results from the Maastricht Treaty reduces a lot the handling margin that the Member States dispose of. Deprived of an essential attribute of sovereignty by the acceptance of the unique currency, the states are also confronted with a reduced liberty in the domain of the budgetary policy, as the deficits must not exceed 3% from GIP.

Under these conditions, in the fiscal policy domain, the autonomy of the states remains reserved, at least from the juridical point of view. The decisions in the fiscal matter must still be taken at the national level and not at European level, which limits a lot the intervention possibilities of the European authorities. The tax levy, which is voted by the national parliaments, represents the “rough core” of the sovereignty of the state.

We must remind the considerable progresses realized by harmonization means, especially during the last few years, with the specification that decisive progresses will not be possible if they are not accompanied by a reform of the institutions.

Significant progresses were registered especially in the domain of indirect taxes, which corresponds to the spirit of the signatories of the Rome Treaty according to whom: there is not enough dissolution of the customs rights between the member states, there must also be eliminate the fiscal frontiers which maintain a division between the national markets.

Not only that all the Member States apply the value added tax, from which one part aliments the proper resources of the community budget, but they also apply it at an uniform trim.

In the United States, there are not only important quota differences, but also trim differences.

Regarding the harmonization of the value added tax, the European states have registered progresses. If they could not agree on the quotas proposed in 1987 by the Commission (between 4 and 9% for the reduced quota of the VAT and between 14 and 10% for the normal quota of the VAT) fixation, in 1992, of a normal minimum quota of the VAT of 15% has represented a progress.

A new regime of the VAT and of the excises (which aims products like alcohol, tobacco or fuels) has been applied beginning with 1 January 1993.

The consumers can buy without limits what they want from the other member states, with the condition that they buy for personal consumption and not for commercialization. At the basis of this reform is the replacement of controls on VAT which took place at the frontiers, with a new system of cooperation between the fiscal administrations of the European Union. This administrative cooperation is based on an informatics network which unites the national fiscal administrations between them and allows the systematic data exchanges necessary in the battle against fiscal fraud. The reform allowed a reduction of formalities which were on the charge of the enterprises.

Regarding the direct taxes, the results are not the expected ones. The connections between the member states remain governed by a labyrinth of bilateral conventions which maintain a considerable number of variations and anomalies.

Certain progresses were still made in the matter of direct taxation of the enterprises: an European directive was adopted in June 1990 to suppress the double taxations in case of merge and of frontier transfer of dividends by the enterprises, and this constitutes the basis of the European taxation of the enterprises.

The aimed objective is that the enterprises can buy, sell, invest and cooperate between them in all the European Union without excessive national obstacles or major fiscal distortions. For this to happen, it is not indispensable to exist in all the European Union the same tax on the societies, with the same quotas or the same rules of

determination of the trim. What matters is that there should be a progressive convergence of the taxation systems.

The harmonization of revenues taxation should focus on the taxation of the capital, of the production factors with weak mobility, as there is work, without needing an immediate fiscal harmonization. The majority of households only place a small part of their economies in chattels personal. The real estates, the life insurance contracts are their most important placements. The risk of delocalization of the economy, if it is real, does only comprise a relatively small portion of the global economy.

Since 1 January 1990, any European resident can own currency accounts and place freely his economies in any other country in the Union.

A European Directive regarding the taxation of the economies entered in force on the 1 July 2005. It provisions automatic exchanges of information regarding the revenues realized by Europeans in the states of the Union where they are not residents, which allows their taxation in the origin country. This directive has as a purpose the elimination of discriminations between residents and non-residents in the treatment of revenues realized from economies.

A fifteen years period of negotiations was necessary to reach this agreement, which only succeeded grace to the application of a derogatory regime for the countries who do not accept giving up the banking secret: Luxembourg, Belgium and Austria, which are exempted from participating at the exchanges of information while the concurrent countries, especially Switzerland, refuse to suspend the banking secret.

In the trade-off, these countries apply a retention to the source on the revenues from economies placed in their banks by non-residents. The tax will be bigger and bigger, as it passes progressively from 15% between 2005 and 2008 at 20% between 2008 and 2011 and at 35% after 2011. 75% from this tax will be paid by these countries to the resident country of the one economizes.

Since February 1989, the European Commission proposed the instauration of a retention to the source of 15% on the interests paid for the residents of the Union. The agreement could not have been concluded because of the opposition of the Lower Countries, Spain, Luxembourg, Germany and Great Britain. This subject has been resumed in 1998 to reach in 2005 the compromise mentioned above. The adopted directive approaches a little the Interest Equalization Tax (tax of equitable distribution of interests), adopted in the United States in 1963, which allowed important issues of capital outside the American territory. The risk of capital flows and delocalization of the economies outside Europe, due to those dispositions, cannot be excluded.

Besides the progresses which were already registered in the process of harmonization, there is a series of problems that need to be solved.

Thereby, in the matter of VAT, the current regime has a temporary character. During 1996 an analysis of the situation should have allowed the decision of passing, in 1997, at the definitive regime, that of taxation of the exportations from the origin country. In fact, this measure could not be applied on the appointed date and the transition period has been extended for an indefinite duration. We are currently confronting with a hybrid system, which is a source of difficulties for the enterprises. The elimination of the physical frontiers had as effect the transfer of the customs work towards the enterprises, obligating them to a certain number of administrative measures for which they were not prepared. The enterprises report directly on the statements of the business figures the intercommunity deliveries and acquisitions. They deposit a recapitulative state of their sales, which results from the statistic document for the exterior commerce.

Despite the reduction of certain formalities, new obligations are imposed to the enterprises and the controls are now made a posteriori and not a priori.

The fiscal authorities are in front of a dilemma: they either let fraud develop, either they consolidate the controls and risk to provoke a rejection of Europe from the contributors.

The taxation of the goods and services in the origin country has a symbolic value and this objective, founded on the hypothesis up until now inapplicable of a unification of the taxation quotas on the consumption practiced in the member countries, corresponds to the concepts of the signatories of the Rome Treaty. In such a system, the assimilation of the European market to an interior market will allow the reduction of customs check-ups. This thing will increase the fiscal revenues from the Member States whose commercial balances in rapport to the other countries of the European Union overflow in the detriment of those who register a deficit.

If the disparities of the VAT quotas persist between the Member States, the institution of a taxation in the origin country risks to make less competitive the enterprises from the member countries which apply the biggest taxes. Under these conditions, we might ask the question if the unanimity of the Member States can be done based on the adoption of such a system. They risk to be less disposed to accept the administrative complications and the unpredictable modifications of the VAT collections which result from such a reform.

Moreover, even if a rapprochement of the VAT quotas would be possible, the application of a different regime for the goods and services exchanged within the European Union and for those exchanged with third countries would

be a source of difficulties for the fiscal administrations. In the end, the principle of taxation in the origin country cannot be applied to the excises, as their level differs very much from one country to another. As the products subjected to excises (alcohol, tobacco and fuels) are generally subjected to the VAT as well, the common application of the VAT in the origin country and of the excise in the destination country will create delicate problems in matter of evaluation, fixation of the transfer price for the multinational enterprises and of distribution of the fiscal revenues.

The current transitory regime risks lasting for more time than it was provisioned, but it is not an obstacle in the pursuit of the European integration. In many countries with federal structure, especially in the United States, the sales between states are not taxed in the origin country, but this does not detain the interior market to function without the necessity of customs check-ups.

Regarding the tax on societies, the fiscal concurrence led to a certain rapprochement of the taxation quotas between the European countries. Instead we can observe a great differentiation of the manner of determination of the trim.

All the states use the digressive amortization as a fiscal simulation instrument but there are no considerable differences between the amortization regimes in France, Germany, Great Britain and Italy.

Regarding the provisions regime, the German enterprises are advantaged in rapport with the French and British enterprises, as they can deduct from their benefits all the losses or the changes they estimate, while the French enterprises must present justifications in this sense and the British enterprises want to interdict this type of provisions.

If, in ensemble, the French enterprises appear subjected to the mandatory extractions bigger than their German or British competitors, this thing is explained especially by the balance of the social subscriptions in charge of the employers and not by that of the taxation.

In September 2004, the European Commission has decided the creation of a work group charged to study the means of harmonization of the taxation trim on the societies. The aimed objective consists of the creation of a unique trim for the societies present in multiple countries as well as the attribution to each state of a part from this trim, calculated according to the business figure realized on the territory of the respective state. The harmonization of the trim can begin from the part of the quoted societies, which, after 1 January 2005, must apply the international accounting norms IAS (International Accounting Standards).

This decision of the Commission confronted with the opposition manifested by Great Britain and Ireland, but also by three new member states: Malta, Slovakia and Estonia. These states oppose to any cooperation in view of

such a harmonization, and consider that the solution comes from the fiscal competition which must operate without obstacles. However, it is hardly possible that we can observe progresses in the harmonization of the taxation trim on the societies in the near future.

The most relevant example is that of the United States which needed a few decades for the member states to register notable progresses in this domain. Europe is still far from adopting such a system.

If at the end of 2000 Romania was situated on the last place in the domain of adopting the community acquis from the 12 candidate states, in the period 2001-2003 it registered progresses in this direction by occupying the fourth place. We must mention the fact that the translation and adoption of the community legislation is not enough, they need to be completed with its implementation and application.

The integration of the national market in the economical, social and cultural economic space represents a lasting process, whose realization needs the elaboration of a global and perspective strategy on the structural evolution of the Romanian economy.

The harmonization of the Romanian legislation with the community one in matter of indirect taxes represents a commitment which must be respected. The European Union has the right to take decisions regarding the harmonization of the legislation for the member states regarding the indirect taxes, insofar as this process is necessary for the insurance of the creation and function of the internal market.

The influence of the European Union on the taxation in the economies in transition, especially in the candidate countries, is realised by the community acquis which chart the institutional reforms and aim the VAT and the excises.

Thereby, by the association Agreement of Romania to the European Union, it is provisioned that, as a main condition of the integration, the harmonization of the present and future legislation of our country with the community one, especially in the domain of indirect taxation.

In this sense there was elaborated the national Strategy of preparation for the adhesion of Romania to the European Union and among the established objectives appeared the perfection of the fiscal system and the adaptation of the instruments, methods and financial legislation to the requirements of the Unique Market and of the Monetary European Union, as well as the observance of the neutrality principles and of the moderation of fiscal pressure.

