REVIEW OF ECONOMIC AND BUSINESS STUDIES

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PURCHASING POWER PARITY AND PRODUCTIVITY-BIAS HYPOTHESIS

Tri WIDODO[*]

Abstract: *This paper examines the purchasing power parity (PPP) theorem adjusted the "productivity-bias hypothesis" or the Balassa-Samuelson effect (Balassa, 1964; Samuelson, 1964) for eight East Asian countries including Japan, New Industrializing Economies (NIE-3: Singapore; Hong Kong, China; and Korea), the ASEAN-3 (Malaysia, Indonesia and the Philippines) and the People's Republic of China (PRC). This paper applies three methods of analysis i.e. univariate time series, multivariate regression and Johansen multivariate cointegration. The three methods give the same conclusions. First, the PPP hypothesis does not hold in the case of the eight East Asian countries. Second, non-traded goods give significant contribution on the PPP deviation. It is confirmed by the existence of Balassa-Samuelson effect.*
Keywords: *Purchasing Power Parity (PPP), Balassa-Samuelson Effect, Cointegration.*
JEL classification: *F31, F33, F36, F42*

1. INTRODUCTION

The Purchasing Power Parity (PPP) theorem is one of the oldest and most studied topics in international economics. Basically, the theorem hypothesizes that the exchange rate between two countries' currencies equals the ratio of the two countries' price levels. The disparity in prices between countries will be harmonized by the exchange rate; that is, the nominal exchange rate will reveal differences in inflation among countries. The theorem therefore envisages that the fall in a currency's domestic purchasing power - as indicated by an increase in the domestic price level- will be associated with the proportional currency depreciation in the foreign exchange market.

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However, the empirical findings on the PPP theorem are still inconclusive. It is generally believed that considerable deviations from PPP have happened since the abandonment of the Bretton-Woods system. Many empirical results confirm that the theorem is not a valid hypothesis about the relationship between nominal exchange rates and national price levels in the short term. However, the others have revealed that the theorem may, even in the short term, have substantial validity during very large changes in price levels. In the long term, the theorem has received extensive empirical supports. The long term is used in the literature to indicate that temporary deviation may happen, but over a sufficiently long time horizon and the deviation will be stationary. In short, although there is little empirical evidence to prop up the application in the short term, many researchers have contributed evidence of the PPP theorem in the long term (Rogoff, 1996).

The PPP theorem might not hold for some determinants. One of the important determinants is productivity differentials that alter equilibrium relative prices between tradable and non-tradable goods. It is commonly called the "productivity-bias hypothesis" or the Balassa-Samuelson effect after two seminal papers, which have placed the foundation for the structural models of inflation, were published by Balassa (1964) and Samuelson (1964). In addition, many studies from the mid-1980s onwards have also examined whether divergence from PPP and national price levels can be explained in terms of the Balassa-Samuelson effect (e.g. Rogoff, 1992; Asea and Mendoza, 1994; Iancu, 2008). The literature does, however, provide a common agreement on how to interpret the evidence. Froot and Rogoff (1995) noted that the Balassa-Samuelson effect may be relevant in the medium term, but that the spreading of knowledge, together the mobility of physical as well human capital generates a tendency toward absolute PPP over the very long term. The existing empirical studies on the PPP theorem adjusted the productivity-bias hypothesis have given mixed result. Balassa (1964), Obstfeld (1993), Hsieh (1982) and Ericsson and Irandoust (2004), among others, found the existence of the productivity bias. Those studies concluded that the deviation of real exchange rate is a function of the productivity-bias. In contrast, studies by Froot and Rogoff (1991), Rogers and Jenkins (1995), Mark and Choi (1997) and Faria and Ledesma (2003), among others, found little or no support for the productivity-bias hypothesis.

Many studies on the PPP theorem had been conducted in the cases of East Asian countries. Razzaghipour et al. (2000) conducted a test of PPP for Indonesia, the Philippines, Malaysia, Thailand, and Korea. They found that symmetry and proportionality restrictions had little support in the unit root tests. However, the Johansen tests suggested that the foreign exchange rate and inflation rates were linked in a long run sense. By applying cointegration test and using exchange rates and price indexes from end-quarter observation over twenty years, Baharumshah and Ariff (1997) found that the PPP proposition did not hold for all selected five East Asian economies i.e. Indonesia, Malaysia, the Philippines, Singapore and Thailand. The similar conclusion was also obtained when the Johansen-Juselius multivariate approach was applied. More recently, Choudhry (2005) analyzed the effect of Asian currency crisis of 1997-1998 on the generalized PPP by using monthly log of real exchange rates of the currencies of Thailand, Malaysia, Indonesia, the Philippines and Korea vis-à-vis the US dollar and the Japanese yen during 1990-2004. Tests were conducted for periods before and after the crisis. Results from the Johansen method of multivariate cointegration confirmed a significant change in the relationship between the real exchange rate before and after the Asian currency crisis.

This paper examines the PPP theorem adjusted the productivity-bias hypothesis in the cases of eight East Asian countries including Japan, New Industrializing Economies (NIE-3: Singapore; Hong Kong, China; and Korea), the ASEAN-3 (Malaysia, Indonesia and the Philippines) and the People's Republic of China (PRC). With the various international policies and degrees of liberalization in the East Asian countries, whether the PPP theorem adjusted the productivity-bias hypothesis holds or not in the East Asian countries is interesting to be investigated. Specifically, this paper is addressed to answer two questions. *First*, does PPP not hold in the strong sense in the case of the three countries? *Second,* does the Balassa-Samuelson effect play a significant contribution in causing deviations away from the PPP theorem? The rest of this chapter is organized as follows. Part 2 describe the exchange rate system. Part 2 describes the literature review. Part 3 exhibits the methodology. Empirical results are presented in part 4. Finally, some conclusions and implications are in part 5.

2. Literature Review

2.1. Types of PPP

There are two kinds of PPP which have been developed over time i.e. absolute PPP and relative PPP. The first PPP hypothesis notes that the exchange rate between the currencies of two countries (E) should be equal to the ratio of the price levels of the two countries ($\frac{P}{P^f}$). It is formulated as:

$$E = \frac{P}{P^f} \qquad (1)$$

where E is nominal exchange rate measured in units of domestic currency per unit foreign currency, P is the domestic price level, and P^f is the foreign price level. In contrast, the relative PPP hypothesis states the exchange rate (E) should be proportional to the price levels of the two countries. It is articulated as:

$$E = \theta \frac{P}{P^f} \qquad (2)$$

where θ is a constant parameter.

2.2. Empirical techniques

The empirical study on the PPP hypothesis has long story (Froot and Rogoff, 1995; Sarno and Taylor, 2002). Basically, the empirical techniques in analyzing PPP can be divided into some types i.e. naive techniques, multivariate cointegration techniques, long-span and panel techniques; and application of non-linear techniques (Caderon and Duncan 2003). The following paragraphs briefly summarize the empirical techniques.

Naive techniques. Very beginning studies apply the following basic linear equation or multivariable regression for testing PPP:

$$e_t = \alpha_o + \alpha_1 p_t + \alpha_2 p_t^f + u_t \qquad (3)$$

where e_t is the nominal exchange rate (NER), p represents domestic prices and p^f denotes foreign price. All variables are in logarithm form. Error term u_t is assumed to be white noise error terms. Then, the ordinary least square (OLS) might be applied to estimate the coefficients in equation (3). Since the fact that exchange rate and prices are non-stationary series, the inference obtained from the standard econometric techniques might not be valid (Griffith et al 1993; Gujarati 2000). If u_t is non-stationary, any relationship obtained from equation (3) is spurious.

Therefore, this technique should be followed by examining the stochastic properties of the error term in equation (3).

Univariate Time Series techniques. Univariate time series basically examines the behavior of series. Regarding to the non-stationary problem in naive technique, univariate techniques use unit root and cointegration techniques on Real Exchange Rate (RER). Researchers who apply this technique always conduct a test whether RER is stationary or not. Respectively, if e, p and p^f denote the logarithm of foreign exchange, domestic price level and foreign price level, long run PPP requires that e+ p^f-p –which is called Real Exchange Rate, RER, in the logarithm form- must be stationary. In specific time (t), RER can be represented (Ender, 1995):

$$RER_t = e_t + p_t^f - p_t \qquad (4)$$

The evidence found is manly against PPP. The unit root (stationary) test on the RER completely assumes the validity of two conditions: symmetry ($\alpha_1 = -\alpha_2$ in equation (3)) and proportionality ($\alpha_1 = 1$ and $\alpha_2 = -1$ in equation (3)).

Parallel with the development of analytical tools and computer program, researchers use different approaches to analyze the stationary of RER, such as: Dickey-Fuller (DF), Augmented Dickey-Fuller (ADF) test, Phillip-Perron (PP) test, Dickey-Fuller test with GLS Detrending (DF-GLS), Ng-Perron test (NP), Kwiatkowski et.al (KPPS)(For detail explanation, see Enders (1995), Caderon and Duncan (2003) and Griffith et al (1993)). Some stationary tests commonly used are ADF and PP tests.

The ADF test constructs a parametric correction of the typical Dickey-Fuller test for highest-order correlation by assuming that the series (RER_t) follows autoregressive with order p -denoted as AR(p)- process and adding lagged difference terms of the dependent variable RER_t to the right hand side of original test regression. The general equation of the ADF is:

$$\Delta RER_t = \beta_o + \beta_1 RER_{t-1} + \sum_{i=1}^{p} \alpha_i \Delta RER_{t-i} + \sum_{j=1}^{q} \gamma_i x_{jt} + \delta t + \varepsilon_t \qquad (5)$$

where x_{jt} is exogenous variables and ε_t is the error term. The RER_t is non-stationary if we accept the hypothesis saying that $\beta_1=0$. For testing the hypothesis, researcher must follow conventional Student's t-distribution $t_{\beta_1} = \dfrac{\beta_1}{se(\beta_1)}$ and it must be

compared with McKinnon critical value.The PP test estimates the non-augmented DF test equation (equation 5 with p=0) and modifies t-ratio of β_1 coefficient in equation (5) so that serial correlation does not affect the asymptotic distribution of the test statistic. In fact, the PP test is an alternative (non-parametric) method of controlling for serial correlation when testing for unit root.

Multivariate Cointegration Techniques. This technique applies cointegration techniques to test the existence of long-run relationship between exchange rate and prices. Cointegration offers an alternative method to check the PPP hypothesis. If PPP holds, the sequence formed by the sum (e+ p^f) should be cointegrated with the p sequence. Let's denote v=(e+p^f). Long run PPP affirms that there exists a linear combination of the form

$$v_t = \theta_o + \theta_1 p_t + u_t \qquad (6)$$

Error term u_t is stationary and the cointegrating vector such that $\theta_1 = 1$ in equation (6). This technique applied not only single equation (Engle and Granger, 1987) but also Vector Auto-Regression (VAR) (Johansen 1988, 1995). The main findings of the studies which applied this technique are: *first,* it is more probable to get support for the PPP hypothesis if fixed exchange rate regimes prevail instead of flexible one. *Second*, it is more probable to reject the null of no-cointegration if the research used Whole Price Index (WPI) instead of Consumer Price Index (CPI) or Gross Domestic Product deflator (GDP deflator). *Third*, it is more probable to get evidence against PPP if the research employ multivariate system instead of bivariate ones (Sarno and Taylor, 2002).

Long-Span Research and Panel Data. This technique analyzes the behavior RER in the very long term. The main shortcoming of this technique is that the presence of real shocks that may shift the RER permanently (Hegwood and Papell, 1998). Panel data is data from combination of time series data and cross-sectional data.

Non-Linear Technique. This technique assumes that RER might have some sort of non-linearity based on the following facts(Sarno and Taylor, 2002): (i) the slope coefficient of changes in the nominal exchange rate and inflation differential is always unity and it increases with the length of the observation interval (ii) the PPP link is stronger under hyperinflation than under modest inflation.

2.3. Purchasing Power Parity and Balassa-Samuelson Effect

Theoretically, the structural model of inflation states that two economies with different growth rates of productivity will have different rates of inflation even if the exchange rate does not change. In this case, the classical PPP hypothesis holds, but it has to be adjusted for the different rates of labor productivity. In this paper, we follow the derivation of the PPP adjusted the productivity-bias hypothesis by Calderón and Duncan (2003). The structural model divides an economy into two sectors i.e. sector producing tradable goods (T) and sector producing non-tradable goods (N). It is assumed that the two sectors have Cobb-Douglas production function. The productions of tradable and non-tradable goods are functions of inputs (capital (K) and labor (L)):

$$Q_T = \rho L_T^\phi K_T^{1-\phi} \tag{7}$$

$$Q_N = \rho L_N^\varphi K_N^{1-\varphi} \tag{8}$$

Labor is assumed to be perfectly mobile between the sectors. It implies nominal wage (ω) equalization:

$$\omega_T = \omega_N \tag{9}$$

The profit margin in two sectors is assumed to be constant, and workers are paid the value of their marginal product, which is expressed as:

$$\frac{\partial Q_i}{\partial L_i} = \frac{\omega_i}{P_i}_{\ i=T,\ N} \tag{10}$$

The ratio of marginal productivities to the ratio of average productivities under Cobb-Douglas production technology can be exhibited as follows:

$$\frac{\partial Q_T / \partial L_T}{\partial Q_N / \partial L_N} = \frac{\phi \dfrac{Q_T}{L_T}}{\varphi \dfrac{Q_N}{L_N}} \tag{11}$$

Inserting (9) and (10) into (11) yields:

$$\frac{P_N}{P_T} = \frac{\partial Q_T / \partial L_T}{\partial Q_N / \partial L_N} = \frac{\phi Z_T}{\varphi Z_N} \tag{12}$$

where labor productivity (average product of labor) Z is defines as output Q divided by L(i.e. $Z_T = \dfrac{Q_T}{L_T}$ and $Z_N = \dfrac{Q_N}{L_N}$). Assuming that labor intensity is equal in the two sectors ($\phi = \varphi$) and expressing equation (12) in the natural logarithm, it becomes:

$$p_N - p_T = z_T - z_N \tag{13}$$

where $p_N = \ln P_N$; $p_T = \ln P_T$; $z_T = \ln Z_T$ and $z_N = \ln Z_N$. Parallel with the structural models, it is assumed the price level in the economy to be equal to the weighted average (convex combination) of the price level in the two sectors, that is

$$p = \tau p_N + (1-\tau)p_T \qquad\qquad 0 \leq \tau \leq 1 \tag{14}$$

where τ is the weight of non-tradable goods in the consumer price index. Similarly, for the foreign economy this equation will be:

$$p^f = \tau p_N^f + (1-\tau)p_T^f \qquad\qquad 0 \leq \tau \leq 1 \tag{15}$$

It is assumed that the weight of non-tradable τ is the same in the domestic and foreign economies. Parallel with the structural models, it is assumed that PPP between prices in the tradable sectors of the two economies, which is stated as $\ln E = \ln \theta \dfrac{P_T}{P_T^{\;f}}$:

$$e = \psi + p_T - p_T^f \tag{16}$$

where $\psi = \ln \theta$.

Equation (16) together with equation (14) and (15) can be expressed as

$$e = \psi + p - p^f - \tau bse$$
$$e = \psi + (\tau p_N + (1-\tau)p_T) - (\tau p_N^f + (1-\tau)p_T^f) - \tau bse \tag{17}$$

where $bse = (p_N - p_T) - (p_N^f - p_T^f)$ (18) is called the productivity-bias hypothesis or the Balassa-Samuelson effect. Real exchange rate changes in

response to the productivity-bias. It implies that an increase in a county's relative productivity affects an appreciation of its real exchange rate (Balassa, 1964; Samuelson, 1964; Officer, 1976)

3. METHODOLOGY

3.1. Data

Bilateral exchange rates *yen* (Japan), *won* (Korea), Hong Kong *dollar, Yuan* (China), Singapore *dollar, rupiah* (Indonesia), *ringgit* (Malaysia), and *peso* (the Philippines) vis-à-vis the United States dollar (USD) spanning from the first quarter (1) of 1970 to the third quarter (3) of 2005 are taken from the International Financial Statistics published by the International Monetary Fund *(*IFS-IMF). However, we use shorter periods for some countries due to the availability of data i.e. China (1980:1-2005:3), Hong Kong (1993:1-2005:3), Singapore (1975:1-2005:3), Indonesia (1971:1-2005:3), Malaysia (1984:1-2005:3) and the Philippines (1993:1-2005:3).

There are three kinds of price indexes commonly employed in the literature. Researches which put great importance to the role of the non-tradable sector tend to use the relatively narrow commodity, export or import price indexes. Other researches rely on the broader price indexes best capture the price change in the economy, for such indexes as the Labor Cost Index. Those who believe a heavier weight needs to be placed on the tradable sector may use the Wholesale Price Index. For both domestic and foreign prices, in this paper we use the Consumer Price Index (CPI) as a proxy for the non-tradable goods price index and the Producer Price Index (PPI) as a proxy for the tradable goods price index. The external price indices are represented by the US's CPI and PPI[i]. Bilateral exchange rates, producer price index and consumer price index are standard choices in the literature (Frankel and Rose, 1996; Li 1999). Data on the Balassa-Samuelson effect is calculated by applying equation (12). In the case of China, there is no data on CPI but the growth of CPI. To get the CPI data, we use the growth of CPI and give 100 for the period 1991:4. Then, the CPI for the following quarters is calculated. China also does not have the PPI; therefore we apply the Industrial Production Index.

Table 1 summarizes the data used in this paper. Japan, Singapore, Malaysia and China have data on Real Effective Exchange Rate (REER) provided by IFS. For the other East Asian countries, this paper constructs data on REER based on equation (4). Therefore, the univariate time series analysis for testing PPP hypothesis can be conducted. Multivariate regression and Johansen framework of cointegration will be applied in the case of all selected countries excluding China because there is no data on Consumer Price Index (CPI) in the case of China. South Korea and Indonesia have two models: model I and model II. The difference between model I and model II is on the foreign prices. South Korea and Indonesia do not have data on Nominal Exchange Rate (NEER). This paper uses Market Exchange Rate which is in national currency per US $. Therefore, this paper uses both weighted foreign prices (model I) and the United State (US) price indexes (model II). Model II can be referred as bilateral analysis of PPP between South Korea and US and bilateral analysis of PPP between Indonesia and US.

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[i] Officer (1982) discussed compressively the choice of variables in empirical analysis on the PPP. Ideally, the external price indices are calculated as weighted geometric averages of the price indices of the main East Asian countries' trading partners, since the US is only one of them. For an examples, In 2005, Korean trade flows (exports + imports) were with East Asian countries (Intra-regional trade), European Union (EU) and the United State in the portions of 48 percent, 15.4 percent, 14.6 percent and 22 percent , respectively (based on Direction of Trade Statistics, DOTS-IMF, 2006). In the case of Indonesia, 67.8 percent, 12 percent, 11.5 percent and 8.7 percent of Indonesian trade flows were trades with East Asian countries, European Union (EU), the United State (US) and the rest of the world, respectively. Accordingly, a research may use Nominal Effective Exchange Rate (NEER) since it represents the ratio of an index of a currency's period average exchange rate to a weighted geometric average of exchange rates for the currencies of selected countries and the euro area (IMF, 2006). Unfortunately, data on NEER are not available in every country in East Asia. In addition, trade is commonly valued in USD. Isogai *et al* (2002) finds that currency used for trade settlement in Korea and Indonesia are dominantly USD. In the case of Korea, they were 88 percent (of exports) and 82 percent (of imports) using USD; meanwhile 5 percent (of exports) and 11 (of imports) using Yen Japan in 1998. In the case of Indonesia, they were 92 percent (of exports) and 78 percent (of imports) using USD; meanwhile 3 percent (of exports) and 8 (of imports) using Yen Japan in 1998. Therefore, it is nicely consistent if this paper uses bilateral exchange rates i.e. domestic currencies vis-à-vis the US dollar.

Table 1. *Summary of Data Used*

	Japan	Singapore	Malaysia	Hong Kong	Philippine	South Korea		Indonesia		China
						I	II	I	II	
Real Effective Exchange Rate	REER	REER	REER	REER*	REER*	REER*	REER*	REER*	REER*	REER
Nominal Exchange Rate	NEER	NEER	NEER	NEER	NEER	Market Rate (national currency per US $)	Market Rate (national currency per US $)	Market Rate (national currency per US $)	Market Rate (national currency per US $)	
Tradable Price	PPI	PPI	PPI	PPI	PPI	PPI	PPI	PPI	PPI	
Non-tradable	CPI	CPI	CPI	CPI	CPI	CPI		CPI		
Foreign Tradable Price	Weighted PPI	Weighted PPI	Weighted PPI	Weighted PPI	Weighted PPI	Weighted PPI	US PPI	Weighted PPI	US PPI	
Foreign Non-tradable Price	Weighted CPI	Weighted CPI	Weighted CPI	Weighted CPI	Weighted CPI	Weighted CPI	US PPI	Weighted CPI	US PPI	
Period	Quarterly: 1970:1 2005:3	Quarterly: 1975:1 2005:3	Quarterly: 1984:1 2005:3	Quarterly: 1993:1 2005:3	Quarterly: 1993:1 2005:3	Quarterly: 1970:1 2005:3	Quarterly: 1970:1 2005:3	Quarterly: 1971:1 2005:3	Quarterly: 1970:1 2005:3	Quarterly: 1980:1 2005:3

Note: * calculated by applying equation (4); Real Effective Exchange Rate (REER) and Real Exchange Rate (RER) are interchangeable in this paper.

Source: International Monetary Fund, *International Financial Statistic* (IFS-IMF)

3.2. Estimation

This paper analyze the PPP hypothesis in the case of East Asian countries by using three methods as previously explained: univariate time series, multivariate regression and Johansen framework of multivariate cointegration. Basically, univariate time series method looks at whether Real Exchange Rate (RER) stationary series of not. If it is, PPP hypothesis holds. This paper applies Phillips Perron (Phillips and Perron 1988) test to analyze stationary of RER.

Multivariate regression is applied to scrutinize the existence of PPP and Balassa-Samuelson effect. As explained in the previous part, equation (18) can be expressed in the econometric model as follows:

$$e_t = \beta_1 + \beta_2(\beta_3 p_{N,t} + (1-\beta_3)p_{T,t}) + \beta_4(\beta_3 p_{N,t}^f + (1-\beta_3)p_{T,t}^f) + \beta_5 bse_t + u_t \quad (19)$$

The existence of PPP and the Balassa-Samuelson effect, therefore, can be scrutinized by testing the null hypothesis (H_o) $\beta_2=1$, $\beta_2=-1$ and $\beta_3=0$. Accepting H_o means that PPP holds and Balassa-Samuelson effect does not exist.

The Johansen multivariate framework of cointegration is a method for estimating the cointegrating relationship that exist between a set of variables as well as testing these relationship. The application of this framework on the PPP relationship with the Balassa-Samuelson effect, as stated by equation (20), can be briefly explained as follows. *First,* a vector autoregressive model with maximum distributed lag length of m is defined (equation system):

$$
\begin{bmatrix} e_t \\ p_{N,t} \\ p_{N,t}^f \\ p_{T,t} \\ p_{T,t}^f \end{bmatrix} =
\begin{bmatrix} \beta_{11} & \beta_{12} & \beta_{13} & \beta_{14} & \beta_{15} \\ \beta_{21} & \beta_{22} & \beta_{23} & \beta_{24} & \beta_{25} \\ \beta_{31} & \beta_{32} & \beta_{33} & \beta_{34} & \beta_{35} \\ \beta_{41} & \beta_{42} & \beta_{43} & \beta_{44} & \beta_{45} \\ \beta_{51} & \beta_{52} & \beta_{53} & \beta_{54} & \beta_{55} \end{bmatrix}
\begin{bmatrix} e_{t-1} \\ p_{N,t-1} \\ p_{N,t-1}^f \\ p_{T,t-1} \\ p_{T,t-1}^f \end{bmatrix} +
\begin{bmatrix} \mu_{11} & \mu_{12} & \mu_{13} & \mu_{14} & \mu_{15} \\ \mu_{21} & \mu_{22} & \mu_{23} & \mu_{24} & \mu_{25} \\ \mu_{31} & \mu_{32} & \mu_{33} & \mu_{34} & \mu_{35} \\ \mu_{41} & \mu_{42} & \mu_{43} & \mu_{44} & \mu_{45} \\ \mu_{51} & \mu_{52} & \mu_{53} & \mu_{54} & \mu_{55} \end{bmatrix}
\begin{bmatrix} e_{t-2} \\ p_{N,t-2} \\ p_{N,t-2}^f \\ p_{T,t-2} \\ p_{T,t-2}^f \end{bmatrix} + ... +
\begin{bmatrix} \delta_{11} & \delta_{12} & \delta_{13} & \delta_{14} & \delta_{15} \\ \delta_{21} & \delta_{22} & \delta_{23} & \delta_{24} & \delta_{25} \\ \delta_{31} & \delta_{32} & \delta_{33} & \delta_{34} & \delta_{35} \\ \delta_{41} & \delta_{42} & \delta_{43} & \delta_{44} & \delta_{45} \\ \delta_{51} & \delta_{52} & \delta_{53} & \delta_{54} & \delta_{55} \end{bmatrix}
\begin{bmatrix} e_{t-m} \\ p_{N,t-m} \\ p_{N,t-m}^f \\ p_{T,t-m} \\ p_{T,t-m}^f \end{bmatrix} +
\begin{bmatrix} u_{1t} \\ u_{2t} \\ u_{3t} \\ u_{4t} \\ u_{5t} \end{bmatrix}
$$

$$(20)$$

In the short version (matrix form), equation (21) can be expressed as:

$$Y_t = \sum_{i=1}^{m} \alpha_i Y_{t-m} + {}_t \qquad t=1,2,.......,T \qquad ; m = 1,2,....,m \qquad (21)$$

where $Y_t = \begin{bmatrix} e_t & p_{N,t} & p_{N,t}^f & p_{T,t} & p_{T,t}^f \end{bmatrix}^T = \begin{bmatrix} e_t \\ p_{N,t} \\ p_{N,t}^f \\ p_{T,t} \\ p_{T,t}^f \end{bmatrix}$ and α_i are 4x4 coefficient matrices

and u_t is a 4x1 vector of independent and identically distributed error terms. The distributed lag length m should be specified long enough for the residual not to be serially correlated. The cointegrating matrix α, which defines the long-term solution of the equation system, is defined as:

$$
\begin{bmatrix}
\alpha_{11} & \alpha_{12} & \alpha_{13} & \alpha_{14} & \alpha_{15} \\
\alpha_{21} & \alpha_{22} & \alpha_{23} & \alpha_{24} & \alpha_{25} \\
\alpha_{31} & \alpha_{32} & \alpha_{33} & \alpha_{34} & \alpha_{35} \\
\alpha_{41} & \alpha_{42} & \alpha_{43} & \alpha_{44} & \alpha_{45} \\
\alpha_{51} & \alpha_{52} & \alpha_{53} & \alpha_{54} & \alpha_{55}
\end{bmatrix}
=
\begin{bmatrix}
1 & 0 & 0 & 0 & 0 \\
0 & 1 & 0 & 0 & 0 \\
0 & 0 & 1 & 0 & 0 \\
0 & 0 & 0 & 1 & 0 \\
0 & 0 & 0 & 0 & 1
\end{bmatrix}
+
\begin{bmatrix}
\beta_{11} & \beta_{12} & \beta_{13} & \beta_{14} & \beta_{15} \\
\beta_{21} & \beta_{22} & \beta_{23} & \beta_{24} & \beta_{25} \\
\beta_{31} & \beta_{32} & \beta_{33} & \beta_{34} & \beta_{35} \\
\beta_{41} & \beta_{42} & \beta_{43} & \beta_{44} & \beta_{45} \\
\beta_{51} & \beta_{52} & \beta_{53} & \beta_{54} & \beta_{55}
\end{bmatrix}
+
\begin{bmatrix}
\mu_{11} & \mu_{12} & \mu_{13} & \mu_{14} & \mu_{15} \\
\mu_{21} & \mu_{22} & \mu_{23} & \mu_{24} & \mu_{25} \\
\mu_{31} & \mu_{32} & \mu_{33} & \mu_{34} & \mu_{35} \\
\mu_{41} & \mu_{42} & \mu_{43} & \mu_{44} & \mu_{45} \\
\mu_{51} & \mu_{52} & \mu_{53} & \mu_{54} & \mu_{55}
\end{bmatrix}
+ ... +
\begin{bmatrix}
\delta_{11} & \delta_{12} & \delta_{13} & \delta_{14} & \delta_{15} \\
\delta_{21} & \delta_{22} & \delta_{23} & \delta_{24} & \delta_{25} \\
\delta_{31} & \delta_{32} & \delta_{33} & \delta_{34} & \delta_{35} \\
\delta_{41} & \delta_{42} & \delta_{43} & \delta_{44} & \delta_{45} \\
\delta_{51} & \delta_{52} & \delta_{53} & \delta_{54} & \delta_{55}
\end{bmatrix}
$$

(22)

In short:

$$\alpha = -I + \alpha_1 + \alpha_2 + ... + \alpha_m \tag{23}$$

where I is the 4x4 identity matrix. The Johansen procedure now continue with decomposing the matrix r into two Nxm matrices $\boldsymbol{\pi}$ and $\boldsymbol{\eta}$,

$$\alpha = \pi\eta^T \tag{24}$$

The rows of the matrix $\boldsymbol{\eta}$ now define the cointegrating relationship among the five variables in the vector Y, and the rows of the matrix $\boldsymbol{\pi}$ show how these cointegrating vectors are loaded into each equation in the system. Johansen, furthermore suggest a maximum likelihood estimation procedure to estimate the two matrices $\boldsymbol{\pi}$ and $\boldsymbol{\eta}$ together with test procedures to test the number of distinct cointegrating vectors. Linear parameter restriction of causality within the system can be tested by testing the matrix $\boldsymbol{\pi}$.

