The methodological predicament

"For the space of economic rationality to function, all individuals must do different things at different times, as must do all the markets and all the economies."

The differentiation of goals and intentions constitutes the basis of economicity. As such, the strong argument which turns methodological individualism into a principle supports the context of the double differentiation on intentions and on goals. Without this differentiation the meaning of the term "individual" becomes a non-sense. Furthermore, the free choice of objectives and of the means for reaching them is the only formula in which individual interest is treated in a non-conflictual manner, as long as free choice is independent in space and time and not treated as part of a group.

However, despite the pretence of universal consistency, the level of discrete diversity – as an expression of the principle of methodological individualism – adds in part to the economic phenomenology. The level which explicitly certifies the functioning of the principle is the microeconomic one. Only at this level the principle operates with a discrete nature; here the parts matter from an actional standpoint because they are the ones creating the rules. The macroeconomic level is configured as a trans-individual reality – a sort of organically fused diversity. At the level the economicity is validated through a reality of a complex consistency, where the whole commands the prevalent functions.

The discrete and discretionary cellular behaviour from the microeconomic level (the result of the gnoseological super-focusing on the individual) cannot realize an inversion towards the organic, complex and cooperative behaviour of the macroeconomic level. At this top level the cognitive relevance of the principle of methodological individualism is dissolved. At the macro level lays the complexity, which is structured on the different principle of methodological sociality. This principle provides cognition with the argumentative platform for describing the sense of the complex reality. It does this by highlighting the spatial and temporal co-relations, the weave of social context and the inter-subjective basis of the human nature. Starting from this methodological principle, Macroeconomics deciphers the interaction between the various intentions and individual objectives.

A fixation with an extra-scientific cause refuses this principle's right of citizenship. Thus, Macroeconomics is asked to remain a vassal to the empire of Microeconomy's specific determinism. The direct consequence of this is the cancelling of the normative, cooperative and distributive functions specific to this side of economic reality. Thus, focusing the analyses on the flavour of individualism with excluding functions paints Macroeconomics as the sum of microeconomic phenomena. The whole is being mechanically conceived as a sum of parts.

In fact, Macroeconomics is a whole catalysed by the social substance of the human individual, by the economic values of intersubjectivity. The reality of the macroeconomic whole exceeds the addition of the functional components, as it has functions which are not only complex, but also completely different in their finality. The cohesion of the whole enforces the preservation of the relationships of prevalence and pre-eminence over everything which justifies the performance of the parts. For instance, the macroeconomic dimension of competitiveness sees microeconomic competition as one of its elements and it will never limit itself to that level. The potential of the economy is a problem formulated in social terms, and its solutions eminently pertain to the nature of consensualized – and thus socialized – discernment.

When changing the horizon and the altitude of the analysis, Economics must avoid methodological inconsistency. This epistemic imperative has been deposited in a rarely encountered principle: what is valid at the microeconomic level is invalid at the macroeconomic level. When it comes to behaviours, inconsistency is evident: for the space of economic rationality to function, all individuals must do different things at different times, as must do all the markets and all the economies.

The paradoxical mechanics of configuring the goals and intentions reveals the epistemological inconsistency of the explicative model of Economics. It may be that the exit from this conundrum could be achieved by understanding the complete fracture in the sense of goals and intentions, suggested by the substantiation of the complexity and of the differentiation on micro and macroeconomic levels. There is a contention of intentions and a dispersion of goals at the micro level, while ate the macro level intentions concentrate and goals integrate. The principle of methodological individualism explains the functional diversity of economic nature, while the principle of methodological sociality explains the diversity of actional contexts which are incorporated into the human nature.

The concordant states of intentions and goals are opposites which exceed the functionality; they are abnormal and become extreme anomalies. They are intelligible only in terms of human nature. Cumulatively, in a macroeconomic sense, they take the form of irrational exuberance, while in a microeconomic differential sense they signify panic. The anomalies on both sides aggressively cancel out the state of economic rationality, by exaggerating the intentions at the macroeconomic level and by failing the goals at the microeconomic level.

The behavioural limits given by irrational exuberance and by panic expose the truth that human nature is the context which substantiates economic nature. The two methodological principles are not replaceable but with the risk of altering cognition. They share part-to-whole relationships of explicative complementarity. Configuring the domains of human existence in contexts limited by the rule of the epistemological arrow which travels from the simple to the complex is a vision which is also valid for the principial microeconomy-macroeconomy coupling, which is in fact the coupling between the individual and the social.

Marin Dinu

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Increase of company performances and shareholders' satisfaction by using design for adaptability (DFA)

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Abstract. *The article handles the increase in performances of an electrical appliances company and in the satisfaction degree of its shareholders by using the design for adaptability method. A strategic decision is based on the quality of accounting information provided by the company's management. The design for adaptability method and the target costing method highlight the importance of the reliability of accounting information provided by both of them for the solid foundation of strategic decisions taken by the company's management. In the current domestic and global economy, in order to guarantee correct decisions, management turns their attention to a multi-dimensional analysis of used information, which will ensure a number of long-term advantages. The article closes with the authors' conclusions on the importance of obtaining accurate accounting information and substantiation of final decisions taken by managers and shareholders, by obtaining superior performances by means of the design for adaptability and target costing methods.*

Keywords: design for adaptability, target costing, management accounting, performance, shareholders.

JEL Classification: M41, M21.
REL Classification: 14I.

1. Introduction

The article highlights the importance of using the design for adaptability method (DFA) for underlining the increased performances of a company and the use of obtained information for substantiating the decisions of managers or heads of departments. The preparation of clear reporting statements provides an alike clear image to the company's shareholders, who can thus create a niche for penetrating certain markets, both among civil and industrial consumers. The aim of this study is to highlight the advantages of applying the design for adaptability method (DFA) to increase the company's performances and the satisfaction of its shareholders in terms of information and financials. The article tries to show from both theoretical and methodological standpoints the way how information obtained by means of DFA and TC methods help the company's specialists, accountants, heads of departments or managers to understand the consistency and requirement of using multi-dimensional databases for substantiating decisions, which ultimately influences the increase of the company's performances.

2. Literature review

Target Costing has been the subject of many specialists, research institutes (Institute of Management Accounting) or consortia (Consortium for Advanced Manufacturing-International) worldwide. Their results were discussed at numerous conferences and workshops, and published in specialised literature. They show the actual usefulness of Target Costing for continuous decrease of the costs of products or lines of products. Since the emergence of the target cost concept at Volkswagen (Germany) and Marks-Spencer (Great Britain) in the 1930's, there was significant progress on the method's systematic application and development at Toyota in Japan, in the 1960's. Expansion from the Asian continent to the European and American ones only occurs in the 1980's, and starting with 2000, the method is more intensely studied on the West-European segment, where the contribution of several specialists is noted (Dekker and Smidt, 2003). In terms of analysing the factors for implementing or not implementing the Target Costing method (competition intensity, industrial affiliation, uncertainty degree in business environment or strategy perceived by managers), there is a number of studies conducted by experts in this field (Ansari and Bell, 1997; Dekker and Smidt, 2003; Hibbets et al., 2003). The results of West-European studies have shown that adoption of Target Costing is related to competition intensity, and not adopting it is related to perception degree in an uncertain environment (Dekker and Smidt, 2003). East-European results have shown that the most solid argument for adopting Target Costing is based on forecasts of clients' requirements and competitors' market behaviour (Briciu and Căpuşneanu, 2013).

The most negative argument for not adopting Target Costing is based on rigid targets identified in the forecasts on clients' requirements and perception degree in an uncertain environment, which suggests for the method to be used only as a tool for maintaining competitiveness. Institute of Management Accounting advises companies that Target Costing may be applied for new products, including those undergoing changes in assortment and range. When sufficiently motivated, a company may change its production technique, which can lead to different production costs and profitability. If some managers believe that primary change is only possible during the manufacturing process, companies could lose significant strategic opportunities. In fact, Target Costing can contribute to the planned change of the product, by using the design for adaptability method.

According to experts, design for adaptability is a new method for designing a manufacturing line or a finished product, which states that the decrease of a system's value is due to the increase of stakeholders' needs and desires, but also to its adaptation capabilities in relation to real options available to the company. Based on this definition, several paradigms were developed with a focus on improving the features of a product right from the design phase (Boothroyd, 1983). Most studies conducted by experts argue that the design determines the features of a product, and the decision taken in the design stage is essential (Ulmann, 1992; Boothyard, 1994; Kushnir and Sheehan, 2003; Simpson, 1998; Condoor, 1999). In order to check the method's reliability, a number of tests were conducted, from both a theoretical standpoint, by means of the academia environment, and an empirical standpoint, by means of the industrial environment. From a theoretical standpoint, the results were not surprising. These have not revealed great achievements applicable in practice (Tate, 1995). Practical tests have shown significant achievements and led to the split of product development into two sub-processes: design and product/production (Reich, 1992; Cross, 1980). Design adaptability gains a new form and a new meaning, which was already evident for most experts. Thus, DFA is used for changing an existing design and for adapting it to clients' new requirements. In other words, a product is reconfigured based on its components, starting from the existing ones and by their partial or total replacement (Gu et al., 2009). The replacement of a manufacturing line or product should meet the needs of stakeholders for a longer period of time, but should also provide the possibility of rapidly adapting to market conditions and shareholders' preferences.

3. Research methodology

3.1. Instrumentation. Data analysis

This study is based on a qualitative research because it involves an interpretative approach of the subject, it is subjective and describes in detail some relevant aspects based on specialised literature. The paper goes rather in depth, being focused on the benefits of using the design for adaptability and target costing methods within companies manufacturing appliances in Romania. The research is intensive and it aims at discovering the peculiarities of using design for adaptability for companies in this field. In order to achieve our goals, we will verify two assumptions:

I1. Does the DFA method increase the performances of appliances companies in Romania?

I2. Are the information provided by the DFA method reliable and do they meet the informational needs of managers and shareholders?

For our scientific approach, we used as research tools the analysis (information evaluation, recognition of main ideas and concepts, establishing relationships between them) and synthesis (focused consistent and easily accessible presentation of information on the studied subject). For achieving our objectives, respectively to discover the benefits of using DFA for designing a production line and how this method and the Target Costing method influence the increase of the company's performances, the research also involved the preparation of a complex case study within a Romanian appliances manufacturing company.

Our study is based on a questionnaire with two questions based on identifying the main objectives pursued for evaluating the results. Questionnaires were sent to 42 respondents in a Romanian appliances manufacturing company. Respondents were divided into three main categories: management (8 persons), department specialists (25 persons) and shareholders (9). After collecting the questionnaires, data review, and validation, the situation was as presented in Table 1:

Table 1. *Categories of respondents*

Questions	Answers per categories of respondents					
	Management		Department specialists		Shareholders	
	Yes	No	Yes	No	Yes	No
1. Do you believe that the design for adaptability and target costing methods can contribute to increased company's performances?	5	3	18	7	6	3
2. Do the design for adaptability and target costing methods provide reliable information for all categories of users (managers, heads of departments, shareholders)?	6	2	22	3	8	1

In terms of graphics, the situation is presented in Figure 1:

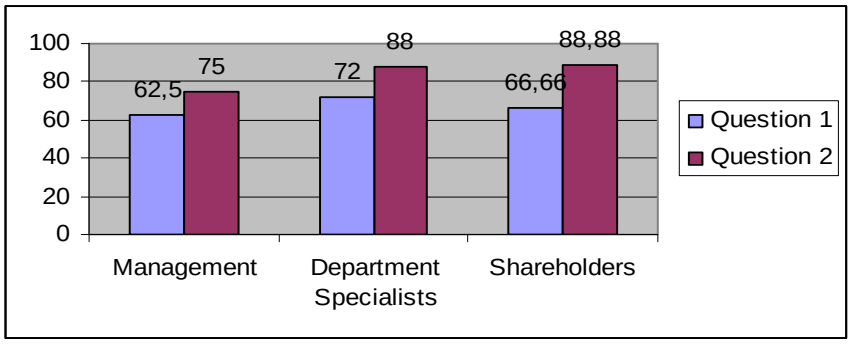

Figure 1. *Graphical representation of the weight of positive answers of the three categories of respondents*

As you can notice, most of the three questioned categories are in favour of using the design for adaptability method in order to increase the performances of an appliances manufacturing company.

3.2. Product life cycle analysis based on Target Costing

The company's management must know the life cycle of manufactured goods, in order to be able to take the most appropriate decisions for ensuring continuous production of a certain product, as long as sales fully cover the costs and profit is made. The variety of goods obtained in the production process moves at different speeds within the cycle, and speeds can also vary within a category of goods. It is well-known that generally products go through several stages in a particular market during their life, as follows:

1) *Launch* (the product is launched on the market and sales slightly increase);
2) *Increase* (the product is accepted and enters the market, rapid increase in sales);
3) *Maturity* (sales increase slow down);
4) *Stagnation* (sales reach a peak and are stable);
5) *Decline* (product demand decreases and sales also decrease accordingly).

Although it has little practical value for many basic goods, the concept of *life cycle* is applicable for most industrial and consumer goods. For establishing the research programmes it is necessary to know at what stage the product is at a certain time. Profitability tends to decrease sooner and faster than sales. When statistics show that sales of a product decreased over a period of time or even stopped this may indicate that the product has reached its maturity or decline stage, and no longer has prospects on that market. This does not mean that the respective market should be eliminated, but a „new product" must be created,

which can begin a new life cycle. Often products get a new life cycle by means of some basic changes or presentation form.

There is a big difference between the price paid by the final consumer (user) and producer's price. Market prices are based on supply and demand, and therefore producers pay special attention to actual costs of obtained products, which compared to sales prices show the efficiency or inefficiency of activities and competitiveness level. According to production companies, the price paid by final consumers is also influenced by other factors besides supply and demand, such as: full commercial costs and marketing costs. Full commercial costs influence the price paid by consumers.

3.3. Multi-dimensional analysis of data based on DFA and TC methods

One of the key objectives of a modern management accounting system is to provide managers and employees knowledge of their company's economic structure and costs, and to encourage them to ask profound questions on the behaviours of their company's costs. Under current circumstances, the combination of DFA and Target Costing methods provides transparency in product design and increased visibility on a certain target segment, and also contributes to determining costs. As companies put more emphasis on learning and discovering, managers and employees will be encouraged to explore more unanswered questions than by means of traditional and standards reports (which to not provide answers fast enough).

The multi-dimensional analysis allows visualization of same costs on several categories, such as: goods, clients, distribution channels (e.g.: wholesale, retail), sales regions, sales types (e.g.: marketing, standard, special) etc. Multi-dimensional reporting allows final users to separate, mix, sort, predict, pivot and aggregate data on organisational structures. Commercial multi-dimensional software can turn to minutes the one-day analysis efforts of employers used to work with month-end standard reports. This allows them to interactively explore and analyse company costs at entity and cost drivers levels. For the first time, managers can truly understand what it means to actually manage a business. In the future, integrated software will be designed for occasional users, and business analysis will expand from professional analysts to all managers and employees with computerized workstations and laptops connected to a network. Instead of few analysts who spend all their time analysing and trying to communicate findings, all managers will spend part of their time navigating and analysing data by means of multi-dimensional software. They will navigate intuitively with the DFA and TC data system that matches their mental model in the chain of activities and flow of internal and external costs of the accumulated supply chain.

3.4. Complexity of information related to management decisions

Decision-making is an action that occurs at all company levels, covering both short-term and long-term perspectives. Plans are activated by decisions, and for a significant number of decisions it is required to have the contribution of a financial or quantitative analysis for reaching rational conclusions, as the case may be. The fundamentals of decision-making are critical in determining what accountants should provide for substantiating a decision. Although accountants are familiar with the entire decision-making process, their most important contribution consists in performing quantitative analogies between existing alternatives, thus providing decision-makers with relevant and financially documented information for ultimately taking optimal decisions. An important factor for decision-making is managers' attitude to risk. The role of accountants is to provide information required for making decisions that reflect the effects of risks and uncertainty and the most likely level of results. With information centralised by means of software, accountants can provide an overview of what is pursued through the company's objectives.

3.5. Case study

A company that annually manufactures product *A* wishes to improve this product by re-designing certain functional elements and is on the point to launch it on the market under the name *Super A*. Estimates of the company's design specialists show that the new product will have a lifetime of three years in three stages: *launch*, *increase* and *maturity*. The company considers a functional decomposition based on product analysis, by taking into account the client's repeated needs. The situation of production capacities, estimated selling prices, and targeted profit margins are presented in Table 2:

Table 2. *Situation of analysed factors during the three stages*

Explanation	**Stage 1** *Launch*	**Stage 2** *Increase*	**Stage 3** *Maturity*
Estimated quantity	5000	7000	8000
Target selling price per unit	200	150	100
Target profit margin	15	9	5
Target cost per unit	185	141	95
Target turnover	1000000	1050000	800000
Target profit margin	75000	63000	40000
Target cost	925000	987000	760000
Weight of profit margin in turnover	7.5%	6%	5%
Weight of target cost in turnover	92.5%	94%	95%

Target costs per unit for each cost element and stage, as well as their weight in the cost of products is presented in Table 3:

Table 3. *Situation of target costs per unit for each component and stage*

Cost components	Weight in product costs	Target costs per unit for each component and stage (lei/pc.)		
		Stage 1 Launch	*Stage 2 Increase*	*Stage 3 Maturity*
Raw materials	20%	18.5	18.8	19
Direct salaries	10%	9.25	9.4	9.5
Maintenance	25%	23.125	23.5	23.75
Assembling	20%	18.5	18.8	19
Plots management	15%	13.875	14.1	14.25
Advertising	10%	9.25	9.4	9.5
Total	**100%**	**92.5**	**94**	**95**

Actual costs incurred over the three years are as follows: 107.5 lei, 109 lei, and 100 lei. The company's management wants to present the evolution of target costs for *Super Alpha* over the three stages, and to perform value engineering for reducing costs in each stage. The company's management requires such information for taking correct and well-grounded decisions, which will impact production policies, competition policies and estimates on future benefits. The company uses Target Costing for presenting the evolution of target costs, and for the changes in product design they will use the design for adaptability method (DFA). Based on the data disclosed above, the situation over the three years is presented in Table 4:

Table 4. *Target costs per costs and stages*

Cost components	Weight in product costs	Target costs per cost components and stages (lei)		
		Stage 1 Launch	*Stage 2 Increase*	*Stage 3 Maturity*
Raw materials	20%	92500	131600	152000
Direct salaries	10%	46250	65800	76000
Maintenance	25%	115625	164500	190000
Assembling	20%	92500	131600	152000
Plots management	15%	69375	98700	114000
Advertising	10%	46250	65800	76000
Total	100%	**462500**	**658000**	**760000**

Deviations determined based on comparing actual costs (per unit and total) with target costs (per unit and total) for each stage are presented in Table 5:

Table 5. *Deviations per stages*

Cost components	*Stage 1 Launch*					
	Actual costs		**Target costs**		**Deviations**	
	per unit	**total**	**per unit**	**total**	**per unit**	**total**
Raw materials	21.5	107500	18.5	92500	3	15000
Direct salaries	10.75	53750	9.25	46250	1.5	7500
Maintenance	26.875	134375	23.125	115625	3.75	18750
Assembling	21.5	107500	18.5	92500	3	15000
Plots management	16.125	80625	13.875	69375	2.25	11250

Cost components	*Stage 1 Launch*					
	Actual costs		**Target costs**		**Deviations**	
	per unit	**total**	**per unit**	**total**	**per unit**	**total**
Advertising	10.75	53750	9.25	46250	1.5	7500
Total	**107.5**	**537500**	**92.5**	**462500**	**15**	**75000**
Cost components	*Stage 2 Increase*					
	Actual costs		Target costs		Deviations	
	per unit	total	per unit	total	per unit	total
Raw materials	21.8	152600	18,8	131600	3	21000
Direct salaries	10.9	76300	9.4	65800	1.5	10500
Maintenance	27.25	190750	23,5	164500	3.75	26250
Assembling	21.8	152600	18,8	131600	3	21000
Plots management	16.35	114450	14.1	98700	2.25	15750
Advertising	10.9	76300	9.4	65800	1.5	10500
Total	**109**	**763000**	**94**	**658000**	**15**	**105000**
Cost components	*Stage 3 Maturity*					
	Actual costs		Target costs		Deviations	
	per unit	total	per unit	total	per unit	total
Raw materials	20	160000	19	152000	1	8000
Direct salaries	10	80000	9.5	76000	0.5	4000
Maintenance	25	200000	23.75	190000	1.25	10000
Assembling	20	160000	19	152000	1	8000
Plots management	15	120000	14.25	114000	0.75	6000
Advertising	10	80000	9.5	76000	0.5	4000
Total	**100**	**800000**	**95**	**760000**	**5**	**40000**

Based on consultations with clients, the company decides to reduce cost components. The company's specialists have used design for adaptability and redesigned product A by eliminating some small components. The new target price will be the old actual cost of the product, and the adjustments of new actual costs over the three stages are presented in Tables 6.1, 6.2 and 6.3.

Table 6.1. *Deviations in stage 1*

Cost components	*Stage 1 Launch*					
	New actual cost		**New target cost**		**Deviations**	
	per unit	**total**	**per unit**	**total**	**per unit**	**total**
Raw materials	22.5	112500	19.8875	99437.5	2.6125	13062.5
Direct salaries	11.25	56250	9.94375	49718.75	1.30625	6531.25
Maintenance	28	140000	24.859375	124296.875	3140625	15703.125
Assembling	20	100000	19.8875	99437.5	0.1125	562.5
Plots management	12	60000	14.915625	74578.125	-2.91563	-14578.125
Advertising	9	45000	9.94375	49718.75	-0.94375	-4718.75
Total	102.75	513750	99.4375	497187.5	3.3125	16562.5

Table 6.2. *Deviations in stage 2*

Cost components	*Stage 2 Increase*					
	New actual cost		New target cost		Deviations	
	per unit	total	per unit	total	per unit	total
Raw materials	21.8	152600	20.492	143444	1.308	9156
Direct salaries	10.9	76300	10.246	71722	0.654	4578
Maintenance	26	182000	25.615	179305	0.385	2695
Assembling	20	140000	20.492	143444	-0.492	-3444
Plots management	15	105000	15.369	107583	-0.369	-2583
Advertising	9	63000	10.246	71722	-1.246	-8722
Total	102.7	718900	102.46	717220	0.24	1680

Table 6.3. *Deviations in stage 3*

Cost components	*Stage 3 Maturity*					
	New actual cost		New target cost		Deviations	
	per unit	total	per unit	total	per unit	total
Raw materials	21	168000	19	152000	2	16000
Direct salaries	10.5	84000	9.5	76000	1	8000
Maintenance	24	192000	23.75	190000	0.25	2000
Assembling	19	152000	19	152000	0	0
Plots management	12	96000	14.25	114000	-2.25	-18000
Advertising	9	72000	9.5	76000	-0.5	-4000
Total	95.5	764000	95	760000	0.5	4000

The situation of results obtained per product over the three years is presented in Table 7.

Table 7. *Results obtained by using DFA and Target Costing*

Explanations	*Stage 1 Launch*	*Stage 2 Increase*	*Stage 3 Maturity*
1. Turnover	537500	763000	800000
Consumption of raw materials	99437.50	143444	152000
Cost of direct salaries + related costs	49718.75	71722	76000
2. Direct costs – total	149156.25	215166	228000
3. Margin per direct costs (1 - 2)	388343.75	547834	572000
Consumed activities			
- machine maintenance	124296,875	179305	190000
- assembling	99437.500	143444	152000
- plots management	74578.125	107583	114000
- advertising	49718.750	71722	76000
4. Total costs per activities	348031.25	502054	532000
5. Total costs (2+4)	497187.50	717220	760000
6. Contributory margin (3 - 4) % of turnover	40312.50 7.5%	45780 6%	40000 5%

3.6. Data interpretation

Based on the analysis of product evolution over the three stages, the findings are as follows:

1) In the first stage (launch), target costs are of 497187.50 lei, calculated by taking into account clients' recommendations (using DFA) to reduce product costs, and the contributory margin stands at 7.5% of the new target turnover. In stage 2 (increase), target costs are of 717220 lei, calculated by applying the Kaizen Costing technique, and the contributory margin stands at 6% of the target turnover. In stage 3 (maturity), target costs are of 760000 lei, and the contributory margin stands at 5% of the target turnover. In conclusion, the company meets its contributory profit margin in each product development stage, but considering the cost reduction requested by clients, the obtained profits are reduced in the first two stages, while in stage 3 profits correspond to those set in the forecast stage.

2) By applying the principles of Target Costing and Kaizen Costing methods, the company is able to be efficient, which is also highlighted by the fact that costs are covered from total revenues, and there are profits in each stage of the product's life cycle.

4. General conclusions

The complexity of data provided by the combined system - Design for Adaptability (DFA)/Target Costing (TC) – leads to a set of synthesis documents that help managers or shareholders to focus on several aspects, some of which being immaterial at first glance. Thus, managers or shareholders shall be informed on the context and alternatives, and capable to take optimal decisions based on the company's strategy for achieving its objectives. The multi-dimensional analysis of obtained data can be used at any time, both in the prediction stage and in the current stage, or whenever required in the simulation stage, based on the requests of information users (department specialists, managers or shareholders). We believe that only information obtained accurately by using DFA and TC, and their weight lead to correct substantiation of managers'/shareholders' decisions, and consequently, to an effective management by increasing performances and shareholders' satisfaction.

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Forecasting crude oil market volatility in the context of economic slowdown in emerging markets

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Abstract. *Crude Oil is a commodity with huge strategic importance to all countries in the world. But in the recent years, the oil market as well as all commodities market has crossed an intense period of changes due to a volatile international economic context. After a decade of rapid economic growth rates, China and the other emerging markets are slowing down. After a harsh and unpredictable crisis, the financial and commodity regulation has changed; the uncertainty and distrust have increased, and, implicitly, the prices volatility in financial and commodity markets has also increased. In this paper we empirically investigated the crude oil market price behaviour and proposed an econometrical GARCH model (Engle, 1982; Bollerslev, 1986) to forecast the volatility of this market. Our research questions are how crude oil price volatility has changed in the recent years? In order to answer to this question we developed an empirical analysis using daily future one month quotation of Brent, Dubai and WTI crude oil over the last three years. These quotations were extracted from Thomson-Reuters Database. Our results suggest a relatively small volatility in crude oil market on a short run with a price fluctuation around the level of 110 USD/barrel for Brent crude oil. Moreover, our final conclusion is that: the economic slowdown in emerging markets, but also the new regulations in commodity markets represent new challenges for economists and researchers, and ask for structural reforms to adjust to new context.*

Keywords: crude oil market, commodity market, price behaviour forecast volatility, GARCH models.

JEL Classification: L71.
REL Classification: 15F.

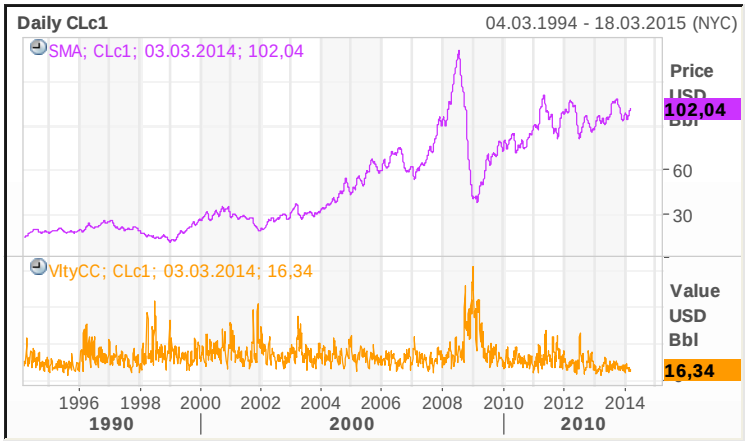
1. Brief introduction and the importance of crude oil market

Crude Oil is a commodity with huge strategic *importance* to all countries in the *world.* "Oil is an essential scarce resource, and there are still no cost effective alternatives to oil for producing vehicle fuels like petrol and diesel" (US Congressional Research Service, 2009).

Crude oil (or unrefined petroleum) is one of the most important natural resource of the industrialized countries. Since the 1850s, it can be refined to produce various derivate products such as gasoline, diesel and different forms of petrochemicals. Its components are used to manufacture almost all chemical products, such as plastics, detergents, paints, and even medicines (Wintershall, 2014).

It is widely accepted that there is a strong relationship between crude oil prices and global economic activity and crude oil is the most demanded commodity in the world. Oil industry concentrates more capital than any other industry. *The increasing prices and large volatilities observed in the last several years in oil market price are in strong relationship with the key role of oil for global economy, but also with the evolution of financial and commodity markets.*

Figure 1. *Crude oil price and volatility dynamics*



Source: Reuters, 2014.

Starting from all above mentioned things, the forecasting the future oil prices and volatilities in this market, but also the management of risks associated with these prices became crucial for governments, companies and researchers in several different aspects.

As we can observed crude oil reached historical peak prices (for instance, price reached 140,60 USD/Bbl for the 15th of July, 2008) and that mainly reflects increased crude oil demand as a result of strong global economic growth (this growth coming specially from the part of China, but also other emerging

countries: Russia, India, Brasil). *As we can see, during the last 20 years, crude oil prices have presented an upward trend and large volatilities.*

This upward trend is strong and directly related to the increasing demand coming from China economic boom, but also from other emerging economies (Brasil, Russia or India). Furthermore, the increasing volatility is the result of uncertainty regarding the strength of recovery of the economy after the financial and economic crisis of 2007-2009. More than that the mistrust related to other factors such as, the increased role of complex financial products, emerging trends in bio-fuel production and new legislation in financial and commodity markets, also has contributed to the high volatility record during the last 20 years.

2. Literature review

Although the interest regarding the study of oil price behaviour and the impact on global economy is not new, in the last decade the literature in this field has been booming based on researchers and practitioners activity.

Since crude oil is a commodity with huge strategic importance to all countries, there is a large consensus that higher oil prices and volatilities impact global economic growth and financial markets (Hamilton, 2009). Moreover the behaviour of crude oil price has sparked interest of many practitioners and researchers among which we have drawn from their works: Lynch (2002), Kaufmann et al. (2004), Merino and Ortiz (2005), Moebert (2007), Hamilton (2008), Aguilera et al. (2009), Kilian (2008), Basher et al. (2010), Elder and Serletis (2010), Richmond et al. (2013).

As we know well enough the oil market is organized and operates as an oligopolistic market (Dees et al., 2003; Mileva and Siegfried, 2012). Even if for oil producers, the long-term marginal cost is a small fraction of the price of oil (Adelman (1993), the prices in the market are quite high compared to the production costs. In order to maintain high price levels in the market, the excess supply is restricted by a cartel. How the market works?

"The higher cost producers sell all they can produce, while low-cost producers satisfy the remainder of the demand at current prices and cut back production if needed" (Mileva and Siegfried, 2012). The low-cost suppliers are especially Arabian countries. Their asymmetric behaviour is also proved by several empirical analyses, among De Santis (2000), who proves in his analysis that, in order to maintain high prices in oil market, Saudi Arabia restricts production as an answer to a negative demand shocks, but does not increase production in the case of positive demand shocks. Furthermore, as indicated by Cooper (2003), also we

have to emphasis the inelastic demand character of crude oil related to price changes.

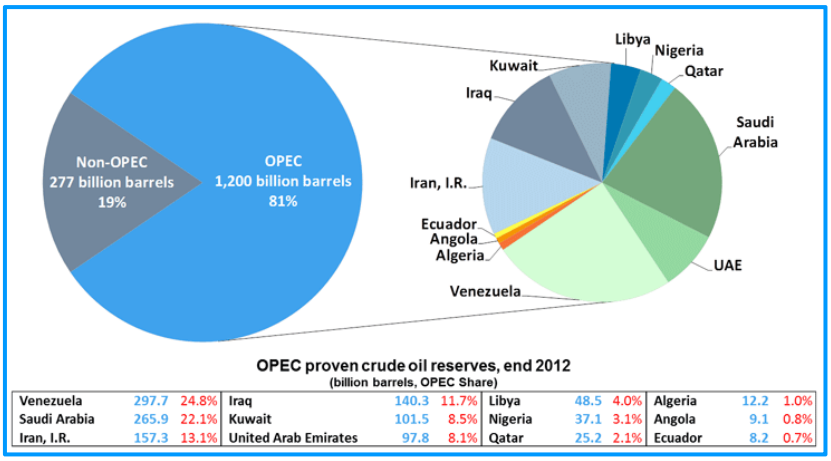
Crude oil market price is the result of direct meeting between demand and supply and traditional fundamentals (world energy use, world production capacity and production supply, crude oil reserves) remains the key drivers for this commodity price (figures related to the evolution of crude oil fundamentals are presented in the Annex).

We have also to emphasise the need to take into consideration other new factors, considered so important for the price behaviour in commodities market: growing commodity demand from emerging countries, financial crisis and the uncertainty regarding the strength of recovery, emerging trends in bio-fuel production, and commodity market financialization.

Moreover we want to emphasis the OPEC (Organization of Petroleum Exporting Countries) key role in global oil market and the impact on global oil demand and supply. We do not intend to present into details the evolution of global oil market, but have to underline that one significant point in the history of this market is the represented by the creation of OPEC(1) in 1960 in Baghdad.

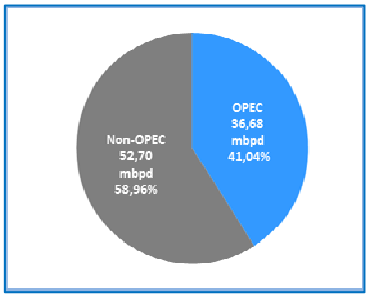
OPEC is considered the most important player in the oil market. Its importance and power come from the high level of oil reserves and exports. For instance, the OPEC oil reserves volume is more than 1000 million barrels and the oil supply around 35 million barrels per day. As we can see, in the bellow chart, for 2012, the average annual oil reserve stood up the value of 1200 billion barrels and the supply recorded in average the value of 36.68 million barrels per day representing 41.04 % of the world oil production.

Figure 2. *OPEC share of world crude oil reserves 2012*



Source: OPEC Annual Statistical Buletin, 2013.

Figure 3. *OPEC share of world crude oil supply* 2012



Source: Reuters, 2014.

The following two tables present the world oil supply and demand evolution during the period 2008-2013 and prevision for 2014-2015. In term of supply OPEC remains one of the main actors in the crude oil market, even if we can remark a slightly decreasing trend as percentage of global oil supply:

Table 1. *World oil supply evolution*

Actuals (mbpd)	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
OECD Supply								
Total OECD	21,02	21,10	21,47	21,62	22,54	23,74	*25,02*	*26,10*
As % of World Supply	24,62	25,01	24,64	24,67	25,22	26,40	*27,29*	*28,05*
Non-OECD Supply								
Total Non-OECD	64,33	63,24	65,67	66,01	66,84	66,20	*66,66*	*66,95*
As % of World Supply	75,38	74,98	75,36	75,33	74,78	73,60	*72,71*	*71,95*
Total World Supply	85,35	84,34	87,14	87,63	89,38	89,94	*91,68*	*93,04*
OPEC Supply								
Total OPEC	35,48	33,87	35,11	35,37	36,68	35,87	*35,73*	*35,59*
As % of World Supply	41,57	40,16	40,29	40,36	41,04	39,89	*38,97*	*38,25*
Non-OPEC Supply								
Total Non-OPEC Supply	49.87	50.47	52.03	52.25	52.70	54.07	*55.95*	*57.46*
As % of World Supply	58.43	59.84	59.71	59.63	58.96	60.12	*61.03*	*61.75*

Source: Thomson Reuters Database, 2014.

Regarding the demand part, most of energy analysts and economists agree that world oil demand will continue to increase in the next years – probably at a much faster rhythm than experienced in the last 20 years, even if after a decade of torrid growth, emerging markets are slowing down, and implicitly the demand coming from these countries is declining. As we can see from the below table the total global demand (expressed in millions barrels per day) has been increased from year to year (these trend comes from non-OECD[(2)] countries specially).