The observance of the neutrality principle imposes the resignation of the fiscal facilities which distort the competitive relationships on the market and stimulate the tax evasion. Regarding the exchanges realized with the member states of the European Union, the insurance of

neutrality of the fiscal system supposes the elimination of the fiscal obstacle and guarantee of the competition.

The observance of the principle of moderation of the fiscal pressure exercised on the individual decisions in the work domain, of the economization, of the consumption and of the investments, implies the compression of the state intervention in economy, as well as the relaxation of the fiscal policy.

After the initiation, beginning with 1 January 1993 of the Unique European market, there were adopted certain measures which pursued the rapprochement of the fiscal systems. If we consider the long term evolution, it is necessary to take into account the example of the American market, where the fiscal competition between the states contributes to the harmonization of the taxation quotas, although important disparities still persist.

Beyond the European or American frame, the globalization has, in ensemble, a positive impact on the evolution of the fiscal systems by the entrainment of the fiscal reforms from the last years, the extension of the trim and the reduction of the taxation quotas, as well as by the reduction of distortions produces by taxation.

Currently the fiscal policy is analysed in the context of globalization which supposes a greater autonomy of the states in this domain.

The globalization process simulates the states by creating an international fiscal competition, to permanently evaluate the fiscal systems and to act if it is necessary by adjustments in the purpose of amelioration of the fiscal climate in the domain of investments or by reduction of obstacles that the mobility of capitals is confronted with.

Major contributors, as the multinational companies, have an economical importance that allows them to realize the strategies for fiscal optimization and the operation under the conditions of the competition manifested between the states.

The fiscal competition between states as well as the competition manifested between enterprises presents certain advantages:

- allows a certain harmonization of the taxation;
- detains the fiscal pressure to reach intolerable levels.

The same as the competition between enterprises, the competition manifested between states can have destroying effects if it is not the object of equitable "game rules".

If, at national level, the governments have the possibility to interfere for the establishment of rules to be respected, at international level such a situation does not exist.

In the European Union, the states use different fiscal instruments for the attraction of foreign investors. They try to favour the resident enterprises in rapport with the foreign competitors but in the same time they try to attract foreign investors on their territory in order to insure a stable taxation basis.

The disloyal competition from the sphere of taxes and levies can influence negatively the fiscal revenues of the member states, while loyal competition constitutes the basic component of the Unique Market as it can lead to the appearance of certain advantages for the population, as would be the offering by the governments of public services at lower pieces, supported by them.

The fiscal competition and the interactions between the fiscal systems can produce effects considered by certain states as being harmful. The states who present structural deficiencies as unfavourable geographical position with insufficient natural resources, consider that the special fiscal regimes are necessary to compensate the absences. Such a case is that of Ireland who justifies the specific taxation of the societies by the need to compensate the deficiencies resulted from its geographical position in rapport with the European competitors as Belgium, the states from the Eastern Europe or the states in south-east Asia, but these arguments are contested by its partners.

The fiscal competition is beneficiary because it allows the reduction of costs for public services and leads to efficient fiscal systems, but it also presents the risk of overvaluation of the taxation basis respectively of degradation of the quality of public services. It all depends on the role of the state and implicitly of the public sector.

According to the liberal appreciations, the fiscal competition is useful in the measure in which it allows the limitation of expansion of the public sector, which has the tendency to increase the expenses and its interventions in an excessive manner.

According to the positive concept of the public intervention, the collective decisions must pursue the maximization of welfare of the citizens and in consequence the fiscal competition cannot be an inefficient factor because it leads to improper public services.

The fiscal pressure due to the fiscal competition can affect especially the mobile elements of the taxable matter as it is the capital.

In order to avoid the abstraction of the capital or fraud, the states are obligated to reduce the taxation quotas, this phenomenon being qualified as fiscal degradation or erosion of the taxable basis.

As the perception of taxes on the revenues from mobile activities has become more difficult, the states risk, if they want to maintain the level of the existent public services, to be obligated to increase the taxes on work, consumption and non mobile activities.

There are, in most countries, dispositions which diminish the taxation basis and which can reach beyond what is necessary for the application of the objectives exposed by the fiscal policy.

The risk of distortions produced by the fiscal competition is reflected by the non-transparent treatment

given to the contributors or by the possibility of negotiation with the fiscal administrations for the fixation of the transfer prices or for the obtaining of certain advantages. If the preferential fiscal regime constitutes the main reason of the investment decisions in a certain country, this thing can help at the identification of the fiscal regimes which are potentially harmful.

The industrialized countries are confronting with a dilemma: they have reached in a collective matter the point where they cannot offer provoking fiscal dispositions, but each of them considers it has the obligation to offer them in order to keep the competitive level towards its partners.

A special category of states is represented by the “fiscal paradises”, notion which makes the distinction between the states which are not able to finance their own public services without applying taxes on the revenues or use reduced quotas and the states which are based on the important retentions from the revenues taxes.

The states from the first category have no interest in trying to end the dropping overbidding in the matter of the revenue tax; they contribute at the erosion of the collections obtained from this tax in the other countries. In exchange, the countries from the second category perceive important fiscal collections which are compromised by the degradable fiscal competition, and therefore there are more chances for them to accept the participation at an action organized to fight against this type of competition.

The fiscal paradises generally support the existent global financial infrastructure, by contributing to the facilitation of the mobility of the capital and the amelioration of the liquidity of the financial markets.

As the countries which are not parts of the fiscal paradises have freed and unregulated equally their capital markets, the potential advantages which resulted from the existence of the fiscal paradise are compensated by the unfavourable effects.

Certain fiscal paradises have legislations that detain the fiscal institutions from communicating to the fiscal authorities information on their investors. With all the progress registered in the matter of access to information, certain fiscal paradises have concluded conventions of administrative assistance with other states in matter of criminal law, which allow the exchange of information regarding the offences in the fiscal domain.

The attraction of these fiscal paradises is capable of being reinforced by the tight connections they can have with other countries which are not fiscal paradises.

Hereby, a fiscal paradise which constitutes a territory that depends from a country freely beneficiate from the infrastructures that the respective country offers, especially in the diplomatic and financial domains. Besides that, the investors who operate in the fiscal paradises when they are residents of the countries with “normal” taxation profit

from the public expenses effectuated in their origin country avoiding to contribute to their financing.

In the European Union, the Council has adopted on the 1 December 1997 the code of good conduct in the fiscal domain by which it guaranteed a minimum level of taxation.

Regarding the OCDE member states, they have adopted, in April 1998, 29 recommendations destined to the fight against the harmful fiscal competition, some of them being respected by national and bilateral measures.

The expansion of the European Union in 2004 has contributed to the consolidation of the fiscal competition; in this sense we must specify that on the ensemble of the European Union the medium quota of taxation of the profits was in march 2004 of 31%, while at the level of the new member states it registered a quota of only 19%. In 2006 the quota of the profit tax was of 33% in France, of 30% in Great Britain and of 28% in Sweden.

Regarding the new member states only Malta is an exception from the rule by using a quota of profit tax of 35%, while Poland uses a quota of profit tax of 19%, Slovakia of 19%, Hungary of 16%, Latvia and Lithuania of 15%, Cyprus of 10%.

For the creation of a more competitive image, many member states of the European Union have reduced, besides certain components of the social assistance, the

profit tax. In this sense, Belgium has diminished this tax from 40,17% to 34% and has announced that it will exclude the dividends from the profit tax, by considering them part of the benefits distributed in the interior of a firm. The reason, more or less declared, is to attract the multinationals. The states which are at a medium level, respectively between the states with high taxation and those with reduces taxation, are making efforts to fit into the second category.

From the combination between the “fiscal dumping”, that is talked about in the member states of the European Union, and the “fiscal protectionism”, that the Europeans say it is practiced in the United States, we can clearly understand one thing: taxes and levies are an excellent lever of influencing the competition on the global level.

We can conclude that the fiscal systems must be subjected to a fiscal harmonization rather than to the accentuation of competition between them, in the purpose of creating a corresponding frame for the development of capital fluxes, work force and merchandise.

The dilemma regarding the tax competition and tax harmonization is topical in the European Union, because of the existence of a unique monetary policy which implies the use of a unique currency; presently at the level of the European Union we can talk about a harmonized fiscal policy and not of an unified one.

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Techniques of Turnovers' Evolution and Structure Analysis Using SQL Server 2005

■

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Abstract. The turnovers' evolution and structure analysis can provide many useful information for the construction of a viable set of policies for products, prices and retail network. When the analysis deals with large quantities of raw data, one of the solutions that guarantees the rigorous treatment of the data is the use of a software system based on a data warehouse.

Key words: data warehouse; analysis; modeling; table; dimension.

■

SQL Server 2005 allows, through its *Business Intelligence* instruments, the use of specific financial analysis techniques on the data collected from the enterprise's information systems.

The general architecture of the software system used for the analysis of the turnover's evolution and structure is presented in figure 1:

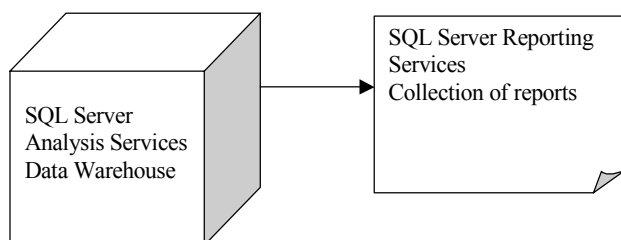


Figure 1. The general architecture of the software system

The software system is divided into two sub-systems:

a) A data warehouse, which contains the data to be analyzed;

b) A collection of reports, (stored inside a report server), which presents the results obtained from the turnovers' evolution and structure analysis.

