

Axial vacuum

“The reality of the social climate is marked by the tragic feeling of the choice for a permanent bifurcation, either towards a project failed out of various reasons or towards the escape from any project which is tied to the place or the time of a nation.”

Historical changes are perceived as cultural turbulences, without exception. Despite the interpretation of change mostly in economic terms, as in the case of post-communist transition, what actually occurs is the passage from one formula of social organization to another. The focus in this case ought to be strictly on the values, as it ultimately concerns the people's concepts and way of living.

By and large, this change is one of societal ideal. Of course, we aren't facing a mechanical possibility, as a swift and simple replacement of the leading image of behaviors is an illusion. Changing the motivational target is an operation of psychological extraction, which is ruled by complex rules, not obviously centered on the palpable, material dimension.

Essentially, the transformation ought to have the determinants and the consequences specific to the Axial Era, enabling it to be a new spiritual origination of the world after the communist experiment. It would then lead to an inappetence for any kind of experiment, both in the East and West, including for the type which defined the post-communist episode and its neoliberal counterpoint. The top difficulty of this watershed is the inadequate treatment of society through the inhibition of its creative function, the societal innovation.

The excessive use of economic arguments in trying to explain the path of post-communist change cripples the truth and eliminates meanings. Post-communist transition, like any other radical shift in social organization, is either built on trans-economic needs, or it becomes an experiment inflicted by violence. The adoption of the post-communist project as a trajectory for the destiny of man is focused on the standards of life, with an identity substrate for the individual and thus with implications on the social climate which is prepared to generate a new type of comfort. In the absence of a climate favorable to the understanding of this, post-communist transition becomes a simple dislocation of statuses, a violent method of intervening in the expectations of people. The transition is depleted of content, it contravenes the frameworks on which people build their expectations of the way the world works.

The confusing fact is that the way things are arranged differs from the model of progress assessment with an eye on future development. The sense of perception is turned toward the past by limiting the project of change to the economic issues, exclusively focused on reconstituting a previous system – e.g. the system of property. This limitation puts the cultural association for the change in organization at odds with moving forwards toward the future. Social creativity is inhibited, as well risk taking, the innovation of means and resources, the fructification of initiative, the support for progress, the emancipation of social involvement, developmental growth, the frenzy of wealth, the spontaneity of do-goodery, the fertility of the climate and individual productivity. Only imitation is being stimulated as a behavioral norm.

The great error regarding the interpretation of post-communist transition is the disregard for the social memory, the fact that the main way in which the process of change is being perceived is as the reestablishment of a state of fact that had been brutally dislodged. The transition, as a retro-projection and not a projection, disturbs the system of rules belonging to the reasoning which has been inculcated with the modern cultural ideologies. When change is expected as a solution for progress, but it takes place as a restoration of the past century, an inhibitive cognitive force appears.

The substance of a dystopia from the pages of a history manual is being installed in the intellect of the human universe which is structured by the promise of the expected future. It is an upheaval of feelings, sentiments and perceptions, a reboot of the generation-of-sacrifice model, a rerouting of the expectations of progress into a loop going around the future, as a solution for coming into the normality of the time.

The social memory becomes in these conditions the source of the anti-experiment. Resorting to distributing blame amplifies the resistance. An avalanche of institutions to break the memory strengthens the perception of transition as that of a social experiment. The elite is culturally minor, operating exclusively in the space of managerial accounting, and it doesn't have the comprehensive view of the deep fundamentals and of the extensive horizon of the zeitgeist.

As a mental image of transition, the return to the past is doubly black marked by the ruin of a project and by the West's showcase display. The reality of the social climate is marked by the tragic feeling of the choice for a permanent bifurcation, either towards a project failed out of various reasons or towards the escape from any project which is tied to the place or the time of a nation. The dominant trends in social behavior are given by social anomia – with a minimalist limit given by the chronic experience of survival and subsistence – on one side, and by

emigration on the other. On each trend the post-communist transition causes the dissolution of the fundamentals of society – as cultural sociologists say – and of society as a nation, which is its fundamental identity.

The escape from communism – as the sense of post-communist transition – takes place at a one-on-one scale, as a reality which dissolves the social cohesion in trying to escape the societal experiment. The part which chooses the solution of the past reconstitutes the society of subsistence, while the other part chooses a reinvention of identity to fit the Western showcase.

The description of post-communist transition in these terms has larger cultural determinants, many of the originating from the hegemony of the cultural model of the economical. The Marxist aggression of the economical over the social, which motivated the post-communist project, is rediscovered in the transition's priming pressure exerted by the materialist obsession of the neoliberal recipe for change, which produces disengagement. In this case social memory cannot be defeated.

Equating yesteryear's consequences of change with those of yesterday's is experientially justified, the result being the dismissive attitude toward reality and the adoption – today – of escape solutions.

Marin Dinu

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Stochastic evolutionary cartel formation

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Abstract. *This paper employs the evolutionary dynamics driven by the Moran process (a special birth-death process) to investigate endogenous cartel formation from the perspective of stochastic evolution of the underlying industry. A Prisoner's Dilemma game is derived based on the Cournot competition between any two firms. Moreover, in a repeated setting, we consider the normal-form game between two well-known behavior modes: cooperative strategy tit-for-tat (TFT) and non-cooperative strategy always defect (ALLD). We then give the corresponding conditions under which full collusion and partial collusion are established, respectively, in stochastic evolutionary sense. Finally, both the threshold of discount factor and the threshold of industry concentration are endogenously determined in the model.*

Keywords: Endogenous cartel, Cournot competition, Prisoner's Dilemma, Repeated game, Evolutionary game theory.

JEL Classification: L13, C73.

REL Classification: 1J.

1. Introduction

When regarding cartel formation, existing literatures (Compte et al., 2002; Vasconcelos, 2005; Escrihuela-Villar, 2009; and Bos and Harrington, 2010) usually assume that the collusive outcome is the joint profit maximum. As you can see, they endogenize cartel composition and cartel formation by using the classic methodology of rational individual choice. That is, in a repeated setting, collusion can be supported and sustained if the expected cost of cheating today is higher than the expected benefit in future, so that firms refrain from undercutting the collusive price. Nevertheless, it is easily seen that bounded rationality and uncertainty in reality indeed may make collusion difficult, particularly in a changing economic environment, because of increased complexity in formulating and monitoring any contract (Williamson, 1975; Levenstein and Suslow, 2006). So, what are the industry conditions which support stochastic evolutionary cartel formation? Are there any new problems or issues when we consider cartel formation in an evolutionary environment and also from the perspective of stochastic group evolution?⁽¹⁾ The objective of this article is to address these and related questions by endogenizing cartel formation in the context of an evolutionary game with an exogenous parameter measuring the extent of substitution between the products.

The major results of the current exploration can be expressed as follows. First, the recognition that “entry” is one of the most important problems facing any cartel encourages us to employ birth-death processes to model such kind of phenomenon in reality, and in particular, the well-known (perturbed) Moran process is used in this study for the first time. Second, noting that “coordination” plays a key role in cartel success in a situation in which there are multiple equilibria, we thus derive a coordination game based upon the Prisoner’s Dilemma game between any two firms and also in a repeated setting, and thus the following analysis strictly surrounds the induced normal-form game. Third, the underlying evolutionary mechanism reveals that “cheating” can be an evolutionary stable strategy (ESS) in relatively weak conditions and therefore cartel formation is faced with much stronger challenge in the present industrial environment. Forth, the minimum discount factor for sustaining full collusion is obtained and we further derive the minimum number of the firms (or the threshold of industry concentration) that supports full collusion for any given discount factor. Finally, we have derived the minimum discount factor such that partial collusion is established when the number of the firms in the underlying industry is sufficiently large and the mutations of the evolutionary dynamics are sufficiently small.

Now, we discuss some related literatures. Selten (1973) has theoretically considered the process of forming a cartel in a simultaneous-moves game in the

sense of Cournot-competition. The main finding of Selten (1973) is that only the industries composed of less than six firms stand a chance of having a cartel. To extend the model of Selten (1973), Prokop (1999) constructs a sequential- and simultaneous-moves game to investigate the process of cartel formation. In the model with sequential moves Prokop (1999) finds that there is a possibility for creation of a dominant cartel, whereas the simultaneous-moves game shows that it might be close to impossible to form a stable cartel even though one can prove the theoretical existence of such a cartel. Recently, there is a pair of articles which endogenize cartel composition and cartel membership in the context of an infinitely repeated game. For example, Escrihuela-Villar (2009) examines an infinitely repeated quantity setting with identical firms and homogeneous goods and the main result reveals that firms only have an incentive to form the smallest sustainable cartel. In addition to that, Bos and Harrington (2010)'s model is the first to endogenize the composition of a cartel in the context of an infinitely repeated game with heterogeneous firms. And their analysis demonstrates that there exists a stable cartel involving the largest firms when firms are sufficiently patient, while a firm with sufficiently small capacity is not a member of any stable cartel.

When compared with existing work, there are some differences which need be specifically pointed out. First, the most obvious difference is that we endogenize cartel formation from the viewpoint of stochastic group evolution rather than the firm's rational individual choice even though we generally can understand the evolutionary outcome by applying the well-known *as if* hypothesis from the perspective of *ex post*. Second, in spite of the firms are assumed to be in repeated interactions, the infinitely repeated game just provides us with a normal-form game and our major analysis follows from the underlying evolutionary dynamics deduced by the normal-form game. That is, we consider a stochastic and dynamic environment instead of a static and deterministic framework. Third, the collusive outcome in the paper is not the joint profit maximum as in Escrihuela-Villar (2008) and among others but a long-run equilibrium selected by the underlying evolutionary mechanism. Forth, asymmetry between the firms characterized by the parameter measuring the extent of substitution between the products does not directly affect the process of cartel formation in the present evolutionary model, and it only indirectly determines the minimum discount factor and the minimum number of firms which support full collusion in the industry under consideration. Last but not least, it is particularly worth emphasizing that the endogenous partial collusion is characterized in the sense of limiting probability distribution and also in asymptotic sense in the present stochastic evolutionary game. Accordingly, these differences may also be regarded as the innovations of the current investigation.

The article is organized as follows. In section 2, the basic model is described and a normal-form game in a repeated setting is established. In section 3, we first introduce the necessary mathematical background, i.e., the Moran process and the perturbed Moran process, and two key theorems are derived, based upon which we then obtain the main results of the present exploration. Section 4 closes this study with some concluding remarks. Major mathematical derivations appear in Appendix A.

2. The induced normal-form games

In the present section, it is assumed that there are two firms in the market. We consider the following inverse demand functions,

$$p_i = \alpha - \beta(q_i + \theta q_j), \quad i \neq j, \quad i, j = 1, 2. \quad (1)$$

for $\alpha, \beta > 0$ and $0 \leq \theta \leq 1$. The parameter θ measures the extent of substitution between the products i and j . In particular, $\theta = 0$ implies that products i and j are completely heterogeneous products while $\theta = 1$ showing us that products i and j are homogeneous, i.e., products i and j will completely substitute each other when $\theta = 1$. Noting that the parameter θ will be the unique parameter that characterizes the difference between products i and j , it will play a crucial role in the following analysis.

Consider a single-period game. Suppose that the firms play non-cooperatively, each firm solves the following optimization problem by making use of (1),

$$\max_{q_i} \pi_i(q_i, q_j) = q_i [\alpha - \beta(q_i + \theta q_j)] - cq_i \quad (i \neq j, \quad i, j = 1, 2). \quad (2)$$

in which $c > 0$ denotes the fixed marginal cost. From the first-order conditions of the maximization problem, it can be concluded that the reaction functions are given by,

$$q_i(q_j) = \frac{\alpha - c - \beta\theta q_j}{2\beta} \quad (i \neq j, \quad i, j = 1, 2). \quad (3)$$

Now, by symmetry and some necessary algebra, we get that in the unique Cournot-Nash equilibrium of the one short game, firms' outputs and individual profits are written as follows,

$$q_1^* = q_2^* = \frac{\alpha - c}{\beta(2 + \theta)}, \quad \pi_1^{Cournot}(q_1^*, q_2^*) = \pi_2^{Cournot}(q_1^*, q_2^*) = \frac{(\alpha - c)^2}{\beta(2 + \theta)^2}. \quad (4)$$

Suppose instead that the firms are encouraged to maximize their joint profit in the one-shot game, thus their equilibrium outputs result from the following optimization problem,

$$\max_{\{q_1, q_2\}} \sum_{i=1}^2 \pi_i(q_1, q_2) = \{q_1 [\alpha - \beta(q_1 + \theta q_2)] - cq_1\} + \{q_2 [\alpha - \beta(q_2 + \theta q_1)] - cq_2\}. \quad (5)$$

From the first-order conditions of the previous maximization problem, and by symmetry between the two firms, it is easily shown that the cooperative outputs and cooperative-equilibrium profits are given as,

$$\hat{q}_1 = \hat{q}_2 = \frac{\alpha - c}{2\beta(1+\theta)}, \quad \pi_1^{Cooperate}(\hat{q}_1, \hat{q}_2) = \pi_2^{Cooperate}(\hat{q}_1, \hat{q}_2) = \frac{(\alpha - c)^2}{4\beta(1+\theta)}. \quad (6)$$

We without loss of generality assume that firm 1 is considering to deviate when the two firms are supposed to set outputs in (6), then making use of firm 1's reaction function in (3), firm 1's optimal deviation output is obtained,

$$q_1^*(\hat{q}_2) = \frac{(2+\theta)(\alpha - c)}{4\beta(1+\theta)}. \quad (7)$$

So, the deviation profit of firm 1 and the corresponding cooperative profit of firm 2 are respectively given as,

$$\pi_1^{Defect}(q_1^*(\hat{q}_2), \hat{q}_2) = \frac{1}{\beta} \left[\frac{(2+\theta)(\alpha - c)}{4(1+\theta)} \right]^2. \quad (8)$$

$$\pi_2^{Cooperate}(q_1^*(\hat{q}_2), \hat{q}_2) = \frac{(\alpha - c)^2(2+2\theta-\theta^2)}{8\beta(1+\theta)^2}. \quad (9)$$

Up to the present step, we have derived all the possible profits of the two firms by applying the symmetry between the firms. Accordingly, one can establish the payoff matrix of the one-shot game by using (4), (6), (8) and (9) as follows,

	Cooperate	Defect
Cooperate	$\frac{(\alpha - c)^2}{4\beta(1+\theta)}$	$\frac{(\alpha - c)^2(2+2\theta-\theta^2)}{8\beta(1+\theta)^2}$
Defect	$\frac{1}{\beta} \left[\frac{(2+\theta)(\alpha - c)}{4(1+\theta)} \right]^2$	$\frac{(\alpha - c)^2}{\beta(2+\theta)^2}$

Figure 1. One-Short Game

Now, based upon the one-shot normal-form game given in Figure 1, we obtain the following result,

Lemma 1. i) If $\theta = 0$, i.e., the products of the two firms are completely heterogeneous, then Figure 1 shows us a Neutral game with the entries having the same value of $(\alpha - c)^2 / 4\beta$;

ii) If $\theta \in [0, 1] \cap \{\theta \mid 8(1 + \theta)^2 > (2 + \theta)^2(2 + 2\theta - \theta^2)\} \neq \emptyset$, then Figure 1 shows a Prisoners' Dilemma game with

$\pi_1^{\text{Defect}}(q_1^*(\hat{q}_2), \hat{q}_2) > \pi_1^{\text{Cooperate}}(\hat{q}_1, \hat{q}_2) > \pi_1^{\text{Cournot}}(q_1^*, q_2^*) > \pi_1^{\text{Cooperate}}(\hat{q}_1, q_2^*(\hat{q}_1))$ for firm 1, and so is firm 2.

Proof. Inserting $\theta = 0$ into Figure 1 produces the required result in i). It follows from Figure 1 that,

$$\pi_1^{\text{Cournot}}(q_1^*, q_2^*) > \pi_1^{\text{Cooperate}}(\hat{q}_1, q_2^*(\hat{q}_1)) \Leftrightarrow 8(1 + \theta)^2 > (2 + \theta)^2(2 + 2\theta - \theta^2)$$

Indeed, we have $0 \notin [0, 1] \cap \{\theta \mid 8(1 + \theta)^2 > (2 + \theta)^2(2 + 2\theta - \theta^2)\} \neq \emptyset$, for example, one may check it with $\theta = 1$. Noting that,

$$\frac{(\alpha - c)^2}{4\beta(1 + \theta)} < \frac{1}{\beta} \left[\frac{(2 + \theta)(\alpha - c)}{4(1 + \theta)} \right]^2 \Leftrightarrow -\theta^2 < 0$$

we obtain $\pi_1^{\text{Defect}}(q_1^*(\hat{q}_2), \hat{q}_2) > \pi_1^{\text{Cooperate}}(\hat{q}_1, \hat{q}_2)$ for $\theta \in (0, 1]$. Moreover, we also get $\pi_1^{\text{Cooperate}}(\hat{q}_1, \hat{q}_2) > \pi_1^{\text{Cournot}}(q_1^*, q_2^*)$ for $\theta \in (0, 1]$ as we have,

$$\frac{(\alpha - c)^2}{4\beta(1 + \theta)} > \frac{(\alpha - c)^2}{\beta(2 + \theta)^2} \Leftrightarrow \theta^2 > 0$$

so, the results in ii) are derived. ■

In what follows, we will consider the infinitely repeated game between the two firms. We let $0 < \delta < 1$ denote the common discount factor. In order to make the notations more compact, we put,

$$\xi_1 \equiv \frac{(\alpha - c)^2}{4\beta(1 + \theta)}, \quad \xi_2 \equiv \frac{(\alpha - c)^2(2 + 2\theta - \theta^2)}{8\beta(1 + \theta)^2}. \quad (10)$$

$$\xi_3 \equiv \frac{1}{\beta} \left[\frac{(2 + \theta)(\alpha - c)}{4(1 + \theta)} \right]^2, \quad \xi_4 \equiv \frac{(\alpha - c)^2}{\beta(2 + \theta)^2}. \quad (11)$$

Indeed, we will focus on the following two kinds of well-known behavior mode: TFT (tit-for-tat) and ALLD (always defect). Thus, based on Figure 1, we obtain the following normal-form game by using (10) and (11).

	TFT	ALLD
TFT	$\frac{\xi_1}{1-\delta}$	$\frac{\xi_2 + (\xi_4 - \xi_2)\delta}{1-\delta}$
ALLD	$\frac{\xi_3 + (\xi_4 - \xi_3)\delta}{1-\delta}$	$\frac{\xi_4}{1-\delta}$

Figure 2. Infinitely Repeated Game

By Figure 2 and Lemma 1, the following lemma can be easily established.

Lemma 2. *It is assumed that Figure 1 provides us with a Prisoners' Dilemma game, i.e., $\xi_3 > \xi_1 > \xi_4 > \xi_2$ in (10) and (11). If $0 < \delta < \frac{\xi_3 - \xi_1}{\xi_3 - \xi_4}$, $\{ALLD, ALLD\}$ will be the unique Nash equilibrium; if $\frac{\xi_3 - \xi_1}{\xi_3 - \xi_4} \leq \delta < 1$, then there are two pure-strategy Nash equilibria $\{TFT, TFT\}$ and $\{ALLD, ALLD\}$, a mixed-strategy Nash equilibrium represented by $\{(\gamma, 1-\gamma), (\gamma, 1-\gamma)\}$ in which*

$$\gamma = \frac{(\xi_4 - \xi_2)(1-\delta)}{(\xi_1 - \xi_2 - \xi_3 + \xi_4) - (2\xi_4 - \xi_2 - \xi_3)\delta},$$

and we also get that

$$\frac{\xi_1}{1-\delta} > \frac{\xi_3 + (\xi_4 - \xi_3)\delta}{1-\delta} > \frac{\xi_4}{1-\delta} > \frac{\xi_2 + (\xi_4 - \xi_2)\delta}{1-\delta}.$$

Proof. Noting that the corresponding proof is quite easy and hence we take it omitted. ■

Furthermore, by applying Lemma 2, we obtain the following result,

Lemma 3. *It is assumed that Figure 1 provides us with a Prisoners' Dilemma game, i.e., $\xi_3 > \xi_1 > \xi_4 > \xi_2$ in (10) and (11), and also we let $\frac{\xi_3 - \xi_1}{\xi_3 - \xi_4} \leq \delta < 1$, i.e., Figure 2 is indeed a coordination game. Then it is easily seen that $\{TFT, TFT\}$ Pareto (payoff) dominates $\{ALLD, ALLD\}$. Moreover, if $\frac{\xi_3 - \xi_1 + \xi_4 - \xi_2}{\xi_3 - \xi_2} < \delta < 1$, we get that $\{TFT, TFT\}$ risk dominates $\{ALLD, ALLD\}$; if $\frac{\xi_3 - \xi_1}{\xi_3 - \xi_4} \leq \delta < \frac{\xi_3 - \xi_1 + \xi_4 - \xi_2}{\xi_3 - \xi_2}$, then we have that $\{ALLD, ALLD\}$ risk dominates $\{TFT, TFT\}$.*

Proof. It is widely known that $\{TFT, TFT\}$ (strictly) risk dominates $\{ALLD, ALLD\}$ if and only if,

$$\frac{\xi_1}{1-\delta} - \frac{\xi_3 + (\xi_4 - \xi_3)\delta}{1-\delta} > \frac{\xi_4}{1-\delta} - \frac{\xi_2 + (\xi_4 - \xi_2)\delta}{1-\delta}$$

which implies that,

$$\frac{\xi_3 - \xi_1 + \xi_4 - \xi_2}{\xi_3 - \xi_2} < \delta < 1$$

Moreover, noting that,

$$\frac{\xi_3 - \xi_1}{\xi_3 - \xi_4} > \frac{\xi_3 - \xi_1 + \xi_4 - \xi_2}{\xi_3 - \xi_2} \Leftrightarrow (\xi_4 - \xi_2)(\xi_4 - \xi_1) > 0$$

which contradicts with the assumption that Figure 1 provides us with a Prisoners' Dilemma game. Therefore, we get,

$$\frac{\xi_3 - \xi_1}{\xi_3 - \xi_4} < \frac{\xi_3 - \xi_1 + \xi_4 - \xi_2}{\xi_3 - \xi_2}$$

which gives the required result. ■

Why do we focus on the case that Figure 2 defines a coordination game? As argued by Tirole (1988), Martin (2002) and Levenstein and Suslow (2006), coordination is one of the most important problems facing any cartel and firms must be able to coordinate on an equilibrium in a situation in which there are often multiple equilibria. In other words, coordination game will provide us with a much better approximation to reality and it certainly implies much richer economic implications and this is why we directly suppose throughout that both TFT and ALLD are (strict) Nash-equilibrium strategies in Figure 2. And as you can see below, we mainly employ the well-known evolutionary mechanism in solving the present equilibrium-selection problem facing the firms in the underlying industry.

3. Evolutionary characterization of cartel formation

3.1. Frequency dependent processes

Now, we will introduce the stochastic evolutionary game dynamics in finite populations that is quite similar to the well-known replicator dynamics for infinite populations. In particular, we will employ the Moran process that is well known in population genetics (Ewens, 2004) where it is normally used to study the

dynamics of constant selection in finite populations. Indeed, the Moran process describes a biological population with asynchronous reproduction, that is, a single individual is chosen to reproduction at any one time step. Thus, there would be overlapping generations in the process, which accordingly provides us with a possible approximation to the characteristic of the evolution of firms in any given industry. For example, fierce market competition implies that there are new entrants as well as incumbent firms for some given time interval and in most of the industries of the market economy. Provided that the time step of reproduction is sufficiently small, we may argue that the Moran process will be a suitable tool for our analysis of the evolutionary characterization of firm's strategic behaviors. It is especially worthwhile mentioning that the results in the current section are directly brought from Taylor et al. (2004), Nowak et al. (2004) and Fudenberg et al. (2006).

3.1.1. The Moran process

Let us consider a symmetric game between two strategies, A and B, with payoff matrix,

	A	B
A	a_{11}	a_{12}
B	a_{21}	a_{22}

Figure 3. $a_{11} > a_{21} > a_{22} > a_{12}$

The fitness of strategies A and B with payoff matrix in Figure 3 is, respectively, given by,

$$f_i = 1 - w + \frac{w[a_{11}(i-1) + a_{12}(N-i)]}{N-1}, \quad g_i = 1 - w + \frac{w[a_{21}i + a_{22}(N-i-1)]}{N-1}$$

in which i denotes the number of individuals using strategy A, and $w \in [0,1]$ specifies the contribution of the game to the fitness. This parameter w , quantifying the intensity of selection, cancels out in deterministic replicator dynamics of infinite populations, but plays a crucial role in finite populations (e.g., Nowak et al., 2004; Fudenberg et al., 2006; Imhof and Nowak, 2006). Let us compare f_i and g_i for each i in order to evaluate whether selection acts to increase or reduce the number of A players at position i . Put,

$$h_i \equiv f_i - g_i = \frac{w}{N-1} [a_{11}(i-1) + a_{12}(N-i) - a_{21}i - a_{22}(N-i-1)] \quad (12)$$

which yields that h_i is a linear function of i defined on $i = 1, \dots, N-1$. Invasion dynamics can be characterized by evaluating the sign of h_1 and h_{N-1} . If $h_1 > 0$ then we say “selection favors A invading B”. If $h_{N-1} < 0$ then we say “selection favors B invading A”. These invasion criteria evaluate whether a single individual of A (or B) has a higher fitness than the resident population.

At each time step, an individual is chosen for reproduction proportional to its fitness. One identical offspring is being produced which replaces another randomly chosen individual. Thus the population size, N , is strictly constant. And at each time step, the number of A individuals can either increase by one, stay the same or fall by one. Consequently, the transition matrix of the Markov process is tri-diagonal and defines a birth-death process. The transition matrix is given by,

$$P_{i,i+1} = \frac{if_i}{if_i + (N-i)g_i} \frac{N-i}{N}, \quad P_{i,i-1} = \frac{(N-i)g_i}{if_i + (N-i)g_i} \frac{i}{N}, \quad P_{i,i} = 1 - P_{i,i+1} - P_{i,i-1}$$

all other entries of the transition matrix are 0.

In this paper, we are particularly interested in the probability that a single A individual reaches fixation in a population of B individuals. This probability is given by,

$$\rho_{AB} = \frac{1}{1 + \sum_{j=1}^{N-1} \prod_{k=1}^j \frac{g_k}{f_k}}$$

which is derived by Nowak et al. (2004), Fudenberg et al. (2006), and Imhof and Nowak (2006). And if $\rho_{AB} > 1/N$, then selection favors A replacing B. Deterministic replicator dynamics of infinite populations admit an unstable equilibrium at a frequency of A given by $x^* = (a_{22} - a_{12}) / (a_{11} - a_{12} - a_{21} + a_{22})$. If the initial frequency of A is less than x^* , then it will be eliminated by natural selection. A can only replace B if its initial frequency exceeds this invasion barrier. The following theorem and definition are established by Nowak et al. (2004).

Theorem 1. *For a given population size N and sufficiently weak selection (small w), selection favors A replacing B if $a_{11}(N-2) + a_{12}(2N-1) > a_{21}(N+1) + a_{22}(2N-4)$. For the smallest possible population size, $N=2$, we obtain $a_{12} > a_{21}$. For the limit of large N , we obtain $a_{11} + 2a_{12} > a_{21} + 2a_{22}$, which is equivalent to $x^* < 1/3$. Moreover, if $x^* < 1/3$, then there is a minimum N , i.e.,*

$$N_{\min} \equiv (2a_{11} + a_{12} + a_{21} - 4a_{22}) / (a_{11} + 2a_{12} - a_{21} - 2a_{22})$$

such that $\rho_{AB} > 1/N$.

Definition 1. (Evolutionary Stability). For finite population size, N , we propose that B is an evolutionary stable strategy (ESS) if two conditions hold: (i) selection opposes A invading B, which means that a single mutant of A in a population of B players has a lower fitness; and (ii) selection opposes A replacing B, which means $\rho_{AB} < 1/N$. So, strategy B is ESS if $a_{12}(N-1) < a_{21} + a_{22}(N-2)$ and $a_{11}(N-2) + a_{12}(2N-1) < a_{21}(N+1) + a_{22}(2N-4)$. For $N=2$ both conditions thus reduce to $a_{12} < a_{21}$. For large populations, the two conditions lead us to $a_{12} < a_{22}$ and $x^* > 1/3$, respectively.

3.1.2. Perturbed Moran process

In this subsection, we will introduce mutation into the Moran process discussed above. That is, we assume that with probability $\mu_{AB} > 0$, an A-offspring is a mutant which plays B instead of A, and with probability $\mu_{BA} > 0$, a B-offspring plays A. After reproduction, the offspring replaces a randomly chosen member of the population, so that the population size is constant. The process $X(t)$ that describes the number of individuals that use A is a Markov process with state space $\{0, \dots, N\}$ and transition matrix (P_{ij}) , where $P_{ij} = 0$ if $|i-j| > 1$,

$$P_{01} = \mu_{BA} = 1 - P_{00}, \quad P_{N,N-1} = \mu_{AB} = 1 - P_{NN} \quad \text{and for } i = 1, \dots, N-1,$$

$$P_{i,i+1} = \frac{if_i(1-\mu_{AB}) + (N-i)g_i\mu_{BA}}{if_i + (N-i)g_i} \frac{N-i}{N} \quad (13)$$

$$P_{i,i-1} = \frac{if_i\mu_{AB} + (N-i)g_i(1-\mu_{BA})}{if_i + (N-i)g_i} \frac{i}{N} \quad (14)$$

$$P_{i,i} = 1 - P_{i,i+1} - P_{i,i-1} \quad (15)$$

Now, the following theorem can be established,

Theorem 2. Let $N \rightarrow \infty$, $\mu_{AB}N \rightarrow \kappa_1$, $\mu_{BA}N \rightarrow \kappa_2$ with $0 < \kappa_1, \kappa_2 < \infty$. If we have $h_i = f_i - g_i = 0$ for $\forall i \in \{0, \dots, N\}$, then the limiting distribution of the process $X(t)$ follows a Beta distribution with parameters κ_1 and κ_2 given above.

Proof. See Appendix A. ■

One can also refer to Fudenberg and Imhof (2006, 2008) for much more general results about the equilibrium selection and limit distribution in such kind of evolutionary dynamics.