Table 2. *World oil demand evolution*

Actuals (mbpd)	2008	2009	2010	2011	2012	2013	2014	2015
OECD Demand								
Total OECD	47,66	46,37	47,02	46,40	45,91	46,02	*46,01*	*46,03*
As % of World Demand	55,70	54,70	53,79	52,39	51,49	50,94	*50,22*	*49,50*
Non-OECD Demand								
Total Non-OECD	37,91	38,41	40,39	42,16	43,26	44,33	*45,61*	*46,96*
As % of World Demand	44,30	45,30	46,21	47,61	48,51	49,06	*49,78*	*50,50*
Total World Demand	85,57	84,77	87,40	88,57	89,16	90,36	*91,62*	*92,99*

Source: Thomson Reuters Database, 2014.

As a result of all above mentioned aspects, the study and analysis of crude oil market behaviour became a challenge issue for researchers and economists. Starting from the importance of crude oil for global economy, and specially the consequences of oil price movements for producers, consumers and commodity and financial markets, many researchers and economists have done many efforts towards developing methods to forecast price and volatility levels. Thus, in order to forecast the oil price and price volatility, there was applied in the literature both quantitative and qualitative methods.

Quantitative methods, based on quantitative historical data and mathematical and econometrical models, focus specially on short and medium term predictions and can be classified into two big categories: (a) standard econometric models (time series models, financial models and structural models) and (b) non-standard computational models (models based on artificial neuronal networks). A detailed presentation on the use of all these methods in order to forecast the crude oil market behaviour can be found at Behmiri and Pires Manso (2013) research analysis.

3. Research methodology

As we mentioned, in order to forecast the behaviour of commodities and financial assets prices, in the literature are used different quantitative models, the most successful in term of cost-effectiveness being models based on time series analysis. As indicated by Behmiri and Pires Manso (2013), these models are split into three categories: 1) naïve models; 2) exponential smoothing models; and 3) autoregressive models ARIMA and (G)ARCH family of models.

Regarding the study of oil market volatility (G)ARCH models family of Engel (1982) and Bollerslev (1986) are mainly used with success. For instance, Mohammadi and Su (2010), using weekly data on 11 different crude oil spot prices for the period 1997-2009, compare out-of-sample forecasting ability of

various GARCH models, and finds that exponential GARCH models perform the best. Also, Agnolucci (2009), Kang et al. (2009) and Wei et al. (2010) compares also the volatility forecasting ability of different models. They use daily or weekly spot prices for different categories of crude oil (except of Agnolucci who use daily future prices). After a detailed analysis of their results, it seems that linear GARCH models fit better for short-term volatility forecasting and the non-linear GARCH models fit better for long-term volatilities forecasting.

On the other side studies such us Xie et al. (2006), Haidar and Woff (2009) or Li Shu-rongand Ge Yu-lei (2013) proposed and applied new methods to forecast crude oil price, these methods being based on SVM (Support Vector Machines) techniques. To compare SVM with ARIMA or GARCH models performances, they used measures like: RMSE (Root Mean Squared Error) and MAE (Mean Absolute Error). They found that the SVM techniques outperform ARIMA and GARCH models in term of forecast accuracy.

What concern us, we have greater confidence in GARCH techniques to forecast and model commodity market volatility, and further we develop this kind of models to forecast crude oil market volatility.

GARCH models are specially designed to model and forecast conditional variance. It means that variance of dependent variable is modeled as a function of past values of dependent variables and /or independent variables.

To develop an (G)ARCH model, we have to provide three distinct specifications related to: 1) conditional mean equation; 2) conditional variance; 3) conditional error distribution.

We start with the simplest version of GARCH models group, represented by GARCH (1, 1) model. The specifications of this model are the following (EViews 8 User's Guide I-II, 2013):

(1) $Y_t = X_t^{'}\theta + \varepsilon_t$ - mean equation

(2) $\sigma_t^2 = \omega + \alpha\varepsilon_{t-1}^2 + \beta\sigma_{t-1}^2$,

where:

Y_t - Dependent variable;

X_t - Exogenous variables;

ε_t - Error term;

ω - Constant term;

σ_t^2 - Forecasted variance (conditional variance);

ε_{t-1}^2 - The ARCH term which includes news about volatility from the previous period, measured as the lag of the squared residual from the mean equation;
σ_{t-1}^2 - The GARCH term that represents last period's forecast variance.

If we recursively substitute for the lagged variance on the right-hand side of equation (2), we can express the conditional variance as a weighted average of all of the lagged squared residuals:

(3) $\sigma_t^2 = \frac{\omega}{1-\beta} + \alpha \cdot \sum_{j=1}^{\infty} \beta^{j-1} \varepsilon_{t-j}^2$.

Furthermore, we know that the error in squared returns is given by $v_t = \varepsilon_t^2 - \sigma_t^2$. Substituting for the variances in the variance equation and rearranging terms, we obtain the following expression in terms of the errors:

(4) $\varepsilon_t^2 = \omega + (\alpha + \beta) \cdot \varepsilon_{t-1}^2 + v_t - \beta \cdot v_{t-1}$

The rewriting of GARCH (1,1) model as in the equations (3) and (4) helps us to interpret better the model. Thus from equation (3), we observe that GARCH (1,1) variance specification is analogous to the sampler variance, but that it down-weights more distant lagged squared errors. From equation (4), we observe that the squared errors follow a heteroskedastic ARMA(1,1) process and the autoregressive root which governs the persistence of volatility shocks is α+β. In many applied settings, this root is very close to unity, so that shocks die out rather slowly.

Furthermore, generalizing the above explanation, one can define GARCH(q,p) process if[3] $\mathcal{E}_t = \sigma_t Z_t, \quad t \in Z$, where (σ_t) is a nonnegative process such that:

(5) $\sigma_t^2 = \omega + \alpha_1 \mathcal{E}_{t-1}^2 + \ldots + \alpha_p \mathcal{E}_{t-p}^2 + \beta_1 \sigma_{t-1}^2 + \ldots + \beta_q \sigma_{t-q}^2, \qquad t \in Z$

or

(6) $\sigma_t^2 = \omega + \sum_{i=1}^{p} \alpha_i \varepsilon_{t-i}^2 + \sum_{j=1}^{q} \beta_j \sigma_{t-j}^2$

and

(7) $\omega > 0, \quad \alpha_i \geq 0 \quad i = 1, \ldots, p \quad \beta_j \geq 0 \quad j = 1, \ldots q.$

The conditions on parameters (7) ensure strong positivity of the conditional variance (5), where: q is the order of autoregressive GARCH term and p is the order of the moving average ARCH term.

If we were write the equation (5) in terms of the lag-operator B we obtain:

(8) $\sigma_t^2 = \omega + \alpha(B)\mathcal{E}_t^2 + \beta(B)\sigma_t^2,$

where:

(9) $\alpha(B) = \alpha_1 B + \alpha_2 B^2 + \ldots + \alpha_p B^p$ and

(10) $\beta(B) = \beta_1 B + \beta_2 B^2 + \ldots + \beta_q B^q$.

If the roots of the characteristic equation, $1 - \beta_1 x - \beta_2 x^2 - \ldots - \beta_q x^q = 0$, lie outside the unit circle and the process $(\mathcal{E}_t)$ is stationary, then we can write (1) as:

$$\sigma_t^2 = \frac{\omega}{1-\beta(1)} + \frac{\alpha(B)}{1-\beta(B)}\mathcal{E}_t^2 \quad or \;\; \sigma_t^2 = \omega * + \sum_{j=1}^{\infty} \delta_j \, \mathcal{E}_{t-j}^2,$$

where:

$\omega * = \frac{\omega}{1-\beta(1)}$,

and δ_j are coefficients of B^j in the expression of $\alpha(B)[1 - \beta(B)]^{-1}$.

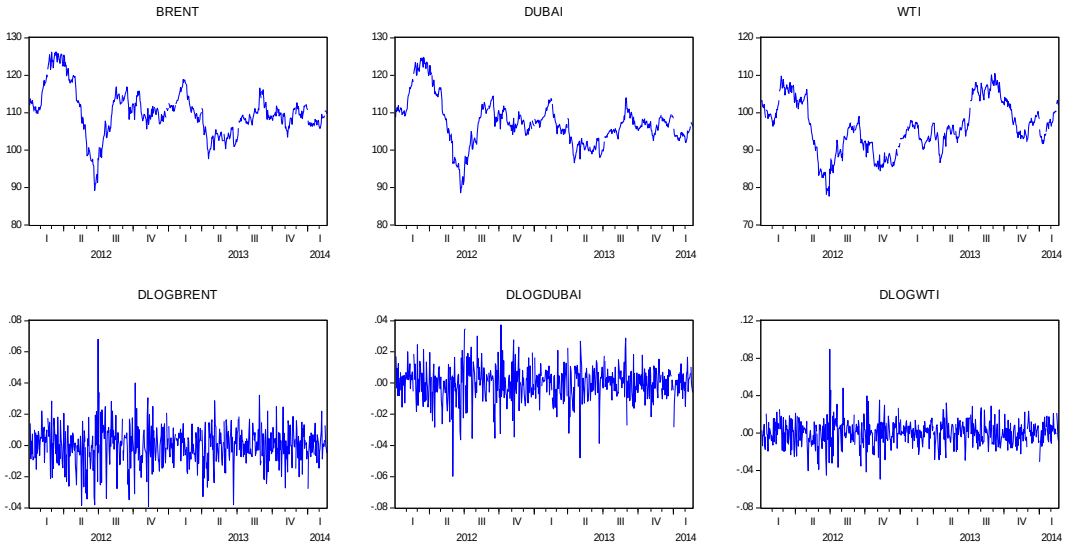
Moreover, to complete the GARCH model specification, we have to do an assumption about the conditional distribution of the error term. Starting from this assumption, GARCH models are commonly estimated by the method of maximum likelihood. There are three main assumptions usually employed when working with GARCH models: 1) Normal Gauss-Laplace distribution; 2) Student's t-distribution; 3) Generalized Error Distribution (GED). Also, in addition to the standard GARCH specification, we used for our estimations, several other variance models. In this paper we tried also: EGARCH and PARCH models.

4. Empirical analysis

In our empirical analysis, we focus on the estimation of crude oil future price and volatility. As we previously mentioned, this crude oil market represents several particularities in price evolution compared with other commodities groups. We briefly discuss proprieties of our data sets and then move on to estimate many competing GARCH-related models and assess their forecasting accuracy.

Our analysis took into consideration daily closing data for Brent Blend, Dubai Fateh, and WTI (West Texas Intermediate) crude oil. These categories of crude oil are considered as benchmarks for oil industry. There is always a spread between Brent, Dubai and WTI quotations due to the transportation cost, specially. The data used in our paper represents crude price prices expressed in US dollars per barrel. The daily prices are extracted from Eikon Thomson Reuters platform, for the period 2012-2014 and represents quotations of crude oil on Intercontinental Exchange (ICE), Dubai Mercantile Exchange (DME) and CME Group platform (the world's leading and most diverse derivatives marketplace, which includes CME, CBOT, NYMEX and COMEX exchanges). Figure 4 gives us the evolution of crude oil future prices one month over the period January 2012 to February 2014 for the three markets taken into consideration.

Figure 4. *Daily Brent, Dubai and WTI crude oil prices and returns dynamics*



Source: Own illustration using data extracted from Thomson Reuters Eikon Platform.

To make sure that our data series do no present trend, and are stationary, we investigate the dynamics of return series instead of price series. In this context we proceed to compute returns on a continuous compounding basis: $R_t = \log(P_t / P_{t-1})$ where R_t = return of crude oil price at the moment "t" and P_t = crude oil price at the moment "t".

As we can observe the behaviour of prices and returns clearly indicate us the presence of volatility clustering, Mandelbrot (1963), where large changes tend to be followed by large changes, of either sign, or small changes tend to be followed by small changes.

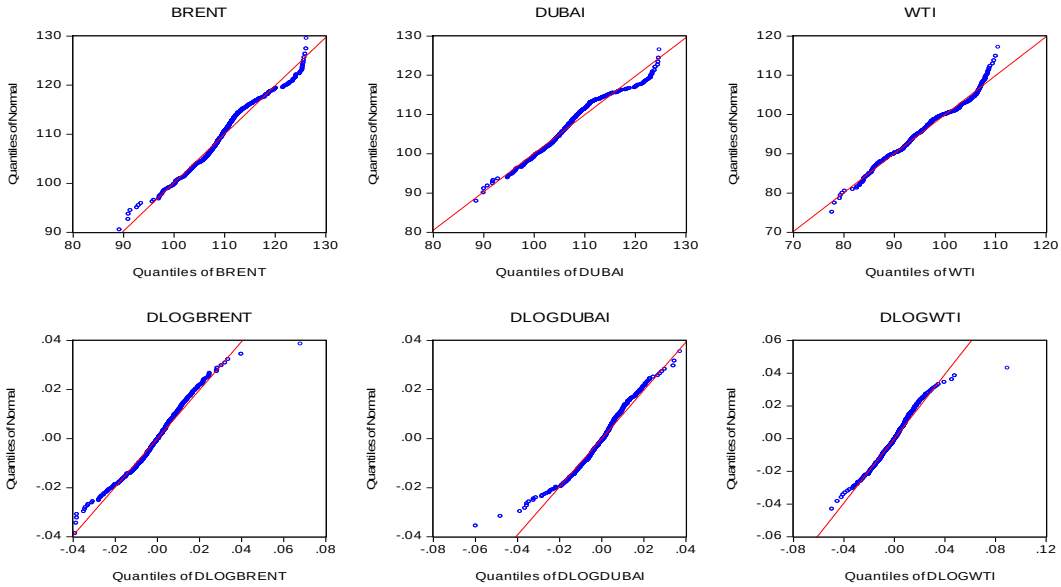
Table 3. *Descriptive statistics of Brent, Dubai, WTI oil prices and return series*

	BRENT	DUBAI	WTI	DLOGBRENT	DLOGDUBAI	DLOGWTI
Mean	110.0206	107.2297	96.15009	-3.94E-05	-4.25E-05	-1.54E-05
Median	109.8100	106.9000	95.88000	0.000679	0.000970	0.000793
Maximum	126.2200	124.8000	110.5300	0.068117	0.037334	0.089454
Minimum	89.23000	88.57000	77.69000	-0.039015	-0.059782	-0.049331
Std. Dev.	6.267985	6.193408	6.750054	0.012423	0.011412	0.013848
Skewness	0.150449	0.474626	-0.028279	-0.026563	-0.615281	0.294582
Kurtosis	3.829719	3.994740	2.453805	**5.095797**	**5.552811**	**6.644335**
Jarque-Bera	17.49444	42.45943	6.771816	**98.52543**	**180.0312**	**305.5008**
Probability	0.000159	0.000000	0.033847	**0.000000**	**0.000000**	**0.000000**
Sum	59301.09	57796.82	51824.90	-0.021181	-0.022861	-0.008290
Sum Sq. Dev.	21136.75	20636.77	24513.02	0.082870	0.069937	0.102981
Observations	539	539	539	538	538	538

Source: own calculations.

As we can observe the kurtosis value is higher than 3 in all 3 cases, thus indicating the presence of fat tails for density function comparing with density function of the standard normal distribution N (0,1). This is a very know behaviour in capital markets and suggest the presence of ARCH effects (heteroskedasticity). Furthermore, Jarque-Bera goodness-of-fit test for normality indicates that neither prices series, nor returns series (for the three oil markets taken into consideration) are normally distributed.

Figure 5. *Q-Q plots of Brent, Dubai and WTI crude oil prices and returns*



Source: own calculations and representations.

As we can see from the below charts, the same information is also given by QQ plots of oil prices and return series (a probability plot, which is a graphical method for comparing two probability distributions by plotting their quantiles against each other), which indicate that both large positive and negative shocks are responsible for non-normality of these series.

Before passing to the next step of our empirical study (Garch modeling of crude oil volatility), it would be normal to test for the stationarity of our return data series. As we know the data series of prices generally are not stationary, and in order to convert them into stationary data series, we proceed to compute the return of these prices using continuous transformation.

The data stationarity is analyzed using time plots (above charts), correlograms (ACF and PACF functions) and stationarity tests or unit root tests: 1) Dicky-Fuller (DF test, 1979) and Augmented Dicky-Fuller (ADF test, 1987); 2) Pilipphe Pearon (PP test, 1988); 3) Kwiatkowski–Phillips–Schmidt–Shin (KPSS test, 1982).

Low values of autocorrelation and partial correlation diagrams indicate the absence of serial correlations across return series. Furthermore the stationary tests Augmented Dicky-Fuller and Pilipphe Pearon also confirm the absence of serial dependencies in series across time (annex). The same characteristics are presented also by Dubai and WTI return series and for this reason we I have not done a detailed analysis in the present papers for Dubai and WTI.

As we mentioned, crude oil markets are characterized by persistence of shocked and cluster volatility (large changes in returns are likely to be followed by further large changes). In order to capture this feature, there were developed GARCH models (generalized autoregressive conditional heteroskedasticity models. In our paper we develop three distinct models from GARCH category in order to model crude oil market volatility: classical GARCH, EGARCH and PARCH models with three different distributional assumptions: normal, student and generalized error distributions. The use of these models allow us to understand specific features of crude oil market and further to compare them and select the best one in order to forecast volatility of this market. This paper presents a detailed analysis only for Brent crude oil market volatility and display only the best selected model (similar results were also obtained for Dubai and WTI market volatilities).

Our empirical results suggest that EGARCH(1,1,1) model with normal distribution is the best fit for Brent crude oil volatility modelling.

EGARCH (1,1,1)

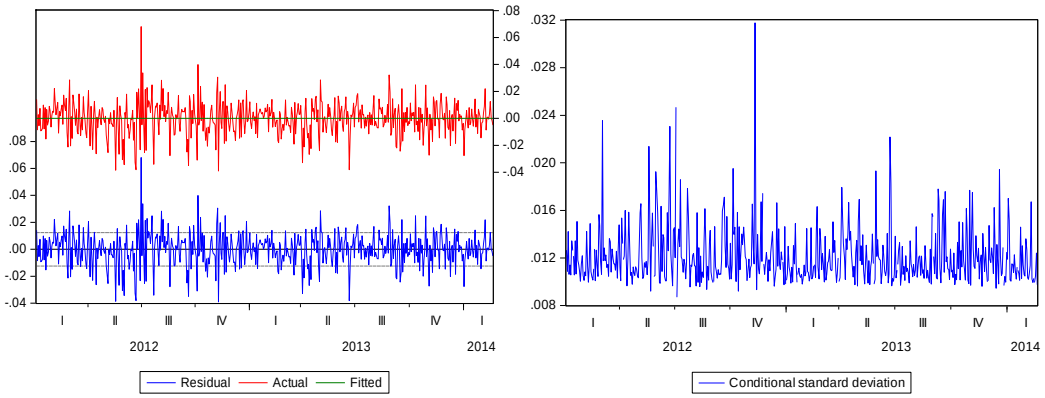
Dependent Variable: DLOGBRENT
Method: ML - ARCH (Marquardt) - Normal distribution
Date: 02/28/14 Time: 14:10
Sample (adjusted): 1/04/2012 2/21/2014
Included observations: 538 after adjustments
Convergence achieved after 30 iterations
Presample variance: backcast (parameter = 0.7)
LOG(GARCH) = C(1) + C(2)*ABS(RESID(-1)/@SQRT(GARCH(-1))) + C(3)
*RESID(-1)/@SQRT(GARCH(-1)) + C(4)*LOG(GARCH(-1))

Variable	Coefficient	Std. Error	z-Statistic	Prob.
	Variance Equation			
C(1)	-4.262462	1.211658	-3.517876	0.0004
C(2)	0.294140	0.063119	4.660114	0.0000
C(3)	-0.160695	0.043982	-3.653679	0.0003
C(4)	0.542929	0.134413	4.039266	0.0001

R-squared	-0.000010	Mean dependent var	-3.94E-05
Adjusted R-squared	0.001849	S.D. dependent var	0.012423
S.E. of regression	0.012411	Akaike info criterion	-5.978959
Sum squared resid	0.082870	Schwarz criterion	-5.947079
Log likelihood	1612.340	Hannan-Quinn criter.	-5.966489
Durbin-Watson stat	2.077678		

The residual diagnostic analysis using Correlogram Squared Residuals and ARCH Test also confirm the validity of the selected model.

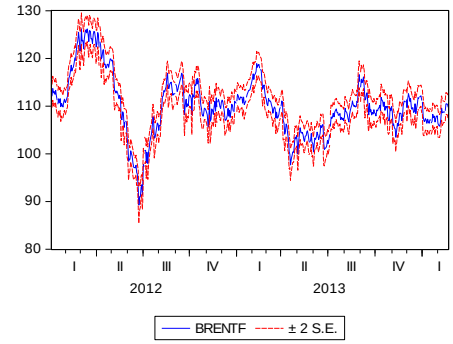
Figure 6. *EGARCH (1,1,1) actual, fitted, residual and conditional standard deviation graphs*



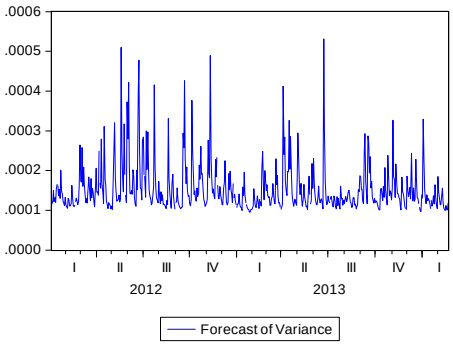
Source: own calculations and representations.

Using our EGARCH (1,1,1) selected model, and both dynamic and static forecast methods for volatility, we obtain the following results reflecting crude oil market behaviour:

Figure 7. *Brent crude oil price behaviour – static forecast*



Forecast: BRENTF	
Actual: BRENT	
Forecast sample: 1/03/2012 1/01/2015	
Adjusted sample: 1/04/2012 2/24/2014	
Included observations: 538	
Root Mean Squared Error	1.342762
Mean Absolute Error	1.014294
Mean Abs. Percent Error	0.928443
Theil Inequality Coefficient	0.006093
Bias Proportion	0.000011
Variance Proportion	0.000000
Covariance Proportion	0.999989



Source: own calculations and representations.

As we can see our estimated model fits fairly well with sample data taken into consideration. Furthermore the dynamic forecast of Brent crude oil price with two standard deviation bands indicates an average price of crude oil around 110 USD/barrel with a relatively small volatility on a short run. The value of Theil Inequality Coefficient very close to zero reflects a very good forecast model.

5. Conclusions

Crude Oil is a *commodity* with *a significant strategic role* for *global economy.* Historical peak prices and large volatilities, *observed in the last several years* in *oil market,* are strongly and directly related to the increasing demand coming from China economic boom, but also from other emerging economies as Brasil, Russia or India. But, after a decade of rapid economic growth rates, China and the other emerging markets are slowing down. After a harsh and unpredictable crisis, the financial and commodity regulation has changed; the uncertainty and distrust have increased, and, implicitly, the prices volatility in financial and commodity markets has also increased.

Therefore, understanding oil price behaviour and volatility became important for many reasons: 1) persisting changes in crude oil market volatility can affect the risk exposure of producers, intermediates and consumers; 2) high volatility can induces mistrust in the market; 3) it has weighty impact for derivatives valuation, hedging and investment decisions related to oil production or consumption; 4) volatility can affect the demand for storage, and implicitly the total marginal cost of production; 5) the higher the volatility, the higher the spot and future prices, and marginal convenience yield.

In this context, we tried to understand better the crude oil price behaviour and model the market volatility. Our selected EGARCH model results suggest a relatively small volatility in crude oil market on a short run with a price fluctuation around the level of 110 USD/barrel for Brent crude oil.

Moreover, our final conclusion is that: the economic slowdown in emerging markets, but also the new regulations in commodity markets represent new challenges for economists and researchers, and ask for structural reforms to adjust to new context.

Notes

(1) The Organization of the Petroleum Exporting Countries (OPEC) is a permanent, intergovernmental organization, created at the Baghdad Conference on September 10–14, 1960, by Iran, Iraq, Kuwait, Saudi Arabia and Venezuela. The five founding members were later joined by nine other Members: Qatar; Indonesia; Libya; United Arab Emirates; Algeria; Nigeria; Ecuador; Angola and Gabon. OPEC had its headquarters in Geneva, Switzerland, in the first five years of its existence. This was moved to Vienna, Austria, on September 1, 1965. OPEC's objective is to coordinate and unify petroleum policies among Member Countries.

(2) Organization for Economic Cooperation and Development (OECD) is an international economic organization of 34 countries founded in 1961 to stimulate economic progress and world trade. The mission of the OECD is to promote policies that will improve the economic and social well-being of people around the world. Today, OECD member countries account for 59 percent of world GDP, three-quarters of world trade, 95 percent of world official development assistance, over half of the world's energy consumption, and 18 percent of the world's population.

(3) $X_t = \log P_t - \log P_{t-1}$, where P_t is the price of a financial asset or commodity at the time "t", so X_t is the return of the financial asset or commodity at the time "t".

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Annex

Null Hypothesis: DLOGBRENT has a unit root
Exogenous: Constant
Bandwidth: 1 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-24.10338	0.0000
Test critical values:	1% level	-3.442299	
	5% level	-2.866703	
	10% level	-2.569580	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.000154
HAC corrected variance (Bartlett kernel)	0.000154

Phillips-Perron Test Equation
Dependent Variable: D(DLOGBRENT)
Method: Least Squares
Date: 02/27/14 Time: 17:25
Sample (adjusted): 1/05/2012 2/21/2014
Included observations: 537 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DLOGBRENT(-1)	-1.040164	0.043154	-24.10368	0.0000
C	-6.66E-05	0.000536	-0.124188	0.9012

R-squared	0.520604	Mean dependent var	-3.47E-05
Adjusted R-squared	0.519708	S.D. dependent var	0.017923
S.E. of regression	0.012421	Akaike info criterion	-5.935131
Sum squared resid	0.082541	Schwarz criterion	-5.919168
Log likelihood	1595.583	Hannan-Quinn criter.	-5.928887
F-statistic	580.9876	Durbin-Watson stat	1.997733
Prob(F-statistic)	0.000000		

Source: own calculations

Null Hypothesis: DLOGBRENT has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=18)

	t-Statistic	Prob.*

Augmented Dickey-Fuller test statistic		-24.10368	0.0000
Test critical values:	1% level	-3.442299	
	5% level	-2.866703	
	10% level	-2.569580	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(DLOGBRENT)
Method: Least Squares
Date: 02/27/14 Time: 17:20
Sample (adjusted): 1/05/2012 2/21/2014
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F-statistic	580.9876	Durbin-Watson stat	1.997733
Prob(F-statistic)	0.000000		

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The sensory brand of the destination. Case study: Transylvania

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Abstract. *Destinations can be considered a predominantly experiential tourism product in the context of sensory marketing, which would be the best instrument for creating, communicating and delivering the experiential values of the tourism product, and for developing the sensory brand of a destination. Given that, generally speaking, the geographic area of a destination is difficult to market (because of the multitude of component entities that must have the same vision, although competing at the same time), the unitary character of a destination is reinforced in the identity of the sensory brand, regarded as a collection of sensory experiences, i.e. a collection of contact points between the tourist and the destination. This study identifies the sensory experiences of tourists in the micro-destination Transylvania, thus being a starting point in the development of the sensory brand of the destination.*

Keywords: identity, image, sensory brand of the destination, sensory marketing.

JEL Classification: M31.
REL Classification: 14G.

1. Introduction

Since the tourist experiences a destination through the five sensory channels (visual, auditory, olfactory, gustatory and tactile) during his/her entire experience (pre-consumption, consumption and post-consumption), and the sensations felt during this time further lead to the triggering of emotions and/or issue of value judgments, most often the motivation behind the choice of tourist destination is the emotional factor. Ever since the first stage of his/her experience (pre-consumption), the tourist imagines the destination thinking about the attractions he/she will see, the music and specific rhythms he/she will listen to, the fragrance of nature in those places that will inspire him/her, the taste of traditional food and drinks that he/she will enjoy, as well as the dances, crafts, customs, sports or other activities that he/she will try.

Therefore, sensory marketing should be understood as a "bridge" between the destination's stimuli and the tourist's sensations, whose aim is to reduce the gap between projection and perception, or, otherwise, to reduce the differences between the identity of the destination and its image by developing memorable experiences in terms of achieving the target (planned) sensations, emotions and thoughts or memories. While the destination brand is "a name, symbol, logo, word mark or other graphic that both identifies and differentiates the destination; furthermore, it conveys the promise of a memorable travel experience that is uniquely associated with the destination; it also serves to consolidate and reinforce the recollection of pleasurable memories of the destination experience" (Ritchie, Ritchie, 1998: p. 103), the sensory brand of the destination combines the destination's stimuli (identity: visual, auditory, olfactory, gustatory and tactile), which creates unique and powerful associations in the minds of tourists regarding the destination. Thusly, brand becomes a function that applies identity to the image. Given that identity is designed by marketers (as transmitters), the image is the result of the perception of identity (Kapferer, 1997), being its representation in the mind of the consumer – as receiver.

The evolution of the concept of brand image is continuous, authors encountering difficulties in the conceptualisation of the term because the consumer perceptual process is subjective, so we cannot speak of a single image, but only of a dominant image (Govers, Go, 2009). Moreover, image measurement involves measuring both a rational component and an emotional component. However, brand image is defined as the set of associations the consumer has formed on a brand (Kotler, 1991; Keller, 1993; Aaker, 1996). In terms of destination brand image, it appears in the literature as the "sum of beliefs, ideas and impressions that a person has of a destination" (Crompton, 1979: p. 18) or as the "perceptions about the place as reflected by the associations held in tourist memory" (Cai, 2002: p. 723), from these definitions resulting the important role that it plays in the decision making process of tourists (Mayo, 1975).

From the tourist's perspective, brand capital begins to accumulate once the tourist has formed unique, strong, positive associations regarding the destination's brand (Kamakura, Russell, 1991), so that the points of differentiation anchored in the brand are the elements based on which consumers will form a positive image of the brand, adhering to it (Keller, Strategic brand management: Building, measuring, and managing brand equity, 2008). Therefore, the brands of the future will be developed holistically, thus making the transition from a "unique selling proposal" to a "holistic selling proposal", by integrating the five sensory dimensions in the brand's platform (Lindstrom, 2009), followed by a communication on all five of the consumer's sensory channels, thus creating specific visual, auditory, olfactory, gustatory and tactile identity elements (that constitute the pillars of the sensory brand).

In the context of the reference system of the macro-destination Romania, using the segmentation criterion of the geographical and historical region, Transylvania is one of eight micro-destinations of the country (Maramureş, Bukovina, Moldova, Dobrogea, Muntenia, Oltenia, Banat-Crişana, and Transylvania). From this perspective, we tried to identify the sensory experiences that tourists have lived in the region of Transylvania, and the possible sensory identity elements specific to this region, that, based on a destination marketing planning process, which should include additional sensory marketing objectives, strategies and tactics, would contribute to the development of the destination's sensory brand. Located within the Carpathian arc, the micro-destination Transylvania is bordered by Maramureş to the North, Bukovina to the Northeast, Moldova to the East, Muntenia and Oltenia to the South, and Banat-Crişana to the West, and consists of the following counties: Alba, Bistriţa-Năsăud, Braşov, Cluj, Covasna, Harghita, Hunedoara, Mureş, Sălaj and Sibiu.

Considering the high reputation of the micro-destination Transylvania (sometimes even comparable to the notoriety of the macro-destination Romania), the study of this region in order to identify specific sensory experiences and identity elements as the next step in the process of developing the sensory brand of the destination turns out to be a useful undertaking, especially in the context of continuing the sensory audit of the destination – Romania (Stăncioiu et al., 2014).

2. Operational Framework

This study was conducted during March-July 2012, on a sample of 374 respondents (females – 75.1%; males – 24.9%), aged between 20 and 24, with higher education in progress or completed, and coming from all the eight historical regions of Romania. The purpose of the research was the identification

of sensory experiences that tourists associate with the micro-destination Transylvania, and the recognition of the visual, auditory, olfactory, gustatory and tactile identity elements that can support the development of the sensory brand of the destination. The research also tested the characteristic identity elements of the micro-destination Transylvania, resulting from the study conducted in October – December 2010 – January 2011, on a representative sample of 1,887 respondents from all regions of Romania and aged between 20 and 24, with higher education in progress (Stăncioiu et al., 2011).

According to research results, Transylvania was visited by most respondents (87%), the rest (13%) not visiting the destination for the following reasons: not enough time (40.8%), lack of material resources (32.7%), lack of interest (8.2%), insufficient information on accommodation facilities (8.2%), do not know (6%), and unfavourable information about the region (4.1%). An interesting aspect is that, from the actual tourists, 97.8% want to return to Transylvania to practice the following types of tourism: leisure, recreation and rest tourism (39%), cultural tourism (23%), visits to relatives and friends (22%), business and professional tourism (9%), balneary tourism (6%), other type of tourism (1%).

Information sources have the greatest influence on the tourist's experience in the pre-consumption phase. Figure 1 summarises the sources the actual tourists have used in choosing the destination.

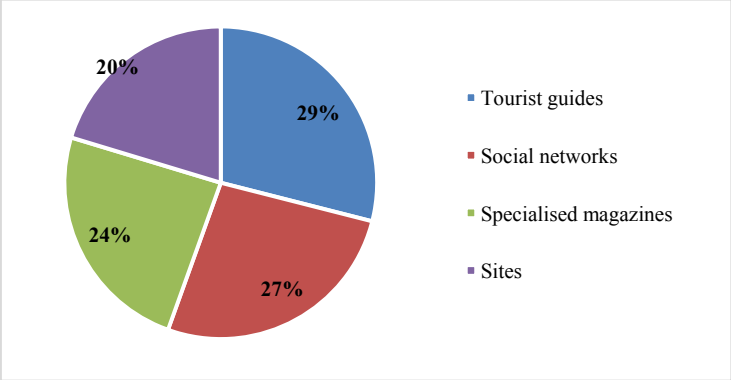

Figure 1. *Information sources used by tourists*

As can be seen, all sources of information are used in a balanced way by tourists, the percentages being relatively close, so none of the sources dominates consumer preferences over others, but, overall, the balance is tilted in favour of offline sources (tourist guides and specialised magazines). What is surprising is the importance of social networks in choosing a destination. A possible justification could come from the very high reputation of the micro-destination Transylvania,

which manages to turn visitors into image vectors, these disseminating information on social networks, according to the model (Diţoiu, Stăncioiu, 2011).

From the point of view of sensory dimensions perceived by tourists in the types of tourism practiced in the micro-destination Transylvania (Figure 2), visual (38.48%) and auditory (23.28%) experiences characterise cultural tourism, olfactory (21.97%) and tactile (26.82%) experiences predominate in balneary tourism, and gustatory experiences (20%) are crucial for visits to relatives and friends. The importance of identifying sensory experiences that characterise each type of tourism is found both in the development of contact points with the destination (transport, accommodation and catering facilities, attractions and leisure centres), which must satisfy tourists, and, symbolically, in design of the sensory brand of the destination, by adapting it to each type of tourism.

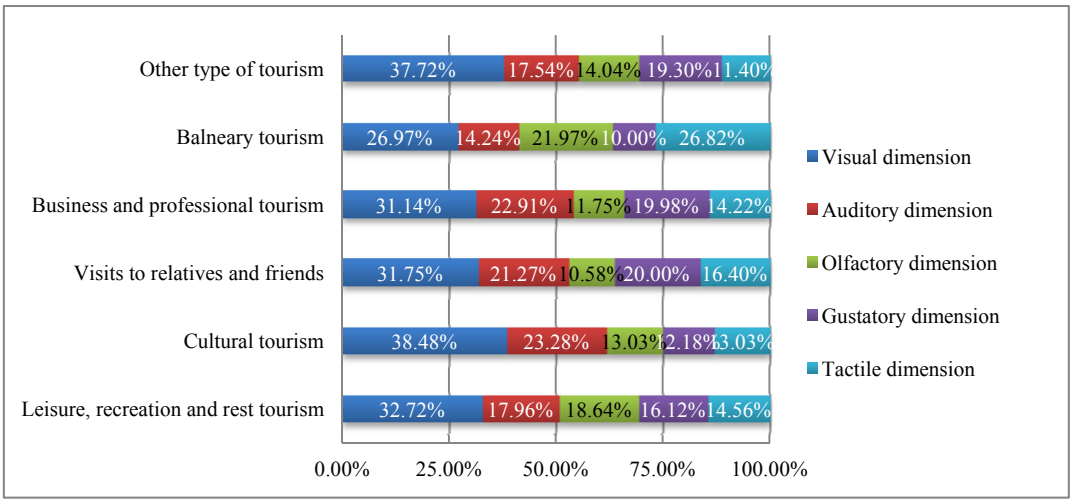

Figure 2. *The sensory dimensions associated with types of tourism practiced in the micro-destination Transylvania*

Once the sources of information that tourists use in choosing the destination and the reason (types of tourism) for which they travel to that destination are known, the marketer has to prepare the contact points across the destination, so the tourist lives a memorable experience, thus respecting the brand's promise. Therefore, it is essential to follow the development of sensory experiences over time, on types of tourism or at one time, on components of the destination (e.g., counties). Sensory dimensions perceived by tourists for the counties that are part of the micro-destination Transylvania are shown in Figure 3. Note that the sensory experiences, which have most satisfied tourists, have the following distribution: visual experiences (59.64%) – Sălaj, auditory (18.11%) and gustatory (17.23%) experiences – Sibiu, and olfactory (16.13%) and tactile (15.31%) experiences – Braşov.