1. The data warehouse

The data warehouse includes the following components:

- The data source;
- Data staging area;
- The data warehouse.

a. The data source

The data source for the turnovers' analysis system is represented by the application used to manage the sales activity. This application has a SQL Server database as back-end.

b. The data staging area

The data staging area is represented by a relational SQL Server database, named *VANZARI_PREGATIRE*. The database diagram is shown in figure 2:

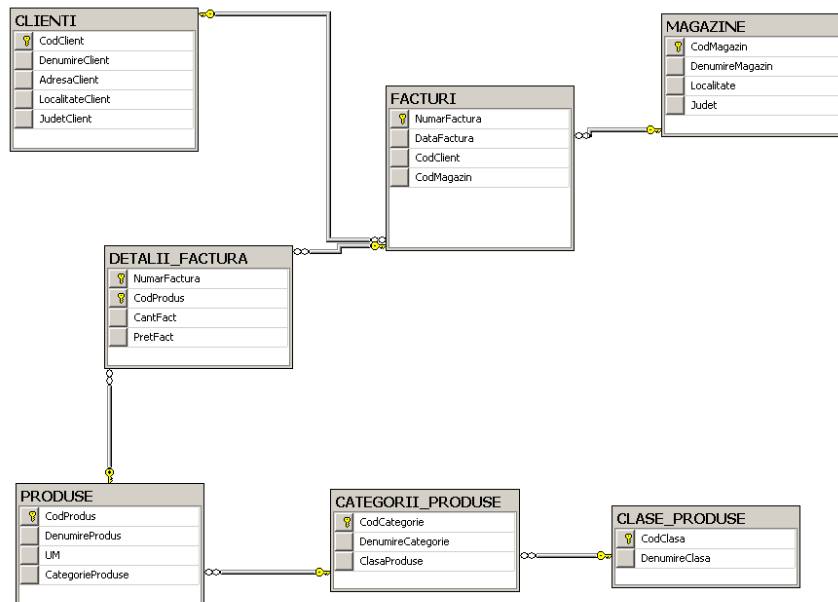


Figure 2. Data staging area (database diagram)

Upon completion of the data preparation operations, the database named *VANZARI_PREGATIRE* will become the data source for the data warehouse.

c. The data warehouse

In order to analyze the evolution and the structure of the turnover, I have built a data warehouse (named *ANALIZA_VANZARI*). I have used the principles of dimensional modeling for the definition of the data warehouse structure, considering the following aspects (determined by the characteristics of the activity in the studied enterprise):

- The turnover’s evolution and structure analysis will focus on the sales revenue, so the facts will be represented by the individual sales operations, distinguished within two tables: *FACTURI* and *DETALII_FACTURA*. The measure of the activity will be the value of each operation (calculated as product between the quantity sold and the sales price);
- The dimensions of the data warehouse will include the criteria taken into account during the analysis (the products and the stores), as well as the time – a crucial element for any data analysis attempt, regardless what kind of methodology is used to support it (economical and financial analysis, statistics, etc.).

The conceptual model of the data warehouse is shown in figure 3:

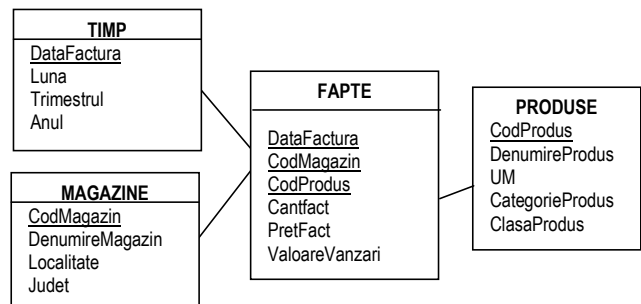


Figure 3. Conceptual model for the *ANALIZA_CA* data warehouse

The development of the data warehouse requires the construction of the dimensional and fact tables, inside the database used as data source (*VANZARI_PREGATIRE*). These operations are described in the following section.

- The creation of the table named *FAPTE_DS*, which will furnish the data for the fact table of the data warehouse. The following diagram shows the syntax of the stored procedure which accomplishes this operation:

```
CREATE PROCEDURE [dbo].[spGENERARE_TABEL_FAPTE]
AS
BEGIN
    SET NOCOUNT ON;
    SELECT F.DataFactura, P.Codprodus, F.CodMagazin, CantFact, PretFact, CantFact*PretFact AS ValoareVanzari
    INTO FAPTE_DS
    FROM FACTURI AS F INNER JOIN (DETALII_FACTURA AS DF INNER JOIN PRODUSE AS P ON P.CodProdus=DF.CodProdus) ON
        F.Numarfactura=DF.Numarfactura
END
```

- The creation of the table that will become the source for the time dimension (*TIMP*). I have used a stored procedure (named *spGENERARE_TIMP*), which

extracts the data of the operations from the fact table and generates the month, trimester and year for each data:

```

CREATE PROCEDURE [dbo].[spGENERARE_TIMP]
AS
BEGIN

    SET NOCOUNT ON;
    SELECT DISTINCT DataFactura, MONTH(DataFactura) AS Luna,
    CASE
        WHEN MONTH(DataFactura) >=1 AND MONTH(DataFactura) <4 then 1
        WHEN MONTH(DataFactura) >=4 AND MONTH(DataFactura) <7 then 2
        WHEN MONTH(DataFactura) >=7 AND MONTH(DataFactura) <10 then 3
        ELSE 4
    END
    AS Trim,
    YEAR(DataFactura) AS ANUL
    INTO DIMENSIUNEA_TIMP
    FROM FAPTE_DS
    ALTER TABLE DIMENSIUNEA_TIMP ALTER COLUMN DataFactura DATETIME NOT NULL
    ALTER TABLE DIMENSIUNEA_TIMP ADD PRIMARY KEY (DataFactura)
END

```

- The construction of the table which will provide the structure and the members for the *PRODUSE* dimension. Since the conceptual model of the *ANALIZA_VANZARI* data warehouse is based on a star schema and the dimensional table named *PRODUSE*

has not the same structure as the corresponding table from the source database, it is necessary to create a new table, in order to reflect all the levels of the hierarchy for the *PRODUSE* dimensions (including the product classes and categories).

```

CREATE PROCEDURE spGENERARE_PRODUSE
AS
BEGIN
    SET NOCOUNT ON;
    SELECT P.CodProdus, P.DenumireProdus, P.UH, CP.DenumireCategorie, CL.DenumireClasa
    INTO DIMENSIUNE_PRODUSE
    FROM PRODUSE AS P INNER JOIN (CATEGORII_PRODUSE AS CP INNER JOIN CLASE_PRODUSE AS CL
    ON CL.CodClasa=CP.ClasaProduse) ON CP.CodCategorie=P.CategorieProduse
    ALTER TABLE DIMENSIUNE_PRODUSE ALTER COLUMN CodProdus INT NOT NULL
    ALTER TABLE DIMENSIUNE_PRODUSE ADD PRIMARY KEY (CodProdus)
END
GO

```

The creation of the data warehouse using SQL Server requires the following operations:

- Defining a data source connected at the *VANZARI_PREGATIRE* database
- Defining a data source view for the previously configured data source.

- Based upon the data source view that has been configured during the previous step, one or more cubes can be defined inside the data warehouse. For the proposed analysis, I have defined a cube named *cubANALIZA_DS_CA*, with the structure shown in figure 4:

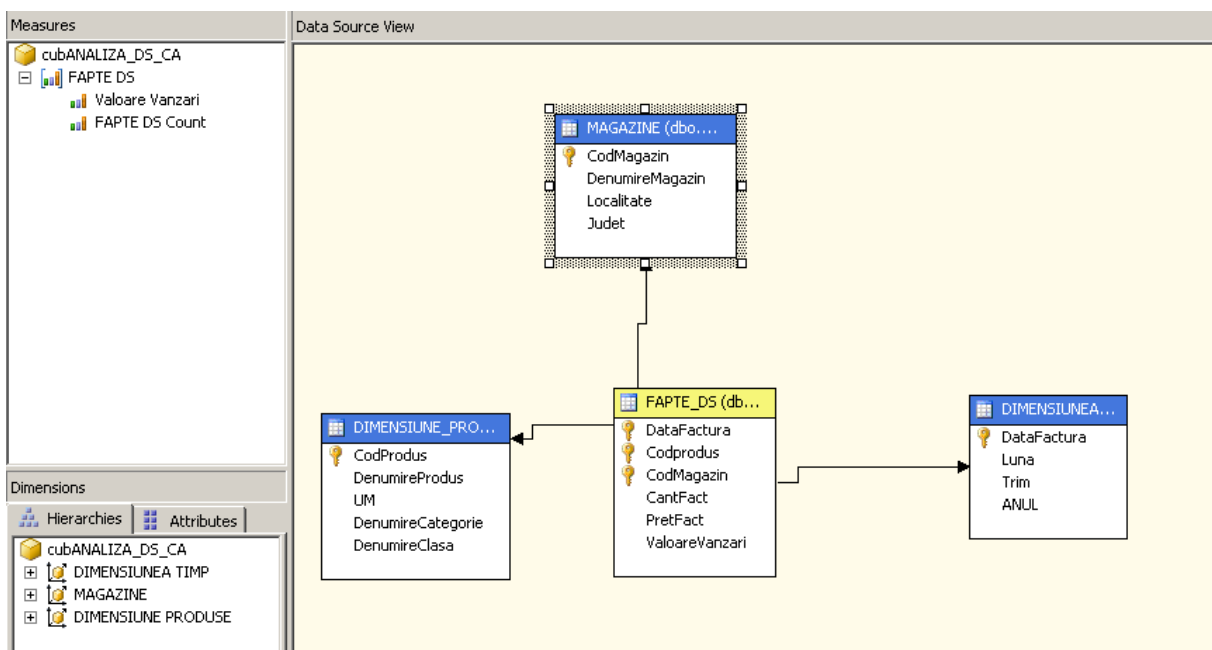


Figure 4. The structure for the cube named *cubANALIZA_DS_CA*

For the studied enterprise, the analysis will aim to describe the structure and the evolution of the turnover grouped by the products offered by the enterprise, grouped into two classes and six categories (each class includes three categories);

Remark: the customer-based analysis has an insignificant informational value, since the enterprise has many customers and the repeatability of purchase is reduced.

After the load of the data warehouse (operation named *cube processing* in SQL Server), the data can be analyzed using the available *Business Intelligence* instruments.