3.2. Evolutionary analysis on firm's behavior

Based upon Figure 2, (12) can be written as follows,

$$h_i = \frac{w}{N-1} \left[\frac{\xi_1}{1-\delta} (i-1) + \frac{\xi_2 + (\xi_4 - \xi_2)\delta}{1-\delta} (N-i) - \frac{\xi_3 + (\xi_4 - \xi_3)\delta}{1-\delta} i - \frac{\xi_4}{1-\delta} (N-i-1) \right] \quad (16)$$

So, based on the results in the previous section, we get,

Proposition 1. *For the infinitely repeated game defined in Figure 2, selection does not favor TFT invading ALLD. And selection favors ALLD invading TFT if we put $\delta \in [\frac{\xi_3 - \xi_1}{\xi_3 - \xi_4}, \frac{(\xi_3 - \xi_1)(N-1) + \xi_1 - \xi_2}{(\xi_3 - \xi_4)(N-1) + \xi_4 - \xi_2})$.*

Proof. By using (16), it is easily shown that $h_1 > 0 \Leftrightarrow \delta > 1$. This implies that selection does not favor TFT invading ALLD. Also by (16), we get,

$$h_{N-1} < 0 \Leftrightarrow \delta < \frac{(\xi_3 - \xi_1)(N-1) + \xi_1 - \xi_2}{(\xi_3 - \xi_4)(N-1) + \xi_4 - \xi_2}$$

And it is demonstrated that,

$$\frac{(\xi_3 - \xi_1)(N-1) + \xi_1 - \xi_2}{(\xi_3 - \xi_4)(N-1) + \xi_4 - \xi_2} \geq \frac{\xi_3 - \xi_1}{\xi_3 - \xi_4} \Leftrightarrow (\xi_1 - \xi_2)(\xi_3 - \xi_4) \geq (\xi_3 - \xi_1)(\xi_4 - \xi_2)$$

which always holds due to the fact $\xi_3 > \xi_1 > \xi_4 > \xi_2$ of Figure 1. Hence, the proof is complete. ■

Although it is assumed that both ALLD and TFT are (strict) Nash-equilibrium strategies in Figure 2, Proposition 1 proves that stochastic evolutionary selection favors ALLD invading TFT, i.e., a single ALLD-firm has a higher fitness than the resident TFT-firms, when the discount factor is strictly less than $\frac{(\xi_3 - \xi_1)(N-1) + \xi_1 - \xi_2}{(\xi_3 - \xi_4)(N-1) + \xi_4 - \xi_2} \equiv \delta_{\sup}$. As you can see, $\delta_{\sup}$ strictly relies on the number of firms in the industry under consideration (or the industry concentration), the parameter θ that measures the extent of substitution between the products (or asymmetry between the products or firms) and also the fixed marginal cost c by noting the definitions given in (10) and (11). Furthermore, Proposition 1 also demonstrates a robust claim that selection driven by the Moran process does not favor TFT invading ALLD, i.e., a single TFT-firm can never have a fitness higher than the

resident ALLD-firms, even if TFT both payoff and risk dominates ALLD (making use of Lemma 3). To sum up, Proposition 1 highlights the great incentive to cheat facing the firms from the viewpoint of stochastic group evolution, thereby undermining the firms' attempts to collude when we employ the classic *as if* hypothesis for the firms in the industry and also from the *ex post* perspective.

Proposition 2. (Full Collusion). *If there are only two firms in the industry, we obtain that selection does not favor TFT replacing ALLD. For the limit of large N , selection favors TFT replacing ALLD if $\delta > \max\{\frac{\xi_3 - \xi_1}{\xi_3 - \xi_4}, \frac{2(\xi_4 - \xi_2) + \xi_3 - \xi_1}{\xi_3 + \xi_4 - 2\xi_2}\}$. Furthermore, there is a minimum number of firms,*

$$N_{\min} = \frac{(2\xi_1 + \xi_2 + \xi_3 - 4\xi_4) + (2\xi_4 - \xi_2 - \xi_3)\delta}{(\xi_1 + 2\xi_2 - \xi_3 - 2\xi_4) + (\xi_4 - 2\xi_2 + \xi_3)\delta}$$

such that selection favors TFT replacing ALLD.

Proof. Combining Theorem 1 with Figure 2 easily confirms the desired results. In particular, by (16) and Lemma 2,

$$\gamma < \frac{1}{3} \Leftrightarrow \delta > \frac{2(\xi_4 - \xi_2) + \xi_3 - \xi_1}{\xi_3 + \xi_4 - 2\xi_2}$$

and also,

$$\frac{2(\xi_4 - \xi_2) + \xi_3 - \xi_1}{\xi_3 + \xi_4 - 2\xi_2} < 1 \Leftrightarrow \xi_4 < \xi_1$$

which holds because Figure 1 is assumed to be a Prisoner's Dilemma game. Thus, the proof is complete. ■

Proposition 2 establishes the explicit conditions based on which stochastic evolutionary selection driven by the Moran process favors full collusion in the underlying industry, thereby leading us to the endogenous cartel formation. As a matter of fact, full collusion can be reached as long as there are sufficiently many firms in the industry and the firms are sufficiently patient. And we have further derived the closed-form solutions of the minimum number of firms (it depends on discount factor δ , the parameter θ measuring the extent of substitution between the products and the fixed marginal cost c) and the minimum discount factor (it relies on the parameter θ measuring the extent of substitution between the products and the fixed marginal cost c) so that full collusion is identified in the industry under consideration and also in stochastic evolutionary sense.

What is the corresponding economic intuition of the results shown in Proposition 2? First, in a repeated setting, the threshold discount factor in Proposition 2

implies that *as if* the firm in the industry weighs the expected gain from cheating today with the expected reduction or cost of cheating in future even from the perspective of group-level stochastic evolution rather than rational individual choice. Second, the number of firms discussed in Proposition 2 naturally leads us to the crucial concept of industry concentration and the threshold $N_{\min}$ in Proposition 2 sufficiently captures the *tradeoff* between the following two opposite effects in stochastic evolutionary sense: on the one hand, an increase in concentration increases each individual firm's payoff from collusion, thereby facilitating collusion as argued by early Structure- Conduct-Performance theorists such as Bain (1951, 1956, 1959), while on the other hand, the value of each firm's share of collusive industry profits declines as the number of firms in the industry increases. That is, in order for firms to be *as if* willing to refrain from cheating in the present evolutionary environment, there must be a critical value of the number of firms provided any value of the discount factor, any value of the marginal cost and any value of the extent of asymmetry between the products or firms. In addition to that, as emphasized by Sutton (1991, 1998) and Symeonidis (2002) that concentration is not exogenous to the history of collusion in the industry, industry concentration is indeed endogenously determined in Proposition 2. And it would be regarded as a long-run equilibrium by noting that the present exploration focuses on evolutionary analysis of industrial organizations.

Proposition 3. *If there are two firms in the industry, then ALLD is an evolutionary stable strategy (ESS) in the sense of Definition 1. Moreover, if there is a large number of firms in the industry, then ALLD is an evolutionary stable strategy (ESS) when $\delta \in [\frac{\xi_3 - \xi_1}{\xi_3 - \xi_4}, \frac{2(\xi_4 - \xi_2) + \xi_3 - \xi_1}{\xi_3 + \xi_4 - 2\xi_2})$.*

Proof. Using Definition 1, Figure 2 and Proposition 2 confirms the required assertion. Here we just check that $\frac{\xi_3 - \xi_1}{\xi_3 - \xi_4} < \frac{2(\xi_4 - \xi_2) + \xi_3 - \xi_1}{\xi_3 + \xi_4 - 2\xi_2}$. In fact,

$$\begin{aligned} & \frac{2(\xi_4 - \xi_2) + \xi_3 - \xi_1}{\xi_3 + \xi_4 - 2\xi_2} > \frac{\xi_3 - \xi_1}{\xi_3 - \xi_4} \\ \Leftrightarrow & 2(\xi_4 - \xi_2)(\xi_3 - \xi_4) + (\xi_3 - \xi_1)(\xi_3 - \xi_4) > (\xi_3 - \xi_1)(\xi_3 + \xi_4 - 2\xi_2) \\ \Leftrightarrow & 2(\xi_4 - \xi_2)(\xi_3 - \xi_4) > 2(\xi_3 - \xi_1)(\xi_4 - \xi_2) \\ \Leftrightarrow & \xi_1 > \xi_4 \end{aligned}$$

which always holds true since we have supposed that Figure 1 provides us with a Prisoner's Dilemma game, i.e., $\xi_3 > \xi_1 > \xi_4 > \xi_2$. As a consequence, the proof is complete. ■

If there are only two firms in the industry, then the non-cooperative strategy ALLD will be an ESS, that is, a single mutant of TFT-firm in a group of ALLD-firm has a lower fitness and stochastic evolutionary selection opposes the cooperative strategy TFT replacing the non-cooperative strategy ALLD. Moreover, if there are a large number of firms in the industry, then the non-cooperative strategy ALLD will be an ESS only when certain requirement is imposed on the discount factor. Indeed, we have derived the threshold $\delta_{\sup} \equiv \frac{2(\xi_4 - \xi_2) + \xi_3 - \xi_1}{\xi_3 + \xi_4 - 2\xi_2}$, which is endogenously determined by the important parameters θ and c owing to the definitions given by (10) and (11).

Although Proposition 3 focuses on the evolutionary stability of the non-cooperative strategy ALLD, it is especially worth emphasizing that it is not necessarily implying that the cooperative strategy TFT is evolutionary unstable. So, what's the underlying implication of Proposition 3? As argued by the classic article of Stigler (1964), Proposition 3 highlights potential cheating as the preeminent challenge that cartels face in repeated interactions and also in stochastic evolutionary sense. In fact, Proposition 3 strengthens the argument of Stigler by identifying that cheating can be evolutionary stale under relatively weak conditions. To summarize, Proposition 3 yields that cartel formation faces much stronger challenge in the present stochastic evolutionary environment.

Proposition 4. (Partial Collusion). *There exists $\delta \geq \frac{\xi_3 - \xi_1}{\xi_3 - \xi_4}$ such that $h_i = 0$ in (16) for $\forall i \in \{0, \dots, N\}$. Let $N \rightarrow \infty$, $\mu_{AB}N \rightarrow \kappa_1$, $\mu_{BA}N \rightarrow \kappa_2$ with $0 < \kappa_1, \kappa_2 < \infty$, then the limiting distribution of the stochastic process $X(t)$ is a Beta distribution with parameters κ_1 and κ_2 given above.*

Proof. We just need to show that there exists $\delta \geq \frac{\xi_3 - \xi_1}{\xi_3 - \xi_4}$ such that $h_i = 0$ in (16) for $\forall i \in \{0, \dots, N\}$. And the remaining proof is quite similar to that of Theorem 2. By (16),

$$h_i = 0 \Leftrightarrow \delta(i, N) = \frac{\xi_3 i + \xi_4 (N - i - 1) - \xi_1 (i - 1) - \xi_2 (N - i)}{(\xi_4 - \xi_2)(N - i) - (\xi_4 - \xi_3)i}$$

Noting that,

$$\frac{\partial \delta(i, N)}{\partial i} = \frac{(\xi_1 - \xi_4)[\xi_4 - \xi_3 - (\xi_4 - \xi_2)(N - 1)]}{[(\xi_4 - \xi_2)(N - i) - (\xi_4 - \xi_3)i]^2} < 0$$

due to the fact that $\xi_3 > \xi_1 > \xi_4 > \xi_2$ in Figure 1. Thus, we get,

$$\min_N \min_i \delta(i, N) = \lim_{N \rightarrow \infty} \lim_{i \rightarrow N} \delta(i, N) = \frac{\xi_3 - \xi_1}{\xi_3 - \xi_4}$$

which shows the required assertion. ■

Intuitively, Proposition 4 shows that there is a minimum value $\delta_{\min} \equiv \frac{\xi_3 - \xi_1}{\xi_3 - \xi_4}$ (it is especially worth noting from (10) and (11) that this value is endogenously determined by two parameters, i.e., the parameter θ measuring the extent of substitution between the products and the fixed marginal cost c) of the discount factor such that neither selection favors ALLD invading TFT nor selection favors TFT invading ALLD in the underlying evolutionary game characterizing the endogenous changes of organizational structures in evolutionary sense. In other words, provided the repeated interactions between the firms and also provided the firms are sufficiently patient, a single ALLD-firm cannot invade into a group of TFT-firms and a single TFT-firm cannot invade into a group of ALLD-firms in stochastic evolutionary sense.

What is more, it is demonstrated in Proposition 4 that the limiting distribution of the Markov process $X(t)$ which represents the number of TFT-firms at time t follows a Beta distribution as long as the firms are sufficiently patient, the number of the firms in the given industry is sufficiently large and the mutations of the underlying evolutionary dynamics are sufficiently small. In spite of full collusion (e.g., all firms employ the cooperative strategy TFT in repeated interactions) may not be established in the present case, we indeed have a explicit characterization of the limiting distribution of the number of colluded firms in the given industry and in the circumstance corresponding to Proposition 4. In other words, such kind of cartel is indexed by the number of the firms that use cooperative strategy TFT in repeated interactions. Meanwhile, it would be easily seen from Proposition 4 that the endogenously formed cartel exhibits asymptotic stability in certain sense.

4. Concluding remarks

What are the explicit conditions which support stochastic evolutionary cartel formation? Can we establish full collusion or at least partial collusion under a given evolutionary mechanism? How encompassing is a cartel in evolutionary sense? In spite of the large body of theoretical work on collusion, there is little research that addresses these questions within the evolutionary game theory framework. The objective of our research is to shed some light on these questions and we reexamine some classic arguments about cartel formation in stochastic evolutionary sense, i.e., we employ the methodology of stochastic group evolution rather than the principle of rational individual choice. We find that the issue of

cartel formation is essentially an equilibrium-selection problem in our model, and also our study focuses on long-run equilibrium due to the characteristics of industrial evolution in reality.

First, it is shown that cheating can be an evolutionary stable strategy (ESS) under relatively weak conditions, and hence cartel formation is faced with much stronger challenge in the present evolutionary framework. Second, we have derived the minimum number of firms in the underlying industry (or the threshold of industry concentration) that supports full collusion in stochastic evolutionary sense. A third finding is that, in a mutation-selection dynamics, there exists a minimum discount factor such that partial collusion can be established when the number of firms is sufficiently large and the mutations are sufficiently small. Finally, it is worthwhile mentioning that the discount factor still plays a crucial role in the current evolutionary model and the corresponding domain is endogenously determined by the parameter measuring the extent of substitution between the products (or asymmetry between the products or firms) and the fixed marginal cost. Noting that we just construct a simple model from the evolutionary perspective, rich extensions can be done based on our framework and we leave it to future work.

Appendix A

Proof of Theorem 2. Some of the results are brought from Karlin and Taylor (1975, pp.141-144). If $h_i = f_i - g_i = 0$ for $\forall i \in \{0, \dots, N\}$, then the transition matrix defined by (13)-(15) can be rewritten as follows,

$$P_{i,i+1} = \left(1 - \frac{i}{N}\right) \left[\frac{i}{N} (1 - \mu_{AB}) + \left(1 - \frac{i}{N}\right) \mu_{BA} \right]$$

$$P_{i,i-1} = \frac{i}{N} \left[\frac{i}{N} \mu_{AB} + \left(1 - \frac{i}{N}\right) (1 - \mu_{BA}) \right]$$

$$P_{i,i} = 1 - P_{i,i+1} - P_{i,i-1}$$

The stochastic process described above is thus a birth and death process with a finite number of states $i \in \{0, \dots, N\}$ whose infinitesimal birth and death rates are, respectively, given by,

$$\lambda_i \equiv \lambda \left(1 - \frac{i}{N}\right) \left[\frac{i}{N} (1 - \mu_{AB}) + \left(1 - \frac{i}{N}\right) \mu_{BA} \right]$$

$$\mu_i \equiv \lambda \frac{i}{N} \left[\frac{i}{N} \mu_{AB} + \left(1 - \frac{i}{N} \right) (1 - \mu_{BA}) \right]$$

in which we have assumed that the probability that the state changes during the time interval $(t, t + \Delta)$ is $\lambda\Delta + o(\Delta)$ independent of the values of $X(t)$ and that the probability of two or more changes occurring in a time interval Δ is $o(\Delta)$ with some constant $\lambda > 0$. So, we obtain,

$$\lambda_i = \frac{\lambda(N-i)}{N^2} (1 - \mu_{AB} - \mu_{BA}) i \left(1 + \frac{F}{i} \right)$$

$$\mu_i = \frac{\lambda(N-i)}{N^2} (1 - \mu_{AB} - \mu_{BA}) i \left(1 + \frac{H}{N-i} \right)$$

where $F \equiv N\mu_{BA}/(1 - \mu_{AB} - \mu_{BA})$ and $H \equiv N\mu_{AB}/(1 - \mu_{AB} - \mu_{BA})$. Put,

$$\pi_k \equiv \frac{\lambda_0 \lambda_1 \cdots \lambda_{k-1}}{\mu_1 \mu_2 \cdots \mu_k}$$

Then we obtain,

$$\log \pi_k = \sum_{i=1}^{k-1} \log \left(1 + \frac{F}{i} \right) - \sum_{i=1}^{k-1} \log \left(1 + \frac{H}{N-i} \right) + \log(NF) - \log \left[(N-k)k \left(1 + \frac{H}{N-k} \right) \right]$$

Making use of Taylor expansion and letting $k \rightarrow \infty$,

$$\sum_{i=1}^{k-1} \log \left(1 + \frac{F}{i} \right) \sim \log(k^F) + \varepsilon_k$$

$$\sum_{i=1}^{k-1} \log \left(1 + \frac{H}{N-i} \right) \sim \log \left[\frac{N^H}{(N-k)^H} \right] + \varsigma_k$$

where $\lim_{k \rightarrow \infty} \varepsilon_k < \infty$ and $\lim_{k \rightarrow \infty} \varsigma_k < \infty$. Thus,

$$\log \pi_k \sim \log \left[\eta_k \frac{k^F (N-k)^H NF}{N^F (N-k)k} \right], \quad k \rightarrow \infty \quad (\text{A.1})$$

where we let $\lim_{k \rightarrow \infty} \eta_k \equiv \lim_{k \rightarrow \infty} (\varepsilon_k + \varsigma_k) \equiv \eta$. Noting that $F \rightarrow \kappa_2$ and $H \rightarrow \kappa_1$ as $N \rightarrow \infty$, we get,

$$\pi_k \sim \eta \kappa_2 N^{\kappa_2-1} x^{\kappa_2-1} (1-x)^{\kappa_1-1}, \quad N \rightarrow \infty$$

in which $k \equiv [Nx]$ is an integer. By (A.1), we arrive at,

$$\frac{1}{N^F} \sum_{k=0}^{N-1} \pi_k \sim \frac{F}{N} \sum_{k=0}^{N-1} \eta_k \left(\frac{k}{N} \right)^{F-1} \left(1 - \frac{k}{N} \right)^{H-1}$$

the right hand of which is the Riemann sum approximation of,

$$\kappa_2 \eta \int_0^1 x^{\kappa_2-1} (1-x)^{\kappa_1-1} dx$$

Thus,

$$\sum_{k=0}^N \pi_k \sim N^{\kappa_2} \kappa_2 \eta \int_0^1 x^{\kappa_2-1} (1-x)^{\kappa_1-1} dx$$

So that the resulting density on $[0,1]$ is,

$$\frac{\pi_k}{\sum_{i=0}^N \pi_i} \sim \frac{1}{N} \frac{x^{\kappa_2-1} (1-x)^{\kappa_1-1}}{\int_0^1 x^{\kappa_2-1} (1-x)^{\kappa_1-1} dx} \sim \frac{x^{\kappa_2-1} (1-x)^{\kappa_1-1} dx}{\int_0^1 x^{\kappa_2-1} (1-x)^{\kappa_1-1} dx}$$

since $dx \sim 1/N$. This is a Beta distribution with parameters κ_1 and κ_2 . ■

Note

⁽¹⁾ Although there are some papers such as Jovanovic (1982), Cabral and Mata (2003) and Malerba (2006) study firm's behavior and industrial organization from the evolutionary perspective, little research focuses on evolutionary analysis of cartel formation. And hence the present exploration can be regarded as an effective supplement to this issue.

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Earnings analysis at industry level

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Abstract. *In the view of the economic recovery, the European Union encourages member states to rapidly implement a policy convergence at competitive levels, coherent with the internal single market. In this context, economic competitiveness should have a leading place within the structural policies designed to unleash the industrial potential of the European economies. Wage is a key factor of economic competitiveness as it also reflects the level of labour productivity. In this study we conducted a panel data analysis of the economic activities in Romania to identify the factors that determine the wage level.*

Keywords: wages, labour productivity, panel data, economic activities.

JEL Classification: J24, J30.

REL Classification: 9B, 12F.

1. Introduction

Labour productivity affects living standards through real wages, that is, wages adjusted to reflect the cost of living. Economic theory holds that “at the aggregate level the growth of real wages is determined by labour productivity growth” (Sharpe, Arsenault and Harrison, 2008). If wages rise in line with labour productivity they are both sustainable and create a stimulus for further economic growth through individuals’ purchasing power increase. Between 1999 and 2011 average labour productivity in developed economies increased more than twice as much as average wages (ILO, 2013).

For a decade or more before the crisis, the link between these indicators was broken in many countries and this contributed to the creation of global economic imbalances. Considering this recent economic crisis and the imbalances between Eurozone countries, the relationship between wages and productivity (or between the growths of them) has become one of particular policy relevance in recent years (Meager and Speckesser, 2011).

Factors that may explain a weak connection between the growths of the two indicators might be price and wage rigidities, labour adjustment costs, employment protection, entry restrictions and market regulations. Also, bargaining power of workers versus firms can play an important role in weakening the link between labour productivity and real wage (Klein, 2012).

In general it is expected that exporting firms are more productive than the others. Some possible explanations for this may be the fact that firms engaging in export activities must be able to compete in international markets and by entering these international markets they probably gain knowledge and expertise allowing them to improve their efficiency (De Loecker, 2007). Thus, it is expected that exporting firms to also pay higher wages, at least as a consequence of a higher productivity.

For example, Bernard and Jensen (1995) found that exporter wage premia are statistically significant for all categories of wages and benefits for the case of US Manufacturing. Their paper started a new literature body research, and Schank, Schnabel and Wagner (2007) surveyed a large part of this literature concluding that the results of these latter studies are broadly consistent with the results of Bernard and Jensen in 1995. Also, Ricker (2010) argues that exporting has a significant positive impact on earnings, more precisely adds an additional 18% to workers’ earnings on average in the US manufacturing sector. He also claims that the export earnings premium varies by industry, being highest in industries with high export shares (like machinery, computers, electrical equipment, and transportation equipment).

In a paper from 2003, Goolsbee found that a 10% investment tax credit raises the relative wages of workers, on average, by 2.5%-3.0% relative to comparable workers in other sectors.

2. Data analysis

In this study we used annual data for the period 2008-2011, regarding 16 economic activities in Romania. The variables employed in this paper are: the average gross monthly earnings (earn), the labour productivity (prod), the net investment (invn) and the exports (exp). The data was collected from National Institute of Statistics database. The labour productivity was calculated as the ratio between the production and the average number of employees. The choice of the period was imposed by the changes made in 2008 to the NACE (the European standard classification of economic activities).

Growth in labour productivity and real wages are real inflation-adjusted concepts and therefore a significant aspect is how nominal estimates are converted into real values. The growth of consumption wages (deflated by the CPI) is more directly relevant to living standards than the growth of product wages (deflated by the GDP deflator), but is less directly linked to labour productivity growth because of the differences between the prices for the goods that workers produce (overall GDP) and the goods that they consume (the basket used to construct the CPI). In the light of these aspects, we decided to deflate earnings by the CPI, and the labour productivity by the GDP deflator. The net investments and the exports were also deflated by the CPI.

There are significant differences between the economic activities in Romania regarding the real gross average monthly wages (Figure 1). It is interesting to note that in the post crisis period, 2008-2011, the wages based on the national economy activities registered an increasing trend in most economic activities (in 13 of the 16 activities analysed). This moderate increase in wages could support the hypothesis that during the crisis unemployment has affected mostly the low-qualified employees.

The most significant increases in the real gross average wages in the post crisis period occurred in sectors such as *Information and communication, Electricity, gas, steam, and air conditioning production, Mining and quarrying, Professional, scientific and technical activities*. The highest level of decreases in wages occurred especially in the public sector – *Human health, Education, Arts, entertainment and recreation*. For *Education* there was an average decrease of 13%, 3% for *Human Health*, and 3.5% for *Arts, entertainment and recreation*. These decreases occur mainly because of the government decision to reduce expenditure, and thus reduce by 25% the amount of wages for the employees paid from public funds.

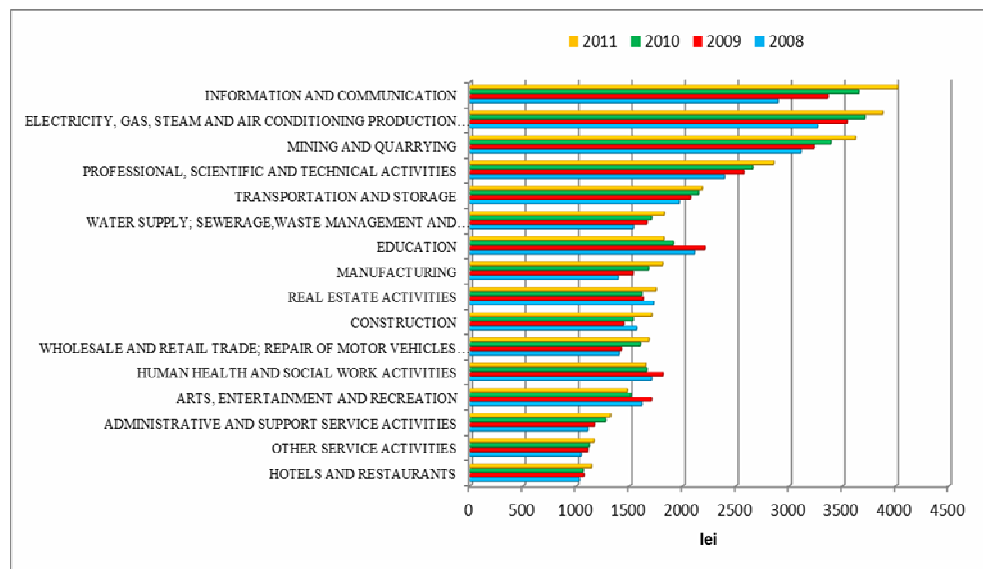


Figure 1. Real Gross Average Monthly Wages

Regarding labour productivity (Figure 2), calculated as the ratio between the output and the average number of employees, we can see that the highest levels were recorded in the industrial sector and the lowest in the tertiary sector (services).

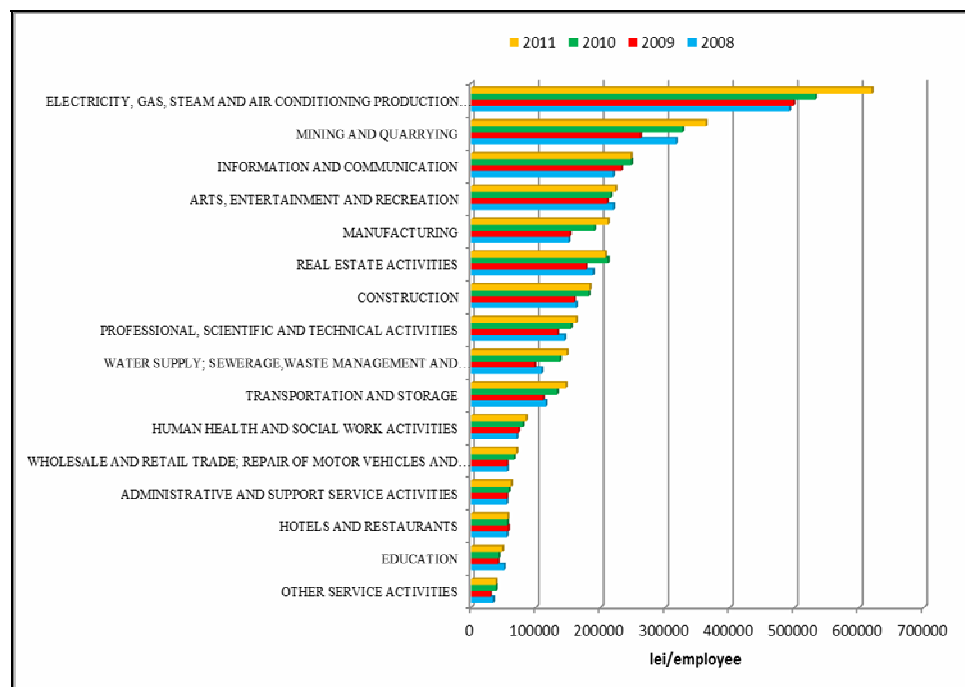


Figure 2. Labour Productivity

The year 2009 is the one in which labour productivity decreased in most economic activities. Another relevant fact is that although the unemployment rate rose in 2009 in all economic activities, labour productivity decreased. The decrease in labour productivity in 2009, despite the unemployment growth, shows that although the economic restructuring was done where this was easier – human resources, it has not been effective. Even though in some sectors dismissal was necessary, this measure proved to be ineffective. It is obvious that the resorts of the loss of productivity in 2009 are not strictly related to the human capital; they may be the result of a defensive strategic approach. The most significant returns on labour productivity growth occurred in *Electricity, gas, steam and air conditioning production* (in 2011 productivity increased by 16.3% compared to 2010), *Mining and quarrying* (increased by 11.05% in 2011), *Manufacturing* (increased by 11% in 2011). Analysing the evolution of wages, we can also notice that in the activities with a high productivity the wage has a high level as well.

At the level of net investment there is a dramatic decrease in almost all national economic activities in the period 2008-2010. The highest levels of net investment are recorded in the secondary sector (*Manufacturing, Construction, Electricity, gas, steam and air conditioning production*), but also in some activities of the tertiary sector (*Wholesale and retail trade, Transportation and storage*). In 2011, net investment had a slight recover, when the highest levels of increase were in *Professional, scientific and technical activities* (an increase of 80% in 2011 compared to 2010), *Administrative and support service activities* (an increase of 68% in 2011 compared to 2010), *Construction* (34%), *Manufacturing* (33%). We could say that in these sectors the investments were focused on equipment, machinery, technology and production lines. The level of investments is high in the activities in which logistics (technical infrastructure) is very important in the production process.

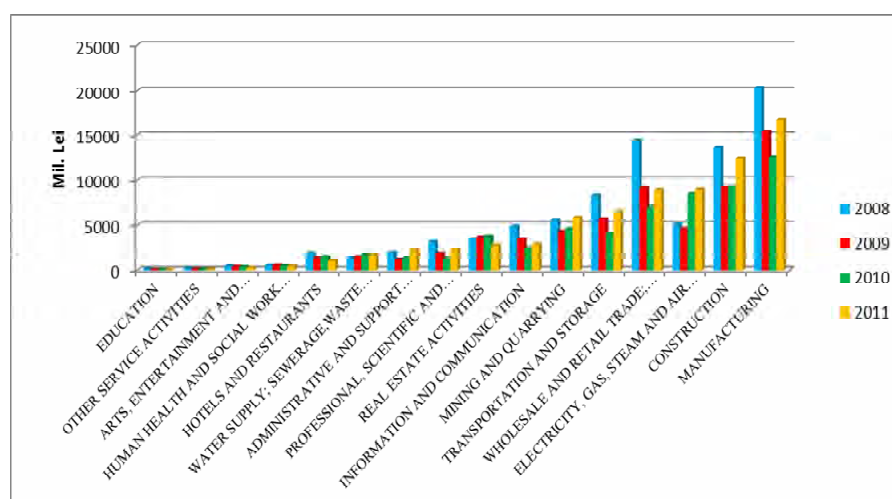


Figure 3. Net investment

Regarding the level of exports within the national economic activities, the highest value is recorded, as expected, in *Manufacturing* (114033 million lei in 2011, an increase of 19% compared to 2010). Significant values of this indicator also occur in *Wholesale and retail trade* and in *Mining and quarrying*. These sectors export products with a high added value, which are the result of a full process of production. Exports are also recorded in other sectors, possibly in high quantities, but at a low added value, and thus the actual value of exports is low.

The cross-industry comparison shows that overall the correlation between real wage and labour productivity is generally positive, although in some industries, such as *Real estate activities*, *Education*, *Human health and social work activities* and *Arts, entertainment and recreation* it is negative. The correlations are in general strong, excepting those negative which are also weak.