4. EMPIRICAL RESULTS

4.1. Stationary of Variables

In order to test for PPP it is necessary to identify whether exchange rate and price indexes time series are stationary. This paper applies Phillips-Perron (PP) Test which is an alternative (non-parametric) method of controlling for serial correlation when testing for unit root (stationary). Table 2 describes the summary of stationary test. By using level of significance 1%, 5% and 10%, the PP-statistic is greater than the critical value for all variables. Therefore, the hypothesis H_o of unit root is accepted and we conclude that all variables are non-stationary series.

Table 2. *Stationary Test*

Country	Nominal Exchange Rate				Domestic Consumer Price Index				Foreign Consumer Price Index				Balassa-Samuelson Effect			
	PP-Statistic	Level of Sig.	Critical Value	Conclusion	PP-Statistic	Level of Sig.	Critical Value	Conclusion	PP-Statistic	Level of Sig.	Critical Value	Conclusion	PP-Statistic	Level of Sig.	Critical Value	Conclusion
Japan	-1.853845	1%	-4.0250	Non – Stationary	-2.218871	1%	-4.0250	Non - Stationary	-0.995233	1%	-4.0250	Non - Stationary	-2.714407	1%	-4.0250	Non - Stationary
		5%	-3.4419			5%	-3.4419			5%	-3.4419			5%	-3.4419	
		10%	-3.1453			10%	-3.1453			10%	-3.1453			10%	-3.1453	
Singapore	-2.476330	1%	-4.0355	Non – Stationary	-0.879130	1%	-4.0355	Non - Stationary	-3.296346	1%	-4.0355	Non - Stationary	-2.016328	1%	-4.0355	Non - Stationary
		5%	-3.4469			5%	-3.4469			5%	-3.4469			5%	-3.4469	
		10%	-3.1482			10%	-3.1482			10%	-3.1482			10%	-3.1482	
Malaysia	-2.196937	1%	-4.0673	Non – Stationary	-1.917273	1%	-4.0673	Non - Stationary	-1.272493	1%	-4.0673	Non - Stationary	-2.560644	1%	-4.0673	Non - Stationary
		5%	-3.4620			5%	-3.4620			5%	-3.4620			5%	-3.4620	
		10%	-3.1570			10%	-3.1570			10%	-3.1570			10%	-3.1570	
Hong Kong	-1.144552	1%	-4.1498	Non – Stationary	-2.782169	1%	-4.1498	Non - Stationary	-2.420848	1%	-4.1498	Non - Stationary	-2.686815	1%	-3.5653	Non - Stationary
		5%	-3.5005			5%	-3.5005			5%	-3.5005			5%	-2.9202	
		10%	-3.1793			10%	-3.1793			10%	-3.1793			10%	-2.5977	
Philippine	-2.280586	1%	-4.1498	Non – Stationary	-1.865377	1%	-4.1498	Non - Stationary	-2.420848	1%	-4.1498	Non - Stationary	0.131626	1%	-3.5653	Non - Stationary
		5%	-3.5005			5%	-3.5005			5%	-3.5005			5%	-2.9202	
		10%	-3.1793			10%	-3.1793			10%	-3.1793			10%	-2.5977	
Korea (Multilateral)	-2.168907	1%	-4.0250	Non – Stationary	-1.035397	1%	-4.0250	Non - Stationary	-1.272493	1%	-4.0673	Non - Stationary	-0.019434	1%	-4.0673	Non - Stationary
		5%	-3.4419			5%	-3.4419			5%	-3.4620			5%	-3.4620	
		10%	-3.1453			10%	-3.1453			10%	-3.1570			10%	-3.1570	
Korea (Bilateral)	-2.168907	1%	-4.0250	Non – Stationary	-1.035397	1%	-4.0250	Non - Stationary	-0.538930	1%	-4.0250	Non - Stationary	-2.025667	1%	-4.0250	Non - Stationary
		5%	-3.4419			5%	-3.4419			5%	-3.4419			5%	-3.4419	
		10%	-3.1453			10%	-3.1453			10%	-3.1453			10%	-3.1453	

Country	Nominal Exchange Rate				Domestic Consumer Price Index				Foreign Consumer Price Index				Balassa-Samuelson Effect			
	PP-Statistic	Level of Sig.	Critical Value	Conclusion	PP-Statistic	Level of Sig.	Critical Value	Conclusion	PP-Statistic	Level of Sig.	Critical Value	Conclusion	PP-Statistic	Level of Sig.	Critical Value	Conclusion
Indonesia (Multilateral)	-2.848215	1%	-4.0268	Non – Stationary	-2.143524	1%	-4.0268	Non - Stationary	-1.573369	1%	-4.0268	Non - Stationary	-2.699749	1%	-4.0268	Non - Stationary
		5%	-3.4428			5%	-3.4428			5%	-3.4428			5%	-3.4428	
		10%	-3.1458			10%	-3.1458			10%	-3.1458			10%	-3.1458	
Indonesia (Bilateral)	-2.848215	1%	-4.0268	Non – Stationary	-2.143524	1%	-4.0268	Non - Stationary	-0.851603	1%	-4.0268	Non - Stationary	-2.456392	1%	-4.0268	Non - Stationary
		5%	-3.4428			5%	-3.4428			5%	-3.4428			5%	-3.4428	
		10%	-3.1458			10%	-3.1458			10%	-3.1458			10%	-3.1458	

Country	Domestic Producer Price Index				Foreign Producer Price Index			
	PP-Statistic	Level of Sig.	Critical Value	Conclusion	PP-Statistic	Level of Sig.	Critical Value	Conclusion
Japan	-2.027822	1%	-4.0250	Non - Stationary	-1.782902	1%	-4.0250	Non –Stationary
		5%	-3.4419			5%	-3.4419	
		10%	-3.1453			10%	-3.1453	
Singapore	-2.163849	1%	-4.0355	Non - Stationary	-2.831595	1%	-4.0355	Non –Stationary
		5%	-3.4469			5%	-3.4469	
		10%	-3.1482			10%	-3.1482	
Malaysia	-2.884182	1%	-4.0673	Non - Stationary	-1.901755	1%	-4.0673	Non –Stationary
		5%	-3.4620			5%	-3.4620	
		10%	-3.1570			10%	-3.1570	
Hong Kong	-2.237585	1%	-4.1498	Non - Stationary	-1.096473	1%	-4.1498	Non –Stationary
		5%	-3.5005			5%	-3.5005	
		10%	-3.1793			10%	-3.1793	

Country	Domestic Producer Price Index				Foreign Producer Price Index			
	PP-Statistic	Level of Sig.	Critical Value	Conclusion	PP-Statistic	Level of Sig.	Critical Value	Conclusion
Philippine	-1.957395	1%	-4.1498	Non - Stationary	-1.096473	1%	-4.1498	Non –Stationary
		5%	-3.5005			5%	-3.5005	
		10%	-3.1793			10%	-3.1793	
Korea (Multilateral)	-1.673849	1%	-4.0250	Non - Stationary	-1.901755	1%	-4.0673	Non –Stationary
		5%	-3.4419			5%	-3.4620	
		10%	-3.1453			10%	-3.1570	
Korea (Bilateral)	-1.673849	1%	-4.0250	Non - Stationary	-1.889115	1%	-4.0250	Non –Stationary
		5%	-3.4419			5%	-3.4419	
		10%	-3.1453			10%	-3.1453	
Indonesia (Multilateral)	-2.263601	1%	-4.0268	Non - Stationary	-2.379643	1%	-4.0268	Non –Stationary
		5%	-3.4428			5%	-3.4428	
		10%	-3.1458			10%	-3.1458	
Indonesia (Bilateral)	-2.263601	1%	-4.0268	Non - Stationary	-2.493704	1%	-4.0268	Non –Stationary
		5%	-3.4428			5%	-3.4428	
		10%	-3.1458			10%	-3.1458	

4.2. Univariate time series analysis

Time series analysis for PPP basically scrutinizes the behavior of an individual Real Exchange Rate (RER) series. This paper applies Phillips-Perron (PP) test to analyze the stationary of RER. Table 3 summarizes the result of PP-test. PP-test statistic, level of significance and critical values are presented in columns 2,3 and 4, respectively. Since PP-test statistic is greater than the critical value of corresponding level of significance used, we accept hypothesis (H_o) of unit roots and conclude that the series is not stationary. For all level of significance, we can conclude that RER is not stationary. Therefore, based on univariate time series analysis of RER we can say that PPP hypothesis does not hold in the strong sense in these countries.

Table 3. *PPP Test Based on Real Exchange Rate (RER)*

Country	PP test Statistic	Level of Significance	Critical Value	Conclusion	
				RER stationary or non-stationary	PPP Hold or not Hold
Japan	-1.853845	1%	-4.0250	Non-stationary	Not Hold
		5%	-3.4419	Non-stationary	Not Hold
		10%	-3.1453	Non-stationary	Not Hold
Singapore	-2.929594	1%	-4.0361	Non-stationary	Not Hold
		5%	-3.4472	Non-stationary	Not Hold
		10%	-3.1484	Non-stationary	Not Hold
Malaysia	-2.444519	1%	-4.0673	Non-stationary	Not Hold
		5%	-3.4620	Non-stationary	Not Hold
		10%	-3.1570	Non-stationary	Not Hold
China	-1.321889	1%	-4.0503	Non-stationary	Not Hold
		5%	-3.4539	Non-stationary	Not Hold
		10%	-3.1523	Non-stationary	Not Hold
Hong Kong	-0.528059	1%	-3.5683	Non-stationary	Not Hold
		5%	-2.9211	Non-stationary	Not Hold
		10%	-2.5985	Non-stationary	Not Hold
Philippine	-1.072086	1%	-3.5683	Non-stationary	Not Hold
		5%	-2.9211	Non-stationary	Not Hold
		10%	-2.5985	Non-stationary	Not Hold
South Korea (Model I)	-1.576242	1%	-3.5083	Non-stationary	Not Hold
		5%	-2.8955	Non-stationary	Not Hold
		10%	-2.5849	Non-stationary	Not Hold
South Korea (Model II)	-1.741460	1%	-3.4768	Non-stationary	Not Hold
		5%	-2.8818	Non-stationary	Not Hold
		10%	-2.5776	Non-stationary	Not Hold

Indonesia (Model I)	-1.645692	1%	-3.4781	Non-stationary	Not Hold
		5%	-2.8824	Non-stationary	Not Hold
		10%	-2.5779	Non-stationary	Not Hold
Indonesia (Model II)	-1.748057	1%	-3.4781	Non-stationary	Not Hold
		5%	-2.8824	Non-stationary	Not Hold
		10%	-2.5779	Non-stationary	Not Hold

Source: International Monetary Fund, *International Financial Statistic* (IFS-IMF). Author's calculation.

4.3. Multivariate analysis

The second method that we use in this paper is the multivariate regression analysis. The econometric model of PPP regarding Balassa-Samuelson effect is specified as equation (19). We rewrite the equation by considering the time (t):

$$e_t = \beta_1 + \beta_2(\beta_3 p_{N,t} + (1-\beta_3)p_{T,t}) + \beta_4(\beta_3 p_{N,t}^f + (1-\beta_3)p_{T,t}^f) + \beta_3 bse_t + u_t \quad (25)$$

The PPP hypothesis holds and Balassa-Samuelson effect does not exist simultaneously when $\beta_2 = 1, \beta_4 = -1$ and $\beta_3 = 0$. Therefore, testing for the existence of PPP and Balassa-Samuelson effect is basically testing whether the requirements $\beta_2 = 1, \beta = -1$ and $\beta_3 = 0$ are fulfilled or not. To do the test, we follow some stages. *Firstly*, we run the model equation (19). The result of estimation is presented in Table 4. From the sign of coefficient, Singapore, Malaysia, Korea and Indonesia have theoretical support. In contrast, Japan, the Philippines, and Hong Kong have the opposite sign suggested by theory.

Secondly, we run the stationary test of error term (u_t) for answering the spurious regression problem. One might be concerned about spurious regression. As we see in part 4.1, all variables in this model are non-stationary; therefore, the regression might curiously be spurious regression. Therefore, we run the test of stationary of error (disturbance error) using PP-test. This test is used to determine whether the result is spurious regression or not. Basically, if the error terms are stationary, the regression is non-spurious regression. In contrast, if the error terms are non-stationary, the regression is spurious regression. The PP-test statistic of error term and the conclusion are presented in row 5 of Table 4. All regression results, except Hong Kong, are non-spurious regressions. Therefore, inference about Hong Kong might be invalid.

Table 4. *Estimation Result*

	Japan	Singapore	Malaysia	Hong Kong	Philippine	Korea		Indonesia	
						I	II	I	II
Constant (β₁)	3.916002*	1.515054*	5.258861*	5.742371**	4.647062**	10.33739*	7.406403*	13.80879*	12.49905*
Coefficient of Domestic Prices (β₂)	-0.653044*	1.146533*	0.054002	-0.475389	-0.999850*	0.724447*	1.262069*	0.952070*	1.051871*
Coefficient of Foreign Prices (β₄)	0.781814*	-0.484908*	-0.179149	0.220930**	0.999470	-1.434461*	-1.366873*	-1.975573*	-1.793272*
Coefficient of Balassa-Samuelson Effect (β₃)	4.137438**	0.817165*	1.254607*	0.487200	573.8069	0.319775*	0.321193**	-0.970935*	-0.562650*
Stationary test of error term: PP statistic	-2.850257***	-2.152706**	-2.192145**	-1.364777	-2.936059**	-2.015522**	-2.157986**	-3.354972**	-4.110787*
Conclusion about Spurious Regression	Non Spurious Regression	Non Spurious Regression	Non Spurious Regression	Spurious Regression	Non Spurious Regression	Non Spurious Regression	Non Spurious Regression	Non Spurious Regression	Non Spurious Regression

Note: *, ** and *** indicate significance at 1%, 5% and 10% respectively

Source: International Monetary Fund, *International Financial Statistic* (IFS-IMF). *Author's calculation.*

Thirdly, after getting the estimation result and knowing the non-spuriousness of regression, we impose restrictions $\beta_2 = 1, \beta = -1$ and $\beta_3 = 0$ to see whether PPP and Balassa-Samuelson effect hold simultaneously. We run Wald-Coefficient restriction test with some restrictions $\beta_2 = 1, \beta = -1$ and $\beta_3 = 0$ proposed by the PPP hypothesis[1]. The result of Wald-test is presented in Table 5. Based on both of F-statistic and Chi-square statistic, we reject the hypothesis H_o (restrictions: $\beta_2 = 1, \beta = -1$ and $\beta_3 = 0$) for all countries. Therefore, we might conclude that PPP does not hold and Balassa-Samuelson effect exists in all the East Asian countries.

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[1] See Gujarati (2000) for detail explanation about Wald coefficient restrictions test. Basically, the Wald test calculates the test statistic by estimating the unrestricted regression and the restricted regression- without and with imposing the coefficient restrictions specified by the null hypothesis, H_o. The Wald statistic measures how close the unrestricted estimates come to satisfying the restriction under the null hypothesis. If the restrictions are in fact true, then the unrestricted estimates should come close to satisfying the restrictions.

Table 5. *Test PPP Hypothesis and Balassa-Samuelson Effect*

	Japan	Singapore	Malaysia	Hong Kong	Philippine	Korea		Indonesia	
						I	II	I	II
F-stat	323.5020*	1922.362*	53.53983*	85.87187*	1.20E+08*	316.3900*	10.94185*	299.9080*	476.4563
Chi –square	970.5060*	5767.085*	160.6195*	257.6156*	3.61E+08*	949.1699*	32.82554*	899.7240*	1429.369
PPP hypothesis	Not hold	Not hold	Not hold	Not hold	Not hold	Not hold	Not hold	Not hold	Not hold
Balassa-Samuelson Effect	Exist	Exist	Exist	Exist	Exist	Exist	Exist	Exist	Exist

Note: *, ** and *** indicate significance at 1%, 5% and 10% respectively

Source: International Monetary Fund, *International Financial Statistic* (IFS-IMF). *Author's calculation.*

4.5. Multivariate cointegration framework

In this part, the result of the Johansen cointegration test procedure -applied to test the PPP hypothesis- is presented. This paper uses all variables -in logarithm form- nominal effective exchange rate, domestic consumer price index, weighted average external consumer price index, domestic producer price index and weighted average external producer price index. In the vector form the variables can be represented as:

$$\begin{bmatrix} e_t \\ p_{N,t} \\ p_{N,t}^f \\ p_{T,t} \\ p_{T,t}^f \end{bmatrix}.$$

The system is tested by applying the following scheme. *First,* the maximum lag length is chosen by applying minimum Akaike information criteria together with the level and the signs of the parameters of the cointegrating vector. All countries, except Japan, have Vector Auto-Regressive lag 2 (VAR(2)) with drift. Japan has VAR(3) with drift.

Table 6 exhibits the result of the Johansen estimation of the model for the sample of the analysis for all the selected countries. The cointegrating vector shows that a valid purchasing power relationship exists. Note that β_3 is the weight of non-tradable in the both domestic and foreign consumer price indexes, and should be theoretically between zero and one. From the sign point view, Japan, Singapore, Malaysia, Korea (I) and Indonesia (I) have theoretical support. However the parameter estimates of the cointegrating vector are relatively far from the value

which PPP requires $\begin{bmatrix} 1 \\ \beta_3 \\ \beta_3 \\ -1 \\ 1 \end{bmatrix}$ expressed by equation (17). In general, the estimates for

domestic and external prices are relatively far from their parity values of minus one and one. Japan has -16.24 and 16.24; Singapore has -12.03 and 12.03; Malaysia has

-3.43 and 3.43; Hong Kong has 0.31 and -0.31; Philippine has 0.93 and -0.93. The closest models with PPP hypothesis is Korea (I) and Indonesia (I) which have cointegrating vector:

$$\begin{bmatrix} 1 \\ 0.718789 \\ 0.718789 \\ -1.088105 \\ 1.088105 \end{bmatrix} \quad \begin{bmatrix} 1 \\ 0.351631 \\ 0.351631 \\ -1.560514 \\ 1.560514 \end{bmatrix}$$, respectively.

Secondly, we conduct test of restriction with

hypothesis H_o: $\begin{bmatrix} \beta_{11} = 1 \\ \beta_{12} = 0 \\ \beta_{13} = 0 \\ \beta_{14} = -1 \\ \beta_{15} = 1 \end{bmatrix}$ as PPP theory required. If hypothesis H_o is accepted, we might conclude that PPP holds and Balassa-Samuelson effect does not exist in specific country. If hypothesis H_o is rejected, we might conclude that PPP does not hold and Balassa-Samuelson effect exists in specific country. The three last rows of Table 6 show the test. For all countries, we conclude that data do not support the hypothesis H_o. In other words, we can conclude that the homogeneity restrictions of minus one and one are rejected. The parameter estimates of the Balassa-Samuelson effect are out of its range of between zero and one. Furthermore, the Balassa-Samuelson effect in the case of Indonesia (II) is not only out of its range of between zero and one, but also the wrong sign. To sum up, the PPP hypothesis does not hold and the Balassa-Samuelson effect does exist in the case of all the selected East Asian countries.

Table 6. *PPP Analysis: Multivariate Cointegration*

	Japan	Singapore	Malaysia	Hong Kong	Philippine	Korea (I)	Korea (II)	Indonesia (I)	Indonesia (II)
Model	VAR(3)	VAR(2)	VAR(2)	VAR(2)	VAR(2)	VAR(2)	VAR(2)	VAR(2)	VAR(2)
	With drift	With drift	With drift	With drift	With drift	With drift	With drift	With drift	With drift
Variables	(e pnpnfptptf)	(e pnpnfptptf)	(e pnpnfptptf)	(e pnpnfptptf)	(e pnpnfptptf)	(e pnpnfptptf)	(e pnpnf^ ptptf^)	(e pnpnfptptf)	(e pnpnf^ ptptf^)
Cointegrating vector	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000
	10.39525	0.461405	1.365587	0.351247	0.073939	0.718789	0.507700	0.351631	-0.043094
	10.39525	0.461405	1.365587	0.351247	0.073939	0.718789	0.507700	0.351631	-0.043094
	-16.24803	-12.02908	-3.429373	0.308747	0.926044	-1.088105	-3.467658	-1.560514	-1.048933
	16.24803	12.02908	3.429373	-0.308747	-0.926044	1.088105	3.467658	1.560514	1.048933
χ^2 Restriction Test $\begin{bmatrix} \beta_{11} = 1 \\ \beta_{12} = 0 \\ \beta_{13} = 0 \\ \beta_{14} = -1 \\ \beta_{15} = 1 \end{bmatrix}$	12.53104**	10.55520**	31.21913*	34.65101*	23.99782*	27.14399*	15.59286*	15.19782*	15.91133*
PPP hypothesis	Not Hold	Not Hold	Not Hold	Not Hold	Not Hold	Not Hold	Not Hold	Not Hold	Not Hold
Balassa-Samuelson Effect	Exist	Exist	Exist	Exist	Exist	Exist	Exist	Exist	Exist

Note: *, ** and *** indicate significance at 1%, 5% and 10% respectively

^ United State (US)

Source: International Monetary Fund, *International Financial Statistic* (IFS-IMF). *Author's calculation.*

Some factors might cause the deviation from PPP hypothesis, such as non-traded goods (Balassa-Samuelson effect), natural barrier (transportation cost), barrier to trade (tariffs and other legal restrictions), imperfect competition and current account imbalances. The statistically significance of the constant (β_1) in equation (19), as presented in Table 4, indicates that some factors cause the deviation from PPP hypothesis. Theoretically, they are non-traded goods (Balassa-Samuelson effect), natural barrier (transportation cost), barrier to trade (tariffs and other legal restrictions), imperfect competition and current account imbalances. The inclusion of non-traded goods in price indexes is often considered the primary explanation for deviations from PPP. We have empirically proved the existence of Balassa-Samuelson effect in the case of East Asia. Balassa (1964) and Samuelson (1964) argued that non-traded goods systematically affect the deviation from PPP. They argued that because non-tradable goods are included in price indexes, high income countries will have overvalued currencies relative to low income countries. This result is caused by differences in productivity across countries and sectors. Even in East Asian countries, the analysis of total factor productivity (TFP) shows different productivity across inputs (labor and capital) and countries. For example, in the case of South Korea the contributions labor, capital, human capital, foreign capital and technical progress on output growth are 10.5%, 49.8%, 11.4%, 1% and 27.3%, respectively; meanwhile in the case of Malaysia, they are 13.5%, 48.7%, 18.7%, 0.6% and 18.5%, respectively (Rao, 2001).

Natural barrier such as sea, mountainous areas and rivers will affect transportation cost (shipping, for example). Therefore, transportation costs may drive a wedge between the prices of the same good in different markets. A more important factor than the presence of natural barriers to trade is the trade impediment, i.e. tariffs and other legal restrictions on trade. Mostly, every country restricts the importation of agricultural goods through the use of tariffs and quotas in order to protect its domestic farm sector. Not only agriculture sector, but also other sectors such manufactures are frequently protected by government. By 2001, China, Indonesia, Malaysia, and the Philippines had average tariff 17.48%, 8.43%, 10.2% and 7.6%, respectively (Athukorala, 2005). Meanwhile Thailand had average tariff 18.48% by 2002 and Vietnam had average tariff 16.65% by 2003.

In the presence of imperfect competition, traded good prices may not equal across countries. To some extent, suppliers, producers or sellers have a certain

degree of market power and then implement price discrimination strategies. Such inequalities will result in deviations from PPP. Markets in developing countries are sometime pointed to have protection. Some studies have been conducted to analyze effective rate of protection (ERP) in the East Asian countries. World Bank (1993) and Fane and Condon (1996) found that Indonesia had ERP 74%, 70%, 59% and 25% in 1975, 1987, 1990 and 1995, respectively. Meanwhile, World Bank (1993) and Panagariya (1994) found that South Korea had ERP 40%, 55%, 67%, 80% and 28% in 1970, 1975, 1980, 1985 and 1988, respectively.

Another reason that exchange rate-adjusted prices might differ across countries is that exchange rates reflect international trade not only in goods and services, but also in financial assets. The PPP-based approach for evaluating exchange rates only considers the role of international commodity trade. However, trade in assets is arguably just as important (if not more important) in determining supply and demand for currencies. Cross-country asset flows are, in turn, closely related to positions of trade balance and imbalance among nations. Current account imbalances can be thought as reflection of discrepancies between domestic investment and savings. As these imbalances generate demand and supply changes for assets denominated in various currencies, exchange rates might deviate significantly from PPP.

5. CONCLUSIONS AND POLICY IMPLICATIONS

This paper has scrutinized the Purchasing Power Parity (PPP) hypothesis and the Balassa-Samuelson effect in East Asian countries -i.e. Japan, Singapore, Hong Kong, China, Korea, Malaysia, Indonesia and the Philippines- by applying three widely used methods: univariate time series of Real Exchange Rate (RER); multivariate regression; and Johansen framework of multivariate cointegration. Some conclusions are withdrawn. *First,* the PPP hypothesis does not hold in the strong sense in the case of all the selected East Asian countries. *Second,* the relative non-traded goods prices plays significant role in causing deviation away from PPP. *Third,* the Balassa-Samuelson effect does exist in the case of East Asian countries.

The deviation from PPP poses important issues for macroeconomic measurement, linkages and policy, such as real income comparisons, interest rate linkages and exchange rate policy. Here are several implications. *First,* with strict PPP based on the law of one price, the purchasing power of a given income in one

county and currency can be compared with the purchasing power of the income of any other county by simply measuring incomes in a common currency. However, the fact that PPP, in the case of East Asian countries previously discussed, does not hold leads to systematic biases in comparisons. The real incomes of less developed countries frequently are underestimated when actual exchange rates are used to make the comparison. The low price of non-tradable goods in less developed countries (due to the productivity differential) yields for less developed countries true purchasing power of income significantly above what exchange rate-converted income suggests.

Second, under PPP the real exchange rates, which show a country's competitiveness, are constant. Violating PPP implies the competitiveness, in the case of East Asian countries, can be intervened by two instrument i.e. exchange rate and domestic price (inflation). Choices of exchange rate system become an important issue i.e. flexible, peg to composite basket, fixed or other systems. If exchange rate can be maintained stable – regardless what exchange rate system implemented- then a country might mainly focused on stabilizing domestic inflation.

Third, failure of one price and violating PPP imply welfare loss due to inefficiency associated with consumers in different location paying different prices for the same good. In a country with domestic currency overvaluation, consumers pay less for imported product.

Fourth, the difference between PPP and exchange rate must be eliminated. Overvaluation or undervaluation of currency might invite speculation-motive attacks which frequently affect domestic economic stability. Exchange rate movements in the short term are 'news driven'. Domestic political issues, announcement about interest rate changes, idea of an economist about business cycle and so on are factors that might drive exchange rates fluctuating in the short run. PPP, by comparison, describes the long run behavior of exchange rates. The economic forces behind PPP will eventually equalize the purchasing power of currencies. However, it might take many years.

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LAW, COERCION AND
SOCIOECONOMIC EQUILIBRIUM

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Abstract: *This paper investigates the economic conditions under which the performance of a Judiciary does not impede non-coercive fair socioeconomic allocations under "Strotz-myopia" regarding the law variable, i.e. under a static view of it in an otherwise dynamic context. The law, here, is the positive factor by which consumption volume is multiplied as a result of law introduction in an otherwise fully private social economy. Lexicographic preferences regarding the law is the keyword in establishing non-coercive equilibria either in the static context of a stone-age economy or in the dynamic context of a jungle economy, given in the latter the presence of farsightedness. Nevertheless, such equilibria are found here to exist even under myopia and regardless the presence of lexicographic preferences. We first detect them within a fully private social economy, and we next qualify them by introducing the Judiciary as state officials. The optimality regarding state finances imposes additional restrictions in establishing myopic non-coercive equilibria. In any case, an equilibrium will be stable if it is not influenced by the homotheticity or not of the preferences, i.e. by income distribution considerations. So, any suboptimal behaviour of the Judiciary should be attributed exclusively to the suboptimality of state finances: Macroeconomics does affect law administration.*

Keywords: *Myopic law preferences; Non-coercive allocations, Homotheticity, Judiciary*

JEL classification: *K00, O40, D60*

1. INTRODUCTION

The purpose of this paper is to investigate the economic conditions under which the performance of a Judiciary does not impede non-coercive fair socioeconomic allocations under "Strotz-myopia" regarding the law variable, i.e.