2. Data analysis

Data analysis is based on the methodology of turnover's evolution and structure analysis. The data are extracted

```
WITH MEMBER [DIMENSIUNEA TIMP].[ANUL].[DINAMICA 2005] AS
[DIMENSIUNEA TIMP].[ANUL].[2005]-[DIMENSIUNEA TIMP].[ANUL].[2004]
MEMBER [DIMENSIUNEA TIMP].[ANUL].[DINAMICA 2006] AS
[DIMENSIUNEA TIMP].[ANUL].[2006]-[DIMENSIUNEA TIMP].[ANUL].[2005]
SELECT { [MEASURES].[VALOARE VANZARI] } ON COLUMNS,
{ [DIMENSIUNEA TIMP].[ANUL].[2004], [DIMENSIUNEA TIMP].[ANUL].[2005],
[DIMENSIUNEA TIMP].[ANUL].[DINAMICA 2005], [DIMENSIUNEA TIMP].[ANUL].[2006],
[DIMENSIUNEA TIMP].[ANUL].[DINAMICA 2006] } ON ROWS
FROM [cubANALIZA_DS_CA]
```

Based on the query, I have built the report named *DINAMICA_CA_TOTAL*, whose preview structure is shown in figure 5:

Anul	Valoare Vanzari
2004	20,771,341.76
2005	21,394,367.27
2006	46,939,883.89
DINAMICA 2005	623,025.51
DINAMICA 2006	25,545,516.62

Figure 5. Turnover's evolution, 2004-2006

The report displays the values for the turnover during the three years for which the analysis is performed, as well as information about the turnover's evolution.

In 2005, the turnover has raised with 623.025,51 lei (3%). In 2006, the turnover was with 25.545.522 lei greater than in 2005 (1,19 times greater), following the significant development of the activity of the firm.

b. Product-based analysis of the turnover's evolution and structure

Considering the available data, the product analysis can be performed at three levels: product class, product

using the MDX language (the used interface is the SQL Server Reporting Services query generator), and the results are presented in a set of reports.

a. The overall analysis of the turnover's evolution and structure

The following MDX query extracts from the *cubANALIZA_DS_CA* cube the values of the turnover for the three considered years, as well as the values representing the indicator's dynamics (2005 against 2004, respectively 2006 against 2005). For extracting the values representing the evolution, the query uses two calculated members *[DIMENSIUNEA TIMP].[ANUL].[DINAMICA 2005]* and *[DIMENSIUNEA TIMP].[ANUL].[DINAMICA 2006]*:

category and product type. These three attributes reflects the three levels of the *PRODUSE* (products) dimension's hierarchy (as presented in fig. 6.):

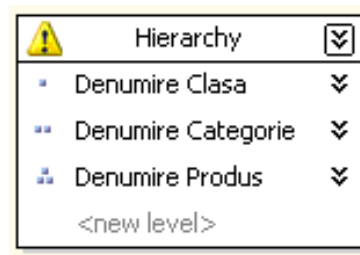


Figure 6. The hierarchy for the *PRODUSE* dimension

Taking into consideration these elements, the turnover's analysis methodology requires the drill-down from the level with the smallest granularity (product class) towards the level characterized by the greatest granularity (the product type). The definition of the hierarchy for the *PRODUSE* dimension is mandatory for the use of the *drill-up* and *drill-down* techniques, described in the following sections.

b1. Analysis of the turnover on product classes

In order to analyze the turnover on the product classes, I have used the following MDX query:

```

WITH MEMBER [DIMENSIUNEA TIMP].[ANUL].[DINAMICA 2005] AS
[DIMENSIUNEA TIMP].[ANUL].[2005]-[DIMENSIUNEA TIMP].[ANUL].[2004]
MEMBER [DIMENSIUNEA TIMP].[ANUL].[DINAMICA 2006] AS
[DIMENSIUNEA TIMP].[ANUL].[2006]-[DIMENSIUNEA TIMP].[ANUL].[2005]
SELECT {[MEASURES].[VALOARE VANZARI]} ON COLUMNS,
{[DIMENSIUNE PRODUSE].[DENUMIRE CLASA].[DENUMIRE CLASA].MEMBERS} ON ROWS,
[DIMENSIUNEA TIMP].[ANUL].[2004],[DIMENSIUNEA TIMP].[ANUL].[2005],
[DIMENSIUNEA TIMP].[ANUL].[DINAMICA 2005],[DIMENSIUNEA TIMP].[ANUL].[2006],
[DIMENSIUNEA TIMP].[ANUL].[DINAMICA 2006]} ON PAGES
FROM [cubANALIZA_DS_CA]

```

As well as the query previously presented, this query uses two calculated members to reflect the evolution of the turnover. Also, the analysis for product classes has required

the definition of the third axis of the query (the *PAGES* axis) The report shown in figure 7 presents the data obtained through the analysis:

	2004	2005	2006	DINAMICA 2005	DINAMICA 2006
Materiale auxiliare finisaje	14,319,405.29	13,024,018.07	30,866,537.00	-1,295,387.22	17,842,518.93
Materiale finisaje	6,451,936.47	8,370,349.20	16,073,346.89	1,918,412.73	7,702,997.69

Figure 7. Turnover's structure and evolution, detailed for each product class

The report uses the conditional formatting options to emphasize the negative values. This way, the readers can easier observe the decrease of sales for the "Auxiliary finishing materials" („Materiale auxiliare pentru finisaje") in 2005 against 2004.

In 2005, the sales value for "Auxiliary finishing materials" has decreased with 9,05%, generating a negative influence on the evolution of the turnover. If the sales amount for auxiliary materials had remained the same, the turnover had increased with 1.295.387,22 lei. The evolution of the sales amount corresponding to "Finishing materials" ("Materiale pentru finisaje") determined the rise of the turnover with 1.918.412,73 lei (29,73%).

In 2006, the sales amount for the "Finishing materials" class of products has recorded a 7.702.997,52 lei increase;

and the sales for the „Auxiliary finishing materials" class have increased by 17.842.518,48 lei. The latest class contributed with 69,85% at the overall increase of the turnover, while the other class of products ("Finishing materials") had a contribution of 30,15% (their sales amount recorded a 92,03% growth).

As for the structural evolution, in 2005 the weight of the "Finishing materials" class has gained 8 percent points, while in 2006 the auxiliary materials gained 4,9 points in the structure of the turnover.

b2. Category-based analysis of the sales amount

While aiming to describe in detail the evolution of the turnover for each product category, it is necessary to use a drill-down operation for the "DENUMIRE CLASA" level of the *PRODUSE* dimension. The following query retrieves the necessary information from the data warehouse:

```

WITH MEMBER [DIMENSIUNEA TIMP].[ANUL].[DINAMICA 2005] AS [DIMENSIUNEA TIMP].[ANUL].[2005]-[DIMENSIUNEA TIMP].[ANUL].[2004]
MEMBER [DIMENSIUNEA TIMP].[ANUL].[DINAMICA 2006] AS [DIMENSIUNEA TIMP].[ANUL].[2006]-[DIMENSIUNEA TIMP].[ANUL].[2005]
SELECT {[MEASURES].[VALOARE VANZARI]} ON COLUMNS,
{[DIMENSIUNEA TIMP].[ANUL].[2004],[DIMENSIUNEA TIMP].[ANUL].[2005],[DIMENSIUNEA TIMP].[ANUL].[DINAMICA 2005],[DIMENSIUNEA TIMP].[ANUL].[2006],[DIMENSIUNEA TIMP].[ANUL].[DINAMICA 2006]} ON ROWS,
DRILLDOWNLEVEL({[DIMENSIUNE PRODUSE].[Hierarchy].[Denumire Clasa].MEMBERS}) ON PAGES
FROM [cubANALIZA_DS_CA]

```

Following the usage of the *Drilldownlevel* function, the report that was build on the previously presented query offers to its beneficiaries the option to view either the grand totals (the amounts corresponding to the product classes), either the

detailed information (at product category level). A set of expand-like buttons within the report allows the users to switch between the two options (a button is attached to the label of each category). The structure of the report is shown in figure 8:

		2004	2005	2006	DINAMICA 2005	DINAMICA 2006
Materiale auxiliare finisaje		14,319,405.29	13,024,018.07	30,866,537.00	-1,295,387.22	17,842,518.93
	Adezivi	9,063,603.02	8,119,280.87	14,438,038.92	-944,322.15	6,318,758.05
	Gleturi	2,286,529.68	1,678,834.43	4,939,387.78	-607,695.25	3,260,553.35
	Vopsele	2,969,272.59	3,225,902.77	11,489,110.30	256,630.18	8,263,207.53
Materiale finisaje		6,451,936.47	8,370,349.20	16,073,346.89	1,918,412.73	7,702,997.69
	Falanta	136,223.15	1,337,420.69	3,001,804.75	1,201,197.54	1,664,384.06
	Gresie	5,584,015.29	3,673,110.08	7,650,175.12	-1,910,905.21	3,977,065.04
	Parchet	731,698.03	3,359,818.43	5,421,367.02	2,628,120.40	2,061,548.59

Figure 8. Turnover's evolution, by classes and categories of products

For each class of products, the report shows on the first line the subtotals of the annual sales amounts and the dynamics corresponding to the product classes and the following rows describes the values for the product categories associated with the respective class. The negative values are emphasized (displayed using a different color).

In 2005, the sales for auxiliary materials have decreased by 1,295,387 lei. This evolution was mainly determined by the decrease (by 10 percents, 944,322.15 lei), of the sales for the “Adhesives” (“Adezivi”) products. The sales of the “Gleturi” category have decreased with 607,695.25 lei (26.58%, against the value from 2004, thus manifesting an unfavorable influence on the turnover’s evolution). The only positive evolution was recorded for the “Painting Materials” (“Vopsele”) category, a growth of 256,630.18 lei (8.64%).

The sales corresponding to the finishing materials has increased with an amount of 1,918,412.73 lei. This happened largely due to the evolution of the sales for the “Parquetry” (*Parchet*) category, which have grown with 2,628,120.40 lei (more than 3.5 times), a value that is 1.36 times greater than the overall evolution for the entire product class. The evolution for the “Faience” (“Faianță”) category was also favorable, being recorded an increase with 1,201,197.54 lei (8.8 times greater against the value corresponding to 2004), which accounts for 62.61% from the overall evolution at class level. The sales for “Gritstone” (“Gresie”), have decreased with an amount of 1,910,905.21 lei, a value close to the evolution of sales for the entire class.