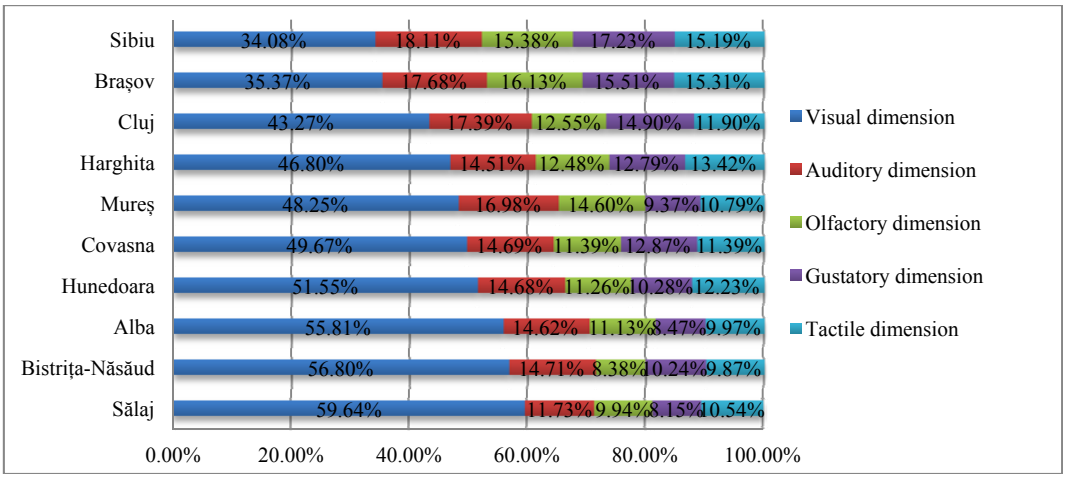

Figure 3. *Sensory dimensions associated with the component counties of Transylvania*

For example, if the marketer considers cultural tourism as a type of tourism specific to the micro-destination Transylvania, which, according to the previous analysis (Figure 2), is supported by visual and auditory dimensions, then the objective should be improving the visual and auditory experiences, especially in counties that have obtained a lower score on these two dimensions (Figure 3).

The process can also continue for attraction elements identified as points of interest for tourists (Figure 4). This process of improvement or development of sensory experiences in the points of interaction between the tourist and the destination "prepares" the tourism product for the actual consumption stage, so that the expectations the tourist has formed in the pre-consumption phase, through brand communication and product exposure elements, materialise. The tourism product, where it overlaps with the destination itself, can be reduced in this approach to the meeting of points of contact developed as sensory experiences for tourists, being correlated with the sensory brand of the destination by integrating sensory dimensions in a symbolic form. The product supports the brand and vice versa, and the tourist's experience (consumption manner) is managed under a sensory aspect to ensure product quality.

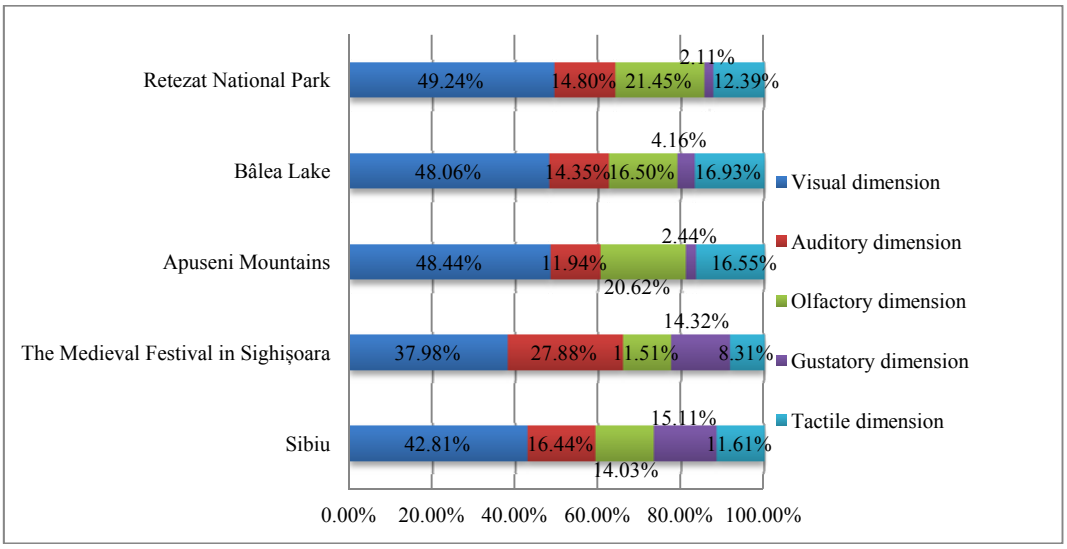

Figure 4. *Sensory dimensions associated with Transylvania's attraction elements*

The sensory brand of the destination is built on pillars – elements of visual, auditory, olfactory, gustatory and tactile identity, which, in time, by implementing the destination's marketing plan and then complementing it with sensory marketing objectives and strategies, leads to obtaining the sensory signatures (Figure 5) of the destination, i.e. iconic elements for each sensory dimension, representing unique, positive and strong tourist associations on that destination.

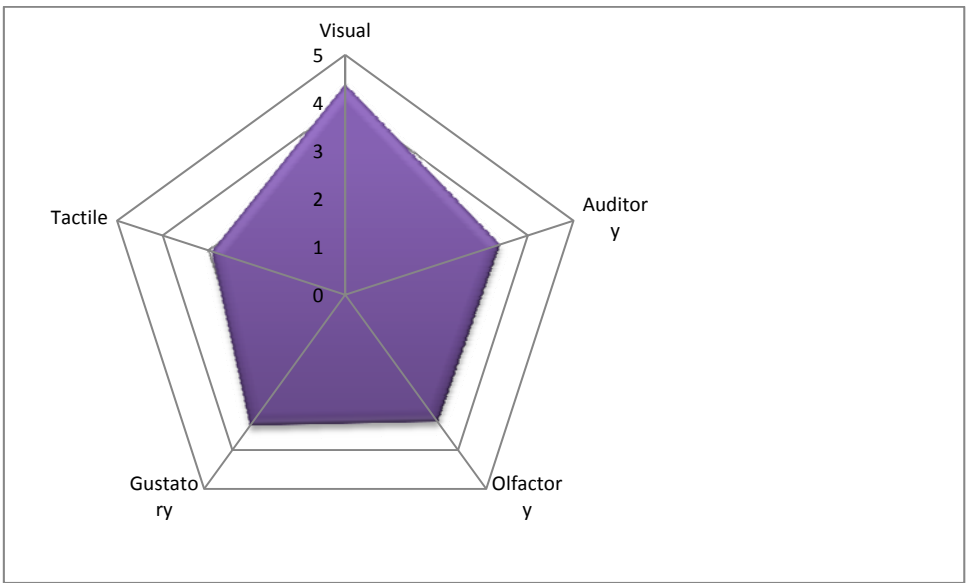

Figure 5. *Sensory profile of the micro-destination Transylvania*

The sensory profile (Figure 5) shows the sensory dimensions integrated in the sensory brand of Transylvania, being developed similar to the brand sensogram model (Lindstrom, 2009). However, the sensogram allows the monitoring of the evolution of sensory dimensions until the achievement of the sensory signature threshold of a visual, auditory, olfactory, gustatory or tactile identity element. In Transylvania's case, the visual size is almost close to reaching the visual signature of the destination threshold, while the tactile dimension (tactile experience) is the least developed.

Improving the sensory experience of the tourist in order to obtain the sensory signature of the destination involves identifying the sensory identity element specific to that destination and integrating it into the brand platform, as well as supporting it "in situ" by the management of contact points that provide those experiences converging to the identity element chosen. Therefore, the micro-destination Transylvania, as shown in Figure 5 and Table 1, is visually represented by Bran Castle. This element of attraction can become a visual signature for the micro-destination Transylvania, thus being the first pillar of the sensory brand.

Table 1. *Visual elements "composing" the experience for the micro-destination Transylvania*

– % of total column–

			of which	
	Visual elements	**Total**	**Male**	**Female**
	Base	374	93	281
1	Bran Castle	12.0	7.5	13.5
2	Sibiu	10.2	9.7	10.3
3	landscape	5.6	2.2	6.8
4	mountain	3.7	3.2	3.9
5	Sighişoara	3.5	5.4	2.8
6	Bran	3.2	5.4	2.5
7	castle	3.2	0.0	4.3
8	beautiful	2.9	3.2	2.8
9	Dracula	2.7	1.1	3.2
10	Braşov	2.4	3.2	2.1
11	Cluj-Napoca	2.1	1.1	2.5
12	architecture	1.9	5.4	0.7
13	Black Church	1.9	2.2	1.8
14	Hunyadi Castle	1.9	1.1	2.1
15	Peleş Castle	1.9	2.2	1.8
16	Others	40.6	46.2	38.8
17	Does not exist/Do not know	0.3	1.1	0.0

From Table 1 we can "extract" a common experience that dominates the micro-destination, namely the experience of medieval Transylvania, supported by castles ("Bran Castle", "Hunyadi Castle", "castle"), architecture, churches ("Black Church"), and cities (Sighişoara, Sibiu). In addition, all the elements associated by

tourists with the visual dimension of the micro-destination Transylvania have positive connotations, except for the character "Dracula", whose legend is inspired by the Vlad the Impaler, considered a just ruler by Romanians.

The auditory dimension of the micro-destination Transylvania is moderately developed (Figure 5), and, as can be interpreted from Table 2, the identity element that could become the destination's auditory signature is the "Festival in Sighişoara", it still requiring more concentration, as well as the development of more experiences convergent towards the event. However, the "Festival in Sighişoara" could become the "voice" of the sensory brand of the micro-destination Transylvania, which would accompany the aforementioned medieval experience.

Table 2. *Auditory elements "composing" the experience for the micro-destination Transylvania*

– % of total column–

			of which	
	Auditory elements	**Total**	**Male**	**Female**
	Base	374	93	281
1	quietness	7.5	3.2	8.9
2	music	3.7	1.1	4.6
3	festival	3.5	4.3	3.2
4	Festival in Sighișoara	2.1	1.1	2.5
5	medieval music	1.9	3.2	1.4
6	noise	1.9	2.2	1.8
7	Dracula	1.6	1.1	1.8
8	exists	1.6	2.2	1.4
9	Mureș	1.6	1.1	1.8
10	birds	1.6	2.2	1.4
11	accent	1.3	3.2	0.7
12	Golden Stag	1.3	1.1	1.4
13	Others	61.2	60.2	61.6
14	Does not exist/Do not know	9.1	14.0	7.5

The experience "Dracula", as noted in the analysis of the visual dimension, is negative at least for some of the tourists, the identity problem being added to this, according to which Romanian residents do not recognise the existence of this character. On the other hand, the reputation of "Dracula" among foreign tourists is high, the experience being mysterious and also an element of attraction for a particular type of audience. In conclusion, Dracula's legend can be used for the benefit of the micro-destination Transylvania, provided the creation of a route that "follows" the legend, with the introduction of the true values over time.

The olfactory experience for the micro-destination Transylvania is dominated by the term "fresh", which defines the products, air, nature (Table 3) in this region. The first olfactory identity element mentioned, specific for Transylvania, is, however, Retezat National Park, which, taking into account the moderate development of the olfactory dimension (Figure 5), has the ability to reach the

olfactory signature of the sensory brand of the micro-destination Transylvania, if measures similar to the auditory signature are taken. Another aspect to be noticed following Table 3 is that all olfactory experiences presented are positive, which helps the marketer to focus activities only on the ongoing development of existing elements, without exhausting resources on the neutralisation or even conversion of negative experiences that lead to a negative image of the micro-destination.

Table 3. *Olfactory elements "composing" the experience for the micro-destination Transylvania*

– % of total column–

			of which	
	Olfactory elements	**Total**	**Male**	**Female**
	Base	374	93	281
1	fresh	11.2	7.5	12.5
2	clean air	7.5	6.5	7.8
3	fresh air	3.7	1.1	4.6
4	fir	2.4	2.2	2.5
5	Retezat National Park	1.9	2.2	1.8
6	pleasant	1.9	0.0	2.5
7	clean	1.6	1.1	1.8
8	flower	1.6	2.2	1.4
9	nature	1.3	1.1	1.4
10	clean mountain air	1.3	1.1	1.4
11	Black Church	1.1	1.1	1.1
12	Cluj-Napoca	1.1	1.1	1.1
13	Others	48.4	53.8	46.6
14	Does not exist/Do not know	15.0	19.4	13.5

The gustatory dimension (Figure 5) associated with the micro-destination Transylvania (like the auditory and olfactory dimensions) is moderately developed. Gustatory experiences specific to the region (Table 4) are closely related to Romanian and Hungarian traditional food. Most likely to become a gustatory signature for Transylvania are "goulash" or "kurtos kalacs" and "Sibiu salami". Further analysing the case of the gustatory identity element "Sibiu salami", there is a discrepancy between the food brand and the place of origin brand, as the product is manufactured in another micro-destination, namely in Bacău, Moldova, or in Sinaia, in the micro-destination Muntenia, where the story of this product began. Ideally, the food brand should support the location brand, and, in turn, the location brand should add value to the food brand. For this, however, the product should be manufactured only in the destination included in its name. The association of "Sibiu salami" with the micro-destination Transylvania is closely related to the inclusion in the product's name of the destination of Sibiu, an aspect justified by the product's history, i.e., the facilitation of exports via Sibiu Customs.

Table 4. *Gustatory elements "composing" the experience for the micro-destination Transylvania*

– % of total column–

			of which	
	Gustatory elements	**Total**	**Male**	**Female**
	Base	374	93	281
1	food	5.9	2.2	7.1
2	Goulash	5.6	6.5	5.3
3	traditional food	4.8	4.3	5.0
4	Kurtos Kalacs	2.9	1.1	3.6
5	Sibiu salami	2.9	2.2	3.2
6	bulz	2.4	3.2	2.1
7	sarmale	2.4	5.4	1.4
8	sweet	2.1	1.1	2.5
9	bellows cheese	1.3	1.1	1.4
10	good	1.6	1.1	1.8
11	tasty	1.3	1.1	1.4
12	Varză (cabbage) à la Cluj	1.3	1.1	1.4
13	Others	52.9	50.5	53.7
14	Does not exist/Do not know	12.3	19.4	10.0

The tactile experience of tourists in the micro-destination Transylvania is "marked" by "coolness" (Table 5). Reality confirms that certain areas of Transylvania are the "cold pole" in Romania, since here low temperatures are recorded frequently. However, cold air is perceived as clean by tourists.

Table 5. *Tactile elements "composing" the experience for the micro-destination Transylvania*

– % of total column–

			of which	
	Tactile elements	**Total**	**Male**	**Female**
	Base	374	93	281
1	coolness	5.3	5.4	5.3
2	temperature	5.1	4.3	5.3
3	cold	3.5	4.3	3.2
4	warm	2.7	2.2	2.8
5	pleasant	2.4	1.1	2.8
6	grass	1.3	1.1	1.4
7	mountain	1.3	2.2	1.1
8	chilly	1.3	2.2	1.1
9	pleasant temperature	1.3	1.1	1.4
10	clean air	1.3	1.1	1.4
11	brick	1.1	1.1	1.1
12	Bran Castle	1.1	3.2	0.4
13	Poiana Brașov	1.1	1.1	1.1
14	pressure	1.1	1.1	1.1
15	Others	51.9	44.1	54.4
16	Do not exist/Do not know	18.2	24.7	16.0

The tactile dimension (Figure 5) is weak, requiring increased attention from marketers that need to develop memorable tactile experiences for tourists in contact points. "Bran Castle" can become a tactile signature (Table 5) for the sensory brand of the micro-destination Transylvania, in addition to its role as a visual signature. The following tactile identity element, "Poiana Braşov", also enables the development of tactile experiences throughout the year through sports activities that can be performed here.

The sensory brand of the micro-destination Transylvania, according to this analysis, includes the following sensory identity elements: "Bran Castle", "Festival in Sighişoara", "Retezat National Park", "Goulash", ("Poiana Braşov"). Thus, each dimension of the sensory brand is represented by an identity element, and, for the tactile dimension, which shares the same element with the visual size, the next item in that category was chosen. It can be seen that identity elements corresponding to the sensory brand of the destination are consistent with the types of tourism for which tourists visit Transylvania, namely leisure, recreation and rest, and cultural tourism.

In the last experience stage (post-consumption), the tourist remembers the pleasant moments experienced in the destination, while making an assessment of the tourism product. If the tourist is satisfied with the whole experience, then he/she will recommend the destination to relatives or even return to the destination. Therefore, in the last stage, the marketer must measure tourist satisfaction (Figure 6). As expected, tourists who visited Transylvania were satisfied with visual experiences, and less satisfied with tactile experiences.

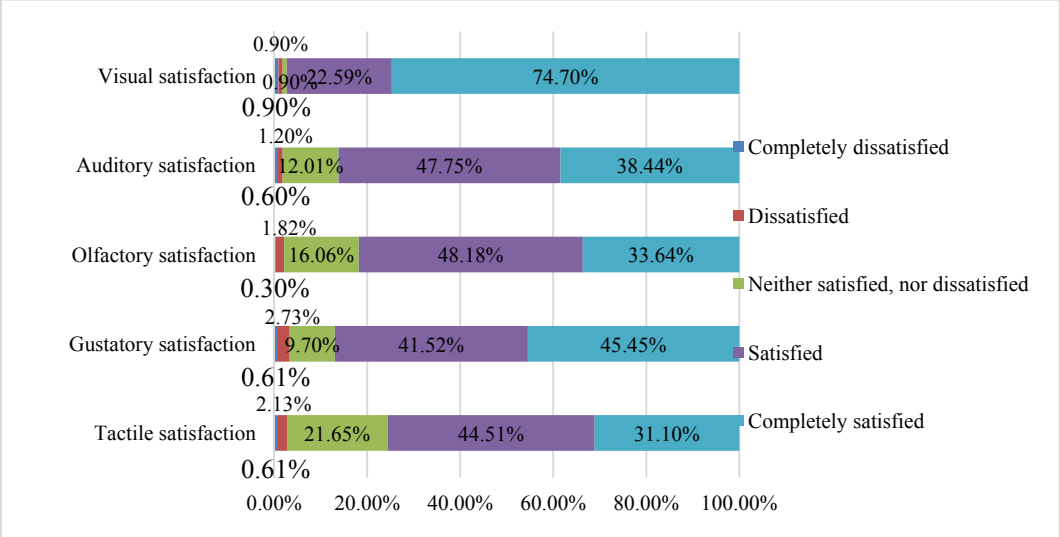

Figure 6. *The satisfaction degree felt by tourists on each sensory dimension*

Overall, the sensory experiences, which can be lived in the micro-destination Transylvania, are positive, and, even if the sensory profile of the destination has no sensory signature yet, there is still a balance between generic and specific sensory elements.

Since the tourism product is experiential, sensory marketing can be the tool to apply the sensory brand to the destination. It is obvious that the pillars of marketing (product, price, placement and promotion) still form the skeleton of the destination brand, but, given the fact that tourists experience a place through the five sensory channels and that external information is received through these channels, the "4 Ps" of marketing are encoded by the marketer in the form of sensory signals.

The sensory brand of a destination helps organisations involved in the marketing and management, respectively, of a destination remain focused on the contact points, which combined form the brand's identity, and ensure the quality of the tourism product by continuing to reduce the projection-perception gaps.

3. Conclusions

The sensory signatures of a destination which originate in the visual, auditory, olfactory, gustatory and tactile identity elements (components of the sensory brand) may be considered at one time, in a particular context, in the development of a destination's brand and of sensory marketing strategies, subordinated to clearly defined product/products objectives, and, of course, very well targeted markets/market segments. Therefore, the importance of a sensory destination brand must be understood in order to obtain a sustainable competitive advantage (Mowle, Merrilees, 2005), which targets certain tourist sensations to trigger an emotional response, thus leading to pleasant memories.

Creating the sensory brand is a process that involves six steps: sensory audit, "staging", "dramatization", "signature", implementation and evaluation (Lindstrom, 2009).

Once the sensory destination brand is developed, it "helps" the tourist imagine the entire destination in the pre-consumption stage, thus influencing the decision making process relating to a tourism product, and forming "expectations" close to the "staged reality"; "guiding" the tourist through the points of contact that support the sensory identity elements communicated so as to provide the "right" stimuli for "dealing with" the senses; reminding the tourists of the memorable experience "lived" in the destination, eventually leading to the formation of a positive image, which consequently leads to the tourist returning to the destination or recommending it.

Research limitations are based on the absence of similar researches on the sensory approach to a complex product such as the destination, locally, regionally and nationally, also being cognitive (lack of linguistic measuring scales for the intensity of sensations generated by a complex tourism product on each sensory dimension).

As a result, the authors will continue in future studies to simplify the design process for the sensory brand of the destination by developing a function intended to apply the identity of the destination (the set of contact points) in the destination image (the set of associations created in the minds of tourists), in this way ensuring the development of effective marketing strategies.

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Difficulties of the supporting pensioners by current employees – alternative to pension systems at international level. Empirical analysis in Romania

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Abstract. *The current problems of the labor market, evidenced by decrease the number of contributors in relation to the number of pensioners, is manifested throughout the world and it is increasing from year to year. The origin of this imbalance is increasing the aging phenomenon that occurs at the international level, correlated with declining of the birth rates. Direct effects of aging population are a decrease in the amount of social security contributions for pension payments, as a result of reducing the number of taxpayers, and the increase in pension expenditure, as a result of increasing the number of beneficiaries. An alternative to these problems of public pensions is the orientation of the population towards private pensions, in the same time with increasing their confidence in such solutions. This requires an effective management of private pension fund assets, by using the adequate strategies to perform investment assets. Thus, in this paper, we realize a statistical study about the influence of the main factors on the size of private pension fund assets in Romania. The research methodology is to test the influence of selected factors, as independent variables, to the net assets of the two components of private pensions in Romania: privately managed pension funds and facultative pension funds. At European Union level, is seeking to implement a variety of strategies to increase the share of pensioners line to remain in the workforce, thus extending their working life.*

Keywords: labor market, aging population, pension systems, private pension, statistical correlation.

JEL Classification: C15, J11, J26.
REL Classification: 10D, 11B, 12B.

1. Introduction

The current problems of the labor market, evidenced by decrease the number of contributors in relation to the number of pensioners, is manifested throughout the world and it is increasing from year to year. The origin of this imbalance is increasing the aging phenomenon that occurs at the international level, correlated with declining of the birth rates.

Direct effects of aging population are *the decrease in the amount of social security contributions for pension payments, as a result of reducing the number of taxpayers*, and *the increase in pension expenditure, as a result of increasing the number of beneficiaries*.

As an answer to these problems, the governments of the European Union member states are seeking to implement a *variety of strategies to increase the share of pensioners in order to remain in the workforce,* thus extending their working life, interest manifested since the 80's, concretized by many actions, resolutions and reports regarding these. Thus, *European Year 2012*, through the report "Active Ageing"[(1),] published in January 2012 by the European Commission, proposed to support active ageing on the three main directions (European Commission, Active Ageing, 2012: p. 4):

- the employment – since life expectancy increases and, along with it, gradually increases the retirement age, European Union aims to improve the professional perspectives of the aged persons;
- participation to social life – by the involvement of aged people into various activities, on volunteer line, by encouragement of the authorities to create a favorable framework to them;
- independent living – for the persons affected by some diseases and handicaps, by promoting of measures to allow their livelihood without relying on someone else.

An alternative to these problems of public pensions is the orientation of the population towards private pensions, in the same time with increasing their confidence in such solutions.

In this paper, we present problems of the public pensions in Romania, related to the phenomena manifested at the European Union level and the alternatives proposed, in order to avoid these difficulties of the pension systems.

2. Demographic tendencies at the European Union level

At the level of European Union States Members, the structure of the population is changing, becoming more aged, recording at the 1st of January 2010 more than 87 million persons over 65 year old, representing 17.4% of the total of the population, comparing to 12.8% recorded at first of January 1985 (Eurostat,

Active ageing and solidarity between generations, A statistical portrait of the European Union, 2012: p. 7).

Demographic aging is determined by two *simultaneous factors:* the decline of the rate of fertility and an increasing average life expectancy.

Fertility rates have suffered a rapid decrease at the end of the 60's, continuing during the 70's-80's. From this period, the average number of born children remained almost constant, at the rate of less than 2 children/woman. The financial economical crisis led to the decrease of the birth rate in the countries more affected by it, like Greece, were the birth rate is 1.43 children/woman, Portugal, 1.35 children/woman or Spain, 1.36 children/woman.

Regarding *the life expectancy at birth* in the European Union, it increased to 79.4 years, at the level of 2011. The highest life expectancy at birth is recorded in France, Sweden, Italy, with over 80 years. At the opposite side, the lowest life expectancy was recorded in Bulgaria, Romania, Latvia, Lithuania, being between 72 and 73 years, at the level of 2011 (Eurostat, Active ageing and solidarity between generations, A statistical portrait of the European Union, 2012: p. 27).

Among the European Union States Members, the life expectancy at birth had the highest grow rate in Portugal, with 15.6 years, Germany, with 11.1 years, and Belgium, with 10.4 years. On average, the life expectancy at the age of 65, for women is 20.7 years, with 3.5 years higher than men.

In a ranking conducted by ONU in 2009 regarding the position of each country depending on the share of the population over 60 years old from the total of the population, Romania is placed in the 29'th place from the 196 countries of the ranking, with a share of the population over 60 years old, at the level of 2009, of 20%. On the first place is Japan with 29.7% of the population over 60 years old, and on the last place, is Qatar with 1.9% (Nations, Department of Economic and Social Affairs, 2010: pp. 70-71).

As a result of these factors, *population structure has changed* (Kinsella, Phillips, 2005: p. 4) and will register in the next years more significant mutations - from the structure in pyramidal shape, in which young people, representing the base, are more numerous than the higher segments, at a representation with "a rectangular paternal" – the share of the population over 60 years old constantly increasing in the total of the population.

The result of decreasing in the number of children at the same time with the increasing in aged persons has a direct influence between equity and solidarity between generations and also within generations. At the global level, the aged population grows at a rate of 2.6% per year, faster than the annual growth of the total population, which is 1.2% per year. Such rapid growth will require economic and social adjustments in the most countries, especially in the segment of pension systems.

3. The pension system in Romania and difficulties of public pensions

In Romania, *the pension system* is structured, also, according to the model proposed in the year 1994 by the World Bank, thus:

- *public pension system*, which represents the *pillar I*, under the supervision of the National House of Public Pensions – NHPP;
- *Private pension system*, set up till April of 2013 under monitoring of Supervisory Commission of the Private Pension System – SCPPS[(2)], with the two components of its:
  - *pillar II*, which is *the mandatory administrative private component*, it was released in May 2008, known as *privately managed pension fund*;
  - *pillar III*, which is *the voluntary private managed component*, known *as facultative pension fund* and it was released one year earlier comparative with the pillar II, in May 2007.

Regarding the demographic trend and the pension system, in Romania there are registered the following *problems* (Andanut, 2009: p. 5, and Statistics, Ministry of Labour, Family and Social Protection for the Elderly, http://www.mmuncii.ro/j33/index.php/ro/transparenta/statistici/date-statistice):

- *employees/retirees report* decreased greatly from 3.3/1 in 1990, to 0.8/1 in 2013 and it will get to 0.4/1 in 2050;
- it was recorded an unjustified increase of the number of *disability pensions*, thus that one in five pensioners would receive an invalidity pension, at the level of 2009, and for 2013, one from seven pensioners;
- *social security budget deficit* deepened in the last years, reaching 12.5 billion lei in 2012, equivalent to 2.2% from GDP;
- *expenditure on pensions have increased by 0,6 billion lei in 2012*, mainly as a result of new entry into system, with higher pensions than the average, of 807 lei, while incomes have advanced only by 0.8 billion lei.

Given these problems, to which is added the problem of the structural deficit of the public pension system, budgetary expenditure with pensions in Romania are unsustainable in relation with social contributions collected. Insufficient public pensions for future retirees should arouse the interest of contributors to supplement them with private pensions.

Mandatory component of private pensions, pillar II, presents the following features:

- has established a statutory pension scheme, meaning a *system of terms, conditions and basic rules on which the manager invests the assets of the pension fund* in order to gain by the participants a private pension fund;

- it is a *mandatory* system for new entrants on the labour market *that are up to 35 years* and *optional* for other categories of persons *aged up to 45 years*, who are already insured and contribute to the public pension system;
- *the insured person may possess one single pension fund account* to which he/she participates, being not allowed to possess another account to a distinct pension fund, otherwise, he/she may transfer his/her account from one pension fund to another, paying a penalty for this transfer.

For the first collection year – May 2008, *the contribution to the privately managed pension funds* indicates 2% of the individual contribution to the public pension system. According to the law, this contribution is planned to follow an increase of 0.5 percent points, till reaching 6% within 8 years (till 2016). This anticipated increase of 0.5% was achieved only for the year 2009. The year 2010 announced a constant level of contribution of 2.5%, and during 2011, 2012, 2013, and 2014, 0.5 percent points are added to the previous values, indicating a level of 3% of contributions for 2011, 3.5% for 2012, 4% for 2013, respectively, 4.5% for 2014. The contribution to the private pension does not involve an additional check off, it represents part of the individual contribution to the social insurance (rated at 10.5% for the year 2014) and it is similarly transferred.

The participant has the right to a private pension when all the retirement criteria for the age limit within the pension public system are met. The amount due as a pension may not be less than the amount of contributions paid, adjusted with the consumer price index, plus transfers of amounts and less, where applicable, transfer penalties and fees.

In Romania, *at the end of August 2013, for the privately managed pension funds, pillar II*, there were registered following indicators (SCPPS, statistical data):

- the existence of 8 pension funds, divided on two categories of risk depending on the investments made: balanced pension fund (7 funds) and dynamic pension funds (one single fund);
- a number of 5939 million participants;
- the net assets of the pension privately managed pension funds, pillar II, registered 12,343.72 million lei.

Facultative component private managed, pillar III, known as *the facultative pension funds*, unlike privately managed pension funds (pillar II), the participation to voluntary pensions based on age is not restricted, *anyone can contribute to the system up to 15% of gross monthly income and provides additional disability protection - as a form of insurance.*

Instead, in order to benefit from an optional pension, the legal demands impose that each participant should have *at least 90 monthly contributions* paid to the

fund (not necessarily successive payments), *at least 60 years old and a minimum collected sum.*

Starting with 2010, *contributions became partially deductible* from the income tax payment within the limit of the equivalent of 400 euro per year for each participant, and if the employer also contributes, the same level of deductibility is applied, namely, 400 euro, to the calculation of the taxable profit (previously to 2010, the deduction margin indicated 200 euro per year). On January 2012, contributions became fully deductible from the income tax payment, assimilating to the immunity of contributions to the optional pensions from the requirement of paying taxes.

The total number of optional pension funds is currently 10, at December 31st, 2013, and, presently, there is no low-risk optional pension fund registered, as these funds have merged with other funds indicating an average level of risk, there are 2 funds registering a high level of risk, and 8 funds of average risk.

4. Correlation between the net assets of the private pension funds and their main influence factors

Considering various factors which influence private pension assets, as interest rates, evolution in exchange rate and the stock market, in our research we determined the extent to which these factors influence or not the net assets value of the private pension funds, separately for each of the two components, the privately managed pension funds, Pillar II, and the facultative pension funds, pillar III (Cristea, 2013: pp. 81-100).

The evolution of the net assets of the privately managed pension funds, Pillar II, for the entire period of analysis, from the beginning till now, is presented in Annex 1.

For the analysis, we use monthly data provided by the Supervisory Commission of the Private Pension System, the Romanian National Bank and Stock Market Bucharest, for the period May 2008 - August 2013, for the privately managed pension funds, Pillar II (the research is applied for a number of 64 monthly observations), and for the period July 2007 - August 2013 for the facultative pension funds, Pillar III (the research is applied for a number of 75 monthly observations).

According to these factors of influence, the following variables have been applied for testing statistical correlations:

- the net asset of privately administered pension funds, as a dependent variable (its values during the studied period, May 2008 – August 2013 (Annex 1);

- the currency exchange lei/euro, the loan interest rate, the deposit interest rate, the monetary interest rate and the value of the BET-C index, as independent variables (Annex 2).

The analysis of the correlation between the dependent variable and the five identified independent variables can be done both separately, through the correlation coefficient, analyzing the correlation between the dependent variable and an independent variable chosen from the group of variables studied or globally, within the linear regression. The intensity of the correlation between the studied variables is assessed using the Pearson correlation coefficient.

Regarding this analysis, in Table 1 there are shown, for the Pillar II, for each multiple linear regression model, the value of the correlation coefficient (R), the value of the ratio of determination (R Square) and the standard error

Table 1. *Correlation models between net assets of the privately managed pension funds and the main influence factors - Model Summary*

Model	*R* **Correlation coefficient**	*R Square* **Ratio of determination**	*Adjusted R Square*	*Standard Error*	**Durbin-Watson Coefficient**
1	0.934[a]	0.873	0.862	1301.87394	0.167

a. Predictors: (Constant), BET-C index, exchange rate, deposit interest rate, loan interest rate, monetary policy rate
Dependent variable: net assets of the privately managed pension funds, Pillar II.

As can be seen from Table 1, all independent variables were entered into the model, for which the correlation coefficient, R, is very high (0.934) and the Ratio of determination, R Square, is 0.873. The correlation coefficient means that there is a strong correlation level and the ratio of determination shows that 87.3% from *the net assets variation of the privately managed pension funds* is explained by the variation of the five independent variables entered into the model.

Regression coefficients calculated for each of the five independent variables and the other statistical indicators of the correlation are shown in Table 2.

Table 2. *Liniar regression coefficients and the statistical indicators of the correlation between net assets of the privately managed pension funds, Pillar II, and the main influence factors*[a]

Model		**Unstandardized Coefficients**		**Standardized Coefficients**		
		B	**Std. Error**	**Beta**	**t**	**Sig.**
1	(Constant)	-416.391	11036.006		-0.038	0.970
	Exchange rate	5219.977	2033.912	0.355	2.566	0.013
	Loan interest rate	-1150.105	241.782	-0.801	-4.757	0.000
	Deposit interest rate	-372.080	384.301	-0.301	-0.968	0.337
	Monetary interest rate	688.065	607.280	0.369	1.133	0.262
	BET-C index	-1.045	0.477	-0.199	-2.192	0.032

a. Dependent variable: net assets of the privately managed pension funds, Pillar II.

It is noted that, for only model obtained, the significant value, Sig., takes very small values (under 0.05), only for three of the five independent variables entered into the model, respectively, *the exchange rate, loan interest rate, and BET-C index value*, while for the variables *deposit interest rate* and *monetary policy rate,* its value exceeds the maximum permitted value of 0.05, which allows to reject the hypothesis that between the loan interest rate and the monetary policy rate, on the one hand, and the net assets of privately managed pension funds, on the other hand, there is a significant relationship, being rejected from the model.