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under a static view of it in an otherwise dynamic context. More specifically, it puts forward the hypothesis that within the context of mainstream economics, preferences need not be lexicographic to have a non-coercive equilibrium even under myopia. But, let us take things one at a time. If one judges from works like those of Sarat and Kearns (1996) and Millhiser (2015) among others, but also from common experience, there are serious grounds of doubting whether the judicial system can be compatible with fair socioeconomic allocations, i.e. with envy-free, equitable, and Pareto efficient allocations. For example, it has become common knowledge through the centuries that there has never been a Judiciary that it didn't finally succumb to unequal treatment. "*Legum servi sumus ut liberi esse possimus*", (i.e. we are slaves of the law so that we can be free) Cicero (106-43 BC),[1] would caution against distrusting Justice.

But, the problem is not with the Justice; it is with the Judiciary. The truth of the matter is that the Judiciary may very well become the source unfair socioeconomic allocations, *ceteris paribus*. And, once the unfairness is imposed by the coercive power invested with the Judiciary, the subsequent economy falls into the category of what Piccione and Rubinstein (2007) model as *jungle economy*. The Judiciary may be held responsible for fostering a jungle economy and hence, its value should be evaluated within this type of social economy. And, according to Houba, Luttens, and Weikard (2013, 2014), in a farsighted rather than myopic jungle, the equilibrium coincides with lexicographic welfare maximization for which initial wealth is irrelevant; otherwise we have jungle or the same, coercive equilibria.

That is, the cause of fair division can be salvaged only under lexicographic preferences. Under the mentality that what matters primarily is to have law and thereby the people administering it regardless of individual preferences over the misallocation prompted by the Judiciary; which is what, of course, the above quotation from Cicero really signifies. If all are farsighted, they do acknowledge the value of Justice, they tolerate "mishaps" as a necessary evil when administering it in practice, and what would be characterized as misallocation in the absence of this acknowledgement and toleration, becomes now a fair division (see e.g. Whalley and Zhang 2011). Put differently, in a decentralized environment encouraging the formation of rational expectations, the Judiciary is expected to live up to its reputation. A myopic perception of things, a

perception based exclusively on short-term self-interest impeding the formation of such long-term expectations, would lead to coercive and hence, unstable equilibria, nurturing socioeconomic unrest.

But, what exactly "myopia" means within the context of the mainstream, non-jungle view of an intertemporal social economy? As the term suggests, it refers to disregard of the future as follows. To preserve the dynamic character of decisionmaking and keep at the same time the analysis simple, a two-period horizon is assumed in this paper. Within this time framework, myopia should mean decisionmaking about consumption today and tomorrow, disregarding the fact that the consumption planned for tomorrow need not be surrounded by the same legal environment which is preferred for consumption today. The preferences tomorrow for tomorrow's legal environment may be different from the current preferences for tomorrow's environment. That is, in a two-period setting, we have to have Strotz's (1956) sense of myopia whereby future expectations do exist but shape current behavior neglecting the fact that preferences in the future may change. Therefore, the law, as it will be defined immediately, should be entering a time-strongly additive utility function in a weakly separable fashion across periods when myopia is postulated in Strotz's sense.[2] This, under the presumption that the presence of law corroborates output growth as North (1991), acting thereby multiplicatively on consumption.

Now, this paper argues that within the context of mainstream economics, preferences need not be lexicographic to have a non-coercive equilibrium even under myopia. To obtain such a result suffices law to be entering the utility function in a weakly separable mode regardless the homotheticity of the function. McCoubrey and White (1996) have shown that no universally acceptable definition of law can be produced, but by the term "law" is meant below the positive factor by which consumption volume is multiplied as a result of law introduction in an otherwise fully private social economy. A factor shaped by such diverse institutions as industry regulation within period, social security rules across periods, or theft and robbery laws as handled by the Judiciary as state officials and hence, depending on whether state finances can ensure a sound Judiciary (see e.g. Chemin 2007). So, if sub-optimal state behavior weakens Judiciary performance after certain equilibrium is thought to have been reached, the solution will be another equilibrium with a different Judiciary, all else being

the same including income distribution. Equilibrium is unstable if it depends on socioeconomic stratification.

The next section offers a formal support of our thesis, followed by a section concluding this article with a discussion in connection with the economics of judicial decisionmaking. From the viewpoint of the source of myopia, to dissociate lexicographic preferences from non-coercion is important because such preferences are necessary and sufficient to prompt "generalized myopia", i.e. myopia independent of information representation (Feldman 1992). This perception of the nexus between preferences and myopia derives from Tintner (1941) and Alchian (1950), and there is no *a priori* reason to presume here that the representation of information does not influence behavior. Anyway, judging from Miceli (2014, Abstract), the approach herein is novel in that it falls neither in the category of the "'economic analysis of law'− which concerns the use of economic theory for describing the incentive effects of legal rules (positive analysis) and for prescribing better rules (normative analysis)" and not in the category of "'law and economics'− which concerns the relationship between law and markets as alternative institutions for organizing economic activity." Moreover, our approach is also an intertemporal one close to the mentality whereby sustained growth dominates in importance the matter of static efficiency (see e.g. Cooter and Edlin 2011).

Finally, according to Epstein (2013, xiii): "In the study of judicial behavior, 'economics' has multiple meanings. Many scholars view it through a theoretical lens, arguing that economic studies operate under the assumption that the judge is a 'rational maximizer'... Others focus on whether the research employs the tools of econometrics. A third group might claim that work exploring economics as a substantive matter − say, a paper on the effect of the economy on judicial decisions − qualifies as an economic study of judging." This paper falls in the realm of the third group. For us, here, the law is put in the service of market exchange across time periods with an eye to investigating whether "Strotz-myopia" over the law variable, a static view of it in dynamic mainstream microeconomics suffices to salvage the case for non-coercive equilibria and thereby the case for fair division under myopia. This is the reason the discussion is made in connection with jungle-dynamic rather than stone-age static equilibria. Myopic non-coercive equilibria are impossible in a jungle economy even under lexicographic preferences, and it is

remarkable that such are the preferences fostering stone-age equilibria, too (see e.g. Houba and Weikard 2009).

2. The Formal Argument

In a few words, this paper starts by pointing out that Justice may not perform its duties satisfactorily because of a number of reasons. It next tries to see if this hampers economic efficiency by focusing on the economic dimension of these reasons. The standard conclusion is that efficiency will not be hampered if people are farsighted and realize that the Judiciary is indispensable to a civil society. Below, we find out that efficiency can still be the case even if people are myopic; that is people need not trust Justice and be lawyers to have a Justice system operating efficiently given sound public finance conditions.

To support our thesis, an economy without a Judiciary is examined first, and the results are next qualified by introducing the Judiciary as state officials. Either case is evaluated under a homothetic utility specification and under an example of non-homothetic utility, both with a two-period horizon. Intertemporal homotheticity means that rich and poor decisionmakers are equally averse to proportional fluctuations in consumption, and respond alike to the challenges by the legal system. An equilibrium will be unstable if it depends on income distribution and this is the reason the possibility of equilibrium under conditions of non-homotheticity is examined as well.

The Private Sector

One well-known utility specification that might be used in connection with intertemporal homotheticity derives from what Neary (2004) calls "the Dixit-Stiglitz Lite". Let current and future consumption be c_1 and c_2, respectively, so that lifetime consumption in the absence of law is: $c_1 + \delta c_2$, where δ is a discount factor. The law, as defined earlier, is designated by variable L, and it is assumed to be multiplying the volume of consumption by contributing to output growth.[3] It is assumed to be produced based on statutes, decrees, regulations, and precedents by the legislature-cum-Judiciary, $\mathcal{L}$, according for simplicity to the production function: $L = \sqrt{\mathcal{L}}/a \Rightarrow \mathcal{L} = (aL)^2$, where a is some positive coefficient. A myopic treatment of it wants it to be invariant over time and hence, it is taken to be the numeraire good so that lifetime budget, H is:

$$(aL)^2 + p_1 c_1 + \delta p_2 c_2 = H \tag{1}$$

where p_1 and p_2 are the prices in periods 1 and 2, respectively. This is the income constraint under which the homothetic Cobb Douglas/Constant Elasticity of Substitution utility:

$$u = L^{1-n}(c_1^e + c_2^e)^{n/e} \tag{2}$$

is maximized, where n is the share parameter and $e \in (0,1)$ is the substitution parameter excluding the case $e = 1$ of perfect substitutability and the case $e = 0$ of independent goods. It is clear that L is separable in (2). The optimal demands then will be:

$$c_1^* = \frac{\Psi}{[H - (aL^*)^2](\delta p_2)^{1/(1-e)}} \tag{3i}$$

$$c_2^* = \frac{\Psi}{[H - (aL^*)^2]p_1^{1/(1-e)}} \tag{3ii}$$

and

$$\mathcal{L}^* = (aL^*)^2 = H - \sqrt{\frac{\left[p_1^{(2-e)/(1-e)} + \delta^{1/(1-e)}p_2^{(2-e)/(1-e)}\right]\Psi}{(\delta p_1 p_2)^{1/(1-e)}}} \tag{3iii}$$

where $\Psi \equiv p_1^{e/(1-e)} + (\delta p_2)^{e/(1-e)}$ while the fraction   gives the elasticity of substitution whose negative is the price elasticity of demand, ϑ.

These optima are certainly non-coercive, and in order to arrive at non-coercive equilibria, the supply-side of the economy has to be examined too, given $\mathcal{L}$ at $\mathcal{L}^*$. Assuming imperfect competition in each period to utilize ϑ, profit maximization occurs when:

$$1p_i\left(1 + \frac{1}{\vartheta}\right) = k_i \tag{4}$$

where k_i is the constant marginal cost in period $i = 1,2$. Hence,

$$p_i^\star = \frac{k_i}{e} \tag{5}$$

prices depend inversely on the substitution parameter. The fixed factor of production $\mathcal{L}^*$ does not enter in this condition, and any positive profits could be considered to be rents to law abiding on the part of firms: $\Pi_i^\star = p_i^\star c_i - k_i c_i - \epsilon L^* > 0$, where $\Pi^\star$ is the optimal form profit. From this last relationship and (5), one obtains that:

$$c_i^\star = \frac{e(\epsilon L^* + \Pi_i^\star)}{k_i(1-e)} \tag{6}$$

which $c_i^\star$'s have at equilibrium to be equal with the c_i^*'s from (3). These equalities characterize the non-coercive equilibria under the presumed myopia type and homotheticity.4

Nevertheless, one the one hand the "Lite" has been criticized by many (among which Hicks 1965), and on the other hand the issue of the stability of equilibrium has to be addressed by relaxing homotheticity. Accordingly, we continue by capitalizing upon the notion of myopic separability advanced by Kannai, Selden and Wei (2014), who note that myopia does not necessarily presuppose homotheticity or logarithmic period utility. Let utility be given for example by the simple non-homothetic function:

$$u = L(c_1 + \sqrt{c_2}). \tag{7}$$

The optimum quantities under again (1) will now be:

$$c_1^* = \frac{4\delta^2 p_2(H + p_1^2) - (1 + 4\delta)p_1^2}{8\delta^2 p_1 p_2} \tag{8i}$$

$$c_2^* = \frac{p_1^2}{4(\delta p_2)^2} \tag{8ii}$$

and

$$\mathcal{L}^* = \frac{4\delta^2 p_2(H + p_1^2) - p_1^2}{8\delta^2 p_2} \tag{8iii}$$

Next, (4) may be rewritten as follows: $p_i = \theta_i k_i / 1 - \theta_i$, where θ_i is the elasticity of demand in period i. This in conjunction with $\Pi_i^\circ = p_i^\circ c_i - k_i c_i - \epsilon L^* > 0$ yields that:

$$c_i^\circ = \frac{(1 - \theta_i)(\epsilon L^* + \Pi_i^\circ)}{(2\theta_i - 1)k_i} \tag{9}$$

Monopolistic power implies presumably that $\theta_i > 1/2 \Rightarrow 2\theta_i - 1 > 0$. The non-coercive equilibria are described now by the equalities between c_i°'s from (9) and c_i^*'s from (8), given $\mathcal{L}$ at $\mathcal{L}^*$ rather than at L^*. A number of such equilibria may be produced depending on the particular non-homothetic utility function employed each time, and a good many such functions may be specified.

The Introduction of the State-cum-Judiciary

Recall that the multiplicative factor L is the output of $\mathcal{L}$. Under a balanced-budget and social-welfare minded state whose only responsibility is the promotion and enactment of growth-contributing legislature, and assuming that state expenses are financed wholly through an income tax at a proportional rate t, this rate might be viewed as the price of $\mathcal{L}$ and the p's as price ratios relative to t. The budget constraint (1) becomes:

$$t(aL)^2 + p_1 c_1 + \delta p_2 c_2 = t(1-t)H. \tag{10}$$

In a state like this, non-coercive equilibria such as those described earlier will continue holding.5 The same holds when in addition to an income tax, a profits tax is levied on the firm given the standard public-finance proposition that corporate taxation does not influence decisionmaking on the part of the firm.

In so far as a sales tax at rate τ is concerned, it is easily checked that τ would enter multiplicatively in the denominator of (6) and (9). Under homothetic preferences, a non-coercive equilibrium can be ensured only under a particular non-linear relationship between t and τ as follows: The budget constraint is now:

$$t(aL)^2 + (1-\tau)(p_1 c_1 + \delta p_2 c_2) = t(1-t)H. \tag{11}$$

Equating the after tax demand and supply c's yields that the equilibrium relationship between t and τ should be such that the ratio $p_1/\delta p_2$ equals the fraction $\{k_2[(\epsilon L^*)^2 + \Pi_1^\star]/k_1[(\epsilon L^*)^2 + \Pi_2^\star]\}^{1-e}$, which, of course, is a quite restrictive condition. And, in so far as our non-homothetic example is concerned, one finds out that equilibrium presupposes that $\tau = 4(1-\theta_2)[(\epsilon L^*)^2 + \Pi_2^\circ](\delta p_2)^2$ and $t = 1 \pm \sqrt{1-4\Phi}$, and hence, the even more restrictive condition that , where Φ

$$= \frac{2(1-\theta_1)[(\epsilon L^*)^2 + \Pi_1^\circ]p_1 + [(1+4\delta)p_1^2 - 4\delta^2 p_2 p_1^2](2\theta_1 - 1)k_1(1-\theta_2)(L^* + \Pi_2^\circ)p_2}{4\delta^2 B(2\theta_1 - 1)k_1(1-\theta_2)[(\epsilon L^*)^2 + \Pi_2^\circ]p_2^2}$$

Moreover, there is no a priori reason to reject one of the solutions for t. It appears in general that indirect business taxation makes it very difficult to attain non-coercive equilibria.

Similar conclusions are reached when the state is allowed to borrow in which case $\delta = 1/1 + r$, where r is the interest rate on bonds, B:

$$B_1 = \delta[\mathcal{L}_2 - tH - \tau(p_1 c_1 + p_2 c_2) + B_2],$$

which given that $\mathcal{L} = (\epsilon L)^2$ and hence, B should not not change over time, becomes:

$$(1 - \delta)B = \delta[(\epsilon L)^2 - tH - \tau(p_1 c_1 + p_2 c_2)],$$

where the bracketed term on the right is the budget deficit. Solving for tH, inserting the result in (10) and manipulating terms gives the budget constraint:

$$t(\epsilon L)^2 + [1 + \tau(1 - t)]p_1 c_1 + [\delta + \tau(1 - t)]p_2 c_2 = (1 - t)(L - rB). \qquad (12)$$

The quantities of c in (3) become:

$$c_1' = \frac{\Psi'}{[(1 - 2t)(\epsilon L^*)^2 - (1 - t)rB]\{[\delta + \tau(1 - t)]p_2\}^{1/(1-e)}},$$

and

$$c_2' = \frac{\Psi'}{[(1 - 2t)(\epsilon L^*)^2 - (1 - t)rB]\{[1 + \tau(1 - t)]p_1\}^{1/(1-e)}},$$

where $\qquad \Psi' = \{[1 + \tau(1 - t)]p_1\}^{e/(1-e)} + \{[\delta + \tau(1 - t)]p_2\}^{e/(1-e)}.$

Equating with the after-sales-tax supplies of c, the relationship between t and τ consistent with non-coercive equilibrium under homothetic preferences becomes:

$$\frac{[1 + \tau(1 - t)]p_1}{[\delta + \tau(1 - t)]p_2} = \left\{\frac{k_2[(\epsilon L^*)^2 + \Pi_1^\star]}{k_1[(\epsilon L^*)^2 + \Pi_2^\star]}\right\}^{1-e},$$

which is certainly more complicated than when the left-hand term is only $p_1/\delta p_2$.

And, of course, one needs not go on with the tedious algebra surrounding the non-homothetic case to conclude that the condition for the equilibrium relationship between taxes will be even more stringent than without borrowing. More important is the observation that homotheticity, income distribution, is not responsible for the additional restrictions in establishing non-coercive equilibria in the presence of the state. Responsible is the state per se regardless income distribution and the social choice rule sustaining it. To have absence of coercion suffices to have a benevolent state from the viewpoint that it does not consist of a rent-seeking bureaucracy rather than from the Italian public finance perspective that: "If fiscal decisions are made by a ruling class, it is evident that they can only be carried out through coercion" (Domenicantonio 1998, 3).

3. CONCLUDING REMARKS

To sum up, the law was put in the service of market exchange across time periods with an eye to investigating whether "Strotz-myopia" over the law variable, a static view of it in dynamic mainstream microeconomics suffices to salvage the case for non-coercive equilibria and thereby the case for fair division under myopia. This was the reason the discussion was made in connection with jungle-dynamic rather than stone-age static equilibria. Myopic non-coercive equilibria are impossible in a jungle economy even under lexicographic preferences, and it is remarkable that such are the preferences fostering stone-age equilibria, too. Yet, such equilibria do come up in our analysis without lexicographic preferences; and they are stable equilibria, since they are not influenced by the homotheticity or not of the utility function, i.e. by income distribution matters. Also, the additional restrictions in establishing myopic non-coercive equilibria in the presence of the state were found to be owing to the state *per se* regardless income distribution and the social choice rule sustaining it.

The ethical side of the law, the value called "law", has prompted many to urge to undermine its economics (see e.g. Jain 2010); from the viewpoint of economics, what they really propose is a lexicographic vision of it: "Without justice, what else is the State but a great band of robbers?", St Augustine (354-430 AD) would ask.[6] But, it is the economic rather than moral dimension of the law which is of concern to economics. Economics may even prescribe laws that are not acceptable on grounds of morality; a temporary, for instance, measure to make black money official to cope with an urgent government budget distress. For us, here, the economic aspect of the law which was of concern was its administration by the Judiciary given its prudence and the prudence of the law: How can state finances distort Judiciary's prudence and induce subsequently coercion in the presence of myopic law preferences on the part of the public? And, to answer this question, one need not necessarily presume any particular preference pattern suffices to obey the axioms of choice. It is also a question originating in admitting that public finance decisions and macroeconomics do matter in assessing judicial performance.

As Posner (2005, 1259) notes: "judicial behavior is best understood as a function of the incentives and constraints that particular legal systems place on their judges." And, public economics and the macroeconomy do shape the

economics of these constraints regardless the difference of legal systems across countries. This difference may be influencing the incentives but is not important at the level of the finances surrounding constraints. Of course, Siegel (1999, 1581) might disagree with this position on the grounds that "economic analysis provides an inadequate account of judicial behavior because economic models are incompatible with a jurisprudence that recognizes basic rule-of-law values." That is, state finances should not matter in so far as the "independence" side of the judicial system is concerned; but there is the "accountability" side too, the responsiveness of judicial decisionmaking to societal needs as framed by the incumbent political regime (see e.g. Contini and Mohr 2007). And, the public economy does come to play a significant role in practicing law even through this roundabout route. After all: "Even though judges may be independent from political control, they may become dependent on other forces, such as senior judges in a judicial hierarchy, with just as much potential to distort individual decision-making as more conventional political influence" (Garoupa and Ginsburg 2009, 6).

This is even more important when as e.g. Hatlebakk (2012) observes, myopic preferences on the part of the public is expected to be the case in low-income economies, where social-welfare concerns permeate all manifestations of the state. Given a paternalistic social objective aiming at maximizing the sum over *ex post* utilities in such economies, taxation and government borrowing become critical to ensuring smooth intertemporal distribution (see e.g. Roeder 2009). Of course, myopia in these studies is taken to mean emphasis on the short-run by "the poor", but this emphasis might be used to rationalize the assumption made in this paper that people do not care if their law preferences will change in the future. And, it is the vast majority of poor people in low-income economies, which might be taken to rationalize the robustness of our results to income distribution matters. But, in a developed economy, with its middle and high-income classes, myopia should be related only with the low-income class. This would be an interesting extension of this paper, which however lies beyond its scope.

But, we can still contemplate on this informally by noting that what in essence this paper claims is that people need not trust Justice and be lawyers to have a Justice system operating efficiently even under adverse economic circumstances if, of course, the subsequent macroeconomic policy does not impede the performance of the Judiciary. Within the development-stage nexus advanced in

the previous paragraph, such a thesis adds to the esteem of the legal system in a less developed country, which is important given the allegations about the connection of Justice in these countries with corruption (see e.g. Priks 2011). In so far as developed countries are concerned, these countries are democracies with efficiency-friendly institutions (Pejovich and Colombatto 2008, chapter 5) expected to be countering the allegations that democracy results in partisan court rulings, which need not be the optimal ones. It is for this perhaps reason that "a considerable number of judges [in developed democracies] think that such tendencies have no significant influence on the management of justice" (Llano 2013, Abstract). From this point of view, our thesis here adds to the esteem of the legal system in a developed-economy democracy as well.

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IMPACT OF THE ECONOMIC CRISIS ON FDI IN CENTRAL AND EASTERN EUROPE

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Abstract: *Few studies have investigated the relationship between the 2008 global financial and economic crisis and foreign direct investments (FDI) flows. This paper aims to analyze empirically this relationship for Central and Eastern European (CEE) countries. The crisis had a major impact on capital flows to the region, although the magnitude of the impact differed notably, depending on specific characteristics of the host country.*
In order to highlight this, we use a multivariate regression model based on dynamic panel data methodology, which will help us in analyzing also the significant factors affecting the evolution of FDI in the CEE countries during the period 2000-2013.
Keywords: *FDI, CEE, financial crisis*
JEL classification: *E22, F21, G01*

1. INTRODUCTION

Our research is focused on the impact of economic crisis on FDI flows to CEE countries and the competitive positions of these countries versus other countries of the region. The paper extends the existing literature by compressing two important dimensions from the literature: FDI distribution and FDI determinants. Therefore, it is important to understand how FDI are distributed by economic activities and origin country, as well as to see the way in which the financial crisis affected the FDI and the impact of other well-known determinants of FDI.

For the CEE region, FDI flows decreased during 2009 – 2010 with 60% compared with the period 2007 – 2008, while for the period 2009 – 2012 the FDI flows to CEE countries recorded a small improvement, a decrease of 50%

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compared with the period 2005 – 2008 still being recorded. Moreover, we were able to see that Poland overpassed the economic crisis more quickly compared with the others countries.

This paper is organized as follows: the second section reviews the literature regarding the main determinants of FDI flows, showing the most important findings of previous research in the process of understanding the manner of influencing FDI flows through different types of macroeconomic variables. The third section presents the methodology used in order to capture the impact of economic crisis in the CEE region, and also the relevance of the methodology used. A descriptive statistics of the main data used in our analysis will be presented in section four. Moreover in this section we will try to deeply analyze FDI flows per origin country for the CEE region. In section five, we will present the main findings of our analysis and the last section will conclude the paper.

2. LITERATURE REVIEW

One tool of promoting economic relationships between different countries is represented by investments. The last two decades were characterized by a constant increasing in FDI up to 1,971 billion USD in 2007, ten times more than 1990 (UNCTAD, 2011). FDI evolution was strongly affected by the economic crisis which caused that in 2012 the value decreased to 1,450 billion USD. Despite this, starting with 2013, an improvement in FDI flows was recorded and it is expected to reach 1,800 billion USD by 2016 (UNCTAD, 2014). Even if during the period 2008 - 2009 the FDI flows decreased, it seems that in 2010 the developing and transition economies absorbed more than half of the world's FDI inflows (UNCTAD, 2010).

FDI importance was highlighted by many researchers in the financial literature, emphasizing the huge importance of FDI for economic growth of the host country as stated by Alfaro et al. (2004), but also being considered as a main factor of financial globalization (Lane and Milesi-Ferretti, 2003).

The positive effect of FDI on economic growth was analyzed by many empirical papers based on data around the world. The development level of financial sector directly affects the FDI level and the economic development of the host country (Chang, 2005; Chowdhury and Mavrotas, 2006; Kahouli and Samir, 2015). Moreover, the link between FDI evolution and economic growth can be

improved by controlling several variables such as human capital, stable economy and liberalized markets (Bengoa and SanchezRobles, 2003).

When we analyze the main determinants of FDI flows we can use two ways of approaches: firm-level and country/region level. Firm-level approach takes into account firm specific variables which can affect the investment decisions. Even if such specific variables as firm size, risk, market share, cost variables can be statistically fairly fragile (Blonigen, 2005) this drawback can be improved by combining more theoretical models when estimating the FDI determinants (Faeth, 2009). The second approach, country-level, or region-level, takes into account macroeconomic variables which can affect the FDI inflows of different countries or regions. Economic literature revealed different macroeconomic variables which were taken into account to analyze the FDI determinants, such as: interest rate, wage changes, financial openness, industrial disputes, GDP per capita, exports, telephone lines, country risk and others (Bevan and Estrin, 2004; Moosa and Cardak, 2006).

This paper highlights the impact of one of the more recent economic event – the economic crisis - on FDI inflows from CEE countries. This is not the only crisis debated in the economic literature. Before 2008, there were debated some past crises, from which the most important are the ''The Big Five Crisis'': Spain crisis in 1977, Norway crisis in 1987, Finland crisis in 1991, Sweden crisis in 1991 and Japan crisis in 1992 (Reinhart and Rogoff, 2008). Despite these important crises there were also recorded several small banking or financial crises such as: Australia (1989), Canada (1983), Denmark (1987), France (1994), Germany (1977), Greece (1991), Iceland (1985), Italy (1990), New Zealand (1987), United Kingdom (1973, 1991, 1995) and United States (1984).

Researchers were interested in finding the magnitude of financial crisis and the effects on FDI flows. Based on literature, it was highlighted the fact that financial crisis had a powerful influence on FDI. Moreover, the economic crisis started in 2008 had a bigger impact on FDI flows, compared to past crisis (Dornean et al., 2012a; Dornean and Oanea, 2013; Poulsen and Hufbauer, 2011). Despite this, the ability of a country to recover from this crisis depends on the FDI level from the period before 2008. This is the reason why countries with higher level of FDI before economic crisis will experience a milder recession and a more gradual recovery.

3. METHODOLOGY

Based on the recent literature regarding panel data studies (Louzis et al., 2012) we consider that the dynamic approach is the most suitable for estimating the economic crisis effect on CEE countries, because it accounts for the time persistence in the FDI's flows:

$$y_{i,t} = \alpha \cdot y_{i,t-1} + \beta(L) \cdot X_{i,t} + \eta_i + \varepsilon_{i,t}, |\alpha| < 1, i = 1,...,N, t = 1,...,T \tag{1}$$

where the i denotes the cross sectional dimension and t denotes time dimension, $y_{i,t}$ is FDI level expressed as percentage of GDP, $\beta(L)$ is the $1 \times k$ lag polynomial vector, $X_{i,t}$ is the $k \times 1$ vector of explanatory variables other than $y_{i,t-1}$, η_i are the unobservable country specific effects and $\varepsilon_{i,t}$ are the error terms.

This methodology was used by Carstensen and Farid (2004) to determine the determinants of FDI for Central and Eastern European countries in 2004.

If we apply Ordinary Least Square method in estimating the equation (1), this will produce biased and inconsistent parameters, due to the correlation between lagged variable $y_{i,t-1}$ and country specific effects η_i. According to Arellano and Bond (1991), the equation (1) is consistent only if we apply the Generalized Method of Moments (GMM), based on first differences, and elimination of η_i:

$$\Delta y_{i,t} = \alpha \cdot \Delta y_{i,t-1} + \beta(L) \cdot \Delta X_{i,t} + \Delta \varepsilon_{i,t} \tag{2}$$

where Δ is the first difference operator, i denotes the cross sectional dimension and t denotes time dimension, $y_{i,t}$ is FDI level expressed as percentage of the GDP.