In 2006, the sales for auxiliary materials have grown with 17,842,518.93 lei. Same as in 2005, the most favorable evolution was the one for painting materials, whose sales amount increased with 8,263,207.53 lei (3.5 times), accounting for 46.31% from the evolution of sales of the entire product class (because the sales amounts for all of the three categories of products have increased, the weight of the dynamics of each category in the overall evolution can be quantified). The sales of adhesives have increased with 6,318,758.05 lei (77.82%), their contribution at the

evolution of sales inside the product class was 35.41%. The sales for *Gleturi* have increased more than three times, by 3,260,553.35 lei, thus contributing with 18.27% at the evolution of sales for their class.

As for the finishing materials, their respective sales amount has increased with 7,702,997.69 lei against the values from 2005. The main factor that has determined this evolution was the growth with 3,977,065.04 lei of the sales for gritstone, which accounted for 51.63% in the total value of sales dynamics. The parquetry products have recorded an increase of 2,061,548.59 lei (61.36%), this growth representing 26.76% from the evolution of the class sales. The smallest influence has manifested for the category *Faience*, whose growth, 1,664,384.06 (124%) accounts for 21.6% of the total increase for the product class.

In 2006, for the finishing materials, the weight of the sales amount for *Parquetry* category increased (from 11.3% to 40.1%), also, the weight for the *Faience* category grew from 2.1% to 16%. In return, the weight for the *Gritstone* category decreased, from 86.5% to 43.9%.

The auxiliary finishing materials class has recorded the following structural evolutions:

- The weight for the painting materials has increased, from 24.8% to 37.2%;
- The weight corresponding to adhesives decreased (from 63.3% to 62.3%);
- The weight for the *Gleturi* category has decreased with 3.1 percentage points, from 16.0% to 12.9%.

In 2006 against 2005, inside the finishing materials class, the weight for the *Gritstone* category grew by 3.7 percentage points. The weight for the *Faience* category has increased by 2.7 percentage points, and the weight for the sales of *Parquetry* decreased from 40.1% to 33.7%.

As for the auxiliary finishing materials, it can be observed the decrease of the weight of the adhesives, from 62.3% to 46.8%. The sales for painting materials have accounted for a weight of 37.2%, a value greater than in 2005, when their weight was 24.8%. The weight for *Gleturi*, has reached a value of 16%.

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Real Options in Capital Budgeting. Pricing the Option to Delay and the Option to Abandon a Project

■

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***Abstract.** Traditional discounted cash-flows method for assessing projects assumes that investment decision is an irreversible one, which is not correct. Managers can and must reconsider their initial decision as the new information arises during the project life. This is managerial flexibility and it creates strategic value for a project, only if management takes advantage of the opportunities associated with an analyzed project. Real options represent a new approach in capital budgeting, using the theory of pricing financial options for investments in real assets. In this paper, we emphasize the characteristics and valuation methodologies of real options. The objective in the last section is pricing the option to delay and the option to abandon a project in construction materials field.*

Key words: capital budgeting; real options; managerial flexibility, timing options; exit options.

■

Introduction

Traditional approaches to capital budgeting, such as discounted cash-flows (from now on DCF), cannot capture entirely the project value, for different reasons: it is assumed that investment decision is irreversible, interactions between today decisions and future decisions are not considered, and investment in assets seems to be a passive one (management doesn't interfere during the life of the project).

Managerial flexibility generates supplementary value for an investment opportunity because of managerial capacity to respond when new information arises, while the project is operated. Investment in real assets includes a set of real options that management can exercise in order to increase assets value (under favorable circumstances) or limit losses (under unfavorable situations).

Managerial flexibility in decision-making process introduces an asymmetry for probability distribution of net present value (from now on NPV) for a project. An investment opportunity value is dependent on future uncertain events, so therefore, it will be greater than forecasted value in the situation of passive management.

From this perspective, a project has a standard value, determined through traditional techniques (DCF, which does not catch adaptability and strategic value), but also a supplementary value, coming from operational and strategic real options held by an active management.

Decision trees are related with real option approach by recognizing their existence, but investment value is calculated as an average of expected cash flows (positive or negative) weighted with probabilities associated with

each state. Real option appraisal eliminates potential losses by abandoning the project when circumstances are unfavorable (negative cash flows become zero) and adjust discount rate to reflect the new level of risk.

Real options represent an integrated solution used under uncertainty, by transposing the theory of financial options to valuation of real assets, projects or even companies, in an uncertain and dynamic environment, where taking decisions must be a flexible process.

Specific features of real options

Unlike financial options, real options have as underlying asset a real asset, which value is given by discounted cash-flows plus the value of any other options associated with the ownership of that real asset (Bruun, Bason, 2001, p. 1).

Real options are defined and valued by analogy with financial options, but they have some specific features (Trigeorgis, 1996, pp. 127-129) that make distinction between the two categories: *not exclusively owned by any investor* (to assure the exclusive rights for a project, someone must identify and use the competitive advantages and raise substantial barriers to entry for other competitors); *nontradable securities* (there are no financial markets where these rights could be traded, the only two alternatives being: exercising option or giving up exercising); *preemption for the investor who undertake the project*, despite that at the beginning the real option was jointly held by all firms involved in that industry; *option compoundness*, consisting of interdependencies inside a project or between projects, depending on exercising other options or taking other projects.

Black and Scholes (1973, pp. 637-657) identified the elements affecting the theoretical price of an option in their formula: stock price (S), exercise price (E), time to expiration (t), variance of returns (σ) and risk free rate (r). Afterwards, Merton (1973, pp. 141-183) completed the Black & Scholes formula (from now on BS) with the sixth element, dividends (δ). Models assessing financial options could be extended for real options because of the analogy between financial and real options, concerning the elements influencing their value (Figure 1)⁽¹⁾.

Financial option (CALL or PUT)	Variable	Real option (investment opportunity)
Stock price	S	Discounted cash-flows for the project
Exercise price	E	Capital expenditure
Time to expiration	t	Period of time that exercise decision may be deferred
Risk free rate	r	Time value of money
Variance of returns	σ	Risk for assets of the project
Dividend yield	δ	Lose of value by deferring investment decision

Figure 1. Analogy between financial options and real options

Traditional methods like DCF and NPV cannot catch the flexibility because they focus only on two components of value creation: discounted payoffs and investment cost. Real options capture the influence of all six elements described before. That means a *reactive management*, consisting of response from the managerial team (through decisions they take) to the cumulated information during operating the investment, under uncertainty.

The *proactive management* of flexibility (Leslie, Michaels, 1997, pp. 12-14) assumes, besides identifying the real options embedded in a project, fairly appraising, exercising them to seize the opportunities and taking decisions for increasing their value, for maximizing project value and shareholders' wealth as well.

A prospective investor (the owner of a real option) cannot control all the components of value creation because of internal or external constraints (such as technical, marketing, competition). Maximizing option price can be obtained by focusing on those elements that indeed can be influenced and confer competitive advantage, keeping in mind the constraints.

Difficulties in using financial options pricing models for real options valuation

There are certain limits for using financial options pricing models for real options because the first category has standard components, which could be easily identified (part of them are clearly specified - maturity, exercise price, or can be observed in the market - price of underlying asset, risk free rate), while the second category do not have such standardization and managerial flexibility determine their pattern. Some of these potential inconveniences, along with solutions proposed in literature on real options are synthetically presented further on (Bruun, Bason, 2001).

Risk neutrality

Also Cox, Ross & Rubinstein (from now on CRR) binomial model and BS model make the assumption that investor creates a replicating portfolio with constant underlying asset price (S), which is risk neutral for an instant of time. A new value for S means changing portfolio structure because hedging ratio is not the same anymore.

Real assets are not frequently traded in a specific market and their price is difficult to observe and is almost impossible to form a replicating portfolio. Under these circumstances, the result of risk neutral valuation is not

applicable anymore and it is not possible to use risk free rate as discount rate.

Lander and Pinches (1998, pp. 537-567) proposed either usage of discount factor corresponding to a traded security with similar risk pattern like underlying asset, or estimation of discount factor by applying an asset pricing model such as CAPM.

The underlying asset

Any investor does not exclusively own this. Option price depends on the level of competition in that industry and on the respond of competitors to new challenges. A study by Smit and Ankum (1993, pp. 241-250) concluded that high growth rates for an industry would bring new competitors, so the rate of return will be closer to the cost of capital and the value of held option will be smaller.

The value of underlying asset is represented by present value of projected cash flows and is calculated from NPV for a project (the so-called static or standard value).

Willner (1995) built a model with discontinuous changes in the value of underlying asset:

$$P(t) = P(0) \times e^{\mu \times t} \times \left(\frac{\lambda}{\lambda - 1} \right)^{Q \times t}$$

The model is working under certain assumptions:

- the value of underlying asset increases with a constant exponential rate, as a result of value creation through research activity (except the occasional up jumps owing to new discoveries and down jumps generated by the entry of new competitors on the market);
- the up jumps will not bring the expected payoffs because the new discoveries will attract more competitors and some losses occur from this situation; decrease in value can be projected from historical data for similar projects;
- the new discoveries are not correlated with market or with entire economy, and investors are not confronted with systematic risk;
- the investment cost (exercise price) is fixed.

The model may be successfully used for assessing multistage projects or start-up ventures.

The exercise price

This is not fixed (it is not established from the very beginning) and do not follow a deterministic process. It

should be found a mutual probability distribution for value of underlying asset and exercise price to determine the level and direction of correlation between the two variables.

Schwartz și Moon (2000) developed a model with a stochastic process for the exercise price. The level of uncertainty is conversely proportional with investment level, which means that uncertainty about initial cost could be eliminated only by undertaking the project.

Pindyck (1993) identified two sources of uncertainty about investment cost: a technological one, eliminated only in the moment when the decision to invest is taken, and an economic one (related with the changes in costs of entries for the project, such as materials and labour). The author considered a stochastic evolution for investment cost, given by the following equation:

$$dK = -I dt + g(I, K) dz,$$

which means that exercise price (K) decreases as investment proceeds and fluctuates along with the two sources of uncertainty (technical and cost of entries for the project).