Table 1. Correlation coefficients by industry

Real Gross Average Monthly Wages	Real Labour Productivity	Export	Net Investment
Mining and quarrying	0.83	-0.23	0.34
Manufacturing	0.98	0.94	-0.56
Electricity, gas, steam and air conditioning production and supply	0.97	0.86	0.83
Water supply; sewerage, waste management and decontamination activities	0.82	0.77	0.88
Construction	0.48	0.66	0.59
Wholesale and retail trade; repair of motor vehicles and motorcycles	0.99	0.88	-0.70
Transportation and storage	0.92	-0.23	-0.70
Hotels and restaurants	0.57	0.49	-0.98
Information and communication	0.88	-0.09	-0.88
Real estate activities	-0.06	-0.20	-0.99
Professional, scientific and technical activities	0.89	0.78	-0.50
Administrative and support service activities	0.98	-0.04	0.17
Education	-0.54	0.90	0.24
Human health and social work activities	-0.22	0.43	0.77
Arts, entertainment and recreation	-0.34	-0.01	0.60
Other service activities	0.62	0.05	-0.91

The correlation between real wage and exports is negative in 6 cases out of 16 industries and once again those negative correlations are also weak correlations. The strongest correlations are in *Manufacturing*, *Electricity, gas, steam and air conditioning production and supply*, *Wholesale and retail trade; repair of motor vehicles and motorcycles* and *Education*.

Regarding the correlation between real wage and real net investment we found that half of them are negative and strong. Among the industries with strong positive correlations we have: *Electricity, gas, steam and air conditioning production and supply* and *Water supply, sewerage, waste management and decontamination activities*.

3. Methodology

The econometric analysis was performed using STATA software. Having 16 national economic activities over 4 years we estimated a panel data model which differs from a regular time-series or cross-section regression through the double subscript on the variables:

$Y_{it} = a + b * X_{it}' + u_{it}, i = 1, \dots, N; t = 1, \dots, T$. The i subscript denotes the cross-section dimension (the activities) and t denotes the time-series dimension. Our model, as most of the panel data applications, uses a one-way error component model for the disturbances, with: $u_{it} = \alpha_i + \varepsilon_{it}$ (Baltagi, 2008). The main advantage in pooling a time series of cross-sections consists in widening the database, obtaining better and more reliable estimates of the parameters of the model.

When working with static panel data regression one has to distinguish between two main types of models: fixed-effects models (in which the α_i are permitted to be correlated with the regressors x_{it} , while continuing to assume that x_{it} is uncorrelated with the idiosyncratic error ε_{it}) and random-effects models (in which α_i is purely random or in other words α_i is uncorrelated with the regressors) (Cameron et al., 2009). In order to decide whether a fixed-effects (FE) or random-effects (RE) model is more appropriate for a particular analysis there are several tests that can be applied, out of which the Hausman test is the most common.

Since in this particular case we will estimate a fixed-effects model (the decision between the two models was made based on the above mentioned test and on economic reasons), we will further present some characteristics of these models and problems that may arise.

So, the most common estimator for the FE model is the “within estimator” which eliminates the fixed-effect by mean-differencing. This is why a time-invariant variable will be excluded from the mean-differenced regression. Also, the fixed-effects α_i will be eliminated by subtraction of the corresponding model for individual means $\bar{y}_i = \bar{x}_i' b + \bar{\varepsilon}_i$ leading to the within model or mean-difference model: $(y_{it} - \bar{y}_i) = (x_{it} - \bar{x}_i)' b + (\varepsilon_{it} - \bar{\varepsilon}_i)$. Because α_i has been eliminated, OLS leads to consistent estimates of b even if α_i is correlated with x_{it} as in the case of FE model.

The default standard errors assume that the error ε_{it} is independent and identically distributed. Furthermore, the regression disturbances are supposed to be homoskedastic with the same variance across time and individuals. This may be a restrictive assumption for panels and when heteroskedasticity is present the standard errors of the estimates will be biased (Baum, 2001). In addition, because

serial correlation in linear panel-data models biases the standard errors and causes the results to be less efficient, the serial correlation in the idiosyncratic error term in a panel-data model should also be checked (Drukker, 2003). Some authors have provided a number of tests in order to identify the problems encountered (Drukker, 2003, Baum, 2001, Green, 2012).

If these problems are encountered, the standard error estimates of commonly applied covariance matrix estimation techniques are biased and the statistical inference based on such standard errors is invalid. In order to overcome these problems, Driscoll and Kraay (1998) proposed a nonparametric covariance matrix estimator which produces heteroskedasticity consistent standard errors that are robust to very general forms of spatial and temporal dependence.

4. Econometric results

As mentioned above we decided to estimate a panel data model because panel data control for the individual heterogeneity (Hsiao, 2003) and also because panel data analysis is more efficient, since it provides the opportunity to identify and measure effects that would not be detectable by other analysis. The following general equation was considered:

$$\ln_earn_{it} = intercept + \beta_1 * \ln_prod_{it} + \beta_2 * \ln_invn_{it} + \beta_3 * \ln_exp_{it} + \alpha_i + \varepsilon_{it}$$

where all the variables are expressed in logs. The subscript i stands for each of the 16 economic activities included in the panel, while t stands for the years 2008-2011.

We decided to estimate a fixed effects model, based on the Hausman test and on economic reasons. We also checked for the presence of heteroskedasticity and autocorrelation of the errors and both tests, the serial correlation test and the test for groupwise heteroskedasticity, indicated that a robust estimation is needed. That is why, in order to ensure the validity of the statistical results, we estimated a robust fixed-effects regression with Driscoll and Kraay standard errors. The final estimation results are presented in the following expression:

$$\ln_earn_{it} = 2.05 + 0.47 * \ln_prod_{it} - 0.04 * \ln_invn_{it} + 0.04 * \ln_exp_{it}$$

(1.07)*** (0.082)* (0.016)** (0.004)*

where between brackets are the robust standard errors and the *, **, *** stands for 1%, 5% and 10% significance.

The classic correlation between wages and labour productivity is well represented in the equation (0.47 the coefficient associated to productivity in a logarithmic expression). It is also interesting to see the symmetric distribution (in absolute

value, coefficient 0.04) of the influence that exports and investment have on wages. The signs of the coefficients associated to the two variables are normal. Investment economizes labour force in the short run, but in a fairly balanced way, with a slightly unfavourable trend for wages above the average (negative sign). Regarding the positive influence that exports exercise on wages, this can be attributed to the effect that exports have on the national economy. The significant difference between the coefficient associated to labour productivity and those associated to net investment and exports can be explained by the fact that in the case of labour productivity the growth effects influence wages directly, whilst the other two factors produce structural changes with an indirect influence. For this reason it can be said that the impact of the two factors (investment and exports) is balanced (the negative contribution of one of them is counterbalanced by the positive contribution of the other), labour productivity is the only one that matters in the end.

5. Conclusions

As expected, the panel analysis showed that the greatest influence on wage is exercised by labour productivity (0.47). The other variables in the model (net investment and exports) have a lesser influence. Net investments have a negative impact highlighting the fact that by making investments, companies save labour force; through their positive impact, exports show their driving effect on the economic activity.

The analysis of the activity correlation coefficients between the variables used confirms the correlations in the econometric equation with some exceptions that we could consider normal. For example, the negative coefficients associated to services in the case of labour productivity – Human health and social work activities, Education, Arts, entertainment and recreation. Another somehow natural situation is given by the influence that exports exercise on wages: coefficients are negative, especially in the predominantly non-tradable sectors (Transportation and storage, Real estate activities, Information and communication). Regarding the negative impact of the net investment on wages, we can notice that it occurs mainly in those sectors likely to involve technological improvements (Information and communication, Transportation and storage, Hotels and restaurants, Professional, scientific and technical activities).

The severe austerity measures imposed on the labour markets, without taking into account the social impact, deteriorate the labour market relations. In Romania, the workers at the bottom of the wage distribution were the most affected, although they should be stronger protected in order to not become working poor. Therefore, in the light of these aspects policy-makers should aim at policies that promote a stronger link between the growth of wages and productivity.

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Analysis of the correlation between the real estate loan stock and the average unit value of urban housing

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Abstract. *Both the real estate market and the mortgage sector have had similar evolutions since 1990, with a significant influence on one another. In the first few years of this interval, the term „housing loans” was mostly associated with the state-run financing schemes for the purchase of such assets (the famous CARs), but after 2001 commercial banks entered this market segment. The products they initially offered were poorly adapted to demand, involving short maturities, high interest rates and impossible collateral, but soon the trend shifted and lending pushed up the construction of new buildings and that created an entire bull market. At the same time, personal loans helped fuel the population’s consumption for a significant time, but eventually ended up by being avoided due to the economic incertitude after 2008.*

Keywords: real estate market, mortgage sector, housing loans.

JEL Classification: E51, E52.

REL Classification: 11B.

Literature review on housing loans

In general terms, the credit dynamics and its effect on economic growth is a subject of intense debate. Regarding evolutions in the transition economies, Koivu (2002, p.7) shows that sometimes, due to the specific conditions of such economies, an increase in lending does not necessarily influence in a positive manner the state of national economies. Based on this work, Cristea and Drăcea (2010, pp. 184-190) take a look at the situation in Romania and come to the conclusion that, in the short term, and especially in the context of the financial woes of 2008, the volume of loans, inflation and the exchange rate can adversely affect the growth of GDP.

As research in this field points out, the main determinants for the real estate market are direct stimuli such as demographic pressure, population income, building costs, access to loans (Mashed and Zemcik, 2009), but also more subtle ones such as expectations for price increase (Muellbauer and Murphy, 2008), rigid and heterogeneous supply (Koetter and Poghosyan, 2009), exchange rate dynamics (Alvares-Lois and Nuno-Barrau, 2007) and the level of regulations within the lending/real estate property symbiosis (Quigley, 1999).

In recent papers, several authors have dealt with the links between the real estate market and the economy in its entirety, especially in the context of recent evolutions of the international financial markets. Muellbauer and Murphy (2008) note that, for instance, in recent years changes in institutional approach of the real estate and mortgage markets in the United States have significantly altered both the channels of transmission for the monetary policies and the entire economic cycle. In their opinion, housing prices are determined by the level of population income, existing real estate stock, demographics, availability of credit linked with interest rates levels, as well as expectations for the continual increase of the value of these assets (which held the potential of pushing the prices up to an unhealthy level). As for factors leading to new investment in real estate, this time in the case of Great Britain they found that the main constraints were linked to restrictive urban planning, which reduced the level at which the population found housing affordable.

In their opinion, the main indicators about real estate collateral and the difficulties in getting the amounts necessary for cash advances are the key to understanding the way in which house price variations explain middle term changes in consumption. Institutional changes, as noticed for several countries over time, are responsible for the significant differences found in relationship to the links between the economy and real estate, which brings in discussion the debate about the way in which monetary or other type of policies should react to a change in house prices.

In a similar paper, Mikhed and Zemcik (2009) investigate the motivation between the dramatic price drops in the United States in 2006. They analyze whether the decrease was justified by changes in the fundamentals, such as available income, population number, rent level, stock exchange values, building costs or housing loans interest rates. Their conclusion was that the real estate prices experience important and long-term divergences from the fundamentals, and require a long time – decades even – to return to the correct levels, the most recent correction being the burst of the 2006 bubble.

Bernanke (2007) notices that the interactions between the real estate market, the lending sector and the economic activity are of critical importance to understanding and anticipating the economic trend, while Miles and Pillowcase (2008) take a look at recent evolutions for real estate prices in Europe (Romania not included due to lack of data) in correlation with lending dynamics, developing a conceptual framework for the evaluation of whether fundamentals such as variations in population income or the number of inhabitants lead to increase in prices, while also trying to quantify the rate with which the increases were based on expectations of growth for the real estate assets in portfolio. According to their research, this happened to a significant degree in countries such as Spain, Sweden, Belgium and the United Kingdom.

The connection between the real estate market and the banking system is of significant importance in dealing with the large-scale phenomenon. Housing serves as collateral and is, at the same time, an object of mortgages. Koetter and Poghosyan (2010) note that real estate prices can diverge from their fundamental value due to rigid offer, heterogenous quality and other market imperfections, which has two contrasting effects on the banking sector's stability: on one hand, high prices increase the collateral value and the net worth of debtors, reducing their overall risk of default, but at the same time can lead to adverse selection by banks, accepting investors with an unusual appetite for risk in their search to expand their lending portfolio, thus increasing the chances of turbulence for the themselves.

Similar research (Collins and Senhadji, 2002) on the markets of South East Asia has revealed the strong ties between the two sectors, which manifested during the regional crisis of 1997. They have shown that the financial market cycle manifested itself through a wave of optimism due to the favorable developments in the real economy, which led to an underestimation of risk, over lending, excessive asset price increase, overinvestment in real estate and, eventually, extravagant consumption expenses. Eventually, with the re-alignment of expectations and market values, massive optimism gave way to excessive pessimism, leading to painful shocks both for the financial sector and the

economy in general. In this context, both Bernanke and Gertler (1995) and Kiyotaki and Moore (1997) have shown how the natural economic cycle can be amplified by the procyclical effect of lending. The real estate market plays a central role in such an evolution (Collyns and Senhadji, 2002), because housing price increases lead to an increased appetite for lending by the banks, which in the context of stock market globalization allowed foreign capital to be absorbed and to amplify the effect. The Asian scenario included over-lending on behalf of the local banks, bringing hyper-valued real estate as collateral and a sudden slowdown of the economy, which led to numerous banking and currency crisis in the entire region.

Hue (2008) has run an analysis of the way in which real estate market shocks are transmitted to the rest of Malaysia's economy, a country affected by the crisis of 1997, identifying a series of channels for transmission and also the most battered sectors: construction activity, lending and, in some measure, population consumption.

The reduction or collapse of real estate activities have as a direct effect on banks the increase in cautionary provisions on one side, as well as the strengthening of own capital on the other side, thus slowing down lending.

Also, for the population a change in net worth by increased values of real estate assets affect the consumption. Hue describes this mechanism in the following manner: a higher price for housing indicates a greater wealth, thus signaling the possible increase of future earnings. Moreover, an increase value strengthens the population's balance sheet, in the form of house equity. This capital can be used to contract loans, which will finance bigger consumption. This phenomenon is called by Pang (2004) the „collateral increase effect” or the „balance sheet effect”.

Over the years, financial innovation has led to the creation of lending products which facilitate the home equity withdrawal, such as mortgages, asset based loans, home equity redraw facilities (which allow the anticipated repay of mortgages, acting as an extra fund from which one can make withdrawals in cases of need). Alternately, the population can access such an extraction by refinancing existing mortgages, if the prices are stable and the interest rates low.

In the case of the Chinese economy, Honey, Park and Siqi (2002) have shown how important real estate investment has become for the country's economy, especially in the last decades, with the support of the central government. The numbers have grown in the last years due to complementary measures: the 1998 housing reforms, which allowed for market freedom, as well as the relaxation of lending conditions for developers. Increases for the sector, according to the paper, were of 35.2% for 1998, 26.8% for 1999, 25.5% for 2000 and 27.3% for 2001, the year previous to the study's publication. The Chinese central bank estimated that, in 2001 alone, real estate contributed to a direct or indirect increase of GDP by 30%.

In a newer research paper, prepared for the Hong Kong central bank, Peng, Yiu and Tam (2005) also look into the developments of Mainland China. They show that, after 1998, due to the real estate reforms, increases in urbanization, strong dynamics of the population income and lending by the commercial banks facilitated the acquisition of property. This led to price hikes of 23% on average for 2000 – 2004, with Shanghai as the best performer, with an annual increase of 13 percent.

Regarding consumption, the authors name three possible channels through which real estate price adjustments affect it. The first is related to the increase of one's wealth due to an increase in property value, in reference to the whole life cycle. The second mentions consumption as a variable, which depends on the population's expectations for further income gains. The third is the reduction of lending constraints due to the hike in prices, which manifests itself through refinancing.

In Turkey's case, Binai and Salman (2008) take a look at the wealth effect, which manifests itself in the context of last decade's economic evolutions. They show that in the industrialized countries, a housing asset is regarded as the most important component of the population's wealth. Price changes of such assets greatly affect the ability to access a loan and the general expenditure. Thus, the main channel through which real estate affects the economy is, in the authors' opinion, the wealth effect correlated with consumption, considering that an increase in housing wealth leads to a higher rate of consumption for the population. The trend is not universally valid, and while in countries such as Australia, Canada, The Netherlands, Great Britain and the United States the wealth effect has a strong correlation with consumption, in others, such as France, Germany, Italy, Japan or Spain it is negligible or non-existent.

The study identifies two channels through which real estate affects consumption, in the case of home owners: on one hand there is the direct effect, which is the case with families which increase their available income for consumption through refinancing existing loans by leveraging higher collateral values, and on the other hand there is the indirect wealth effect, which explains the increase in consumption through the creation of expectations for future wealth increase during the owner's lifetimes. All these can only manifest themselves where a well-developed credit market exists, as pointed out by the authors.

The negative side-effect manifest itself for renters, an increase in home values meaning higher costs with the rent, which, when taking into consideration that a home has a less-than-perfect substitution rate, leads to decreases of consumption for these individuals.

Domestically, the interest shown by researchers for this field has been somewhat modest, although some efforts have been made to investigate the mechanism of real estate lending or the overall quantitative analysis for the entire market. Probably the main barrier has been the lack of official statistical data (or even unofficial data, for that matter) for the evolution of prices in a highly volatile sector.

Also, the interactions of the real estate market have enjoyed little attention. Bauble (2009) has presented an analysis of housing loans evolution in Romania, showing the tendencies for 2007-2009, and also analysing the correlation of several fundamental factors. A synopsis of the main characteristics of national policy regarding the real estate sector has been published by Ion Zilişteanu (2010). Regarding the overall behavior of the real estate market since the crisis onset, Turku, Dima and Saru (2009) have given us a snapshot of 2008 and the beginning of 2009 from the perspective of price variations, lending and the creation of new housing stock.

Lending in the general economic context

Returning to the evolution of lending, the increase in income for an important part of the population meant the possibility of obtaining real loans. Thus, the tendency for loans in the last decade has been one of expansion and opening-up towards the final consumer, the population. Non-government credit has increased to a significant degree, and this figure in the case of the population has soared from 5.68% in 2000 to 49.99% in September 2009 (Bauble, 2009, pp. 47-56).

Real estate lending has also known important advances, correlated on one side with an increase in demand (and prices, implicitly), as well as with the general decrease in interest rates for loans in foreign currency, on the other side, which was a favorite solution for purchasing an asset which was, invariably, priced in foreign currency. The large sums available for non-lei lending was due especially to insufficient internal resources, the foreign-owned banks (constituting a majority in Romania) taking on credit lines from their owners abroad.

As one can gather from the following table, the savings' value relative to GDP has gone through an abrupt downturn after 1991, losing more than two-thirds (down to 11.8%) in 1994. After that, the indicator resumed its slow recovery, reaching the initial levels in 2009-2011. On the other hand, the demand for loans started to increase since 2000, and internal resources became insufficient in 2003, which dictated that financial players contract external credit lines from the main offices.

Table 1. *The evolution of bank savings relative to GDP and the credit to deposit ratio in Romania, 1991-2011*

	1991	1992	(...)	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Bank deposits to GDP ratio	31%	21%	(...)	17%	17%	18%	18%	19%	22%	24%	26%	27%	31%	32%	31%
Loans to deposits ratio	-	-	(...)	36%	44%	49%	71%	71%	80%	94%	114%	131%	120%	120%	121%

Source: Čihák et al., 2012.

The significant expansion of the number and value of loans in foreign currency meant that the population accepted several risks. The most important of all, the currency risk, started to become a substantial reality after 2008. The leu/euro exchange rate deteriorated gradually, by approximately 28 percentage points by the end of 2012. Considering the average stock of population credit of 15.1 billion euro, the impact on repay ability has become important.

From a demand point of view, the introduction in 2003 of the first real estate loans by commercial banks signaled the perspectives for housing assets purchase for the population. As we can see, in the value of total household expenditure of Romania, the weight of investment spending has increased from 1.6% in 2003 to 7.1% in 2009 (Stancu, 2011, pp. 257-262). Housing prices had known a sharp increase since January of that year, stimulated by an ever-increasing number of transactions. Another factor, which contributed to the advance, was the „on par” conversion from US dollars to euros for the prices, which happened quite rapidly and was an important psychological catalyst.

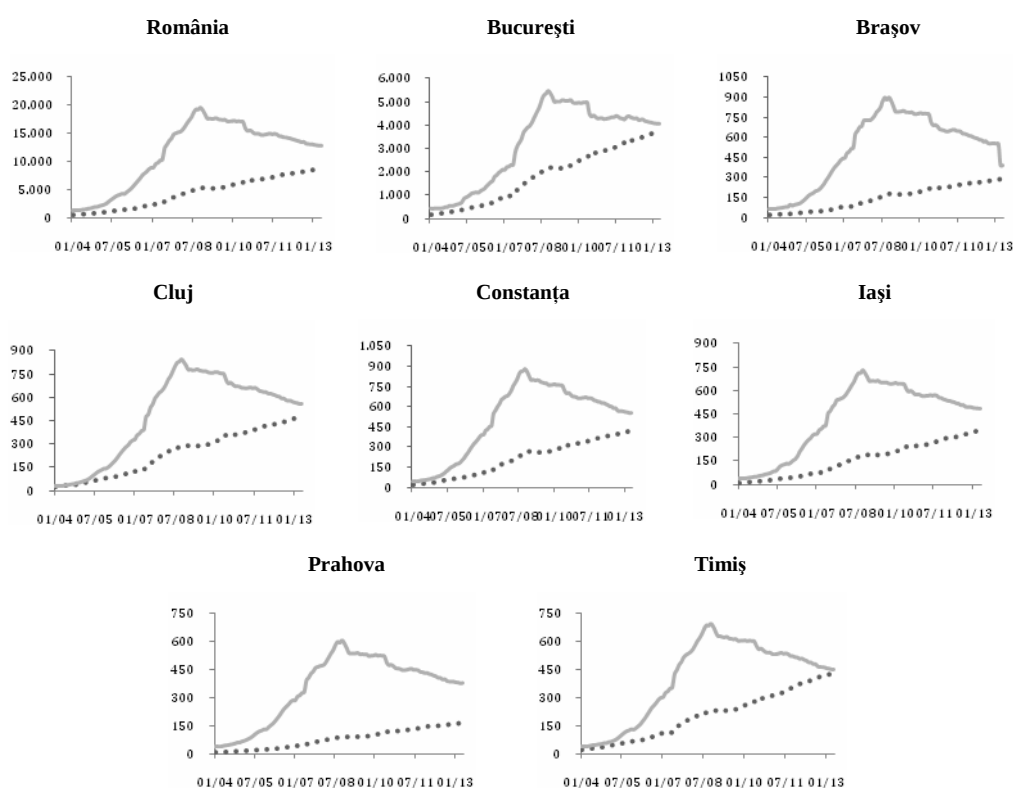
The immediate effect of these evolutions was the diversification of products offered by the financial market, the first loans with maturities of twenty, twenty five or thirty years making an appearance. The difference between interest rates of loans in lei and foreign currency became very high, in favor of the latter, leading to a substantial increase in credit denominated in euro or even Swiss francs, a currency perceived by many clients as being more stable.

In March 2007 the No. 3 Regulation regarding limitation of the risk for the population was issued, as a reaction by the National Bank to recent market evolutions. This allowed commercial banks to be more flexible, to a degree, regarding the conditions for loans qualification, adopting measures such as the scrapping of a minimal 25% minimum advance or the maximum debt ceiling of 40% of the person (or family) being granted the loan.

In parallel with the housing loan, the consumption lending has known an even more accelerated dynamic, with a fourteen and a half-fold increase during 2004 to 2008 for the entire country, up to a maximum value of 19.7 billion euro (calculated by using the NBR official exchange rate), while the housing loans have increased by an order of ten and a half, countrywide.

Regional evolutions

In a territorial snapshot, the consumption lending has known a relatively homogeneous evolution for the entire decade which we analyzed, mirroring in a large degree the overall economic development, allowing us to point out virtually the same levels of maximum and minimum values for all the regions taken into consideration, and for the whole country overall. Between 2004 and 2013, the total consumption loans increased in value by over eight-fold nationally, currently reaching 12.9 billion euros, a 7.7 billion decrease from the maximum values reached in August 2008.



Source: NBR, own calculations.

Figure 1. Total values of housing and consumption loans, millions of euro, 2004-2013

This being said, the level of consumption loans reported by the NBR is not entirely relevant in the context of the real estate market developments. Anecdotic evidence suggests a practice of „reallocation” of funds, which were granted as personal needs loans, and the utilization of these amounts for the financing of the down-payment requested by the bank, thus the final purpose being the purchase of housing as well. This means that the true dimension of real estate loans can be much larger than the periodic reports of the central bank suggest.

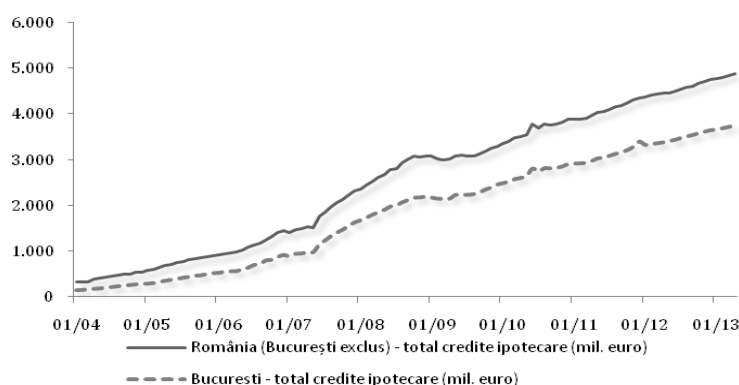
A reversal of the market trend has begun to manifest itself with the first months of 2008, a moment in which we can see a down-shifting for the overall real estate loans' value, as the maximum price values have been reached. After a relative stagnation of prices, these have eventually started to go down, pushed by the so-called market blockage, which had started to manifest in January, but also by a worsening of lending conditions.

In May 2009 a new program was launched by the Romanian government, called „The first home”, in reality a publicly-run guarantee scheme with the purpose of facilitating home purchases for young families, on one side, and the stimulation of new real estate investment on the other. In 2009 a guarantee ceiling sufficient for granting 495 million euros worth of credit was set in place. In 2010, that value had reached 935 million euros following a decision by authorities to reduce the degree of guarantee to a half, down from 100%. In 2011 and 2012 loans worth 740 million and 1.01 billion respectively were granted, and for 2013 (May) that amount was 410 million euros. This counts loans of up to 3.59 billion euros for the four years of the program.

The total number of loans granted was a little over 92 thousand, and the average value was approximately 39 thousand euros. Out of these, approximately 51% have been directed towards the purchase of two-rooms apartments, at a national level.

The first semester of 2013 marked a return of housing market values to mid-2006 levels, resulting in a 50 to 55% loss of their historical maximum values of March 2008. In this context, housing loans' values have continued to increase at a moderate pace, fueling current transactions.

With this analysis we aim at drawing attention to the significant discrepancies at the territorial level of credit distribution for housing purchases. Therefore, as we show below, in 2013 the Bucharest region had gathered approximately 43% of the country-wide values. The total amount, of 3.74 billion euros, which is contracted in the capital, represents no less than 76% of the entire value of the rest of the country combined.



Source: NBR, own calculations.

Figure 2. Housing loans in Bucharest and the rest of the country, 2004 to 2013

Compared to the other seven regions, which combined have a loans stock of 2.13 billion euros, Bucharest has a 75 percentage points advance. We cannot help but point out the polarization of housing lending in two national distinct markets, the capital and the rest of the country, with the two segments virtually equal.

Empirical results

The data series show the evolutions of monthly real estate lending (in millions of euros) and that of the average value per square meter for housing (in euro) for Romania, during 2004 to 2013.

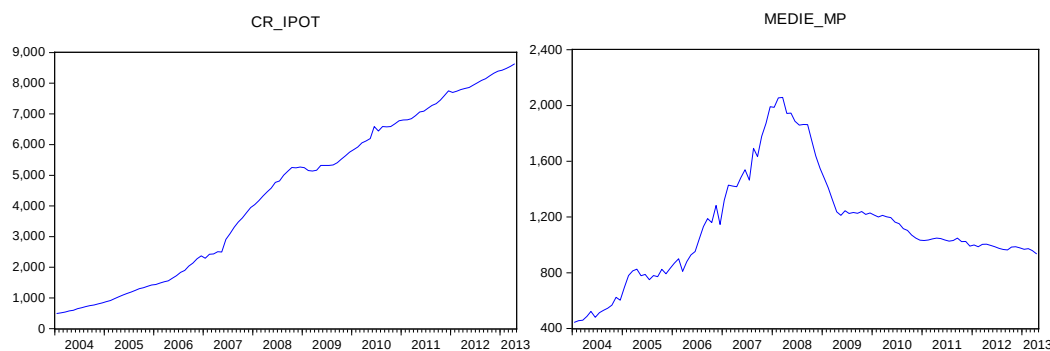


Figure 3. Graphical evolution of the monthly real estate lending value and the average value of housing per square meter between 2004 and 2013

For the entire 2004 to 2013 period, the monthly stock of housing loans has had a growing evolution, which continued during the recession years as a result of previously, contracted loans with very long maturities (20 to 30 years). On the contrary, the average price per square meter reflects in a good manner the effects of the financial crisis, which was in turn determined by a crisis of the real estate prices.

From a statistical analysis point of view, the evolution of the real estate loans stock in the period analyzed shows a definitive trend. For the regression analysis, this temporal series must be turned into a stationary set (by first and second differentiations), thus reflecting the monthly variations of this indicator. The same can be said of the series of prices, which at first shows an ascending trend (2004 – mid 2008) and afterwards a descending trend, for the remainder. For the stationarity we will proceed, as well, with the differentiation for the monthly changes in this average price indicator.

Table 2. *Descriptive statistics*

	CR_IPOT	MEDIE_MP
Mean	4412.473	1128.500
Median	5067.500	1043.000
Maximum	8632.000	2058.000
Minimum	493.0000	444.0000
Std. Dev.	2653.808	390.8787
Skewness	-0.047727	0.589669
Kurtosis	1.571047	2.963499
Jarque-Bera	9.571415	6.496804
Probability	0.008348	0.038836

Given the previously revealed trends, the mean and median values are not very revealing. The maximum and minimum values better reflect the extreme evolution of these variables. The skewness and kurtosis values indicate a distribution which is a little asymmetrical, compared to the frequency of the median. The Jarque-Bera indicator shows a very small probability (of 0.8% and 3.9% respectively) for us to consider that the two variables have a normal distribution. We can state that the frequency distribution of the average price series is a somewhat close to the normal distribution.

Table 3. *The correlation matrix between the real estate loans stock and the average value per square meter*

	CR_IPOT	MEDIE_MP
CR_IPOT	1.000000	0.261339
MEDIE_MP	0.261339	1.000000

We note the poor correlation (of 0.26) between the lending value and the price per square meter value. The regression analysis real estate loan – average price will have a determination coefficient (R^2) of little intensity.

Within the stationary test, a high probability indicates the fact that time variations of the median and dispersion of the data sets do exist, variations, which invalidate the potential regression model. For the monthly data series of loans, the probability of having a unit root and, therefore, of non-stationarity is very high (95.4%). Neither is the case for the average price time series for having stationarity (the probability for non-stationarity is 15.4%). After the first differentiation (D(CR_IPOC and D(MEDIE_MP)) we eliminate the non-stationary, unfortunately, only for the loans time series (a zero probability for non-stationarity). The average price series has, still, a probability of 32.7% for non-stationarity after the first differentiation. After the second differentiation we get a stationary series for the average prices.