Following the dynamic panel data literature, we test the overall validity of the instruments used in estimation based on the Sargan test (Arellano and Bond, 1991), which is asymptotically distributed as chi-square. The null hypothesis of the test assumes that the moment conditions are valid.

The model used in our analysis has as a starting point the hypothesis of Growth-led FDI that relates to the Multinational Corporations theory. The background is represented by the Eclectic Paradigm or OLI (Ownership, Location and Internalization) described by Dunning (2000) in detail. According to the location sub-paradigm of countries, a MNC with some ownership advantages will choose to invest in countries with a location advantage, emphasizing the market

size (usually approximated by GDP). The rationality behind this theory is that an increase in the market size of the host country will lead to an increase in the level of FDI, due to a higher expected profitability. Following the methodology proposed by Assunção et al. (2011), we will extend the model, because we want to capture the economic crisis effect on FDI as well as the impact of three main determinants: infrastructure, human capital and economic stability.

The baseline model used in our estimation takes the following form:

$$FDI_{i,t} = \alpha \cdot FDI_{i,t-1} + \beta_1 \cdot Crisis_{i,t} + \beta_2 \cdot I_{i,t} + \beta_3 \cdot HC_{i,t} + \beta_4 \cdot ES_{i,t} + \eta_i + \varepsilon_{i,t} \quad (3)$$

with, $|\alpha| < 1, i = 1,...,11, t = 2000,...,2013$.

In equation (3), $FDI_{i,t}$ denotes the FDI percentage from GDP, $Crisis_t$ is a dummy variable which captures the economic crisis and takes 1 for the period 2009 – 2013 , and 0 otherwise; the infrastructure determinant of the host country, expressed by the number of internet subscriptions per 100 persons; HC_t is the human capital determinant and it is expressed through the average years of schooling; EC_t is the economic stability determinant which measures the economic stability and will be expressed by several variables which approximate the economic environment situation: inflation rate, real GDP growth rate, unemployment rate, and openness trade.

4. DATA AND DESCRIPTIVE STATISTICS

Data for selected variables are available on the United Nations Conference on Trade and Development (UNCTAD) web site (FDI, inflation rate, real GDP growth rate, openness trade), World Bank web site (unemployment rate and the number of internet subscriptions), and United Nations Development Programme for average year of schooling for period 2000 – 2013.

CEE countries have experienced the financial crisis more aggressively after the beginning of 2009. In 2009, the level of FDI decreased to 2.52% of the GDP, compared to the level of 2008 of 6.02% of the GDP. A worst situation was recorded by the GDP growth that fell from 19.31% in 2008 to -15.73% in 2009. The evolution of average FDI and average GDP growth can be clearly observed in Figure 1.
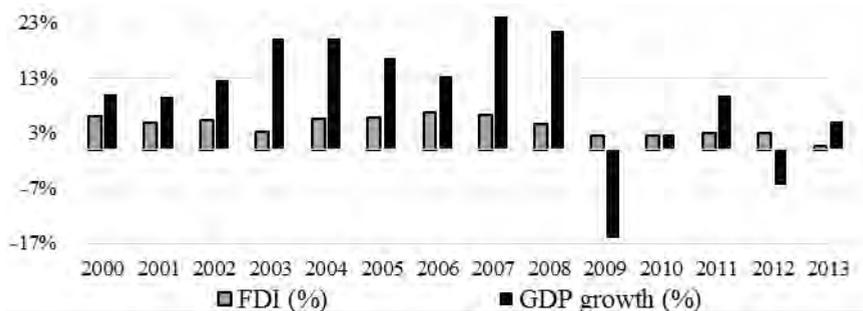
Figure 1. *Average FDI (% of GDP) and average GDP growth for CEE countries*
Source: based on data from UNCTAD, available at:
        http://unctadstat.unctad.org/ReportFolders/reportFolders.aspx

The descriptive statistics for selected variables for entire series and country level series are given in Table 1.

At first glance, we can observe that the highest level of FDI is recorded in Bulgaria (10.54%), while the lowest level belongs to Slovakia and Lithuania (0.01%). Even if the highest value for the average GDP growth is recorded for Lithuania (4.46%), the maximum level of GDP growth was recorded in 2006 for Latvia, when GDP grew with almost 11%. By means of an in-depth data analysis, we were able to find that in 2008 only Latvia and Estonia recorded a decrease in the GDP level, while the rest of the countries were still on a positive trend. At the same time, one year later, all CEE countries, except Poland, recorded a decrease in the GDP (the highest decrease was recorded by Latvia, of 17%, while the smallest decrease was recorded for Czech Republic of 4%). Poland is a special case within the CEE countries, because it is the only country which did not record any decrease in the GDP during the economic crisis. Obviously the increase in the GDP was smaller, in that the minimum increase in the GDP was 1.6% in 2009, respectively 1.7 in 2013.

Regarding Romania, we notice that the average FDI level is 4.17% of the GDP, being below the CEE countries average of 5.14%. At the same time, the average value of the GDP growth rate of 3.52% is higher than the CEE countries average of the GDP growth, which is 3.31%. Even if Poland was able to diminish the economic crisis effect, the level of FDI is lower than the level of FDI for Romania, when we express this variable as percentage of the GDP: 3.23% for Poland and 4.17% for Romania.

Table 1. *Descriptive statistics of selected variables*

Variable	Mean	Median	Max.	Min.	Std. Dev.	Skewness	Kurtosis
Average series							
FDI/GDP	5.14	3.94	29.41	-1.44	4.60	2.308	10.603
InternetSub	44.07	46.11	80.01	3.61	21.97	-0.262	1.855
YearSchool	11.19	11.30	13.20	9.40	0.85	-0.329	2.427
GDP	3.31	4.05	10.98	-17.69	0.04	-1.651	7.590
OpenTrade	1.21	1.21	1.91	0.57	0.33	0.142	2.055
Inflation	5.08	3.90	45.66	-1.11	5.41	4.425	29.674
Unemployment	10.57	9.60	20.50	4.30	4.31	59.84	2.217
Country level	FDI (% of GDP)				GDP Growth (%)		
	Mean	*Max.*	*Min.*		*Mean*	*Max.*	*Min.*
Bulgaria	10.54	29.42	2.70		3.64	6.75	-5.48
Czech Rep.	4.87	10.82	1.07		2.74	7.02	-4.51
Croatia	4.48	8.53	0.83		1.85	5.37	-6.95
Estonia	8.42	20.64	1.51		4.43	10.10	-14.10
Hungary	4.73	11.22	1.57		1.78	4.80	-6.77
Latvia	3.95	8.38	0.36		4.31	10.99	-17.70
Lithuania	3.14	6.01	0.01		4.46	10.28	-14.85
Poland	3.23	5.74	1.23		3.67	6.79	1.21
Romania	4.17	9.26	1.38		3.52	8.49	-6.58
Slovakia	7.38	23.97	0.01		3.98	10.49	-4.94
Slovenia	1.63	7.00	0.06		2.08	6.96	-7.94

Legend: FDI/GDP denotes the ratio between the FDI inflow and GDP as percentage; InternetSub denotes the number of internet subscriptions per 100 persons expressed in percentage; YearSchool denotes the average years of schooling of adults expressed in years; GDP denotes the real GDP growth rate as percentage; OpenTrade denotes the financial opening of the host country and it is computed as (imports+exports)/GDP as percentage; Inflation denotes the inflation rate as percentage; Unemployment denotes the unemployment rate as percentage.

Based on the GDP growth rate evolution, we consider the year 2009 to be the first year of the economic crisis, because all CEE countries recorded a decrease in both GDP and FDI level. The exception is Poland which in 2009 recorded an increase in both GDP (1.6%) and FDI level (7.1%).

Table 2. *FDI in CEE countries split by origin countries (billion EUR)*

Country	Period 2005 - 2012		Period 2005 - 2008				Period 2009 - 2012			Changes (%)
	Total	Share	Mean	Max.	Min.		Mean	Max.	Min.	
Germany	46.11	18.9%	6.66	9.18	5.40		4.87	7.03	1.78	-26.9%
Austria	39.17	16.0%	7.45	10.30	5.74		2.34	3.79	0.65	-68.6%
Netherland	33.79	13.8%	5.92	8.31	3.77		2.53	4.81	0.64	-57.4%
France	20.25	8.3%	2.98	4.18	0.84		2.09	3.39	0.71	-30.0%
Luxembourg	16.17	6.6%	2.97	3.40	2.30		1.07	2.65	-1.12	-64.0%
U.K.	11.40	4.7%	1.54	3.71	-0.19		1.31	2.06	0.90	-15.4%
Italy	10.05	4.1%	1.21	3.18	-1.70		1.30	3.91	-4.02	7.3%
Sweden	9.63	3.9%	1.30	2.00	0.30		1.11	2.98	-0.55	-14.3%
Belgium	8.65	3.5%	1.13	3.54	0.19		1.03	2.47	-0.91	-9.2%
Switzerland	8.15	3.3%	1.64	1.90	0.93		0.39	1.19	-1.49	-76.0%
Cyprus	7.47	3.1%	1.00	1.48	0.34		0.87	1.39	0.42	-13.7%
Spain	6.71	2.7%	1.04	1.74	0.45		0.64	1.18	0.27	-38.2%
U.S.A.	6.16	2.5%	0.72	1.15	0.12		0.82	1.78	0.05	13.3%
Hungary	4.12	1.7%	0.77	1.34	0.41		0.26	0.61	-0.05	-66.1%
Poland	3.30	1.4%	0.56	1.79	0.04		0.26	0.57	0.07	-53.5%
Denmark	3.24	1.3%	0.70	0.88	0.55		0.11	0.37	-0.44	-84.1%
Greece	3.01	1.2%	1.00	1.50	0.35		-0.25	0.41	-0.86	-125.0%
Czech Rep.	2.66	1.1%	0.38	0.62	0.18		0.28	0.64	-0.15	-27.1%
Malta	2.38	1.0%	0.39	1.03	0.03		0.21	0.53	0.03	-47.5%
Norway	1.71	0.7%	0.18	0.36	0.00		0.25	0.72	0.05	42.2%

Legend: The table presents the total value of FDI invested by the main 20 investors in CEE countries for the period 2005 – 2012 expressed in billion EURO. The column Share denotes the percentage of each country FDI in the total value of FDI in CEE countries for the same period. At the same time, the table presents descriptive statistics for two important sub periods: 2005 – 2008 and 2009 – 2012, as well as the percentage evolution between these two sub periods. Data were obtained from each national bank of CEE countries, being collected from July until August 2015.

Going further we tried to see the values of FDI split by origin country and main economic activities. In order to achieve this, we collected data from each national bank official site for the period 2005 – 2012, except Estonia, for which we were not able to find data for the mentioned period. Moreover, we split this period in two sub periods in order to divide it as a period before economic crisis, 2005 – 2008, and a period after the economic crisis, 2009 – 2012.

In table 2 we present the FDI values in CEE region split by origin countries, in which we can see the first 20 most important investors in CEE region. At a first

glance, we are able to notice that the first three major investors are Germany (46 billion EUR), Austria (39 billion EUR) and the Netherland (33 billion EUR), which invested almost 50% from the total FDI in CEE countries during 2005 – 2012. Moreover, we are able to observe that only three countries (Italy, United States of America and Norway) increased the investments in this region after the economic crisis, compared with the previous period.

If we analyze the territorial distribution of origin countries which invest in the CEE region, we are able to see that the first 20 most important investors are from Europe, except the United States of America, which invested only 3% from the total FDI in CEE countries.

When analyzing more deeply all the data for CEE countries regarding the country source of investments, we pointed out nine countries which invested in all countries from CEE region, namely: Austria, Belgium, Switzerland, Germany, France, Italy, Netherlands, Sweden and Denmark. Once again we have to mention that this result does not include Estonia, due to lack of data. Despite this, we consider that this lack of data does not affect the results, due to the fact that Estonian's FDI represent only 3.3% from the total FDI of CEE countries for the period 2000-2013.

In Romania's case, we are able to identify some changes regarding the main investor country. Based on our analysis we found that during the period 2005 – 2012, the biggest investors in Romania were Austria (6,831 million EUR), Germany (6,209 million EUR) and the Netherlands (5,946 million EUR). The economic crisis influenced this hierarchy, but more significantly the value invested in Romania, so that during the period 2009 – 2012, the biggest investors were Netherlands (4,827 million EUR), Austria (1,734 million EUR) and France (992 million EUR).

If we take into account the FDI regarding the economic activity in which it was invested, we notice, based on data presented in table 3, that the financial intermediation and manufacturing attracted almost 50% from the total FDI during the period 2005 – 2012. Moreover, a higher increase in the period of economic crisis was recorded for investments in research and development.

For Romania, the situation is different, because the main economic activity which attracts the highest value of FDI is represented by manufacturing. Due to the

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economic crisis, the FDI flows into manufacturing sector decreased by almost 60% during the period 2009 – 2012, compared with the period 2005 – 2008.

Table 3. *FDI in CEE countries split by economic activities (billion EUR)*

Economic activity	Period 2005 - 2012		Average FDI 2005 - 2008	Average FDI 2009 - 2012	Modification (%)
	Total	Share			
Financial intermediation	65.30	27.5%	10.70	5.62	-47.5%
Manufacturing	45.17	19.0%	8.37	2.93	-65.0%
Real estate activities	35.46	14.9%	7.39	1.48	-80.0%
Research and development	22.51	9.5%	0.12	5.51	4393.2%
Electricity, gas	18.84	7.9%	1.84	2.87	55.7%
Wholesale trade	14.95	6.3%	2.90	0.84	-71.1%
Construction	14.77	6.2%	2.61	1.08	-58.5%
Post and communications	11.11	4.7%	2.41	0.36	-84.9%
Hotels and restaurants	6.89	2.9%	0.77	0.95	22.4%
Agriculture	2.47	1.0%	0.34	0.28	-18.8%

Legend: The table presents the total value of FDI for CEE countries split by economic activities expressed in billion EURO. The column Share denotes the percentage of FDI value for each economic activity in the total value of FDI in CEE countries for the same period. At the same time the table presents the average FDI per economic activity for two important sub periods: 2005 – 2008 and 2009 – 2012, as well as the percentage evolution between these two sub periods. Data were obtained from each national bank of CEE countries, being collected during July to August of 2015.

5. RESULTS

In order to capture through the regression model the characteristics of the selected variables (all being time series), we apply the Levin, Lin and Chu (LLC) test to see if the time series are stationary or not. According to the results presented in table 4 all series are stationary, except unemployment rate.

Table 4. *Stationarity Test Results*

LCC	Variables						
	FDI	InternetSub	YearSchool	GDP	OpenTrade	Inflation	Unemployment
t-statistic	-2.0161	-11.3145	-5.5430	-4.5222	-4.2709	-6.6268	-1.1823
p-value	0.0219	0.0000	0.0000	0.0000	0.0000	0.0000	0.1185

Legend: LLC stands for the Levin, Lin and Chu (2002) test where the null hypothesis that each individual time series is a unit root is tested against the alternative that all of them are stationary

One-step GMM estimation results for baseline model and also for robustness check models are presented in table 5, which also contains the Sargan test value for each model.

We are able to see that almost all coefficients estimated are statistically significant. Moreover, we can notice that all types of determinants have a significant impact on FDI.

The coefficient of lagged dependent variable is positive and statistically significant.

Table 5. *GMM estimation results*

Determinant type	Variables[a]	Basic model	Model 1	Model 2	Model 3
Time component	FDI(-1)	0.2968*** (0.0859)[b]	0.2706*** (0.0849)	0.2651*** (0.0936)	0.2712*** (0.0944)
Crisis	Crisis	-0.0319*** (0.0121)	-0.0447*** (0.0103)	-0.0438*** (0.0108)	-0.0476*** (0.0126)
Infrastructure	InternetSub	0.1501* (0.0339)	0.0348 (0.0401)	0.0815** (0.0352)	0.0928** (0.0425)
Human capital	YearSchool	-0.0318** (0.0156)	-0.0244 (0.0161)	-0.0352** (0.0354)	-0.0325** (0.0165)
Economic stability	GDP	0.1501* (0.0805)			
	OpenTrade		0.0540* (0.0273)		
	Inflation			-0.0379 (0.1270)	
	Unemployment				0.0992 (0.1522)
Sargan test		73.9508 [0.4900][c]	77.3964 [0.6000]	72.2062 [0.4300]	71.3123 [0.4000]

Notes: [a] – dependent variable is represented by foreign direct investments; [b] - (standard errors in parentheses); [c] – [P-value for Sargan test]; *, **, *** - Indicates significance at the 0.1 level, 0.05 level and 0.01 level.

The implication is that the investment attractiveness of a country depends on previous investments behavior, that is why it is important for the host country to apply sustainable policies which promote the FDI on a long term period not only in the short run.

Infrastructure influences positively the level of FDI attracted by a country, while the human capital affects it negatively. The chosen proxy for infrastructure was represented by the number of internet subscriptions per 100 persons, so it is

logic that a country with a better telecommunication infrastructure to be preferred instead of another country with less developed infrastructure. At the same time, the average year of schooling seems to affect negatively the FDI level. Even if at a first glance, this result is strange, if we analyze in more depth we can understand that a higher educated population means higher costs for a multinational corporation regarding the salaries. That is the reason why a MCN that invests in a country prefers the one with lower educated persons, which in the end is cheaper compared with a country having a higher rate of educated persons.

Economic stability is very important in attracting FDI, because the GDP is the main indicator of a country economic situation, which explains why a host country with a higher growth rate of the GDP will attract more FDI.

But the variable of higher interest in this paper is represented by the economic crisis. Based on the results presented in table 5, the coefficient of crisis variable is negative and highly statistically significant at FDI level (99% confidence level). The implication is that the investment attractiveness of a country was affected by the economic crisis, in such a way that some of countries reallocate their investments or that the level of investment they made decreased significantly.

6. CONCLUSIONS

This paper aimed at capturing the main impact of economic crisis on FDI level in Central and Eastern Europe. Based on the GDP growth evolution we pointed out that CEE countries have experienced the economic crisis more aggressively after the beginning of 2009, due to the fact that GDP growth has fallen from 19.31% in 2008 to -15.73% in 2009.

When dividing FDI flows by origin countries, we can see that the major investors are Germany (46 billion EUR), Austria (39 billion EUR) and the Netherland (33 billion EUR), which invested almost 50% from the total FDI in the CEE countries in the period 2005 – 2012. Among the first 20 investors for CEE countries we found only European countries, with the exception of the United States of America, which invested almost 3% from the total FDI. At the same time, we highlighted that Austria, Belgium, Switzerland, Germany, France, Italy, Netherlands, Sweden and Denmark are the only countries which invested in all countries from the CEE region, including Romania.

The main economic activities which attracted almost 50% from the total FDI during the period 2005 – 2012 are financial intermediation and manufacturing. For Romania the situation is different, because the main economic activity which attracts the highest value of FDI is represented by manufacturing.

Going deeply, we were able to highlight that all countries reduced their investments in CEE countries in the main two years of economic crisis in a significant way, with few exceptions: Netherlands increased the investments in Croatia; Luxembourg increased the investments in Poland and Croatia; Switzerland increased the investments in Hungary and Croatia; United Kingdom increased the investments in Czech Republic, Hungary, Slovenia and Latvia; Sweden increased the investments in Poland and Croatia; Italy increased the investments in Poland, Bulgaria, Hungary, Croatia and Lithuania; Belgium increased the investments in Romania.

When analyzing the recovery trend after the peak of economic crisis and comparing the difference in FDI per origin country, for the period 2005 – 2008 and 2009 – 2012, we found that Italy overpassed the economic crisis effects and started to increase the FDI flows in the CEE countries. Despite this, Romania and Czech Republic are not as attractive as before the economic crisis, so the level of FDI invested is the smallest.

When we took into account consolidated data for CEE region, we were able to see that the investments in the period 2009 – 2012 decreased with almost 60% compared with the period 2007 – 2008, while for the period 2009 – 2012 the FDI flows to the CEE countries recorded a very small improvement, but the decrease recorded is still high – 50%.

Based on our research we pointed out that only Poland overpassed the economic crisis more quickly compared with the others countries. We noticed that during the period 2009 – 2012 the three main investors (Austria, Germania and France) started to increase the FDI flow towards Poland. The others countries tried hard to fight in order to recover after the economic crisis, but even after four years after the peak of economic crisis, the countries did not succeed to reach at least the level of FDI existing before the beginning of the crisis.

Based on one-step GMM estimation results we found that all types of determinants (time component, infrastructure, crisis, human capital and economic stability) have a significant impact on FDI. Investment attractiveness of a country

depends on previous investments behavior, which is why it is important for the host country to apply sustainable policies which promote the FDI on a long term period not only on a short term.

Regarding infrastructure, a country with a better telecommunication infrastructure will be preferred against a country with undeveloped infrastructure. Moreover, a higher educated population means higher costs for a multinational corporation regarding the salaries. That is the reason why when a MCN will choose to invest in a country, it will select the country having lower educated persons, which in the end is cheaper compared with a country having a higher rate of educated persons. At the same time, economic stability is very important in attracting FDI, that is why a host country with a higher growth rate of GDP will attract more FDI.

The most important variable in our analysis, crisis, has a negative and high impact on FDI level (99% confidence level). The economic crisis affected the attractiveness of a country, therefore some of the countries reallocated their investments or the level of investments decreased significantly after the start of the economic crisis.

Our results emphasize the existing literature (Blăjuţ, 2015) which states that location advantages are extremely important to attract FDI, such as education level, unemployment rate or infrastructure, as we showed in this paper.

Our results are important in supporting the regulatory environment of a country, in order to attract more FDI as a solution to recover the economy affected by the economic crisis. By knowing the most important determinants of FDI can help authorities to improve the public policies.

These results complete our findings from previous papers regarding FDI (Dornean et al., 2012b; Dornean and Oanea, 2013) in which we analyzed the impact of the recent crisis on FDI for the case of Romania, for Central and Eastern Europe countries (from EU) and even for all European Union countries. We found that the level of economic growth influenced the level of FDI, still within the same year. In comparison with our previous research in which we studied the economic growth as a FDI determinant, the current study tackles other FDI determinants. Further research can continue our study in order to see how changes in public policies stimulate FDI.

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IMPACT OF THE IFRS ADOPTION ON FINANCIAL ASSETS AND LIABILITIES. EMPIRICAL EVIDENCE FROM BUCHAREST STOCK EXCHANGE

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Abstract: *The aim of this paper is to study the impact of the transition to IFRS on financial assets and liabilities reported by non-financial companies listed on the Bucharest Stock Exchange. It uses data from the individual financial statements for the comparative year 2011, prepared under both Romanian accounting standards (RAS) and IFRS. Through a set of financial ratios involving information from balance sheet, income statement and cash flow statement, we study how the IFRS adoption affected financial assets and liabilities. We also test the empirical correlation between profitability (measured by ROE) and financial assets/ liabilities before and after the transition to IFRS. We find that financial instruments are very little affected by the change in the accounting system. However, the association between ROE and financial assets/ liabilities is of greater intensity for the IFRS data.*
Keywords: *IFRS adoption, financial assets, financial liabilities, ROE, financial ratios*
JEL classification: *M41, G11*

1. INTRODUCTION

The history of the IFRS implementation in Romania is interesting and original. As an ex-communist country, Romania shifted from the soviet accounting system towards a market economy model of accounting early in the '90s. The shift was made by adopting a French inspired model (and not an Anglo-Saxon one) due to the long and close historical, economic, political and social relationships built up between the two countries over a long period (Albu et al, 2014).

The IAS/IFRS adoption only came into play in the late '90s following requests made by the International Monetary Fund and World Bank, as part of the

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financial agreements contracted by Romanian authorities at that time (Ionascu et al., 2014). This was the first attempt to implement the international standards and, even though it was not a very successful one, it gave the Romanian companies the opportunity to get acquainted with the accounting rules issued by the IASC (prior to 2001, the international standard-setter was referred as the International Accounting Standards Committee). The second attempt, dated in 2006, was induced by the preparations for Romania's adhesion to the EU. It was when the IFRS became mandatory for the consolidated accounts of listed companies (starting with January 1st 2007). Even though, at that time, an option to choose between the European directives and the IFRS existed for non-financial unlisted entities (for their consolidated accounts), few non-financial companies truly exercised it. Nonetheless, the regulations applicable to those entities comprised some IFRS rules, introduced during the 1st attempt, that were not removed as they were not conflicting with the provisions of the European accounting directives. In the context of this existing IFRS experience, the 3rd attempt to adopt IFRS was made in 2012 when all listed companies were required to use the international standards in their individual accounts starting with…2012. Unlike previous attempts, this time entities were given virtually no preparation time to implement the IFRS.

Under these circumstances, our paper investigates the successfulness of this 3rd attempt by conducting an empirical analysis on *the impact of the IFRS adoption on accounting numbers related to financial assets and liabilities*. Firstly, it focuses on non-financial companies as accounting rules regarding financial instruments (e.g. *IAS 39 Financial Instruments: Recognition and Measurement*) are applicable by all companies and previous research argues that this subject is also of great interest for non-financial entities. Findings by Gebhardt, 2012, Huian, 2013a and Huian, 2013b show that, given the amount of financial assets and liabilities reported in the non-financial entities' balance sheets, many of them expect the provisions of this IAS to significantly impact their financial statements. Secondly, our paper examines the association between financial performance (measured as return on equity - ROE) and data on financial assets and liabilities presented in the balance-sheets of Romanian listed non-financial companies. This profitability measure is largely used in the literature studying the consequences of the IFRS adoption on the accounting outcomes (Istrate, 2014, Cordazzo, 2013). The test is performed for both pre-IFRS and IFRS data for the comparative year 2011 as to

better emphasize the impact of the IFRS adoption. In our opinion, explaining this connection by using 2 sets of data (prepared under domestic rules – Romanian accounting standards - RAS and IFRS, respectively) for the same fiscal year has the merit of exclusively showing the effects of the change in accounting system on the selected variables. Analysis performed for longer periods (a few years before and after the transition) usually deals with the integrated influence of several factors, some not directly related to the IFRS implementation, factors whose investigation is beyond the scope of this paper.

For the first line of research, findings are that financial assets and liabilities seem to be barely affected by the transition to IFRS. Results for the 2nd test show there is a connection of reasonable intensity between ROE and the accounting numbers related to some financial assets and liabilities which has a higher intensity after the IFRS adoption.

Our contribution to the literature mainly consists of: *empirically assessing the impact of IFRS adoption on accounting outcomes in Romania*. This subject has been thoroughly investigated in the last few years but empirical evidence on its effects is still scant; examining *the relationship* between *financial assets/ liabilities* and *profitability measures* (ROE) for *non-financial listed companies*, before and after the transition to IFRS. Studying this particular subject on non-financial companies (that use a great variety of less sophisticated financial instruments – Gebhardt, 2012, Huian, 2015) is an interesting challenge as usually the emphasis is placed on the financial industry (considered the main user of financial instruments); *providing evidence on the nature and size of RAS-IFRS differences* as far as financial assets and liabilities are concerned; developing the research on *accounting and reporting for financial instruments* in Romania, as an emergent economy.

The rest of the paper is organized as follows: section 2 deals with the literature review and development of hypotheses, section 3 describes the research methodology, section 4 discusses the results and section 5 concludes the paper.

2. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Ever since the European Commission has made public its intention to mandatorily require the use of IFRS in the consolidated accounts of the publicly traded companies by 2005, the literature on the transition to IFRS has known a

tremendous development. According to Bruggemann et al., 2013, the studies dealing with the subject of the IFRS adoption investigate 3 types of economic consequences or effects: financial reporting effects, capital market effects and macroeconomic effects.

As our paper is included in the 1st category, we further present a brief literature review of *studies examining the financial reporting effects*. This category focuses mostly on the enhanced transparency and comparability of the financial statements and it is subdivided, by the same authors, in 3 strands of research. The 1st one *comprises studies emphasizing the compliance with the IFRS and the accounting choices*. This strand includes a rather limited number of articles that mostly find lack of compliance and significant variation in IFRS policy choices. Verriest et al., 2011 report substantial heterogeneity across companies in terms of IFRS disclosure and compliance issues, while Kvaal and Nobes, 2011 document a continuation of the national patterns in the IFRS practice which casts doubts over the comparability of financial statements. The 2nd strand includes *papers analyzing the properties of accounting numbers* (such as earnings smoothing, conditional conservatism or discretionary accruals). Ahmed et al., 2013 find evidence of increased income smoothing and reporting aggressiveness of accruals which overall suggest a decrease in accounting quality after the IFRS adoption. Christensen et al., 2015 show an increase in accounting quality for firms with incentives to adopt IFRS (which are voluntary adopters) and no improvement of quality for forced adopters. The 3rd strand of literature investigating financial reporting effects refers to *value relevance articles* showing mixed results. Few papers find increased value relevance of financial reporting after the adoption: Schadewitz and Vieru, 2007 report it for earnings, others document a decline in relevance of financial reporting: Callao et al., 2007 and many argue there is a rather limited or no improvement at all in value relevance: Filip and Raffournier, 2010; Dobija and Klimczak, 2010, Tsalavoutas et al., 2012; Aledo and Abellan, 2014.