Time to maturity

Exercise date for real options is not a priori specified and it is uncertain because of exogenous factors, such as competition or barriers to entry. Optimal exercise time depends on various elements:

- the greater the technological uncertainty, the greater the uncertainty concerning exercise date;
- the stronger the competition and the weaker the barriers to entry for an industry, the sooner the exercising of the option (to take advantage on preemption), although a delay for the project has some benefits, because in the mean time supplementary information occurs;
- the patents or licences owned by investor protect him against competition and permit him not to hurry with exercising the option.

Risk free rate

The discount rate is the rate of return for a riskless security, with the same maturity as the real option. But exercise date for the option is uncertain, so is quite difficult to identify the appropriate discount factor. More than that, rate of return is not constant over time. The solution is similar with previous cases: rather considering a stochastic evolution for discount rate than a deterministic one.

The volatility of the underlying asset

Volatility is the only element not directly observable for financial options and it has to be estimated for the entire period until maturity. If the underlying asset is traded, the historical variance is extrapolated for future periods. If the underlying asset is not traded (the case of real options), volatility is difficult to appraise. Luehrman (1998) suggested some alternative solutions. First, the observed risk for a financial market index could be used as a proxy for the project risk (adjusted with the level of individual, specific risk). Second, the volatility could be estimated from historical data regarding similar projects from related industries. Third, volatility could be obtained from probability distribution of projected cash flows, when applying Monte Carlo simulation.

Another problem is that volatility is not constant over long periods, but this inconvenient could be eliminated by applying a GARCH model, if possible.

The dividend yield

It is represented by loss of cash flows until maturity of the real option (for example, by deferring the project).

Pricing real options in capital budgeting - the option to delay and the option to abandon a project

A various range of real options are identified and used as powerful instruments in capital budgeting: *timing options* assume that investor may postpone the investment decision until specific information arise and help him to understand, even partly, the uncertainty connected with the analyzed project; *staging options* are very useful for assessing multistage projects, when uncertainty is not resolved over time and investor must undertake the project even in small increments, in order to learn about cost pattern and profitability of the project; *exit (abandon) options* allow investor to avoid or at least reduce losses if bad circumstances appear, by turning negative cash-flows into null payoffs; *operating options* enable the firm to organize operations for adjusting its processes to business environment and react to economic changes by scaling up to enhance earnings or scaling down to reduce damages, depending on given circumstances; *flexibility options* consist of purchasing or building a flexible production capacity or asset, so that it has two or more different uses, depending on market conditions; *growth options* are usually associated with strategic investments, which sometimes have negative NPV, but are indispensable for implementing following projects with substantial positive NPV, greater (in module) than losses from the initial project.

The objective of this section is to explain in detail the working mechanism and assess two types of real options from the categories discussed above, namely the *option to delay* and the *option to abandon* a project, with wide applications in capital budgeting.

Pricing the option to delay a project

On the one hand, the possibility of deferring a project is significantly valuable because investor needs more time to learn about uncertain variables of the project. On the other hand, this value is diminished with the lost cash flows for period that investment was deferred. So the option is exercised only if potential earnings from delay exceed losses in such a situation.

Projects with negative NPV (initially rejected from the point of view of traditional investment analysis) could turn to positive NPV in the future. Decision to postpone a project is equivalent to holding a CALL option, which provides the right, but not the obligation, to undertake the project sometimes in the future, when the holder decides to do so. Even profitable projects from the very beginning (with positive NPV) acquire a plus of value by delay of the project, if conditions related to competition, barriers to entry or exclusive rights for a product or technology allow that.

Pricing an option to delay a project requires identification of the variables (Damodaran, 2002) in the model:

- *underlying asset* - is represented by the project itself; its value (S) is calculated with DCF method;
- *exercise price* - is the cost of implementing the project; the model is working under assumption that this is constant in real terms and it is affected only by inflation; its evolution is deterministic, but not stochastic;
- *time to maturity* - is established as the period of time that investor enjoy of exclusivity for the analyzed project or at least has an important competitive advantage which allow him deferring the project without risking its achievement by another firm;
- *risk free rate* - is represented by the expected rate of return for a riskless security (treasury bill or treasury bond), with the same maturity with real option;
- *volatility of the underlying asset* - it appears because of the errors associated with estimation of the financial cash-flows and the value of underlying asset and it is the most difficult element to appraise because the underlying asset is not traded. Monte Carlo simulation is used for

assessing variance, because the distribution of probability for the components of cash flows (size of the market, market share) is defined and random numbers (normally distributed, for example) are generated for the specification errors of the variables in the model. Different scenarios for expected DCF result from here. Rolling a great number of simulations (it is recommended to do at least 3,000 iterations), the standard deviation of DCF is obtained, and then it is used as a proxy for volatility of underlying asset in the option pricing model.

- *dividend yield* - delay of investment generates lose of cash-flows for each year. There are two situations:
 - if annual cash-flows are evenly distributed in the period until maturity of the option (n years), the lost value for the first year is 1/n and it increases with time (1/(n-1) in the second year, 1/(n-2) in the third year and so on);
 - if annual cash-flows are not evenly distributed, the cost of postpone the project with one year is given by the following formula:

$$\text{Cost of delay} = (\text{PV of CF}_{\text{in the future}} - \text{PV of CF}_{\text{at the current moment}}) / \text{PV of CF}_{\text{at the current moment}}$$

After identifying all these six elements, all we need is to apply a pricing option model (BS or CRR), but also keep in mind the difficulties emphasized in the previous section.

Users prefer BS model because it consists in a simple formula:

$$\begin{aligned} \text{CALL option price} &= \\ &= S \times e^{-\delta \times t} \times N(d_1) - E \times e^{-r \times t} \times N(d_2) \end{aligned}$$

$$\begin{aligned} \text{PUT option price} &= \\ &= -S \times e^{-\delta \times t} \times N(-d_1) + E \times e^{-r \times t} \times N(-d_2) \end{aligned}$$

where:

$$d_1 = \frac{\ln(S/E) + [(r - \delta) + 1/2 \times \sigma^2] \times t}{\sigma \times \sqrt{t}}$$

and

$$d_2 = d_1 - \sigma \times \sqrt{t} \text{ and } N(d) \text{ represents the cumulated probability of normal distribution.}$$

Binomial model requires laborious calculus because valuation proceeds iteratively backwards, from the last period to the current time moment (the more periods until option maturity, the more complex the determination of option price).

More than that, binomial model considers only a finite number of periods (it is a model in discrete time). It leads, at limit, to BS model (in continuous time), which unlike the first one, assumes that time to maturity is divided into an infinite number of periods. That is why the value derived from BS formula is always smaller than value provided by binomial model (but close to it). To apply CRR model, when the values of the six variables for BS model are known, Damodaran proposes two formulas⁽²⁾:

$$u \text{ (the "up" factor)} = e^{\sigma \times \sqrt{dt} + (r - \sigma^2 / 2) \times dt}$$

$$d \text{ (the "down" factor)} = e^{-\sigma \times \sqrt{dt} + (r - \sigma^2 / 2) \times dt}$$

where dt = 1/number of periods from a year, until maturity.

We stressed before that option value is reducing as time passes (the loss in value measured by dividend yield is enhancing). Repeating the calculus for delay option price, an equilibrium point can be determined, where strategic NPV (including option premium) decreased and became equal to standard NPV. This is the moment for exercising the option (by investing), only if, of course, NPV is positive. Beyond this point, deferring does not create value anymore, but destroy part of it. Therefore, the real duration of delay option is always shorter than the initially projected one (because of competition, appearance of similar products).

Pricing the option to abandon a project

The possibility to renounce to a project under unfavourable circumstances represents, in fact, another real option for investor. The option to abandon (a PUT option this time) will be exercised if DCF generated subsequently by the project are even negative or positive, but inferior to salvage value gained after project abandonment.

Value of the underlying asset is represented again by estimated DCF and volatility could be assessing with the same tools as before (similar traded companies from industry, simulations). Option maturity is the period for adopting abandonment decision and it may coincide with time remaining for operating the project.

Exercise price is the salvage value obtained from abandonment of investment, estimated at the current

moment of time. Pricing model is applied under the hypothesis that real assets do not depreciate (salvage value is fixed over time). Lose of value is quantified through dividend yield and it is determined⁽³⁾ as: $\delta = 1/\text{period}$ remaining from the project life.

The actual value from abandonment may be inferior to the estimated one, from different reasons: there is not demand for such a technology or an organized second-hand market is not operational.

Until now, we implicitly supposed that liquidation value is positive. There are situations when from abandonment does not result something or worse, there is a cost to cover for. In this case, the investor will renounce to the project only if loses from still operating the project are bigger (in absolute value) than the costs implied by liquidation procedure.

The price of option to abandon a project increases if investor builds a flexible operational structure from the very beginning, which allows him to take easier the decision concerning abandonment. This objective can be accomplished by employing labor for limited time, by renting or taking in leasing the fixed assets, by choosing a more expensive, but flexible technology.

Case study: pricing of real options - option to delay and option to abandon a project

Investment presentation and assumptions⁽⁴⁾

A construction company from Bucharest analyses the opportunity to invest in a project for producing metallic tiles for roofs (a green field project). There will be obtained two types of products (A and B), with different technical features. The firm will install an annual production capacity of about 1,500 thousands pieces (type A) and 500 thousands pieces (type B). The life of the proposed project is ten years (2007 - 2016). The cost required by implementing the project is 3,670 thousands USD, consisting of land, buildings and technology, and it will be entirely financed with equity capital. Salvage value, estimated for the end of exploitation period of investment (including tax shields), is 1,485 thousands USD.

A rigorous and detailed analysis of the project (financial analysis of the company, investment cost, European and Romanian market of metallic tiles and perspectives for growth rates, market share, sale prices, cost components, forecasted inflation rate, fiscal implications, discount rate) was performed before and it doesn't make the object of this study. That's why the hypothesis for assessing free cash-flows are concisely

presented, to create the basis for identifying and pricing real options associated with this investment. Estimation of free cash flows is done in American dollars (USD) because some cost elements are specified in USD.