Regression analysis: housing loans – average price per square meter

The purpose of our paper is to identify the most adequate model for explaining the evolution of housing loans related to the evolution of per square meter price for homes in Romania. Implicitly, we started with the hypothesis that the evolution of the average price leads to an inclination of the population towards purchasing housing assets. The first model attempts to show a regression between the absolute values of the two variables. Being warned from the beginning that the absolute data series are non-stationary, we are cautioned that the model does not meet the stationary criterion for median and dispersion of the series we analyzed. Even though the sensitivity coefficient for the real estate credit (1.77) is statistically significant (zero probability of having values close to 0), the determination coefficient R^2 is very low (0.06).

Regression Model nr. 1: $CR_IPOT = 2410.15 + 1.77 * MEDIE_MP$

Dependent Variable: CR_IPOT				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2410.151	745.8768	3.231300	0.0016
MEDIE_MP	1.774322	0.624841	2.839636	0.0054
R-squared	0.068298	Mean dependent var		4412.473
Adjusted R-squared	0.059828	S.D. dependent var		2653.808
S.E. of regression	2573.198	Akaike info criterion		18.56138
Sum squared resid	7.28E+08	Schwarz criterion		18.60993
Log likelihood	-1037.437	Hannan-Quinn criter.		18.58108
F-statistic	8.063532	Durbin-Watson stat		0.002789
Prob(F-statistic)	0.005381			

The Durbin-Watson statistic is very weak ($=0.0028$), which signifies the existence of residual autocorrelation within the model. We hope this can be eliminated by differentiation.

Regression Model nr. 2: $DCR_IPOT = 50.28 + 0.18 * D2MEDIE_MP(-1) + 0.3267 * DCR_IPOT(-2)$

Dependent Variable: DCR_IPOT				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	50.28043	9.438295	5.327278	0.0000
D2MEDIE_MP(-1)	0.179803	0.086278	2.083984	0.0396
DCR_IPOT(-2)	0.326738	0.090174	3.623421	0.0004
R-squared	0.135257	Mean dependent var		74.19266
Adjusted R-squared	0.118941	S.D. dependent var		74.93200
S.E. of regression	70.33473	Akaike info criterion		11.37155
Sum squared resid	524379.2	Schwarz criterion		11.44562
Log likelihood	-616.7492	Hannan-Quinn criter.		11.40159
F-statistic	8.289892	Durbin-Watson stat		1.842848
Prob(F-statistic)	0.000452			

While attempting to find the most adequate model to explain the evolution of housing loans in Romania, we have used as regressors, in the second model, the series we obtained through the second differentiation of the average price per square meter for the previous month{d2medie_mp(-1)}, as well as the first differentiation of real estate loans for the second previous month{dcr_ipot(-2)}. Model nr. 2 is the one which satisfies best the conditions for regression validity between the housing loans and the average price value. Still, the determination coefficient adjusted R^2 is low (about 12%), which shows that there are other variables which explain the evolution of the real estate loans' dynamic. The model has a very good statistical significance (close to 0% probability that the model, overall, has coefficients close to zero, and a less than 5% probability that the coefficients of the two explanatory variables are non-significant). The Durbin-Watson statistic is close to the ideal value of 2 (=1.84), which signals the inexistence of autocorrelation between the residuals.

The model identifies the fact that the monthly variation of the housing loans stock is explained in a low proportion (unfortunately only 12%) by the dynamics of the previous month's price per square meter of urban dwelling, but also by the two months-old variation of the housing loans stock. It is clear that our model explains in little measure the evolution of housing loans in Romania, and we set out to identify other explanatory variables in a subsequent paper.

Conclusions

The macroeconomic context for the bank lending over the decade between 2004 and 2013 has imposed a specific dynamic to the population's behavior regarding accessing loans. The stock of real estate lending towards the population has known a significant increase on a monthly basis up to 2008, the moment of financial incertitude and the subsequent reduction in appetite for this kind of credit. In parallel, the housing loans were crucial to the evolution of the real estate market, both during the boom years, but especially during the decline after 2009, the „First home” programmed holding an essential place. We notice also the great polarization in regional terms, among which Bucharest stands out, the increased economic activity being a direct determinant with accessing loans, the two fueling each other.

Regarding the statistical explanation of the evolution of real estate lending in Romania, we have synthesized the second model of regression for the monthly variation of the loans with the increase rhythm of the average price per square meter in the previous month{d2medie_mp(-1)}, as well as with the variation of real estate lending in the second previous month{dcr_ipot(-2)}. The second model is the one which satisfies the validation conditions best for the regression between

the loans stock and the average per square meter value. The determination coefficient, adjusted R^2 show a low correlation (of about 12%), which signals the fact that there are other variables which explain the credit's evolution. The model has a very good statistical significance (close to 0% probability that the model, overall, has coefficients close to zero, and a less than 5% probability that the coefficients of the two explanatory variables are non-significant). The Durbin-Watson statistic is close to the ideal value of 2 ($=1.84$), which signals the inexistence of autocorrelation between the residuals.

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Debt and economic growth: Is there any causal effect? An empirical analysis with structural breaks and Granger causality for Greece

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Abstract. *During the last decade Greece has faced many economic problems. The economy is teetering on the brink of bankruptcy and the debt deepens. In this paper we will examine whether the debt is promoting economic growth in Greece. We use time series data from 1980 to 2010. The data is fitted into the regression equation using econometric techniques such as Phillips – Perron, Augment Dickey – Fuller and KPSS. We are testing the variables with techniques such as Zivot Andrew's, Perron's and Bai Perron's tests to find any structural breaks. Then we are testing to see if there is any causal effect in our model with Granger causality test. The results reveal that there are structural breaks in the economy of Greece but no causality between the variables.*

Keywords: economic growth, public debt, structural breaks, Bai Perron test, Granger causality.

JEL Classification: A10, C32, N15.

REL Classification: 8E.

1. Introduction

During the recent decade, many developing countries are facing economic problems and high levels of indebtedness. Greece is one of the countries of the European Union (E.U) which facing major economic problems. There is no doubt that it is at a very critical juncture of its recent history and the danger of bankruptcy is very close.

2. Literature review

There is a wide body of literature, analyzing the relationship between debt and economic growth in both developed and developing countries. Eaton (1993) found that for developing countries it is expected that the marginal product should be higher than the world interest rate. Because of that such countries would benefit from external borrowing. Afxentiou (1993) argues that high levels of debt have a negative effect on economic growth.

According to Krugman (1988) “debt overhang” defined as the situation in which the expected repayment on external debt falls short of the contractual value of debt, and therefore expected debt service is likely to be an increasing function of the country's output level. In many empirical research the negative effect between external debt and economic growth is attributed to “debt overhang”

Many researchers (e.g. Savvides (1992), IMF (1989) and Greene and Villanueva (1991)) claim that the negative relationship and the low growth rates are due to the fact that the high levels of external debt lead the private investment to a reduction.

In the literature there is great interest about the effects of debt on economic growth for developing countries. Using OLS estimation method for a sample of 81 developing countries, Cohen (1993) estimated an investment equation. He shows that the slowdown of investment in developing countries cannot be explained by the level of debt. Cunningham (1993), using a sample of sixteen heavily indebted nations, examined the relationship between economic growth and the level of (total) debt. The author found that that debt has a negative effect on the economic growth as the productivity of capital and labour are significantly reduced. Also Deshpande (1997) find negative relationship between external debt and economic growth for developing countries. The authors Rockerbie (1994) and Sawada (1994) in their works indicate that the decrease in economic growth and investment is due to the external debt.

Were (2001), tried to analyze the debt overhang problem (Kenya) and find evidence for its impact on economic growth. He used data from 1970 to 1995, but he didn't find any impact. In a recent work Pattillo, Poirson and Ricci (2002) find that the average impact of debt on per capita GDP growth is negative only for

high levels of debt. Similarly Schclarek (2004) employing time series data over a period of 1970 to 2002 for 83 developing and industrial countries didn't find evidence about the relationship between debt and productivity. In this study he finds that for developing countries a higher growth rate is associated with a lower debt level.

Mohamed (2005), investigated the relationship debt indebtedness and economic growth for Sudan using annual data from 1978 to 2002. He found that inflation and debt avert growth. On the other hand he found exports to have a positive effect on economic growth. Adepoju et al. (2007) analyzed the economy of Nigeria using data from 1962 to 2006. They concluded that economic growth for Nigeria is hampered by the debt. Focusing on 6 Pacific Island countries for the period 1998-2004 Jayaraman et al. (2008), concluded that there is a significant positive relationship between debt and GDP, and inverse relationship between growth and higher fiscal deficit.

In a recent survey Hameed et al. (2008) tried to explore the effect of debt, capital stock and labour force on growth for a period of 1970-2003 for Pakistan. They found that economic growth is hampered by the adverse effect of debt on capital productivity and labour. Focusing on 27 Latin American and Caribbean countries for the period 1970-2003, Butts (2009) tried to investigate the relationship between economic growth and debt. He found that there is evidence of Granger causality in half of these countries (13).

3. Data

This study uses annual time series data on GDP per capital and Gross Debt (as percentage on GDP) sourced from IMF (International Monetary Fund). The data cover the period between 1980 and 2010 in Greece. The logarithm of GDP and External Debt are used in the empirical analysis. The transformation of the series to logarithms is intended to eliminate the problem of heteroskedasticity.

4. Econometric methodology

According to Ogunmuyiwa (2011) we use the model $GDP_t = f(DEBT_t)$ and $GDP_t = \beta_0 + \beta_1(DEBT_t) + \mu_t$

In order to avoid spurious regression outcomes on the time series data, we are using unit root tests that affirm the stationarity of the series. In this paper we use two kinds of unit roots tests. First of all we use the traditional unit roots tests which do not take into account structural breaks such as Augmented Dickey-Fuller (ADF) tests (Dickey and Fuller, 1979 and 1981) the Phillips-Perron test (1988) and the test of Kwiatkowski et al. (1992). The second kind of unit root

tests we use are the tests that take into account one structural break such as Zivot and Andrews (1992) and Perron (1997). The third method we use in the paper is the Bai Perron(1998, 2001) method for estimating linear regression models subject to multiple breaks. Finally we have used Granger causality analysis in order to investigate the relationship between GDP and External Debt.

4.1. Unit root tests without structural break

4.1.1. ADF test

$$\Delta y_t = c + \alpha y_{t-1} + \sum_{j=1}^k d_j \Delta y_{t-j} + \varepsilon_t \quad (1)$$

$$\Delta y_t = c + \alpha y_{t-1} + \beta_t + \sum_{j=1}^k d_j \Delta y_{t-j} + \varepsilon_t \quad (2)$$

The first equation (1) tests the null of a unit root against a mean stationarity in yt (y is the time series we examine each time). The second equation (2) tests the null of a unit root against the alternative of trend stationarity (ΔY_{t-j} is lagged first differences)

4.1.2. Phillips Perron (PP test)

The PP test (1988) makes the semi –parametric correction for autocorrelation and it's more powerful in the case where we have weakly autocorrelation and heteroskedastic regression residuals. We can say that Phillips Perron test is an extension of the ADF test.

4.1.3. KPSS test

Unlike most of the unit root tests Kwiatkowski-Phillips-Schmidt-Shin (1992) provide a test where the null hypothesis is that a series is stationary. The test has been developed to complement unit root tests as the last have low power with respect to near unit root and long run trend process.

4.2. Unit root tests with structural break

4.2.1. Zivot and Andrews model

Zivot and Andrews (1992) proceed with three models to test for a unit root: model A, which permits a one-time change in the level of the series; model B, which allows for a one-time change in the slope of the trend function, and model C, which combines one-time changes in the level and the slope of the trend function of the series. The 3 models are

$$\Delta Y_t = \kappa + \alpha * Y_{t-1} + \beta * t + \theta_1 D U_t + \sum_{j=1}^k d_j \Delta Y_{t-j} + \varepsilon_t$$

(Model A)

$$\Delta Y_t = \kappa + \alpha * Y_{t-1} + \beta * t + \gamma_1 DT_t + \sum_{j=1}^k d_j \Delta Y_{t-j} + \varepsilon_t$$

(Model B)

$$\Delta Y_t = \kappa + \alpha * Y_{t-1} + \beta * t + \gamma_1 DU_t + \gamma_1 DT_t + \sum_{j=1}^k d_j \Delta Y_{t-j} + \varepsilon_t$$

(Model C)

DU_t is an indicator dummy variable for a mean shift occurring at each possible break-date (TB) while DT_t is corresponding trend shift variable:

$$DU_t = \begin{cases} 1 & \text{if } t > TB \\ 0 & \text{otherwise} \end{cases} \quad \text{and} \quad DT_t = \begin{cases} t - TB & \text{if } t > TB \\ 0 & \text{otherwise} \end{cases}$$

The null hypothesis in all the models is that $\alpha=0$, which means that the series {yt} contains a unit root with a drift that excludes any structural break. The alternative hypothesis is that $\alpha<0$. It implies that the series is a trend-stationary process with a one-time break occurring at an unknown point in time.

4.2.2. Perron test

Perron (1997) proposed a unit root test which allows for an endogenous structural change. According to Perron (1997, p.358) we have 2 equations. In the first model the unit root test is performed using the t –statistic for testing $\alpha=1$ in the following regression:

$$Y_t = \mu + \gamma DU_t + \beta_t + \delta D(T_b)_t + \alpha Y_{t-1} + \sum_{i=1}^k c_i \Delta Y_{t-i} + e_{t*} \quad (3)$$

where: $DU_t = 1$ ($t > T_b$) and $D(T_b)_t = 1$ ($t = T_b + 1$), T_b denotes the time at which the change in the trend function occurs; t is a linear time trend; Δ is the first-difference operator; e_t are white noise error terms. Moreover, as the second model (Model 2), the test is performed using the t-statistic for the null hypothesis that $\alpha=1$ in the regression:

$$Y_t = \mu + \gamma DU_t + \beta_t + \gamma DT_t + \delta D(T_b)_t + \alpha Y_{t-1} + \sum_{i=1}^k c_i \Delta Y_{t-i} + e_{t*} \quad (4)$$

where: $DT_t = 1$ ($t > T_b$)_t is the dummy variable. We conduct regression (2) for $k+3 \leq T_b \leq T-3$. In the above equations (1) and (2), the break date, T_b , and lag length, k , are treated as unknown. The break date, T_b , is selected based on the minimum t-statistic for testing $\alpha = 1$ (see Perron, 1997, pp. 358—359). For each T_b , the selection of lag length, k , is selected by t-sig criterion with maximum lag length, $k_{\max} = 5$ (see Perron, 1997, p. 359).

4.2.3. The Bai-Perron method

Bai and Perron (1998, 2001) proposed a method for estimating linear regression models subject to multiple breaks. The model assumes that the dependent variable, y_t , is related to a set of state variables, x_{t-1} but that the relationship has been subject to q breaks up to time T :

$$\begin{aligned} y_t &= \beta'_1 x_{t-1} + \hat{u}_t & t = 1, 2, \dots, T_1 \\ y_t &= \beta'_2 x_{t-1} + \hat{u}_t & t = T_1 + 1, \dots, T_2 \\ &\vdots \\ y_t &= \beta'_{q+1} x_{t-1} + \hat{u}_t & t = T_q + 1, \dots, T \end{aligned}$$

$T_1 < T_2 < \dots < T_q < T$ and U_t is a disturbance term. The Bai and Perron method permits consistent estimation of the number and location of the breakpoints and the parameters.

The model it's possible to be restricted to allow partial breaks that only affect some of the regression coefficients. Because the breaks are viewed as deterministic and the approach thus does not require specifying the underlying process that generated the breaks in the first place. The approach relies on a number of design parameters such as the maximum number of breaks and the minimum distance between breaks.

We can determine the number of the breaks with many ways. One approach is to determine the number of breaks sequentially by testing for $q + 1$ against q breaks. Alternatively a global approach of testing for q breaks against no breaks can be used. Finally, the number of breaks can be selected by using penalized likelihood methods such as the Schwarz information criterion (SIC) or Akaike's information criterion (AIC) which differ in terms of the penalty they apply to the inclusion of additional breakpoint parameters. All of the above and other practical issues are further discussed in Bai and Perron (2001).

4.3. Granger causality test

The test procedure as described by (Granger, 1969) is illustrated below:

$$GDP = \sum_{j=1}^K A_j ED_{t-j} + \sum_{j=1}^K B_j GDP_{t-j} + U_{it} \quad (5)$$

$$DEBT = \sum_{i=1}^K C_i DEBT_{t-i} + \sum_{j=1}^K D_j GDP_{t-j} + U_{2t} \quad (6)$$

Equation (5) represents that current GDP is related to past values of itself as well as that of DEBT and vice-versa for Eq. (6). Unidirectional causality from DEBT to GDP is indicated if the estimated coefficient on the lagged DEBT in equation (5) are statistically different from zero as a group and the set of estimated coefficients on the lagged GDP in Eq. (6) is not statistically different from 0. The converse is the case for unidirectional causality from GDP to DEBT. Bilateral causality exists when the sets of DEBT and GDP coefficient are statistically different from 0 in both regressions (Gujarati, 2004). (Note: we are using the variables in first differences)

5. Empirical Results

5.1. Unit Root Tests without Structural Break

Before we will proceed to the analysis we have to determine the integration order of the variables. The results of the tests we have used are presented in table 1. All the variables are expressed in natural logarithms so that elasticities can also be determined.

Table 1. Unit Root Tests without Structural Break

	Dickey – Fuller			Phillips - Perron		KPSS	
	τ_{μ}	τ_{τ}		τ_{μ}	τ_{τ}	η_{μ}	η_{τ}
LGDP	0.163 [0.965]	-3.201 [0.059]	1	0.0050 [0.952]	-2.4835 [0.333]	0.690**	0.698***
LDEBT	-2.602 [0.022]	-2.475 [0.337]	1	-2.456 [0.027]	-2.407 [0.369]	0.652**	0.182**
Δ LGDP	-3.580** [0.013]	-3.383 * [0.073]	0	-3.916 *** [0.005]	-3.209 [0.102]	0.160	0.080
Δ LDEBT	-4.028*** [0.004]	-4.337 ** [0.009]	0	-4.118 *** [0.003]	-4.423 *** [0.008]	0.289	0.053

Notes: τ_{μ} is the t-statistic when a time trend is not included in the equation and τ_{τ} is the t-statistic when a time trend is included in the equation. The calculated statistics are those reported in Dickey-Fuller (1981). The critical values for the tests of Dickey – Fuller and Phillips – Perron are at 1% -3.67, at 5% -2.96 and at 10% -2.62 for τ_{μ} and -4.36, -3.60 and -3.23 for τ_{τ} respectively.

η_{μ} and η_{τ} are the KPSS statistics for testing the null hypothesis that the series are $I(0)$ when the residuals are computed from a regression equation with only an intercept and intercept and time trend, respectively. The critical values at 1%, 5% and 10% are 0.739, 0.463 and 0.347 for η_{μ} and 0.216, 0.146 and 0.119 for η_{τ} respectively (Kwiatkowski et al, 1992, Table 1).

***, **, * indicate significance at the 1, 5 and 10 percentage levels.

The results according to the tests of ADF, Phillips-Perron and KPSS statistics, have showed that all the explanatory variables are integrated of order $I(1)$.

5.2. Zivot Andrews results

Table 2. Zivot Andrew's test

	t-Statistic	Prob. *	Break Point
Zivot-Andrews test statistic (DLGDP)	-3.970220	0.009121	2003
Zivot-Andrews test statistic (DLDEBT)	-1.644756	0.001550	1994
1% critical value:	-5.34		
5% critical value:	-4.93		
10% critical value:	-4.58		

The results for Zivot and Andrew unit root test are presented in Table 2. The results suggest that we can reject the null of unit root for GDP and DEBT. At the same time, the test identifies endogenously the point of the most significant structural break in every time series examined in the paper. Table 2 tells us about the break dates for each variable. The Break point for the variable of DEBT is 1994 (since 1994 the ratio of debt to GDP has remained above 94% and after that year the ratio rapidly grew above 100%). The Break point for the variable of GDP was 2003 (after that year the real GDP growth ratio started to fall).

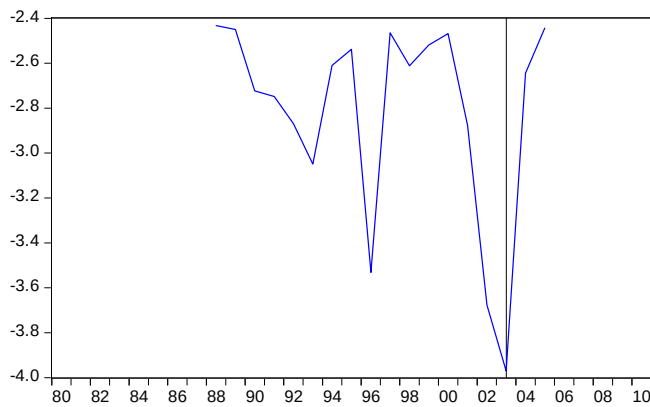


Figure 1. Zivot – Andrew's Breakpoint for DLGDP (2003)

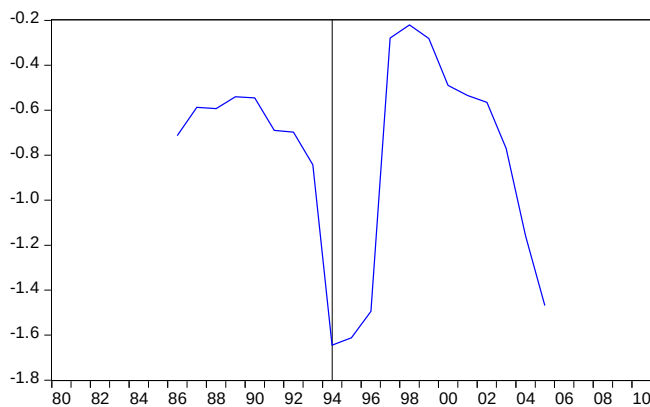


Figure 2. Zivot – Andrew's Breakpoint for DLDEBT (1994)

5.3. Results of Perron's unit root test

Table 3. *Perron's Unit Root Test*

	t-Statistic	Break Point
Perron Unit Root Test (DLGDP)	-5.699543	2002
Perron Unit Root Test (DLDEBT)	-5.981288	1993
1% critical value:	-5.92	
5% critical value:	-5.23	
10% critical value:	-4.92	

As we can see from the results which are presented in table 3 the break points for the variables of GDP and DEBT are 2002 and 1993 respectively. If we will compare the results of the two tests we see that they are slightly different (they differ by one year). The results of the Perron's test have shown a break point one year earlier than the Zivot Andrews test.

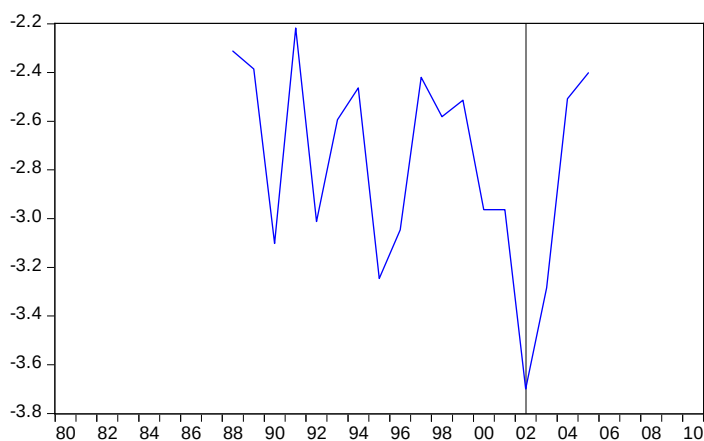


Figure 3. *Perron's Breakpoint DLGDP (2002)*

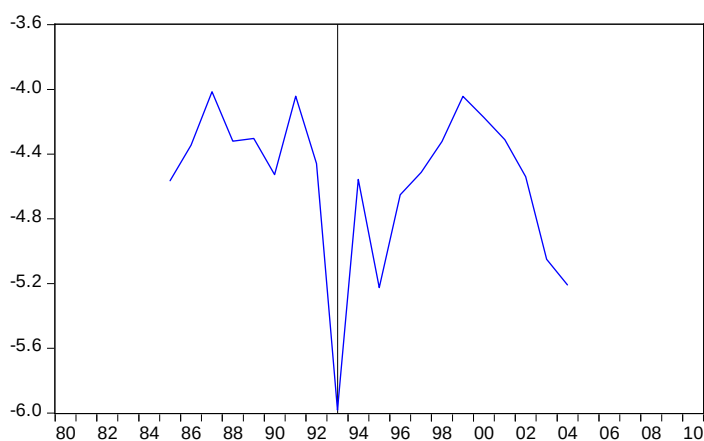


Figure 3. *Perron's Breakpoint DLDEBT (1993)*

5.4. Results of Bai-Perron's breakpoint test

The next test we have obtained was the Bai-Perron's breakpoint test. In table 4 we report the optimal number of breakpoints (i.e the one associated with the minimum BIC score or the maximum Log – Lik score). The optimum number of breakpoints we have in our model is 3 and the breaks were in year 1986, 1992 and 2001.

Table 4. *Bai-Perron's breakpoint Test*

Breakpoints	0	1	2	3	4	5	6
BIC	-47.87189	-51.46029	-47.57901	-53.72965	-48.69511	-48.73396	-32.17504
Log-Lik	30.73834	39.33493	44.19669	54.07441	58.35953	65.18135	63.70428
RSS	0.226298	0.127580	0.092262	0.047757	0.035889	0.022775	0.025132
N. Coefs	4.000000	8.000000	12.00000	16.00000	20.00000	24.00000	28.00000
Chosen number of breaks: 3							
Breaks :	1986						
	1992						
	2001						

5.5. Granger causality test

Table 5. *Granger causality test*

Null Hypothesis:	Obs	F-Statistic	Prob.
DLDEBT does not Granger Cause DLGDP	28	1.13476	0.3388
DLGDP does not Granger Cause DLDEBT		0.21841	0.8054

Having affirmed the stationarity of the series, we then proceed to find the causality using the Granger causality test as defined by Granger (1969). The results are shown in Table 5 and clearly we can conclude that they fail to support any strict causality between Debt (DEBT) and economic growth in Greece. Thus, it can be affirmed that the variables are exogenous of one another, but the degree of exogeneity between the variables cannot be determined easily. Hence, it can be stated that external debt is not a specific factor determining the rate of economic growth or economic slowdown in Greece. Our finding is in confinement with the findings of Afxentiou and Serletis (1996a) who stated that indebtedness is not a specific factor of per capital income growth. Also our findings are in confinement with Bullock and Rogoff (1990) propositions that public debt of developing countries is a symptom rather than a cause of economic slowdown.

6. Conclusions

In this paper we are trying to determine if economic growth can be promoted by debt in Greece. Many researches have shown that causation between debt and growth could not be established in developing countries and public debt could thus not be used to forecast improvement or slowdown in economic growth in Greece.

In order to examine that relationship we have used some stationarity tests. First of all we have used the traditional unit roots tests which do not take into account structural breaks such as Augmented Dickey-Fuller (ADF) tests (Dickey and Fuller, 1979 and 1981) the Phillips-Perron test (1988) and the test of Kwiatkowski et al. (1992). The results have shown that all of our variables are stationary of order one. The second kind of stationarity tests we have used are the tests that take into account one structural break such as Zivot and Andrews (1992) and Perron (1997). Here we have found that with Zivot and Andrews's method the Break point for the variable of DEBT was 1994 and for the variable of GDP was 2003. The results of Perron's test were slightly different and give us different break points for the variables (GDP and DEBT are 2002 and 1993 respectively). We have used also the Bai Perron's (1998, 2001) method for estimating linear regression models subject to multiple breaks. The test has shown that the optimum number of breakpoints we have is 3 and the breaks were in year 1986, 1992 and 2001. Finally we have used Granger causality analysis in order to investigate the relationship between GDP and Public Debt. The results suggested that we cannot establish causality between debt and growth in Greece.

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Behavioral finance: biased individual investment decision making; like the company but dislike the investment

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Abstract. *Classical economics considers people to be rational, self-interested and self-controlled. Behavioral economics showed instead that we are not as logical and efficient as we might think: we do care about others, and we are not as disciplined as we would like to be. Our intuitive mind works by mean of mental shortcuts that lead to erroneous decisions, since our mind delivers the products of these mental shortcuts, and we accept to follow them, spending the significant mental resources remaining available for other, survival related tasks.*

Keywords: psychology, biases, efficiency, individual investment.

JEL Classification: G11, G12, G14.

REL Classification: 5F, 5G, 5K, 7J, 7K, 7L, 10B, 10F.

Database

The sources of this data include Stock Market Confidence Indexes – as linked from Yale School of Management International Center for Finance as directed by the 2013 Nobel Prize in Economics Dr. Robert Shiller – the Investor Behavior Project.

Additionally, S&P/Case-Shiller Home Price Indices is a key source of data. Another, significant input of data is relatively easily downloadable from Shiller, R., US Stock Price Data, Annual, with consumption, both short and long rates, and present value calculations. (<http://aida.wss.yale.edu/~shiller/data.htm>). We also use extensively publicly available stock market data for US, Europe and Romanian market.

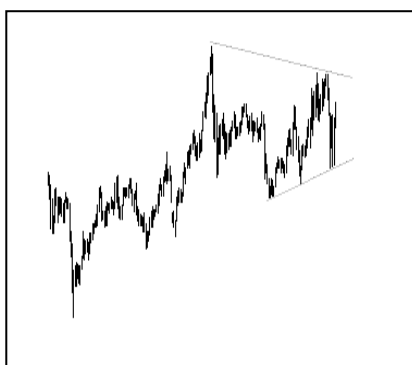
Introduction

Behavioral finance integrates economic principles with psychological influences of human behavior in the investment decision. The systematic cognitive errors and biases are recurrent and predictable but this can be observed mostly ex post. It is relatively easy to find an explanation on why a certain person assumed a financial decision in some circumstances but it is extremely difficult to use the explanatory power of behavior finance to predict how the respective person will react in the future to the same type of events and within similar circumstances. From a psychological standpoint, investors make non-rational mistakes because the inner resorts of human nature prevail over any education, training and computing power. No matter how sophisticated is the financial and statistical data, the decision has to be implemented by a human being, subjected to emotions and fears, job security constraints, etc. If these biases and errors are recurrent and predictable, that means that a rational investor can profit from non-rational decisions of some noisemakers activating in the market

A group of Swiss soldiers gets lost the Alps, and after several days of dwindling supplies and increased fatigue, one of the men realizes that he has a map, and with this map on hand, the platoon managed to reach a town. Back to their base, the commanding officer was briefed on how the soldier realized that they have a map. “You found a map, but it’s not a map of the Alps, it’s a map of the Pyrenees...” The story was told by Daniel Kahneman the distinguished laureate of a Nobel Prize in behavioral economics and finance. Although the map was a worthless document, it provided an energetic boost to the soldiers’ confidence, sense of security and the marching order out of trouble.

By understanding stress and how we cope or react under it, the more we understand and believe in what we do in terms of strategic and analytic financial decisions and rely less on guts, rules of thumb, heuristics or emotional biases.

Investors have chronic attention deficit/hyperactivity disorder (AD/HD) with inability to see that stock investing is for the long run. By an articulated discipline an investor can gain confidence on a strategy that worked in the past and on the process in place to measure and ensure that the strategy is repeatable. Investors should not focus on things outside of their control, i.e. stock market prices, but rather on what they really control, information and knowledge. Emotional pain of a financial loss is temporary, but quitting is permanent. Nothing is more difficult, and therefore more precious, than to be able to decide.