Romanian literature on the subject of the IFRS adoption and its consequences is also mostly included in the stream dealing with financial reporting effects. It is divided in 2 major categories.

A.   *Studies of perceptions of stakeholders* (users, preparers, auditors, accounting professionals, academics) that rely on questionnaire-based surveys and interviews (Ionaşcu et al., 2014) to investigate: a) the cost of the IFRS adoption.

While Ionaşcu et al., 2007 find that IFRS implementation in Romania comes at low costs mostly due to it being only partial at the time of the research, Dănescu et al., 2013 argue that it involves high costs to train the personnel, to adjust software and reporting systems and to audit the accounts. Albu and Albu, 2012 identify several types of costs affecting not only the companies, but the regulators as well. Results of a questionnaire-based survey conducted by Gîrbină et al., 2012 in the banking system reveal many concerns regarding the implementation costs in this particular industry; b) the benefits of the IFRS adoption. According to Ionaşcu et al., 2011, the perceived benefits can be divided into desirable effects (increased quality of accounting information) and economic benefits. The latter are further detailed by Săcărin et al., 2013, who identify advantages such as transparency, comparability, attractiveness to investors, decreased cost of capital, greater relevance for managers, etc.;

B.   *Empirical evidence on the impact of the IFRS implementation*. These studies test: a) the level of conformity/compliance of numbers and disclosures by using various indexes of comparability. Istrate, 2014, applying the Gray index, reports mixed results with increases in equity and leverage and decreases in profitability ratios. His latter results confirm prior research of Săcărin, 2013 who finds a low impact of IFRS on net income. On the other hand, Tiron-Tudor and Raţiu, 2010 state, based on the Cook disclosure index, that there is an improved transparency in the consolidated financial statements. b) the value relevance of accounting information. Filip and Raffournier, 2010 find very limited value relevance increase of earnings, Mihai et al., 2012 show the cost of capital decreases after the adoption, while Mironiuc et al., 2015 argue for an increased value relevance of net income and comprehensive income.

A significant stream of literature at European level argues for different effects of transition to IFRS when adoption is mandatory as opposed to the voluntary one. The 2012 adoption in Romania is a forced one, imposed by Romanian authorities, therefore we provide evidence on the nature and size of RAS-IFRS differences for mandatory adopters. The IFRS impact is significantly influenced by the company's institutional environment (Bruggemann et al., 2013). This is defined by the legal system (code law or common law), enforcement regime and development of capital market. In this context, a classification of financial reporting at European level is useful as it enables the prediction of behavior for

certain countries regarding the IFRS adoption. Using Nobes' classification (Nobes, 2008), we include Romania in Class B which corresponds to the accounting systems shaped by weak levels of investor protection, strong governmental regulations and tax-dominated practices (other Romanian authors follow the same route – Istrate, 2014). In class B systems, accounting data has been traditionally used to fulfil taxation purposes, with state seeing itself as the main user of financial statements, and not to inform capital providers, which are the main users according to the IFRS philosophy. Completely decoupling tax and financial reporting in countries from class B, as required by the transition to IFRS, poses a major practical problem. Therefore, in such countries, the IFRS conversion does not represent a simple translation from domestic standards to IFRS but a massive change in accounting principles and the whole basis of financial reporting (Cordazzo, 2013).

Romania is an emergent country in which accounting is rule-based (while IFRS are principle-based standards), taxation is given a particular importance, capital market is less developed and mostly inefficient, accounting profession is less focused on professional judgment and more on compliance with technical rules (Albu et al., 2014). This makes it a candidate for an economic setting in which transition to IFRS would have significant consequences on accounting outcomes. Therefore, we formulate the following hypothesis regarding the impact of the IFRS adoption on financial assets and liabilities of non-financial listed companies:

H₁: The adoption of the IFRS by Romanian non-financial companies significantly affected financial assets and liabilities reported in their individual financial statements.

Moreover, as the population analyzed is represented by non-financial entities, we want to test the idea that there is a certain association between their performance (measured as ROE) and the information on financial assets and liabilities. Even though derivatives or hybrid instruments are rarely used by non-financial entities, some other financial assets/ liabilities represent a significant part of their total assets/liabilities. As demonstrated by Gebhardt, 2012 and Huian et al., 2014, receivables are the most important class of financial assets for these companies, followed by cash and cash equivalents. Similar results are found for liabilities where accounts payable and short and long-term loans payable are the most reported financial liabilities. This leads to our second hypothesis:

H_2: *Financial assets and liabilities have an impact of measurable intensity on profitability of Romanian companies.*

To connect this hypothesis with the 1st one, we further test a sub-hypothesis **H_{2a}**: *The impact is more significant under IFRS than RAS*. This test is based on the explanatory power (R^2) of the models, which must be greater for the IFRS data than for the RAS data.

3. RESEARCH METHODOLOGY

This section discusses the variables used in the research, the financial data and its descriptive statistics and describes the methods of data analysis and the proposed models.

Discussion of Variables

As the main purpose is to demonstrate the impact of the IFRS adoption on financial assets and liabilities of non-financial companies, *all individual balance sheets are manually reclassified to properly show the application of IAS 39 "Financial instruments: recognition and measurement"*. The IAS 39's version endorsed by the European Commission for the analyzed reporting period is used. The reclassification consists of regrouping assets in 3 major classes: financial assets within the scope of IAS 39 (FA_{IAS39}), financial assets outside the scope of IAS 39 ($FA_{nonIAS39}$) and non-financial assets (NFA); and liabilities in 2 classes: financial liabilities within the scope of IAS 39 (FL_{IAS39}) and non-financial liabilities (NFL). These data are structured following both IAS 39 and IFRS 7 "Financial instruments: disclosures", as the information from balance sheets is corroborated with the one provided in the footnotes.

Data from these reclassified balance sheets are used to compute 23 financial ratios (*table 1*) selected as variables included in testing the 2 hypotheses previously described.

Table 1: *Numerical variables included in the analysis*

Ratios	Formulas	Explanations
Financial assets (IAS 39) percentage of total assets R_{aft}	$R_{aft} = \dfrac{FA_{IAS39}}{TA}$	Indicates the relationship of financial assets to its base – total assets
Accounts receivable percentage of total assets R_{art}	$R_{art} = \dfrac{AR}{TA}$	Shows the relationship of accounts receivable to total assets

Ratios	Formulas	Explanations
"Loans and receivable" percentage of total assets R_{lrt}	$R_{lrt} = \dfrac{LR}{TA}$	Indicates the relationship of "loans and receivables" to total assets
Accounts receivable percentage of financial assets R_{arf}	$R_{arf} = \dfrac{AR}{FA_{IAS39}}$	Measures the relationship of accounts receivable to financial assets within the scope of IAS 39
"Loans and receivable" percentage of financial assets R_{lr}	$R_{lr} = \dfrac{LR}{FA_{IAS39}}$	Indicates the relationship of "loans and receivables" to financial assets within the scope of IAS 39
Financial assets (IAS 39) percentage of total financial assets R_{af}	$R_{af} = \dfrac{FA_{IAS39}}{TFA}$	Shows the relationship of financial assets within the scope of IAS 39 to total financial assets
Financial assets (non-IAS 39) percentage of total financial assets R_{oaf}	$R_{oaf} = \dfrac{FA_{nonIAS39}}{TFA}$	Shows the relationship of financial assets not within the scope of IAS 39 to total financial assets
Financial liabilities percentage of total liabilities + stockholders' equity (L+SE) R_{flt}	$R_{flt} = \dfrac{FL}{L+SE}$	Indicates the relationship of financial liabilities to total liabilities + stockholders' equity
Financial liabilities percentage of total liabilities R_{lt}	$R_{lt} = \dfrac{FL}{L}$	Indicates the relationship of financial liabilities to total liabilities
Accounts payable percentage of L+SE R_{apt}	$R_{apt} = \dfrac{AP}{L+SE}$	Shows the relationship of accounts payable to total liabilities + stockholders' equity
Debt percentage of L+SE R_{dt}	$R_{dt} = \dfrac{D}{L+SE}$	Shows the relationship of debt to total liabilities + stockholders' equity
Accounts payable percentage of liabilities R_{apl}	$R_{apl} = \dfrac{AP}{L}$	Indicates the relationship of accounts payable to liabilities
Debt percentage of liabilities R_{dtl}	$R_{dtl} = \dfrac{D}{L}$	Measures the relationship of debt to liabilities
Accounts payable percentage of financial liabilities R_{apf}	$R_{apf} = \dfrac{AP}{FL}$	Shows the relationship of accounts payable to financial liabilities
Debt percentage of financial liabilities R_{dfl}	$R_{dfl} = \dfrac{D}{FL}$	Indicates the relationship of debt to financial liabilities
Financial leverage ratio R_{finind}	$R_{finind} = \dfrac{FL}{SE}$	Shows the company's degree of dependence on financial liabilities

Ratios	Formulas	Explanations
Financial solvency ratio R_{alf}	$$R_{alf} = \frac{FA_{IAS39}}{FL}$$	Indicates if financial assets are enough to pay debt
Financial debt ratio R_{dr}	$$R_{dr} = \frac{FL}{FA_{IAS39}}$$	Measures the percentage of financial assets financed with debt
Quick Ratio R_{cd}	$$R_{cd} = \frac{Cash\_CashEquiv}{D_{ST}}$$	Measures ability to pay short-term debt with cash and cash equivalents
Return on financial assets R_{ofa}	$$R_{ofa} = \frac{Net\ income}{FA_{IAS39}}$$	Indicates how profitably a company uses its financial assets
Capacity of repayment ratio R_{ocf} and R_{ocf2}	$$R_{ocf} = \frac{AP}{OCF}$$ and $$R_{ocf2} = \frac{FL}{OCF}$$	Indicates how many years it takes to pay accounts payable (R_{ocf}) or financial liabilities (R_{ocf2}) with operating cash flows
Re-investment rate R_{inv}	$$R_{inv} = \frac{FA_{IAS39}}{ICF + FCF}$$	Shows weight of financial assets within the scope of IAS 39 in investing and financing cash flows.

Legend: FA_{IAS39} – financial assets within the scope of IAS39; TA – total assets; AR – accounts receivable; LR – loans and receivables; TFA – total financial assets; $FA_{nonIAS39}$ – financial assets not within the scope of IAS 39; L + SE – liabilities + stockholders' equity; AP – accounts payable; D- debt (short-term + long-term); L – liabilities; FL – financial liabilities within the scope of IAS39; Cash_CashEquiv – cash and cash equivalents; D_{ST} – short-term debt; OCF – operating cash flows, ICF + FCF – investing cash flows + financing cash flows

19 of these ratios use only balance sheet information and measure the relationship between total financial assets/ liabilities (and the major classes of financial assets/ liabilities) and total assets/ total liabilities + stockholders' equity. 3 of those 19 ratios emphasize the connection between financial assets and financial liabilities (R_{alf}, R_{cd} and R_{dr}). The remaining 4 ratios take into account data from the income statement (R_{ofa}) and the statement of cash flows (R_{ocf}, R_{ocf2} and R_{inv}) to show the relationship to other financial statements.

To test the 2nd hypothesis, a profitability measure, Return on Equity (ROE) is used. ROE is one of the most popular measures of performance due to its importance to both investors and managers. It is a way of assessing management's ability to properly use capitals provided by shareholders [Mironiuc, 2006, p. 379]. ROE relies heavily on the company's financial structure and is influenced by its level of indebtedness.

Data source and characteristics of the analyzed population

Our study is performed on a population of 65 non-financial entities quoted on the Bucharest Stock Exchange (BSE), on the regulated market, for the period 2011-2012. Only companies that have been listed on the BSE for the whole period are included. Financial data is hand-collected in a mediated manner from the annual individual financial statements available on the companies' websites and/or the BSE's website. Data processing is performed using the IBM Statistical Package for the Social Sciences, version 23.0. The analysis period is limited to 1 fiscal year, 2011, due to the fact that it allows for comparisons as it is the only year for which 2 sets of data are available. Initially, the 2011 financial statements were prepared according to the Romanian regulations, thereafter referred as Romanian Accounting Standards (RAS). When restating the information for 2012 according to the IFRS, comparative data for 2011 under IFRS were also provided.

To better interpret the research results, we characterize the population in terms of financial assets and financial liabilities through a series of 23 ratios calculated in the *table 2*.

Table 2: *Descriptive statistics of financial ratios*

No. crt.	Ratio	RAS		IFRS	
		Mean	Std. Deviation	Mean	Std. Deviation
1	R_{aft}	0,2608	0,1794	0,2639	0,1854
2	R_{art}	0,1598	0,1393	0,1687	0,1468
3	R_{lrt}	0,2329	0,1686	0,2366	0,1693
4	R_{arf}	0,6312	0,3078	0,6534	0,2979
5	R_{af}	0,9018	0,1817	0,8985	0,1792
6	R_{oaf}	0,0982	0,1817	0,1015	0,1792
7	R_{lr}	0,9100	0,1816	0,9175	0,1717
8	R_{flt}	0,3461	0,2953	0,3471	0,3028
9	R_{lt}	0,7290	0,2271	0,6964	0,2359
10	R_{apt}	0,1360	0,1657	0,1335	0,1652
11	R_{dt}	0,1657	0,1767	0,1895	0,2060
12	R_{apl}	0,3136	0,2127	0,2968	0,2145
13	R_{dtl}	0,3674	0,2937	0,3729	0,2837
14	R_{apf}	0,4831	0,3221	0,4745	0,3157
15	R_{dfl}	0,4639	0,3341	0,4904	0,3320

No. crt.	Ratio	RAS		IFRS	
		Mean	Std. Deviation	Mean	Std. Deviation
16	R_{alf}	2,9366	7,4168	2,9530	7,4762
17	R_{dr}	2,7705	5,5753	2,7806	5,6079
18	R_{cd}	0,4793	0,9432	0,5026	1,0178
19	R_{finind}	2,2449	20,2899	0,8459	5,7791
20	R_{ofa}	-0,4890	2,6932	-0,6307	3,1377
21	R_{ocf}	1,1876	7,5553	1,6136	24,1365
22	R_{ocf2}	5,7006	22,7190	0,0339	68,4764
23	R_{inv}	28,2603	269,7400	25,8673	269,6572

According to *table 2*, financial assets represent, on average, 26% of total assets of Romanian non-financial listed companies (R_{aft}). Of all financial assets, accounts receivable are the most common (R_{arf} is more than 63% of total financial assets within the scope of IAS 39). Accounts receivable combined with cash and cash equivalents, which are called "loans and receivables" in IAS 39, are, on average, 91% of all financial assets (R_{lr}), which means that derivatives and other short-term or long-term investments account for less than 10%. These findings are similar to the ones of Gebhardt, 2012 for non-financial companies included in the STOXX Europe 600 Index.

In terms of liabilities, the financial ones are almost 35% of total liabilities + stockholders' equity. The rest of 65% are non-financial liabilities (payroll, taxes, leases, provisions, government grants, etc.) and stockholders' equity. The mean financial liabilities are around 70% of all liabilities (R_{lt}). The most important financial liabilities are accounts payable (R_{apf} is around 48%) and short and long-term debt (R_{dfl} has almost the same weight as R_{apf}). Again, results are consistent with the ones provided by Gebhardt, 2012.

Mean financial solvency ratio (R_{alf}) is more than 2.90 which is way above the 1.66 limit considered in the literature the threshold for insolvency [Mironiuc, 2006, p. 284]. Therefore, the companies in the sample have, on average, enough financial assets to pay their financial liabilities. This might be due to the significant weight of accounts receivable in total financial assets as, in terms of short-term liquidity, the quick ratio (R_{cd}) averages at around 0.5 (which is below the acceptable threshold of 0.8 to 1 – Harrison and Horngren, 2008, p. 697). Thus, the

non-financial companies in the sample do not possess, on average, the ability to pay short-term debt with their most liquid assets. Financial leverage ratio (R_{finind}) has a mean of 2.24 for the RAS dataset which exceeds the benchmark of 2 [Mironiuc, 2006, p. 285] deemed as the threshold from which banks no longer accept to finance a business. Return on financial assets (R_{ofa}) has negative average values showing that Romanian listed companies are not successful in using financial assets to earn profits. Capacity of repayment ratio (R_{ocf}) shows that it takes more than 1 year to pay accounts payable with the operating cash flows, which might be worrisome. The mean of R_{ocf2} is so different for IFRS than RAS due to the severe skewness of data; therefore, we analyze the median R_{ocf2} which is 1.82 years for IFRS and 1.58 for RAS - this means it takes more than 1.5 years to pay all financial liabilities with cash flows from operating activities.

Methods for data analysis and proposed models

In order to test the 1st hypothesis, we compare the 2 sets of financial ratios computed under RAS and IFRS in *relative figures*, by using an index of comparability (IC) adapted by Istrate, 2014 after Gray's comparability index. We apply the following formula:

$$IC = 1 – [(IFRS\ numbers – RAS\ numbers)/\ |RAS\ numbers|] \tag{1}$$

To interpret the results, we follow the Gray scale of conservatism stating that an IC>1.05 shows IFRS figures are below RAS (which is referred as conservatism), an IC between 0.95 and 1.05 shows IFRS and RAS figures are very close (neutrality), and an IC< 0.95 means IFRS figures are greater than RAS (optimism).

Subsequently, we identify the main causes of the documented changes in financial assets and liabilities figures through the *content analysis* of the footnotes to financial statements.

To test the 2nd hypothesis, i.e. to analyze whether financial assets and liabilities have a significant impact on financial performance measured by ROE, we use *multiple linear regression* for which we develop 3 models based on the general equation (2).

$$Y_t = \alpha_0 + \beta_1 \cdot X_{1t} + ... + \beta_n \cdot X_{n_t} + \varepsilon \tag{2}$$

Where, Y is the dependent variable (ROE), β_i are the regression coefficients measuring the change of the dependent variable generated by the independent ones

(X_i- the financial ratios) taken into account. The residual variable (ε) sums up the influence of other variables not included in the model. The association between ROE and the series of ratios related to financial assets and liabilities is studied separately for both sets of data: RAS and IFRS.

The 1st model takes into account only ratios involving financial assets and liabilities whose amounts are presented in the balance sheet (ratios 1 to 18 from *table 2*). The 2nd model uses as independent variables, ratios (19 to 23) that involve other balance-sheet structures (e.g. equity), income statement items (e.g. net income) and cash flow statement structures (operating, investing and financing cash flows). The 3rd model combines the other two, using all 23 ratios.

In all 3 models, the dependent variable is naturally log transformed to ensure the normal distribution of data (Jaba and Grama, 2004). According to Osborne, 2002, the natural-log transformation reduces the skewness and kurtosis in the raw data and does not change the relationship between variables.

4. RESULTS AND DISCUSSIONS

The 1st hypothesis seeks for answers to the question what was the *impact of the IFRS adoption* on financial assets and liabilities of Romanian listed companies measured through the set of *23 ratios* computed above? In relative terms (see *table 3*) the items *least* affected by the transition to IFRS are those involving (short-term) debt, accounts payable, loans and receivable and total financial assets/liabilities (R_{flt}, R_{dr}, R_{af}, R_{alf}, R_{lr}). The ones *most* affected, in relative terms, are actually ratios that involve other items besides financial assets and liabilities (R_{ocf2}, R_{finind}, R_{ocf}, R_{ofa}, R_{inv}) such as operating cash flows, equity or net income (the IC shows either conservatism or optimism). Thus, other structures of the financial statements are more significantly impacted by the change of the accounting rules. For example, stockholders' equity seems to increase after the IFRS adoption, confirming the findings of Cordazzo, 2013, Istrate 2014 and Callao et al., 2010.

Overall, 14 of the 23 ratios (more than 60%) record changes that range from -5% to +5%, which can be interpreted, according to the IC scale, as a neutral impact of IFRS implementation (because IFRS and RAS lead to very close figures –IC is between 0.95 and 1.05).

Table 3: *Mean Index of Comparability (IC)*

No. crt.	Ratio	RAS - Mean	IFRS - Mean	% change of mean (IFRS/RAS)	IC
1	R_{aft}	0,2608	0,2639	1,19	0.988
2	R_{art}	0,1598	0,1687	5,57	0.944
3	R_{lrt}	0,2329	0,2366	1,59	0.984
4	R_{arf}	0,6312	0,6534	3,52	0.965
5	R_{af}	0,9018	0,8985	-0,37	1.004
6	R_{oaf}	0,0982	0,1015	3,36	0.966
7	R_{lr}	0,9100	0,9175	0,82	0.992
8	R_{flt}	0,3461	0,3471	0,29	0.997
9	R_{lt}	0,7290	0,6964	-4,47	1.045
10	R_{apt}	0,1360	0,1335	-1,84	1.018
11	R_{dt}	0,1657	0,1895	14,36	0.856
12	R_{apl}	0,3136	0,2968	-5,36	1.054
13	R_{dtl}	0,3674	0,3729	1,50	0.985
14	R_{apf}	0,4831	0,4745	-1,78	1.018
15	R_{dfl}	0,4639	0,4904	5,71	0.943
16	R_{alf}	2,9366	2,9530	0,56	0.994
17	R_{dr}	2,7705	2,7806	0,36	0.996
18	R_{cd}	0,4793	0,5026	4,86	0.951
19	R_{finind}	2,2449	0,8459	-62,32	1.623
20	R_{ofa}	-0,4890	-0,6307	28,98	0.710
21	R_{ocf}	1,1876	1,6136	35,87	0.641
22	R_{ocf2}	5,7006	0,0339	-99,41	1.994
23	R_{inv}	28,2603	25,8673	-8,47	1.085

A more detailed analysis made company by company showed there were ratios for which no change of value was recorded at all when applying the IFRS. The percentage of items that remained unchanged ranged from 52.3 for R_{cd} to 46.2 for R_{af}, 40% for R_{lr} and 36.9% for R_{dfl} to only 7.7 for R_{aft}, R_{art}, R_{lrt} or R_{apt}. This means that 52.3% of companies reported the same amount of cash/cash equivalents and short-term debt under both RAS and IFRS, 46.2% of entities presented the same amount of financial assets, etc. At the same time, only 7.7% of firms displayed an unchanged relationship between financial assets/liabilities, on one hand, and total assets/ liabilities + stockholders' equity, on the other hand. This confirms the previous assumption that ratios more impacted are the ones involving other financial statements structures (such as stockholders equity, net income, cash flows).

Causes of changes in financial assets, identified after careful analysis of the footnotes, are:

1. Recognition of service revenues and the corresponding receivables, according to IAS 18 Revenue;
2. Revaluation of some long-term financial assets due to the hyperinflationary conditions of Romanian economy prior to 2004;
3. Use of fair value measurement for some assets previously measured at cost;
4. Reclassification of some long-term financial assets (receivables or investments such as bank deposits) to short-term assets or vice-versa;
5. Reclassification of some assets from one category of financial assets to another (for example, bank deposits with a maturity longer than 3 months reclassified from cash equivalents to other short-term investments).

Changes in the first 3 points determine changes in total financial assets, while the last 2 (4 and 5) only affect the internal structure of financial assets and not their total value. It is worth mentioning that the most common and important cause of change in receivables, the reclassification of advances paid to suppliers of inventory or fixed assets (which are presented as inventory/fixed assets under RAS) to accounts receivable or other receivables, did not affect our data as these advances are not financial assets according to IAS 39.

Causes of changes in financial liabilities, identified after careful analysis of the footnotes, are:

1. Reclassification of some financial liabilities based on maturity (short-term – long-term);
2. Recognition of new liabilities kept off balance-sheet under RAS;
3. Adjustments made to transaction costs that were expensed under RAS but capitalized under IFRS (especially, for bank loans).

The relative change/ index of comparability (IC) analysis shows there is no evidence to support H_1. Financial assets and liabilities remain relatively unchanged after the adoption of IFRS while other financial statements structures seem more affected by the transition. This might be surprising as Romania, being a class B country, according to the Nobes classification, was supposed to show a significant change in accounting number after the IFRS adoption. But let us not forget that the hypothesis refers to certain assets and liabilities, reported by non-financial companies. As the most used financial instruments by Romanian non-financial companies are accounts receivable/ payable, cash and bank loans, it seems that the

accounting rules referring to these traditional financial assets and liabilities are not very different under RAS from IFRS. Where IAS 39 significantly differs from RAS has to do with derivatives and other sophisticated financial instruments. Our results are consistent with those found by Grabinski et al., 2014 for Poland regarding accounts receivable or short-term liabilities. Nevertheless, our findings contradict those of Callao et al., 2007 who report significant changes in cash, accounts receivable and long term liabilities for Spanish companies. Even though both Poland and Spain are classified by Nobes in the same class of accounting system - B, Romania shows more similarities, in terms of IFRS financial reporting effects, to the other ex-communist country - Poland.

Regarding the 2nd hypothesis, as far as RAS data is concerned, *table 4* shows connections of increasing intensity between variables included in the 3 models. The lowest explanatory power (R^2=36%) belongs to *model 1* that takes into account balance sheet data regarding financial assets and liabilities. Only 2 of the 18 ratios included have a statistically significant influence over the dependent variable and they both relate to financial liabilities. The determination ratio (R^2) of *model 2* is higher, 44.1% of the changes in ROE being explained by the variation of R_{finind}, R_{ofa} and R_{inv} (of the 5 ratios included in the model, these 3 have coefficients that are statistically significantly different from zero - the p-value for the regression coefficient is less than 0.05). *Model 3* has the highest significance, since it includes all variables and explains 52.5% of the variance in ROE.

Table 4: *Regression models – RAS data, N= 53 observations*

		R	Adjusted R	ANOVA	
Model 1 $LnROE=-1.978+4.904 \times R_{flt} -3.682 \times R_{lt}$	R	R Square	Square	F	Sig.
	0.600	0.360	0.334	14.049	0.000
Model 2 $LnROE = -3.123 -0.110 \times R_{finind} - 0.238 \times R_{ofa} - 0.002 \times R_{inv}$	R	R Square	Adjusted R Square	ANOVA F	Sig.
	0.664	0.441	0.406	12.863	0.000
Model 3 $LnROE = -1.841 + 3.963 \times R_{flt} - 3.401 \times R_{lt} -0.002 \times R_{inv} - 0.080 \times R_{finind}$	R	R Square	Adjusted R Square	ANOVA F	Sig.
	0.725	0.525	0.486	13.272	0.000

The regression models performed on the IFRS data (*table 5*) show higher explanatory powers than the RAS ones (the largest difference of more than 10% in R^2 is noticeable for model 2). The major difference is recorded for *model 3* and consists of the statistically significant independent variables, which in the case of IFRS data involve financial assets (R_{aft}) rather then financial liabilities.

Table 5: *Regression models – IFRS data, N= 48 observations*

Model 1 LnROE = -1.667 + 4.943 x R_{flt} – 4.146 x R_{lt}	R	R Square	Adjusted R Square	ANOVA	
				F	Sig.
	0.637	0.406	0.380	15.394	0.000
Model 2 LnROE = -2.960 -0.160 x R_{finind} – 0.002 x R_{inv} – 0.191 x R_{ofa}	R	R Square	Adjusted R Square	ANOVA	
				F	Sig.
	0.741	0.549	0.518	17.831	0.000
Model 3 LnROE = -3.639 – 0.173 x R_{finind} – 0,002 x R_{inv} – 0.214 x R_{ofa} +2.240 x R_{aft}	R	R Square	Adjusted R Square	ANOVA	
				F	Sig.
	0.778	0.605	0.568	16.442	0.000

Under these circumstances, hypothesis **H_2** is supported: there is a measurable connection between financial asset/ liabilities and ROE. In addition, the sub-hypothesis **H_{2a}** is also confirmed, as the explanatory power of the models using IFRS data, quantified by R^2, is greater than the one of the models using RAS data. Even though accounting numbers related to financial assets and liabilities barely changed after the IFRS adoption, companies' profitability did: mean ROE decreased after the IFRS transition (IC>1.05), (confirming results by Istrate, 2014). In this new context, more of ROE variability is explained by financial assets and liabilities. This finding is consistent with results reported by Huian, 2015 regarding an increased value relevance of accounted data on financial instruments under IFRS rules and Tsalavoutas et al., 2012 who find that information provided by IAS 39 significantly affects Greek firms' market value.