Value of sales for the two categories of products, on internal market, is of approximately 4,000 thousands USD. The annual growth rate, in real terms, is estimated to 20-22% for the first two years, 10% for the next four years, respectively 1-2% for the last four years. This foreseeing represents the combined results of estimations for market size (as quantity) and unit sale prices (in real terms) for the two categories of products, for the entire life of the project. The firm wants to achieve a market share of 20-30% in the first two years, following an increasing of this percent with ten percentage points every year, until production capacity is completely utilized (according to forecasting, this event will occur in the sixth year of operating).

The expenditures were appraised under subsequent assumptions: unit variable cost represents 60% of turnover (in the first two years), then it enhances annually with two percentage points until it reaches 70%, which is kept constant afterwards; fixed costs (others than amortization) are established to a level of 80 thousands USD (in real terms) and amortization is about 166 thousands USD (in nominal terms).

Projected inflation rate is 2% per year (for USD) and nominal discount rate is 18.5%. There are also used in calculations a corporate income tax rate of 16% and an average of 30 days for assessing working capital investment.

Investment ratios under certainty

Keeping in mind the assumptions described in the previous subsection, we have estimated annual turnover and operational expenses (in nominal terms), then financial margins. It was also taken into account the tax shields provided by the recover of financial loses from the first year in the following years (when profits are obtained).

Finally, nominal free cash flows were appraised and discounted with nominal cost of capital (in fact, a cost of equity capital). The result is an NPV of 1,297 thousands USD. Profitability index is greater than one (1.34), indicating that the investor recovered all expenses and gained a net discounted profit of 34% from invested capital. Internal rate of return is 25% and exceeds the cost of capital (18.5%). The discounted payback period is about 4.5 years.

All these calculations lead to conclusion that investor must accept the analyzed project and they are exhibited in Table 1.

Investment ratios for the project under certainty

Table 1

- thousands USD -

YEAR	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
FCF=NOPAT+Amo-ΔImo-ΔWorkCap	-3,777.6	446.8	575.6	779.5	1,059.7	1,366.0	1,860.9	1,761.3	1,735.7	1,695.0	3,681.5	
Cost of capital (nominal)		18.5%	18.5%	18.5%	18.5%	18.5%	18.5%	18.5%	18.5%	18.5%	18.5%	18.5%
Discount factor		118.5%	140.4%	166.4%	197.2%	233.7%	276.9%	328.1%	388.8%	460.7%	546.0%	647.0%
DCF	5,074.84	377.1	409.9	468.4	537.4	584.6	672.1	536.8	446.4	367.9	674.3	
NPV		1,297.3										
IRR		25.0%										
Profitability index		1.34										
Discounted payback period		4.5 years										
PV of future CF (delay of the project)	4,563.55		420.9	373.3	445.4	510.5	579.9	573.4	446.4	367.9	304.5	541.3

Pricing the option to delay the project

The sensitivity analysis presumes that there are certain intervals for possible values taken by variables from free cash-flows model, and thus investment analysis is transposed in an uncertain environment. Strong arguments (related with projected trend for construction and construction materials market, competition level, evolution of imports and currency exchange rate, using

similar products in consumption, fiscal policy regarding corporate income tax, firm policies for marketing, employment and wage system, and evolution of utilities costs) help us to establish the inferior and the superior limits for these intervals. The new values for NPV of the project are pictured in Table 2 and they are graphically illustrated in Figure 2.

Sensitivity analysis – NVP

Table 2

- thousands USD -

Variable	-50%	-30%	-20%	-10%	-5%	0%	5%	10%	15%	20%	30%	50%
Market size				921.4	1,122.7	1,297.3	1,440.8	1,570.9	1,700.2			
Market share		-48.1	451.5	921.4	1,122.7	1,297.3	1,440.8	1,570.9	1,700.2	1,829.5	2,084.3	
Unit sale price (real terms)				-177.4	561.1	1,297.3	2,033.4					
Unit variable cost (real terms)					1,792.4	1,297.3	802.1	307.0	-189.7			
Fixed expences (real terms)			1,362.1	1,329.7	1,313.5	1,297.3	1,281.0	1,264.8	1,248.6	1,232.4		
Days for working capital	1,434.6	1,379.7	1,352.2	1,324.7	1,311.0	1,297.3	1,283.5	1,269.8	1,256.0	1,242.3	1,214.8	1,159.9

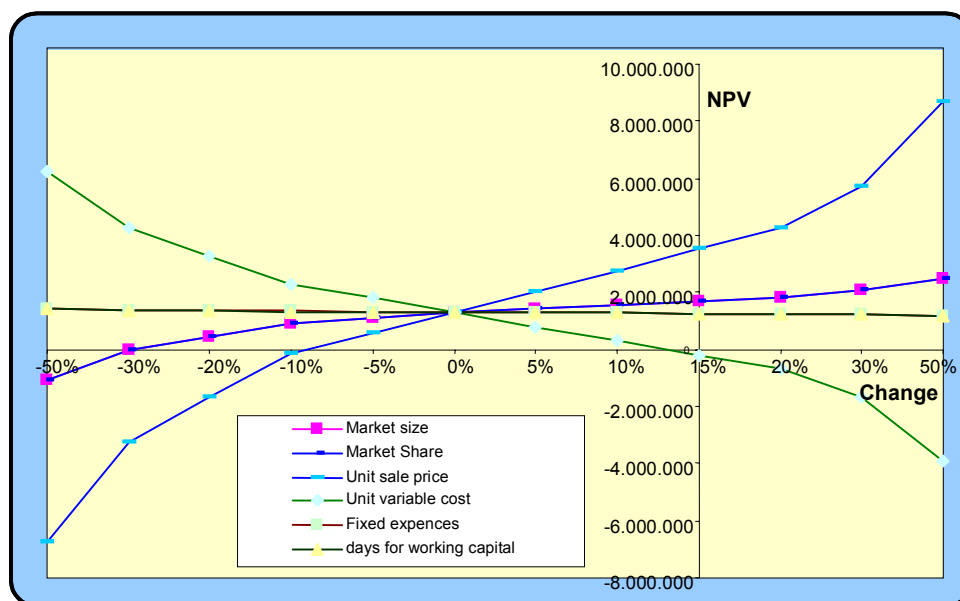


Figure 2. Sensitivity analysis - Change in NPV

It is easy to notice that the project is very sensitive to little changes for unit sale price, with a great variance of the results. A decrease for price of only 9% means negative NPV. This situation is possible to achieve, because the value is placed inside the interval of variation, which is (-10%, +5%). A negative NPV is also obtained for a fall of 30% in internal market size or in market share of the new firm. Treated independently, the two variables induce the same effect, because their product represents the quantity sold by the company. The value of 30% is even the inferior limit for market share interval (-30%, +30%), but is outside the interval for market size (-10%, +15%). Increasing the variable costs with at least 13% determines a negative NPV, but the value is situated outside the interval (-5%, +10%), even it is close enough to its superior limit.

To gather supplementary information about unknown variables (sold quantity, market share, unit sale price), the company considers the possibility to delay the investment decision, which means that investor owns a CALL real option, appraised in this section. The first step is to assess the elements from BS and binomial option pricing models. The value of the underlying asset is represented by discounted cash flows of 5,074.84 thousands USD and exercise price is the cost of implementing the project of 3,670 thousands USD (constant in real terms).

Time to maturity is strictly related with the period while investor can maintain the advantage of the first Romanian producer in this market consisting entirely of imports. As we mentioned before, the company does not exclusively own this option, because other investors

could be equally interested of such a project. As construction industry is growing, is expected that construction materials industry follow the same trend, so it is a great probability that new competitors entry on this expansive market. Using of top technology and high level of investment needed are significant barriers to entry in this industry, offering a supplementary advantage for investor. Therefore, under given circumstances, we appreciate that deferring the project with more than 3 years could drive to lose of preemption right.

Risk free rate is assimilated to the rate of return for government bonds with maturity in 3 years. Because the Public Finance Ministry in Romania did not issue any more US dollars denominated bonds, we use as a proxy the rate of return for treasury bills with maturity at 3 years, issued by United States Treasury (4.7% at the end of year 2006) plus the country risk premium for Romania. International rating agencies noted Romania, for government bonds denominated in a foreign currency with BBB (Fitch Ratings⁽⁴⁾, last modified in august 2006), Baa3 (Moody's⁽⁵⁾, improved in October 2006, from Ba1) and BBB- (Standard & Poor's⁽⁶⁾). USA rating is Aaa or AAA that is the greatest note for all agencies. Country default spread is zero for government bonds noted with Aaa and 2% (or 200 points) for Baa3⁽⁷⁾. In conclusion, for the binomial model we use an interest rate (a so-called risk free rate, composed of the two elements) of 6.7% (in discreet time), corresponding to a rate of 6.486% for BS model (in continuous time).

Volatility of the underlying asset is estimated from the distribution of probability of DCF from Monte Carlo

simulation (4,000 scenarios were included). For every rolling of simulation is generated the distribution of probability for NPV and the present value of free cash-flows PV(FCF). Rolling subsequently the simulation for many times, the average for natural logarithm of discounted free cash-flows - $E(\ln(PV(FCF)))$ is situated between 15.4 and 15.5, and standard deviation $\sigma(\ln(PV(FCF)))$ falls between 14.56 and 15.54. We could be tempted to use the maximum value for σ (the maximum level of risk), but we know that the greater the volatility of the underlying asset, the greater the value of CALL option. That is why we decide to use an average of the two values, which is $\sigma = 15\%$, corresponding to a dispersion $\sigma^2 = 0.0225$.

Because the financial flows generated by investment are not evenly distributed during the life of project, dividend yield is calculated with the following formula:

$$\text{Cost of delay} = \frac{(\text{PV of CF}_{\text{in the future}} - \text{PV of CF}_{\text{at the current moment}})}{\text{PV of CF}_{\text{at the current moment}}}$$

Present value of cash-flows (in the future) in the situation of deferring the project with one year is determined under some assumptions: the forecast for exogenous variables is extended with one year to 2017 (market size and unit sale prices remain the same in 2007, even the company doesn't invest, projected inflation rate is still 2%, and corporate income tax is unchanged 16%); for endogenous variables, strictly related to firm features and policies, the foreseeing is lagged with one year, the life of the project falls now between 2008 and 2017 (for instance, market share for the first year is again 25%, but it is applied now to another level for market size, so the quantity sold in the first year is different from the initial scenario). The variable expenses have the same weight, but they are computed from other values for turnover. Amortization has the same value in nominal terms, but the amortization process is also lagged with one year. We do not forget about losses recover procedure (needed for financial lose in the first year of operating) and investment in working capital when we recalculate the discounted cash flows. The result is $\text{PV of CF}_{\text{in the future}} = 4,563.55$ thousands USD and dividend yield = -10.075% (the sign indicates that this is a cost).