By design, when markets go up, most of the investors do better than when markets go down. Probably it is much better to try to understand where the market is going, when is going to start in that direction, and how much of your money will you be able to bet on that.

By design, when markets go up most of the investors do better than when markets go down. Understand where the market is going, when is going to start in that direction, and how much of your money will you be able to bet on that.

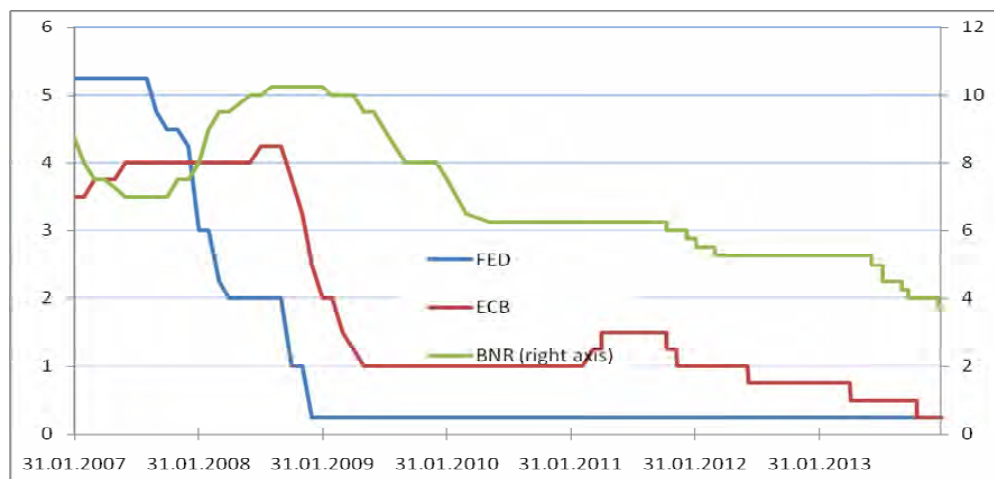
Human mind searches patterns. Three is a trend

The field of modern finance has progressed impressively in the last half century, from intuitive concepts of present value of future economic benefits, to diversification and risk measurement, to monetary value of the option to choose, the cycle is complete with behavioral finance comprehensive approach of considering the essential influence of human element in the financial decision. Classic finance foundation lays on strict rationality and optimization of financial decisions. Behavioral finance adds to the equation the psychological and emotional facets of the human decision but still has a difficult task in explaining, on a strict scientific basis, why people behave apparently non-rational when dealing with their or other people's money.

The larger context: investors should zoom out: the current and historical context is essential. What your competitors do matters most, since the impact of your decisions can be influenced by what competition does

Graph 1: The context is critical in any investment decision:

Central Banks rates of FED, BCE and BNR (the right vertical axis): Consumption, investment lending in sustainable conditions is still far away, while taking into consideration the prolonging and even intensification of cross-border financial deleveraging, monetary accommodation competition between the large central banks.



In general, those that succeeds on the long term, make small gains, systematically (or wins more and more times than they lose). Their investment success is not a simple result of a continuous stream of rational and correct material decisions but of a disciplined and focused approach, prime access to information and ability to assemble on time and correctly the available data, coupled with the ability for innovation and adaptation to the continuous change and challenge of the market game. Investment managers have to prove their repeatable professional ability and sustainable value-adding capability on a continuous basis to their employers, employees, and investment public.

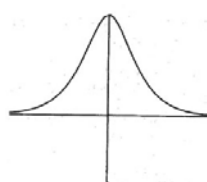
Understanding the psychological foundation of human behavior in financial markets facilitates the formulation of investment policy statements for individual investors. There is a low correlation between professional abilities and investment success. Investors have high confidence that somehow, someday they will succeed in beating the markets, in a systematic way. Beating the market by outsmart moves ahead of competition, finding undervalued and overvalued securities and implementing the buying and selling decision at the right timing is difficult, if not impossible, in the long run, sustainable way.

Nobody wants to be just a spectator of the game; everybody wants a piece of action because of a non-rational herd instinct. From a rational standpoint, however, it should be clear that the upward trend might not continue indefinitely. Just to compound the problem, the objects of investor affection is represented by those stock that performed dearly in the latest period and are obvious most exposed to the eventual correction. Perception of context and expectation are key determinants of and investment decision. An investor analyzing the table below most probably would be interested in the booming Romanian market:

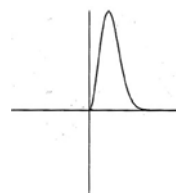
2014, Over recession but under prolonged crisis: Equity Risk and Credit Premiums								
	Real GDP Growth	Real Earnings Growth	Dividend + Yield	Expected Real Return =	Real Bond Yield -	Implied = ERP	Expec- ted Inflation	Expected Nom. Return
US	3.0	3.0	1.8	4.8	1.5	3.3	2.0	6.8
Japan	1.5	1.5	1.7	3.2	0.8	2.4	0.5	3.7
UK	2.8	2.8	3.2	6.0	-1.0	7.0	2.0	8.0
Romania	1	2	2	4.0	2.5	1.5	2.5	4
	+2.5	3,5	3,5	7	3	4	2,75	6,75
	+5	4	4,5	8,5	2	6,5	5.0	11,5
Europe	0.3	2.3	2.9	5.2	-1.0	6.1	2.0	7.2
World	2.5	2.5	2.3	4.8	0.4	4.4	1.8	6.6

Investors put too much weight into most recent financial experiences and ignore a longer term, larger perspective. They evaluate other players decisions as discretionary and non-rational and assume their own decision to be logical and rational, and in conformity with all existing information. Active investment is strongly influenced by behavioral biases. Based on local market data (Romanian Stock Market), the paper contends that benefits of active allocation are small and unsustainable. Careful asset allocation and appropriate timing of rebalancing can improve the chances of higher portfolio efficiency. Investors should be better off by focusing on asset and sector allocation and less on security selection and market timing.

One critical assumption is to consider the return distribution as normal or lognormal. In a normal distribution, return distribution intervals have a constant measure, in a lognormal distribution, the intervals value depends on the relative value of stock price. If stock price variations are independent, the return distribution is normal, and if log differences are independent and have a finite variance, the price distribution is lognormal. An efficient, fair market should preclude any investor to infer immediate evolution based on past evolution (Bodie et al., 1989).



Normal distribution



Lognormal distribution

The local market research introduced also by the paper tests the random walk hypothesis to see if markets move at random and investors do not express any behavioral biases. To test daily return distribution and independence, a regression equation is introduced:

$\ln(I_t) = \mu + \rho \ln(I_{t-1}) + \varepsilon_t$, where I_t is the index value (the most representative, BET FI Index) in day t and ε_t is the residual value.

Next, to test the linear dependence, the paper introduces the regression $\varepsilon_t = \phi_0 + \phi_1 \varepsilon_{t-1}$. If ϕ_1 proves to have statistical significance than we can conclude with the degree of confidence that the evolution is linear dependent, the market does not follow a random walk.

BETFI⁽¹⁾

Regression equation: $\ln(I_t) = \mu + \rho \ln(I_{t-1}) + \varepsilon_t$

Dependent Variable: L_BETFI

Method: Least Squares

Sample (adjusted): 2 2065

Included observations: 2064 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.012179	0.004333	2.810478	0.0050
L_BETFI(-1)	0.998839	0.000450	2220.474	0.0000
R-squared	0.999582	Mean dependent var		9.544222
Adjusted R-squared	0.999582	S.D. dependent var		1.315671
S.E. of regression	0.026907	Akaike info criterion		-4.391915
Sum squared resid	1.492827	Schwarz criterion		-4.386457
Log likelihood	4534.456	F-statistic		4930504.
Durbin-Watson stat	1.739751	Prob(F-statistic)		0.000000

Regression equation: $\varepsilon_t = \phi_0 + \phi_1 \varepsilon_{t-1}$

Dependent Variable: RESID_BETFI

Method: Least Squares

Sample (adjusted): 3 2065

Included observations: 2063 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.50E-06	0.000588	-0.002556	0.9980
RESID_BETFI(-1)	0.129934	0.021846	5.947840	0.0000
R-squared	0.016875	Mean dependent var		-3.18E-06
Adjusted R-squared	0.016398	S.D. dependent var		0.026906
S.E. of regression	0.026685	Akaike info criterion		-4.408477
Sum squared resid	1.467593	Schwarz criterion		-4.403017
Log likelihood	4549.344	F-statistic		35.37680
Durbin-Watson stat	1.993355	Prob(F-statistic)		0.000000

According to the regression equation that was tested, the ϕ_1 coefficient is statistically significant, we can infer that there is linear dependence between daily returns, and the index series of BETFI does not follow a random walk pattern. Other factors could influence this evolution, and they are persistent and consistent.

For the specific analysis of eventual behavioral influences in the investment management decision making process we tested the nonlinear dependence through GARCH models for financial company's index, BETFI. We were excited by the idea first introduced by the paper of Stancu and Stancu (2013). Rationality versus Irrationality on the Romanian Capital Market; the authors contend that: *"The shares of financial services companies confirm the second case, that of irrational, subjective behavior, not only at the level of the individual investor but also at the level of the community of stock exchange operators. The shares are traded mostly for short-term gains purpose. Their stock prices reflect investor expectations of the stock market development and not the issuer's financial performance. As a consequence, investors have the priori belief that these performances are greater than they are in reality. With that in mind, their concern is purely speculative"*. We have deliberately chosen to test the financial companies' index BETFI as a more suggestive of investor over confidence in their prediction power.

The nonlinear dependence is tested through a GARCH model, that is an ARCH general (GARCH (p,q)):

$$r_t = \beta_0 + \beta L(r_t) + \varepsilon_t$$

$$\varepsilon_t \approx N(0, h_t)$$

$$h_t = \alpha_0 + \alpha(L)\varepsilon_t^2 + \gamma(L)h_t$$

Where r_t is an ARMA (p', q')⁽²⁾ process, (or AR (p') or MA (q')); h_t is a process ARCH (p) and GARCH (q).

BETFI⁽³⁾

Dependent Variable: D_L_BETFI

Method: ML - ARCH (Marquardt) - Normal distribution

Sample (adjusted): 3 2065

Included observations: 2063 after adjustments

Convergence achieved after 22 iterations

Variance backcast: ON

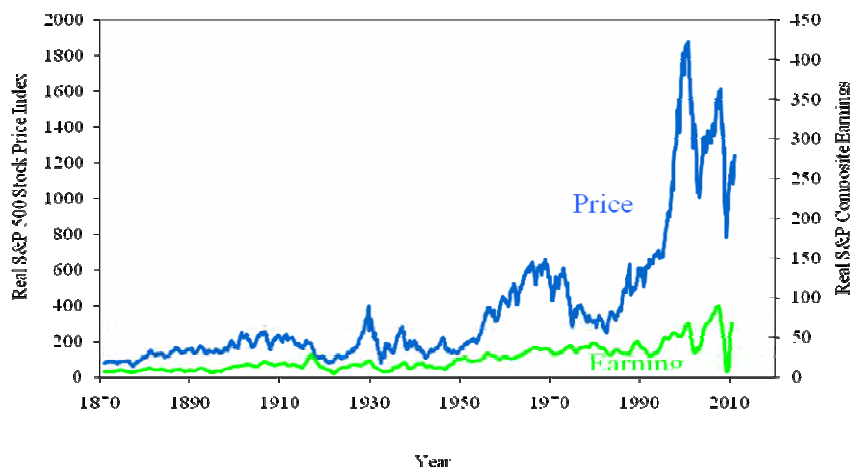
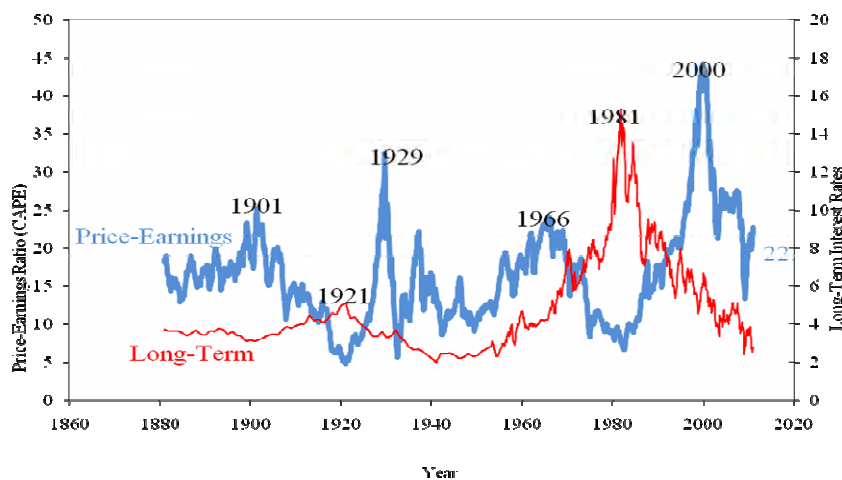
LOG(GARCH) = C(3) + C(4)*ABS(RESID(-1)/@SQRT(GARCH(-1))) +
C(5)*LOG(GARCH(-1))

	Coefficient	Std. Error	z-Statistic	Prob.
C	0.001589	0.000366	4.346874	0.0000
D_L_BETFI(-1)	0.118050	0.021970	5.373306	0.0000
Variance Equation				
C(3)	-0.667941	0.053915	-12.38880	0.0000
C(4)	0.319185	0.015548	20.52874	0.0000
C(5)	0.942138	0.006394	147.3410	0.0000
R-squared	0.016616	Mean dependent var		0.001093
Adjusted R-squared	0.014705	S.D. dependent var		0.026949
S.E. of regression	0.026750	Akaike info criterion		-4.729761
Sum squared resid	1.472674	Schwarz criterion		-4.716111
Log likelihood	4883.748	F-statistic		8.693593
Durbin-Watson stat	1.965885	Prob(F-statistic)		0.000001

According to the tested results, for the financial index BETFI there is a statistical nonlinear dependence, with the following specifications: r_t is AR (1), h_t is an exponential ARCH (1) and GARCH (1), with the end result of E-GARCH (1, 1).

We can infer that there is linear dependence between daily returns, and the index series of BETFI does not follow a random walk pattern. Other factors could influence this evolution, and they are persistent and consistent. We can confidently assume that BETFI index pattern evolution does not follow a random walk.

Robert Shiller's' Paper on *The Volatility of Stock markets Prices* published in 1987 uses dividend data and real interest rates to seek evidence that true investment value changes through time sufficiently to justify the price changes. His paper concluded that most of the volatility of the stock market prices appears unexplained. Shiller volatility or fluctuations prove that behavior of markets is not normal. Non normal distribution series is a widely followed proof of inefficiency in prices.



Conclusions

The paper shows that behavioral biases are detrimental to the investment return of individual investor portfolios. As a direct influence of behavioral biases, the intuitive correlation between risk and return does not hold. Low risk investments have the highest returns along all dimensions of the market. The practical findings contrast the principles of efficient markets – high risk is not correlated with high expected return and low risk/safe investments have highest investment returns.

Research in behavioral finance has important practical and academic applications. The research can help guide investment portfolio allocation decisions, both by helping the understanding the kinds of errors that investors tend to make in managing their portfolios, and also by allowing us to understand better how to allocate assets and locate profit opportunities for investment managers. Understanding the psychological foundation of human behavior in financial markets facilitates the formulation of investment policy statements for individual investors.

Methods that originate in psychology are used as research tools, along with traditional finance research methods. Over these years, the academic and practitioners world of finance have seen the blossoming of behavioral finance into a significant body of knowledge. The combination of theoretical and empirical work has allowed us to see the relevance of the basic psychological theories to many financial phenomena. The newly developed body of knowledge is an important addition to the theory and practice of modern finance.

Behavioral finance integrates economic principles with psychological influences of human behavior in the investment decision. The systematic cognitive errors and biases are recurrent and predictable but this can be observed mostly *ex post*. It is relatively easy to find an explanation on why a certain person assumed a financial decision in some circumstances but it is extremely difficult to use the explanatory power of behavior finance to predict how the respective person will react in the future to the same type of events and within resembling circumstances. From a psychological standpoint, investors make non-rational mistakes because the inner resorts of human nature prevail to any education, training and computing power. No matter how sophisticated is the financial and statistical data, the decision has to be implemented by a human being, subjected to emotions and fears, job security constraints, etc. If these biases and errors are recurrent and predictable, that means that a rational investor can profit from non-rational decisions of some noisemakers activating in the market.

Notes

- (1) BETFI index public data: Apr. 1998 – Jan. 2012.
- (2) General format of an AR process with a finite number of p variables contribute to the current level of y variable: $y_t = a_1 y_{t-1} + a_2 y_{t-2} + \dots + a_p y_{t-p} + \varepsilon_t$, where a_i are the coefficients to be estimated and ε represents the random residual in a classical regression equation. $\varepsilon_t = y_t(1 - a_1 L^1 + a_2 L^2 + \dots + a_p L^p)$. L^i is a lag operator that for the value of the variable for the period and for the current period. The MA process of a q ranking can be arranged as follows:
- $$y_t = \varepsilon_t - \sum_{i=1}^q b_i \varepsilon_{t-i} \text{ and also can be expressed based on time lag: ARMA process:}$$
- $$y_t(1 - b_1 L^1 + b_2 L^2 + \dots + b_q L^q) = \varepsilon_t(1 - b_1 L^1 + b_2 L^2 + \dots + b_q L^q).$$
- (3) BETFI index public data: Apr. 1998 – Jan. 2012.

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The role of community foundations in local development – Slovak experience

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Abstract. *The issue of local development is nowadays very relevant. According to the customary perception in the post-socialistic countries, local development should be ensured primarily by municipalities. Over time, under the influence of various factors, there is a change of paradigm. One of the alternative initiators and implementers of development processes at a local level is the community foundation. The aim of this study is to evaluate the benefits of community foundations in the field of local development. Furthermore, there are discussed the advantages and disadvantages of community foundations. The study provides empirical findings of own research in the field of community foundations within Slovakia. Data was obtained primarily from the questionnaire survey, as well as from own analysis of annual reports and financial statements of community foundations, existing in Slovakia.*

Keywords: community foundation, inter-sector cooperation, local development, municipalities.

JEL Classification: H41, L31.

REL Classification: 13G.

Introduction

In time of economic crisis it is necessary to municipalities and to their inhabitants to provide at least the performance of the necessary task, which are obligated to municipalities by the law, and whose purpose is to provide basic living conditions in the municipality. The main task of municipality is to provide the care of overall development of its territory and the needs of its inhabitants. This contains the obligation of municipality to implement development activities. According to the fact that municipalities often deal with the question of how to survive or they have to take care of the transferred competence, which are being transferred in excessive numbers from state, the other subjects have to take over the implementation of these development activities. One of them is community foundations.

1. A brief description of the problem

When we want to talk about **local development**, we need to realise that development could be perceived in many meanings. For example the social meaning, economic meaning, environmental meaning, political meaning etc. All of these meanings have, at last one common feature. Ramukumba et al. (2012, p. 8) say about it. As they stated, local development is “seeking innovative growth options”. The most common form of the local development known in society is the concept of Local economic development.

Blakely and Leigh say that economic development cannot be reduced to economic growth. They define three elements of economic development (2010, pp. 75-76):

1. Economic development establishes a minimum standard of living for all and increases the standard over time.
2. Economic development reduces inequality.
3. Economic development promotes and encourages sustainable resource use and production.

According to this definition it could be said, that local economic development is realised when the community identifies basic standard they accept for living in the area, they permanently increase its volume or its quality that leads into the sustainable development of community.

Local economic development (LED) is the concept that has been developed by many theorists. There are many definitions of what the Local economic development is. At this place we should use couple of definitions that show that LED concept and Good Governance concept are strongly interconnected.

The World Bank (2003, p. 1) defines LED as “the process by which public, business and nongovernmental sector partners work collectively to create better conditions for economic growth and employment generation. The aim is to improve the quality of life for all.”

Cunningham and Meyer-Stamer (2005, p. 9) state that “LED is only rarely a mandatory role of government”. According to the definition of LED of Trousdale (2005, p. 8), this role includes:

- Participation of the subject from all sectors that run their activities in particular municipality
- Stimulation of local commercial activity
- Creating a resilient and sustainable economy

Metaxas (2002, p. 4) says that LED is “the main common conclusion is the existence of a competitive tendency between community’s goals and enterprises’ objectives”.

At this place it is necessary to give a brief definition of **community foundation**. Community foundation is specific by the fact that it is founded by the private-law act, however it performs its competences in the area, regulated mainly by the public-law norms. Definition of community foundation is not simple. We may define it as “targeted association of assets, performing its activities on exactly specified area, to exactly specified group of people, normally residents of the territory” (Poliak, 2011a, p. 50).

It is possible to define exact differences between community foundation and foundation in general.

Table 1. Differences between community foundation and foundation in general in Slovakia

Factor	Community foundation	Foundation (general)
<i>Legal regulation</i>	Act No.34/2002 Coll. on foundations and on change of Civil code as amended	Act No.34/2002 Coll. on foundations and on change of Civil code as amended
<i>Number</i>	11 (2.56%)	429 (100%)
<i>Founder</i>	Combination of subjects	Mainly individuals or law persons
<i>Purpose of organization</i>	Municipal development (predominately social)	Philanthropy in the broad sense
<i>Method of financing activities</i>	Predominately from the share of individual income tax according to §50 of Act No.595/2003 Coll. on income tax as amended	Multisource fundraising

Source: Own processing.

Community foundation is not different from foundation in general, according to its form and legal regulation. Due to the specialization in municipal development, the whole number of 429 foundations in Slovakia, which have been reported in the Register of foundation, maintenance of which is in competence of Ministry of Interior of Slovak republic, contains only 11 (2.56% of whole number) community foundations.

Due to fact that community foundation may be understood as an additional source of financing the development of municipality, respectively development of region, or the territory in general, the progress of which affects positively the budget of municipality and potential negative progress of its management has no impact on municipality, it may be said that there is a relatively significant effort of keeping community foundations by municipalities, on which territory these organizations perform their activities.

Table 2. *Founders of community foundations in Slovakia*

Region and number of community foundations	Founder
Bratislava region – 2	
Community foundation Bratislava	Individuals
REVIA – Little Carpathian community foundation	Individuals
Trenčín region – 1	
The foundation of Trenčín	Non-formal association of Trenčín
Nitra region – 2	
Community foundation of Nitra	Community initiative of Nitra, c.a. Town Nitra
Community foundation Šaľa	Town Šaľa
Žilina region – 1	
Community foundation Liptov	Development fund of Liptov, NGO
Banská Bystrica region – 1	
Community foundation Healthy town	Foundation Healthy town Banská Bystrica
Prešov region – 4	
Community foundation Bardejov	Town Bardejov
Community foundation of town Humenné	Town Humenné
Community foundation Blue Torysa	Civic association NGO People and water
Community foundation Veľký Šariš	Town Veľký Šariš
Slovakia – 11	

Source: Processing based on data from Ministry of Interior of Slovak republic.

Easterling (2011, p. 81) states some functions of community foundations:

- 1) publicizing issues that need more public and political attention;
- 2) drawing together various stakeholders to develop new solutions;
- 3) creating a new organization focused on a critical local issue;
- 4) developing, testing, and disseminating innovative program models;
- 5) advocating for changes in public policy and social norms;
- 6) encouraging people and organizations to adopt new practices; and
- 7) building the capacity of individuals, organizations, and communities.

According to the implementation of these functions in practice of Slovak republic we can identify some ***advantages of community foundations*** that may be stated following:

- 1) *Community foundation is a private-law organization* – Compared to the extra-budgetary monetary funds that can be founded by municipalities according to the Act No.523/2004 Coll. on budgetary rules of public administration as amended or Act No.583/2004 Coll. on budgetary rules of territorial self-government as amended, are community foundations regulated primarily by the norms of private law, through what they may fulfil provision of article 2 section 3 of Constitution of Slovak republic No.460/1992 Coll. as amended, which regulates discretion of all persons that are not the state organs. After extension of this provision of §1 section 2 of Act No.71/1967 Coll. on administrative procedure as amended it is clear that municipality in area of decision-making about use of community foundations resources, is not as limited as in case of its own budget, or extra-budgetary monetary funds.
- 2) *Community foundations is able to identify preferences of resident more precisely* – In favour of community foundations speaks mainly their detachment from the public policy at any level. It is fully true in case of community foundations, founded by private persons. In case of community foundations, founder of which is municipality, respectively town, there is obvious certain, however often negligible, connection to the government. Residents are more opened and they trust community foundations more than they trust the “politicking” of their own representatives.
- 3) *Community foundation may access the unequal residents by unequal manner* – The essence is certain degree of “discrimination” of majority population, which is not acceptable in public sector. Activities of community foundation may protect interests either the whole spectre of territorial residents, or of its part. For example community foundation may protect interests of the environment and environmental groups in municipality, or to protect interests of socially excluded residents of municipality but, on the contrary, it may try to develop culture in municipality, to renovate historical buildings, to repair the local communications, sidewalks, riverbeds, from which benefit all residents or visitors of the municipality.
- 4) *Community foundation is, in certain degree, the accelerator of cooperation between public and private sector in municipality* – By performance of its activities it necessarily touches both organs of municipality and mainly local enterprises, which use to support financially community foundations, within their presentation of corporate social government. Community foundation can ensure implementation of certain projects, on which cooperate all sectors in municipality.
- 5) *Community foundation is able, in certain degree, to prevent outflow of finance from territory of municipality* – This benefit is associated primarily to the

institute of share of paid income tax, of which use may decide a taxpayer. Community foundation can, by some marketing activities, ensure that considerable amount of these resources will be donated to them and they will not flow into the state budget.

- 6) *Community foundation finances activities of which financing is not in abilities or priorities of municipality, or of which financing municipality refuses.*

It is possible to identify some ***disadvantages of community foundations***.

- 1) *Community foundation has basically not ensured a stable income flows* – It all depends on fundraising and on the ability of its financial management. Some community foundations were donated by securities, possibly realty, from which they have current revenue, possibly of which sale they may gain certain capital revenue. Community foundations, the founder of which is town, obtain certain annual amount of finance from its budget. According to the fact that community foundation has character of which purpose is not entrepreneurial activity and is not linked to the public income flows, the progress of revenue is unstable.
- 2) *Community foundation may be perceived by part of the population with mistrust* – This negative perception may be determined mainly by some negative aspects of nongovernmental organizations on national level. This mistrust also appears in case of elected representatives of municipality.
- 3) *High initial investments on foundation of community foundation* – According to §3 section 2 of Act No.34/2002 Coll. on foundations and on change of Civil code as amended there is an obligation to make a property deposit in minimum value of 6638 Euro. In case of individuals, it is mostly impossible for him to obtain such high amount. This is the reason why in Slovakia there is such a small number of community foundations and why only towns, from the subjects of public administration, can afford to found it.

2. Methodology

Material for processing of this study was obtained by the questionnaire research between existing community foundations in Slovakia. The questionnaire contained 29 questions and it was divided into three basic pillars:

- a) activities of community foundation;
- b) relationship of community foundation to its surrounding;
- c) community foundation finance.

According to the fact that the questionnaire was completed and returned only from four of eleven existing community foundations, the results, presented in the next part of text, will have character of more less qualitative, not quantitative research.

3. Results and discussion

The range of territory, covered by activities of community foundation, is more or less expressed in its name. As it may be seen in Table 2, community foundations usually identify themselves directly with town on which territory they operate. It may be said that from the view of territorial specialization there are two types of community foundations:

- 1) Community foundations focused on municipality, in which they have their residence.
- 2) Community foundations focused on municipalities of particular micro-region.

Outweigh those, which specialize on specific town. The second type of community foundations has in their name the name of micro-region, as e.g. Community foundation Liptov, or Community foundation Blue Torysa. An exception on Slovakia is Community foundation Healthy town, which was established by Foundation Healthy town Banská Bystrica, however it performs its activities on territories of town twins Zvolen and Banská Bystrica.

The main form of activities of community foundations is mainly providing of addressed grants from budget of community foundation. Community foundation therefore fulfils mainly redistribution function. Community foundations in area of providing grants work the same as the others foundations. Grant applications are submitted by authorized persons, either a) based on published call of community foundation, or b) based on the existing foundation fund. In both cases the purpose of use of resources, which has the applicant to fulfil, in case of obtaining the grant, is known in advance. Many community foundations use grants as a tool to avoid the pollution of town, when the community foundation declare the competition for a particular amount of resources, under the condition of beautifying of apartment building, houses, or residence, branch of enterprise, of which assessment is done after the expiration of stated time. Grants are provided also based on individually submitted projects, from which has to be clear a benefit for particular community. *The secondary activities* are e.g. providing a social care, supporting the education, protection of environment on defined territory.

The focus of community foundations uses to be general. It may be explained by the specialization of community foundations in supporting of overall, not the particular area of municipal development.

Relation of community foundation to its surroundings may be understood in four dimensions:

- 1) *Relation of community foundation to residents.*
- 2) *Relation of community foundation to the others non-profit organizations.*
- 3) *Relation of community foundation to private enterprises and to individuals – entrepreneurs.*
- 4) *Relation of community foundation to the municipality, on territory of which it performs its activities.*

Ad 1) Stated relation may be assessed from the view of donors and volunteers. Volunteers create basic source for personal substrate of community foundations. They create from 75% to 100% of persons, involved in the running of community foundation and the interest in the performance of volunteerism has a steadily growing trend. The other the main problems, associated with residents, is their mistrust in abilities of community foundations, alternatively lack of interest of residents, in position of donors, in particular themes of the municipal development (e.g. poverty, the Roma issue). Community foundations mostly use some marketing tools to communicate with residents as potential receivers of grants, or as potential donors. They use primarily their websites, annual reports, special brochure about community foundation and its activities, public events and press releases. Those were the classic methods of communication. Community foundations try to adapt to current conditions in the computerization, and nowadays they communicate also through media and social networks as Facebook. Some community foundations do not use any of stated methods.

Ad 2) In case of non-profit organization there is mainly the relationship, which may be expressed as the relation between donor and receiver of grant. Community foundation supports other NGO's by financing their activities, focused on development of municipality. The foundations, performing their activities on national level, support community foundations through grants.

Ad 3) Enterprises are movers of local economic development. Vast majority of community foundations in Slovakia cooperate with local enterprises. The form of this cooperation is mainly direct financial support, gifts, volunteering, and administration of grant programs and implementation of common projects. This cooperation is performed both in institutionalized and non-formal dimensions. Some enterprises organize volunteering days of their employees, during which they work on one of community foundation's activity. Many of enterprises regularly donate particular amount of finance. Interesting fact is that community foundations cooperate in the long term with more than one enterprise. Enterprises can create their own foundation fund, which is administrated by community foundation and about which use, that is consistent with the fundamental purpose of community foundation, decides directly enterprise. Enterprises donate community foundations despite the current economic crisis.

Ad 4) Cooperation with municipalities, or town, on which territory the community foundation operates, is the most important part of their activities. They mainly cooperate in area of social care, sport and culture, environment protection, education and economic development.

Main benefits from this cooperation are defined as obtaining confidence, financial support, volunteers, expert advices, information, space and advertisement. They

realise that the cooperation with municipality is “the brand” of credibility of community foundation. Community foundations stated that they perceive no negative aspects from performed cooperation.

For potential areas of inter-sector cooperation are suggested mainly improvement of the entrepreneurial environment in towns, improvement of use of available resources of municipalities and thus use of the development potential of municipality, propagation of participation of inhabitants in solving local problems, protection of environment.