Using the calculated coefficients, which are found in column B of Table 2, the multiple linear regression model identified for the variables studied is given in equation no. 1.

$$Y = -416.391 + 5219.97 * X_1 - 1150.105 * X_2 - 1.045 * X_3 \quad (1)$$

where:
Y – net assets of the privately managed pension funds, Pillar II;
X_1 – exchange rate;
X_2 – the loan interest rate;
X_3 – BET-C index.

The interpretation of the coefficients from the obtained equation (equation no. 1) reveals that based on the analyzed data for the May 2008 - August 2013 period, on a short time horizon, the following correlations may occur:

- If the value of the exchange rate increases with one point, the total net asset of the privately managed pension funds value increases with 5219.97 thousand lei;
- If the loan interest rate increases with 1%, the total net asset value drops with 1150.105 thousand lei;
- If the BET-C index increases with one point, the total net asset value drops with 1.045 thousand lei.

The evolution of the net assets of the facultative pension funds, Pillar III, for the entire period of analysis, from the beginning till now, is presented in Annex 3.

For the analysis, we tested to what extent the factors previously considered to measure the impact on privately managed pension funds, Pillar II, influences the net assets of the facultative pension funds, Pillar III.

Analyzed period is July 2007 - August 2013, for which the research is applied to a number of 75 monthly observations.

The correlation model for the facultative pension funds, Pillar III, is shown into the Table 3.

Table 3. *Correlation models between the net assets of the facultative pension funds, Pillar III, and the main influence factors - Model Summary*

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson coefficient
1	0.964[a]	0.928	0.923	60613.66038	0.224

a. Predictors: (Constant), exchange rate, BET-C index, monetary policy rate, loan interest rate, deposit interest rate.
Dependent Variable: Facultative pension fund net assets, Pillar III.

The interpretation of the three resulting models of correlation is the following: all the five independent variables were introduced into the model, for which, the correlation coefficient, R, is very high, of 0.964 and a determination ratio, *R Square*, of 0.928. These figures show that there is a very strong correlation between the all variables, because 92.8% of the variation in total net assets is accounted for by the all five variables variation: *exchange rate, BET-C index, monetary policy rate, loan interest rate, deposit interest rate*.

Regression coefficients calculated for each of the five independent variables are shown in Table 4.

Table 4. *Liniar regression coefficients and the statistical indicators of the correlation between net assets of the facultative pension funds, Pillar III, and the main influence factors*

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	732002.319	404159.939		1.811	0.074
	Exchange rate	157689.376	71743.647	0.260	2.198	0.031
	Loan interest rate	-51773.621	11185.701	-0.535	-4.629	0.000
	Deposit interest rate	-2165.022	12868.353	-0.026	-0.168	0.867
	Monetary interest rate	-22602.578	15311.019	-0.183	-1.476	0.144
	BET-C index	-62.022	17.617	-0.381	-3.520	0.001

a. Dependent Variable: net assets of the facultative pension funds, pillar III

In this study, the significant value, Sig., takes values below the ones permitted, of 0.05, only for three of the five independent variables entered into the model, as well as for privately managed pension funds, Pillar II, respectively, *the exchange rate, loan interest rate, and BET-C index value*. For the variables *deposit interest rate* and *monetary policy rate,* its value exceeds the maximum permitted value of 0.05, which allows to reject the hypothesis that between these and the net assets of facultative pension funds there is a significant relationship, being rejected from the model.

Using the calculated coefficients, which are found in column B of Table 5, the multiple linear regression model, identified for the variables studied is given in equation 2.

$$Y = 732{,}002.319 + 157{,}689.376 X_1 - 51{,}773.621 * X_2 - 62.022 * X_3 \quad (2)$$

where:
Y – Total Net Assets of Facultative Pension Funds;
X_1 – exchange rate;
X_2 – loan interest rate;
X_3 – BET-C index.

The interpretation of coefficients from the obtained equation (equation no. 2) reveals that based on the analyzed data for the July 2007 - August 2013 period, on a short time horizon, the following correlations may occur:

- if the value of the loan interest rate increases with 1%, the total net asset value decreases with 51,773.621 thousand lei;
- if the exchange rate increases with one point, the total net asset value increases with 157,689.376 thousand lei;
- if the BET-C index increases with 1 point, the total net asset value drops with 62.022 thousand lei.

According to the analysis performed, should be considered that on a short time horizon, an increase in the loan interest rate and in the BET-C index will cause a slight decrease in net assets of private pension funds, both for pillar II, and for pillar III, the effect which will be counteract by a possible reallocation of the investments of pension funds to placements that provide better returns. On the other hand, increasing the exchange rate will affect to some extent the increase of the net assets of private pension funds.

The analysis[3] shows that, the evolution of the interest rate on deposits and the monetary policy rate does not affect the facultative pension fund assets, although their growth will have an indirect effect on these assets. The increase of the interest rate on deposits will increase the default rate on loans for possible continuing interest margin in the same range.

Knowing the value changes of the net assets of private pension funds is very important, primarily through their effects on the increase or decrease in value of investments for the insured accounts, while maintaining unchanged their contributions and, therefore, the results obtained in these placements.

5. Conclusions

Regardless of the organization of the pension system on the two core components of its, *public pension and private pensions*, were developed numerous *studies and analyzes regarding identifying the solutions to tackle the problems of public pensions*, aiming at the value evolution of private pension assets under the

influence of certain factors and their efficient allocation to investments that lead to high yields, by applying the uniform regulatory and guaranteed schemes.

In response to the solvency decrease of public retirement systems due to demographic changes, most countries have adopted a series of pension reforms during the past 25 years. Measures have included raising the rates of contribution, restructuring or reducing pensions, raising the standard retirement age and the introduction of private pensions in the structure of pension systems, supporting the private pensions by creating an appropriate legal framework, the establishment of rules for the management of the funds carefully monitored, in order to complement effectively public pension component.

In terms of the actual age at which it exits from the labour market, in the year 2009, in the countries of the European Union, this was 61 years and 5 months (European Commission, Active Ageing, 2012: pp. 58), and in the six countries of the European Union, the age at which it came out of the labor market was under 60 years. To increase the share of aged people who remain in the labor market, many European countries have raised or announced the intention of increasing the mandatory retirement age. These measures may have a slight impact on public opinion, so that young people will gradually accept that they will have to work longer than the current retirees.

Representatives of the European Commission argue that, once the States have undertaken the implementation of a particular model of reform, they have to maintain that system, regardless the economic situation. EU intervention in the architecture of the pension systems of the Member States is limited, amid different cultures and economies, with its own features and rules to manage pension schemes.

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Notes

(1) Report was developed for all 27 Member States of the European Union, but also included other five non-member countries, such as Croatia, FYROM (Former Yugoslav Republic of Macedonia), Iceland, Norway and Turkey.

(2) Starting with May 2013, the three supervisory bodies of private pensions market, insurance and capital markets, respectively Supervisory Commission of Private Pension System, Supervisory

Commission of Insurance and Securities Commission were replaced by Financial Supervisory Authority, common for all the three components of the financial market

(3) This analysis is taken from the article entitled "Study on the dynamics of private voluntary Pension Fund Assets in Romania", published in the African Journal of Business Management, vol. 6 (21), pp. 6347-6357, May 30, 2012, DOI: 10.5897/AJBM11.309, ISSN 1993-8233, http://www.academicjournals.org/AJBM/contents/2012cont/30May.htm

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Annex 1
The evolution of the net assets of the privately managed pension funds, Pillar II

Period	The value of the net assets (millions lei)
Year 2008	
May	86.45
June	187.12
July	285.23
August	393.81
September	498.31
October	598.46
November	715.72
December	831.90
Year 2009	
January	949.60
February	1076.46
March	1202.21
April	1330.69
May	1437.23
June	1573.56
July	1705.32
August	1850.51
September	1995.86
October	2116.58
November	2251.40
December	2384.39
Year 2010	
January	2537.70
February	2725.80
March	2967.20
April	3144.50
May	3236.30
June	3379.40
July	3379.40
August	3379.40
September	3236.30
October	4030.70
November	4152.40
December	4331.91
Year 2011	
January	4501.99
February	4682.88
March	4884.65
April	5059.34

Period	The value of the net assets (millions lei)
May	5184.74
June	5373.84
July	5550.49
August	5670.35
September	5799.53
October	6035.58
November	6206.80
December	6416.36
Year 2012	
January	6719.06
February	7006.73
March	7263.96
April	7501.57
May	7667.73
June	7920.70
July	8210.83
August	8493.43
September	8762.59
October	9049.56
November	9292.70
December	9637.28
Year 2013	
January	9987.66
February	10279.07
March	10543.60
April	10844.31
May	11265.81
June	11536.34
July	11961.77
August	12343.72

Annex 2
Evolution of the main factors of influence on the private pension funds in Romania

Period		Exchange rate lei/euro *	Loan interest rate	Deposit interest rate	Monetary interest rate	BET-C index
Year 2007	June	3.2264	13.28	6.67	7.25	6559.52
	July	3.337	13.14	6.55	7.25	7017.79
	August	3.2237	12.97	6.50	6.10	7017.55
	September	3.3466	12.92	6.56	6.48	6605.92
	October	3.3525	13.02	6.63	6.87	6914.50
	November	3.4707	13.04	6.76	7.00	6278.77
	December	3.5289	13.05	6.78	7.50	6665.47
Year 2008	January	3.6930	13.16	6.96	7.50	5167.49
	February	3.6528	13.49	7.31	8.00	5202.33
	March	3.7218	13.75	7.66	9.00	4964.97
	April	3.6426	14.36	8.33	9.03	5028.04
	May	3.6594	14.40	8.72	9.50	5488.62
	June	3.6557	14.41	9.16	9.75	4637.50
	July	3.5792	14.60	9.50	9.75	4385.25
	August	3.5268	14.90	9.92	10.00	4055.20
	September	3.6254	15.29	10.28	10.25	3235.74
	October	3.7454	16.67	11.06	10.25	2169.66
	November	3.7753	17.45	12.04	10.25	2177.39
	December	3.9153	17.47	13.22	10.25	1977.10
Year 2009	January	4.2327	17.87	14.03	10.25	1510.65
	February	4.2839	18.11	14.40	10.25	1244.65
	March	4.2821	18.15	14.53	10.14	1550.82
	April	4.1954	18.08	14.22	10.07	1949.17
	May	4.1689	17.73	13.52	10.02	2060.35
	June	4.2126	17.46	12.64	9.71	2104.60
	July	4.2168	17.00	11.51	9.50	2318.34
	August	4.2185	16.68	10.51	9.00	2519.07
	September	4.2389	16.50	9.92	8.53	2657.78
	October	4.2848	16.60	9.62	8.50	2653.02
	November	4.2881	16.57	9.50	8.00	2781.45
	December	4.2248	16.58	9.43	8.00	2714.77
Year 2010	January	4.1409	16.30	9.13	8.00	2966.73
	February	4.1179	15.60	8.60	7.50	3063.63
	March	4.0879	14.99	8.03	7.25	3519.93
	April	4.1285	14.23	7.43	7.00	3434.75
	May	4.1743	14.26	7.10	6.50	2952.22
	June	4.2396	13.90	6.93	6.25	2804.47
	July	4.2611	13.89	6.86	6.25	2964.79
	August	4.2396	13.59	6.81	6.25	2975.51

Period		Exchange rate lei/euro *	Loan interest rate	Deposit interest rate	Monetary interest rate	BET-C index
	September	4.2642	13.42	6.77	6.25	3102.99
	October	4.2798	13.17	6.71	6.25	3098.65
	November	4.2931	12.93	6.69	6.25	2994.34
	December	4.2925	12.65	6.70	6.25	3111.17
Year 2011	January	4.2622	12.40	6.68	6.25	3293.47
	February	4.2472	12.61	6.67	6.25	3412.29
	March	4.1646	12.54	6.51	6.25	3524.27
	April	4.0992	12.16	6.45	6.25	3528.33
	May	4.1120	12.13	6.38	6.25	3285.94
	June	4.1929	11.90	6.27	6.25	3312.27
	July	4.2405	11.66	6.16	6.25	3221.67
	August	4.2501	11.81	6.14	6.25	2917.41
	September	4.282	12.02	6.09	6.25	2648.19
	October	4.3238	12.13	6.07	6.25	2795.41
	November	4.3536	12.09	6.08	6.00	2585.64
	December	4.3267	12.08	6.07	6.00	2621.41
Year 2012	January	4.3428	11.90	6.02	5.75	2901.21
	February	4.3506	11.62	5.97	5.50	3103.44
	March	4.3652	11.35	5.82	5.25	3076.07
	April	4.376	11.02	5.66	5.25	2994.89
	May	4.4381	11.04	5.52	5.25	2591.4
	June	4.4603	11.11	5.43	5.25	2547.54
	July	4.5484	11.13	5.33	5.25	2628.85
	August	4.5163	11.24	5.30	5.25	2691.8
	September	4.5007	11.25	5.24	5.25	2616.1
	October	4.5583	11.33	5.23	5.25	2670.1
	November	4.5255	11.43	5.25	5.25	2608.2
	December	4.4895	11.49	5.22	5.25	2786.1
Year 2013	January	4.3793	11.55	5.21	5.25	2952.7
	February	4.3848	11.52	5.16	5.25	3090.9
	March	4.3915	11.42	5.08	5.25	3037.8
	April	4.3802	11.03	4.90	5.25	2930.7
	May	4.3375	10.78	4.76	5.25	2928.8
	June	4.4765	10.66	4.70	5.25	2822.4
	July	4.4257	10.55	4.58	5.00	2893.2
	August	4.4353	10.43	4.41	4.5	3047.8

*Monthly average exchange rate is calculated as the simple arithmetic average of daily exchange rates of the foreign exchange market provided by the National Bank of Romania.

Source: National Bank of Romania, http://www.bnro.ro/Baza-de-date-interactiva-604.aspx

Annex 3
The evolution of the net assets of the facultative pension funds, Pillar III

Period	The value of the net assets (thousands lei)
Year 2007	
June	58.70
July	328.70
August	892.04
September	1863.09
October	3137.84
November	8443.20
December	14371.81
Year 2008	
January	17553.00
February	21388.00
March	2481600
April	29217.00
May	34529.00
June	40141.00
July	47152.00
August	53461.00
September	59598.00
October	65785.00
November	75575.00
December	84287.00
Year 2009	
January	92675.00
February	100223.00
March	110484.00
April	121806.00
May	129942.00
June	139819.00
July	150532.00
August	161278.00
September	172612.00
October	180758.00
November	192091.00
December	204041.00
Year 2010	
January	215296.00
February	228295.00
March	246101.00
April	255420.00
May	255862.00

June	264393.00
July	276640.00
August	285460.00
September	297600.00
October	307040.00
November	314431.00
December	328000.00
Year 2011	
January	339570
February	349560
March	363368
April	372294
May	375740
June	385320
July	394100
August	397090
September	400840
October	413590
November	421270
December	435650
Year 2012	
January	455070
February	471410
March	483490
April	495180
May	500640
June	512230
July	527630
August	542440
September	554890
October	570340
November	580560
December	598920
Year 2013	
January	618590
February	632720
March	645380
April	653950
May	677270
June	687500
July	711120
August	730540

Source: Data processing on the published site Supervisory Commission of Private Pension System http://www.csspp.ro/evolutie-indicatori/, statistics section – data series.

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Single market fragmentation. The influence of the public decision system's features upon the national decision system: A case study of the Romanian Eco-duty(1)

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Abstract. *The concern for improving the functioning of the single market pertains both to the European decision authorities and to those of the Member States of the European Union. If we take into account the specificities of the European space development (Nedergaard, 2007, Matei and Matei, 2012) in understanding the single market building, as the effect of both the enlargement and the institutional evolution of the EU, of the public management practices and their specific legislation (European institutions), we believe that the integrated political approach of the single market is the fundamental condition of its existence. In support of those assertions we underline:*

1) *The specificity of the European decision-making system, the existence of three levels of decision – supra-systemic, systemic and under-systemic built under the European Treaties.*
2) *The distribution of powers between the European and national level, of the Member States based on the principles of action.*
3) *The European Regulatory Policy.*
4) *The convergence of the economic policies and the long term social impact, highlighting the involvement of the relevant actors in the single market.*

The improvement of the single market functioning by removing the administrative obstacles that restrict the exercise of one or more of the four fundamental freedoms of the EU, is the European priority and is found in the documents such as Europe 2020, COM(2012) 756/14.12.2012, COM(2012)164/4.4.2012.

The problem regarding the movement of goods and citizens pertaining to the existence of barriers affecting the cross-border activities, despite of the single market shall be analyzed in relation to the problem of vehicles pollution. The pollution is on the priority list of the European Union (Treaty establishing the European Community

(Art. 174/130r – EC Treaty establishing the polluter pays principle (PPP)). Therefore, the European Union is entitled to adopt measures under Article 114 TFEU in order to ensure the proper functioning of the single market for vehicles.
The multilevel governance system of climate policy presents both opportunities and challenges for policy makers […] the capacity of decision makers operating at any one level can be enhanced or (more frequently) constrained by the policies at other levels (National Research Council, 2010: 318), e.g. the case of the Romanian tax-register (Dinu, 2011: pp. 25-39). The same problem pertaining to the subsidiarity and the environment is underlined by Pelkmans (2003: p. 53) namely whether competencies should be assigned on the European Union's level with regard to following a certain environmental policy. Pelkmans best emphasises the core of the problem in the case of the trans-frontiers negative externalities (most of them are from the environmental field): should the European Union have an exclusive competence considering the fact that the EU countries have different national characteristics? It would probably not happen mainly because at least a part of the environmental problems are local, regional or national, and their differences are best considered on those administrative levels.
The paper refers to whether there is a correspondence between the procedural part of the decision-making (correlating the national and the European level) and the formal part consisting in a formula that weights the elements that the research finds important. In the paper the pollution issue is analyzed from the perspective of vehicles EU market fragmentation caused by the different implementation by the Member States of the taxes specific car-duties, as a result of the particular decision-making procedure. The duties and taxes are not harmonized at EU level, the Member States being free to exercise their tax powers on vehicles in accordance with the EU legislation. The lack of harmonization triggers such a "technical" fragmentation of the single market.
Romania does not have a broad experience in this area (as it is also a New Member State) or if it has it is one that has confirmed our lack of expertise (e.g. the case of the eco-duty) – e.g. the formula establishing the method of calculus for the eco-duty has led to its suspension in the past for reason of conflict between decision level and stakeholders (Dinu, 2011: pp. 25-39), as it does not take into account both the contextual variables and the technical indicators.
This paper focuses on testing this research question by going in-depth of the public decisions on which the eco-duty is based. There are several stakeholders involved, which only strengthens our hypothesis according to which not only the national and European level authorities craft the eco-duty, but also the bargaining power of duty payers versus car producers/dealers and the representing state authorities (Ministry of Environment and Climate Changes, Ministry of Public Finances) may have a strong impact upon the eco-duty design.

Keywords: single market, public decision, regulation.

JEL Classification: H41.
REL Classification: 13B, 20D.

The multilevel governance system of climate policy

In order to substantiate the *importance* of the problem nowadays, the aim of the paper is to review the research in the field of public decision-making pertaining to negative externalities, choice of alternative actions directed towards the institutions on both regional and central or local level. The negative externalities give a focus to this research due to their role in the economic theory of subsidiarity developed as part of the multilevel governance. In this regard, the negative (trans-frontiers) externalities represent an assigning criterion based on the subsidiarity principle, especially referring to the `beggar-thy-neighbour` policies, namely air or water pollution and commercial protection (Pelkmans, 2006: p. 5).

The *question* raised in this particular case mainly concerns one of the state's four functions, namely the distribution function, which embodies the decisions made to ensure equity, social justice and income distribution. Aiming at such a sensitive issue like equity, it can be said that in fact the public decision-making pertaining to this distribution function is strongly influenced by the political factor, more than other decision stages like building knowledge on public sector activities and organisation design (financing method, expenditures and local and central duties), anticipating the consequences (the effects of a tax on return – price increase, wage cut, increasing the retirement age), or assessing the alternatives (Matei, 2006: p. 63). These stages apply for all public decisions taken in the framework of the other state's functions. For example, in the case of the allocative function, due to the fact that the public decisions pertaining to this function aim at the government's intervention in the market's allocative function so to correct its negative effects (*e.g.* negative externalities), the stage referring to consequences' anticipation proves to be quite important (Matei, 2003: pp. 26-27). A similar situation can also be found in the decision context of the stability function, which intervenes in case of macroeconomic imbalances seen in the case of inflation, unemployment, economic downturn, deficits of the trade balance and balance of payments etc. (Ailenei, 2002: p. 29). In turn, the public decisions pertaining to the regulatory function aimed at reducing the tendencies towards monopoly or, in the context of this research, the negative externalities refer to setting limits for the discretionary behaviour and freedom of individuals by imposing certain rules (through a functional juridical system), thus emphasising the decision-making stage that aims at building knowledge on the public sector activities and organization.

Going back to the public decision-making, no matter to which state function pertains to, the decision variables specific to the field where the decision is applied are difficult to be defined. In the public decisions' case the problems at

stake are specific to both the private sector (efficient allocation, productivity, performance (Constantin et al., 2011)) and to the issues that only concern the public field (provision of public goods and services, collective choice, externalities). All in all, the public decision-makers dilemmas can be formulated as follows: What is to be produced? How is to be produced? For whom is it to be produced? How are these decisions made? (Stiglitz, 1999: p. 14). Therefore, the influence of each variable become important, be it contextual (organisational culture, strategy, stakeholders, legislation, and so on) or which intervenes in the decision efficiency (economic and social status, technical parameters, so on and so forth). Thus, the answer to the first question (What is to be produced?) lies in the resource allocation, underlined in the field literature with the help of the Production Possibility Frontier (PPF) instrument. The second dilemma must search its answers in the combination of the production factors (labour, land and capital) captured by the governmental policies (e.g. the environmental policy adopted as a response to a specific negative externality may affect at least one C (namely, Choice of technology). The target group (For whom is it to be produced?) is defined by the distribution, which is equally influenced by the fiscal policy (*e.g.* eco-duty) or by the public goods provided so to satisfy the needs of certain groups – free rider problem (e.g. the Romanian Jalopy Program) (Dinu, 2011: pp. 32-37). The decisions are collectively made (`tragedy of the commons`) and, as mentioned above, have different stages: building knowledge on the public sector activities and organisation, anticipating the consequences, assessing the alternatives and the influence of the political factor (Matei and Dinu, 2011).

The problem's elements of difficulty lay within the implementation of the policies avoiding or correcting the negative externalities. The multilevel governance system of climate policy presents both opportunities and challenges for policy makers […] the capacity of decision makers operating at any one level can be enhanced or (more frequently) constrained by the policies at other levels (National Research Council, 2010: 318), e.g. the case of the Romanian tax-register (Dinu, 2011: pp. 25-39). The same problem pertaining to the subsidiarity and the environment is underlined by Pelkmans (2003: p. 53) namely whether competencies should be assigned on the European Union's level with regard to following a certain environmental policy. Pelkmans best emphasises the core of the problem in the case of the trans-frontiers negative externalities (most of them are from the environmental field): should the European Union have an exclusive competence considering the fact that the EU countries have different national characteristics? It would probably not happen mainly because at least a part of the environmental problems are local, regional or national, and their differences are best considered on those administrative levels (see Table 1).

Table 1. *EU Subsidarity Test*

Step 1: verify whether the issue at stake falls under shared or (EU) exclusive powers	The power is shared, as the Member States are free to apply taxes other than VAT on passenger cars as long as these taxes are in line with the general principles of EU law. Vehicle taxation is not harmonised at EU level (Harmonisation in the field of indirect taxes has been difficult to achieve due to the unanimity requirement under Article 113 TFEU). This entails that Member States enjoy a wide level of freedom in determining whether to apply registration taxes on vehicles that are intended to be used on their territory and also in determining the level of taxation (SWD(2012) 429 final: 8).
Step 2: the 'need-to-act' in common; is regulation at national level ineffective (1st criterion) or too costly because of scale or externalities (2nd criterion)?	*1st criterion*: the multitude of different and un-coordinated thresholds and technical triggers for different levels of taxation such as engine size, fuel used or CO 2 emissions (be it for registration or circulation taxes) further complicates the already diverse market conditions for car producers triggering a tax-induced fragmentation of the Single Market, which results in tax-induced cross-border trade as well (COM(2012)756: 2). *Therefore*, there is a 'need-to-act' in common.
Step 3: can the common action avoid centralization at EU level? For example, by cooperative action among some or all member states, or by coordination, or by jointly accepting constraints on national regulation.	The national tax schemes are fragmented. Nevertheless, through the Communication and the SWD aimed at clarifying the EU rules on vehicle taxation, explaining rights and obligations of Member States, citizens and businesses the citizens and businesses are more aware of their rights and their obligations in various situations, thus triggering certain national regulatory changes (see Table 2).
Step 4: centralization at EU level is justified if step 3 is not credible.	NA

Source: adapted after Pelkmans (2012), *The Economics of Single Market Regulation*, p. 11.

Table 2. *National regulatory changes triggered by certain European decisions*

National regulatory changes pertaining to the registration tax (car eco-duty)	
Emergency Governmental Ordinance no. 50 of April 21, 2008	Establishing the pollution duty for vehicles
Governmental Decision no. 686 of June 24, 2008	Approving the methodological norms for enforcing the EGO no. 50/2008
Selected European decisions that triggered national regulatory changes pertaining to the registration tax (car eco-duty)	
Consolidated Version of the Treaty on the Functioning of the European Union, Article 110, March 30, 2010	No Member State shall impose, directly or indirectly, on the products of other Member States any internal taxation of any kind in excess of that imposed directly or indirectly on similar domestic products. Furthermore, no Member State shall impose on the products of other Member States any internal taxation of such a nature as to afford indirect protection to other products.
Judgment in Case C-402/09 Tatu v The Romanian State represented by the Ministry of Finance and Economy and Others, April 7, 2011	The pollution tax introduced by Romanian legislation, levied on vehicles on first registration in Romania, is contrary to EU law
Communication from the commission to the European Parliament, the council and the European Economic and Social Committee COM(2012)756 of 14.12.2012	Strengthening the Single Market by removing cross-border tax obstacles for passenger cars

National regulatory changes pertaining to the registration tax (car eco-duty)	
Commission Staff Working Document SWD(2012) 429 final of 14.12.2012	Principles of taxation of motor vehicles according to EU law as interpreted by the Court of Justice
Emergency Governmental Ordinance no. 9 of February 9, 2013	Establishing the environmental stamp (eco-duty) for vehicles
Governmental Decision no. 88 of March 13, 2013	Approving the methodological norms for enforcing the EGO no. 9/2013
Order of Minister no. 296 of March 15, 2013	Approving the procedure for establishing the amount representing the eco-duty for vehicles
Order of Minister no. 490/407 of March 29, 2013	Approving the procedure for refunding certain amounts established by EGO no. 9/2013

Source: developed by the authors based on information gathered from http://ec.europa.eu and http://europa.eu and from http://www.afm.ro/legislatie_acte_normative.php, last accessed on August 5, 2013.

Therefore, the same author reveals that when establishing the objectives, one must distinguish between three levels of externalities: bi- or trilateral, community and world. This approach of the collateral effect (externalities) narrows in a way the limits of the field research. It takes us to the above stages, namely cooperation, and when that fails (and it usually does when there are more than two actors involved) it comes down to the bargaining powers (Dinu, 2011: pp. 28-30). In fact, the integration process is led by the collateral effects from a policy field to another (Molle, 2009: p. 34), as we shall present the case of the collateral effect from the fiscal policy to the environmental one.

The overall objective of the paper is to map the public decision-making for a particular market failure (externalities or spill-overs) by appealing to the instruments provided by the multilevel governance vision and its subsidiarity principle so to provide a more efficient relationship between the costs and the benefits of a solid environmental policy. This must provide a correspondence between the procedural part of the decision-making (correlating the national and the European level) and the formal part consisting in a formula that weights the elements that the research finds important (e.g. the formula establishing the method of calculus for the eco-duty has led to its suspension for reason of conflict between decision level and stakeholders, as it does not take into account both the contextual variables and the technical indicators).

The *challenge* is to foray into both the field literature and the case study archives pertaining to the particular case of the eco-duties on both national and European Union level, following *actions* like establishing fiscal rules either to give in to the bargaining power of the negative externalities' `producer' or to the bargaining power of the negative externalities' `consumer`, thus reaching the *result* of keeping the cost of regulation to a minimum level so the market failure does not turned into a regulation failure.

The case of the negative externalities was picked out of the six situations in which the markets are not Pareto efficient: 1) Failure of competition, 2) Public goods,

3) Externalities, 4) Incomplete markets, 5) Failure of information and 6) Unemployment, inflation and imbalance – firstly because of its topicality and the intense debates that has been triggering in the EU-27 (Community guidelines on State aid for environmental protection 2008/C 82/01; Treaty establishing the European Community (Nice consolidated version) - Part Three: Community policies - Title XIX: Environment - Article 174 - Article 130r - EC Treaty (Maastricht consolidated version) establishing the Polluter Pays Principle (PPP), and so on) and, secondly, for sensitive issue that the most well-known negative externality (pollution) has proven to be. The reason for its highly sensitive feature, which in fact allows the intervention, refers to both sides of a failure. One is that the best possible result was not reached followed by the necessity to act, and the other is that the actors involved are unable to cooperate.

Insofar as markets can fail, appropriate regulation or subsidies or some other policy intervention (like EU common policies) will have to overcome or remove the market failure at the common level of government. Of course, this assumes that the EU level of government (with all its complex decision-making) can act benevolently in the EU public interest (Pelkmans, 2012: p. 2).

In most cases of market failures, however, government has to intervene. Yet, due to the imprecise nature and extent of market failures, regulatory intervention may well turn out to be too weak, too strong or otherwise not fully appropriate. Therefore, even if one strictly adheres to the EU public interest approach, there is nevertheless a risk, when regulating, of getting it wrong. The EU public interest will be badly served when market failures would be replaced by 'regulatory' or 'government failures' (Pelkmans, 2012: p. 4).

The influence of the public decision system's features upon the national decision system

The multitude of different and un-coordinated thresholds and technical triggers for different levels of taxation such as engine size, fuel used or CO 2 emissions (be it for registration or circulation taxes) further complicates the already diverse market conditions for car producers triggering a ***tax-induced fragmentation*** of the Single Market, which results in tax-induced cross-border trade as well (COM(2012)756 of 14.12.2012).

Despite the pressure coming from the car manufacturers, this type of market fragmentation continues to be fostered by the European realm as the Member States did not unanimously agreed upon a 2005 proposal on passenger car related taxes (COM(2005)261 of 5.7.2005). Therefore, not only there is no harmonisation at EU level of car registration and circulation taxes, but also they often use different thresholds (pertaining to the environmental elements) resulting in

(sometimes huge) differences in the tax levied. This absence of harmonisation, thus, triggers a 'technical' fragmentation of the Single Market.

Often, the thresholds have been set according to national market characteristics or national policy ambitions valid at the time of their introduction, and also having net revenue implications of successive reforms in mind (COM(2012)756: 8).

The European Union has always underlined the importance of introducing objective criteria in the car registration and circulation taxes, such as CO_2 emissions, and not technology-specific criteria, such as engine size or engine power (see Table 3).

Table 3. *Tax-induced market fragmentation*

Country (EU 27)	Registration tax	Eco-duty upon registration	Taxes are based on:
Belgium	Taxe de mise en circulation	Eco-Malus (Région Wallonne)	Engine power, expressed either in fiscal horsepower or in kilowatt (kW)
Bulgaria			
Czech Republic			
Denmark	Motor vehicle registration duty		Price inclusive of VAT and fuel efficiency
Germany			
Estonia			
Ireland	Vehicle Registration Tax (VRT)		
Greece	Registration tax	Luxury tax	Price inclusive of VAT
Spain	Impuesto Especial sobre Determinados Medios de Transporte		Price exclusive of VAT Rate depending on the CO 2 - emissions
France	Taxe sur les certificats d'immatriculation des véhicules	Taxe additionnelle à la taxe sur les certificats d'immatriculation Malus applicable aux voitures particulières polluantes	Horsepower. The formula: CO 2 /45 + (kW/40) 1.6 Levied by the regions There is also a CO 2 -based bonus-malus system. A malus (tax) is due above 140 g/km CO 2
Italy	Imposta provinciale di trascrizione	Imposta di bollo e imposta sul valore aggiunto	Rates depend on the type and the capacity of the vehicle
Cyprus	Registration tax	Excise duty	Cc and CO 2 - emissions
Latvia	Motor vehicle registration tax		CO 2 -emissions
Lithuania			
Luxembourg			
Hungary	Registration tax		Cc. The tax rate is based on the type of fuel and environmental features
Malta	Motor Vehicle Registration Tax		Registration value
Netherlands	Belasting van personenauto's en motorrijwielen		11,1% of the net catalogue price and depending on fuel type and CO 2 emissions. From 2013 the registration tax is only based on CO 2 emissions
Austria		Normverbrauchsabgabe	Consumer price exclusive of VAT

Country (EU 27)	Registration tax	Eco-duty upon registration	Taxes are based on:
Poland		Excise duty levied on vehicles before first registration on territory of Poland.	Price
Portugal	Tax on Motor Vehicles – Imposto Sobre Veículos(ISV)		Cc and CO 2 emissions
Romania	Registration tax (Taxa de Înmatriculare → Timbru de mediu)	Car pollution tax (taxa pe poluare pentru autovehicule)	Cc, pollution norm of the vehicle and vehicle type
Slovenia	Motor Vehicle Tax		Selling price exclusive of VAT. The tax rate is determined according to environmental criteria (CO 2 , Euro emission standards) and engine fuel. For diesel motor vehicles also Particulate Matter (PM) emissions
Slovakia			
Finland	Car Tax		Price inclusive of VAT and this tax
Sweden			
United Kingdom			

Source: developed by the authors based on information gathered from SWD (2012) 429 final: pp. 21-29.

The problem arising when using the inappropriate criteria can force the Car manufacturers - wherever economically meaningful - to adjust their supply to these design features of car taxes, notably by supplying cars to their main markets that remain just below certain thresholds, such as providing cars with engine sizes of 1599 cm^3 or 1999 cm^3.

One may look at this as customisation but, as it was also emphasised by the European Commission on June 6, 2012 in its final report on the Competitiveness and Sustainable Growth of the Automotive Industry in the European Union (CARS 21 High Level Group) the potential economies of scale of a Single Market with around annually 13 million new cars being registered cannot be exploited in full, having a negative impact both on the competitiveness of the industry and the effectiveness of incentive schemes. The cost of cars is also raised as a result. This is because a fragmented system induces car manufacturers to waste resources on fine-tuning cars to different thresholds, and reduces the cost-effectiveness of European climate policy.

Moreover, the thresholds should be regularly updated to keep pressure to buy a clean and efficient vehicle. From this perspective it is suggested that Member States examine in a Working Group how the criteria they use as a basis for calculating registration and circulation taxes can be better coordinated, so that the technical fragmentation of the EU car market is reduced, economies of scale are exploited, and environmental goals are reached in a cost-effective manner. It is also to be noted that the Commission services are currently preparing guidelines for Member

States wishing to introduce financial incentives in line with the European strategy (COM(2010)186 of 28.4.2010) on clean and energy-efficient vehicles.

In case Tatu (*Judgment of 7 April 2011, case C-402/09 Ioan Tatu v Statul român prin Ministerul Finanţelor şi Economiei and Others, paragraphs 52 and 53*), the Court clarified that although Member States have the power to make new tax arrangements, such powers are not unlimited. In this respect Article 110 TFEU would be deprived of meaning and purpose if Member States could introduce new taxes which had the purpose or the effect of discouraging the sale of imported products in favour of the sale of similar domestic products available on the domestic market which have been placed on the market before those taxes entered into force (SWD(2012) 429 final: 10).

The case study

In order to ensure the environmental protection by developing certain programs and projects for improving the air quality and to better fit the boundaries provided by the European legislation in the field, the Romanian authorities established in 2008 an eco-duty that soon became the perfect example for both the difficulties of addressing such a sensitive issue like cost covering for negative externalities and European v national decision-making bias.