BS model for pricing the CALL option to delay this project leads to following results: $d_1 = 0.96296$ and $N(d_1) = 0.83222$, $d_2 = 0.70315$ and $N(d_2) = 0.75902$, so *CALL option price is 828.66 thousands USD*.

We can also use binomial model to asses the option, but value of the underlying asset changes this time only once per year, so $dt = 1$, the "up" factor $u = 1.2284$ and the "down" factor $d = 0.9101$. Investor may exercise the option

in each year until maturity (three years), which means that this is an American CALL option. Dividend yield diminishes the price of the underlying asset in each point of the binomial tree. For an example, a value of the underlying asset of 5,074.84 thousands USD become, after one year, $S(u - \ddot{a}) = 5,722.88$ or $S(d - \ddot{a}) = 4,107.09$ and so on (Figure 3).

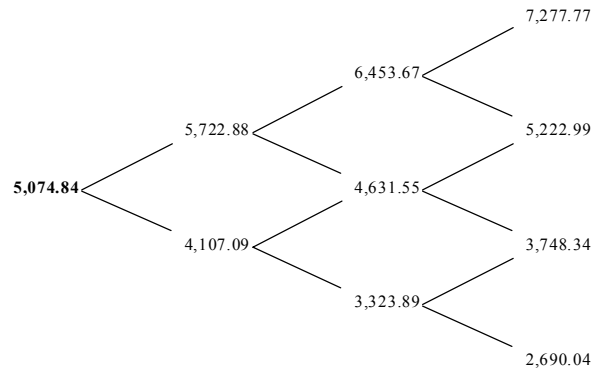


Figure 3. The binomial tree for the value of the underlying asset

$$\text{Risk neutral probabilities are } p = \frac{1 + r - d}{u - d} = 49.29\%$$

and $1-p = 50.71\%$.

Option pricing is done for every point of the binomial tree, starting with the third year and going backwards to the current moment of time. As an example, we picture the binomial tree for discrete time value of option to delay this project, in Figure 4.

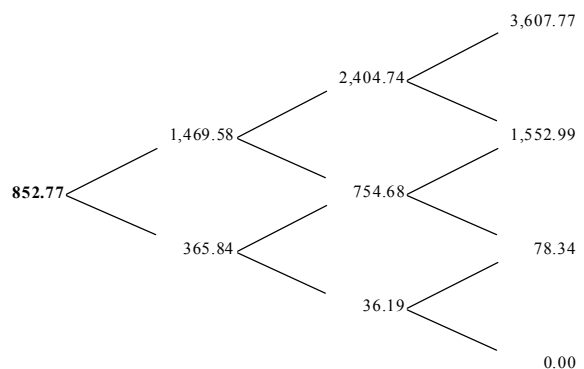


Figure 4. The binomial tree for the CALL option to delay the project

CALL option value from the binomial model is 852.77 thousands USD, bigger than the value obtained from BS model (828.66 thousands USD), because we divided the time until maturity in a very small number of periods (only three). We also built a tree with 12 periods (changing

the value of the underlying asset every trimester). Trimestrial rate of return is 1.68%, $u = 1.0726$ and $d = 0.9232$, risk neutral probabilities are $p = 0.6262$ and $1 - p = 0.3738$, and trimestrial dividend yield is 2.51875%. The value of CALL option is now 847.57 thousands USD, smaller than in the situation of annual change for the underlying asset, but still not so close to the value from BS model. Despite of this, unlike other securities traded continuously, the underlying asset for a real option is always represented by discreet value of DCF (usually, estimated once a year).

For pricing financial options, binomial tree is a reliable tool only if year is divided in a large number of periods. However, for real options, a binomial tree with annual change for price of the underlying asset is more appropriate than BS model. For this reason, we say that CALL option to delay the project has a maximum value of 852.77 thousands USD (representing 23.2% of capital investment), but could not be smaller than 828.66 thousands USD (which means 22.6% of project value).

Pricing the option to abandon the project

We can imagine scenarios for correlated evolution of variables from the free cash-flows model with negative NPV for the project. The possibility to abandon the project if one of these pessimistic scenarios occurs becomes valuable. Therefore, the investment has attached a PUT option to abandon.

The price of the underlying asset is again the present value of projected cash flows and that is 5,074.84 thousands USD. Exercise price is represented by the salvage value from the abandonment, estimated at the current moment of time by cumulating market values for land, buildings and technology (the value is fixed over time, in real terms). Experts of real estate industry appraise the market value of land to 360 thousands USD.

Buildings have a long life period (legal amortization period is 40 years) and we can take their production cost (440 thousands USD) as a proxy for the market value after 10 years (no matter that the book value decrease with every passed year). Because the company constructed the buildings itself, the production cost is, for sure, smaller than their market value. Experts estimate that market value is at least 660 thousands USD, with 50% bigger than accounting value.

Market value for equipments and installations is hard to asses, because it is an inflexible and specialized technology, and there is not an active second-hand market for this kind of equipment. That is why we consider (subjectively, of course) that our old technology worth at least 1.600 thousands, approximately half of the price for a similar new technology. Doing so, we do not risk overestimating the salvage value, because for a PUT option, the bigger the exercise price, the bigger the price of the option.

The time to maturity is thought to be 10 years, because investor may decide to abandon the project anytime during the exploitation period.

Risk free rate is equal to rate of return for treasury bonds with 10 years maturity (issued by US Treasury), which was 4.67% at the end of year 2006, plus country risk premium for Romania, estimated to 2%. The result is a discount rate of 6.67% for the binomial model (in discreet time) and 6.457% for BS model (in continuous time).

Volatility of the underlying asset is the same with dispersion obtained in Monte Carlo simulation $\sigma^2 = 0.0225$. The dividend yield is $\delta = 1/\text{the remained period from the life of the project} = 10\%$.

Pricing the PUT option to abandon the project with BS model generates the following results: $d_1 = 0.88401$ and $N(-d_1) = 0.18835$, $d_2 = 0.40966$ and $N(-d_2) = 0.34103$, and *PUT option value is 116.82 thousands USD*.

We also built a binomial tree for the underlying asset for 10 years, with $dt = 1$ (annual change for the discounted cash-flows of the project). The multiplying factors are $u = 1.2281$ and $d = 0.9098$. This PUT option is also an American option and it may be exercised anytime in the period of 10 years until maturity. Risk neutral probabilities are $p = 49.3\%$ and $1 - p = 50.7\%$. Option pricing is done by calculating its value in every single point of the tree, backwards from the tenth year to the current moment of time.

PUT option value from the binomial model is 142.5 thousands USD, bigger than the value obtained from BS model (116.82 thousands USD), for the same reasons reported before, for the option to delay the project. So we consider that PUT option to abandon the project has a maximum value of 142.5 thousands USD (representing 3.9% of capital investment), but could not be smaller than 116.82 thousands USD (which means 3.2% of project value).

Conclusions

The first conclusion is obvious: pricing real options associated with the investment of producing metallic tiles conduct the investor to recommendation of adopting the project. NPV was positive even before identifying and pricing the real options. Option to delay and option to abandon bring a supplementary value of 26% of invested capital, and represents an enhancement of approximately 75% for NPV, in comparison with situation when real options were ignored.

The option to delay the project has a significant value, because uncertainty associated with this investment is greater than investor thought it would be. Sensitivity analysis reveals that the project is extremely sensitive to changes in unit sale price and unit variable cost. On one hand, to postpone the investment decision is a valuable opportunity because new information arises while time passes. On the other hand, deferring the project exposes the company to potential competition. For such investments with multiple sources of uncertainty, the only solution is to undertake the project.

Option to abandon the project has a small price, because of the influence coming from the reduced value

for volatility (σ is only 15%) and from undervalued exercise price (these two elements diminish the price of a PUT option). If abandonment appears in the first two or three years, this value is certainly bigger.

The value for the underlying asset is taken from project appraisal in a certain environment, using the same discount rate of 18.5%. But real options embedded in a project reduce the risk of investment, and we must use a smaller discount rate, so the value for the underlying asset increases, which implies that the price of option to delay enhances, while the price of option to abandon decreases.

Real options are reliable tools for capital budgeting only if they are used for complex strategic projects. Real options are used rather to conceptualize projects than to appraise them, to change organizational structure in a company, needed to gather the maximum potential from a project.

In conclusion, using real options is more related with company management than with valuation methodology. Applying real options successfully assumes training the managerial team in real options spirit. Managers must detach from decisions adopted only with DCF or NPV and to be ready to renounce to a project if it is proven to be more efficiently that way.

Notes

- (1) Source: Mauboussin M., 1999, pp. 8 și Bruun S., P. Bason, 2001, „Essay One: What Are Real Options?”, pp. 5 (abordare preluată și adaptată din Timothy A. Luehrman, 1998, „Investment Opportunities as Real Options: Getting Started on the Numbers”, *Harvard Business Review*, July – August, pp. 51 – 58.
- (2) Damodaran A., 2002, Chapter 5: „Option Pricing Theory and Models” și Capitolul 28: „The Option to Delay and Valuation Implications”. A similar formula also in Richard A. Brealey and Stewart C. Myers, 1996, „Principles of Corporate Finance”,

Fifth Edition, The McGraw–Hill Companies Inc., New York, pp. 598, where $u = e^{\sigma \times \sqrt{dt}}$ și $d = e^{-\sigma \times \sqrt{dt}}$, and $d = 1/u$.

- (3) See Damodaran A., 2002, Chapter 29: „The Option to Expand and Abandon: Valuation Implications”
- (4) Source: www.fitchratings.com, Fitch Ratings Ltd., New York
- (5) Source: www.moodys.com, Moody’s Investors Service
- (6) Source: www.standardandpoors.com, Standard & Poor’s, The McGraw–Hill Companies, New York
- (7) Source: www.sjsu.edu/faculty/watkins/countryrisk, according the data given by Moody’s

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