5. CONCLUSIONS

This paper had the following motivations: 1) to study whether the transition to IFRS impacted on the financial assets and liabilities reported by non-financial companies in their balance sheets; 2) to test the association between financial

performance (ROE) and data on financial assets and liabilities; 3) to test which set of data has a stronger impact on ROE: RAS or IFRS? The impact of the IFRS adoption has been measured and statistically tested through the index of comparability analysis, content analysis and regression analysis providing the following findings: 1) financial assets and liabilities seem to be barely affected by the transition to IFRS, if one analyzes the 23 financial ratios selected in this paper to show the impact of IFRS; 2) there is a connection of reasonable intensity between ROE and the accounting numbers related to some financial assets and liabilities; 3) based on the explanatory power of the linear regression models used, the association is of higher intensity after the adoption of the IFRS. These mixed findings are similar to the ones reported by other Romanian researchers investigating the subject of the IFRS adoption, such as Istrate, 2014 or Mironiuc et al., 2015, but also other European researchers such as Grabinski et al., 2014 or Tsalavoutas et al., 2012.

Romania is an interesting setting for this kind of studies as the process of the IFRS adoption was drastic, rapid, sustained and sometimes contradictory (Albu et al., 2014) unlike other emerging economies where the implementation was made gradually and slowly. Also, its accounting system is characterized by a certain fiscal orientation and weak levels of investor protection. Moreover, its code law system implies more conservative accounting practices than those required by the IFRS (Cuzdriorean et al., 2012). Therefore, analysis performed on such economy enriches the theoretical aspect of the IFRS-related research. It also provides useful evidence for other emergent markets which are yet to adopt IFRS in the individual accounts. In addition, results might be of use for the Romanian authorities (especially for the accounting regulator - the Ministry of Finance - MF) in assessing the fulfillment of their objective regarding a more transparent and attractive economic environment to foreign investors. This objective was re-introduced on the MF agenda by the international bodies – IMF and European Commission, which conditioned the granting of funds to Romania by the mandatory IFRS adoption for all listed companies in 2012.

Our results might be explained by several factors:
- Romanian non-financial companies hardly use sophisticated financial instruments (such as, derivatives, hybrid instruments or compound instruments), that involve the use of fair value and therefore, a significant

difference between RAS (which rarely require measurement at fair value) and IFRS numbers could not have been expected. Moreover, not even some of the traditional primary financial instruments (such as stock investments, bonds investments or bonds payable) are much used by the analyzed companies;

- most of the financial assets and liabilities reported by Romanian companies are short-term or current ones, which entails a low value change between initial recognition and subsequent recognition at balance sheet date. The insignificant use of fair value and amortized cost (required especially for long-term financial instruments) makes that there is not much difference between the IFRS and RAS numbers;

- the 2011 IFRS numbers are a restatement of RAS numbers and not the consequence of using IFRS as basis of accounting. The results might be different if analysis is performed for periods starting with 2013 when IFRS have been applied in current accounting;

- Romanian companies' previous experience with the IFRS adoption might not be very helpful as according to Cordazzo, 2013, prior experience does not make the full transition fast and easy; on the contrary, the process is slower and more conservative in this case.

There are some limitations of our research: 1) the size of the sample, small when compared to other studies, but common to emerging economies (the sample is further reduced in the regression models by the natural log transformation which resulted in the loss of 18% of all observations for RAS data and 26% of observations for IFRS data) and 2) a narrow time horizon of the analysis that was limited to 1 fiscal year. Therefore, we are aware of the fact that we cannot extrapolate our results and we see this paper as the starting point of more extensive researches conducted on larger populations and more extended timeframe.

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THE MONETARY POLICY OF THE NATIONAL BANK OF ROMANIA IN THE INFLATION TARGETING ERA. A TAYLOR RULE APPROACH

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Abstract: *In this paper we analyse the monetary policy of the National Bank of Romania during 2005-2015 by estimating the Taylor rule, on a quarterly basis. We determined the potential GDP by employing the Hodrick-Prescott filter, in order to distinguish between the cyclical and the structural components of the output. Then, we estimated the traditional Taylor rule function (with a classic OLS regression), but slightly modified, as to take into account the forward-looking attitude of the NBR. The results confirm the direct correlation between the monetary policy rate and the output gap on the one hand, and the inflation differential (inflation – inflationtarget) on the other hand. Also, the results show us that NBR paid a higher attention to the dynamics of the inflation versus its target than to the output gap. Last, but not least, the central bank has been also sensitive to the financial stability, as reflected by the results of the incorporation of the ROBOR-EURIBOR spread in the classical Taylor rule.*
Keywords: *monetay policy, Taylor rule, National Bank of Romania*

1. INTRODUCTION

The literature on monetary policy significantly developed after the innovative paper written by Taylor (1993). This American economic researcher analyzed the FED monetary policy during 1987-1992. In the classical approach of this rule, when deciding on the monetary policy, the central banks pay a special attention to the dynamics of the following elements: the potential output, the inflation target, the output gap and the deviation of the inflation from the inflation

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target. In other words, the central banks increase / decrease the interest rates during the economic cycle in order to diminish the output gap and the deviation of inflation from its target.

The rule of Taylor was employed by the central banks in the developed countries before the Great Recession (the most severe global economic and financial crisis since The World War II), as most of them implemented the inflation targeting system starting early 1990s. According to Wyplosz (2006), the Taylor rule turned to the *automatic pilot* for the central banks, at least before the global crisis.

However, the incidence of the Great Recession (2007) determined important changes in the monetary policy in the developed countries, most of them recurring to non-conventional measures in order to avoid the scenario of Great Depression.

We underline that the central banks in the developing economies have also employed the rule of Taylor, as a benchmark, especially after these institutions started to implement the inflation targeting (as is the case in Romania, since 2005).

The original form of the Taylor rule was the following:

$$i = \text{r*} + \pi_t + \alpha\text{*}(\pi_t - \pi\text{ *}) + \beta\text{*}(y_t - y\text{*}_t) \qquad (1.1)$$

where i, r*, π_t, π *, y_t and y*$_t$ represent the monetary policy rate, the real interest rate, the inflation rate (the average deflator over the past four quarters), the inflation target, the dynamics of GDP and the dynamics of potential GDP, while α and β are the parameters reflecting the sensitivity of the central bank regarding the inflation objective and the economic growth objective.

In the above written relation, the higher the *α* the higher the sensitivity of the central bank in terms of inflation, while the higher the *β* the higher the sensitivity of the central bank regarding the dynamics of the GDP growth (and, consequently, of the unemployment rate).

In this paper we evaluate the monetary policy effectiveness of National Bank of Romania (NBR). In this order, we estimate the Taylor rule for the monetary policy of the NBR during 2005-2015, on a quarterly basis (1Q2005 – 2Q2015). It is well known that in 2005 the central bank of Romania started to implement the inflation targeting mechanism, in order to contribute to the convergence of inflation towards the EU average.

Since NBR launched the inflation targeting system the dynamics of the consumer prices in Romania decreased significantly, from almost 10% YoY in

2005 to almost 0% YoY in 2Q 2015. During 2005-2015 the National Bank of Romania decreased the inflation target, from 7.5% YoY in December 2005 to 2.5% YoY in December 2015.

The rest of the paper is structured as follows. Section 2 reviews the literature on monetary policy rules. Section 3 describes the methodology and data used to estimate the Taylor rule in case of National Bank of Romania. Section 4 discusses the empirical results while Section 5 concludes.

2. LITERATURE REVIEW

The seminal contribution of Taylor (1993) revolutionised the literature on monetary policy rules. In another relevant paper, Fourçans and Vrânceanu (2004) introduced the following classification of the monetary policy rules: 1) Backward-looking; 2) Forward-looking; 3) Generalized rules.

Among the backward-looking monetary policy rules these authors mention the Taylor rule, which studies the relation between the monetary policy rate, on the one hand, and the output gap, the inflation deviation from the target, the real interest rate and the inflation target, on the other hand.

As regards the category of forward-looking rules the above mentioned economists underline the model introduced by Clarida *et al* (1997):

$$i*_t = i^- + \beta^* (E[\Pi_{t,k} \mid I_t] - \Pi^-) + \gamma E[y_{t,q} \mid I_t] \qquad (2.1)$$

where $i*_t$, $\Pi_{t,k}$, Π^- and $y_{t,q}$ are the interest rate target for period t, the inflation rate for the following k periods, the inflation target and the output gap average for the following q periods.

Last, but not least, in the category of generalized rules Fourçans and Vrânceanu (2006) mention the rules incorporating other elements beyond the inflation deviation from its target and the output gap, such as: the money supply, the exchange rate, etc.

The incidence of the Great Recession determined a new era for the literature on monetary policy rules. Despite the change of the monetary policy paradigm, from orthodox to non-conventional, the central banks in the developed countries seemed to have not abandoned the benchmarks established by the classical rules.

However, the change of paradigm in terms of monetary policy after the incidence of the Great Recession contributed to the development of complex/non-linear monetary policy rules.

For instance, Conrad and Eife (2012), Lee and Son (2013), Olsen et al. (2012), Kempa and Wilde (2011) and Kolman (2013) employed non-linear Taylor rules in order to analyze the monetary policy in several developed countries: United States, Euro Area, Japan, United Kingdom and Canada.

Similarly, according to the paper of Su et al (2015) (estimating non-linear Taylor rules for several Central and Eastern Europe) the monetary policy decisions in the region are also dependent on global macro-financial climate. This conclusion seems normal, given the high dependence of this region on the foreign demand and international financing.

We underline that several recent papers introduced financial stability elements in analyzing the monetary policy rules employed by the central banks. This seems also normal, as, after the incidence of the Great Recession the central banks around the world added a new monetary policy objective: the financial stability. As an example, Albulescu (2013) employed a classical Taylor rule complemented by a financial stability indicator in order to study the monetary policy in the Euro Area.

Last, but not least, we mention that over the past years the attention of the researchers on monetary policy rules (based on Taylor rule) extended to the emerging countries. In this context, we mention the contributions of Gadanecz et al. (2015), Nojković and Petrović (2015), Petreski and Jovanovic (2013), Baranowski and Gajewski (2015), Frömmela et al (2015) and De Melo Modenesi et al 2013.

Our paper contributes to the literature in several ways. On the one hand, there are very few studies that analyze the monetary policy in Romania (see e.g. Andrieş, 2008; and Mutascu et al., 2013) by employing the Taylor rule. On the other hand, it assesses the entire period of inflation targeting in Romania, from 1Q 2005 to 2Q 2015. Also, we included in the monetary policy rule additional variables, like the 1 year CDS (credit default swap) for Romania and the 3 months interest rate spread (Romania vs. Euro Area), in order to obtain a better estimations of central bank behavior function. In this context, we can draw some considerations

regarding the effectiveness of the implementation of the inflation targeting mechanism Romania.

3. METHODOLOGY AND DATA

Our assessment is organized in two steps. First of all we estimate the potential output by employing the Hodrick-Prescott filter, one of the most used methods by economists in order to distinguish between the cyclical and the structural components of the GDP. This method is based on the following mathematics relation:

$$\underset{t=1}{\text{Min}} \sum_{t=1}^{T}(Y_t - Y_t^*)^2 + \lambda \sum_{t=2}^{T-1}((Y_{t+1}^* - Y_t^*) - (Y_t^* - Y_{t-1}^*))^2 \qquad (3.1)$$

where Y_t and Y^*_t represent the GDP dynamics and the potential GDP dynamics, while λ is the parameter of smoothness (we employ a value of 100, similar to that used by Hodrick-Prescott (2015)).

Afterwards, we estimate the traditional Taylor rule function (with a classic OLS regression), but slightly modified, as to take into account the forward-looking attitude of the NBR. The estimated equation is represented mathematically by the relation (1.3).

$$i_t = c(1) + c(2)*(\text{inflation }_{t+1} - \text{inflationtarget }_t) + c(3)*(\text{GDP }_{t-2} - \text{PotentialGDP }_t) \qquad (3.2)$$

where i_t is the monetary policy rate, inflation $_{t+1}$ is the dynamics of the consumer prices during t+1, inflationtarget $_t$ is the NBR YoY target for inflation, GDP $_{t-2}$ is the dynamics of the GDP during period t-2 and potentialGDP $_t$ is the estimated dynamics of the potential GDP during period t.

In order to better understand the monetary policy decisions taken by NBR over the past decade we introduced new variables in the classical Taylor rule: the 1 year CDS (credit default swap) for Romania and the 3 months interest rate spread (Romania vs. Euro Area).

In other words, we estimated the following equations:

$$i_t = c(1) + c(2)*(\text{inflation }_{t+1} - \text{inflationtarget }_t) + c(3)*(\text{GDP }_{t-2} - \text{PotentialGDP }_t) + c(4) * \text{CDSRO1YR} \qquad (3.3)$$

$$i_t = c(1) + c(2)*(\text{inflation }_{t+1} - \text{inflationtarget }_t) + c(3)*(\text{GDP }_{t-2} - \text{PotentialGDP }_t) + c(4) * \text{SPREAD3M} \qquad (3.4)$$

where CDSRO1YR represents the risk of entering in sovereign default within 1 year, while SPREAD3M represents the spread for the 3 months money market interest rate (Romania vs. Euro Area) (ROBOR3M – EURIBOR3M).

By applying these equations we tried to estimate to what extent the monetary policy decisions of NBR took into account the Romanian macro-financial risk perception (also influenced by the domestic policy-mix), reflected either by the level of the credit default swap or by the interest rate spread.

In our analysis we employed the Eurostat data for quarterly GDP, from 1Q2005 to 2Q2015 in order to determine the potential GDP. At the same time, we used the Statistics Office monthly data for the dynamics of the consumer prices and we computed the quarterly averages. We also computed the quarterly averages for CDS and for the 3M interest rate spread, these data being gathered from Bloomberg. Last, but not least, we employed the NBR data for monetary policy interest rate and for the inflation target.

4. RESULTS AND DISCUSSIONS

The Table 1 presents the estimates of the equations 3.2., 3.3., 3.4.

Table 1. *Estimations statistics*

Dependent variable: i_t - the monetary policy rate			
Independent variables	equation (3.2)	equation (3.3)	equation (3.4)
(inflation $_{t+1}$ – inflationtarget $_t$)	0.574***	0.516291***	3.509362**
	(0.183)	(0.130290)	(0.113805)
(GDP $_{t-2}$ – PotentialGDP $_t$)	0.192*	0.207552***	0.248064*
	(0.097)	(0.072952)	(0.055177)
CDSRO1YR		0.006374**	
		(0.002465)	
SPREAD3M			0.099279***
			(0.089310)
R-squared	0.275775	0.556378	0.556378
Adjusted R-squared	0.237658	0.510486	0.510486

Note: Standard deviations are presented between brackets.

*, **, *** indicates significance levels at 10%, 5% and 1%

As can be easily noticed in Table 1., the estimated coefficients of equation (3.2) are statistically significant. At the same time, if we look at the sign of the coefficients, we may see that the economic relations are respected: there is a direct

relation between the monetary policy rate and the output gap on the one hand, and the inflation differential (inflation – inflationtarget) on the other hand.

Last, but not least, from the estimated equation there resulted that, during 2005-2015, NBR paid a higher attention to the dynamics of the inflation versus its target than to the output gap, as the estimated inflation differential's coefficient is higher than the output gap's coffiecient. This aspect reflects the rationale of the implementation by NBR of the inflation target mechanism: the convergence of the dynamics of the consumer prices to the EU average.

In this equation the coefficient $c(1)$ may be interpreted as the sum between the real interest rate and the average inflation, for the period 2005-2015, except for the period of the VAT shock increase (from 19% to 24%) (3Q2010-2Q2010). Excluding those 4 quarters, the average real interest rate and the average inflation rate presented values of 2.1% YoY and 4.9% YoY during 2005-2015.

The following figure presents the relation between the dynamics of the NBR monetary policy rate and the dynamics of the interest rate as resulted from the estimated Taylor rule:
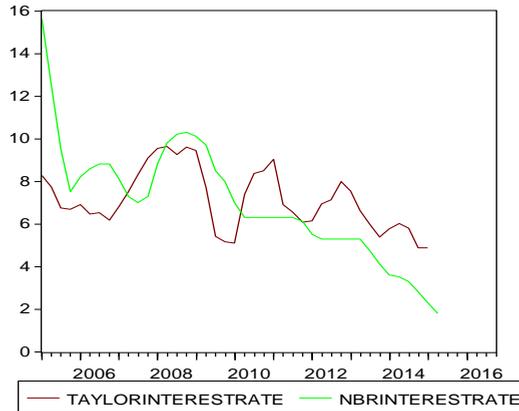
Figure 1: *NBR monetary policy rate vs. Taylor rule interest rate (%)*
Source: NBR, own estimates according to the above mentioned methodology

As can be noticed from Figure 1., the NBR closely followed the Taylor rule guide during the period 2005-2015. However, over the past quarters, there seems that NBR monetary policy rate undershoot the Taylor rule rate. This evolution might be explained by the fact that the downward trend of consumer prices (due to

supply factors) was not accompanied to the same extent by the reduction of the NBR's inflation target. At the same time, there are differences in what regards the output gap, between our estimates and the NBR's macroeconometric models.

The importance of the current analysis for the future monetary policy in Romania is immediately. On the one hand, as can be noticed from Figure 2., the deviation of inflation from NBR's target is at its record low levels at present. On the other hand, the Government announced the implementation of several tax cuts in the short and mid-run. Taking these aspects into account and the results of the Taylor rule estimates for Romania, it seems very likely that, in the following quarters the Central Bank of Romania would pay a higher attention to the output gap in establishing the monetary policy rate.
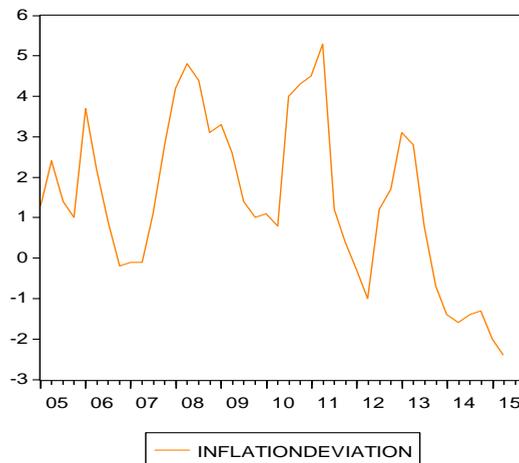
Figure 2. *Deviation of inflation from NBR's target (pp)*
Source: NBR, own estimates according to the above mentioned methodology

In Table 1. column "equation (3.3)", it is presented the estimates of the equation (3.3) for the period 1Q 2007 – 1Q 2015. We selected this time interval as the degree of economic and financial integration of Romania with the EU increased after the country joined the European Union (1st of January 2007).

As can be noticed, the estimated coefficients are statistically significant. More important, compared with the previous estimates, the level of the adjusted R-squared is significantly higher, more than 51%. In other words, the monetary policy rate of NBR is better explained by incorporating the level of CDS in the classic Taylor rule.

At the same time, the sign of the coefficients confirms the economic relations between variables - a direct correlation between the monetary policy rate and: the output gap, the inflation differential (inflation – inflationtarget) and the 1 YR credit default swap.

Last, but not least, the current estimates also confirm the previous results: the fact that NBR paid a higher attention to the dynamics of the inflation versus its target than to the output gap or to the 1 YR CDS during 2007-2015, as the estimated inflation differential's coefficient is higher than the output gap's and the CDS' cofficients.

In the Table 1. column "equation (3.4)", it is presented the estimates of the equation (3.4) for the period 4Q 2006 – 1Q 2015. As can be noticed, the estimated coefficients are statistically significant. At the same time, the level of the adjusted R-squared hit the highest level of all estimated equations (almost 68%).

Similarly to the previous results, the sign of the coefficients confirm the economic relations between variables - a direct correlation between the monetary policy rate and: the output gap, the inflation differential (inflation – inflationtarget) and the 3 months interest rate spread (Romania vs. Euro Area).

However, these results (the levels of the estimated coefficients) suggest that the central bank paid a higher to the 3 months interest rate spread (ROBOR 3 M – EURIBOR 3M) since 2007. This result reflects the prudence of NBR in the context of the incidence of the Great Recession (the level of 3M interest rate spread's coefficient is higher than the levels of the inflation differential's and output gap's coefficients). This prudence was determined by the fact that Romania entered the most severe global financial and economic crisis since the end of The World War Two with high deficits (both current account and public finance).

Overall, the current estimates also confirm the previous results: the fact that NBR paid a higher attention to the dynamics of the inflation versus its target than to the output gap during 2007-2015: the estimated inflation differential's coefficient is higher than the output gap's cofficient.

In the end of our analysis we put together the results in one graph: the estimated monetary policy rate obtained by applying the Taylor rule in the three versions and the NBR reference interest rate over the past decade (Figure 3).

As can be noticed in this Figure, during 2007-2015 the monetary policy of NBR followed more closely the Taylor rule augmented with the 3 months interest

rate spread. This evolution can be explained by the high level of risk perception Romania faced since the incidence of the Great Recession (second half of 2007) until the end of 2014. These results also reflect the re-launch of convergence towards the Euro Area (starting 2013) after the severe adjustment of the deficits (current account and public finance).
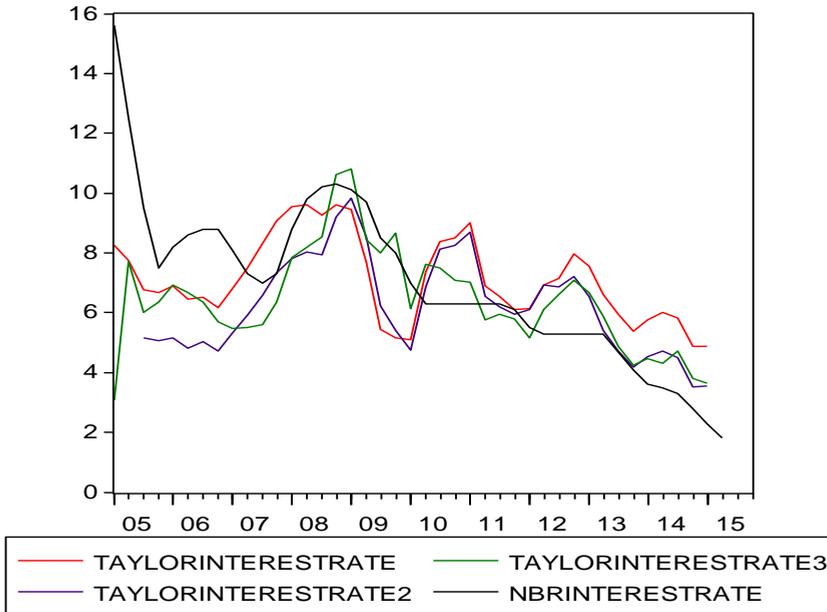
Figure 3: *NBR monetary policy rate vs. Taylor rule interest rate (%) in the estimated scenarios*

Source: NBR, own estimates according to the above mentioned methodology

5. CONCLUSIONS

In this paper we estimated the Taylor rule in several alternatives in order to analyze the monetary policy of the National Bank of Romania during 2005-2015.

According to our results there is a direct relation between the monetary policy rate and the output gap, on the one hand, and the inflation differential (inflation – inflationtarget), on the other hand.

At the same time, especially after 2007, the central bank has paid a higher attention to the risk perception regarding the Romanian economy, as reflected by the credit default swap and by the interest rate spread (ROBOR vs. EURIBOR). This attitude reflected the prudence of the central bank in the context of the

incidence of the Great Recession (which surprised the Romanian economy in an overheating stance). These results are in line with economic fundamentals and the empirical literature (Nojković and Petrović, 2015; Frömmela et al, 2015).

A secondary results is that, during 2005-2015, NBR paid a higher attention to the dynamics of the inflation versus its target than to the output gap.

In this context, taking into account the Government's intentions for implementation of several tax cuts in the short and mid-run, it seems very likely that, in the following quarters the Central Bank of Romania would pay a higher attention to the output gap in establishing the monetary policy rate.

Consequently, we expect that the impact of inflation differential to decrease and and those of the output gap, CDS and interest rate spread to increase in the mid-run, as the New Fiscal Act and the change of the policy mix perspectives (witht impact for the financial stability) would be the main challenges for the monetary policy in Romania.

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EXPOSURE TO SYSTEMIC RISK OF THE EUROPEAN TOO-BIG-TO-FAIL BANKS DURING CRISIS

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Abstract: *This paper investigates the exposure to systemic risk of "too-big-to-fail" banks. Using a sample of top ten European banks by total assets at the debut of the most recent financial crisis we assess the contagion effects during 2008-2010 by employing the Conditional Value at Risk methodology. Empirical results suggest an intensification of banks' exposure to systemic risk during the crisis period. The vulnerability to systemic events is significantly and positively associated with higher long term government bonds yields and lower interbank offered rates for unsecured lending transactions.*
Keywords: *too-big-to-fail, systemic risk, Conditional Value at Risk, quantile regression, tail risk*
JEL classification: *C22, C51, G01, G21, G32*

1. INTRODUCTION

The design of prudential regulations which ensure effective monitoring of systemic risk and limit the spread of contagion between financial institutions involves the identification of systemically important institutions. Distinguishing them is a constant topic of debate among supervisory authorities as their collapse could significantly affect the whole financial system due to the propagation of negative externalities. Moreover, special prudential regulations should be applied to these banks.

The Basel Committee on Banking Supervision developed a framework to identify global systemically important banks (GSIBs) considering their size, interconnectedness, complexity, substitutability and global activity (BCBS, 2014). The European Banking Authority proposed the term global systemically important

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institutions (G-SIIs) stressing their interconnectedness as a major factor by which they should be included in this list (EBA, 2014). According to the International Monetary Fund (IMF, 2008), financial institutions should be classified in this category only to the extent that their collapse transmits negative externalities to the whole economy. Although there is not yet a widespread agreement on what constitutes systemically important institution, all the definitions and regulations issued by the supervisory authorities focus on the "too-big-to-fail" (TBTF) paradigm.

A significant strand of literature assesses the probability of occurrence of a liquidity crisis to cause damage to the entire banking system due to particular massive cash withdrawals (Andries et al., 2012; 2015). The basis of the studies that examine the link between the level of liquidity and bank fragility in the event of massive withdrawals of deposits before maturity is designed by the famous model of Diamond and Dybvig (1983). Since then, a series of models propose improvements to the original one. Jacklin and Bhattacharya (1988) examined the sensitivity of banking contracts to the information asymmetry regarding future performance of the banks. Bhattacharya and Gale (1987), Bhattacharya and Fulghieri (1994), as well as Allen and Gale (2000) developed models that are based on customers' liquidity needs and banks' ability to exploit long-term financed investment projects, given the possibility of borrowing on the interbank market.

Alongside, a number of models that assess the interbank market contagion and the anticipated massive withdrawals of deposits have been developed: Allen and Gale (1998, 2000), Chen (1999), Rochet and Tirole (1996a), Freixas et al. (1999), Freixas and Holthausen (2005), Rochet and Vives (2004). Also, with the intensification of contagion in the financial system after the collapse of Lehman Brothers financial supervisory authorities have reiterated attention towards basic guidelines of the Diamond-Dybvig model.

Important contributions to the literature on interbank contagion are found in Rochet and Tirole (1996b), Allen and Gale (2000), and, Freixas, Parigi and Rochet (2000). Contracts that are based on interbank loans expose banks to counterparty default risk. Due to tight connections between financial institutions, but also because of common exposures to certain risk factors, contagion in the interbank market may generate some of the most severe adverse effects both at the level of the national economy and also internationally. The situation is even more severe

when large value loans are granted without appropriate collateral, both quantitative and qualitative.

Considering this background the aim of our paper is to investigate the exposure to systemic risk of "too-big-to-fail" banks. Using a sample of top ten European banks by total assets at the debut of the most recent financial crisis we assess the contagion effects during 2008-2010 by employing the Conditional Value at Risk methodology. This implies to estimate the probability that a bank will face a drop in its market value of total assets in stressed periods due to the reduction of the system's market value of total assets. The impact of extreme events is assessed using a unique set of market variables that the banks in our sample are exposed to: interbank rates, capital markets indices and government bonds yields. Also, we account for the time-varying dimension of risk.

Empirical results suggest an intensification of banks' exposure to systemic risk during the crisis period. This vulnerability is significantly and positively associated with higher long term government bonds yields and lower interbank offered rates for unsecured lending transactions.

The remainder of paper is organized as follows. Section 2 describes the methodology. Section 3 presents the sample and data. Section 4 discusses the empirical results. Finally, section 5 concludes.

2. METHODOLOGY

The empirical strategy implies estimating the exposure of banks to systemic risk during distressed periods. Our approach is similar with Adrian and Brunnermeier (2011), but instead of estimating the contagion effects from a particular bank to the systemi, we use a top-down approach and asses the contagion effects from the whole system to a particular bank. The methodology resides in calculating the Value at Risk (VaR) and Conditional Value at Risk (CoVaR) indicators. VaR reflects the individual risk of a bank (i.e., the maximum possible loss at a given confidence level), while CoVaR indicates the VaR of a bank conditional on the VaR of the whole system.