For the analyzed period (2008-2013) there were several stakeholders that reinforced the fact that the applicability of the theoretic concept of public decision has specific characteristics as it pertains to each of the state's powers (legislative, executive and judicial). In practice, the decision takes different forms: managerial on the level of the executive power, political on the level of the legislative power and legal on the level of the judicial power. These approaches are not separate, but they are embodied by the tri-dimensional view (managerial, administrative and political) of the public decision, as it follows: the government, as a representative of the executive power applies the political decision coming from the legislative level and observes the other adopted decisions (see Table 4).

Table 4. *The public decisions pertaining to establishing the eco-duty*

Year	Emergency Governmental Ordinance	Constitutional Court Decision	Law	Decision on ...
2008	No. 50			Establishing the eco-duty for vehicles
	No. 208			Replacing annexes 1,2 and 3
	No. 218			Replacing annexes 1,2 and 3
		No. 1344		Art. 11 of EGO 50/2008 -rejected
2009	No.7			Modifying art. 8(1), replacing annexes 1, 2 and 4
		No. 586		Art. 1 – rejected
		No. 499		Art. 11 – rejected

Year	Emergency Governmental Ordinance	Constitutional Court Decision	Law	Decision on …
		No. 802		EGO 50/2008 and art. 11 – rejected
		No. 834		Art. 11 – rejected
		No. 1178		EGO 50/2008 and art. 4(a) – rejected
			No. 329	Modifying art. 1, 3(2b), 3(3-5), introducing art. 3(2f)
			No. 335	Rejecting EGO 208/2008
		No. 1596		Art. 4(1) and 11 – rejected
2010		No. 65		Art(s). 3(5) – rejected
		No. 137		Art. 4(a) – rejected
		No. 239		Art. 4(a) – rejected
		No. 408		Art(s). 3(2), 4(a) and 9(1) – rejected
		No. 500		Art. 4(a) – rejected
		No. 550		Art. 4(a) – rejected
		No. 1119		Art. 4 – rejected
		No. 1152		Art. 11 – rejected
		No. 1160		Art(s). 1 and 3(1) – rejected
		No. 1249		Art. 4(a) – rejected
	No. 118			Modifying art. 3(2d), 3(6), 5(2), 6(1a(1,2),2c), introducing art. 4(c), replacing annexes 1-3
		No. 1599		Art(s). 3(2), 4(a) and 9(1) – rejected
2011			No. 142	Approving EGO 7/2009
		No. 668		Art(s). 4(a) and annexes 1-4 – rejected
		No. 669		Art(s). 1 and 3 – rejected
		No. 673		Art. 4(a) – rejected
		No. 738		EGO 50/2008 – rejected
		No. 802		EGO 50/2008 – rejected and art(s). 1 and 3(1)
		No. 1088		Art(s). 1 and 3 – rejected
		No. 903		Art. 4(a) – rejected
		No. 921		Art. 4(a, b) – rejected
		No. 1241		Art(s). 3(2), 4(a) and 9(1) – rejected
2012			No. 9	Abrogating EGO 50/2008
		No. 1		Suspending art(s). 2(i), 4(2), 5(1) until January 1, 2013
			No. 185	Approving EGO 1/2012
2013		No. 9		Establishing the environmental stamp for vehicles

Source: developed by the authors based on information retrieved from http://www.afm.ro/legislatie_acte_normative.php, last accessed on August 5, 2013.

There are three key moments that the analysis must take into account with respect to the changes they trigger for the cost covering of the matter at hand. The first one refers to establishing the eco-duty in 2008, the second one refers to the law passed in 2012 that abrogated the previous eco-duty, and the third one to the environmental stamp (the new eco-duty). If the first key moment provides the state with considerable funds to cover the costs build by this particular negative externality, the second key moment drastically cuts the funding for 2012. After implementing the EU recommendations, the 2013 moment should reinstate balance pertaining to covering the costs of the negative externality, but the issues cannot as the fiscal year is not over (see Table 5).

Table 5. *Balancing the eco-duty revenue v eco program funding*

Fiscal Year	Fiscal revenue from the eco-duty for vehicles *Thousands lei*	Expenditures for environmental protection programs and projects *Thousands lei*
Pollution duty for vehicles		
2009	1.644.150	1.143.305
2010	1.658.502	1.889.884
2011	2.057.508	2.397.703
Duty for pollution emissions (Law no. 9/2012)		
2012	275.000	824.935
Environmental stamp		
2013	365.263	556.000

Source: developed by the authors based on information retrieved from http://www.afm.ro/informatii_publice_bvc_2010.php, last accessed on August 5, 2013.

The paper's aim is to identify the way in which the public administration succeeds in not only identifying the proper method of covering the costs induced by the negative externalities (in this case, the vehicles' pollution) but also to build the **consumers' awareness** regarding this issue. In doing that, the public administration should clearly put forward the programs and projects that the tax-payers are financing when paying the eco-duty.

When the eco-duty was first established (July 1, 2008) the normative act established that the gathered duties must finance programs and projects for environmental protection. When analyzing the 2009 budget of the Fund for the Environment (administered by the Environmental Fund Administration (EFA) under the Ministry of the Environment and Climate Change) we find specific reference to the environmental programs and projects finance in accordance with EGO no. 50/2008 on the establishment of pollution duty for vehicles. Nevertheless, this is not the case for the 2010-2013 budgets. The programs and projects developed by EFA are listed altogether, without underlining those meant for redistributing the eco-duty revenue (see Table 6).

Table 6. *The amounts allocated for each program or project (2009-2013)*

Environmental Programs and Projects	Allocated amount *Thousands lei*				
	2009	2010	2011	2012	2013
Program for stimulating the national car fleet renewal	228.000	228.000	544.484	114.000	166.000
National program for improving the environmental quality by creating green areas in municipalities	200.000	230.000	197.500	70.000	25.000
Projects for replacing and completing the classic heating systems with systems using solar, geo-thermal and wind power	310.000	310.000	197.899	90.000	40.000
Projects for renewable energy production	305.055	50.000			
Projects for afforestation	100.250	152.279	69.500	50.000	30.000
Projects for revegetation	0	0	0		
Projects for creating bicycle lanes	0	0	5.000		

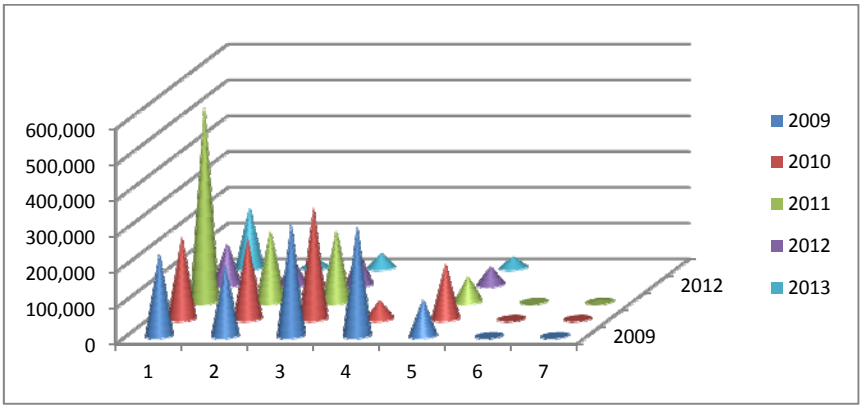
Environmental Programs and Projects	Allocated amount *Thousands lei*				
Program for pollution prevention		24.210			
Program on diminishing the impact upon the atmosphere, water, soil		100.000	27.800	13.937	1.256
Program on noise reduction		0	0		
Program on using clean technologies		0			
Program on waste management		239.000	112.200	41.132	1.250
Program on water resources protection		105.927	200.000	200.000	90.854
Program on integrated zonal coastal management		15.000	0		10.000
Program on biodiversity conservation		3.000	981	378	2.380
Program on managing the protected natural areas		2.350			
Program on Education and awareness on environmental protection		9.853	20.731	14.348	8.560
Program on renewable energy production growth		150.000	230.000	94.081	25.000
Program on greenhouse gas reduction		0			
Program on reconstruction and sustainable forest management		265			
Program on mining tailings closure		50.000	20.000	41.950	100.000
Program on works for preventing and diminishing the effects of dangerous meteorological phenomena		70.000	620.000	51.100	40.000
Program for stimulating the national agricultural machines fleet renewal		100.000	51.608		
Project on rebuilding the contaminated historical sites		0	50.000		
Projects on risk reduction for dangerous meteorological phenomena		40.000			
Projects on asbestos roofs replacement		10.000	0		
Program for monitoring, studying and researching the environmental protection field			25.000	19.009	4.500
Program on risk maps development for water basins			0		
Program on developing and optimizing the National Network for Air Quality Monitoring			20.000	20.000	10.000
Program for promoting the clean and efficient energy vehicles			5.000	5.000	1.200

Source: developed by the authors based on information retrieved from http://www.afm.ro/informatii_publice_bvc_2010.php, last accessed on August 5, 2013.

With respect to the consumer awareness, only the 2008 budget reflects the importance of underlining the need to balance the eco-duty revenue and the programs' funding. The budget clearly specifies that a number of seven programs and projects were financed in accordance with the Emergency Governmental Ordinance no. 50/2008 on establishing the eco-duty for vehicles (see Figure 1):

1) Program for stimulating the national car fleet renewal.
2) National program for improving the environmental quality by creating green areas in municipalities.
3) Projects for replacing and completing the classic heating systems with systems using solar, geo-thermal and wind power.
4) Projects for renewable energy production.
5) Projects for afforestation.
6) Projects for revegetation.
7) Projects for creating bicycle lanes.

Figure 1. *The seven programs and projects funded through the eco-duty collection*



Source: developed by the authors based on information retrieved from http://www.afm.ro/informatii_publice_bvc_2010.php, last accessed on August 5, 2013.

If those seven programs and projects were developed after carefully considering the costs of pollution and the proper fields where the gathered funds should be reallocated – and thus properly pricing externalities – or if there was only luck of the draw, is not emphasized by the other budgets (2010-2013). All the other programs and projects developed for that remaining period were funded under the "Environmental protection expenditures" chapter, without any specific reference to the eco-duty revenues.

Findings

The 2013 normative act (EGO 9.2013) ensured the compliance with the European Commission recommendations (in accordance with the 'need-to-act' in common – see Table 1) from COM(2012) 756, which establishes that the eco-duty on vehicles should not be based on specific technological criteria, but on objective performance criteria (e.g. CO2 emissions). The national authorities also reinforced that the legislative turmoil that preceded this normative act had not only a negative impact upon the financing of programs and projects for environmental protection, but also a direct impact upon the population by severely limiting the vehicles trade.

An important finding refers to the lack of synergy between the national and European decision-making. The analysis revealed that the initial establishing of the eco-duty in 2008 did not take into account the already existent EU recommendations pertaining to avoiding a multitude of different and un-coordinated thresholds and technical triggers for different levels of taxation such as engine size, fuel used or CO 2 emissions (be it for registration or circulation taxes), which would only further complicate the already diverse market conditions

for car producers triggering a tax-induced fragmentation of the Single Market, which results in tax-induced cross-border trade as well. Therefore, this lack of synergy delayed a proper eco-duty setting, leading to negative legal consequences (e.g. Case C-402/09, see Table 2) and a five-year decisional „fog" (from 2008 until 2013 when the eco-duty was reestablished – see Table 4).

In technical terms, the change involved shifting the focus of the car producers from dealing with the real issue (CO_2 emissions) to readjusting the engine sizes to 1599 cm³ or 1999 cm³, according to the established thresholds and only deepened the market fragmentation. The initial formula of the eco-duty (in 2008) referred to five variables:

1) A = the combined value of CO_2 emissions (grams/km);
2) B = the specific duty (euro/1 gram of CO_2);
3) C = engine size (Cc);
4) D = specific duty on Cc;
5) E = duty rate reduction.

The amount to be paid = [(A x B x 30%) + (C x D x 70%)] x (100 - E)%

The current formula (established by EGO 9/2013) shifting the focus back to the CO_2 emissions, considering the following three variables for the eco-duty calculus:

1) A = the CO_2 emissions level, expressed in grams/km;
2) B = the value of the CO_2 emissions, expressed in euro/1 gram;
3) C = environmental stamp reduction.

The amount to be paid = [A x B x (100 - C)] / 100

The public decision on negative externalities' coverage, made in accordance with the economic approach of subsidiarity in the multilevel governance provides a balanced solution for all interested parties – citizens, economic agents (car dealers and producers) and the government. Covering the social costs created by the negative externalities should be in line with both the national and European decisions, but, at the same time, suspending that duty (like in 2012, see Table 5) when it is conflictive is not an answer; it would leave the social costs uncovered as the funds for environmental programs and projects are mainly raised through this eco-duty (see Table 5).

Note

(1) The paper has been accepted and presented at the Annual Conference of the European Group for Public Administration (September, 2013, Edinburgh, Scotland – UK), PSG XVI: "Public and nonprofit marketing".

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Effects of macroeconomic variables on poverty in Iran (Application of bootstrap technique)

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Abstract. *It is believed that the level of poverty is significantly determined by macroeconomics variables such as inflation, government expenditure and unemployment rate. In this paper attempt has been made to investigate how macroeconomics variables affect the level of poverty in Iranian society. Our findings indicate that economic growth has significant effects on poverty in Iran. In addition, there is a negative relation between poverty and growth, namely increasing the growth rate leads to poverty reduction. The results of this study have also shown that unemployment and inflation have positive effects on poverty, while social security expenditure relating to government expenditure has no meaningful effects on poverty. In this study bootstrap technique is used to check the validity of the results.*

Keywords: poverty, unemployment, growth, government expenditure, bootstrap.

JEL Classification: E61, I32.
REL Classification: 7G, 8M.

1. Introduction

One of the most widely used measure is headcount ratio, which simply measures the proportion of the population that is counted as poor, often denoted by *H*. Formally, $H = \frac{q}{n}$ Where *q* is the number of the poor and *N* is the total population. Another moderately popular measure of poverty is the poverty gap index, which adds up the extent to which individuals on average fall below the poverty line, and expresses it as a percentage of the poverty line.

More specifically, the poverty gap (*I*) is defined as the poverty line (*Z*) less than the actual income (s_i) for the poor individuals. The gap is considered to be zero. Otherwise using the index function, we have:

$$g_i = (z - \mu^*).I(Y_i < z)$$

Then the poverty gap index (*I*) may be written as

$$I = \frac{\sum_{i=1}^{q}(z - s_i)/q}{z} = \frac{z - \mu^*}{z} = \frac{\sum_{i=1}^{q} g_i}{qz}$$

In addition to previous indices, Sen (1976) index is also used in this paper. Sen (1976) proposed an index that sought to combine the effects of the number of the poor, the depth of their poverty and the distribution of poverty within the group. The index is given by

$$P = Q(Z) = H\left[I + (1 - I)G^*\right]$$

Where *H* is the headcount ratio, G^* is the Gini coefficient of inequality among the poor and *I* is the poverty gap index .

In analyzing the poverty one of the basic questions is that how we can distinguish the poor from the non-poor? To answer this question, first we have to define poverty. With a literature review of poverty we can observe that various definitions are given for poverty. Each of these definitions has led to different criteria for assessment of poverty. There are various methods for calculating the poverty threshold. Depending on which concept of poverty to be concerned, there will be different methods of calculating poverty line. Table 1 summarizes the most important methods for evaluating the poverty threshold:

Table 1. *Different Methods for Assessing Poverty Line*

Method	Remarks
Measuring poverty line based on calorie needs	The poverty line is measured based on the calorie need and the concept of absolute poverty and the basic needs. In these studies, the poverty line is measured based on 2179, 2300 and 2000 calories.
Measuring poverty line based on 50 or 66% of the average household expenditure	This method indicates a relative definition of poverty line, in which poverty line is determined according to the average cost of the households and based on a related rate.
Measuring poverty line based on 50% to 66% of median of household expenditure	A percent of mean of costs is considered as the poverty line.
Measuring poverty line based on the reciprocal Engel coefficient	Average households expenditure multiplies the estimated Engle coefficient.

As you see in Table 1, there are various methods for calculating poverty line. If we assume that each person needs only 2000 calories of energy per day, the estimated poverty line is shown in Table 2 for the years 2001 to 2007. These results indicate that the poverty line in urban area has shown an upward trend in the years under study. The study carried out by Khodadad Kashi and his colleagues (2008) revealed that the income gap during the years 2001 to 2007 in rural regions, has had lots of fluctuations, so that in the year 2001, the income gap in rural regions was 0.234 and in the year 2005 it declined to 0.226 and in the year 2007 once again it increased to 0.243.

In urban regions, the income gap during the years 2001 to 2004 has had an upward trend so that this index was 0.214 in 2001, and increased to 0.243 in 2004. In 2005, the index declined to 0.199 and maintained an upward trend thereafter.

During 2001 to 2007, the poverty line maintained an upward trend both for rural and urban regions, so that the poverty line in rural regions increased from Rls819763 per month in 2001 to Rls2640222 in 2007. In urban area the poverty line increased from Rls1393267 to Rls4235601 during the same period.

Upon evaluation to attain minimum calories during the years 2001 to 2007, it was observed that the cost of calorie intake has increased for poor families during the period of study, so that each person in urban household needed Rls297602 per month for providing 2000 calorie per day in 2001 and Rls980118 in 2007. Regarding to Head-Count Ratio, we can observe that the number of poor people in 2007 increased compared to 2001, so that the rate of poverty increased from 4% of the total population in 2001 to 4.9% in 2007. Based on Sen Index, income gap, the changes in poverty have been shown in Table 3.

Table 2. *Poverty indices in Iran, based on 2000 calories intake poverty line*

year	region	Income gap	Poverty line	Head-Count Ratio
2001	rural	0.234	819763	4.5
	urban	0.214	1393267	4.0
2002	rural	0.235	1040327	4.1
	urban	0.228	1749769	4.4
2003	rural	0.233	1280090	4.2
	urban	0.231	2235705	4.1
2004	rural	0.235	1715157	4.2
	urban	0.243	2815233	4.6
2005	rural	0.226	1921691	4.2
	urban	0.199	3191748	4.3
2006	rural	0.224	2248901	4.6
	urban	0.212	3558943	4.7
2007	rural	0.243	2640222	4.4
	urban	0.231	4235601	4.9

Source: Khodadad Kashi et al., 2010.

Table 3. P*overty indicators based on 2179 calories intake poverty line*

year	SEN poverty index		Income gap index		Head-Count Ratio	
	Rural regions	Urban regions	Rural regions	Urban regions	Rural regions	Urban regions
2001	0.024	0.019	0.248	0.234	6.913	5.727
2002	0.021	0.02	0.247	0.245	6.129	6.01
2003	0.02	0.019	0.247	0.242	5.811	5.65
2004	0.019	0.022	0.242	0.252	5.503	6.084
2005	0.019	0.018	0.235	0.223	5.659	5.767
2006	0.022	0.021	0.233	0.233	6.627	6.474
2007	0.021	0.022	0.248	0.25	6.197	6.375

Source: Khodadad Kashi et al., 2010.

2. Effects of macro variables on poverty

Macroeconomic variables such as inflation, unemployment, government`s expenditure and economic growth affect the extent of poverty indices. In macroeconomic issues, the economic stabilization is one of the most important goals of economy, always persuade by governments through economic policies. Government and monetary officials apply macroeconomics policy including fiscal and monetary policies to stabilize the economy.

Not only Business cycle leads to the deviation of macroeconomics variable from their long run path but also badly affect the poor people. Two major business cycles include recession and inflation cycles. In the first case the economic activities will face a remarkable decline and the level of production and employment will decrease. It is obvious that the effects resulted from business

cycles that mainly include unemployment and inflation, will have the most important influence on low income and the poor stratums of the society. The reduction of employment through reduction of job opportunities will deprive all individuals of the society, especially poor people who are not the owners of the production, from gaining of income and the inflation will reduce their purchasing power over time. In such circumstances, the government and Central Bank implement stabilization policies in order to reduce the length of recession and inflation cycles. So, in continuation of the discussion, we will try to have a more precise analysis in order to study the effects of macro variables on poverty in Iran.

It also should be noted that some studies like Khodadad Kashi (2010); Baye (2006); Baye and Fambong (2001); Bigsten et al. (2003); Canagarajan et al. (1997); Datt and Gunewarden (1997); Datt and Ravallion (1992); Foster et al. (1984); Kakwani (1997); Mckay(1997); Ravalion (2001); Zelealem (2006) have reviewed the literature**.**

3. Introducing the model

In this section, we try to investigate the relation between macro variables and poverty level through an econometric model. In line with achieving this goal, we will first introduce the model and stationary testing of the variables, and we will then analyze the number of Co-integration vectors in poverty equations and finally we will estimate the optimal model and consider the tests for goodness of fit of the model and analysis of the estimated model.

In this research, the variables of inflation rate, unemployment rate, Gini coefficient, the share of Social Security and Health expenditures to the government's budget and the economic growth during the years 1985-2007 are considered as determinants of poverty level. The statistical information related to the price index, Gini coefficient, the Social Security and Health expenditure and the government's expenditure have been obtained from Central Bank of Iran and the information related to unemployment rate from the Statistical Center of Iran (SCI).

In order to study the effect of macro variables on poverty in Iran the following regression has been considered:

$$Pov = \alpha + \beta_1 Gini + \beta_2 SSG + \beta_3 U + \beta_4 Inf + \beta_5 Y + \varepsilon$$

$$Pov = \left[H, I, Q(Z)\right]$$

in which Gini is the inequality measure, SSG is the share of Social Security and Health expenditures to the government's budget, U is the unemployment rate, Inf is the inflation rate and y indicates the economic growth.

$$\frac{q}{n} = \alpha + \beta_1 Gini + \beta_2 SSG + \beta_3 U + \beta_4 Inf + \beta_5 Y + \varepsilon \quad (1)$$

$$\frac{\sum_{i=1}^{q}(z - s_i)/q}{z} = \alpha + \beta_1 Gini + \beta_2 SSG + \beta_3 U + \beta_4 Inf + \beta_5 Y + \varepsilon \quad (2)$$

$$H\left[I + (1-I)G^*\right] = \alpha + \beta_1 Gini + \beta_2 SSG + \beta_3 U + \beta_4 Inf + \beta_5 Y + \varepsilon \quad (3)$$

3.1. Stationary test

The use of usual methods of econometrics in experimental studies is based on the assumption that the time series variables existing in the model are stationary. On the other hand, most macroeconomic time series of are non-stationary. So, before using time series it is necessary to get assured whether they are stationary or non-stationary. To find out whether the time series variables used in the model are stationary or non-stationary, Augmented Dickey Fuller (AFD) test, Phillips-Perron (PP) test and Kwiatkowski–Phillips–Schmidt–Shin (KPSS) test have been used.

As you can see in Table 4, most of the variables in this study (excluding the unemployment rate and SSG) are stationary.

Table 4. *ADF, PP and KPSS test at 95 percent of confidence level*

Variables	ADF			pp		KPSS			
Stationary tests	ADF	*N(lag,c,t)	0.05	$Z(t_\alpha)$	B(f_0,c,t)	0.05	LM	***KPSS (f_0,c,t)	0.05
GINI	-3.72	N(0,c)	-3.0	-3.70	B(1,c)	-3.0	0.34	B(1,c)	0.46
h	-3.78	N(0,c,t)	-3.63	-3.78	B(0,c,t)	-3.63	0.10	B(2,c,t)	0.14
SSG	-2.45	N(0,c,t)	-3.57	-2.45	B(0,c,t)	-3.58	0.6538	B(0,c)	0.46
Inf	-2.97	N(0,c)	-3.0	-3.04	B(1,c)	-3.0	0.21	B(2,c)	0.46
Y	-4.77	**** N(0,n)	-1.95	-4.79	B(2,n)	-1.95	0.20	B(0,n)	0.46
U	-0.77	N(0,n)	-1.95	-0.77	B(0,n)	-1.95	0.12	B(3,n)	0.46
Sen	-3.88	N(0,c,t)	-3.63	-3.88	B(2,c,t)	-3.63	0.10	B(2,c,t)	0.14
Z	-3.97	N(0,c,t)	-3.63	-3.97	B(0,c,t)	-3.63	0.16	B(0,c,t)	0.14

In this research in order to determine the number of co-integration vectors, the test statistic quantities of λ_{trace} and λ_{max} have been used. As you can see in Table 5, based on the two statistics (λ_{trace} and λ_{max}) the existence of one co-integration vector in Sen regression equation is approved, but the equations in which the dependent variable is the number of poor people (h) and the income gap (Z), do not have co-integration vector.

Table 5. *Determining the number of co-integration vectors with* λ_{trace} *and* λ_{max}

Equations	hypothesis	λ_{max}	λ_{trace}	Critical value	p-value	result
SEN Equation(SEN)	$H_0 : r = 1$ $H_1 : r \geq 1$	0.22	5.05	3.84	0.024	One co-integration vector
number of poor equation (h)	$H_0 : r = 1$ $H_1 : r \geq 1$	0.000154	0.003	3.84	0.95	Without co- integration vector
Income gap equation(z)	$H_0 : r = 1$ $H_1 : r \geq 1$	0.153	3.32	3.84	0.068	Without co- integration vector

Source: current research.

So, taking the above issue into consideration, in this research in order to avoid encountering spurious regression, the regression model in which the dependent variable for poverty index is Sen, has been used in order to measure the effect of macro variables on poverty in Iran.

3.2. Estimation of the model

The results of a survey on the effect of macro variables on poverty in Iran reveal that the Gini Coefficient, unemployment rate, inflation rate, economic growth rate and the wartime have had significant effect on poverty in Iran.

As shown in Table 6, the Gini coefficient has a negative impact on the poverty in Iran. Perhaps it is assumed that there is a positive relation between inequality of income and poverty, but the case is that we have to determine what would be the reason for change of Gini coefficient and what is the reason for its increase and decrease?

The Sen poverty index is the result of poverty gap, Head count ratio and inequality in income distribution and specially income distribution amongst poor families. Actually the extent of poverty index mainly pertain to the poor people of the society. But on the other hand, the Gini coefficient is an index that addresses the distribution of income throughout the whole society and is influenced by income information of all people of the society. So, we cannot expect that there is always a pre-defined relation between the Gini coefficient and poverty index. This

means under specific circumstances the Gini coefficient may change in one direction and the poverty index may change in the opposite direction.

In the current study, the poverty index has been calculated based on the poverty line according to the minimum energy intake. During the study, the supporting policies (payment of subsidies for necessity goods) have caused the households to have access to their minimum energy requirements and this issue has a declining effect on the poverty calculated based on calorie.

On the other hand some studies confirm that the currency and monetary policies implemented during the period of study have increased inequality. So, it is natural that the direction of changes of poverty index and Gini coefficient during the period under survey to be reversed.

As we expected from theoretical point of view, the increase of unemployment rate leads to intensified poverty. As it is shown in Table 6, the unemployment rate in Iran has a significant effect on increasing the poverty. Also the inflation rate, as another macro parameter, has a significant effect on increase of poverty in Iran.

There is an important question whether or not the economic growth has led to reduction of poverty in Iran. The issue that how growth impacts poverty, depends on how the additional income resulted from growth is distributed within the country. In principal, if the economic growth happens with the increase of income for the poorest people, poor people's income will grow faster than people with an average level of living. Accordingly, if the economic growth is associated with the reduction of share of income of the poorest families, the growth of poor people's income will be less than the average income growth of the country. In other words, from the theoretical point of view, whenever the distribution of income is more balanced, with a specified rate of economic growth, poverty will be less than the average income growth of the country.

The results of this survey reveal that first the economic growth has a significant influence on intensity of poverty in Iran; secondly the relation between economic growth and poverty is negative which means the economic growth has leads to the reduction of poverty. In the estimated model, it is observed that the SSG has not had a significant effect on reduction of poverty.

Table 6. *Effects of macro variables on the poverty index (based on Sen index)*

$pov = \alpha + \beta_1 Gini + \beta_2 SSG + \beta_3 U + \beta_4 Inf + \beta_5 Y + \beta_6 Dum$				
variables	coefficient*	Standard error of coefficient	statistics t	p-value
intercepte	-7.838639	309.0166	-0.025366	0.9802
Gini coefficient	-2.057618	1.022801	-2.011747	0.0673
Share of social security expenditure in government budgets	847.1132	589.5236	1.436945	0.1763
Unemployment rate	0.836433	0.403429	2.073307	0.0603
Inflation rate	0.158920	0.074551	2.131713	0.0544
Economic growth	-0.119071	0.055098	-2.161074	0.0516
Dummy variable	-9.485832	1.956840	-4.847527	0.0004
Other measures				
$R^2 = 0.91$	$\overline{R}^2 = 0.85$	Durbin-Watson= 2.2	Prob(F-statistic)= 0.000025	
Ramsey RESET Test: F-statistic=-0.856613		Jarque-Bera= 1.16 Prob(0.55)	Heteroskedasticity Test: ARCH: $nR^2 = 3.33 \quad prob: 0.06$	

Source: current research.

3.3. Statistical test of the model estimators using bootstrap method

One of the important issues in studying the income distribution, poverty and social welfare is that it may be possible that the value calculated for an estimator or the value of its changes in statistical point of view is not significant. So, it is necessary to measure the statistical validity of the coefficient through calculating the confidence interval. Since the identification of distribution and estimation of diversion of the criteria of poverty indices is analytically problematic because of complexity, so the researchers use the resampling method. There are three traditional methods and one modern method in resampling. The traditional methods include: cross-validation, Jackknife method and Delta method. The modern method of resampling is called boostrap. Boostrap is used to calculate the confidence intervals for the estimated parameters. In other words, this method is used for bias correction of statistical inference.

In this survey, 200 of the existing samples were resampled and the confidence interval has been calculated for each coefficient at 95% significance. The findings are mentioned to include dispersion of criterion and confidence level for the estimators of regression model, specified based on the bootstrapping method in Table 7. Table 7 shows the confidence interval for the coefficient of the regressors.

Table 7. *Calculating standard deviation and confidence interval (with bootstrapping technique)*

variables	coefficient*	Standard error of coefficient(with bootstrap)	t statistics	Confidence interval (95)
intercepte	-7.84	20.88	-0.38	$[-28.72 \quad 13.04]$
Gini coefficient	-2.06	0.68	-3.01	$[-2.47 \quad -1.37]$
Share of social security expenditure in government budgets	847.11	1938.72	0.44	$[-1091.61 \quad 2785.3]$
Unemployment rate	0.84	0.21	4.07	$[0.63 \quad 1.04]$
Inflation rate	0.16	0.08	1.98	$[0.08 \quad 0.24]$
Economic growth	-0.12	0.04	-2.88	$[-0.16 \quad -0.08]$
Dummy variable	-9.49	1.22	-7.80	$[-10.7 \quad -8.27]$

Source: current research.

4. Conclusions

This study aimed to examine the poverty trend in Iran firstly by posing the relevant theoretical basis and then evaluating the impact of macroeconomic indicators on the Poverty so that based on these topics some policy recommendations is offered as follows:

1. The findings demonstrate that the unemployment has had a significant effect on the poverty increase in Iranian society. It is stated theoretically (in the macroeconomic domain) that Favorable performance of the labor market performs a crucial role in an economy while Iranian economy indicates disequilibrium in both supply and demand sides so as not use its potential capacities and causes more poverty. Hence it is offered that the government and central bank pursuit coordinated financial and monetary policies in line with job creation. Meanwhile, the vulnerable groups specially women and youth as the target groups must be regarded through the labor market and supportive priorities.

2. The results show that the inflation has a positive impact on the poverty increase in Iran. Rate of liquidity growth under the literature has been the most important paradigm among various effective factors so that the covariance of liquidity growth and inflation was positive and high correlated. So, adopting contractionary monetary policy by the officials in order to reduce the absolute poverty is the main solution for hinder the inflation rate.

3. As mentioned before that there is a negative relationship between the economic growth and poverty, therefore the relevant officials should have more attention on

this variable in order to reduce the absolute and relative poverty by following the growth-oriented strategies, besides designing more efficient institutions which give more proceeds and profits to the poor. In other words, the government in line with serving its necessary classics task which is fairly income, opportunities and facilities distribution should prepare a pattern for optimal allocation of resources as far as by implementing income redistribution policies make a proper pave for efficient transition of growth spillovers on the fragile groups and less developed regions.

4. The results indicate that the Expenditure share of Social Security and Welfare has not had a significant role in the government budget in order to reduce the volume of poverty. The empirical evidence states that the government expenditures lead to more inequality and poverty in the society. This is while that combination of government expenditures is the important issue in the path of making opportunities and facilities such that decreases the poverty in mid-term and long run, if it happens. That is, some measures like providing an appropriate basis in order to expand the growth of infrastructures such as roads, hospitals, schools, railways and generally the public goods in addition to preparing Latest minimum requirements livelihood of deprived regions including fresh water availability, electricity and sanitation services, presenting a good framework for the transfer and subsidies payments to the poor groups and so on could reduce the absolute poverty of the society. Hence it is suggested that the Iranian government applies a right combination for allocation of credits as well as resources distribution at the aim of enhancing the economic growth and poverty reduction.

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Determination of factors affecting willingness to pay for low SAR value cell phones: A case study of Turkey

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Abstract. *Along with the technological developments, products that improve the life quality have become commonplace. Cell phones are one of these products. Some of the radioactive waves produced during the communication of cell phones with base stations are absorbed by tissues in human body and negatively affect human health. SAR (Specific Absorption Value) is the rate with which these waves are absorbed by body tissues. The aim of the present study was to determine factors affecting the willingness of consumers in Tokat Province of Turkey to pay more for low SAR value cell phones using ordered probit analysis. Of the variables used in the model, age of the consumer, average monthly income, sickness feeling during long cell phone calls, awareness of SAR value, double SIM-card phone, use of earphone, level of social responsibility had positive coefficient values and were statistically significant.*

Keywords: mobile telephones, mobile communication, specific absorption rate, ordered probit.

JEL Classification: D01, D12.
REL Classification: 7B.

1. Introduction

With the advance of the technology, life-improving products have become commonplace. Mobile telephones, internet, wireless communication tools such as Wi-Fi technology are among the fast-growing technologies in recent years. Cell phones are one of these products. New cell phone models are brought to market and used for many aims such as sending message, taking pictures, listening to music, internet access in addition to phone calls. Based on the recent data, there are more than 5 billion active cell phones in the world and more than 65 million in Turkey.

Bestselling cell phone manufacturers in the world and their market shares are given in Tables 1 and 2.

Table 1. *Top Five Smartphone Vendors, Shipments, and Market Share, 2012 Q3 (units in millions)*

Vendor	3Q12 Unit Shipments	3Q12 Market Share	3Q11 Unit Shipments	3Q11 Market Share	Year-over-year Change
Samsung	56.3	31.3%	28.1	22.7%	100.4%
Apple	26.9	15.0%	17.1	13.8%	57.3%
Research In Motion	7.7	4.3%	11.8	9.6%	-34.7%
ZTE	7.5	4.2%	4.1	3.3%	82.9%
HTC	7.3	4.0%	12.7	10.3%	-42.5%
Others	74.0	41.2%	49.9	40.3%	48.3%
Total	179.7	100.0%	123.7	100.0%	45.3%

Source: www.idc.com, Access: 1 March 2013.

The top five smart phone sellers, marketed smart phone numbers and their market shares in the third quarter of 2011 and third quarter of 2012 are given in Table 1. Samsung had the largest market shares with 22.7 and 31.3% in the third quarters of 2011 and 2012, respectively.

Table2. *Top Five Total Mobile Phone Vendors, Shipments, and Market Share, 2012 Q3 (units in millions)*

Vendor	3Q12 Unit Shipments	3Q12 Market Share	3Q11 Unit Shipments	3Q11 Market Share	Year-over-year Change
Samsung	105.4	23.7%	87.2	20.1%	20.9%
Nokia	82.9	18.7%	106.5	24.5%	-22.2%
Apple	26.9	6.1%	17.1	3.9%	57.3%
LG Electronics	14.0	3.1%	21.1	4.9%	-33.6%
ZTE	13.7	3.1%	17.6	4.1%	-22.2%
Others	201.6	45.3%	184.6	42.5%	9.2%
Total	444.5	100.0%	434.1	100.0%	2.4%

Source: www.idc.com, Access: 1 March 2013.

The top five mobile phone sellers, number of cell phones marketed and their market shares from the third quarter of 2011 and third quarter of 2012 are given in Table 2. Samsung had the largest market shares with 20.1 and 23.7% in the third quarters of 2011 and 2012, respectively.