Community foundations use to participate in creation of Program of Economic and Social Development of municipality (PESD), which is obligatory created by every municipality in Slovakia. All community foundations that responded to the questionnaire, participated on it. They do not participate in creation of any other plans or development documents as the community plan of social services of municipality, territorial plan of municipality, marketing plan of municipality or budget of municipality. According to the fact that community foundations are interested in participation in creation of these stated documents, it would be well to consider whether municipalities should not use this option.

According to the formal structure of municipality, we can say, that some towns include community foundations into it. Some of community foundations are included in particular commissions of town council. Also towns, on which territory has the community foundation its residence, are often represented in organs of foundation. This representation is performed through elected representatives and employees of town. Elected representatives are mainly members of the community foundation's board, employees are members of board of supervisors and advisor board of community foundation. We can say that community foundations may be understood both as the municipal policy maker and taker. It is in accordance with ideas stated by Daun-Barnett – Wangelin – Lamm (2012) or Daun-Barnett – Lamm (2012).

Community foundations complain on insufficient financial reserve, slightly bad communication and mistrust of elected representatives of municipalities, but they recognize that the financial support of community foundation is regular. The others municipalities, except of towns, which founded the foundation, do not financially support it. It is necessary to mention that central government uses to support community foundations through grants. These grants are used for covering activities of community foundation, with accordance to the orientation of the Government.

Basic source of financing community foundations is a proportion of paid income tax. Its share on total revenue of community foundation is in interval of 25-95%. Smaller community foundations are more dependent on this source. The next one

is flow from budget of town. Additional sources are gifts from individuals and law persons, grants from national-wide foundations and subsidies from the Government. Some of community foundations are financed also by revenue from capital assets. There are also some exceptions, when particular community foundation is financed by the town, on which territory it performs its activities. In this case the share of this revenue on total revenue of community foundation is approximately 50 to 75%.

According to current global economic crisis, the majority of community foundations stated that they work with a smaller volume of resources. It is due to decrease of state revenue of individual income tax, decreased demand for products of local enterprises and implementation of restrictive fiscal policy of the Government. Households are nowadays trying to save the money, so the volume of their donations to activities of the third, non-profit sector, has decreased. This has a negative impact on managing the community foundations.

Proportion of administrative expenditure on total expenditure of community foundations are moving in the interval of 10 to 20%. Administrative expenditure contain rental fees, phone charges, charges for postage, cost of material, labour costs and possible propagation costs. The rest expenditure contains provided grants and coverage of performance of community foundation's activities, which is consistent with their mission.

As it was stated, community foundations provide grants to particular applicants. For community foundations it is necessary to measure the **effectiveness of granted resources**. Measurement of effectiveness in nongovernmental sector is almost impossible. Theory knows only indirect methods of measurement of effectiveness of NGO's activities. Community foundations in Slovakia measure effectiveness of provided grants following:

- Monitoring of supported projects.
- Monitoring of fulfilment the budget of community foundation.
- Audit by auditor.
- Assessment of transversal and final reports from recipients of grants.

It is clear that community foundations have tendency to connect the effectiveness measurement with implementation of control of use of provided contributions. In this area it would be good if community foundation would verify the ability of applicant to fulfil the aim of project, due to the implementation he calls for support. This step would eliminate a possible problem with ineffective management of community foundation's resources.

The **vision of development of community foundation** is usually stated in its annual report. It was also the last question of questionnaire. Respondents stated their vision as follows:

- Institutional stabilization and more intensive communication with active local NGOs, non-formal groups and municipality.
- To be a stable partner for donors and for active people and organizations that want to improve the quality of life and environment.
- Further development of support of local activities of citizens in each sphere.
- Development of communication tools, cooperation with small enterprises.

From each vision it is clear that community foundations want to improve their co-operational ability.

Conclusions

This study has fulfilled its aim, stated at the beginning. It proved that community foundations have a not negligible significance in the field of local development. This significance may be defined in following areas:

- 1) Community foundations ensure providing particular public goods – They provide it by themselves or by financially supporting the other subjects of which task is to ensure these goods.
- 2) Community foundations fill a gap in the local market.
- 3) Community foundations ensure participation of residents in decision-making about a significant questions of building the municipality, or about determining the direction of the municipal policy.
- 4) Community foundations ensure a broad mutual cooperation of subjects, living, working, producing or trading on territory of municipality.
- 5) Community foundations act as a catalyst in the field of cooperation of enterprises and municipalities.
- 6) Community foundations support the development of local philanthropy.
- 7) Community foundations ensure a transparent and a direct provision of financial support there, where its use will ensure the greatest possible benefit for the municipality, and its residents.
- 8) Community foundations are highly profitable for the municipality – From own calculations it is evident that the annual investment of town in the community foundation shows in average approximately a three to four-fold return on investment in conditions of Slovakia.
- 9) Community foundations, founded by towns, mean no additional risk and they do not affect the town's budget in any way, besides the potential annual financial support.

According to stated it is clear that community foundations have a great potential to be the leader of local development. The practice in Slovakia shows that better conditions for performing their activities have those community foundations, of which founder is a town. Given the defined benefits it remains only the question of why towns do not

found these organizations. During the economic crisis is for enterprises a matter of survival to innovate and to find an additional source of financing. It appears that for Slovak municipalities does not apply such an analogy.

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The role of small and medium enterprises in improving employment and in the post-crisis resumption of economic growth in Romania

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Abstract. *In the European Union, the Europe 2020 strategy seeks to obtain a smart, sustainable and inclusive economic growth that ensures high levels of employment, productivity and social cohesion. On the other hand, Europe 2020 strategy also supports the overcoming of the current economic crisis, which has caused and continues to cause effects in various sectors of the economy. In this context, the system of companies represents the "heart" of this strategy of growth of the European economy. Encouraging the SME sector is an important concern at European Union level, considering that SMEs are key drivers for economic recovery. The paper focuses on SMEs because at European Union level they accounted for 99.8% of total non-financial businesses. The crisis has highlighted the vulnerability of these enterprises, and of all the problems facing this system, we will focus on the one that targets the impact of the crisis on the active population of SMEs in Romania, compared with the European Union.*

Keywords: small and medium enterprises (SMEs), Europe 2020 strategy, economic crisis, employment, economic growth.

JEL Classification: L26, G01, J24.

REL Classification: 17H, 20I, 12G.

1. Introduction

Small and medium enterprises play an important role in the development of economy, by creating jobs, by supporting competitiveness and innovation, emphasizing dynamism and market atomicity.

Both in Europe and in Romania, small and medium enterprises (SMEs) are predominant in both the total number of enterprises and in terms of number of employees. Therefore SMEs directly affect employment and economic growth.

In Romania, SMEs account for 70% of GDP, provide employment of 65.9% of total employment in the private sector and generate 50.34% of gross value added.

However, SMEs in Romania also face some difficulties, exacerbated by the current financial and economic crisis, related to difficulties in obtaining capital or credit, decreased demand for goods and services in domestic and foreign market, increases in raw material and energy prices, high taxes, bureaucracy, low absorption of European funds. These difficulties have influenced SMEs' access to new technologies and innovation, stressing the differences between Romania and the developed countries.

In order to support the development of SMEs, strategies and action programs have been adopted at European level, allowing a better exploitation of the growth and innovation potential of SMEs. Among them an important role is played by Small Business Act (SBA), Europe 2020 Strategy, Entrepreneurship 2020.

2. The role of SMEs in the "Europe 2020" Strategy

"Europe 2020" Strategy aims to be a mechanism to coordinate social policies, employment, education, research and energy connected to the competence of national governments. On the other hand, "Europe 2020" Strategy also supports overcoming the current economic crisis that has caused and continues to cause effects in various sectors of the economy affecting the number of jobs and employment policies.

Industry and especially SMEs have been hit hard by the economic crisis and all sectors face the challenge driven by globalization and adaptation of their manufacturing processes and their products to a competitive and sustainable economy.

SMEs play an important role in supporting economic growth and overcoming the crisis, because they have the largest share in all enterprises, at European level and they also contribute the most to the gross value added.

SMEs represent the largest creator of jobs, thereby increasing employment of active labour. Therefore, at European Union level, SMEs receive special attention in European policies and strategies. Being an important job creator, SME sector may be under crisis conditions an unemployment generator as well, which amplifies the concerns of decision makers to support this sector, especially in times of crisis.

Thus, at European Union level, the improvement of the business environment is aimed, especially of SMEs; supporting innovative SMEs, promoting the internationalization of SMEs; improving the access of SMEs to the single market, improving the access of SMEs to Intellectual Property Protection; facilitating SMEs' access to finance, supporting research and development within SMEs. (Europe 2020 Strategy)

In the field of employment, Europe 2020 Strategy mainly aims achieving an employment rate of 75% for the population aged 20 to 64 years. At the same time it aims to achieve economic, social and territorial cohesion by empowering people through high levels of employment, investing in skills, fighting poverty and modernizing labour markets and training systems and social protection to help people anticipate and manage changes.

To support SMEs, to increase employment, efforts should be made both at European and national level. Therefore, policies supporting SMEs should be combined with employment and economic growth policies.

The successful implementation of these strategies depends on the coordination of common policies of the EU and the national ones (structural and macroeconomic adjustment); ensuring coordination between the National Reform Programmes and Convergence National Programmes (Stability), monitoring achieved progress and identifying in real time congestion and adverse effects.

The successful implementation Europe 2020 strategy in Romania involves the development of decisive action that is focused on several priorities, listed and explained below. (Aceleanu, 2011)

a) Improving the functioning of the labour market

Given the persistent negative effects on the labour market, policies and their implementation should have an important role in constituting a means of correcting the current trends and preventing the potential adverse effects. (Burghelea, Ene, Uzlău, 2013)

In this regard, it should be aimed at reducing structural unemployment, the adoption of flexicurity policies, and strengthening labour market institutions.

Structurally speaking, chronically high unemployment is a major loss of human capital that discourages workers and lead to their premature withdrawal from the labour market generating social exclusion. At the same time, the persistence of high rates of long-term unemployment creates their tendency to self-perpetuate, thus creating difficulties for the economy to recover economically (hysteresis effect).

The most common structural causes of persistent long-term unemployment in the European Union are: mismatches between educational qualifications and skills provided by the education and training systems; low geographical mobility of the workforce; geographical mismatch between employment and vacancies; the existence of a high tax burden on low income combined with generous social assistance benefits for those who do not work, acting as a disincentive in looking for a job; the persistence of undeclared work because of high cost of social security contributions which the employer has to bear; as well as the disappearance of some sectors of the economy where there is skilled labour and the emergence of new sectors in which there are many vacancies as there is no qualified personnel.

Flexicurity policies are the best tool for modernizing labour markets. However, they must be adapted to the post-crisis context, to accelerate the pace of reform, to reduce labour market segmentation and to support equality between women and men.

Labour market institutions need to be strengthened, to ensure that workers benefit from transitions between jobs, occupations, business sectors. Ensuring profitability of transitions is essential for offering workers the necessary security to accept and cope with mobility adequately.

In terms of the coordinates above, Romania has made progress in terms of labour market performance, but it still must act by improving legislation, combating undeclared work, promoting equality between women and men. It should also be sought the facilitation of transition from unemployment to employment, by anticipating changes in the labour market and the implementation of active measures to improve the employment.

b) Better labour training, learning and continuous vocational training

The present context needs competent workforce able to contribute and adapt to the changes imposed by the new technologies, the requirements of sustainable development and achievement of knowledge economy. The investment in education and training, anticipation of skills needs, compliance and guidance services are fundamental factors in increasing productivity and competitiveness, in accelerating economic growth and increasing employment.

Skills are the key to economic growth, productivity and prosperity and creating jobs. Lifelong learning is an important element to ensure good transition between jobs and occupations, and to avoid long-term unemployment, leading to loss of human capital. (Badea, Pociovălișteanu, 2011)

In order to develop tools for qualifications, Romania follows the finalization of the National Qualifications Framework and the Classification of Occupations. It also provides support for continuous training through courses and counseling. Promoting workforce adaptability to the new requirements of the labour market, to the current economic developments and technology development should be continued. It is necessary to define and effectively implement an integrated model of education for the labour market. A thorough reform of the education system with the achievement of a coherent network of lifelong learning through various educational institutions and forms requires a joint effort of the state and the private sector to support the assumed changes.

c) More diverse and powerful policies to promote the creation of new jobs while increasing the demand for labour

It is not enough to ensure that people remain active, but to accumulate the necessary skills to get a job. Economic development must be based on economic growth generating employment. Conditions to create more jobs need to be done, including within societies that operate with high skills and business models based on intensive research and development. Selective reductions of non-wage labour costs or well targeted employment subsidies may be incentives for employers to recruit long-term unemployed and other workers who are removed from the labour market. Policies that allow exploitation of the key sources of job creation and promoting entrepreneurship and self-employment are also essential to increase employment.

To create more jobs, entrepreneurial culture should be felt in Romania with a positive attitude towards risk-taking and innovation capacity. Independent work should become a real option for those who have recently lost their jobs. But this will require removing obstacles, such as unequal treatment of an independent employee within most social security systems as well as barriers to moving to other Member States, due to lack of portability of social rights and pension.

Supporting the development of SMEs, large generator of jobs, is a solution to increase employment and economic growth. This can be achieved by improving SME access to finance, tax reduction, development and support of entrepreneurship and entrepreneurship education.

d) Increasing the quality of jobs and better working conditions.

There is no compromise between quality and quantity of employment: high levels of quality jobs are associated with equally high labour productivity and employment participation. Working conditions and physical and mental health of workers must be considered to meet the requirements of present professional careers, characterized by numerous transitions between employment and new forms of work organization.

These priorities should be supplemented by actions aimed at coordination of macroeconomic policies, the revival of scientific research and innovation, developing partnerships between business, universities and research institutes. In this respect, Romania should improve through appropriate policies the share of innovative enterprises (SMEs) and cooperation between enterprises, research institutes and universities.

3. Small and medium enterprises (SMEs) and their contribution to the growth of employment and gross value added at EU level

The positive effects generated by the SME sector are multiple, the best known are: improving the competitive environment, creating opportunities for development and adaptation of new technologies, occupying niche markets that are not profitable for large companies, anchoring in local economies by capitalizing local resources (financial, material, of labour and informational).

Encouraging SME sector is an important concern at European Union level, considering that SMEs are key factors for economic recovery. Between 2002 and 2010, 85% of total jobs emerging in Europe were generated by small and medium companies. This percentage exceeds 67% of the percentage of SMEs in total employment. During this period, total employment increased significantly by an average of 1.1 million new jobs each year.

In 2011-2012, European economy faced several challenges: intensification of the sovereign debt crisis in the euro area, under the specter of the double recession felt in several Member States, as well as economic downturn, even in the most advanced countries. The most important challenge for the European economy is exiting the vicious circle of unsustainable public debt, exiting the state of disturbance characterizing the financial markets and of reduced growth in the number of jobs in some Member States (Trașcă, Popa, 2011). Indebtedness of governments has and will continue to have negative repercussions on the real economy, in that they will have to conduct austerity programs to be able to pay its debts, which will negatively influence economic growth and hinder job training and entrepreneurship development. (Moldovan, Popa, 2012) In this context,

although the economic and financial environment is characterized by instability and uncertainty, SMEs still maintain their position as “backbone of the EU”.

Table 1. Numbers of enterprises, employment level and gross value added created in the EU27 by enterprise-class, 2012

	Micro (less than 10 employees)	Small (10-49 employees)	Medium (50-249 employees)	SMEs (Micro+Small+Medium)	Large Enterprises	Total Enterprises (SME + Large)
Situation of enterprises						
Number	19.143.521	1.357.533	226.573	20.727.627	43.654	20.771.281
%	92.2	6.5	1.1	99.8	0.2	100
Employment level						
Number of employees	38.395.819	26.771.287	22.310.205	87.477.311	42.318.854	129.796.165
%	29.6	20.6	17.2	67.4	32.6	100
Gross value added						
Million euros	1.307.360,7	1.143.935,7	1.136.243,5	3.587.540	2.591.731,5	6.179.271,4
%	21.2	18.5	18.4	58.1	41.9	100

Source: ec.europa.eu, PPF Report 2013.

In 2012, SMEs represented 99.8% of the enterprises operating in the non-financial sectors of the economy. Most of them, respectively 92.2% were micro-enterprises, holding less than 10 employees. Small enterprises with a number of employees between 10 and 49 represented 6.5% of SMEs, and medium-sized enterprises, with a total of 50-249 employees represented 1.1% of SMEs.

At European level the contribution of SMEs to employment is 67.4%, higher than that of large enterprises, 32.6%. And the gross value added of SMEs is superior to that obtained by large enterprises, even if it has declined in the last two years as a result of the financial crisis.

An important contribution of SMEs in 2012 was registered in services and production, and the service sector attracted the largest share of employees, namely 84 million people, of which 56 million were employed in enterprises with less than 250 employees.

However, the service sector recorded the highest contribution to the value added at the level of SMEs.

The crisis affected the SME sector, especially by the negative impact on the number of employees, which was the most affected, in relation to gross value added and the number of SMEs. This decrease in the number of employees aimed at staying on the SME market affected by the crisis by reducing costs.

The number of persons employed in 2008-2009 at the EU27 level fell stronger among larger enterprises, compared to SMEs, but it experienced a quicker recovery in 2010-2012, of large enterprises compared to SMEs.

After 2008, value added registered a decrease at both the level of SMEs and large enterprises. The loss of SMEs in 2012 in terms of gross value added was of 1.3% versus 0.3% loss suffered by large companies.

The performance of SMEs in the EU differ from country to country depending on many factors, such as: economic context, divergent performance of Member States in terms of value added growth and employment within SMEs, legislation, taxation level, the level of development of entrepreneurial environment, economic recovery after the crisis, the effectiveness of the adopted economic policies.

The most important factors that influence the development of SMEs and their performance are:

- the macroeconomic environment, which is the general economic climate – this includes aspects that directly or indirectly affect the GDP and GNP growth, surprinzând totodată aspecte legate de capacitatea economiilor de a investi pentru viitor;
- the structural characteristics of the economy - which relates to the sectoral structure of the business economy in relation to technologies used by the industry, enterprise distribution by size class, the way in which governments promote new technologies, public and private expenditure for R & D and innovation as well as investment in innovation activities;
- microeconomic factors – such as the demography of enterprises, entry and exit to / from the market of enterprises.

The best results in terms of performance were recorded in SMEs in Germany and Austria, and the worst performances in Hungary, Lithuania, Bulgaria, Romania.

The high performance recorded by the SMEs in Austria and Germany were based on three factors:

- concentration of SMEs staff in high technology fields;
- the existence of a direct correlation between labour productivity, investment and export;
- employment growth while increasing productivity.

However, the analysis of the correlation between innovation and competitiveness show that countries with the highest economic performance in the European Union also have the greatest percentage of SMEs in the areas of production and high tech services.

The annual report 2012-2013 on small and medium enterprises in the European Union highlights issues relating to employment and labour efficiency of SMEs, due to the crisis, but predicts an improvement of these results in the following period. The revival of SMEs is expected especially in services, and the other fields will resume positive growth in terms of employment and value added. It is also expected that the innovative sectors namely those that use high technology to develop in the following period having in their structure mostly SMEs that become promising innovation engines.

Certainly this recovery of SMEs in the EU will be different from one economy to another, depending on the extent of damage caused by the crisis, the policies adopted at national level, the market conditions where SMEs operate.

Thus, EU Member States and European institutions aim to improve the competitiveness of SMEs and increase their performance through strategies based on two pillars. Firstly, it aims at increasing concerns regarding political areas of interest which have suffered because of the crisis, at restoring and improving the absorption of labour and productivity growth and competitiveness of SMEs and secondly, at improving the business environment, at supporting entrepreneurship and access to finance for SMEs.

4. Small and medium enterprises and their performance in Romania

SMEs play an important role in the development of the Romanian economy by increasing dynamism, competitiveness, innovation and employment of active labour. The small size of SMEs contributes to improving human relations, influencing employment in terms of performance and job satisfaction. SMEs also have the advantage of occupying those niche markets that are not profitable for large companies.

On the labour market, SMEs generate the largest number of new jobs and with a lower cost of capital, being an important alternative to combat unemployment.

On the other hand, unlike corporations which provide relatively safe jobs, 50% of SMEs “go out” in the first five years of existence which means that, although give rise to a large number of jobs, they are also an important source of unemployed.

By their small size and large number, SMEs emphasize the atomicity of the market, thus reducing the power of large enterprises to influence it, particularly through price control. Thus, the ability of SMEs to stimulate competition weakens the monopolistic position of large enterprises reducing their ability to control the market.

In the recent years the SMEs sector in Romania has generally evolved like the one in the European Union holding a share of 99.7% SMEs of total enterprises. However, there are some differences compared to the SMEs in the European Union, mainly in terms of competitiveness and innovative potential.

In Romania, the SMEs in the non-economic sectors are the main provider of jobs employing two thirds of the total number of employees, according to the reports in 2011.

According to the study “The contribution of SMEs to economic growth, present and perspectives”, conducted by CEROPPE (Romanian Centre for Economic Policies) and National Commission for Prognosis, SMEs contribution to employment and economic growth can not be achieved without a favourable business system. According to this study, in 2004-2008, a period characterized by economic growth, SMEs created 26% of the 700,000 jobs created in fast-growing companies representing 94% of the new jobs created in Romania.

The financial and economic crisis made that more than half of the new jobs created in 2004-2008 to be lost leading to a net loss of 375,000 jobs. The loss registered by SMEs was of 17%. Even amid these losses from crisis SMEs continued to employ, creating in 2008-2010, 242 800 new jobs. (Pâslaru (coord.), Modreanu, 2012)

As a result of the crisis, the evolution of the number of employees in SMEs and of the number of active enterprises follows the same decreasing trend. Therefore, after the positive trend experienced during 2007-2008 which reached maximum values in both indicators in 2008, the worsening of the conditions in the economic environment and the tax regime introduced caused a dramatic decrease in the staff employed simultaneously with the decrease in the number of SMEs.

If in 2009, this system of enterprises (SME) recorded negative growth both in terms of value added and employment, in 2012 growth rate is positive for both indicators, but it is below the EU27 average.

With an annual growth of 1%, employment growth for SMEs was higher than that of large enterprises, which was of 0.5%.

By sector, a clear exception was the trade sector, in which employment in SMEs increased by 0.7% annually, compared to 2.2% in large enterprises. This is due to the strong increase of large trade enterprises, in particular in car sales, maintenance and repair. (Human Resource Development Project, 2007-2013)

In Romania only 20 SMEs per 1,000 inhabitants activates, three times below the European average. The density of SMEs in Romania is half the EU average, and

SME sector is characterized by poor productivity and low profitability, especially among micro and small enterprises. Thus, a small number of SMEs influences their contribution to gross value added, which is also reduced.

Post-Privatization Foundation report on SME sector draws attention to a worrying trend: between 2008 and 2011 13% of jobs in small and medium enterprises were closed. According to this report, the share of SMEs in total number of companies in Romania is of 99.7%, and 85% of all companies in Romania have under ten employees (in other words, they are microenterprises). 67.5% of employees work in a SME i.e. on average 5.8 employees work in each SME in Romania. (PPF, 2013)

There are slight differences in the structure of the sector by size class in the sense that, in Romania microenterprises have a smaller percentage (88%) compared to the European average of 92.2% and small firms accumulate 10% of total SMEs, more than the share recorded in the EU by this size class (6.5%). In Romania small firms predominate in SMEs because they are based mainly on domestic capital, which usually can not support major investments and, on the other hand, because the law favoured this area.

In terms of sectoral distribution by economic activity, there is a higher concentration of SMEs in Romania in the retail and wholesale (38%), compared to the EU average of 30%; followed by the service sector in the hotel industry and catering, transport, real estate and business services (29%), constructions (18%) and manufacturing (10%). The distribution of employees by sector also keeps the same relationship among sectors meaning that most employees are in the trade sector, followed by services, industry, construction and agriculture.

Under these conditions, as PPF report also highlights, the SME sector in Romania is neither numerically consistent nor structurally reinforced.

The demographic evolution of these companies was influenced by the worsening of the market conditions caused by the economic crisis and by the pace and magnitude of changes in the tax regime in Romania. According to statistics provided by the National Office of Trade Register, in 01.01.2013-30.09.2013 the number of deletions was of 59381, 16.77% higher than the same period of the previous year. The disappearance from the economic landscape of a large number of companies was the consequence of suspensions of activity of a number of 17148 companies. This picture, however, may also reflect positive aspects. The reduction of firms may be due to the elimination of unviable or economically inactive companies and maintaining the potentially competitive ones. In the same period, 100 685 companies were registered in the Trade Register, an increase of only 0.56% over the same period of the previous year. If in 2011-2012, each new registration was accompanied by the suspension of activity of a company, in 2013,

each suspension of activity of a company is accompanied by about two new registrations.

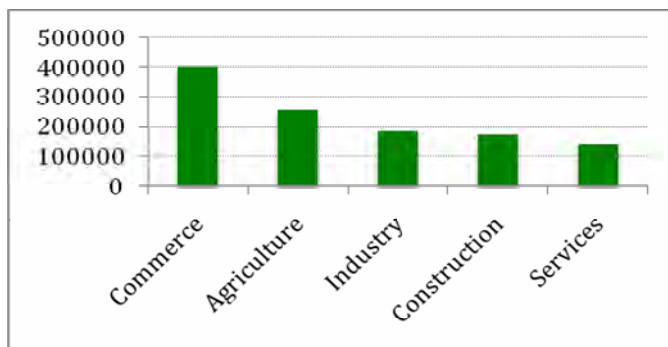
If we analyze the evolution of the number of SMEs and the number of employees in SMEs, we will generally observe the existence of a direct relationship between these developments, which is explained by the fact that a large number of SMEs established means basically a larger number of employees in SMEs.

The structure and evolution of employment by size class of SMEs in the period 2003-2010 is as follows: 2003 – 27%/31%/42% (micro/small/medium); 2007 – 31%/33%/36% (micro/small/medium); 2010 – 33%/34%/33% (micro/small/medium). It is observed an increase in employment in micro and small enterprises and a decrease in the number of those in medium enterprises. The greater reduction in the number of employees in medium-sized enterprises can be explained by the more severe restructuring measures introduced to deal with the impact of the crisis by reducing costs. The fact that the micro and small enterprises were less affected by the reduction of number of employees during the crisis is explained by the idea that the total number of employees for micro and small enterprises is much lower, personal adjustments could not have been made without affecting the basic functions of these enterprises.

Regarding the performance of SMEs in Romania, according to the Post-Privatization Foundation Report on the SME sector in Romania (2013), there are some malfunctions compared to the developed countries of the EU generated by the crisis and by the low level of technology and innovation.

SME performance is analyzed by using the indicators *labour productivity*, defined as the ratio between turnover and number of employees and *profitability*, which measures the contribution of staff to the achievement of economic and financial performance calculated as the ratio between the amount of profit achieved and the average number of employees.

The average value of labour productivity in SMEs calculated by the average turnover per employee is of RON 233,434.2 compared to the value of labour productivity of large firms which is of RON 323,215.4. The difference can be explained by the lower capitalization and inferior level of technology in SMEs based mainly on domestic capital, compared to multinationals or large Romanian enterprises that have seen a consistent process of restructuring and technological modernization.

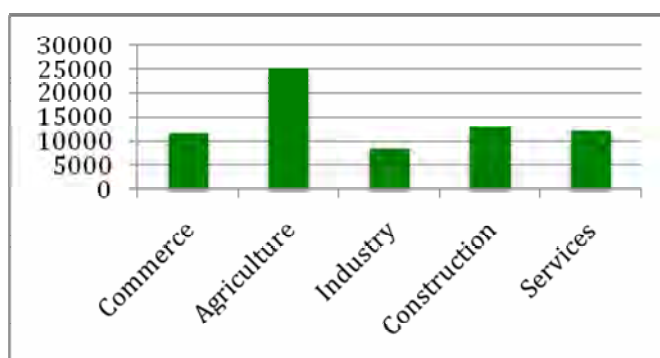
Labour productivity in SMEs in Romania by sector (2011)

Source: based on the *Post-Privatization Foundation Report on the SME sector in Romania* (2013).

Analyzing labour productivity by sectors it is observed that the highest value is recorded in trade, especially due to the fact that this sector registers high turnovers with a small number of employees. The next one is the agricultural sector with a labour productivity level above average, which can be explained by investments in agriculture in recent years stimulated by European funds.

In industry, SMEs have a productivity level below average, which indicates an inadequate level of technology in the productive sector. The lowest labour productivity is found in construction and services, the turnover achieved being reduced in relation to the large number of employees.

The efficiency of SMEs in Romania in terms of the ratio between the value of profit and the average number of employees in 2011 had an average value of 11 583 lei/person.

The profitability of SMEs in Romania, by sector (2011)

Source: based on *Post-Privatization Foundation Report on the SME sector in Romania* (2013).

Based on the data presented in the chart above it is seen that the largest profitability is recorded in agriculture, followed by construction, trade and services. SMEs in industry are the least efficient in terms of profitability, with a level of only 8.410 lei/employee. High profitability registered in agriculture is explained by the fact that SMEs operating in agriculture had a steady and stable development, even if at low levels compared to the existing potential their development has also been supported by European funds.

Analyzing the two performance indicators in parallel, there are some discrepancies between their values at the level of the same sector, which indicates some problems of efficiency and competitiveness of SMEs in Romania.

5. Conclusions

The SME sector in Romania is currently under a process of consolidation and improvement which requires further support of public policies in promoting and supporting entrepreneurship and entrepreneurship education.

Even if, amid the current financial crisis, SMEs have reduced their contribution to GDP they have remained the main generator of jobs, the average number of employees in SMEs in Romania being of 5.8 persons, compared to 4.2 in the European Union.

Problems faced by SMEs in Romania are included in the results of efficiency indicators. Thus, the average value of labour productivity in SMEs is lower than that obtained in large enterprises (representing 72% of it), due to lower capitalization and low level of technology. The low competitiveness of SMEs in advanced technologies correlates with the shortage of skilled labour in this field.

On the other hand, the Romanian SMEs are oriented rather conjectural in a business environment that is unstable and unpredictable, without strengthening their market position. SMEs in Romania are mostly dependent on the domestic consumption domestic market and they are insufficiently prepared to compete successfully on the European Union market. Even though there have been efforts and progress in this respect, however, the usability of EU funds for SMEs is low and the access to bank loans is quite restrictive. Under the current economic crisis, the reduced banks' interest in small customers, the higher costs of loans, as well as the more stringent requirements and the creditworthiness of applicants, legislative instability, the sharp decline in demand for goods and services, high taxation have led SMEs to reduce investment, to delay or abandon certain investment projects, to renegotiate contracts with suppliers, to restructure / reduce activities and thus reduce staff and salaries. (Popa, 2013)

All these affect the contribution of SMEs to GDP growth, which is not high, being affected by the structural changes in the Romanian economy, the early process of market maturation and low entrepreneurial capacity. Thus, the efforts to support SMEs should continue being an important generator of jobs and economic growth supporter. This should be aimed at developing and supporting entrepreneurship, promoting entrepreneurship education, improving SME access to finance, supporting research - development-innovation in SMEs, improving cooperation among SMEs - universities and research institutes.