Due to the dynamics of financial markets, banks' exposure to systemic risk varies in time depending on a number of factors that affect the entire banking system. To capture the variation in time of banks' exposure we estimate VaR and

CoVaR indicators as a function of a number of market indices that may significantly influence the TBTF banks.

First, the rate of change in the market value of each bank's assets $(R_{A,t}^i)$ is estimated using the following linear relationship for a daily frequency:

$$R_{A,t}^i = \alpha^i + \beta_1^i GB10y_{t-1} + \beta_2^i CECEBNK_{t-1} + \beta_3^i SXAIE_{t-1} \\ + \beta_4^i SXFINE_{t-1} + \beta_5^i Euribor3M_{t-1} + \varepsilon^i \tag{1}$$

where αi accounts for each bank's characteristics, $\beta_{(j)}^i$ reflects the dependence relationship with the market indices $I_{p,t-1}^{(j)}$ (j=1,5) one day lagged and εi is the error term. A detailed description of the market indices is given in section 3.

The method used to estimate eq. (1) is Quantile Regression (QR). The main advantage of this method is that it enables a more robust estimate of the tails in the presence of outliers (Koenker and Bassett, 1978). There are different approaches for building confidence intervals. Inference within QR is more robust than within other models as the confidence intervals for different quantiles are independent of the estimators' distribution. Koenker and Bassett (1978) showed that QR estimators are similar with OLS estimators in normal distributions, but more efficient in non-normal distributions.

Applying QR method on the relationship above for the 1% quantile and 50% quantile (the median) of the distribution of market valued asset returns $(R_{A,t}^i)$ we obtain estimates of the regressors $\hat{\alpha}^i$ and $\hat{\beta}_{(j)}^i$. These will be further used to calculate the individual risk of banks in stressed periods $(\widehat{VaR}_{q,t}^i)$ and the individual risk of banks in normal periods $(\hat{R}_{A,t}^i(50\%))$:

$$\widehat{VaR}_{q,t}^i = \hat{\alpha}^i + \sum_{j=1}^{5}(\hat{\beta}_{(j)}^i \times I_{p,t-1}^{(j)}) \tag{3}$$

$$\hat{R}_{A,t}^i(50\%) = \hat{\alpha}^i + \sum_{j=1}^{5}(\hat{\beta}_{(j)}^i \times I_{p,t-1}^{(j)}) \tag{4}$$

In a similar manner we determine the VaR of market value assets returns of the system $(\widehat{VaR}_{q,t}^{sys})$ by considering a system formed by a number of 53 banks which assets cover more than 70% for the European banking market total assets.

In addition to the market indices, banks' individual risk also varies in time in relation to the system's risk as follows:

$$R_{A,t}^{i|sys} = \alpha^{i|sys} + \sum_{j=1}^{5} (\beta_j^{i|sys} \times I_{p,t-1}^{(j)}) + \delta^{i|sys} \times R_{AP,t}^{sys} + \varepsilon^{i|sys} \qquad (5)$$

where αi accounts for each bank's characteristics, $\beta_{(j)}^{i}$ reflects the dependence relationship with the market indices $I_{p,t-1}^{(j)}$ (j=1,5) one day lagged, $\delta^{i|sys}$ indicates the dependence relationship with the system's market value asset returns one day lagged, and εi is the error term.

Applying QR technique on eq. (5) for quantiles de 1% and 50% of the distribution of market valued assets returns, we obtain an estimate of the regressors $\hat{\alpha}^{i|sys}$, $\hat{\beta}_{(j)}^{i|sys}$ and $\widehat{\delta}^{i|sys}$ which will further use to calculate the Conditional Value at Risk in stressed periods $(\widehat{CoVaR}_{q,t}^{i|sys(q)})$ and in normal periods $(\widehat{CoVaR}_{q,t}^{i|sys(50\%)})$ as follows:

$$\widehat{CoVaR}_{q,t}^{i|sys(q)} = \hat{\alpha}^{i|sys} + \sum_{j=1}^{5} (\hat{\beta}_{(j)}^{i|sys} \times I_{p,t-1}^{(j)}) + \hat{\delta}^{i|sys} \times \widehat{VaR}_{q,t}^{i} \qquad (6)$$

$$\widehat{CoVaR}_{q,t}^{i|sys(50\%)} = \hat{\alpha}^{i|sys} + \sum_{j=1}^{5} (\hat{\beta}_{(j)}^{i|sys} \times I_{p,t-1}^{(j)}) + \hat{\delta}^{i|sys} \times \hat{R}_{AP,t}^{i}(50\%) \qquad (7)$$

Finally, we determine each bank's exposure to systemic risk as the difference between VaR of the bank conditioned on the VaR of the system in stressed periods and VaR of the bank conditioned on the VaR of the system in unstressed periods:

$$\Delta CoVaR_t^{i|sys}(1\%) = \widehat{CoVaR}_{1\%,t}^{i|sys\,(1\%)} - \widehat{CoVaR}_{1\%,t}^{i|sys\,(50\%)} \qquad (8)$$

3. DATA

Our sample consists of top 10 European banks according to their total assets held at 31.12.2010. This group covers leading international banks with complex activities that are included by the supervisory authorities in the systemically important financial institutions list (BCBS, 2014; EBA, 2014). A ranking of the banks by total assets held at 31.12.2010 is given in Table 1.

Table 1. *Sample of European banks ranked by Total Assets*

Rank	Symbol	Bank	Country	Total Assets (billion EUR)
1	FR013	BNP Paribas	France	1.988.916
2	DE017	Deutsche Bank	Germany	1.897.289
3	GB089	HSBC Holdings Plc	United Kingdom	1.833.063
4	GB090	Barclays Plc	United Kingdom	1.735.554
5	GB088	Royal Bank of Scotland Group	United Kingdom	1.688.960
6	FR014	Credit Agricole	France	1.588.309
7	NL047	ING Bank NV	Netherlands	1.237.896
8	ES059	Banco Santander S.A.	Spain	1.200.412
9	GB091	Lloyds Banking Group Plc	United Kingdom	1.152.358
10	FR016	Societe Generale	France	1.127.205

Note: The ranking is based on total assets held by banks at the end of 31.12.2010. Data are extracted from Worldscope.

Estimating the probability of a drop of the market value of total assets for each bank and also for the system implies the usage of both market prices (daily) and balance sheet variables (quarterly). VaR and CoVaR indicators are estimated using the daily returns of the market value of total assets ($R_{A,t}^i$) during the period 30.09.2008–30.09.2011 (corresponding to 783 days). Quarterly data is transformed into daily frequency through cubic spline interpolation.

Table 2. *Description of bank level variables*

Symbol	Definition	Calculation	Source
EqM	Market value of Equity	Shares outstanding×Price	Worldscope
LEV	Leverage	Total assets / Equity	Worldscope
A_t	Market value of Total assets	EqM×LEV	Own calculation
$R_{A,t}^i$	Market value of Total assets return	(A_t / A_{t-1}) -1	Own calculation

Market value of total assets is calculated based on balance sheet items that capture the bank's size, capitalization and indebtedness as it gives a much clearer picture of risk exposure compared with the profitability and efficiency indicators (Zhao, 2009). The computational details are given in Table 2. The evolution of market value of total assets for the banks in our sample is presented in Figure 1.
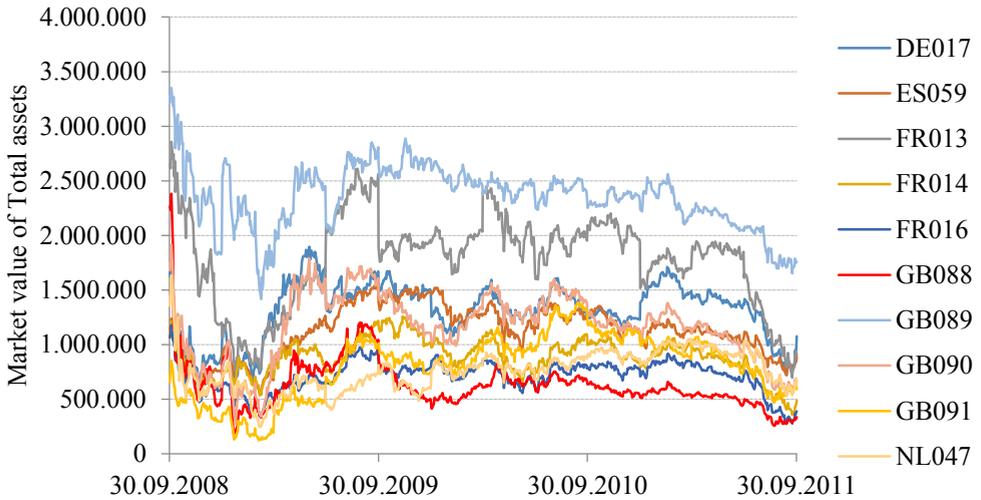
Figure 1. *The evolution of banks' market value of total assets*

Note: Market value of Total assets is expressed in billion EUR. Data are extracted from Worldscope.

The descending trend of banking system assets is closely linked to a range of variables representative for financial markets. To capture the dynamic nature of systemic risk we considered the following market indices: 10-year Government Bonds Benchmark yield, CECE Banking index, STOXX America 600 index, EURO STOXX Financials index and 3-mounth Euro interbank offered rate. They are extracted from Statistical Data Warehouse of European Central Bank (ECB) and Yahoo Finance. Definitions and calculation details are given in Table 3.

Table 3. *Description of market indices*

Symbol	Definition	Calculation	Source
GB10y	Euro area 10-year Government Bonds Benchmark yield (GB10y)	10-year ln(GovB10y(t)/GovB10y(t-1))	ECB
CECEBNK	CECE Banking Index – index representative for the banks traded on stock exchanges in the region of Central, Eastern and South-Eastern Europe	ln(CECEBNKt/CECEBNKt-1)	Yahoo Finance

Symbol	Definition	Calculation	Source
SXAIE	STOXX America 600 Index - index representing the largest 600 USA companies by market capitalization	ln(SXAIEt/SXAIEt-1)	Yahoo Finance
SXFINE	EURO STOXX Financials Index – benchmark index of 64 financial institutions from the Eurozone	ln(SXFINEt/SXFINEt-1)	Yahoo Finance
Euribor3M	3-mounth Euro interbank offered rate for unsecured lending transactions	ln(Euribor3M(t)/Euribor3M(t-1))	ECB

Note: Daily data are extracted from Statistical Data Warehouse of European Central Bank (ECB) and Yahoo Finance.

The daily evolution of market indices during 2008-2011 is shown in Figure 2 while their correlation is given in Table 4. Immediately after the Lehman Brothers collapse all indices registered a severe drop, followed by a correction started at the end of 2009.

Figure 2. *Market indices evolution during 2008-2011*

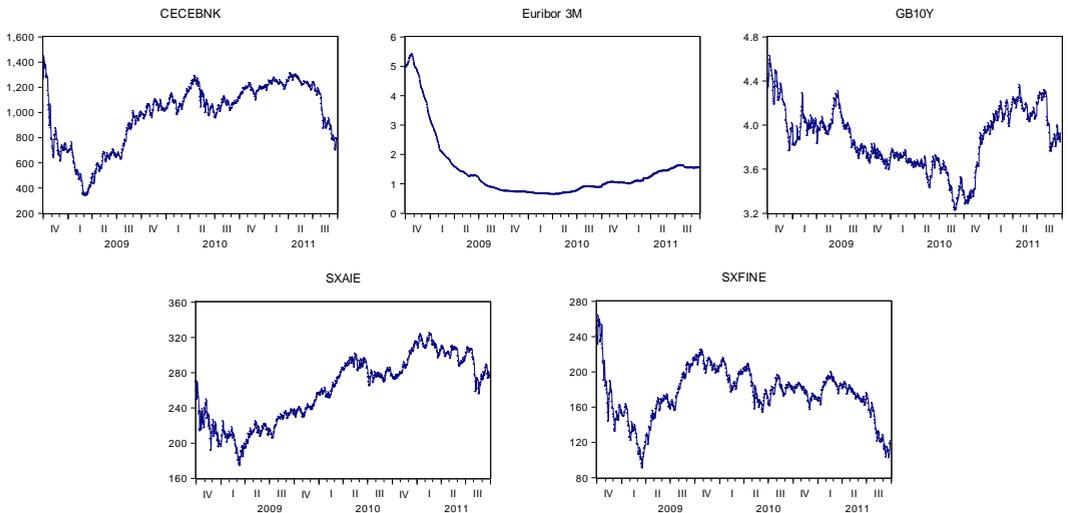Note: Daily data extracted from Statistical Data Warehouse of European Central Bank (ECB) and Yahoo Finance. The definition of market indices is given in Table 3.

Table 4. *Correlation coefficients of market indices*

	GB10y	CECEBNK	SXAIE	SXFINE	Euribor 3m
GB10y	1,000	0,056	0,047	0,090	0,019
CECEBNK	0,056	1,000	0,012	0,232	0,022
SXAIE	0,047	0,012	1,000	0,050	-0,001
SXFINE	0,090	0,232	0,050	1,000	-0,003
Euribor 3m	0,019	0,022	-0,001	-0,003	1,000

Note: Correlation coefficients based on daily data of market indices. The definition of market indices is given in Table 3.

4. RESULTS

Table 5 reports the empirical results corresponding to the 5% quantile regression for the daily market value assets returns of TBTF banks conditioned on the system's market value assets growth rate (lagged one day) and on the market indices (lagged one day). The estimation period range between 30.09.2008-30.09.2011.

Analyzing the empirical results it can be observed that each bank's market value assets return is significantly and positively associated with the system's market value assets return. This implies that a drop in the market value of the entire system's assets return will significantly reduce the TBTF banks' market value assets return. The greatest impact is registered for the Royal Bank of Scotland Group (RBS), followed by ING Bank NV and by Lloyds Banking Group Plc. A daily 1% drop of the system's market value assets return will result in a daily 1.65% drop of RBS market value assets return, a daily 1.60% drop of ING market value assets return and a daily 1.39% drop of Lloyds market value assets return.

Table 5. *Exposure to systemic risk of the TBTF banks*

Banks	$R_{AMV,t}^{sys}$	GB10y	CECEBNK	SXAIE	SXFINE	Euribor3M	Pseudo R²
BNP Paribas	1.1447***	-0.1930	0.3170***	0.4750***	0.0674	0.1094	0.41
	(0.1264)	(0.3858)	(0.0501)	(0.0526)	(0.0802)	(0.8719)	
Deutsche Bank	0.9495***	0.6562***	-0.0580	0.3021**	0.0499	0.6823***	0.46
	(0.0612)	(0.2363)	(0.1332)	(0.1173)	(0.1077)	(0.1115)	
HSBC Holdings Plc	0.8682***	0.7481***	0.1111	0.1932**	0.3305***	0.9117***	0.33
	(0.0435)	(0.1572)	(0.0731)	(0.0962)	(0.0942)	(0.0921)	
Barclays Plc	1.3486***	-1.532***	0.4140*	0.4352***	0.0921	1.0658***	0.38
	(0.0893)	(0.5466)	(0.2216)	(0.1607)	(0.2191)	(0.2054)	
Royal Bank of Scotland Group	1.6461***	0.1498	0.4396***	-0.0810	-1.203***	2.2957***	0.32
	(0.1026)	(0.5317)	(0.1095)	(0.2077)	(0.1311)	(0.2497)	
Credit Agricole	1.0706***	-0.3648*	-0.0167	0.0528	-0.0164	-0.3857	0.48
	(0.0414)	(0.2114)	(0.0365)	(0.0616)	(0.0478)	(0.2996)	
ING Bank NV	1.5986***	-0.8345**	0.3463*	0.1507**	-0.0351	1.165.8***	0.32
	(0.0938)	(0.2996)	(0.1816)	(0.0279)	(0.1546)	(0.2343)	

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Banks	$R^{sys}_{AMV,t}$	GB10y	CECEBNK	SXAIE	SXFINE	Euribor3M	Pseudo R^2
Banco Santander S.A.	0.8889***	-0.1303	0.0832**	-0.0612	0.0767	0.3117	0.55
	(0.0629)	(0.5082)	(0.0535)	(0.0535)	(0.0487)	(0.5871)	
Lloyds Banking Group Plc	1.3872***	-0.4568	0.3762	1.2609***	0.0260	2.0505***	0.31
	(0.1691)	(0.8920)	(0.3441)	(0.2813)	(0.2720)	(0.2517)	
Societe Generale	1.2436***	0.2664	0.2058*	0.5997***	0.0153	0.9712***	0.36
	(0.0677)	(0.6466)	(0.1155)	(0.1020)	(0.1818)	(0.1559)	

Note: The dependent variable is represented by bank i's market value of total assets return as in eq. (5). Method used is 5% Quantile Regression with Huber Sandwich technique for computing the covariance matrix, Kernel (residual) for Sparsity estimation, Hall-Sheather Bandwidth method, Rankit (Cleveland) method for computing empirical quantiles and Epanechnikov kernel function. Pseudo R^2 represents Koenker and Machado (1999) goodness-of-fit measure. *** significant at 1% level, **significant at 5% level, * significant at 10% level. Standard error in (). All market indices are one day lagged. All models include an unreported constant.

Regarding the market indices, results show that 10-year Government Bonds Benchmark yield is negatively associated with TBTF banks' market value assets returns being significant for half of the banks in the sample. The finding suggests that higher long term yields raise banks' exposure to systemic events. In contrast, higher interbank offered rates for unsecured lending transactions may significantly reduce TBTF banks' exposure to systemic risk, as the coefficient associated with the 3-mounth Euro interbank offered rate is positive and significant for almost all banks in the sample. In case of the financial market indices CECE Banking index, STOXX America 600 index, EURO STOXX Financials index results are mixed. However, when significant, the coefficient is associated with a positive sign, suggesting that an upward trend of these indices is associated with a reduction of banks' exposure to systemic risk.

Table 6. *Average exposure to systemic risk of TBTF banks during 2008-2011*

Rank	Bank	Total assets (billion EUR at the end of 2010)	VaR (Average daily loss)	Exposure to systemic risk (Average daily loss)
1	BNP Paribas	1.988.916	-2.85%	-1.73%
2	Deutsche Bank	1.897.289	-1.68%	-1.07%
3	HSBC Holdings Plc	1.833.063	-3.25%	-2.46%
4	Barclays Plc	1.735.554	-3.51%	-2.27%
5	Royal Bank of Scotland	1.688.960	-6.02%	-4.99%
6	Credit Agricole	1.588.309	-3.39%	-1.68%
7	ING Bank NV	1.237.896	-3.43%	-1.88%
8	Banco Santander S.A.	1.200.412	-3.72%	-1.93%
9	Lloyds Banking Group Plc	1.152.358	-5.78%	-5.08%
10	Societe Generale	1.127.205	-3.31%	-2.33%

Note: The ranking is based on total assets held by banks at the end of 31.12.2010. Data are extracted from Worldscope.

In terms of economic significance the results are also relevant. Table 6 presents the daily average loss for each TBTF bank in the sample during 30.09.2008 – 30.09.2011. Both individual loss (VaR) and loss caused by exposure to systemic risk (CoVaR) are given. The most affected banks are Lloyds Banking Group and Royal Bank of Scotland Group Plc, which register an average daily loss of about 5% of their total market value assets during 2008-2010 when considering their exposure to systemic risk. When assessing the individual risk of TBTF banks (VaR indicator) their daily loss is even larger (i.e., for RBS and Lloyds the daily average loss is about 6% of the market value assets).

4. CONCLUSION

This paper aims to contribute to the literature on systemic risk and "too-big-to-fail" banks. An investigation of the behavior of TBTF banks is crucial especially during crisis periods as their collapse could significantly affect the whole financial system. Also, after the Lehman Brothers collapse supervisory authorities highlighted the need of applying special prudential regulations to TBTF banks in order to limit the propagation of negative externalities to other counterparties from the system.

Motivated by this background we investigated the exposure to systemic risk of "too-big-to-fail" banks. Using a sample of top ten European banks by total assets at the debut of the most recent financial crisis we assessed the contagion effects during 2008-2011 by employing the Conditional Value at Risk methodology. Through Quantile Regression technique we estimate the probability that a bank will register a drop in its market value of total assets in stressed periods due to the reduction of the system's market value of total assets. The impact of extreme events is assessed using a unique set of market variables that the banks in our sample are exposed to: interbank rates, capital markets indices and governmental bonds yields. Also, we account for the time-varying dimension of risk.

Empirical results suggest an intensification of banks' exposure to systemic risk during the crisis period. This vulnerability is significantly and positively associated with higher long term government bonds yields and lower interbank offered rates for unsecured lending transactions. Also, a downward trend of financial market indices (CECE Banking index, STOXX America 600 index,

EURO STOXX Financials index) is associated with an intensification of banks' exposure to systemic risk.

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DIFFERENT WEB CREDIBILITY ASSESSMENT AS A RESULT OF ONE YEAR DIFFERENCE IN EDUCATION. A STUDY ON THE DIMENSIONS OF CREDIBILITY OF COMMERCIAL PRESENTATION WEBSITES

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Abstract: *This study is based on the hypothesis that one year of study difference between students underlines different evaluations of the dimensions of commercial presentation websites' credibility. The objectives of this study are: (-) highlighting significant differences of credibility dimensions evaluation between second and third year of study students; (-) highlighting the dimensions considered to be important by the second year of study students; (-) highlighting the dimensions considered to be important by the third year of study students. For presentation commercial Websites, as approached by this study, second year of study students consider "site-user connection" and "information support" as important dimensions; for the same category of Websites, third year of study students consider "ease of use", "real world feel" and "site-etiquette" as important dimensions.*
Keywords: *Credibility, Website, Regression analysis, Dimension, Construct*
JEL classification: *M31, M39*

1. INTRODUCTION

Although the credibility concept has been studied since ancient times, the credible information was first defined by Fogg and Tseng (1999) as the information that can be trusted, believed to be secure (Ţugulea, 2015). Studies on credibility have been conducted in various situations – assessment of credibility of different types of media (Flanagin and Metzger, 2000; Savolainen, 2007), different types of Web pages such as forums and blogs (Chun Ho, 2006; Garrison, 2003; Metzger

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and Hall, 2005), particular manners used to increase credibility (Bohner *et al.*, 2003), the importance of the element "price" in assessing credibility (Trifts and Häubl, 2003).

Researchers agree on the multidimensional nature of the construct of credibility. The credibility's dimensions in various contexts are identified using the exploratory factor analysis (Eisend, 2006; Raven 1994; Munteanu *et al.*, 2009; Kim and Mueller, 1978).

Recent studies investigate this concept applied on the Web context. Researchers investigated credibility's dimensions of various types of Websites (Hong, 2006; Morrison, 2005; Eisend, 2006; Fogg, 2001). Some of the identified dimensions are: expertise, good will, trustworthiness, profoundness, honesty, real world feel, ease of use, tailoring, amateurism, commercial implications, sufficiency, decision, accurate, confident, complete, etc.

The table below displays the most common identified dimensions of the construct of credibility of Websites.

Table 1: *Dimensions of Web sites' credibility identified in past researches*

Dimension	Study
expertise	Hong (2006), Fogg (2001)
goodwill	Hong (2006)
trustworthiness	Hong (2006), Fogg (2001), Morrison (2005)
depth/sufficiency	Hong (2006), Morrison (2005)
fairness /privacy/bias	Hong (2006), Morrison (2005)
real-world feel/identity	Fogg (2001)
ease of use	Fogg (2001)
tailoring	Fogg (2001)
commercial implications/ advertising and sponsorships	Fogg (2001)
amateurism	Fogg (2001)
sufficiency	Morrison (2005)
decision	Morrison (2005)
confidence	Morrison (2005)
accuracy	Morrison (2005)

(Sources: Manolică, A., Ciobanu, O., Bobâlcă, C. and Sasu, C., (2011), „A Method to Asses Credibility of Commercial Web SItes. One level to Change Consumers' Attitude and Behaviour", *Proceedings of the International Conference on Management of Technological Changes*. Democritus University of Thrace, Alexandroupolis, Greece, Ciobanu, O. (2011), Aspecte ale evaluarii credibilitatii site-urilor comerciale, Tehnopress, Iaşi)

A company that proves to be credible in the online environment is more likely to build behavioural loyalty among its clients who begin to say nice word

about the company, express their preference for the company and buy its products (Bobâlcă, 2014a, Bobâlcă, 2014b); also, their loyalty can be expressed by their emotional response (Bobâlcă et al, 2014).

The element that favoured the Electronic Word of Mouth (eWOM) was trust (Chiosa, 2014a), which is directly connected to credibility. Credibility of advertising can easily be checked nowadays (Chiosa, 2014b), and this includes the online advertising as well.

This research is a continuation of the study Ţugulea (2015), which identified different perceptions between two sub-samples on credibility's dimensions of online sales Websites. The two sub-samples were distinct as there was one year of study difference between the two of them. Also, the Websites analysed were in the online sales category. The samples in this research have the same one year of study difference between them. The sub-samples analysed in this research are different than the sub-samples analysed in the previous research (Ţugulea, O., 2015). Another difference between the two studies is that this research investigates different perceptions between the two sub-samples on credibility's dimensions of a different category of Websites: commercial presentation Websites. This research uses the same demarch as the study of Ţugulea (2015), as described in this paragraph.

The purpose of this research is to investigate the perception of two types of samples on credibility's dimensions of a certain commercial presentation Website. The samples are: students in second year of study and students in third year of study. The *hypothesis* states that one year difference in the education level leads to different assessment of credibility online dimensions. The objectives are: (1) to identify significant differences in assessment of credibility's dimensions between the two categories of students; (2) to identify the important credibility's dimensions from students' perception in the second year of study; (3) to identify the important credibility's dimensions from students' perception in the third year of study. The method is a quantitative survey, investigating 205 students randomly selected from the Faculty of Economics and Business Administration, University "Alexandru Ioan Cuza" of Iaşi, Romania. Data was gathered using a questionnaire in one week period of time. Results reveal that in most cases, there are significant differences in credibility assessment between the two groups and for the two groups the important dimensions are different.

2. RESEARCH METHOD

The *purpose* of this research is to investigate students' perceptions on importance of credibility's dimensions of a certain clothes presentation Website.

The *hypothesis* of this research states that one year difference in the education level leads to different assessment of credibility online dimensions. This hypothesis is supported by the assumption that at this level of education, one year brings more experience and changes some elements of perception of the online world.

The *sample* consists of 205 students from the Faculty of Economics and Business Administration, University "Alexandru Ioan Cuza" of Iaşi, Romania. Students were randomly selected from the second and third year of study. Students in the first year of study were eliminated from this research because, as a result of a previous study, the majority of this category of potential respondents has little experience with the online commercial information. The sample was divided into two categories: 107 students in the second year of study and 98 students in the third year of study. All the analyses presented in this paper were conducted on the two groups of respondents. The purpose of this division is to understand whether one extra year of studentship leads to different evaluations of the commercial presentation Website credibility's dimensions.

The *method* was the quantitative survey. Each student received one questionnaire to fulfil and access to one computer connected to Internet. The computer gave access to visit a presentation clothes Website, that didn't have any online acquisition options. The selected Website is not a popular one. It is expected for the web page not to influence the credibility's rank due to Website's lack of popularity. All respondents evaluated the same Website during this research. The instrument was a questionnaire composed of 12 items. 11 items represented the dimensions of presentation commercial Websites' credibility, as they have been revealed by a previous research (Manolica *et. al,* 2011): sincere communication; ease of use; real world feel; company's experience; trustworthiness; framing adverts; expertise; site etiquette; site - user connection; information support; site length. These items were formulated so that each respondent evaluated each aspect (dimension) on the concrete example of a presentation commercial Website presented on a computer in front of them. The last item was an evaluation of the

overall credibility of the assessed Website. The 7 point scale was used to gather data for each item:

1 – criterion is not accomplished;   *7 – criterion is fully accomplished*

Source: Ciobanu, 2011

3. RESULTS

Initially, Independent samples T test was conducted for testing the assumption that second and third year of study students differently evaluate the dimensions of commercial presentation Websites, in score means, for each variable included in the study. These differences, if significant, may support the initial hypothesis that one extra year of study leads to different evaluation of the online environment due to more experience gained in the online environment.

Regression analysis was used in order to identify the dimensions of commercial presentation Websites considered to be important by the students included in the sample. This analysis was conducted separately for the two groups analysed: second and third year of study students. Results are compared in the conclusion section.

Objective 1 - identifying significant differences in assessment of credibility's dimensions of commercial presentation Websites between the two categories of students

Independent samples T test was conducted in order to identify any significant differences between the two groups concerning the evaluation of each dimension and the evaluation of the overall credibility of the Website.