Table 3. *Mobile Phone Vendors and Market Share in Turkey, 2006*

Vendor	Market Share (%)
Nokia	64.8
Samsung	16.8
Sony/Ericcson	6.8
Motorola	5.8
Siemens	2.2
LG	1.9
Others	1.7
Total	100.0

Source: Şimşek and Noyan, 2009, Middle East Technical University (ODTU) Development Magazine, p.133.

Bestselling cell phone brands and their market shares are given in Tables 3 and 4. As can be seen in Table 3, the most selling cell phone brand in Turkey in 2006 was Nokia and had a 64.8% market share. Samsung followed Nokia with a market share of 16.8%. Table 4 shows the top selling cell phone brands in Turkey in 2012. Samsung is at the top of the list with a market share of 52.5%, followed by Nokia with 29.5%.

Table 4. *Mobile Phone Vendors and Market Share in Turkey, 2012*

Vendors	Market Share (%)
Samsung	52.5
Nokia	29.5
Apple	5.0
HTC	3.5
Sony/Ericcson	3.0
LG	1.5
Blackberry	1.5
Others	3.5
Total	100.0

Source: Akinci Electronic Communications, Istanbul, 2013.

The technological innovations and products that make human life more comfortable also bring some negative impacts on human life. Studies conducted so far have shown that cell phones cause dose-dependent complaints such as inability to concentration, fatigue, headache, insomnia, and pose threats for human reproductive system.

Communications among cell phones are carried out via base stations. Possible health risks of cell phones, therefore, are mediated by the signals emitted by the base stations (Cox, 2003: p. 241). A portion of radioactive waves released during the communications between cell phones and base stations are absorbed by the tissues of human body. SAR value represents the radiation emitted per tissue weight (Luxon et al., 2006: p. 1). Direct measurement of SAR value is almost impossible. Therefore, some parameters that can be easily measured or observed are used in determination of critical levels. SAR caused by a radio-frequency

emitting device is determined by measuring the electrical field in a nearby human tissue (Fung et al., 2002: p. 656). The more the human body absorbs energy, the higher the temperature increase and the risk for causing disorders in immune system. Studies showed that human body cannot regulate one °C temperature increase and remain vulnerable to certain risks. For a 1°C increase, 4W energy is needed to be absorbed per a kg of tissue (Taktak et al., 2005: p. 645).

Human body absorbs the radiation from radiofrequency waves in three ways (Aksoy et al., 2005: p. 3):
1. Based on the size of body part and wavelength of the signal,
2. Based on the interaction of radiofrequency waves and the tissue,
3. Based on the absorbance by vibration.

Cell phones are a radio receiver and transmitter, and need to be manufactured according to some standards in order to prevent the exposure to radioactive waves. Electromagnetic Field Study conducted by the World Health Organization suggested that SAR values of cell phones should be less than 0.1 Watt/kg. Cell phones sold in Turkey have SAR values between 0.1 and 1.11 Watt/kg (www.emo.org.tr).

There are many studies about the SAR value in literature. Moulder et al. (1999) investigated the association between radiation waves and cancer, and concluded that the epidemiological evidence of such an association was weak and inconsistent. This study indicated that the evidence for a causality relationship between the radiation from cell phones and cancer was only weak. Fung et al. (2002) found that efficiency of SAR lowering products is not sufficient, but some protective materials result in about a 9% decrease in SAR. Hossmann and Herman (2003) concluded that as long as the radiation intensity remains in non-thermal interval, its negative impacts on health will remain negligible. Cox (2003) studied possible adverse effects as well as short and long term impacts of base stations. The author concluded that these technologies have not been used sufficiently long enough to reach a clear conclusion. Timotijevic and Barnett (2006) studied the public behavior towards the recommendations by the British Government about the possible health risks of these technologies. They verified the present concerns of the public about the level of phone use. Dewenter et al. (2007) conducted a hedonic price analysis over mobile phones in German market. The investigators found that radiation was not statistically significant and its impact on the price of phone was not important. Wiedemann et al. (2008) studied the effect of SAR value on cell phone purchasing preference of public as well as the effect of declared precautionary SAR value on the risk perception of people. In empirical purchasing, price and features were the leading factors affecting the preference, while the information about the precautionary limit did not affect the risk

perception. Yeowve et al. (2008) investigated the factors affecting customer satisfaction in cell phone use in Malaysia. Using factor analysis, the investigators revealed that six independent factors explained 73.72% of the total variance. As the duration of total cell phone calls and family coordination increased, so did the exposure to radiation waves. Barnett et al. (2008) studied the mobile communication regulations in the UK, and tried to determine the public behavior towards the health precautions using exploratory factor analysis. Cousin and Siegrist (2010) carried out a study using cognitive models and determined that the participants were aware of but tended to disregard the damage caused by base stations. Markov (2012) dealt with the potential effects of wireless technologies on children's brains. He concluded that there is no way of determining the effects of radiation on the brains of children exposed to it.

Since the radioactive waves from cell phones cannot be seen and felt directly, their possible cumulative long term effects are not taken duly into account by the public. The aim of the present study was to determine factors affecting the willingness to pay more for purchasing low SAR value phones.

2. Methodology

2.1. Data collection

Data used in the study was sound first hand data obtained from a questionnaire [(1)]. In the present study where the factors affecting the willingness for the consumers to pay more for low SAR value cell phone was investigated, population over 18 years of age and over living in the town of Tokat in Turkey was studied. Data were obtained from randomly selected 550 consumers over the period from April to June, 2012, but 50 of them were discarded since they were not suitable for analysis. In order to determine the validity of the questions in the questionnaire form, a pilot application was conducted in downtown Tokat on 25 consumers, and final adjustments were made. In preparation of the questionnaires, other studies were also taken into account. Likert-type scale was used in the study. For the reliability of the scale, Cronbach Alpha coefficient was used and it was found that the scale had a moderate level (0.55) of reliability. In the questionnaire form prepared, questions about which factors were taken into account while purchasing a cell phone were asked.

In the first part of the questionnaire, the consumers were asked questions about their demographic and socio-economic situations. The questions in the second part was about the duration of cell phone use, considerations taken into account while purchasing cell phone, average daily time of cell phone calls and any disturbance after long phone calls. In the third part, awareness of consumers about

SAR value and their willingness to pay more for low SAR phones were determined. In the last part, consumers were asked to answer the questions about social responsibility level, behavior towards risks and adaptation processes to innovations.

For the analysis of the factors involved in consumers' willingness to pay more for their cell phone preferences, ordered probit model was used. This method has been commonly used in scientific studies. Bocaletti and Moro (2000) investigated the consumers' willingness to pay for food products obtained through biotechnology in Italy in 1999. Using ordered probit model, the investigators revealed that willingness to pay is influenced by income and awareness. Nayga, Poghosyan and Nichols (2002) studied the consumers' willingness to pay for radiated beef products using ordered probit model and found that about 58% of the participants were willing to pay a premium for radiated beef. Cranfield and Magnusson (2003) investigated the consumers' willingness to pay for the food containing pesticides using an ordered probit analysis and found that more than 65% of the participants were willing to pay more to these products compared to the traditional ones. Magnusson and Cranfield (2005) studied the consumer preference for food that does not contain pesticide in three Canadian towns using ordered probit analysis. They found that pesticide-free food products were preferred by consumers who were sensitive about environment, non-sensitive about the price, younger, who had better training and higher household income. Using a combination of an ordered probit and a split probit model, Harris and Zhao (2007) developed a zero-inflated ordered probit model. Erdem, Şentürk and Şimşek (2010) developed an ordered probit model and investigated Turkish consumers' willingness to pay for hybrid automobiles. They found that higher education, income, and environmental sensitivity levels were the major determinants of hybrid automobile preference. Gündüz and Emir (2010) analyzed the factors affecting frozen food consumption using ordered probit model. Results indicated that socioeconomic variables such as household size, age of household head, monthly household income, employment status of spouse, and behavioral variables such as health, price and the need to save time have significant effects on frozen food use. Hasegawa (2010) made a Bayesian estimate using ordered multiple probit and found that service and food had the highest share in total satisfaction of tourists. Lefevre (2011) used ordered probit model to measure the willingness of Senegal consumers to pay fresh local dairy products instead of products manufactured from imported powdered milk. Large households were less willing to pay for dairy products produced from local milk. Wealthy households, on the other hand, were willing to pay more to dairy products produced from local milk compared to moderate income households.

Definitions and descriptive statistics of variables used in the prediction model are given in Table 5. Descriptive statistics of variables obtained from the answers to some of the questions in the questionnaire form are given below: 49.8% of the participants were male and 50.2% were female. Average age interval was 18-40, the median education was college, and the median monthly income was 1500-2000 Turkish Liras.

Average daily cell phone use of the consumers was 30-60 minutes. Consumers felt moderate level of sickness feeling during long calls, had low awareness level for SAR value, and half of them valued use of earphones during cell phone calls. In terms of adopting the new developments, 30.4% adopted late, 27.4% the latest, and 24.2% fast. It was found that 30.8% of the consumers were risk takers, 38.4% moderate level of risk takers, and 30.8% low level risk takers. On average, consumers were willing to pay 20% more for low SAR value cell phones.

Table 5. *Variable definitions and their descriptive statistics*

Variables	Definitions of variables	Mean	St. dev.
WTP	Consumers' willingness to pay for lower SAR value mobile phones (none=0; %10 more=1; %20 more=2; %30 more=3; %40 more=4; %50 more=5; more than %50=6)	1.656	1.656
GENDER	Gender of respondent (female=0; male=1)	0.498	0.501
MARIAGE	Marital status of respondent (married=1; otherwise=0)	0.580	0.494
AGE	Age of respondent (between18 and 40 years=0; 41 years and above=1)	0.284	0.451
EDUC	Level of education (elementary school=1; secondary school=2; high school=3; vocational training school=4; university=5; master and above=6)	3.610	1.295
AVMINC	Average monthly income (0-749 TL=1; 750-1499 TL=2; 1500-1999 TL=3; 2000-2999 TL=4; 3000 TL and above=5)	2.326	1.258
CALLTIME	Average daily duration of mobile phone calls (minute) (0-5=1; 5-30=2; 30-60=3; 60-360=4; 360 and above=5)	2.802	1.047
FEELSICK	Feeling sick after long-term mobile phone calls (none=0; less=1; moderate=2; more=3; much more=4)	1.232	1.207
PUTAWAY	Put away your mobile phone when not in use (strongly disagree=1; disagree=2; Neutral =3; agree=4; strongly agree=5)	2.610	1.180
SARINFOR	Information about SAR value (none=0; lesser=1; less=2; moderate=3; more=4; much more=5)	1.884	1.535
DUALSIM	The importance of being possessed dual card mobile phone (strongly disagree=1; disagree=2; Neutral=3; agree=4; strongly agree=5)	1.810	0.951
EARPHONE	Using the earphone (strongly disagree=1; disagree=2; Neutral =3; agree=4; strongly agree=5)	2.180	1.023
SOCRESP	Level of social responsibility (lesser=1; less=2; moderate=3; more=4; much more=5)	3.362	1.065
INNOV1*	Innovators. dummy variable (if respondent is a first individual to adopt an innovation=1; otherwise=0)	0.064	0.245
INNOV2	Early adopters (if the respondent inside the second fastest category of individuals who adopt an innovation=1; otherwise=0)	0.116	0.321
INNOV3	Early majority (if the respondent adopt an innovation after a varying degree of time=1; otherwise=0)	0.242	0.429

Variables	Definitions of variables	Mean	St. dev.
INNOV4	Late majority (if the respondent adopt an innovation after the average member of the society=1; otherwise=0)	0.304	0.460
INNOV5	Laggards (if the respondent is the last individual to adopt an innovation=1; otherwise=0)	0.274	0.446
RISK1*	Risk averse (if participant is a risk averse=1; otherwise=0)	0.308	0.462
RISK2	Risk moderate(if participant is a risk moderate =1; otherwise=0)	0.384	0.487
RISK3	Risk lover(if participant is a risk lover=1; otherwise=0)	0.308	0.462

*Reference category omitted from the models to avoid multicollinearity.

2.2. Econometric model

In econometric study, when the dependent variables take more than two and qualitative values, data are categorized using a ranking system that takes into account their size. Ordered probit model is one of the most suitable ordered response models proposed for the solution of data sets with these kinds of variables. It is commonly used in social sciences (Maddala, 1983; Long, 1997: pp. 114-115). These kinds of constructs are most commonly encountered in Likert type scales in questionnaire studies. There is a clear and ranked nature of dependent variable categories. However, distances between successive categories are not equal. It is appeared that in many models where consumer theories are investigated ordered probit model is used (Bocalettive Moro, 2000; Nayga, et al., 2002; Cranfield and Magnusson, 2003; Magnusson and Cranfield, 2005; Harris and Zhao, 2007; Erdem et al., 2010; Gündüz and Emir, 2010; Hasegawa, 2010; Lefevre, 2011).

In ordered probit model, in addition to observed, exact and ranked categories (y), there is a continuous, but unobserved dependent variable. The unobserved latent dependent variable (y*) is explained by explanatory variables vector and error term. Error term is supposed to have normal distribution and the model is represented as follows (Greene, 2002: pp. 736-737):

$$y^* = x'\beta + \varepsilon \quad (1)$$

$$y = 0 \text{ if} y^* \leq 0 \quad (2)$$

$$y = 1 \text{ if } 0 < y^* \leq \mu_1 \quad (3)$$

$$y = 2 \text{ if} \mu_1 < y^* \leq \mu_2 \quad (4)$$

$$\vdots$$

$$y = J \text{ if} \mu_{J-1} \leq y^* \ . \quad (5)$$

Here, x represents x explanatory variables vector, β – parameter vector to be estimated, and ε – error term. Relationship between dependent variable (y) and unobserved dependent variable (y^*) is expressed as a function of threshold values(μ_J) which can take different values in different participants and which are estimated using (β) regression coefficients.

Since the consumers select one of the seven alternatives which they see fits best to themselves, dependent variable is ordered in a way to take seven different values ($y = 0, 1, 2, 3, 4, 5, 6$). In ordered probit model, probabilities for students to select one of the seven alternatives are calculated as follows:

$$\text{Prob}(y = 0|\text{x}) = \Phi(-x'\beta) \quad (6)$$

$$\text{Prob}(y = 1|\text{x}) = \Phi(\mu_1 - x'\beta) - \Phi(-x'\beta) \quad (7)$$

$$\text{Prob}(y = 2|\text{x}) = \Phi(\mu_2 - x'\beta) - \Phi(\mu_1 - x'\beta) \quad (8)$$

$$\text{Prob}(y = 3|\text{x}) = \Phi(\mu_3 - x'\beta) - \Phi(\mu_2 - x'\beta) \quad (9)$$

$$\vdots$$

$$\text{Prob}(y = 6|\text{x}) = 1 - \Phi(\mu_5 - x'\beta) \ . \quad (10)$$

In order for the probabilities to be positive, $0 < \mu_1 < \mu_2 < \cdots < \mu_6$ condition must be realized.

Here, Φ is cumulative normal distribution function. The model is solved through maximum likelihood method. To determine the effects of explanatory variables on probabilities, marginal effects are needed to be estimated. Marginal effects of seven probabilities can be estimated using the following equations via the help of derivation (Greene, 1997).

$$\frac{\partial \text{Prob}(y=0|\text{x})}{\partial \text{x}} = -\phi(x'\beta)\beta \quad (11)$$

$$\frac{\partial \text{Prob}(y=1|\text{x})}{\partial \text{x}} = [\phi(-x'\beta)\beta - \phi(\mu_1 - x'\beta)]\beta \quad (12)$$

$$\frac{\partial \text{Prob}(y=2|\text{x})}{\partial \text{x}} = [\phi(\mu_1 - x'\beta)\beta - \phi(\mu_2 - x'\beta)]\beta \quad (13)$$

$$\vdots$$

$$\frac{\partial \text{Prob}(y=6|\text{x})}{\partial \text{x}} = \phi(\mu_5 - x'\beta)\beta \ . \quad (14)$$

Here $\frac{\partial \text{Prob}}{\partial \text{x}}$ is the derivation of probability based onx, ϕ is cumulative normal distribution function, and estimation of ordered maximum likelihood ofβ, x.

Dependent variable of the study was the willingness of consumers to pay more for low SAR value cell phones. This variable was classified into seven groups, i.e. not willing to pay more, willing to pay 10% more, 20% more, 30% more, 40% more, 50% more and over 50% more. Descriptive statistics of variables used in the study are given in Table 5.

The assumption that consumers' willingness to pay more for low SAR value cell phones vary with socioeconomic and demographic features were taken as the basic hypothesis in the study. Expectations regarding the coefficients of some basic explanatory variables were summarized below:

Education variable was expected to be positive. It was thought that consumers with a higher degree of education are more conscious and they make a longer and more conscious market research before buying a product. Therefore, they are expected to be willing for paying more for low SAR value cell phones.

Coefficient of age of the consumer variable (AGE) was expected to be positive. Older consumers are expected to pay more for low SAR value cell phones, as older individuals take more care of their health and are willing to pay more.

Average monthly income variable (AVMINC) was expected to have a positive coefficient. Consumers with higher incomes are expected to prefer healthier, better quality and safer products. There is a positive correlation between income level and demand for superior quality products.

GENDER and MARRIAGE variables were expected to have negative coefficients. It is assumed that women are more sensitive than men, and married people are more sensitive than unmarried ones in terms of health issues.

Average daily cell phone call time (CALLTIME) was integrated into the model. It was assumed that there would be a positive relationship between CALLTIME variable and willingness to pay more for low SAR value cell phones. Therefore, consumers who make more daily cell phone calls would be willing to pay more.

Consumers' attitudes towards risk could affect their willingness to pay for low SAR value cell phones. It was presumed that there would be a negative relationship between risk variable and willingness to pay more for low SAR value cell phones. Consumers who want to take more risks are thought to be less willing to pay more for low SAR cell phones. In order to eliminate the dummy variable danger, RISK1 variable was taken as a reference category.

Rogers (1995) classified the consumers into five categories based on adoption characteristics of new developments: innovators, early adopters, early majority, late majority and laggards. Definitions for these categories are given in Table 5.

In order to test the association between categories for adoption of new developments and willingness to pay more, four variables (INNOV2, INNOV3, INNOV4 and INNOV5) were included in regression model. In order to eliminate the dummy variable danger, INNOV1 variable was taken as basic category. It was presumed that there would be a positive relationship between adoption of new developments and willingness to pay more for low SAR value cell phones. Low SAR value phones were considered as a new product for the consumers.

In the regression model was included the variables of feeling sick in long cell phone calls (FEELSICK), knowing SAR value (SARINFOR), use of dual SIM card (DUALSIM) and earphone (EARPHONE), level of social responsibility (SOCRESP) and putting away the cell phone while not using (PUTAWAY). Willingness to pay more for low SAR value cell phone was presumed to have a negative correlation with PUTAWAY variable and positive ones with other variables.

2.3. Experimental findings

Results of ordered probit model are given in Table 6. Of the variables in the model, age of the consumers (AGE), average monthly income (AVMINC), feeling sick during long cell phone calls (FEELSICK), knowing the SAR value of the phone (SARINFOR), dual SIM card phone (DUALSIM), earphone use (EARPHONE), social responsibility level (SOCRESP), INNOV3 and INNOV5 had significant positive coefficients. GENDER, MARIAGE, EDUC, CALLTIME, PUTAWAY, INNOV2, INNOV4, RISK2 and RISK3 variables of the model, on the other hand, were not statistically significant and were not discussed.

In order to eliminate Multicolinearity (multiple linear correlation), INNOV1 and RISK1 variables were randomly removed from the model. Based on maximum likelihood method, ordered probit model was statistically significant ($P < 0.000$). Coefficients of the model were tested using t ratio and standard error. Estimated threshold values in the model showed the quantitative association between benefit function of consumers and willingness to pay more for low SAR cell phones. According to Maddala (1983), threshold values should be positive and $\mu_1 < \mu_2 < \mu_3 < \mu_4 < \mu_5$. Threshold values of the model was positive and statistically significant ($P<0.01$). This finding implied that categories of willingness to pay more were suitably ordered and that socio-economic and demographic properties of the consumers had considerable effects on their willingness to pay more for low SAR cell phones.

Table 6. *Ordered probit model results*

Variables	Coefficients	Standard error	t values	P values
CONSTANT	-1.854***	0.400	-4.634	0.000
GENDER	0.076	0.109	0.702	0.483
MARIAGE	-0.061	0.127	-0.477	0.633
AGE	0.309**	0.130	2.377	0.018
EDUC	0.027	0.049	0.556	0.578
AVMINC	0.106**	0.045	2.364	0.018
CALLTIME	0.015	0.543	0.278	0.781
FEELSICK	0.078*	0.433	1.801	0.072
PUTAWAY	0.055	0.046	1.199	0.231
SARINFOR	0.275***	0.035	7.895	0.000
DUALSIM	0.129**	0.056	2.282	0.023
EARPHONE	0.101*	0.058	1.734	0.083
SOCRESP	0.090*	0.471	1.911	0.056
INNOV2	0.399	0.319	1.249	0.212
INNOV3	0.679**	0.291	2.330	0.020
INNOV4	0.378	0.295	1.285	0.199
INNOV5	0.477*	0.297	1.605	0.108
RISK2	0.184	0.133	1.386	0.166
RISK3	0.034	0.138	0.246	0.806
Mu(1)	0.879	0.065	13.435	0.000
Mu(2)	1.521	0.081	18.740	0.000
Mu(3)	2.109	0.096	22.087	0.000
Mu(4)	2.283	0.099	22.993	0.000
Mu(5)	2.660	0.115	23.132	0.000

Note: *, ** and ***show that the coefficients are statisticallysignificantat1, 5 and 10 percent significance levels.

Log likelihood function -753.9381, restricted log likelihood -837.8309,

Chi-squared (18) 167.7857, Significance level 0.000.

Marginal effects of variables in ordered probit model are given in Table 7. In order to take into account the marginal effects while interpreting the variables, coefficients given in Table 6 and marginal effects given in Table 7 were discussed together.

A one year increase in age of consumers over 40 years of age lowered the willingness not to pay more and to pay 10% more for low SAR value cell phones by 9.8 and 2.3%, respectively. Willingness to pay 20, 30, 40, 50% and over 50% more increased by 3.5, 4.2, 1.0, 1.7 and 1.7% with a one year of age increase.

Marginal effect of monthly income variable was negative in the first two categories, but positive in the subsequent ones. This finding implied that a one-unit increase

in monthly income lowered consumers' willingness to not pay more and to pay 10% more by 3.4 and 0.8%, respectively, but increased the willingness to pay more in other categories, though only slightly.

Table 7. *Marjinal effects for ordered probit model*

Variables	Prob(Y=0)	Prob(Y=1)	Prob(Y=2)	Prob(Y=3)	Prob(Y=4)	Prob(Y=5)	Prob(Y=6)
GENDER	-0.024	-0.006	0.009	-0.253	0.003	0.004	0.004
MARIAGE	0.019	0.004	-0.007	-.008	-0.002	-0.003	-0.003
AGE	**-0.098**	**-0.023**	**0.035**	**0.042**	**0.010**	**0.017**	**0.017**
EDUC	-0.009	-0.002	0.003	0.004	0.001	0.001	0.001
AVMINC	**-0.034**	**-0.008**	**0.012**	**0.015**	**0.004**	**0.006**	**0.006**
CALLTIME	-0.005	-0.001	0.002	0.002	0.001	0.001	0.001
FEELSICK	**-0.025**	**-0.006**	**0.009**	**0.011**	**0.003**	**0.004**	**0.004**
PUTAWAY	-0.017	-0.004	0.006	0.008	0.002	0.003	0.003
SARINFOR	**-0.087**	**-0.020**	**0.031**	**0.038**	**0.009**	**0.015**	**0.015**
DUALSIM	**-0.041**	**-0.009**	**0.014**	**0.018**	**0.004**	**0.007**	**0.007**
EARPHONE	**-0.032**	**-0.007**	**0.011**	**0.014**	**0.003**	**0.005**	**0.006**
SOCRESP	**-0.029**	**-0.007**	**0.010**	**0.012**	**0.003**	**0.005**	**0.005**
INNOV2	-0.127	-0.029	0.045	0.054	0.013	0.022	0.022
INNOV3	**-0.216**	**-0.049**	**0.076**	**0.092**	**0.022**	**0.037**	**0.038**
INNOV4	-0.120	-0.028	0.042	0.052	0.013	0.020	0.021
INNOV5	**-0.152**	**-0.035**	**0.053**	**0.065**	**0.016**	**0.026**	**0.027**
RISK2	-0.059	-0.013	0.021	0.025	0.006	0.010	0.010
RISK3	-0.011	-0.003	0.004	0.005	0.001	0.002	0.002

Marginal effects of FEELSICK, SARINFOR, DUALISM, EARPHONE and SOCRESP variables were negative in no-extra payment and 10% extra payment (the first and second extra-payments), but positive in others. Marginal increase in EARPHONE variable lowered consumers' willingness to pay 10% more for low SAR cell phones by 0.7%, but increases the willingness to pay more than 50% more by 0.6%. A one-unit marginal increase in FEELSICK, SARINFOR, DUALISM and SOCRESP variables increased consumers' willingness to pay 30% more for low SAR value cell phones by 1.1, 3.8, 1.8 and 1.2%, respectively.

In the top category, marginal effects of INNOV3 and INNOV5 variables were 3.8 and 2.7%, respectively, meaning that consumers who early adapt to new developments 3.8% more likely to pay more than 50% for low SAR value cell phones compared to other consumers. Similarly, the consumers who adapt last to new developments are 2.7% more likely to pay more than 50% more for low SAR value phones compared to others.

3. Conclusions

The aim of the present study was to determine the factors affecting the willingness of consumers to pay for low SAR value cell phones. Data were obtained from 500 consumers who were 18 years old and over living in the town Tokat in Turkey over a period from April to June, 2012, and subjected to ordered probit analysis. Of the variables in the Model, effects of age of the consumers, average monthly income, feeling sick during long phone calls, knowing SAR value of the phone, use of double SIM card phone, use of earphone, level of social responsibility variables were positive and statistically significant. It was revealed that average daily cell phone calling time was 30-60 minutes, that consumers felt less sickness when they made long calls compared to when they made moderate long calls, that they were less aware of SAR value, and that about half of the consumers valued using earphone when making cell phone calls.

Dewenter et al. (2007) conducted a hedonic price analysis about mobile phones in German market. In that study, radiation was not statistically significant and did not have a significant effect on the price of phone. Wiedeman et al. (2008) studied whether SAR value was associated with cell phone purchasing considerations of public and the effect of disclosure of precautionary SAR value over the risk perception of people.

In studies about empirical purchasing, it was found that price and features were the first considerations and that knowledge of precautionary limit did not affect the risk perception. In the present study a different approach was used. Using ordered probit analysis, factors affecting the willingness of consumers to pay more for low SAR value cell phones were ordered. It was found that the consumers were on the average willing to pay 20% more for low SAR value phones. The findings of the present study, thus, contradict the findings from other two studies.

The present study can be considered as a data set for both producers and manufacturers. Increasing health awareness of consumers would increase the awareness about using low SAR value cell phones. It can be concluded that a production planning considering the factors affecting and not affecting the cell phone prices by manufacturers would be extremely important for a more efficient use of resources and profitable production.

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Implications of the financial crisis to the relevance of Taylor rule Case study: European Union

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Abstract. *The recent global economic crisis has caused huge losses not only financial but also and more important losses related to the general confidence in the ability of the science of economics to contribute to the political decision making in a manner that will ensure an economic, social and sustainable development on the long run. To this regards, the science of economics, as any other science, must constantly review all its mainstream theories, theories that in time have been implemented by most of the economic policymakers around the world. The Taylor rule is a central element in the decision making process of monetary policy rates set by most central banks, both in developed and emerging economies .*
This paper proposes an analysis of the Taylor rule efficiency in terms of achieving the objectives of the monetary policy throughout the European Union, and to briefly outline some possible adjustments taking into account the unique specificity of these economies.

Keywords: macroeconomics, economic crisis, monetary policy, financial markets, Taylor's rule.

JEL Classification: E44, Q54, E43.
REL Classification: 8J, 8N.

1. Introduction

The recent financial crisis came as a surprise to macroeconomic policy makers. The financial crisis has been felt in the U.S. at first, but has quickly spread to the European continent and the entire world due to the very strong economic ties in the global financial system, as a result of the globalization process.

Basically, by the magnitude of adverse effects and the persistence, this crisis is proving to be one of the most severe economic crisis that mankind has seen so far. Today, more than five years after its inception, the financial crisis still makes its presence felt in the everyday lives of people everywhere.

Among the most damaging and long lasting effects of this financial crisis is the remarkable loss of confidence in the ability of the most market participation to the financial system to help grow the economy through the efficient allocation of resources, in the capacity of policy makers to help ensure economic stability and in the market's ability to self-adjust in time. Finally, it is also important to mention the trust loss of politicians and opinion leaders in the science of economics ability to provide concrete solutions to the problems encountered.

In these circumstances it is of the upmost importance for the science of economics to revise the widely accepted theories and assumptions on which it is based.

Taylor rule is a central element for analysing the decision making of monetary policy rates set by most central banks in both developed economies and emerging economies.

This paper is divided into five parts. After a brief introduction, the second part proposes a brief description of the Taylor rule, a rule that expresses a mathematical relationship between the monetary policy interest rate, inflation and the output gap (the difference between actual GDP and potential GDP). The third part aims to present the main coordinates of the evolution of the financial crisis in the European Union, focusing on the reaction of central banks in the EU. In forth part we analysed the monetary policies adopted by the European Union central banks, through the relationship proposed by John B. Taylor, in the pre-crisis period and during the crisis. The last part is an attempt to explain the reasons for deviations from this rule, and to outline some possible improvements to it.

2. Short description of Taylor's monetary policy rule

Taylor monetary policy rule expresses a simple mathematical relationship linking monetary policy interest rate, which is the main tool used by central banks to implement the economic policies that are responsible for, the output gap (the difference between actual GDP and potential the GDP) and the inflation deviation from the target (Taylor, 1993: p. 202):

$r = p + 0.5y + 0.5(p – 2) + 2$,
where:
r – monetary policy interest rate;
p – inflation rate over the last 4 quarters;
y – GDP output gap measured by:
$y = 100(Y - Y^*)/Y^*$,
where:
Y real GDP;
Y* potential GDP.

The above equation is adjusted for the US economy in which the targeted level of inflation and the equilibrium long term interest rate are equal with 2%.

Long before the appearance of this rule, economists have tried to find a mathematical relationship between inflation and interest rates charged by central banks. Although many relationships were previously proposed, the Taylor equation was the rule which prevailed between the theories of mainstream economic thinking. Currently this, rule is the main instrument to asses the decision making process of monetary policy rates set by most central banks in both developed economies and emerging economies.

Over the past decades, there have had outlined several monetary policy strategies. Currently, the most commonly used are direct inflation targeting strategy, practiced primarily in the European Union, and the strategy used by FED in the United States that implies the existence of a dual mandate: the central bank has responsibility for price stability and for the level of employment rate.

Inflation targeting strategy was first adopted in March 1990 by New Zealand and followed by Canada (1991), UK (1992), Finland, Spain and Sweden (1993) and Australia (1995). Romania has adopted this strategy in August 2005.

Both strategies involve the public announcement of a specific quantitative target (variation margin) inflation rate, valid for one or more periods and the accountability of the central bank to achieve it.

One of the main reasons why monetary policy Taylor rule has been so quickly agreed upon is because it fits very well both in terms of central banks having the fundamental objective of price stability and in terms of central banks having a dual mandate (Asso et al., 2010: p. 12). If central banks, besides pursuing price stability, also concentrates on full employment, the rule proposes a formula that takes into account these two objectives: the output gap tends to be minimum when the potential GDP equals actual GDP and the deviation of inflation from the target

becomes a separate part of the equation. If there is a single fundamental objective of monetary policy, namely price stability, output gap becomes a simple external factor that must be estimated correctly by the central bank.

With regards to the proper use of the mathematical relationships, in his published in work in 1993, Taylor stated that monetary policy makers must take into account many factors in determining the interest rates practiced and recommended adding the rule "on experimentally basis" (Taylor, 1993: p. 208).

Since its publication, Taylor rule has proven to be an effective tool in evaluating the performance of central banks. Studies on the application of the Taylor showed that during 1970, in most developed economies, interest rates charged by central banks were mostly below the level resulting from the application of this rule. From this perspective, the monetary policy of those years can be considered one of relaxation. By contrast, during the years 1980-2000, official interest rates have been consistently below the Taylor rule, the period is characterized by low inflation and an overall macroeconomic stability (Hofman, Bogdanova, 2012: p. 37).

3. Causes and manifestations of the financial crisis in European Union

There is a general consensus that the recent financial crisis has its origins in the US. In a brief analysis, the main reason for the outbreak of the financial crisis was the large volume of subprime loans that US banks have granted to individuals, based solely on real estate collateral. These credits could be granted because the US financial regulations allowed this. This is because banks which gave them could, in turn, emit a type of derivative called MBS (mortgage-backed securities), derivatives having for the underlying asset the mortgages on the financed houses. This created a vicious circle because these financial instruments fuelled the continued growth of the housing market, leading to buying houses only to access a housing loan. Eventually, after the grace period expired, the mortgage loan was refinanced by the bank through a higher amount because meanwhile the property value increased.

We can not say that the European Union commercial banks have granted too many of such loans. However the crisis has expanded rapidly in Europe due to high yields of MBS derivatives. By buying these derivatives in large quantities, the European banks also fuelled the U.S. housing market growth.

At some point, however, around 2007-2008, the housing market has reached its saturation level and the commercial banks were finding more and more difficult people with sufficient financial reliability to give them credit. The US housing market began to decline slowly and price MBSs literally collapsed.

The reasoning above seems to identify the main causes of the financial crisis in the banking regulations that allowed granting subprime loans and massive investments in financial derivatives. Another issue that stands out is the problem of corporate governance in the banking system. Basically managers of major banks on both continents showed a narrow view of the financial markets and the general course of economies, at the same time being attracted by the high profits made by the institutions they represent and by their personal financial bonuses.

For the above aspects, economic policymakers around the world seem to have put in an agreement. The most important evidence that sustains this fact is their recent adopted measures which will produce significant positive changes in corporate governance systems of the financial institutions and in the general worldwide financial regulations.

However, the causes of the financial crisis remain an extremely important and unresolved issue because the above reasoning doesn't answer an important question: how the commercial banks have had so much money in order to give the huge volumes of subprime loans? In the next chapter we show, using the a Taylor rule based model, that even before the 2008 financial crisis, there was too much liquidity in the economics systems, a fact noted by other independent studies (see OECD (2010); Taylor (2009); Hofmann, Bogdanova (2012); Belingher, Bodislav (2012) for Romania).

In terms of reaction to the financial crisis, most central banks of the world, including the European Union, responded by providing a sufficient level of liquidity in the market. It was the only thing they could do in the short term. This, however, reduced the negative effects only partially. In the short term it was not possible to address the root causes that led to this undesirable situation. When the financial system is in danger, it seems justifiable for a central bank to take action in order to increase liquidity in its financial system, even at the risk of inflation stress. Also, it's worth mentioning that during a financial crisis, in the short term, prices tend to fall.

4. Deviations from the Taylor equation

We tried to test the Taylor relationship for a number of major economies in the European Union: Euro Area 17, Great Britain, Poland, Hungary, Czech Republic and Romania. We chose these countries/economic zones to cover all types of EU monetary systems which are characterized by a very high diversity. The period analysed is 2000-2012 and the frequency of data is annual.

Euro Area 17 represents an economic zone that includes most of the developed European states who chose to submit to on a common monetary policy but kept their own fiscal policies and regulations of the financial system. Although the European treaties guaranteeing the implementation of strict fiscal principles (public debt 60% of GDP and a maximum budget deficit to 3% of GDP), fiscal policy in these countries has proved to be very different. Basically, only a few European countries have followed these principles. In these circumstances, it is difficult to adopt a common monetary policy that is suitable for all countries in the Eurozone.

Britain is one of the most advanced economies in the European Union and in the world with an important international currency and a highly developed financial system that has attracted many MBS financial derivative, later called toxic assets.