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The issue of competing currencies. Case study – Bitcoin

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Abstract. *The complexity and interdependence of the economies of various geographical and political entities have one generic binder - money. The economic history of the last century, replicated in the first decade of our century, can be “written” with money. Indeed, money, a multiple discovery of the civilization in its historical way, was and still is the guardian of hope for prosperity. The disputes about money clearly indicate the need, opportunity and the possibility of monetary competition, which would provide, from the point of view of entrepreneurs, the most suitable production of money based on expectations of their economic preferences. Increasingly more, theorists, practitioners and analysts bring to the fore the issue of simultaneously using the official currency and the digital one. Thus, the issue of the public debate regarding the private money is still of interest. Based on these considerations, this paper aims to highlight how the digital currency Bitcoin can meet the challenges of the economic environment, taking into account both the opportunities and the threats to which it is subject, and the records emphasized by the history of economic thought and adapted to the current reality.*

Keywords: currency, Bitcoin, market, competition, private currency.

JEL Classification: B25, M00.

REL Classification: 1I, 14A.

1. Introduction

Throughout the centuries, the currency has been a topic of interest for both academia and the policy makers. The currency issue goes beyond time, it being the subject of numerous studies and regulations since the earliest times. In antiquity philosophers such as Xenophon, Plato and Aristotle tried to unravel the key issues concerning the value, the shape, the functions and the way currency circulates on the market; studies have advanced with the times (Dobrescu and Paicu, 2012), and economists have refined their theories, but the issue regarding the currency is far from being finally answered.

Nowadays, we are talking more and more in different geographical areas about using a new currency called Bitcoin, a few economists bringing again to the fore an essay that seemed long forgotten, *“Denationalization of Money-The Argument Refined: An Analysis of the Theory and Practice of Concurrent Currencies”*, written by Friedrich August von Hayek, Nobel Laureate in Economics in 1974.

In 1976, Friedrich August von Hayek started from an idea that emphasized the excess/deficit existing on the monetary market, showing that inflation and its socio-economic consequences are usually presented as being the result of the excess due to market, where the economic recovery measures require corrective intervention of the government. At that time, Hayek’s approach has given rise to heated disputes in academia and beyond, starting from the statements he made from the very beginning of the introduction: *“The further pursuit of the suggestion that government should be deprived of its monopoly of the issue of money opened the most fascinating theoretical vistas and showed the possibility of arrangements which have never been considered.”* (Hayek, 2006, p.7) Hayek argued that, in fact, it is a market gap created by the monopoly of the state over money, thus the solution would be the denationalization of money.

About the solution offered by Hayek there were a lot of discussions both within the Austrian School of Economics and beyond. Speaking about the essay of Hayek, Murray Rothbard argued that: *“The best known proposal to separate money from the state is that of F.A. Hayek and his followers. Hayek’s “denationalization of money” would eliminate legal tender laws, and allow every individual and organization to issue its own currency, as paper tickets with its own names and marks attached.”* (Rothbard, 2003)

The belief of Hayek that free competition between private producers of currency is the best way to achieve a healthy currency has generated a number of critics both outside and inside the Austrian School of Economics. Murray Rothbard himself claimed that: *“Hayek’s plan would have merit if the thing – the commodity – we call “money” were similar to all other goods and services. [...] There is a crucial difference, however, between money and all other goods*

*and services. All other goods, whether they be postal service or candy bars or personal computers, are desired for their own sake, for the utility and value that they yield to consumers. Consumers are therefore able to weigh these utilities against one another on their own personal scales of value. Money, however, is desired not for its own sake, but precisely because it **already** functions as money, so that everyone is confident that the money commodity will be readily accepted by any and all in exchange. People eagerly accept paper tickets marked “dollars” not for their aesthetic value, but because they are sure that they will be able to sell those tickets for the goods and services they desire. They can only be sure in that way when the particular name, “dollar,” is already in use as money. Hayek is surely correct that a free market economy and a devotion to the right of private property requires that everyone be permitted to issue whatever proposed currency names and tickets they wish. Hayek should be free to issue Hayeks or Ducats, and I to issue Rothbards or whatever. But issuance and **acceptance** are two very different matters. No one will accept new currency tickets, as they well might new postal organizations or new computers. These names will not be chosen as currencies precisely because they have not been used as money, or for any other purpose, before.” (Rothbard, 2003)*

Although it has long been criticized Hayek's view, considered a utopia, it has complied with stated belief to lead to the final task of the economist theorist: “...I strongly feel that the chief task of the economic theorist or political philosopher should be to operate on public opinion to make politically possible what today may be politically impossible, and that in consequence the objection that my proposals are at present impracticable does not in the least deter me from developing them.” (Hayek, 2006, p. 11)

Based on the controversies concerning the competition between the official and centralized currency and other private currency (regardless of how much trust would enjoy and regardless the favorable public perception), the financial and banking institutions, experienced users of the common currency, will not willingly accept to trade a virtual currency with zero transaction costs, but they cannot prevent people to prefer another method of making payments. Over time, an alternative currency made its place on the market, both in developed economies and emerging economies. The alternative currency circulated in different time periods in different geographic, physical or virtual areas. Below are listed a few such attempts.

- QQ – Chinese currency launched in a network on the Internet. After the advent and use of this currency in China was born a black market where the virtual currency was exchanged for the real one. In 2007 there were approximated transaction amounting of nearly 6.8 billion Yuan (one billion

dollars) realized with QQ. The Chinese government has intervened and in 2008 there were withdrawn large amounts of cash of the QQ market (*Business Magazin*, 2009).

- M-PESA used by Kenyans to change minutes into cash. The payment for an economic good is done by transferring a number of minutes to the phone of the cash register. Every day, through the M-PESA system there were made transactions totaling 10 million dollars, which means about \$ 3.6 billion annually (*Business Magazin*, 2009).
- Tem - a currency used from 2010 in Volos, a Greek port city. The established system implies people to use Tem units in order to exchange products, goods and services - cleaning, cooking, repairs, teaching, baby-sitting and technical assistance. The system has been improved, and the rate of exchange Tem/ Euro is at parity, as has always been since the beginning (Dumitru, 2013).
- Sano ('a currency for barter in Siros' worth an hour of work) - the inhabitants of the Greek island of Siros realize mutual exchange of services or products and digitally record the transactions (*The EpochTimes Romania*, 2012).
- "Peaches" - from the end of November 2013 in Montreuil, France, people are discussing about a new currency, which is a French way of ensuring that "transactions are not lost in the banking system" and the currency is meant "to promote the local trade". (Dumitru, 2013).
- "Bees" – in Villeneuve sur Lot they are used since January 2010, when a bee had the same value as an euro. Every six months, "the bee" was depreciated by 2%. (Dumitru, 2013).
- In Toulouse, beside euro it is used a currency called metaphorically "soil" (Dumitru, 2013).
- In Vaucluse, euro circulates alongside the "wheel" (Dumitru, 2013).
- In Romans-sur-Isere the French are using "the measure", in Angers - "the muse" and in Brittany there have been introduced "the Heol" (Dumitru, 2013).
- In Barcelona there are issued checks in "hours", used subsequently in order to purchase goods or services. The model called "time bank" has spread to other Spanish regions. "In Malaga, the system functions exclusively online. In Vilanova i la Geltru, the locals use a variety of credit card made of paper, which uses an alternative currency, accepted by just a few stores. Some cities have begun to accept the peseta again, these being the national currency before joining the euro zone; in the present context, the central bank in Madrid estimates that Spanish people still own pesetas amounting \$ 2.4 billion that they have not surrendered before the introduction of the euro." (Dumitru, 2013)
- In Mataelpino city and 10 other towns in the Sierra Norte region, people are paying with "moras" (blackberries). In the capital city of Madrid are also accepted "boniatos" (sweet potatoes) and "bivs"; in Bilbao "gitas" and in

Valladolid “neighbors”. In Sevilla were issued “jaras” and “cougars”, in Catalonia “the echoes” have spread and the Basque Country uses “eusko”. (Dumitru, 2013)

A special category of alternative currencies is the crypto-currency, which represents a digital currency being peer-to-peer, decentralized, whose circulation is based on the principles of cryptography to validate transactions and currency generation itself. Among the crypto-currencies currently used there are: Bitcoin, Litecoin, Peercoin, Namecoin, Novacoin etc. One of the most recent publicized such currency is the Bitcoin, which will be presented in the following sections.

2. What is the Bitcoin?

The digital currency called Bitcoin falls into the pattern of the private currency described by FA von Hayek, except the cyberspace in which it circulates. The Bitcoin was issued in the beginning of 2009 by an anonymous entity, working under the name “Satoshi Nakamoto” after the same entity in 2008 introduced the concept in a study.

Bitcoin uses a database, relying on 20,000 nodes of a network of peer-to-peer with the purpose of the inventory of transactions. Cryptography is used, so that the currency is very often called a crypto-currency. The goal of using cryptography is to provide the core of the security functions - Bitcoins can be spent only by the one who owns them and this thing can be done only once (Hall, 2013). The relationship between Bitcoin and a traditional currency is still not regulated; therefore, the responsibility for the way Bitcoins are circulating on the market lies to the economic agents who use Bitcoin.

The digital currency can be obtained by:

- The operation called “mining” - the personal computer is programmed to “dig” for Bitcoins. After the computer solves several problems, the owner will compete with other users to generate the number that the Bitcoin network is looking for. If the computer of the concerned person finds the number, then it will receive 25 at 10-minute period is generated every 25 Bitcoin. It should be noted the terminology used, which refers to the mining practiced in the heyday of the gold coin for its extraction. Also important to mentioning that the “mining” is quite expensive and involves the use of high performance computers, which use a lot of energy.
- Exchanging Bitcoins with real money, on the assumption that the rate of exchange is set based on the free meeting of demand and supply (Plassaras, 2013, p. 386). It should be noted that although Bitcoin does not have intrinsic value, over time, the exchange rate reached highs. Thus, in January 2013, one

Bitcoin was changed to \$ 20; on 10 April, the exchange rate reached 266 dollars and after three days it dropped to \$ 54 (Husler et al., 2012, p. 305).

- Exchanging goods Bitcoin newly generated (Hall, 2013). Currently/services for Bitcoin (Plassaras, 2013, p. 386).

The novelty that comes with the use of Bitcoin is a decentralized system, in other words there is no involvement of any central bank or of any government. The system was programmed so as to provide a limited number of coins in a certain time. It is expected, based on the generation algorithm of the Bitcoin that the total amount (21 million) provided by the system to be reached in 2025 according to some authors (Plassaras, 2013, p. 387), or in 2140, according to others (Hall, 2013).

In order to store the Bitcoins, a personal computer can be used, which will include a “wallet file” or the storage can be done using a service of the type “wallet” belonging to a third party. In both cases the money can be sent via the Internet to anyone with a Bitcoin address. In other words, Bitcoin is a smart scheme to make payments on the Internet without paying fees (for example, if you pay by card over the Internet, in our country the issuing bank charges the dealer with a commission of 1-2%, and in the USA 2 - 3%).

The currency has spread pretty quickly, today being already recognized and carrying out transactions in different countries. If in the early days of the existence of digital currency, a personal computer could occasionally get a few coins, nowadays the generation process is dominated by professionals who possess computers built in order to ensure an amazing computing power. At the price of 122 dollars on a Bitcoin, the 3600 coins generated daily are worth over 430,000 dollars. The whole “economy” of Bitcoin has a market capitalization of about 1.4 billion dollars (Urzică, 2013).

Bitcoin has acquired increasingly more ground in the real economy; the currency is accepted for payment throughout many sites such as Wordpress.com, Reddit or new file hosting service on the web Mega. The increasing number of users has been influenced by the advantages the cyberspace provides and by the diminishing trust in the banking system. For example, in Cyprus and in Canada were inaugurated ATMs through which real currencies can be exchanged for virtual currency (Abrihan, 2013). In addition, also in Cyprus was identified the first university in the world that accepts the Bitcoin for paying the university fees, its representatives stating that the strategy used is to immediately convert the alternative currency into Euro (Szoldra, 2013). In China, despite expectations, an increasing interest in using the Bitcoin can be noted.

In Germany, the Bitcoin is not classified as e-money or foreign currency, but is seen as a financial instrument subject to banking regulations, instrument from which the German government aims to gain by taxing the use of virtual currency

(Neroth, 2013). The fact that Germany has adopted the use of private money is interpreted as a safety measure taken in the event that the European single currency would not survive. Worldwide it is noted that a number of increasingly large businesses begin to adopt the new currency. Also in Romania there are merchants who accept the payment of services / goods offered with Bitcoin.

The fact is that in what is called human routine money bring together some of the most diverse interests so that private money could be preferred if it had the qualities of the official ones (trust, rarity, acceptability and inalterability, manageability etc..) and if in addition to these, private money would provide full respect for property. The scientific and practical message of private digital money correlates the rigor and pragmatism with the advantage of high technologies in the production and processing of information, and Bitcoin or howsoever called digital currency, could be viewed as the most suitable means of payment.

3. Advantages of using Bitcoin

F.A. von Hayek asserted about the capacity of the private currency to compete with the currency issued by the state that has a number of advantages that can ease its existence on the market. The Nobel Prize Laureate for Economics argued that:

“a) a money generally expected to preserve its purchasing power approximately constant would be in continuous demand so long as the people were free to use it, b) with such a continuing demand depending on success in keeping the value of the currency constant one could trust the issuing hanks to make every effort to achieve this better than would any monopolist who runs no risk by depreciating his money,

c) the issuing institution could achieve this result by regulating the quantity of its issue.

d) such a regulation of the quantity of each currency would constitute the best of all practicable methods of regulating the quantity of media of exchange for all possible purposes.” (Hayek, 2006, p. 41)

Starting from the advantages of the private currency, listed by Hayek, we will try to highlight the strengths of Bitcoin.

- The digital currency does not require the physical presence of traders for a transaction, therefore the use of Bitcoin saves a lot of time for those involved (Plassaras, 2013, p. 387).
- Transactions can be done anytime and anywhere, providing business flexibility.
- Issuance expenditures are prevented, as well as the costs of transportation, storage and security which arise when putting traditional currency into circulation. Annually in the USA there are spent about 60 billion dollars for such activities (Plassaras, 2013, p. 387). In addition, bureaucracy is avoided for the money issuance (Frâncu, 2011).

- Facilitates transactions anywhere in the world, thus avoiding costs related to foreign exchange trading. It is enough to possess a quantity of Bitcoin to perform operations in Japan, USA, France, etc.
- It has the same qualities as gold, simulating rarity very well. In order to produce a Bitcoin, equipment and power are required, and the amount of Bitcoin is limited to 21 million.
- Do not assume the payment of commissions that banks typically charge. Transfers are facilitated directly without using a payment processor between nodes. The Bitcoin client transmits the transaction to the nearest nodes which in turn propagates the transaction in the network. Corrupt or invalid transactions are rejected by honest nodes. Transactions are usually free, but a fee is likely to occur in the case of other nodes for the prioritization of transaction processing.
- Bitcoin use does not generate inflation. It is well known that limiting the money supply can be seen as an advantage in fighting against inflation (Burghilea, 2008). The total amount of money supply consisting of Bitcoins was determined by using the technology of generating exactly 21 million.
- It keeps the anonymity of businessmen involved in the transactions, for those interested in this aspect.
- Answers a natural human need - impatience, the speed of Bitcoin transactions being high and giving the operators the opportunity to swiftly conclude their operations.
- It is not subjected to central bank intervention generating trust for a particular category of individuals due to the lack of government intervention on the exchange rate.
- The use of the virtual environment can be an incentive for some people in order to improve the use of different types of software.

The digital currency thus involves a number of advantages, not to be neglected, but their evidence does not rule out the threats and disadvantages brought by the crypto-currency.

4. Disadvantages of Bitcoin circulation

Like any other currency in circulation, the crypto-currency raises a series of questions about its ability to upgrade disadvantages and associated dangers. Among them we can mention:

- The excessive volatility. In a normal day on Mt. Gox are exchanged approximately 200,000 Bitcoins. A study shows that from the beginning of 2013 until mid-August, the value of a currency fluctuated from 13 dollars to 166 dollars (Lemieux, 2013, p.14). A recent analysis of the Mt. Gox site shows that in the last part of 2013, Bitcoin fluctuated more spectacularly, as can be seen in the chart below.



- The transactions with Bitcoin are preserved and are public, which means that everyone has access to the number and size of transactions from any address in the network, without having the possibility to associate the address with the real name of the person who made the transaction. Therefore, it is recommended that with each transaction the user should use a new address in order to keep the anonymity.
- Transactions are uncontrollable. As long as Bitcoin transactions are made between accounts, authors remain anonymous. There is no central authority to be able to authorize Bitcoin transactions and to keep track of them.
- If Bitcoin or any other private currency will be used widely in the global trade, its use in speculative attacks can generate large negative effects, as an international body such as the IMF can not intervene, because it is not outlined the legislative framework concerning this area.
- Limited confidence in Bitcoin, caused mainly by incomplete information, is a drawback, but not a major impediment. In fact, the events of the last few years which have shaken financial markets are more likely favorable to the competing currencies like Bitcoin.
- Increased vulnerability caused by the use of the online environment. The security breaches can lead to the loss of the savings in Bitcoin. If Bitcoins are lost or stolen there is not an intermediary institution to reward loss. The concern about this issue is quite high, due to the fact that the on BIPS was stolen the digital currency equivalent of \$ 1 million (The Economist, 2013, p.11).
- Significant initial investment and electricity generation costs for people who currently use Bitcoins (purchase of performing equipment and of software needed to use).

- The Bitcoin is held responsible as it is used in illegal activities - encourages gambling, tax evasion, terrorism, facilitating transactions with goods prohibited by law (drugs, weapons). This is why the American Treasury announced that in the case of the digital currency it will apply the rules concerning money laundering. The Department of Financial Services in New York has sent subpoenas to several companies associated with Bitcoin, within a broader investigation concerning their practices. IMF and the Department of Homeland Security-DHS conducted some investigations themselves. In Canada, the Virtex online market through which people trade Bitcoins, running more than \$ 13 million, has been closed by the Royal Bank of Canada, through which those transactions were made. Meanwhile, bank dealers in Canada have begun to announce that virtual markets “cannot work”. In addition, Thailand authorities took measures in July 2013 to ban the use of Bitcoin (Mutar, 2013).
- In the USA, question marks were raised following the fact that the currency has been involved in a Ponzi-type fraud - a Texan created a pyramid scheme, which he promoted through a fund investment - “Bitcoin Savings and Trust” (dailybusiness.ro, 2013). Also, it was the currency used to facilitate the transactions made through the website Silk Road, closed by the FBI in October 2013 due to the fact that through this site drugs were bought and sold (Moore, 2013).
- A growing number of people identify in Bitcoin a currency that can help them avoid the taxation of the savings in various states. Based on this, one can observe that it is possible for the authorities to give up the attempts to create a legal framework for Bitcoin and look for ways to remove it from the market.
- Bitcoin generates some panic among bank representatives, because it competes with the traditional currency and therefore with a certain type of banking products. The cost of web transactions with Bitcoin is much lower than the fees charged by banks.

5. Instead of conclusions

Bitcoin is a case of how life knocks books! Basically, Bitcoin is like gold, but in a virtual environment. I mean, you know from the very beginning that you have a limited amount of Bitcoin which you need to exploit henceforth; exploiting it costs you, but you know that Bitcoin is unalterable. The remaining people have to buy with cash from those who have Bitcoins, so there are quotations against the dollar or other currencies. The novelty of the method to create money without diminishing their value lies in the competition that Bitcoin generates concerning any financial institution. The question that arises frequently in the case of some economists is related to the ability of the private currency to survive. The history has shown that man has the capacity to find ways which can “avoid” various kinds

of prohibitions, thus being able to find alternatives to the traditional currency. Whether talking about Bitcoin or any other alternative currency it can be easily seen that the individual has found a way to ensure the existence and simultaneous circulation with the traditional currency in different historical periods. Is it Bitcoin that particular private currency which will have the longest life? And if so, how long will it run in parallel with the traditional currency? Will Bitcoin have the ability to benefit from a higher degree of confidence than the present one starting from the backdrop of the growing discontent generated by numerous imbalances occurring in the economies of different states? Will Bitcoin overcome the numerous obstacles listed in the present paper?

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Test of the bank lending channel: The case of Hungary

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Abstract. *This study examines the bank lending channel for Hungary based on a simultaneous-equation model consisting of the demand for and supply of bank loans. The three-stage least squares method is applied. This paper finds evidence of a bank lending channel for Hungary. Expansionary monetary policy via a lower interbank rate or open market purchase of government bonds to increase bank reserves/deposits would increase bank loan supply.*

Keywords: bank lending channel, federal funds rate, bank deposits, 3SLS.

JEL Classification: E52, E51.

REL Classification: 11B.

1. Introduction

The bank lending channel suggests that monetary policy affects bank loan supply. A lower policy rate reduces the cost of borrowing by banks and increases bank incentives to make loans. Conversely, a higher policy rate increases the cost of borrowing by banks and reduces bank incentives to make loans. Open market operations affect bank reserves/deposits and the amount of loans banks can make.

Whether the bank lending channel is valid has remained inconclusive. Bernanke and Blinder (1988), Bernanke and Blinder (1992), Gertler and Gilchrist (1994), Bernanke and Gertler (1995), Peek and Rosengren (1995), Kashyap, Stein and Wilcox (1993), Kashyap and Stein (1995, 2000), and Suzuki (2004) argue or find support for the bank lending channel. On the other hand, Romer and Romer (1989), Ramsey (1993), Oliner and Rudebusch (1995), and Morris and Sellon (1995) raised doubts about the concept. To the author's knowledge, few studies have examined the subject for Hungary based on a simultaneous-equation model incorporating global factors.

A study of the bank lending channel for Hungary is important. During the recent financial crisis, bank loans decreased significantly partly because many loan applicants were not eligible for loans due to poor credit standing and partly because banks would like to avoid potential large increase in non-performing loans. The paper has several major features. First, bank loan demand and supply are specified separately in order to identify bank loan supply. Second, global factors are incorporated into the model to account for potential international capital flows. Third, the three-stage least squares method is applied in empirical work to correct for any correlation between the error terms in loan demand and loan supply.

2. The model

Extending Bernanke and Blinder (1988, 1992), Suzuki (2004), Zanforlin (2011), Vera (2011) and other studies, we can specify the demand for and supply of bank loans as:

$$L^d = f(LR, Y, BR) \quad (1)$$

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$$L^s = g(LR, DE, PR, EX, FR), \quad (2)$$

+ + - ? -

where:

L^d = demand for bank loans in Hungary;

L^s = supply of bank loans in Hungary;

LR = the lending rate;

Y = output;

BR = the interest rate on bonds;

DE = bank deposits;

PR = the policy rate of the central bank;

EX = the exchange rate, and

FR = the foreign interest rate.

We expect that bank loan demand has a negative relationship with the lending rate and a positive relationship with output and the interest rate on bonds and that bank loan supply has a positive relationship with the lending rate and bank deposits and a negative relationship with the policy rate of the central bank and the foreign interest rate.

The sign of the exchange rate is unclear. As the forint depreciates, there may be three separate effects on bank loan supply. A weaker forint is expected to help exports, increases business revenues, results in more favorable financial positions, and increases banks' incentive to supply loans. As the forint becomes weaker, foreign investors may be more likely to increase loanable funds to the country as it can exchange for more units of the forint per unit of a foreign currency. As the forint depreciates, collateralized values of firms decrease, and it is less likely for banks to increase loan supply. Hence, the net impact is unclear and will be determined by empirical work.

3. Empirical results

The data were collected from the *International Financial Statistics* published by the International Monetary Fund. Bank loans are measured in billions of forints. Industrial production is selected to represent output and is an index with 2005 as the base year. The government bond yield is chosen to represent the interest rate on bonds. Bank deposits are measured in billions of forints. The interbank rate is used to represent the policy rate. The exchange rate is measured as units of the forint per U.S. dollar. The euro area government bond yield is used to represent the foreign interest rate. All the variables are expressed on a log scale. Hence, the estimated coefficient is the estimated elasticity. The sample ranges from 2001.Q1 to 2013.Q1 and has a total of 49 observations. The data for the interbank rate earlier than 2001.Q1 are not available.

Table 1 presents estimated coefficients, z values, and other related statistics. In the estimated regression for bank loan demand, 86.23% of the variation in bank

loan demand can be explained by the three right-hand side variables. All the coefficients are significant at the 1% level. If the lending rate rises 1%, bank loan demand will decline 0.7793%. A 1% increase in industrial production will cause bank loan demand to rise by 1.3205%. An increase in the interest rate on bonds will cause bank loan demand to rise by 1.3663%.

Table 1. *Estimated regressions for bank loan demand and supply for Hungary*

Log(demand for bank loans)		
	Coefficient	z statistic
Log(lending rate)	-0.7793	-5.11
Log(industrial production)	1.3205	9.33
Log(government bond yield)	1.3663	7.10
Intercept	1.5820	2.10
R-squared	0.8623	
Sample period	2001.Q1-2013.Q1	
Sample size	49	
Log(supply of bank loans)		
	Coefficient	z statistic
Log(lending rate)	2.2425	5.11
Log(bank deposits)	0.2030	2.16
Log(interbank rate)	-1.6545	-5.55
Log(exchange rate)	-1.2996	-9.20
Log(euro area government bond yield)	-0.0363	-0.25
Intercept	12.4409	13.71
R-squared	0.8036	
Sample period	2001.Q1-2013.Q1	
Sample size	49	

Notes: All the coefficients are significant at the 1% level, except that the coefficient of bank deposits is significant at the 5% level.

In the estimated regression for bank loan supply, all the estimated coefficients are significant at 1% or 5% level. Bank loan supply is positively affected by the lending rate and bank deposits and negatively associated with the interbank rate and the exchange rate. The coefficient of the euro area government bond yield is insignificant at the 10% level. The estimated coefficient of 2.2425 for the lending rate suggests that bank loan supply is much more responsive to the lending rate than bank loan demand. As the interbank rate declines 1%, bank loan supply will rise by 1.6545%. When the forint depreciates, bank loan supply is expected to decrease. Hence, the negative effect of currency depreciation dominates the positive impacts.

When the nominal effective exchange rate is chosen to replace the exchange rate, its coefficient is positive and significant at the 1% level. However, the value of R-squared declines a great deal. When the euro area government bond yield is replaced by the 10-year U.S. Treasury bond yield, its coefficient has a positive sign but is insignificant at the 10% level. To save space, these results are not printed here and will be made available upon request.

4. Summary and conclusions

This paper has examined bank loan demand and supply for Hungary based on a simultaneous-equation model. The exchange rate and the foreign interest rate are incorporated into the model to capture potential international capital flows. The three-stage least squares method is employed in empirical work. Major findings are summarized below. A lower lending rate, more output, or a higher interest rate on bonds would increase bank loan demand. A higher lending rate, more bank deposits, a lower interbank rate, or appreciation of the forint would increase bank loan supply.

There are several policy implications. First, a simultaneous-equation model is more appropriate than a single-equation model because bank loan supply can be clearly identified. Second, bank loan supply is much more sensitive to the lending rate than bank loan demand. It suggests that if the loan demand curve shifts upward, the percent increase in bank loans will be greater than the percent increase in the lending rate. Third, monetary easing via a lower interbank rate or open market operations to buy government bonds is expected to increase bank loan supply. Although the coefficients of bank deposits and the interbank rate have the expected sign and are both significant at the 1% or 5% level, the impact of a change in the interbank rate is more measurable than the effect of a change in bank deposits because banks may have other avenues to change deposits. Fourth, recent appreciation of the forint since the 2008-2009 financial crisis suggests that it would have a positive impact on bank loan supply as foreign investors are likely to provide more loanable funds to Hungary.

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The dimensions of the global financial crisis

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Abstract. *The Global Economic Crisis has shaken the global economic system to the ground determining the economists all over the world to try hard to get the causes and mechanisms of the crisis right. Worldwide timing impact of the crisis was caused by the deterioration of aggregate demand, the uncertainty of the business environment, the rate of financial constraints and market collapse of assets. Considering that the current crisis featured some close similarities to earlier ones we try to answer two questions of the major global crisis: what are the similarities and how costly is the current crisis.*

Keywords: economic crisis, global economics, financial cost.

JEL Classification: E44, F23, G32.

REL Classification: 10I, 10J.

1. Introduction

The global financial crisis that erupted in 2007-2008, is considered, by some authors, the most complex crisis of all times, in particular through the causes that generated it, except in terms of its effects (Moldovan, Popa, 2012, pp.131-140).

Although the ongoing global crisis has shaken the world, we believe that the reason for the extension of the current crisis is based on the complete misunderstanding of its roots.

Without this understanding, how the crisis progresses, eventually made the things worse. Therefore, this paper examines some major ideological causes, and provides supporting arguments to show how they have led to a worsening situation for the long-term prospects. The insight into causes can lead to solutions and directions for progress, which is a long-term benefit in treating correctly the global crisis.

We note that the global economy is recovering from the deep recession in the post-World War-II era, being triggered by a severe financial crisis in key advanced economies that coincided with the freezing of global financial markets and the collapse in the global cash flow. While the crisis quickly resulted in deep recessions in a number of advanced economies, the emerging markets and developing economies were also seriously affected, but the impact varied across regions and countries.

Crisis management involves many aspects that should be considered in addition in terms of economic, political, educational and legislative decision-making. The decision making process should take into account the socio-cultural, ethical, psychological, technological, technical, organizational and managerial aspects and also educational aspects concerning the environment. The economists' view is that each business cycle can not be explained without referring to the other one. This close relationship implies that if an external shock occurs, a high impact would be felt by the economy.

Although the process of global economic recovery is already underway, the nature and implications of the crisis have still been at the center of academic and policy discussions.

Globally, there has been an intensive discussion about the similarities and differences between the latest crisis and the past episodes, but the latest crisis was different both in intensity and scale.

Another dimension of the ongoing discussions about the crisis has focused on its global spread and cost.

The crisis originated in the United States, but it took place in a highly integrated global economy where the widespread use of sophisticated financial instruments along with massive international financial flows facilitated its rapid spread across

markets and borders. Although it was not surprising that a global crisis led to a significant decline in global activity, the extent and duration of this decline have been a major area of research. Recessions associated with the global financial crisis, while displaying similar patterns with previous recession episodes, reflect an unlikely confluence of factors. Specifically, current recessions are associated with serious financial disruptions, including credit crunches, house price busts, equity prices busts and outright banking crises, in some countries.

In order to analyze this crisis we should address three major questions, namely: how costly is this crisis? How different is the crisis from earlier ones? How can we come out of this global crisis?

The story of winners and losers remains an important and hotly debated topic in the social sciences. In this context the key question is: how does the structure of the world-economy impact economic development and the wealth/poverty of nations? The key point of contention revolves around two views of the role that the international division of labor plays in the development of individual countries. As Evans (1995) argues, “the international division of labor can be seen as the basis of enhanced welfare or as a hierarchy”.

Our basic conclusion is that the massive financial crisis that has gripped the global economy over the past two years is a result of a multitude of factors. Some of these factors are similar to those observed during the buildup to past financial crises, but some others are distinctly new. Thus ranking the relative contributions of these various factors is difficult, it helps us to explain the considerable scale of crisis.

2. How costly is and how different is the current crisis?

The severity and the globalization of the current crisis included surprising disruptions and breakdowns of several markets in the fall of 2008; the crisis was different than previous ones because of a widespread use of complex and opaque financial instruments; the interconnectedness among financial markets, nationally and internationally were dysfunctional.