Czech Republic and Poland are two countries of the emerging economies EU group, characterized by sustainable growth rates in the long term without too many structural problems. It is important to note about these countries have been able to attract significant EU funds, funds that allowed a strong economic development, without increasing too much the level of dependence on external financial markets.

Romania and Hungary are two emerging countries very different from those above, that experienced in the pre-crisis period growth rates which were mostly based on the attraction foreign private capital. However, due to serious structural problems, these countries have not succeeded in attracting many European funds, and a large part of the capital inflows financed only imports for consumption.

The model used in this paper is based on Taylor's 1993 equation, in it's general form:

$i_t = r^* + \pi + \alpha(\pi - \pi^*) + \beta^* y$,
where:
i_t –Taylor monetary policy rate;
r^* – real long term equilibrium interest rate;
π – annual inflation rate Dec./Dec. calculated based on the Harmonised Index of Consumer Prices (HICP);
α, β – model parameters for output gap and inflation gap.
π^* – inflation target;
y – output gap measured by:
$y = 100(Y - Y^*)/y^*$,
where:
Y actual GDP;
Y* potential GDP.

For simplicity, in this article, we used parameters values $\alpha = \beta = 0.5$ for each economic area, according to the original equation proposed by Taylor in 1993. The values of these parameters depends on the country and are mainly linked to the specific economic and monetary policy that the central bank adopts.

Regarding the source of the data, we note that the data on the reference interest rates for monetary policy were collected from the websites of the relevant central banks. Most of the economies currently analysed are using inflation targeting as a monetary policy strategy. Regarding the analysed period (2000-2012), Hungary has adopted this strategy since 2001 and Romania since 2005. The remaining states had since 2000 as inflation targeting monetary policy strategy. This is relevant because such a strategy involves publishing central banks inflation target. Regarding Romania's Central Bank should be recalled that the state law for the period 2000 - 2004, price stability was the main objective pursued. In the annual reports of every year we can find the relevant inflation target level.

The annual inflation rate was collected from the Eurostat website based on the HICP (Harmonised Index of Consumer Prices).

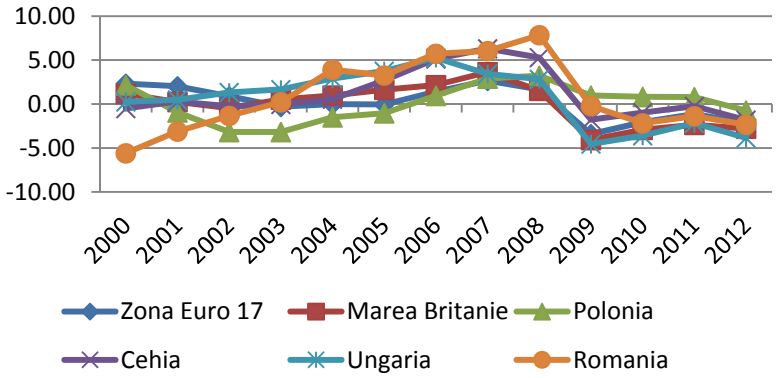
Output gap is the percentage difference between actual GDP and potential GDP. Calculation of this variable involves estimating potential output which is a conceptual variable. In the economic literature there are several methods for estimating the output gap. Two of them are most commonly used: the estimation method using a production function - the method involves estimating GDP at full employment conditions and at using the whole capital stock – and the estimation method using the Hodrick-Prescott coefficient. The latter requires econometric analysis of time series of actual GDP and the calculation of its trend and its residual component. Potential GDP is given by the trend. In our analysis we opted for the first method because it is less mechanical and is more sensible to the variation of important economic and demographical indicators. The data used in this analysis are based on an estimate of potential output using a production function that measures the level of GDP in conditions of full employment. For consistency, the data on the output gap for each of the economies analysed were taken from the European Commission's website, which contains their latest estimates of these variables. The results are presented in tables and graphs below:

Table 1. *Output gap (% of potential GDP)*

	Euro Area 17	Great Britain	Poland	Czech Republic	Hungary	Romania
2000	2,32	1,16	2,15	-0,51	0,25	-5,59
2001	2,02	0,24	-0,93	0,29	0,47	-3,12
2002	0,88	-0,47	-3,18	-0,24	1,33	-1,34
2003	-0,31	0,52	-3,17	-0,04	1,66	0,21
2004	-0,01	0,98	-1,49	0,56	2,90	3,91
2005	-0,05	1,63	-1,04	2,68	3,76	3,26
2006	1,40	2,16	0,95	5,13	5,25	5,72
2007	2,66	3,64	2,90	6,30	3,44	6,04
2008	1,66	1,53	3,22	5,29	2,83	7,84
2009	-3,42	-4,08	0,97	-1,78	-4,54	-0,22
2010	-2,07	-2,92	0,82	-0,97	-3,59	-2,18
2011	-1,14	-2,35	0,79	-0,25	-2,17	-1,38
2012	-2,18	-2,79	-0,73	-1,81	-3,86	-2,34

Source: https://circabc.europa.eu

Graph 1 - output gap (% of potential GDP)



Source: https://circabc.europa.eu

Equilibrium real interest rate is a conceptual variable representing the economic interest rate for which the money supply equals money demand. This is the interest rate that would be obtained if the prices would be stable and the output gap would be zero. There are many economic studies that support the estimation of this rate based on the potential GDP growth trend, which, in turn, depends on numerous economic factors (structural and/or institutional) such as: technical progress, population growth, changes in total productivity of the economy.

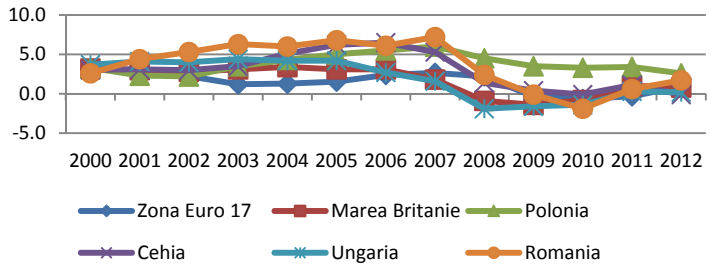
In our analysis we estimated the real equilibrium long term interest rate by calculating the trend of potential GDP estimated for the period 1996-2015 by the European Commission (1998 for Euro Area 17) via a production function, using a simple moving average of 3 periods. The results are shown in the table and graph below:

Table 2. *Real equilibrium long term interest*

	Euro Area 17	Great Britain	Poland	Czech Republic	Hungary	Romania
2000	3.2	3.2	3.3	3.0	3.7	2.6
2001	2.9	3.0	2.3	3.1	4.1	4.4
2002	2.2	2.8	2.2	3.0	4.0	5.3
2003	1.2	3.1	3.5	3.5	4.4	6.3
2004	1.3	3.4	4.3	5.1	4.2	6.0
2005	1.5	3.1	5.0	6.2	4.2	6.8
2006	2.4	3.1	5.5	6.5	2.7	6.1
2007	2.7	1.8	6.0	5.3	1.6	7.2
2008	2.2	-0.9	4.5	1.4	-1.9	2.4
2009	-0.3	-1.4	3.5	0.4	-1.6	-0.1
2010	-0.7	-0.8	3.3	-0.1	-1.4	-1.9
2011	-0.3	1.0	3.4	1.1	0.3	0.6
2012	0.9	0.8	2.6	-0.1	0.2	1.7

Source: own estimations based on Eurostat data.

Graph 2 - Real equilibrium long term interestReal equilibrium long term interest



Source: own estimations based on Eurostat data.

By applying the Taylor equation for calculating the monetary policy rate using the variables described above and comparing these results with the policy interest rates actually used by central banks economies, revealed the following:

Table 3.1. *Euro Area 17*

	Taylor rate	MPIR
2000	6.6	4.0
2001	6.0	3.9
2002	4.8	3.2
2003	3.1	2.3
2004	3.5	2.0
2005	3.7	2.3
2006	5.0	3.0
2007	6.5	3.9
2008	4.8	3.4
2009	-0.6	1.4
2010	0.4	1.0
2011	1.5	1.3
2012	2.0	0.8

Graph 3.1 Taylor vs. monetary policy interest rate Euro Area 17

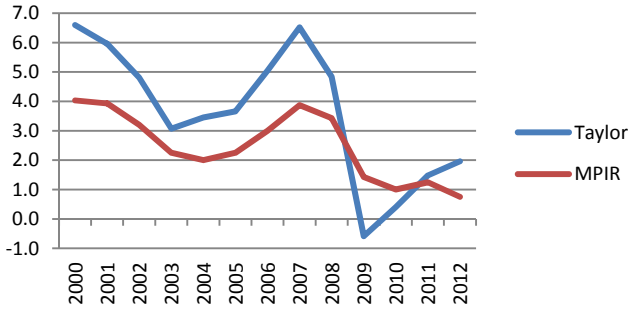


Table 3.2. *Great Britain*

	Taylor	MPIR
2000	5.4	6.0
2001	4.9	5.1
2002	4.7	4.0
2003	5.2	3.7
2004	5.7	4.4
2005	5.9	4.7
2006	6.7	4.6
2007	5.7	5.5
2008	2.4	4.7
2009	-1.0	0.6
2010	0.6	0.5
2011	2.9	0.5
2012	1.8	0.5

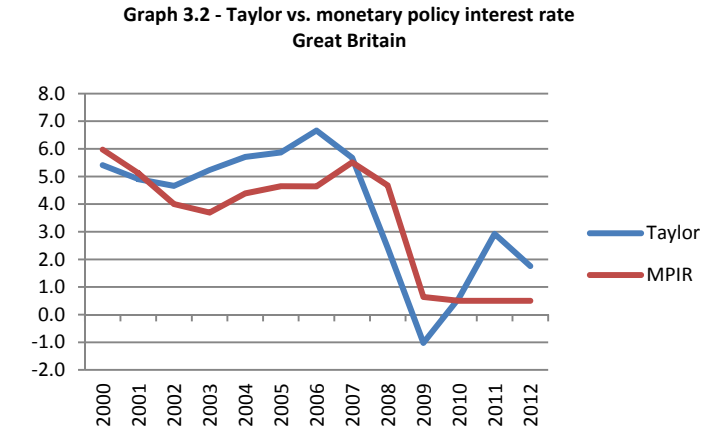


Table 3.3. *Poland*

	Taylor	MPIR
2000	11.6	18.0
2001	7.1	15.4
2002	3.5	8.5
2003	4.2	5.6
2004	7.0	5.8
2005	6.1	5.3
2006	7.9	4.1
2007	10.8	4.5
2008	9.0	5.7
2009	7.2	3.7
2010	6.4	3.5
2011	7.3	4.2
2012	4.6	4.6

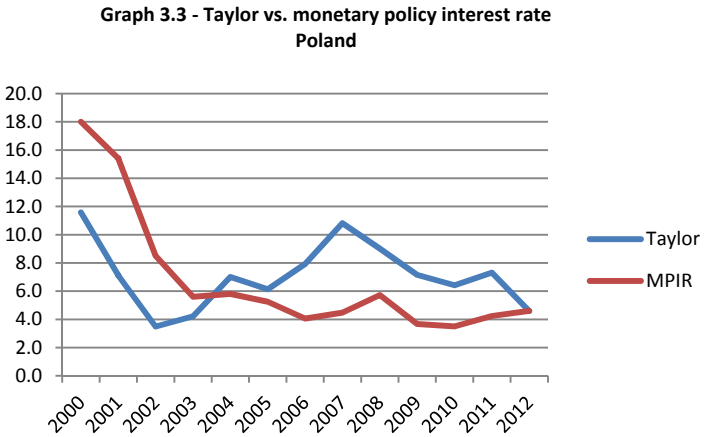


Table 3.4. *Czech Republic*

	Taylor	MPIR
2000	7.0	5.3
2001	6.7	5.1
2002	4.9	3.6
2003	6.0	2.3
2004	8.1	2.2
2005	10.0	2.0
2006	11.3	2.2
2007	12.7	2.9
2008	7.2	3.4
2009	1.3	1.5
2010	1.6	0.8
2011	3.4	0.8
2012	1.2	5.9

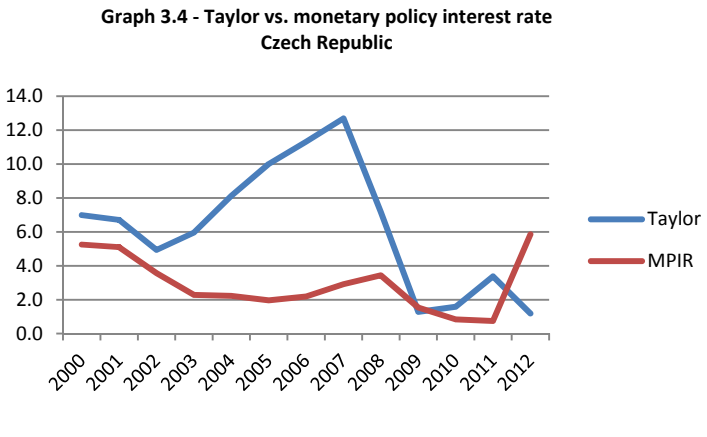


Table 3.5. *Hungary*

	Taylor	MPIR
2000	13.3	11.5
2001	11.2	10.7
2002	9.3	9.0
2003	9.8	8.7
2004	10.2	11.0
2005	9.7	7.3
2006	10.4	7.2
2007	8.5	7.6
2008	2.7	9.7
2009	0.3	7.6
2010	0.6	5.6
2011	2.8	6.5
2012	2.3	6.3

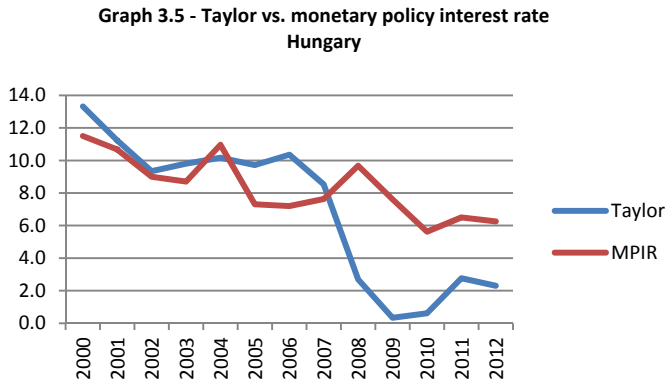
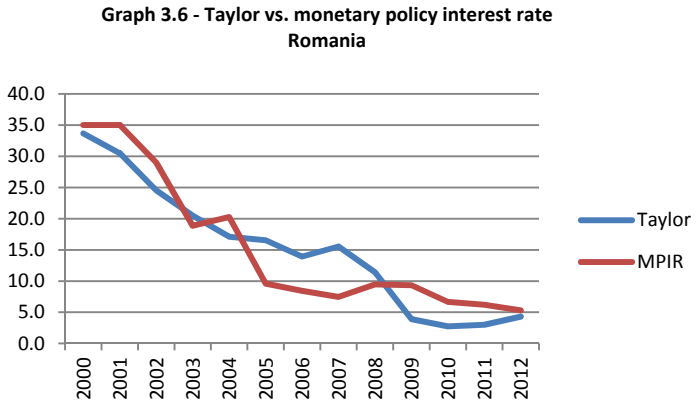


Table 3.6. *Romania*

	Taylor	MPIR
2000	33.7	35.0
2001	30.5	35.0
2002	24.5	29.0
2003	20.5	18.8
2004	17.1	20.3
2005	16.5	9.6
2006	13.9	8.4
2007	15.6	7.5
2008	11.4	9.5
2009	3.9	9.3
2010	2.7	6.7
2011	3.0	6.2
2012	4.3	5.3



From the above graphs and tables we can observe a significant deviation from the Taylor rule regarding the setting of monetary policy interest rates for the Euro Area 17 in the period 2000 to 2008, during which the interest rate used by the European Central Bank was under the Taylor level. In the UK there is a significant deviation in the period 2003-2006, in the same sense. In Poland and the Czech Republic similar deviations can be seen (with a higher magnitude in the Czech Republic) in the period 2003-2011 for Poland and from 2003 to 2007 for the Czech Republic. In Hungary there is a slight deviation in both directions, the central bank rate used were placed slightly bellow Taylor during 2002-2007 and above after 2007. Regarding Romania, the monetary policy rate was placed very close to Taylor in the 2001-2004 period, below this value during the period 2005-2008, above this value in 2009-2010 and very close (slightly above) after 2010.

5. Conclusions

The analysis results are consistent with several other recent studies on the subject. Basically, in the period before the financial crisis, the majority of EU monetary policies have been rather accommodative. In the situation of an economic boom, an accommodative monetary policy is of a procyclical nature. No one can ignore the fact that in the period before the financial crisis, in the banking systems around the world there has been an abundance of liquidity.

The questions arising from this conclusion are: how should have banks use this liquidity? There were other areas where banks would have been better to invest and did not?

Certainly, one reason that banks have not invested in other areas was the attractiveness of real estate investments sector. From this point of view, it is noteworthy that the U.S. housing market has also been supported by European banks, indirectly, through financial derivatives. Another possible explanation could be the quite strict regulations of the banking systems that didn't allow too much credit without the existence of collateral, in case of debtor default. This makes hard to finance those businesses that start from zero because there are not capitalized. However, some of these businesses involve real innovation, which is an essential element for sustainable growth. In our opinion, the regulations on these types of loans should be analysed in detail.

It is also important to note that most analysed central banks have successfully achieved their fundamental objectives of a low inflation (often set by state laws). From this perspective, we consider that economic science has to answer a seemingly simple question: How should inflation be measured? Inflation represents the general rise of prices. We must determine exactly what kind of prices. Real estate prices are not included in the international methodologies for calculating inflation. This happens, although the majority of our revenues are used for the purchase of houses (more or less new). One of the causes of the financial crisis is that excess liquidity has slipped somewhat unnoticed, going to real estate markets. This, in our opinion, is one of the main source of the crisis. When the banks began to face difficulties in repayment of loans and had to be assisted in providing liquidity for the daily operations, the financial crisis turned into a sovereign debt crisis and an economic crisis of great magnitude.

So far, long-term changes on the economic framework in response to the financial crisis have materialized in better regulation of financial markets and solve problems of corporate governance in financial systems. In the absence of a comprehensive analysis of all the causes that made the emergence and development of this crisis possible, the worldwide policymakers efforts to prevent future crises could be insufficient.

The crisis, however, also requires an answer to a fundamental problem of economics regarding how to set the optimal level of liquidity at a particular point in time in an economy. The model proposed by Taylor is not perfect mainly because it doesn't respond very quickly to major economic fluctuations that can not be ignored by central banks. After the occurrence of the financial crisis, central banks found themselves in a position to act to save their banking systems, and further increase the liquidity in the market. Another practical problem with the Taylor rule implementation is that this requires the use of several estimated variables (potential GDP, the long-term equilibrium interest rate, etc.). Also, the Taylor model doesn't respond to the problem of determining the inflation target. In theory, by setting a higher inflation target, a central bank policy may be procyclical but still fit into the model proposed by Taylor. In addition, we consider that it's necessary to improve the methods for calculating inflation worldwide. Currently, housing prices do not fall in the inflation index.

The above presented ideas highlights the importance of the Taylor rule in monetary policy decision making, which is an essential factor in preventing future crises.

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Non-performing loans – dimension of the non-quality of bank lending/loans and their specific connections

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Abstract. *This paper deepens the study of non-performing loans (NPLs), conceived by the author as an expression of non-quality of part of bank lending / loans, which is considered in turn, as being reflected directly by the proportions held by these loans in the total volume of loans (granted by banks). In this respect, it starts from conceptual delimitations required to perform the research, including a redefinition of NPLs (compared to the documentary sources in this area). A large part of paper is assigned, however, to the analyzes focused on econometric modelling, based on the determining relationships regarding the volume of NPLs, the author outlining appropriate regression models, taking into consideration the volume of these loans, both as dependent variable and as determinant variable within relationships with some macro indicators (the total volume of bank loans, GDP, etc.), included in these regression models, either as determinant or dependent variables. Testing them, by processing the corresponding data in Romania's case, led to relevant results and conclusions, being also validated the models used.*

Keywords: bank loan, loan categories, causal linkages, feedback, econometric models.

JEL Classification: C22, E43, E51, G21.
REL Classification: 11B.

Introduction

Bank lending is performed as a complex process, centered on the fundamental principles of credit, assuming, firstly and objectively, the obligation of repaying the borrowed money amounts and paying the related interest by the borrower in favour of the creditor banks. Applying these principles appears to be defining in assessing the quality of lending and implicitly of the bank loans by fulfilling some conditions of economic and financial performance, both in activity of banks and in that of the debtor customers. On the contrary, disrespecting those principles assumes usually nonperformance or poor performance in the activities of participants in the credit relationships, associated with the presence of non-performing loans (NPLs).

From the same perspective, it appears to us significantly also the way of manifestation of the general credit risk, materialized, mainly, by not being reimbursed the borrowed amounts (at maturity) and not being paid the corresponding interest, even if in the phases of approval and granting of the loans there were favourable conditions to obtain performance in the activities of the contracting parties and, concurrently, to assure the quality necessary for these loans.

The eventual non-quality of bank lending is reflected synthetically in those loans granted by bank for which borrowers do not make the due payments related to them, they being generally called nonperforming. Such a financial phenomenon arises in the context of current running credit processes under the incidence of certain objective and subjective factors, which usually manifest themselves in the financial and economic activity of debtors, but sometimes, also in the lending activity performed by banks itself. On a broader plan, however, as determinants of non-quality of lending and, implicitly, of bank loans, respectively of recording of NPLs by creditor banks, should be considered the very lack of quality or performance in the activities of the credit contract parties.

On the other hand, the transfer of some current loans by creditor banks in a separate category, of NPLs, may produce multiple feedback effects. Such effects have an impact on the flows and financial results achieved, firstly, by the participants in these credit relationships. But, in a broader plan, the NPLs' feedback manifests itself on macroeconomic level, based on some connections and correlations, certified also by the dynamics of these loans, in relation to that of some typical indicators, including gross domestic product (GDP), which appears particularly relevant.

A relatively long period, the quality of bank lending and the existence of non-performing loans have not captured the attention of researchers in this field. However, on the background of amplifying the proportions of this financial

phenomenon and of the observation of its effects, they started to be tracked and quantified in many other states, and in Romania only after 2000.

At the same time, it has to be admitted that the smaller sizes of NPLs and the effects generated by them till the current economic and financial crisis, could explain also the existence of relatively few studies published before 2000 on the quality of bank loans respectively on NPLs. Moreover, the latter become, not only in a direct way, an expression of non-quality of a part of bank lending and loans, but also, indirectly, a true measure of the quality of the overall lending activity and of the entire volume of bank loans. However, especially in the financial crisis context, the declining quality of bank loans, which is reflected in a concrete way by higher and higher dimensions of the NPLs, justifies the extension of research on identifying the factors that determine the existence of this category of loans and the effects induced by their presence on the economic and financial situation, including on the development of the whole society.

Therefore, we consider that it is still necessary to study more in-depth the quality of lending and bank loans, including from the perspective of their non-quality, especially considering the volume of NPLs registered by banks, in order to improve the management of the activities for preventing or decreasing the proportions of this category of bank loans and thus to increase the level of lending quality. In the same framework, we consider that for the relevance of the approaches and conclusions resulted from the analysis regarding the quality or non-quality of lending and bank loans it is necessary also to define the concept of non-performing bank loan, in terms of its financial and economic essence.

Conceptual approaches

There is no doubt that the presence of non-performing loans affects the quality level of the lending activity performed by banks and, implicitly, of the bank loans, considered globally. But under the latter aspect, one can see that the concept of quality of bank loans itself is too little outlined, including in the scientific literature. Only some connotations of this phrase can be identified in a classification of loans granted by credit institutions, which is consistent with the scheme developed by the Institute of International Finance (IIF), quoted in the literature. This classification distinguishes, in a descending order of their quality level, five classes of loans, namely standard, watch, substandard, doubtful, loss (Krueger, 2002: p. 20). The classification of the bank loans in a class or another is based mainly on the criterion of the delay of the due payments on loans received (with a certain number of days) by the debtors of the banks, last class including the loans with total lack of quality.

In our opinion, yet, such an approach of the quality of bank loans, although provides a significant image, it is not relevant enough, given both the approximated, variable and questionable nature of the choice of the number of days of late payments and the diversity of the causes that generate not making the due repayments and interest payments.

At the same time, it has to be recognized that, in principle, the quality level of lending and bank loans depends, on the one hand, by the very quality of specific activities performed by banks, starting from the phase of credit policy development, including their exigencies in assuming the risk of default for the granted loans. But on the other hand, is entitled the appreciation of the quality, respectively of the non-quality of the loans granted by banks, by reporting to the existence of the delays from the borrowers in making due repayments and interest payments, which is usually caused by the lack of performance in the activities financed by the loans in question. It is highlighted thus the determining role of the quality of financial and economic activities conducted by the beneficiaries of bank loans, respectively the direct impact of the levels of performance obtained by them on the formation and the dimensions of NPLs and, implicitly, on the non-quality proportions of bank lending. However, precisely from this perspective, achieving higher performance within the activities of the parties involved in credit relations becomes a vital precondition for the optimal progress and completion of lending processes, inclusively for the prevention of non-quality or ensuring the necessary quality for bank loans. Moreover, it is highlighted, thus, also an objective connection of the quality of each (banking) loan with the performance levels achieved by the debtors and the creditor banks in their activities, being admitted that these levels are reflected in the results obtained by each participant to the credit relationships, which prints each credit either a performing character or an underperforming one. Therefore, to ensure a superior quality of bank loans would require, primarily, that the borrowers to run activities with positive results, at a performance level as high as possible. Under such circumstances, it is ensured obtaining of at least enough income to make the due payments on the received loans, avoiding the delays or default of borrowers and thus the formation of NPLs. It remains, still, in the foreground, the creditor banks' concern to obtain performance also in their lending activities, which is corroborated with the performance achieved by borrowers, allowing full and on time recovery of the receivables from the granted loans and the prevention or limitation of their transformation into NPLs.

Nevertheless, it is possible for the debtor to use inefficiently the bank loan and, under the conditions of a nonperforming activity, not to ensure the necessary income for making the due repayments and interest payments, which makes the bank to encounter difficulties in its lending activity, inclusively overdue

receivables out of the current loans that became temporarily or permanently unrecoverable. Such situations appear to be typical for the manifestation of non-quality of lending or bank loans involved in the formation of these claims and for their reflection into the nonperforming category.

On the other hand, the concept of "non-performing bank loans" appears to us insufficiently defined, as specific financial phenomenon. In this respect, reference sources show a diversity of meanings attributed to the phrase "nonperforming bank loans." At its basis, it is placed, most often, the differentiation those loans from the current ones on the grounds of the delay of the due payments (consisting of instalments and corresponding interest amounts) by the debtors on a variable interval of time, and frequently, it is invoked a delay of such payment of at least 90 days. Thus, according to one of the most important sources (IMF, 2006: p. 46), NPL means the "principal (the loan amount – o.n.) or interest unpaid for 90 days or longer." Likewise, by other authors (Louzis, Vouldis and Metaxas, 2011: p. 5), non-performing loans are coming from the current loans for which occurred delays in payments to creditor banks over 90 days from their maturities. Also, sometimes the expression "non-performing loan" means that loan being in the position of either "lost" or to become "lost" (Saba, Kouser and Azeem, 2012: p. 127), or for which there are manifesting obvious weaknesses either of the loan itself or of the borrower (Barisitz, 2011: p. 29).

In a manner applied also in banking practice, NPLs are separated by the other ongoing loans, within the loan portfolios of banks, in relation to the classes stated by the same IIF scheme previously invoked. Thus, in principle, are included in NPLs' category all bank loans falling within the classes "loss" doubtful "and" substandard "(IMF, 2005: p. 396). This presumes, therefore, incorporating three levels of nonperformance and non-quality of bank lending, corresponding to the NPLs which are differentiated on the three mentioned classes, which may make questionable the relevance of the analyzes, particularly of those of comparative types and of the conclusions that would be based only on the values regarding the total amount of NPLs.

However, it must be admitted that, on macro level, the quality of the global volume of loans granted by banks can be assessed from the reverse perspective of its of non-quality, depending on the proportions of the accumulated NPLs, which are, in fact, the direct expression of the non-quality of part of the bank lending processes. By default, it results that the quality of bank lending can be characterized through the dimensions represented, especially as share of the amount of NPLs in the total bank loans in progress. This percentage becomes a synthetic indicator of the quality of bank lending, respectively of the quality of loan portfolios of commercial banks, but also of their assets (De Bock and Demianets, 2012: p. 12), being relevant and useful for the analyzes and the bank management decisions at any level of approach.

In relation to the invoked sources, we find, so, that the approaches regarding the concept of "non-performing loans" focus primarily on the differentiation of the ongoing loans, having as main landmark the delay or failure of due payments, related to some of these, usually with a minimum number of 90 days, which represents, however, only a technical side of the bank lending process and not the essence of this financial phenomenon. However, in our view, in defining the concept of non-performing (bank) loan should be invoked its essence, of altered or damaged, unwanted, negative credit relationship, which contradicts the fundamental principles of credit. Such damage occurs under the conditions of nonperformance in the specific activities of the borrower and of the creditor bank. Simultaneously, it is worthy to note that a non-performing loan manifests itself either as (actual or potential) losses of banks or as unacceptable blockages of lending resources in nonperforming activities of the debtor clients, leading to failure in reimbursing the borrowed amounts and paying of due interest by them.

Therefore we consider that a non-performing loan could be defined, essentially, as a credit relationship that is deteriorating amid non-performance of the involved activities, becoming generator of losses or temporary blockage of credit resources, for the creditor banks.

In the same context, it must be recognized that the presence of NPLs expresses also a manifestation of the credit risk assumed by banks, but the large sizes of these loans affect significantly not only the financial status of creditor banks, up to their bankruptcy (Barr and Siems, 1994: p. 3). The very pronounced tendency of growth of NPLs can be considered as an indication of the onset of a crisis in a country (Kaminsky and Reinhart, 1999: p. 476). But firstly, such a development regarding the proportions of these category of loans indicates a possible banking crisis (Reinhart and Rogoff, 2010: p. 8), which was confirmed also in the case of the manifestation of the current economic and financial crisis.

The presence and the dimensions of the NPLs and, implicitly, of non-quality of bank lending evolve under the incidence of a variety of determining factors. Some of these factors are acting from outside the banks expressing themselves most often through macro-level indicators, such as those depicting developments in GDP, (total) volume of bank loans, inflation, unemployment, etc. Other factors are considered, however, to be specific for the internal activities of banks, and between them might be observed, entitled, the size of the capital, excessive lending (Salas and Saurina, 2002: p. 203), low return on capital (Berger and DeYoung: 1997 p. 28). But, more generally, there are detaching the managerial performance, respectively the credit policy pursued by each bank, including the selection of the criteria for granting, setting interest rates on loans to be granted etc.

From the perspective of quality/non-quality of bank lending it is outlined, thus, a wide range of causal linkages, characteristic for the manifestation of NPLs, which should be taken into account into specific determination relationships between them and various economic and financial variables. Among these relationships keeps attention, especially, the relationship between the dimensions of NPLs, on the one hand, and GDP, on the other hand, which is addressed, usually, through the relation of determination which implies a reduction in the volume of the first one, on the account of the increase of the latter (Louzis, Vouldis and Metaxas, 2011; Khemraj and Pasha, 2009, Jimenez and Saurina, 2006, Rajan and Dahl, 2003; Salas and Saurina, 2002). However, it appears to us to be more direct the reverse conditioning relation, because the reduction of NPLs makes available financial resources usable to finance through loans the increase of production and thus of GDP (Filip, 2013: p. 130).

The volume of outstanding loans granted by banks represents, in turn, objectively, a determining factor for the occurrence and changes registered by NPL balance (Saba, Kouser and Azeem, 2012; Khemraj and Pasha, 2009; Sinkey and Grenwalt, 1991). Moreover, we believe that this factor is fundamental for the existence of NPLs and the increase of the volume of granted bank loans itself creates preconditions for the increase of the volume of NPLs because, naturally, there is a probability that part of the total loans to fall into this category. Also, a possible rapid increase in the volume of bank loans amid an eventual easing of the conditions imposed by banks to borrowers may amplify the conversion of the current loans into NPLs.

Also, the interest rate charged on bank loans can be considered as another factor of influence on the occurrence and evolution of NPLs (Berge and Boye, 2007; Nkusu, 2011; Beck, Jakubik and Piloiu, 2013). Thus, it has to be accepted that, in principle, the increase of the interest rate on the loans granted by banks involves a greater burden for borrowers and reduces their ability to make payments on the current outstanding loans and a possible increase in NPLs. On the contrary, a decrease of the interest rate may have the opposite effect, of reducing the amount of the due payments on current loans, favouring making these payments and diminishing the amount of previously accumulated NPLs. We appreciate, however, that it must not be ignored the presence of a potential effect of changes in interest rates on bank loans, which may manifest itself in reverse directions to those exposed above. Thus, its increase reduces the access to credit of the clients with doubtful solvency, helping to prevent the accumulation of NPLs. In contrast, lower interest rates may favour granting loans to customers with poor repayment capacity, on the background of the reduction of the bank's exigencies in selecting the loan applicants, and eventually the classification of these loans in NPL category.

Normally, also inflation rate interacts the dimensions of NPLs, its impact highlighting, in principle, mutations in the same sense, respectively a positive determination relationship (Khemraj and Pasha, 2009; Fofack, 2005), most often generating a erosion of the debtors' ability to pay. Yet, we subscribe to the idea that, in this case, is not to be neglected either the potential reduction in the real value of NPLs under the increase of inflation, making more advantageous the repayment of due amounts by the borrowers (Nkusu, 2011: p. 8; Klein, 2013: p. 6), given that the creditor banks are not updating their claims with the inflation rate.

Also, the unemployment rate is invoked, in principle, as factor that causes changes in the size of NPLs (Nkusu 2011; Berge and Boye, 2007; Rinaldi and Sanchis-Arellano, 2006), in the same direction with its own variations. In this respect, we admit that an increase in unemployment rate is likely to adversely affect the income of the borrowers, especially those of individuals, deepening their difficulties to make repayments and interest payments, which may lead to the transformation of current loans into NPLs. Moreover, the income reduction of the population, generated by unemployment's increase, leads to lower demand of goods and services for consume, with the consequence of the reduction in the production and sales of companies, which determines in turn, the reduction of revenues and of the repayment capacity of the debtors (Louzis, Vouldis and Metaxas, 2011: p. 10), favouring also the increase of NPLs.

In contrast, any reduction in the unemployment rate causes creating jobs and employment and, implicitly, the increase of the income and of the capacity of borrowers to make due repayments and pay interest on the current loans, including the possibility of making payments for overdue amounts, which may lead to reducing of previously accumulated NPLs.

In their turn, but on a larger scale, the feedback type effects generated by changes in NPLs (considered as a determining factor) can manifest themselves in many ways, including through the impact on the functionality of the economy (Hou, 2007: p. 2), respectively in terms of balanced development and economic growth.

The approaches regarding the feedback of NPLs aim, in the foreground, the effects reflected in the financial condition of banks and, implicitly, on the economy of a country, starting often from the connection of these loans with the total supply of bank loans. It is assumed, therefore, firstly, that an increase of NPLs level in banks can create uncertainty about their financial stability, which would generate a limitation of their access to other resources on financial markets (Diwan and Rodrik, 1992). As result, may result reactions from banks to limit customers access to lending, inclusively by raising the interest rate on loans to be granted. The latter reaction may affect both the volume of bank loans and the maintenance, within acceptable limits, of profitability and efficiency of creditor

banks. But, from the same perspective, in our view, becomes relevant finding that, in fact, NPLs are blocked or even lost financial resources for the banks, they reducing so their potential for granting new loans. However, the reduction of NPLs involves also the adequate release of resources for lending, out of which banks may grant other loans, reducing simultaneously the costs of managing NPLs, including the provisions. Under such circumstances, there are created favourable conditions to obtain much easy by the commercial banks, other credit resources, cheaper, including from the central banks, which lead to increasing the supply of bank loans at a lower rate interest. In the same context, we believe that it must be taken into account the feedback of changes in the dimensions of NPLs either towards reducing them, with return to the business of the corresponding monetary resources, supporting, thus, economic growth (GDP) especially if new credit is granted for the development of productive activities, or backwards, with negative impact on GDP growth.

Methodology and data sources

Our research is based on the documenting focused on the consultation of scientific literature, useful also conceptually, and of other sources of information on the approached area, including banking practice. It also includes making of analyzes on the quality of bank lending, through the prism of the existence of NPLs. Such analyzes start from the objective nature of the connections of these loans with the action of some factors often represented by variations of certain macroeconomic indicators, perceived as determinant variables, and continue with the feedback on these loans, reflected, in principle, by variations of those indicators who become determined variables. The quantitative analyzes of econometric type are developed based on data for Romania, adapting for this purpose certain econometric models, according to our own choices on the variables included.

Therefore, by taking into account the specific correlations between the determining factors / variables and highlighting the determining relationships between the volume of NPLs at the end of the current period, on the one hand, and the levels of certain macroeconomic indicators, on the other hand, we have outlined an econometric model. It includes, as variables that determine the evolution of NPLs, the corresponding values of the following indicators: GDP, total bank loans, the change in the inflation rate, the change in the unemployment rate, the change in interest rate on bank loans.

In determining of the causal linkages between the dependant variable and the determinant variables, we used as research method the OLS regression (Ordinary Least Squares) and also Pearson correlation analysis of the considered variables.

For purposes of adequate processing of the information about NPLs regarding Romania, which are relatively few, we opted to take into account of quarterly values corresponding to these variables, considering that they ensure the formation of a satisfactory sample of available values for the period 2001-2012. In this regard we extracted and processed the necessary information from data series published by the National Bank of Romania and National Institute of Statistics of Romania.

Also, in our case study we used the following notation on the variables included in the calculations: NPL – the volume of NPLs at the end of the current period (in billions RON); NPL (–1) – the volume of NPLs at the end of the previous period (in billions RON); GDP – the GDP realized in the current period (in billions RON), TL – total bank loans volume at the end of the current period (in billions RON); ΔINFLR – quarterly change in inflation rate (%); ΔUNEM - quarterly change in unemployment rate (%) ΔLIR – quarterly change in the interest rate on bank loans (%).

Processing of the statistical data included in our assessment as the first step of the analysis led to the following general characterization results, for the period 2001-2012, shown in Table 1:

Table 1. *Summary statistics*

	Mean	Median	Maximum	Minimum	Std. Dev.
NPL	9.10	1.64	38.37	0.14	12.49
NPL(-1)	8.31	1.59	37.16	0.14	11.79
GDP	92.67	93.40	172.1.	20.69	44.73
TL	110.45	93.35	219.45	7.98	82.39
ΔINFLR	2.47	2.11	9.10	-0.93	2.08
ΔUNEM	0.01	0.00	3.80	-2.00	0.97
ΔLIR	-0.79	-0.47	2.25	-4.10	1.42

According to the data of Table 1 it results the existence of relatively large variations of the variables such as GDP and the total bank loans volume followed by those of NPLs and of changes in inflation rate and, in a smaller proportion, by the changes in interest rate on bank loans, respectively by the changes in unemployment rate, over the period 2001-2012. Still, we find that if the terms of the inflation rate and the interest rate on bank loans, large variations are found at the beginning of the period under review, for GDP and total bank loans volume are recorded major changes in the boom economic years 2005-2008, and NPLs recorded a sharp increase between 2008-2012, on the background of the financial crisis manifestation.

The analysis of the linking relations between the dependent variable and the determining variables reveals through the correlation matrix, the following results, shown in Table 2.

Table 2. *The correlation matrix*

	NPL	NPL(-1)	GDP	TL	ΔINFLR	ΔUNEM	ΔLIR
NPL	1.000000						
NPL(-1)	0.997328***	1.000000					
GDP	0.737660***	0.725578***	1.000000				
TL	0.805975***	0.784279***	0.917163***	1.000000			
ΔINFLR	-0.411711***	-0.394545***	-0.624133***	-0.610464***	1.000000		
ΔUNEM	-0.015079	-0.013507	-0.037471	-0.004405	0.098637	1.000000	
ΔLIR	0.250359*	0.246428*	0.516333***	0.503199***	-0.367517**	0.273756*	1.000000

*, **, *** - denote significance at 1, 5, and 10 percent, respectively.

Thus, from Table 2, there result the direction and intensity of causal linkages that occur between the volume of NPLs at the end of the current period and the other variables. According to the coefficients highlighted matrix appear to be significant the positive correlations between the volume of NPLs at the end of the current period and the volume of NPLs at the end of the previous period (0.9973), and, also, the GDP realized in the current period (0.7377). These values also certify, significant positive correlations of the NPLs at the end of the current period with the total bank loans at the end of the same period (0.8059) and with the quarterly changes in interest rate on bank loans (0.2504). At the same time, are highlighted the negative correlations of the NPLs at the end of the current period with quarterly change in inflation rate (–0.4117) and in unemployment rate (–0.015), the latter having, however, an insignificant level. The same data confirm the positive and significant correlation between the total volume of bank loans and GDP size, for each quarter. It also confirms the reverse causality linkage between GDP and the change in unemployment rate, the development of the latter variable influencing negatively the former one and vice versa, and also the natural reverse correlation between the change in unemployment rate and the evolution of the total volume of bank loans.

Econometric modelling and results

Overall, the results (according to Table 2) and the previous observations allow a positive assessment on the possibility of establishing of the influences transmitted over NPLs at the end of the current period, considered as a dependent variable by the determinant variables taken into calculations, according to the levels of the corresponding indicators in the years 2001-2012, in Romania's case. The evaluation

of these influences may be accomplished by using the OLS (Ordinary Least Squares) regression method, having as base a model of regression equation, adjusted by us, keeping the previous notations, in the following form:

$$\begin{aligned} NPL = \beta_0 NPL(-1) + \beta_1 GDP + \beta_2 TL + \beta_3 \Delta INFLR + \\ + \beta_4 \Delta UNEM + \beta_5 \Delta LIR + \varepsilon \end{aligned} \quad (1)$$

Therefore, in relation to the proposed regression equation (1), the determination of NPLs at the end of the current period, by processing of data for the period 2001-2012, in Romania's case, led to the results shown in Table 3:

Table 3. *Regression results for the applied research model on Romania's case*

Dependent Variable: NPL				
Method: Least Squares				
Date: 09/28/13 Time: 18:34				
Sample (adjusted): 2001Q1 2012Q4				
Included observations: 48 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	P-value
NPL(-1)	1.000554	0.014923	67.04968	0.0000
GDP	-0.012007	0.004882	-2.459239	0.0181
TL	0.016824	0.003883	4.332971	0.0001
ΔINFLR	-0.033228	0.053035	-0.626539	0.5344
ΔUNEM	0.027394	0.121503	0.225462	0.8227
ΔLIR	-0.162290	0.091188	-1.779729	0.0824
R-squared	0.996715	Mean dependent var		9.100083
Adjusted R-squared	0.996324	S.D. dependent var		12.49426
S.E. of regression	0.757558	Akaike info criterion		2.399035
Sum squared resid	24.10355	Schwarz criterion		2.632935
Log likelihood	-51.57684	Hannan-Quinn criter.		2.487426
Durbin-Watson stat	1.580219			

The values determined and reflected in this table, for the proposed regression equation, indicate that the volume of NPLs at the end of the current period is determined in a very high proportion (R-squared of 0.9967, adjusted R-squared of 0.9963) by the variables included in the applied econometric model, which confirms its relevance.

At the same time, the results in the table highlight the dependence, in the same direction, of the volume of NPLs at the end of the current period on the volume of NPLs at the end of the previous period and on the total volume of bank loans at the end of the current period. Also, we note that both the values of the determinant variables present P-values below a level of significance of 1%, which leads to the rejection of the null hypothesis value of their coefficients and confirm the certain dependency of the dependent variable on the action of these factors.

Similarly, but at slightly lower significance levels (5% and 10% respectively), we find the existence of some reverse dependencies of the dependent variable on the GDP volume, respectively on the change in the interest rate on bank loans.

For the other variables, considered as determinant (the change in inflation rate and the change in unemployment rate), the P-values lead to the conclusion that they are less significant in influencing the dependent variable. However, through the prism of the resulted coefficient, we find that the dynamics of the unemployment rate causes a similar trend of the dependent variable, while the inflation rate has an impact in the opposite direction on the same dependent variable.

Regarding the quantitative assessment of the feedback effects generated by NPLs, considered as determinant variables, taking into account the same data on Romania, during 2001-2012, we admitted the hypothesis of some reverse determining relationships between them and GDP, the total volume of bank loans, the change in inflation rate, the change in unemployment rate and the change in interest rate on bank loans. The latter become thus dependent variables, and in this framework we shaped equations, respectively econometric models adaptable to them.

Such an econometric model implies reflecting cumulatively of the feedback effects generated by all the determinant variables on the evolution of each variable considered to be dependent, and the results established so are useful for understanding of the positive or negative nature and of the intensity of these determination relationships. In this respect, based on testing an appropriate model it can be appreciated the impact on the volume of NPLs on GDP, in Romania's case, in the period 2001-2012, using OLS (Ordinary Least Squares) regression method, according with an equation, of the following form:

$$\begin{aligned} GDP = {} & \alpha_0 NPL + \alpha_1 NPL(-1) + \alpha_2 TL + \alpha_3 \Delta INFLR + \\ & + \alpha_4 \Delta UNEM + \alpha_5 \Delta LIR + \varepsilon \end{aligned} \qquad (2)$$

in which the variables keep the names and symbols used in the regression equation (1).

Testing the equation (2), using the data set corresponding to Romania's conditions, during the mentioned period, led to the results summarized in Table 4:

Table 4. *Regression results for the determinants of quarterly GDP*

Dependent Variable: GDP				
Method: Least Squares				
Date: 09/28/13 Time: 19:19				
Sample (adjusted): 2001Q1 2012Q4				
Included observations: 48 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	P-value
NPL	-10.48323	4.262792	-2.459239	0.0181
NPL(-1)	9.999754	4.315627	2.317104	0.0254
TL	0.807807	0.059240	13.63608	0.0000
ΔINFLR	3.687609	1.467974	2.512039	0.0159
ΔUNEM	-0.993781	3.589101	-0.276889	0.7832
ΔLIR	-3.945303	2.727073	-1.446717	0.1554
R-squared	0.776157	Mean dependent var		92.66908
Adjusted R-squared	0.749509	S.D. dependent var		44.72502
S.E. of regression	22.38448	Akaike info criterion		9.171081
Sum squared resid	21044.73	Schwarz criterion		9.404982
Log likelihood	-214.1060	Hannan-Quinn criter.		9.259473
Durbin-Watson stat	1.336392			

The results shown in Table 4, outline, firstly, a high viability of the proposed regression equation (R-squared = 0.7762; Adjusted R-squared = 0.7495), which means that quarterly GDP volume could be determined sure enough by the quarterly volume of NPLs in conjunction with the other determinant variables included and taken into consideration in equation (2). From the same table results, also, logically, that there is a high probability that both the current level (P-value = 0.0181) and the previous level (P-value = 0.0254) of the quarterly volume of NPLs to influence the evolution of the quarterly volume of GDP. Thus, according to the sign of the coefficients, it results that the evolution of the quarterly volume of NPLs cause a contrary trend of the quarterly GDP volume, as the current size of the quarterly volume of NPLs has a negative impact on GDP volume, partially compensated by a possible positive effect of volume NPL previous quarter.

In the same framework, we notice the existence of a positive determination on GDP, of the total volume of bank loans and of the change in inflation rate and also the determination, in reverse, at a lower significance level, induced by the changes in the interest rate on loans and of the change in the unemployment rate over the dependent variable, and these findings are corresponding with the theoretical anticipations made earlier in the paper.

Similarly, to determine the "feedback" of NPLs on the total quarterly volume of bank loans in Romania, for the years 2001-2012, we have outlined a new regression equation of the form:

$$\begin{aligned} TL = {} & \gamma_0 NPL + \gamma_1 NPL(-1) + \gamma_2 GDP + \gamma_3 \Delta INFLR + \gamma_4 \Delta UNEM + \\ & + \gamma_5 \Delta LIR + \varepsilon \end{aligned} \tag{3}$$

in which the variables keep the names and symbols used in the previous regression equations.

Applying the equation (3) for the same set of data, the Romania, has led to the results in Table 5:

Table 5. *Regression results for the determinants of the quarterly total volume of bank loans*

Dependent Variable: TL				
Method: Least Squares				
Date: 09/28/13 Time: 19:20				
Sample (adjusted): 2001Q1 2012Q4				
Included observations: 48 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	P-value
NPL	18.36220	4.237786	4.332971	0.0001
NPL(-1)	-17.00938	4.401134	-3.864772	0.0004
GDP	1.009824	0.074055	13.63608	0.0000
ΔINFLR	-1.664580	1.741444	-0.955862	0.3446
ΔUNEM	0.013393	4.016527	0.003334	0.9974
ΔLIR	6.208106	2.973620	2.087727	0.0429
R-squared	0.917545	Mean dependent var		110.4452
Adjusted R-squared	0.907729	S.D. dependent var		82.39174
S.E. of regression	25.02741	Akaike info criterion		9.394289
Sum squared resid	26307.60	Schwarz criterion		9.628189
Log likelihood	-219.4629	Hannan-Quinn criter.		9.482681
Durbin-Watson stat	1.292730			

Results in Table 5 reveal, in the foreground, a very high viability of the proposed regression equation (R-squared = 0.9175; Adjusted R-squared = 0.9077), which expresses that the total quarterly volume of bank loans evolves in close dependence on the volume of NPLs at the end of the current period, respectively on the NPLs at the end of the previous period, and on the other variables considered as determinants, included in equation (3).

The same results also highlight the fact that the volume of NPLs influences significantly the evolution of the total volume of bank loans, as confirmed by the very high probability corresponding both to the current (P-value = 0.0001) and previous level (P-value = 0.0004) of NPLs. In this context, based on the recorded values of the coefficients, it results that the evolution of the quarterly volume of NPLs causes a similar trend of the total quarterly volume of bank loans, since the current size of the quarterly volume of NPLs has a positive impact on the latter, more higher than the negative effect of NPLs in the previous quarter.

Moreover, there are highlighted the significant relationships of positive determination on total quarterly volume of bank loans, of the quarterly GDP and of the changes in interest rate on bank loans and also the negative determination, at a lower significance level, corresponding to changes in inflation rate, while the

changes in unemployment rate appear to have a positive, but insignificant, influence on the dependent variable.

On the other hand, the assessment of NPLs feedback on the changes in interest rate on bank loans can be achieved also by applying a regression model similar to the previous ones, starting from the same data on Romania for the period 2001-2012, drawing another regression equation of the following form:

$$\Delta LIR = \gamma_0 NPL + \gamma_1 NPL(-1) + \gamma_2 GDP + \gamma_3 TL + \gamma_4 \Delta INFLR + \\ + \gamma_5 \Delta UNEM + \varepsilon \quad (4)$$

in which the variables keep the names and symbols used in the previous regression equations.

Testing the equation (4), by processing the same set of data, for Romania's case, led to the results listed in Table 6:

Table 6. *Regression results for the determinants of changes in interest rate on bank loans*

Dependent Variable: ΔLIR				
Method: Least Squares				
Date: 09/28/13 Time: 19:22				
Sample (adjusted): 2001Q1 2012Q4				
Included observations: 48 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	P-value
NPL	-0.432106	0.242793	-1.779729	0.0824
NPL(-1)	0.410096	0.245057	1.673468	0.1017
GDP	-0.012031	0.008316	-1.446717	0.1554
TL	0.015145	0.007254	2.087727	0.0429
ΔINFLR	-0.285156	0.074986	-3.802773	0.0005
ΔUNEM	0.426354	0.187155	2.278079	0.0279
R-squared	0.320955	Mean dependent var		-0.787083
Adjusted R-squared	0.240116	S.D. dependent var		1.418051
S.E. of regression	1.236134	Akaike info criterion		3.378323
Sum squared resid	64.17710	Schwarz criterion		3.612223
Log likelihood	-75.07974	Hannan-Quinn criter		3.466714
Durbin-Watson stat	1.218626			

The results in Table 6 attest, firstly, an acceptable level of viability of the proposed regression equation (R-squared = 0.321; Adjusted R-squared = 0.2401), which confirms that the changes in interest rate on bank loans are relatively dependent on the volume of NPLs at the end of periods (current and previous) and on the other variables included in the equation.

From the same table, it results also that there is a good probability that both the current (P-value = 0.0824) and the previous period (P-value = 0.1017) level of the NPLs to influence the evolution of the interest rate of bank loans. Under the conditions to which are reported the data processed by us, the corresponding

coefficients indicate that, overall, the evolution of the volume of NPLs determines a contrary trend of the interest rates on bank loans, since the negative impact of the volume of NPLs at the end of the current period is partially compensated by a possible positive effect of the volume of NPLs at the end of the previous period.

At the same time, it can be observed that other determinant variables, consisting of the changes in the unemployment rate and the total volume of bank loans have significant positive influences on the changes in the interest rate on bank loans, while the change in inflation rate and the volume of GDP have negative impact on the same dependent variable.

Similarly, by conceiving appropriate regression models to assess the feedback of NPLs (along with other variables that become determinant within the corresponding equation) there can be processed the data, by applying the same OLS method, also in the cases of the changes on inflation rate, respectively of the changes in unemployment rate, considering the latter ones, separately, as dependent variables.

Conclusions

Our research has conducted, firstly, to highlighting the specific framework, with objective character, of the interpenetration of NPLs existence phenomenon, on the one hand, with those of non-quality or low (partial) quality of bank lending/ loans, respectively with the levels performance achieved in the activities of the parties involved in bank credit relationships, on the other hand. This allowed us to more precisely shape the concepts of quality/non-quality of lending/bank loans and, in particular, of the NPL. Furthermore, we consider the latter as a direct expression of non-quality of part of bank lending, reflecting simultaneously nonperformance of the activities of the users of bank loans, primarily of those funded by bank loans.

The considerations made within this context sustain that the development of the research on bank lending non-quality can focus on analyzes carried out on NPLs, deepening the study of the connections and correlations specific to the manifestation of this category of loans, with factors that are influencing their proportions, respectively the quality level of bank lending, out of which some become variables included in econometric models adapted our approach.

The documentation taken, showed that the notion of non-quality of bank lending/ loans is not distinctively found in the theoretical and practical approaches, it being assumed to have a reverse acception to that of their quality. Moreover, the concept of quality of NPLs itself and, particularly, that of NPLs are used in theory and especially in practice, with different meanings, they being not explicitly defined,

which can sometimes generate questionable interpretations. Consequently, we have outlined the concepts of non-quality, respectively of quality of bank lending /loans, concluding that NPLs manifests themselves as synthesising, direct expression of non-quality and indirectly characterize, the quality of bank lending/ loans, and these loans allow Knowing and evaluating the impact of factors that determine the evolution of their volume and, implicitly, the quality level of the total volume of loans granted by banks.

Therefore, because the sources in this area are using the notion of NPLs, most often referring to those loans for which there occur delays of the payments regarding the outstanding loans for over 90 days, we appreciated that such a technical criterion is not essential and the number of days taken into consideration can have a subjective, debatable character. As a result, in our opinion, this concept must be defined in terms of its financial and economic essence of NPLs, which consists in being a damaged, unwanted, negative, credit relationship, expressing directly, the partial non-quality of bank lending and, from a reverse perspective, the quality level, higher or lower, of the loans granted by banks. Such credit relations involve blocking, temporary or permanently, of credit resources, which can become losses for the creditor banks, and means, also, both non-performance in the activities carried on by the contracting parties and the non-quality of part of the bank lending/ongoing loans. Accordingly, we conclude that the volume of NPLs as an absolute amount, but more importantly, as a share of total bank loans reflects directly the proportions of lending's non-quality, and indirectly the obtained quality level of the totality of bank loans (in%), which is reduced, as compared to the maximum (100%), with the size of the respective share. The high percentage of NPLs in total bank loans, with strong rising trend, especially in recent years, expresses the amplification of the deterioration of bank lending quality, corresponding to the increase of the non-quality part of total bank loans.

The analysis the existence of NPLs and implicitly of the bank lending non-quality, through the causal linkages with other economic and financial phenomena, led, first, to highlighting of characteristic connections with influential specific factors, respectively of the relationships of determination regarding the size of these loans, within some logical correlations under economic and financial aspect. Further development of this analysis, targeting directly the expression of those correlations, under the real conditions of Romania, for the period 2000-2012, can be materialized as econometric approach, outlining, in this respect, a first regression model and using Pearson correlation, respectively OLS method. Thus, in this model, we considered as determinants, the variables the volume of NPLs at the end of the previous period, the GDP volume, the total bank loans volume, the change in inflation rate, the change in unemployment rate, the change in interest rate on bank loans and as the volume of NPLs at the end of the current period, as

dependent variable. The results obtained by testing this model showed a very high level of viability for the regression equation, and have revealed that the volume of NPLs at the end of the previous period, the total volume of bank loans, the volume of GDP and the change in interest rate on bank loans are particularly relevant in the determination of NPLs from current period. In the same context, it results that changes in inflation rate and changes in the unemployment rate appear to be less relevant in influencing the dependent variable and, implicitly, on the non-quality of bank lending.

In turn, the analysis of NPLs feedback was based on designing and testing of other regression models (equations), considering that the volume of these loans is a determinant variable for the progress of several macroeconomic indicators included in the corresponding equations, in which they were considered as dependent variables. In this regard, taking as dependent variable the GDP volume, it resulted a significant reverse feedback effect, transmitted over it by volume of NPLs, which confirmed also the validity of the regression model used. In the same context, it resulted also that the total volume of bank loans and changes in the inflation rate are positively influencing the GDP volume, while changes in the unemployment rate and changes in the interest rate on bank loans are generating opposite effects.

At the same time, the distinctive analyzes regarding the NPLs impact, based on models separately developed for each of the other macroeconomic indicators, conceived as dependent variables, showed different but significant effects generated by the volume of NPLs, as determinant variable. Thus, by testing the regression models on the data for Romania, during 2001-2012, is resulted that NPLs have a positive effect on the total volume of bank loans and a negative effect on the change in interest rate on bank loans.

Although, through the prism of the changes in the volume of NPLs, this variable can manifest itself also in a positive sense towards other dependent variables, we consider that, in principle, the presence of NPLs registered by banks remains a negative phenomenon, with undesirable effects, justifying intense concerns for limiting them to the lowest possible level.

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Regional implications of salary in the European Union

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Abstract. *To have a unique labor market at the European level, must keep in mind the fact that wages in the European Union member states are very different.*
In industry, for example, the salary of Germany is about four times higher than that of Portugal. Therefore, the remuneration of the labor market and regulations in this area are highly diversified and, therefore, slows the progress of the single market in the European Union labor.
However, the salary varies from state to state. So we divided the EU into regions and analyzed the implications of labor remuneration regional perspective.
In this paper, we want to show these aspects of labor remuneration in different Member States of the European Union, taking into account mainly the minimum wage.

Keywords: labor market, the minimum wage, the average wage, European regions.

JEL Classification: F62, F63, F66.
REL Classification: 12F.

Bălăceanu and Bentoiu said in their book that "in discussions with people working in different economic activities that are beneficiaries of income from work, we find terms such as: salary, soldiers, retribution. Economic theory synthesizes these terms the notion of salary." (Bentoiu and Bălăceanu, 2007: p. 65).

In economic theory, Grund and Slivka (2005) showed that the satisfaction derived from work depends not only on the absolute level of wages, but the wage increases. Also, Easterlin (2001) argued that people do not anticipate that aspirations increase in direct proportion to the increase in income, and this result was supported with empirical evidence.

EU labor remuneration is very different, especially by European regions. In this paper we consider a classification of EU regions geographically. Thus, there are four major regions of the European Union(1), namely:

- Northern Region (Sweden, Finland, Denmark, Estonia, Latvia, Lithuania, UK, Ireland);
- Western Region (France, Belgium, Netherlands, Luxembourg, Germany, Austria);
- Eastern Region (Romania, Poland, Czech Republic, Hungary, Slovakia, Bulgaria);
- South Region (Italy, Greece, Slovenia, Spain, Cyprus, Portugal, Malta, Croatia).

Depending on the salary of each Member State of the European Union will set wage region.

The average salary considered one of the most important economic indicators economy, which is one of the decisive factors for investors who want to invest in a country. Moreover, the average salary is of major importance because its evolution is taken into account when calculating pensions.

However, the average wage is strongly influenced by the inflation rate. Thus, while the net average wage increased by 300%, while inflation increased by over 100% in the same period, real wage growth net average wage in the economy is 200%, given that prices have doubled.

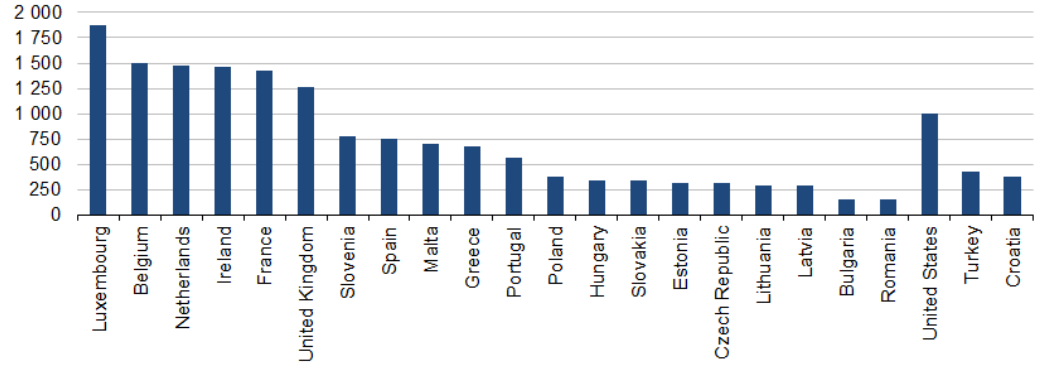
At the same time, the existence of the minimum wage is justified, even if it is a market economy there are negotiations between employer and employee. Thus, a company can set a threshold below which it can not descend, even if both parties so desire.

The Member States of the European Union there are several types of minimum wage, for example:

- There is only one minimum wage required by law, the following EU Member States: France, Luxembourg, Netherlands, Ireland, UK, Malta, Spain, Portugal, Croatia, Czech Republic, Hungary, Latvia, Lithuania, Romania, Slovenia;
- There is only one minimum wage set by collective agreements in the Member States of the European Union: Belgium, Estonia and Greece (bipartite agreements), Bulgaria, Poland and Slovakia (tripartite);
- There sectoral or occupational minimum wages fixed by law in Cyprus;
- There sectoral or occupational minimum wages set by collective agreements in the Member States of the European Union: Austria, Germany, Italy, Denmark, Finland and Sweden.

In Chart 1 can see the minimum wage on 1 January 2013, Member States of the European Union along with the United States and Turkey (EU candidate).

Chart 1. *The minimum wage on 1 January 2013 (euro/month)*



(1) Denmark, Germany, Italy, Cyprus, Austria, Finland and Sweden, not applicable.
Source: Eurostat (online data code: tps00155)

From these data, it is noted that Romania reached in January 2013, the last in the European Union regarding the minimum wage, according to Eurostat.

The highest minimum wage was in the Netherlands, Belgium and Luxembourg, where the latter was the minimum wage in January 2013 to 1874 euro/month.

From this point of view, it can be seen that the poor countries of the European Union(2), the minimum wage is at least twice higher than the minimum wage in Romania and Bulgaria.

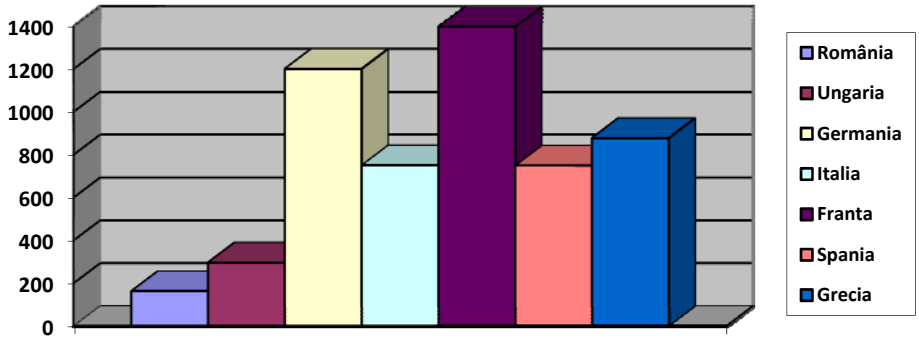
For example, in Croatia (state which joined the EU on 1 July 2013), the minimum wage was in January 2013, the 374 euro/month, while in Turkey (State canditat EU) is 429 euro/month.

Meanwhile, in Greece, where severe restrictions have been imposed, the minimum wage (which received 14 times a year, as in Spain and Portugal) was in January 2013 to 684 euro/month.

To better differentiate the Table 1 we present minimum wage in different Member States of the European Union.

Table 1. *The minimum wage in different Member States of the European Union*

No.	Member States	Minimum wage (euro)
1	EU	162
2	Romania	296
3	Hungary	1200
4	Germany	750
5	Italy	1398
6	France	748
7	Spain	877

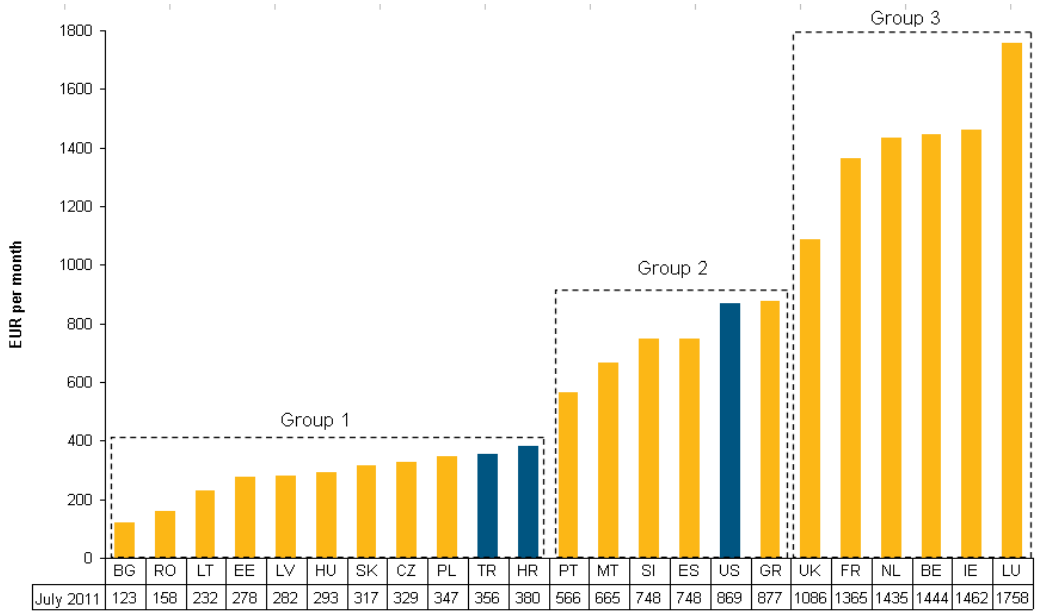


Source: Eurostat.

Therefore, Member States of the European Union where there is regulated minimum wage, together with Croatia and Turkey were divided into three groups according to its level at 1 January 2013, according to Chart 2:

I. Romania, Bulgaria, Latvia, Lithuania, Czech Republic, Estonia, Slovakia, Hungary, Croatia, Poland and Turkey, with the lowest minimum monthly wages, ranging between 100 and 500 euro/month.
II. Portugal, Greece, Malta, Spain and Slovenia, with an intermediate level of minimum monthly salary from 500 euro/month, to just under 1,000 euro/month.
III. United Kingdom, France, Ireland, the Netherlands, Belgium and Luxembourg, the minimum wage was in January 2013 over 1,200 euro/month.

Chart 2. *Minimum wage on 1 January 2011 (euro/month)*



	BG	RO	LT	EE	LV	HU	SK	CZ	PL	TR	HR	PT	MT	SI	ES	US	GR	UK	FR	NL	BE	IE	LU
July 2011	123	158	232	278	282	293	317	329	347	356	380	566	665	748	748	869	877	1086	1365	1435	1444	1462	1758

Source: ttpepp.eurostat.ec.europa.eustatistics_explainedindex.phptitle=FileMW_EUR_July_2011.png&filetimestamp=20110805142929 (2)

The minimum wage in the economy is fixed at an hourly rate, weekly or monthly and is applied by law, after consultation with the social partners, or directly by national intersectoral agreement. According to Eurostat, in January 2013, 20 countries of the European Union of 27 Member States (Belgium, Bulgaria, Czech Republic, Estonia, Ireland, Greece, Spain, France, Latvia, Lithuania, Luxembourg, Hungary, Malta, the Netherlands, Poland, Portugal, Romania, Slovenia, Slovakia and the United Kingdom), and Croatia and Turkey have national legislation that sets a minimum wage or a national intersectoral agreement.

Minimum wages above were expressed by Eurostat in gross amounts, amounts expressed before the deduction of income tax and social security contributions, which vary from state to state. However, it should be mentioned that the data on national minimum wages are transmitted to Eurostat in the national currency. Thus, for countries outside the euro area, minimum wages are expressed in national currencies and the calculation of Eurostat are converted into euro by applying the exchange rate at the end of the previous month (e.g. for minimum wages on January 1, 2013 was used exchange rate at the end of December 2012).

The situation is similar if the gross monthly average salary, Romania (474 euro) and Bulgaria (363 euro) the states with the lowest gross wages in the EU, while in Germany the same indicator record in 2010, according to Eurostat, 3500 euro and the UK, Finland and Sweden around 3200 euro.

In Table 2 we present the evolution of the average gross annual salary in the years 2008-2010 in the Member States of the European Union.

Table 2. *Average annual gross salary in the period 2008-2010*

	2008	2009	2010
Belgium (2)	40 698	42 149	43 423
Bulgaria	3 590	4 085	4 396
Czech Republic (3)	10 930	10 596	11 312
Denmark	55 001	56 044	58 840
Germany	41 400	41 100	42 400
Estonia (2)	10 045	9 492	9 712
Ireland	45 893	45 207	:
Greece	25 915	29 160	:
Spain	25 208	26 316	:
France	:	35 530	:
Italy (3)	26 845	27 419	28 230
Cyprus (2)	:	24 775	25 251
Latvia	8 676	8 728	8 596
Lithuania (3)	7 398	6 895	6 735
Luxembourg (2)(4)	47 034	48 174	49 316
Hungary	10 237	9 603	10 100
Malta	:	20 811	21 446
Netherlands	43 146	44 412	45 215
Austria (2)	39 875	40 457	41 123
Poland (3)	9 868	8 399	9 435
Portugal	:	17 129	17 352
Romania	:	5 450	5 891
Slovenia (5)	15 997	16 282	17 168
Slovakia	9 707	10 387	10 777
Finland	37 946	39 052	40 122
Sweden	37 597	34 746	40 008
United Kingdom	42 327	38 047	39 626
Norway (2)	52 632	51 343	:
Switzerland (5)	:	:	56 509
Croatia (5)	11 979	11 969	:

(1) Enterprises with ten or more employees; NACE Rev. 2 Sections B to N.
(2) All enterprises.
(3) All enterprises; full-time units (FTU).
(4) Break in series, 2009.
(5) Enterprises with ten or more employees; full-time units (FTU).
Source: Eurostat (online data code: earn_gr_nace2)

Czech Republic is the state of the European Union scale wages nearest United States, the model that was developed labor market and developed Asian economies and Japan.

In conclusion, we find that the Western Region has a minimum wage of 1412 euro/month and the Eastern Region ranks last, with a minimum salary of 286 euro/month. Also, the North has a minimum wage of 725 euro/month and the South 691 euro/month. These data do not take into account the wages in Sweden, Finland and Denmark, as in these countries were not available, they will not regulated minimum wage.

Notes

(1) Geographically division of Europe: http://commons.wikimedia.org/wiki/File:Europe_ subregion_ map_UN_geoschme.svg

(2) According to Eurostat criteria, the minimum wage in a country is small if it is situated at a level between 100 and 500 euro/month.

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