The current U.S. recession is clearly an outlier in many respects confirming the severity of the ongoing recession. The sheer size of the U.S. financial market and its central role as investment destination contributed to the spreading of the crisis, any shock to the U.S. financial markets is bound to have global effects. The crisis also triggered an unwinding of imbalances in other countries, because of closer international financial integration, financial and macroeconomic conditions, notably. This led to the spread and synchronization of global crisis and has shown the limits of policy measures in dealing with financial meltdowns and the fact that a greater coordination between macroeconomic and financial policy is needed.

Prudential regulation has to acquire a macro system-wide dimension. The global nature of the financial crisis has also shown that financially integrated markets have benefits, but also risks, with large real economic consequences. It also has shown that the international financial architecture is still far from institutionally matching the closely-integrated financial systems. The crisis has had major financial and economic repercussions for emerging markets and developing countries, however, the crisis has highlighted some challenges specific to financial sector reforms in emerging markets and developing countries.

Economic crisis can be defined as a situation characterized by a marked instability, which leads to volatility and increased uncertainty. It is difficult to making any assessments when a financial crisis becomes an economic one or if an economic crisis generates a financial crisis, or vice versa. Basically we refer to an economic crisis caused by financial, political or social reasons. The financial crisis is only a manifestation of the economic crisis and reflects a confidence in the financial system, a significant decrease in the volume of transactions on the stock market, a disturbance of market mechanisms.

In literature are found many points of view on the causes of the crisis, propagation effects and economic policies, more or less appropriate to the conditions of crisis. Thus, before the crisis, it had adopted policies to reduce the interest rate, given the existence of an extra liquidity into the economy, which has led to encouraging mortgage credit. Emphasizing financing through capital markets in the U.S. in terms of extending deregulation, would have required changes in the system of incentives and in the rules of market surveillance, changes that have not been made yet.

The expansionary monetary policy has energized an "excessive" consumption, considered as a real "harmful" to the economy, creating major structural imbalances. The main cause of why the crisis quickly spread worldwide is explained by some economists through the globalization, which brings a wave of liberalization of capital flows, investment, trade and labor, in the context of intensification of international competition. It makes the economic developments of a country to influence and to be influenced by the economic developments of other countries.

3. The global financial crisis

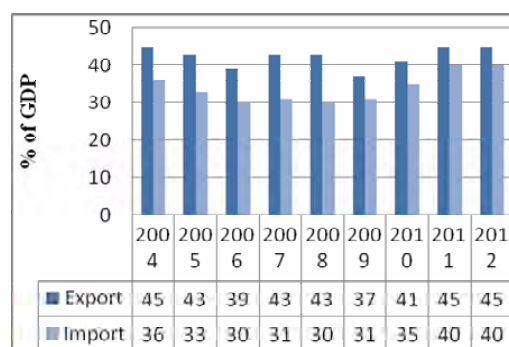
With the intensification of the financial turmoil in the autumn of 2008, global economic activity fell abruptly, resulting in a strong decline in the global trade in goods back to 2005 levels. The decline was sharp and rapid: world trade in goods fell by almost 17% between September 2008 and February 2009. Global economic activity declined abruptly, with output levels falling by 1.2% in the fourth quarter of 2008 and by 1.4% in the first quarter of 2009.

However, trade volumes fell by much more than expected given the size of the overall decline in final demand. This can be partly explained by a number of factors.

First, the composition of the global demand shock contributed significantly to the disproportionately large decline in trade relative to output. Global activity in the manufacturing sector contracted considerably with the intensification of the financial turmoil, while activity in the services sector was much less affected. Consequently, the decline in global demand primarily affected trade in goods, which accounts for a much larger share of trade than of GDP.

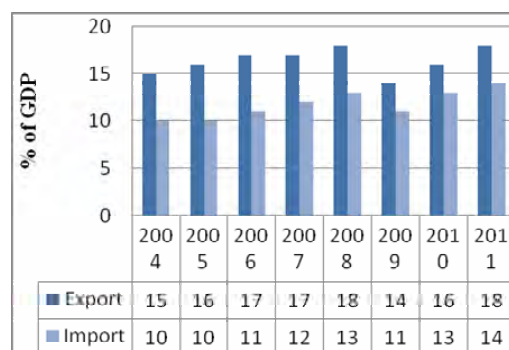
Moreover, the recession led to a shift away from trade intensive GDP components, such as investment, to other components, such as government consumption, while the fall in exports also exacerbated the decline in trade as they are highly import-intensive.

However the financial crisis and the simultaneous confidence shock also led firms to abruptly reduce their inventories and their investment in capital goods. As a result, trade in intermediate and capital goods contracted much more than trade in consumer goods, driving a wedge between developments in trade and those in GDP.



Source: Database-World Bank.

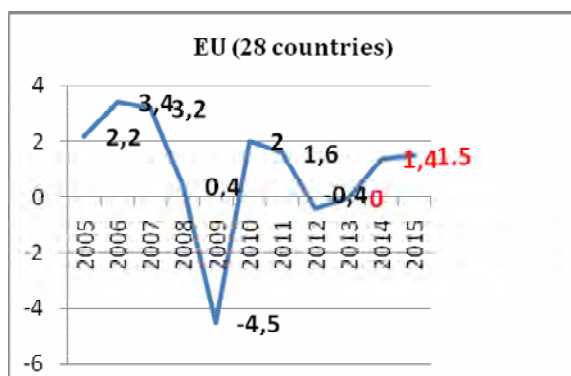
Figure 1. Imports and export of goods and services – Romania



Source: Database-World Bank.

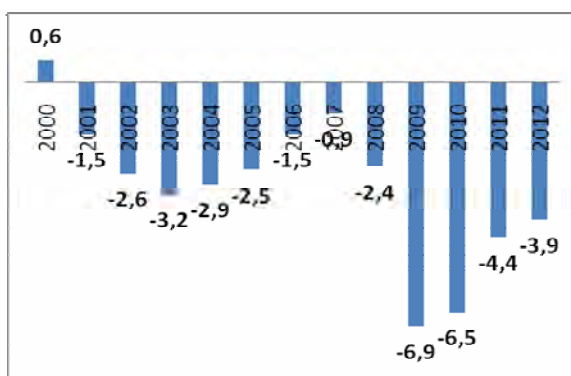
Figure 2. Imports and export of goods and services - USA

Internationally, for the first time in the last three decades it recorded a contraction of global GDP (-0.6%), which was higher in Europe and the United States, while China and India recorded deceleration of economic growth. In the European Union, real GDP decline was much larger (over 4%), despite the unprecedented demanding measures implemented by governments and central banks. As a result of the implementation of these measures, the budget deficit recorded in the European Union increased to almost 7% of GDP, the public debt to GDP increased by 12 percentage points and the interest rate of the monetary policy in the euro area fell to a history minimum of 1% per year.



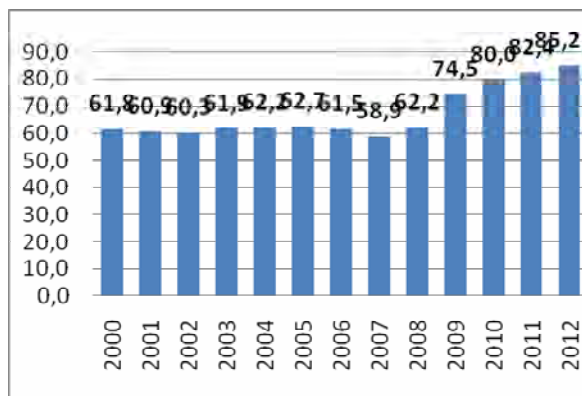
Source: Eurostat.

Figure 3. Real GDP growth (%)



Source: Eurostat.

Figure 4. European Union government deficit (% of GDP)



Source: Eurostat.

Figure 5. *European Union public debt (% to GDP)*

Second, the increase in the responsiveness of trade to fluctuations in demand may also be partly explained by structural changes related to the globalisation process. Empirical evidence shows that the elasticity of world trade to world income has increased over recent decades. In addition, the response of trade is estimated to be even higher during global downturns. This can be partly explained by the acceleration in globalisation trends over recent years, in particular the increased role of global supply chains in international trade.

The United States suffered the worst financial crisis after the World War II. The bankruptcy of investment bank, Bear Stearns, the fifth largest U.S. bank, has affected credit market instability, the trade deficit and falling exchange. Overall it has estimated loss of 800 billion dollars.

Being the world's largest economy, whatever happens in the U.S., has repercussions throughout the global economy and, in particular, the European Union and Japan.

The net capital inflows on the U.S. market have decreased by 48.5% from December 2007 to \$ 37.4 billion, as private investors avoid U.S. assets. The amount of capital inflows was not enough to cover the U.S. trade deficit, which reached 58.2 billion dollars, and for a long-term that amplifies the dollar's decline.

In the U.S., the annual growth rate of real GDP of 2007 was 2.2%, by 0.7 percentage points lower than in 2006. The correction in the housing market was the main inhibitor element of GDP growth, which has tempered it with almost one percentage point by restricting residential investment. The turmoil on the capital markets has intensified since the summer of 2007, contributing to the slowdown of economic growth rate towards the end of the year.

Thus, economic activity was weak in the United States, and in 2009 as a whole the economy contracted at a rate of 2.4%, compared with growth of 0.4% in 2008. Real GDP continued to post consecutive negative quarterly growth rates in the first half of 2009, following the sharp downturn in the second half of the previous year.

In Japan, economic activity deteriorated significantly in the first quarter of 2009, before entering a recovery phase in the second quarter.

Table 1. *Real GDP growth rate(%)*

	USA	Japan	China	India
2005	3,1	1,3	11,3	9,3
2006	2,7	1,7	12,7	9,3
2007	1,9	2,2	14,2	9,8
2008	-0,8	-1	9,6	3,9
2009	-3,1	-5,5	9,2	8,5
2010	2,4	4,7	10,4	10,5
2011	1,8	-0,6	9,3	6,3
2012	2,2	1,9	7,8	3,2

Source: Database – World Bank.

The emerging economies of Asia showed notable resilience to the global downturn. In the first quarter of 2009 the collapse of foreign trade led to negative real GDP growth rates in the export-oriented economies of Hong Kong S.A.R., Korea, Malaysia, Singapore, Taiwan and Thailand. China, India and Indonesia, on the other hand, posted lower but still positive economic growth in the same period.

Boosted by large fi scale stimulus packages and expansionary monetary policy, emerging Asia began to recover in the second quarter and recorded annual real GDP growth of 5.7%.

Economic activity in Latin America contracted sharply during the first half of 2009, following a very similar pattern to that of the world economy. In year-on-year terms, real GDP for the region as a whole contracted by 2.8% in the first quarter of 2009 and by 3.9% in the second (although in quarter-on-quarter terms, it expanded by 0.4% in the second quarter).

The Baltic countries registered the depth of the decline in economic activity, the average annual growth recorded double-digit contraction, after the noticeable negative growth since 2008 in Estonia and Latvia. This pronounced economic slowdown reflects, in a great measure, the adjustment of significant macroeconomic imbalances, that were accumulated even before this global financial crisis, which increased the vulnerability of these countries to the effects of the international recession.

In all EU Member States outside the euro area, except for of the Baltic countries, the larger- than-expected decline in economic activity was driven by the collapse of external demand and external financing constraints. However, the decrease in

consumer confidence and, in some instances, the negative wealth effects, that result from the mark-down assets, have led to the visible deterioration of domestic demand in most countries.

Poland was the only country that registered a positive growth (1.7%) in 2009, and may have reflected the relatively low degree of openness in the economy, financial sector soundness, early depreciation of the currency and the absence of major macroeconomic imbalances.

In Denmark, UK and Sweden, the three EU Member States outside the euro area that joined the European Union before 2004, economic activity shrank by about 5%. In 2008, in Denmark and Sweden, economic activity was in process of collapse, while in the UK, the economic activity continued to record lower growth rates.

In 2009, economic activity contracted significantly in the Czech Republic and even more in Hungary. In Hungary the decline partly reflected policies to ensure macroeconomic consolidation.

In Bulgaria and Romania, economic activity contracted by 5.1% and 7.1%, after, in 2008, it had reported the highest levels of growth of from outside the EU countries.

4. Conclusions

Our basic conclusion is that there is no unique balance model that includes all important strategies, financial and economic aspects needed to study the roots of the Great Depression. We provided a brief analysis which suggests that the global economy can be restructured and rebalanced in part, by economic and institutional changes that will promote higher savings and a new economic reform.

If we look at the origin of the imbalances mentioned above, we find out which is the direction we need to go. First, the economic and financial power must be divided, not worldwide overly concentrated, otherwise financial imbalances, that arose and spread in the U.S., will increase. Institutions that aim to control all global transactions must establish rules of the game and control financial transactions to exclude the speculative method. The global financial system should encourage only the profitable activities that generate goods and services able to support the company in the future.

Concerning the evolution of the world economy, it should also take into account some risks that might occur in future. In this context, we should not expect that the global economy has a significant increase or decrease in the future, but rather can bounce back and recover the temporary loss, maintaining unemployment and budget deficits. Thus it can be identified at least three risks that could lead to global economic slowdown. The first is related to policies of the stimulus, implemented by governments and central banks in a disorderly manner and that

could lead both to a sharply long-term increased interest rate and a currency imbalance which is already lackluster. The second risk factor is that financial institutions would be unable to rebuild capital reserves and liquidity to cope with the financial and economic threats. The third, and probably the most negative risk factor is that of an unexpected decline in the dynamics of Chinese economic growth. However, expectations of Chinese economic growth appears to include a heavy and durable performance. This seems to be immune to cyclical pressure.

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Budgeting mechanisms in public administration – meeting today's and tomorrow's development challenges

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Abstract. *The efficiency of the rational allocation process of public resources represents a constant issue for both scholars and practitioners, under the European and global requirements set up by International Monetary Fund, European Commission and OECD agendas. In Romania, among the objectives of local government reforms, the rational allocation of public resources can also be identified. Influenced by changes induced by the global economic crisis, achieving this objective became a requirement for the administration of public institutions. From an economics and legal perspective, budgets increasingly came to be used as an instrument for public intervention.*

The goal of this paper is to identify budgeting mechanisms used at local public administration level in order to determine the main interest factors for the approached subject. In this context, our research is based on an analytical method of collecting information from existing written sources, legal analyses and strategic documents. Therefore, the research aims to outline the positive and negative aspects of budgeting processes in the public administration. The results of the research will help us to draw some conclusions which will be integrated into a project concerning the rational resource allocation processes in territorial administrative units.

Keywords: local government reform, budgeting mechanism, rational allocation.

JEL Classification: B26, D61, H61, H68, H72.

REL Classification: 8B, 13C, 13G, 16H.

1. Introduction

The paper analyzes the budgeting tools and mechanisms of public administration at a local level, being developed under the scope of a two year research project investigating the rational allocation process of public institutions at administrative - territorial units level. In this paper, by mechanisms we understand the policies, rules, procedures, systems, organizational structures that govern the budgeting process. Having responsibilities in areas such as education, social services, and environmental well-being, local government is a major player in the delivery of public services. The financing for current and capital expenses of local interest is ensured: (1) entirely from the local budget (depending on subordination); (2) extra budgetary incomes and subsidies granted from the local budget, and (3) entirely from extra budgetary incomes (Matei, 2009). Therefore, public sector budgeting in Romania has changed radically in recent years due to global economic crisis and reforms of public administration.

Budgeting mechanisms help the leaders of local public administration to restrict managerial discretion and therefore to mitigate the public administration's problems. The budget must be made to ensure that it fits the government policies and priorities. The budget is both an instrument of economic and financial management and an implicit policy statement, as it sets relative levels of spending for different programs and activities (Dumitrescu, 2012, pp. 23-26). A good budget process is not an exercise in balancing revenues and expenditures for one year period, but it is a plan that allocates resources on the basis of identified goals. According to Government Finance Officers Association (1998, p. 3) a good budget process is characterized by several essential features, namely: (1) incorporates a long-term perspective, (2) establishes linkages to broad organizational goals, (3) focuses budget decisions on results and outcomes, (4) involves and promotes effective communication with stakeholders and (4) provide incentives to government management and employees.

2. Budgeting mechanisms in Romania

2.1. Economics perspective on budgeting

Financing the economic and social activities on a central or local governance level is mainly performed through public budgets (Matei and Dinu, 2009, p. 1). A budget is defined as the formal expression of plans, goals, and objectives of management that covers all aspects of operations for a designated time period (Shim and Siegel, 2008, p. 1).

From an economic perspective, the budget is a financial tool providing targets and directions, but in order to carry out relevant results and to help managers for

social actions, economic actions. From economic criteria, the classification is: operational expenditure, transfer expenditure and investment expenditure.

In this context, public budgeting is a mechanism within government that seeks to allocate resources. It is a technique resulting in systematic management in order to achieve the established objectives. In other words, budgeting is a complete expression of the planning operations of the organization for a specific period.

Budgeting is a form of planning and policy development considering resource constraints. It is a planning mechanism and may look at “what - if” scenarios (Shim and Siegel, 2008, p. 23). Budgeting has been described as being “at the core of the financial process within a local authority” (Hale and Capaldi, 2003, p. 309). Many of economic perspectives on budgeting are based on traditional rational model of decision-making, characterized by the immense calculative complexity of alternative, a rigorous cost-benefit analysis, with a strong planning and programming system. In practice this model has been very difficult to implement determining the local reforms to take into consideration the changing of this. Thus, for a long time, budgeting has been dominated by the practice of incrementalism (Seal and Ball, 2008, p. 5), but starting with the middle of 1990s, a new paradigm arises, called New Public Management. This new paradigm picks holes in incrementalism, providing a new alternative to the managerial approach of public administration, but concentrated mainly to performance improvement and budgetary sustainability.

2.2. Legal perspective on budgeting

From the state budget by the budgets of main credit release authority transfers an amount of money to local budgets in order to finance some development or social programs of national, county or local interest, which are approved, annually, in global form, by the Law on state budget. The local public finances have been reshaped starting with Romania’s Integration in the European Union by the entrance in force of the local public finances’ Law. The elaboration of a new law on local public finance has been also determined by the requirement of improvement the principles and budgetary procedures relying on the European countries’ experience and, particularly on the financial rules applied to the European Union’s budget. In this way, four new principles were introduced: the principle of local financial autonomy, the principle of consultancy, the principle of proportionality and the principle of solidarity (Ichim, 2007, pp. 57-58).

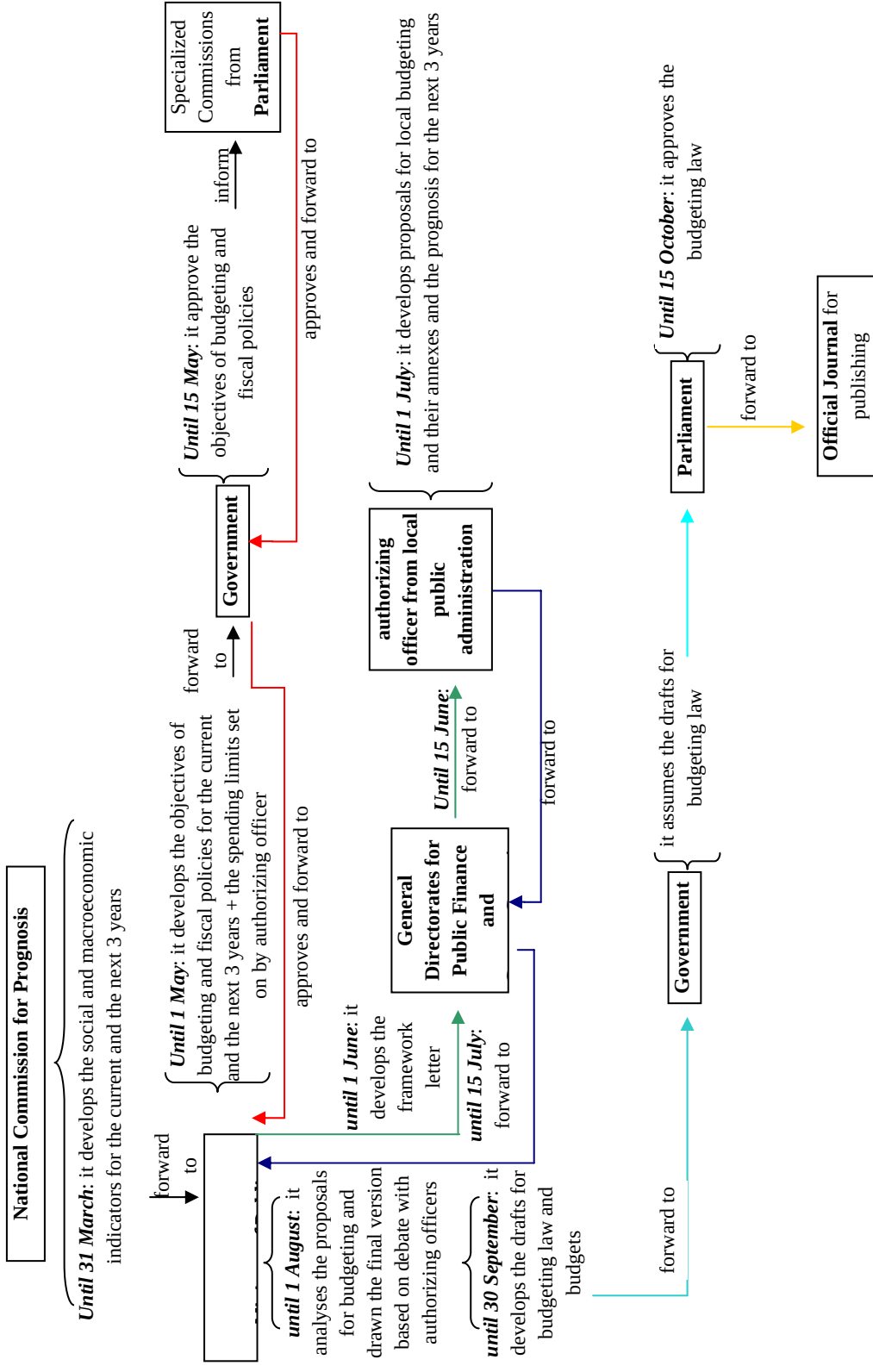
The legislation in this area comprises the following: (1) Law no.215/2001 on local public administration; (2) Law no. 273/2006 on local public finance; (3) Law no. 500/2002 on public finance; (4) Government Ordinance no. 92/2003 on the Fiscal Procedure Code; (5) Law no. 92/2003 on the Fiscal Code, and (6) Annual budget law (see Figure 2).

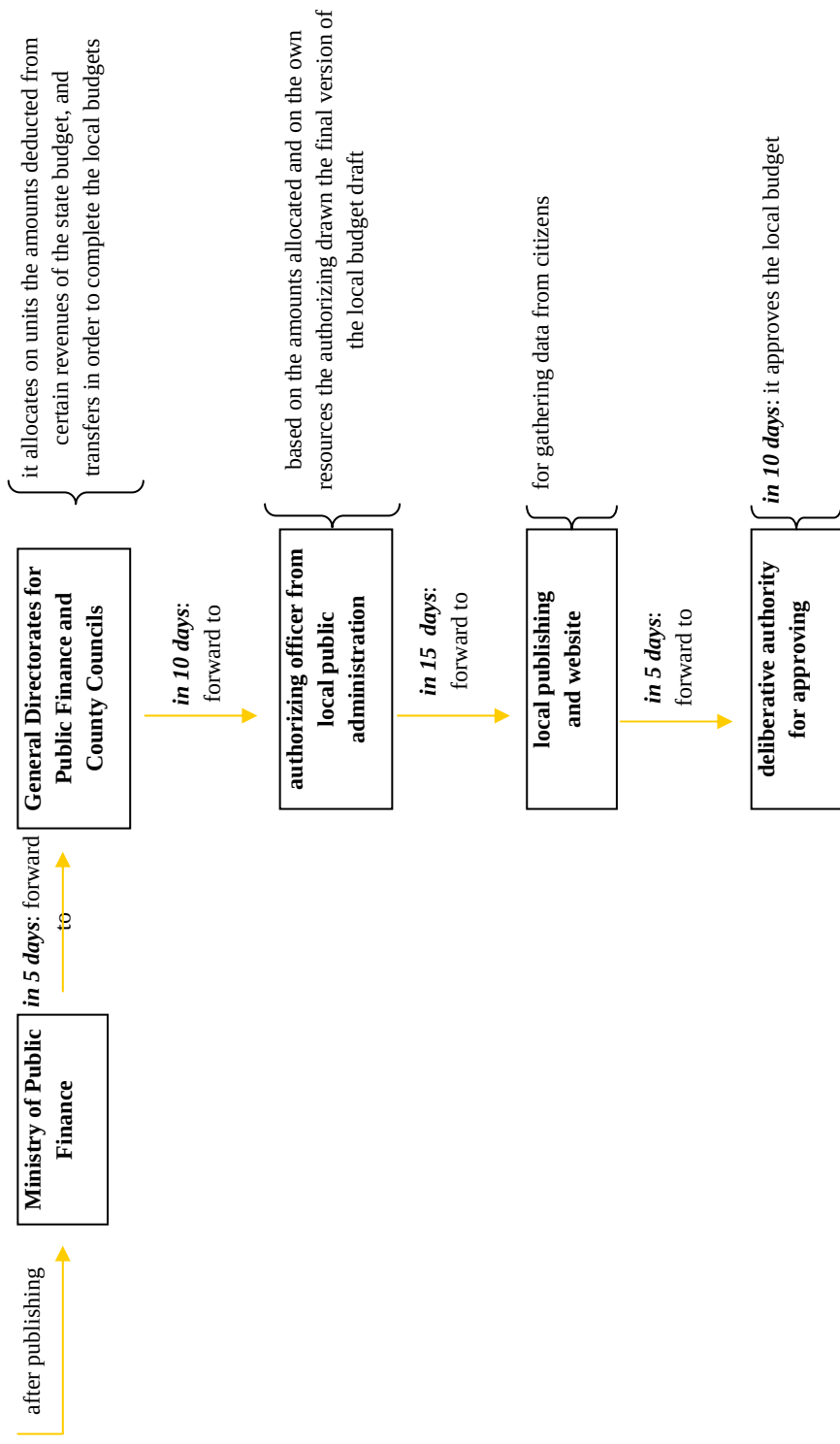
Law no. 273/2006 takes most of the provisions of the old law, clarifies many aspects and introduces clear rules (a formula, a mechanism) to allocate resources in a balancing way from state budget to local budgets (transfer) cutting out a part of the county councils' influence, more often a political one. Articles no. 32 and 33 comprise the main provisions regarding the allocation of resources towards local public administration, drawing two important budgeting mechanisms.

The first mechanism (art. 32) defines how to directly share the income tax (revenue paid on earnings) based on collection area. Thus, from the income collected to the state budget at each administrative-territorial unit's level is monthly transferred within 5 working days after the end of the month in which income has been collected, a quota of 44% to the local budgets of communes, towns and municipalities whose territory operate the taxpayer, a quota of 12% to the budget of county and a quota of 21% in a separate account, opened on behalf of General Directorates of County Public Finance for balancing the local budgets of communes, towns and municipalities, respectively the budget of county. So, a quota of 77% from income tax collected at administrative - territorial units' level is allocated directly as shared income to local and county councils' budgets.

The second mechanism (art. 33, paragraphs 1-7) defines the allocation's way of balancing transfers for local budgets. The main goal of this mechanism is allocation of some deducted amounts for financing the public expenditures, as well as the balancing of local budget of administrative-territorial units. The mechanism consists on two stages: (1) transfer from central to territorial (county) level and (2) from county to local level. Balancing the allocation to counties is made through annual budget law using two criteria: (1) fiscal capacity per person at county level, based on income tax, weighted 70%; (2) area of county, weighted 30%. The last mechanism presented has the scope to make more predictable and transparent the allocation process of budget balancing.

Taking a look to the provisions of annual budget laws after the entrance into force of the law no 273/2006 until now, we will remark significant changes of the amount and the rules from one year to other. Although, the legislative accountability has continued to govern the administration of budgets today, in addition, budgeting has acquired dimensions of economic planning and key instrument of national policy-making worldwide.





Source: authors on legal framework regarding public finance.

Figure 2. *Planning and budgeting process*

3. Advantages and short comings of budgetary mechanisms

Looking at the budgetary mechanisms presented above, we can observe a series of advantages and disadvantages of the budgeting process. Since budgeting is a future-oriented activity, it relies mainly on prognosis, which is always corrupted by a degree of mathematical uncertainty. This uncertainty derives from the statistical model used, but also from the validity of the mathematical assumptions that are the basis of the forecast.

Also, prognosis is subject to interpretation, which is prone to blur its accuracy. Interpretations can disturb the meaning of the figures calculated within the forecast, but also, can corrupt the mathematical assumptions on which it relies (Popa, 2010, pp. 17-23).

There are two ways of diminishing the negative influence of mathematical uncertainty and of the errors induced by faulty interpretations of figures: (1) setting up scenarios (as in worst and best case scenario, what if analysis and so on) (King, 2005, pp. 123-141), which will determine the acceptable margins of variation, or, if these are established by law, will determine to see, whether the budget is well within these margins, and (2) orientation of the budget towards activities, and rely less on the figures of past years.

Another sensible issue of budgetary processes refers to transfers from the state budget to the local budget. In principle it is a very simple method for local communities to fill out the deficits between incomes and expenditures, which almost every time will affect local public investments. By subsidizing some activities, certain amounts of the local revenues can be transferred to other activities, such as financing investments.

However, there can be several problems, especially if the governmental development strategy differs from the local one. Local communities in Romania, for example, have accused in the last years a significant drop in allocations from the state budget. It is not necessary for the two strategies to be coherent, since communities do not develop at the same pace and in the same direction as the state (usually, communities develop faster than nations) (Klimovsky, 2013, pp. 15-17). Lacking coherence to the state development, local communities must match some aspects of their development strategies (Iancu, 2013, pp. 73-86) according to the variations in budgetary allocations by the state.

Also, there might be issues with the criteria used to distribute the money. As a rule, communities that contribute with higher amounts per capita to the local budget, will get more funds allocated by the state. Also, the allocation is made in accordance to the area of that community. It must be said, that these criteria of allocation show a great degree of objectivity, which makes them suited to be written down in the form of laws, making them comprehensible on one hand, and applicable on the other.

This is a problem especially for the poorer communities, which do not contribute per capita as much to the state budget. It is, however, usually these communities who are in need of greater allocations from the state budget, in order to sustain their own development programs. Given this, poorer communities rely more on government programs of regional development, since they are not able to sustain investments themselves.

A last aspect refers to the approach used in order to set up yearly budgets. The preferred method of budget setup is taking the budget from past periods and weighting it with forecasted figures. There are two main advantages to this method: (1) it is the most simple method of budget setup and (2) the method offers coherent budgets from one year to the other, which can be easily justified and asserted.

There are also some downsides to this method: (1) by using this method it is very difficult to correlate the budget to the local strategies; (2) a budgetary execution based on such a budget is very rigid and interferes with the reaction capability of the community to various stimuli coming from the its environment and (3) the budget is susceptible to the uncertainty of the predictions, as mentioned at the beginning of this chapter.

A local community must take into account existing needs of its citizens and correlate them with what local authorities can offer in matter of public services (Mulgan, 2009, pp. 234-235). That is why a budget must offer a certain degree of flexibility, and at the same time, must respect the legal framework that defines it.

4. Conclusion

“To be strategic is to take the future seriously, and to resist the myopia that particularly affects institutions facing intense pressures to be accountable for present actions” (Mulgan, 2009, p. 235). In this regard, budgets are an important tool of the public sector, at local and central level, for modeling the future. Budgets are no less that a mirror of the strategy of an entity, institution, state or even a supranational organization. They reflect tendencies, and make statements on the health of local, regional, national or even European organizations.

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