Table 2: *Independent Samples T Test*

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
The site makes me believe it sincerely, openly communicates, in detail	Equal variances assumed	3,342	,069	3,384	203	,001	,788	,233	,329	1,248
	Equal variances not assumed			3,371	197,247	,001	,788	,234	,327	1,249
The site is easy to use	Equal variances assumed	,707	,401	3,635	203	,000	,927	,255	,424	1,429
	Equal variances not assumed			3,624	198,218	,000	,927	,256	,422	1,431
The company is real	Equal variances assumed	2,164	,143	2,511	203	,013	,601	,239	,129	1,073
	Equal variances not assumed			2,499	195,467	,013	,601	,240	,127	1,075
The company has experience in its field of activity	Equal variances assumed	,321	,572	3,778	202	,000	,875	,232	,418	1,331
	Equal variances not assumed			3,786	201,356	,000	,875	,231	,419	1,331
I trust this site	Equal variances assumed	,457	,500	1,460	201	,146	,360	,247	-,126	,846
	Equal variances not assumed			1,463	201	,145	,360	,246	-,125	,845
Adverts are well framed	Equal variances assumed	,087	,769	3,555	203	,000	,933	,263	,416	1,451
	Equal variances not assumed			3,557	201,944	,000	,933	,262	,416	1,451

		Levene's Test for Equality of Variances		t-test for Equality of Means							
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference		
									Lower	Upper	
The company is an expert in its field	Equal variances assumed	1,541	,216	3,420	202	,001	,784	,229	,332	1,236	
	Equal variances not assumed			3,428	201,934	,001	,784	,229	,333	1,235	
The site has a good image in the online environment	Equal variances assumed	3,371	,068	2,549	203	,012	,628	,246	,142	1,114	
	Equal variances not assumed			2,561	202,963	,011	,628	,245	,144	1,111	
The site creates a good connection with the users	Equal variances assumed	14,205	,000	3,389	203	,001	,915	,270	,383	1,448	
	Equal variances not assumed			3,423	199,141	,001	,915	,267	,388	1,443	
Information delivered on the site is well supported	Equal variances assumed	,476	,491	5,135	200	,000	1,306	,254	,804	1,807	
	Equal variances not assumed			5,132	198,798	,000	1,306	,254	,804	1,808	
The site is small	Equal variances assumed	5,989	,015	1,564	200	,119	,405	,259	-,106	,917	
	Equal variances not assumed			1,556	189,563	,121	,405	,261	-,109	,919	
How credible is the overall site?	Equal variances assumed	3,053	,082	4,256	200	,000	,878	,206	,471	1,284	
	Equal variances not assumed			4,239	192,769	,000	,878	,207	,469	1,286	
	Equal variances not assumed										

Different Web Credibility Assessment as a Result of One Year Difference in Education.

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In order to gather some conclusions from these statistical results, an example is given. For the first variable, "The site creates a good connection with the users", the Sig. value for Levene's Test for Equality of Variances is 0.000. As this value is < 0.05, the null hypothesis in Levene's Test is rejected. For this particular item, we follow results displayed in the second row. The Sig. value of t-test for Equality of Means is 0.001. As this value is < 0.05, the conclusion is that there are significant differences between the second year of study and third year of study in evaluating this variable.

Almost all the variables have been evaluated significantly different by the respondents. The exceptions are the variables *trustworthiness* and *site length.* This supports the initial hypothesis that one extra year of study leads to different evaluation of the online environment due to more experience gained in the online environment. The elements of trust seem to be similarly evaluated, even if there is a small difference in years of education. It might be that people generally, students in this case, put a special accent on the elements of trust due to past online history. Also, the length of site is evaluated of a similar manner because this is mostly an objective assessment that doesn't involve perception as much as the other dimensions.

Objective 2 – identifying the important credibility's dimensions of commercial presentation Websites from students' perception in the second year of study

In order to detect the extent to which one variable is important or not, regression analysis was conducted for both groups of respondents. The dependent variable was *overall credibility*, an item that evaluated the overall credibility of the analysed Website, on the same 7 points scale. The multiple linear regression analysis, enter method, was conducted. Objective 2 presents results for second year of study students. Objective 3 presents result for third year of study students.

The condition to conduct a regression analysis is to have a data base with more than 5 respondents per each independent variable (Bartlett et al., 2001, Ciobanu, 2011). As the database included 107 students in the second year of study and 98 students in the third year of study and the questionnaire contained 11 independent variables, the condition is accomplished. The samples were large enough to test b and R^2 coefficients.

Regression analysis, enter method, was conducted with 11 independent variables, corresponding to the credibility's dimensions and the dependent variable corresponding to the general evaluation of credibility of the analyzed clothes presentation Website.

Approximate 67 % of the variability of dependent variable is explained.

Table 3: *R and R Square values*

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,816	,666	,625	,842

The hypothesis that coefficients equal 0 is rejected by the Anova test and the independent variables as a whole help to explain the variation of the dependent variable.

Table 4: *Anova test*

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	126,115	11	11,465	16,168	,000
	Residual	63,113	89	,709		
	Total	189,228	100			

A significant relationship between independent variables and the dependent variable is given by: *site - user connection* ("The site creates a good connection with the users" – sig. = 0.058) and *information support* ("Information delivered on the site is well supported" – sig. = 0.031). For the case of clothes presentation web sites, the presented dimensions are the important dimensions defining the credibility construct.

Table 5: *Function Coefficients*

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1,100	,422		2,607	,011
	The site makes me believe it sincerely, openly communicates, in detail	-,053	,068	-,063	-,789	,432
	The site is easy to use	,071	,069	,093	1,024	,308
	The company is real	,096	,062	,115	1,545	,126
	The company has experience in its field of activity	,121	,084	,150	1,441	,153
	I trust this site	,021	,084	,027	,246	,807

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
Adverts are well framed	,052	,065	,071	,798	,427
The company is an expert in its field	,158	,102	,194	1,539	,127
The site has a good image in the online environment	,129	,091	,172	1,419	,159
The site creates a good connection with the users	,109	,057	,170	1,919	,058
Information delivered on the site is well supported	,132	,061	,175	2,186	,031
The site is small	-,018	,057	-,022	-,311	,756

Regression analysis was conducted including only the two important dimensions (Ciobanu and Bobâlcă, 2011). The purpose of this analysis is to highlight the important dimensions in an equation that only includes dimensions with a significant relationship between the independent variables and the dependent variable. The model explains 46% of the variability of dependent variable.

Table 6: *R and R Square values*

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,676	,458	,447	1,015

Table 7: *Function Coefficients in second year of study sample*

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2,070	,303		6,828	,000
	Information delivered on the site is well supported	,271	,059	,356	4,635	,000
	The site creates a good connection with the users	,307	,049	,479	6,241	,000

The equation explaining the relation between the two independent variables and the dependent variable, applicable for the particular case of clothes presentation Websites evaluated by second year of study students is:

$$\text{Credibility} = 2.070 + 0.271 * \text{Information support} + 0.307 * \text{Site - user connection} \quad (1)$$

Objective 3 – identifying the important credibility's dimensions of commercial presentation Websites from students' perception in the third year of study

The same process was conducted for students in the third year of study. Regression analysis, enter method, was conducted with 11 independent variables, corresponding to the credibility's dimensions and the dependent variable corresponding to the general evaluation of credibility.

Approximate 67 % of the variability of dependent variable is explained.

Table 8: *R and R Square values*

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,818	,669	,626	,946

The hypothesis that coefficients equal 0 is rejected by the Anova test and the independent variables as a whole help to explain the variation of the dependent variable.

Table 9: *Anova test*

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	153,988	11	15,637	16,168	,000
	Residual	76,094	85	,895		
	Total	230,082	96			

A significant relationship between independent variables and the dependent variable is given by: *ease of use* ("The site is easy to use" – sig. = 0.040), *real world feel* ("The company is real" – sig. = 0.050) and *site etiquette* ("The site has a good image in the online environment "– sig. = 0.000), these three dimensions being the most important in the perception of third year of study students.

Table 10: *Function Coefficients*

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	,143	,360		,397	,693
	The site makes me believe it sincerely, openly communicates, in detail	,059	,076	,066	,780	,438

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
The site is easy to use	,159	,076	,193	2,082	,040
The company is real	,143	,072	,167	1,990	,050
The company has experience in its field of activity	-.070	,083	-,073	-,840	,404
I trust this site	,030	,091	,033	,332	,741
Adverts are well framed	,086	,073	,104	1,180	,241
The company is an expert in its field	,009	,100	,009	,086	,932
The site has a good image in the online environment	,369	,097	,397	3,812	,000
The site creates a good connection with the users	-,025	,074	-,027	-,332	,741
Information delivered on the site is well supported	,129	,073	,151	1,760	,082
The site is small	,058	,054	,075	1,072	,287

As for the second year of study sample, regression analysis was conducted including only the three important dimensions (Ciobanu and Bobâlcă, 2011). The model explains 63% of the variability of dependent variable.

Table 11: *R and R Square values*

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,797	,636	,624	,958

Table 12: *Function Coefficients in third year of study sample*

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	,375	,296		1,268	,208
The site is easy to use	,226	,063	,273	3,580	,001
The company is real	,230	,065	,266	3,561	,001
The site has a good image in the online environment	,411	,070	,438	5,845	,000

The equation explaining the relation between the three independent variables and the dependent variable, applicable for the particular case of clothes presentation Websites evaluated by second year of study students is:

$$\text{Credibility} = 0.375 + 0.226 * \text{Ease of use} + 0.230 * \text{Real world feel} + 0.411\,\text{Site etiquette.} \quad (2)$$

4. CONCLUSIONS

For "second year students", the important dimensions of the credibility of clothes presentation Websites are *site-user connection* and *information support*. "Third year students" seem to focus on other dimensions: *ease of use, real world feel* and *site-etiquette*. Possible explanations may be that "second year students" are more attracted to creating relations and to exterior looks, while for "third year students" aspects to make them feel secure are the most important elements of the online world. Variables such as age, year of education, specific disciplines studied in the third year could serve as mediators that lead to differences in the amount and quality of available information.

If we consider the differences in assessment of each dimension, "third year students" ranked lower all the dimensions considered being important for both groups.

Table 13: *Means values of variables included in the analysis*

year of study		N	Mean	Std. Deviation	Std. Error Mean
The site makes me believe it sincerely, openly communicates, in detail	2	107	4,97	1,599	,155
	3	98	4,18	1,737	,175
The site is easy to use	2	107	5,24	1,764	,170
	3	98	4,32	1,886	,191
The company is real	2	107	5,35	1,620	,157
	3	98	4,74	1,807	,183
The company has experience in its field of activity	2	107	4,51	1,684	,163
	3	97	3,64	1,615	,164
I trust this site	2	105	3,96	1,813	,177
	3	98	3,60	1,691	,171
Adverts are well framed	2	107	4,39	1,892	,183
	3	98	3,46	1,862	,188
The company is an expert in its field	2	106	3,40	1,683	,163
	3	98	2,61	1,584	,160
The site has a good image in the online environment	2	107	3,50	1,845	,178
	3	98	2,87	1,666	,168

year of study		N	Mean	Std. Deviation	Std. Error Mean
The site creates a good connection with the users	2	107	3,59	2,128	,206
	3	98	2,67	1,692	,171
Information delivered on the site is well supported	2	104	4,84	1,791	,176
	3	98	3,53	1,823	,184
The site is small	2	104	4,71	1,676	,164
	3	98	4,31	2,002	,202
How credible is the overall site?	2	104	4,50	1,365	,134
	3	98	3,62	1,563	,158

The hypothesis was confirmed. One year difference in the education level leads to different assessment of online credibility dimensions.

The contribution of this study is that it reveals important differences in students' perception between groups that are similar. The only difference between the groups involved in this paper is one extra year of study, one extra year of online experience.

Research limits

The most important limit is considered to be the composition of the sample. Students were randomly selected and they were all studying at a Faculty of Economics. The research would be complete if the study involved students from as many faculties as possible, from all types of universities, from different geographical areas in the country. Another limit considers the sample size. A stepwise regression could bring more revealing results but that was not possible for a sample size with less than 40 respondents per each computed variable (Țugulea, 2015).

Future research

The two categories that were analysed in this paper are not necessarily different through the age perspective but through the online experience perspective. This leads to a new hypothesis to be tested in a future research: students' online experience and perceptions change greatly from one year to another. Another future direction is to conduct this analysis on gender groups. The hypothesis is that women and men assess differently the credibility's dimensions of presentation Websites of certain types of products (Țugulea, 2015).

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IMPROVING GRADUATES' EMPLOYABILITY IN IT FIELD. THE CASE OF ACCOUNTING AND INFORMATION SYSTEMS STUDY PROGRAM

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Abstract: *The studies published in 2015 analyzing the need for human resource in Iasi IT market (the most representative market for the North-East of Romania) conclude that the demand for specialists exceeds by far the number of graduates from faculties which train IT specialists. Nationwide, within the FEBA[2], the employment rate for the students that complete the Economic Informatics undergraduate program and different master programs that specialize students in BIS[3] is approximately 95%. We strongly believe that the students graduating the program AIS[4] could get a higher employability in the IT area and appropriate improvement measures would beneficially contribute to a higher rate of employability, but also to the diversification of their professional horizon and their adjustment to the IT field requirements for professional accountants nowadays. The research also attempts to determine the profile of AIS graduates and their compatibility with IT related positions in the labour market and graduates' employability in terms of knowledge, skills and attributes relevant to the employers' needs.*
Keywords: *Accounting and Information Systems study program, IT market, Accounting profession*
JEL classification: *M15, M41, C15*

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1. INTRODUCTION AND RESEARCH PURPOSE

Although there's reticence, the cloud and software-as-a-service (SaaS), along with several other technology trends — like social, mobile, and big data/analytics— are changing the ERP dominated enterprise software landscape (Piazolo,2013); (Wortmann,2014). As information technology advances, organizations react and create new jobs to account for new responsibilities. Important evolutions relevant to the business landscape and their impact to organizations and their information systems are for short described next.

Cloud adoption is number one key trend shaping tomorrow's enterprise software landscape (Zhong,2014). Unlike traditional ERP system, Cloud ERP provides much more flexibility and ease of use without increasing the costs and providing features that accommodate every type of business (Grubisic,2014). Cloud Computing and ERP together equal innovation and it will mark the enterprise information system.

The increased availability of services to the mobile devices is why mobility and the demand for real-time information became another important enterprise software trend. As some research indicated, mobility integration turned out to be a major distress for organizations (Dospinescu,2008), but major projects are still performed. It is expected that in the near future tens of millions of users will use ERP, CRM, SCM or BI applications on a mobile device. Mobile devices will replace traditional PCs in hosting of business applications.

Using a classical information system today, the percentage of exploited data is under 25%. To reach the potential insights contained in the ocean of data, integrating ERP with big data analytics is another important evolution in enterprise systems. Business analytics is extremely relevant nowadays, so organizations are interested in data analytics professionals, who are now refining their skills to adapt to the influx of data flowing in and out of the company (Ekman,2015). The integration between ERP and big data should enable organizations to have a better and wider - in scope - best practices (Glowalla,2014).

Last, but not least, the use of emergent social software platforms represents a key trend. Enterprise 2.0 is a concept which promotes the integration of the social and collaborative tools of Web 2.0 (Web applications that facilitate interactive information sharing, interoperability, user-centred design and collaboration on the

World Wide Web) into the enterprise environment (Usman,2014). Profound changes in existing positions and new jobs are also expected in this respect.

These arguments corroborate that software solutions that run businesses - especially ERP systems - are undergoing profound changes. New business trends require new responsibilities, which change the attributions of current positions and also create new jobs and require new expertise. Professor Mantz Yorke defined employability as 'a set of achievements – skills, understandings and personal attributes – that make graduates more likely to gain employment and be successful in their chosen occupations, which benefits themselves, the workforce, the community and the economy' (Yorke,2006). However, in the new technological context, employability is more than having a graduate job, it entails a big amount of versatility, the capacity of the graduate to function in a job and be able to move between jobs, thus remaining employable.

Universities and the specific study programmes - mostly within the Faculties of Informatics and Business - are expected to be aware of the presented trends. The shift to what many experts call "the post-PC age" is happening as we speak, graduates with a renewed set of skills and knowledge are expected in organizations to utilize their abilities to help business growth and enhance operations (Fotache M., et al, 2015). Because we believe that it is the university's mission to produce graduates prepared to achieve high personal and professional standards.

Trying to summarize the skills and knowledge that employers expect from graduates, we reach to the following list:
- To be 'IT' literate.
- To understand the businesses processes, and integrate accounting to finance, manufacturing or distribution.
- To be technically aware with a good understanding of databases.
- To understand IT project management.
- To have communication skills that allow them to communicate non-technical information to technical people.
- To have the initiative and commitment to continue their professional development and help others to impart their knowledge.

For employers in the IT industry, disciplinary knowledge and understanding are extremely relevant, the generic academic qualifications are not enough. In this context, graduates of programmes that are not 100% IT oriented have new

opportunities in the labour market, if they are in the possession of relevant achievements. We consider this may be the case of the Accounting and Information Systems bachelor programme, which is one of the most successful programmes if we consider the number of enrolled students - we have a previous analysis of the potential of this study programme (Fotache and Pavaloaia, 2015). Although the enrolled students are mainly attracted by the accountant or auditor career perspective, we consider that this programme might also produce IT employable graduates. We identified the need of qualified workforce in the local IT market, as we have investigated this market and become aware of its continuous increasing trend in the last few years. (Fotache D., Hurbean L., 2015) In the last 5 years we witnessed important investments in the Iaşi's IT market on one hand and the companies' struggle in finding adequate qualified employees, on the other hand. While the growing trend is expected to continue, we realize that it may represent an opportunity for graduates of programmes that are not entirely IT oriented. Our research will present their attraction for this professional trajectory and then how should the AIS bachelor programme respond to it.

We have analyzed the declared mission and specific goals of AIS study programme, as well as the curriculum and the course descriptions in the Faculty of Economics and Business Administration at "Alexandru Ioan Cuza" University. First of all, we certify there is a suitable teaching and learning environment with adequate facilities. The content and structure of the curriculum, staff, and facilities enable the incoming students to achieve the intended learning outcomes. We need to remark here that most outcomes target the accountant and the auditor professions. The program curriculum reveals professional modules (knowledge-based learning line) and projects (experience-based learning line). The curriculum components devote considerable attention to both general competencies (fundamental knowledge) and professional competencies (practice-oriented). The literature being used throughout the course is relevant and meets the level that should be expected of a professional bachelor's course. Also, the solid, firm and well-structured knowledge foundation is applied in real or simulated professional situations, but even more is expected - the theoretical knowledge should increasingly be aligned with actual professional practice and priority in the learning process should be given to issues that come up in real-world situations.

We should also mention that in recent years, a substantial number of students (more than 50%) enrolled for a Master's programme before or when simultaneously entering the job market. Their perception is very relevant in our opinion, as they are still in a study program (master level) and also in touch with the labour market; therefore they were involved in the following empirical research.

2. RESEARCH METHODOLOGY, DATA COLLECTION AND HYPOTHESIS

The research methodology applied takes into account the experimental method and probative thinking. The specifics of the experimental method assume the application following methods in the analysis and interpretation of the research results: the concordance, the difference, the consistency and the difference method, residues method and the method of concurrent variations. In the questionnaire-based analysis we have also considered, the quantitative method with positivist-explanatory orientation. The investigation carried out by the questionnaire has considered three investigation directions which form our researched hypotheses. , namely:

H1: At least a quarter of the students that graduate the AIS programme work in the IT area;

H2: Less than half the students that graduate AIS programme work in the Accounting area;

H3: The students that graduated AIS programme mainly use IT during their daily tasks, even if they don't work in the IT field.

Our research was conducted based on a questionnaire developed with Google tools and available in Google drive, distributed to 285 potential respondents. The criterion for creating the sample was to include only the AIS graduates that are currently enrolled in different master programs at FEBA. Thus, the target population are the FEBA's students that graduated the AIS programme and are currently enrolled in different master programs. In the light of the above information, the size of the population is 285 individuals. We have delivered the questionnaire in various manners: in person, via e-mail and through FEBA's Portal. This action leads us to obtaining a total of 120 valid responses. Therefore, the sample size is 120. Given the sample size, compared to the population size, and also by taking into account the fact that all students in the population had the same probability to be included in the sample, we consider the sample representative.

The questions delivered throughout the questionnaire are structured in two categories: general and specific questions. The last category has a logical and theoretical based correlation between the questions allowing us to match and pair the results. For instance, in some cases, throughout the questions we have linked the grades obtained by AIS students with the degree of promotions and benefits received as employees. This way we were able to state whether the students with high ranking prove the same standards in the real world environment. Another example of logic and correlated questions would be the case of questions for ERP tasks where it was investigated if the AIS graduates daily tasks performed at work are compatible with the requirements of the jobs within the ERP industry. The obtained answers were analysed using SPSS descriptive statistics using frequency analysis, descriptive indicators of central tendency, quartiles, dispersion indicators and by performing a robustness test.

3. FINDINGS AND RESULTS

Given the qualitative and quantitative nature of the data, we used descriptive statistics for both types of data. In order to follow and accomplish our goal which was to construct the profiles for AIS students that work in the IT&Accounting fields, we have used univariate descriptive statistics by analysing the central tendencies and the dominant behaviour of the respondents.

In the now-a-days competitiveness of the business environment, one will be surprised if not stunned to find out that in Romania, in the small and even medium sized firms, the IT tools are scarcely used only in certain moments (for preparing different financial reports and the trial balance sheet). Even though the general perception is that all employers working in the Business sector make extensive use of the IT tools in achieving their daily goals, we did not find a study, for the analysed region that would displays these figures. Therefore, our study investigates the percentage of AIS graduate students working in Accounting that fully use IT tools (generalized accounting software, ERP systems or other IT tools developed in-house) within their daily activities. Consequently, for the purpose of increasing the robustness of our conclusion that AIS students fully use IT on their daily tasks, we have performed a Chi-square test to verify if there is a significant association between the field of work and the use of IT tools.

The first investigated hypothesis

Assuming and then proving that some of the AIS graduates are working in IT area, our research displays their profile and characteristics. Thus, the results reveal that AIS graduates working in the IT environment have a 25.83% share on the entire sample and 47.69% share on the sample of students that are or have worked. Thus, our first hypothesis was confirmed. These students have said they followed and graduated some specialized courses organized by their employers. These students have many advantages, like for example a better remuneration.

Table 1 includes a series of statistics which highlight the characteristics of AIS graduates that are employed in the IT environment. For the purpose of outlining their academic profile in Table 2 it was carried out a description of the statistical indicators applied on the situation of the most relevant IT discipline's grades obtained by the students over the undergraduate period.

Table 1: *Descriptive indicators of the characteristics of graduates working in IT field*

	N		Mean	Median	Std. Dev.	Mode
	Valid	Missing				
Please specify your age:	31	0	23.97	23.00	3.230	
If you work in the field, specify the number of months since the last employment:	27	4	13.89	6.00	29.939	
Did you earn any promotions at work:	31	0				no
If you have been promoted at work, enter the number of promotions:	31	0	.26	.00	.631	
Have you benefited from wage increases to current job?	31	0				no
How many wage increases did you have at your current job?	31	0	.97	.00	2.243	

a. Multiple modes exist. The smallest value is shown

Table 2: *Descriptive indicators of grades for AIS graduates working in the IT field*

Grade	N		Median	Mode	Percentiles		
	Valid	Missing			25	50	75
[Enterprise Resource Planning]	28	3	2.00	2.00	2.00	2.00	2.00
[Information Systems analysis and design]	30	1	2.00	2.00	2.00	2.00	2.00
[End user computing]	24	7	2.50	3.00	2.00	2.50	3.00
[Business information technologies]	20	11	2.00	2.00	2.00	2.00	2.00
[Information system's security]	27	4	2.00	2.00	2.00	2.00	3.00

Based on the descriptive statistics analysis elaborated in Tables 1 and 2, we were able to build the profile of AIS graduates working in IT field, as follows:

- Their average age is 24 years
- 50% of them have at most 6 months since the last employment while the rest of 50% have at least 6 months since their last employment
- Most of them did not obtained any promotions or wage benefits at the current place of work
- Their academic performance are above the AIS graduates mean within the sample, while for some of the disciplines, 75% of graduates obtained at least grade 8 on a 1 to 10 scale.

The results obtained (using the concurrent variation method) confirm the hypothesis originally set, according to which, many AIS graduates that are enrolled in the 1st year of studies at FEBA master programs are working in the field of IT. The rest of the respondents indicated that in varying proportions, but in all cases more than 50%, could hold positions in the field of IT.

The second investigated hypothesis

The research through the second hypothesis looks at the AIS graduates employed in Accounting. The share of students that are working in Accounting is 43% and thus our hypothesis was confirmed. From the remaining difference (57%), it was proved that 25,83% work in the IT domain meaning that 31% are working in other areas than those for which they were prepared during their undergraduate studies. At this point, we should suggest that they might get employed in IT positions, where we see the job market is more generously sized compared to the accounting positions market. And we also consider that the university may also play a role with by amending the programme's curricula with courses such as Databases or Programming, or by upgrading the number of hours to some existing disciplines, such as Enterprise Resource Planning. Going back to the graduates that are employed in the field of Accounting, Table 3 highlights through the descriptive statistics theirs characteristics, while Table 4 analyzes their academic state.

Table 3: *Descriptive indicators for characteristics of graduates working in Accounting*

	N		Mean	Median	Mode	Std. Dev.
	Valid	Missing				
Please specify your age:	43	0	25.72	23.00	23	6.100
If you work in the field, specify the number of months since the last employment:	42	1	18.26	6.50	6	31.751
Did you earn any promotions at work:	43	0			2	
If you have been promoted at work, enter the number of promotions:	43	0	.40	.00	0	.728
Have you benefited from wage increases to current job?	43	0			2	
How many wage increases did you have at your current job?	43	0	.98	.00	0	1.626

Table 4: *Descriptive indicators of grades for AIS graduates working in Accounting*

Grade	N		Median	Mode	Percentiles		
	Valid	Missing			25	50	75
[Enterprise Resource Planning]	37	6	2.00	2.00	2.00	2.00	2.00
[Information Systems analysis and design]	34	9	2.00	2.00	2.00	2.00	3.00
[End user computing]	30	13	2.00	2.00	1.75	2.00	2.00
[Business information technologies]	6	37	2.00	2.00	1.75	2.00	3.00
[Information system's security]	5	38	1.00	1.00	1.00	1.00	2.00

As a result, based on the analysis performed in Tables 3 and 4, it may be outlined the profile of the AIS graduate working in Accounting:

- Average age is 26 years;
- 50% of them have at most 6.5 months since the last employment while the rest of 50% have at least 6.5 months since their last employment;
- majority did not obtained any promotions or wage benefits at the current place of work;
- most of them obtained grades of 8 and 9 (on a 1 to 10 scale).

The third investigated hypothesis

The last hypothesis assumes that many AIS graduates are working in Accounting and their activities are fully computerized.

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In the beginning, the study detected whether respondents are employed (Table 5) and if so, how many of them are working in the field of Accounting (Table 6).

The current analysis aims to showing that in most cases, the employees, regardless the area in which they operate, use IT tools to solve their daily tasks at the workplace. Therefore, using the difference method as a research method, our study highlights that:

- 54.2% of AIS graduate students are employed (see Table 5);
- Among them 66.2 % work or have been worked in Accounting (Table 6);
- 87.7% of the AIS graduates that are employed in Accounting use specific software or IT tools in relation with their tasks at their workplace (Table 7).

Table 5: *Distribution of respondents by the employee status*

Are you currently employed?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	65	54.2	54.2	54.2
	No	55	45.8	45.8	100.0
	Total	120	100.0	100.0	

Table 6: *Distribution of respondents by the area they are employed*

Did you work or have worked in Accounting?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	43	66.2	66.2	66.2
	No	22	33.8	33.8	100.0
	Total	65	100.0	100.0	

Table 7: *Respondents distribution by the status of using software or IT tools at their workplace*

Do you use software or IT tools in your daily tasks?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	57	87.7	87.7	87.7
	No	8	12.3	12.3	100.0
	Total	65	100.0	100.0	

The survey results, using the concordance method, showed that 57 respondents, representing 87.7% of graduates working in the field of Accounting

are fully using within their activities accounting software or IT tools. Therefore, the third research hypothesis was confirmed.

Table 8. *The results of chi-square tests*

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3,345	1	,067		
Likelihood Ratio	3,148	1	,076		
Linear-by-Linear Association	3,294	1	,070		
N of Valid Cases	65				

In order for us to observe if there is a significant association between the use of software or IT tools and the field of work, we have performed a Chi-square test (Table 8). The results show a significant association between the two, at a significance level of 10%. Also, displays that more than 7% of the employed students are using (accounting) software or IT tools, and that more than 60% of the employed students work in Accounting and use specific software or IT tools during their daily tasks (Table 9).

Table 9. *The bivariate frequency table between the two variables*

Did you work or have worked in Accounting? * Do you use (accounting) software or IT tools in your daily tasks? Crosstabulation

		Do you use software or IT tools in your daily tasks?		Total
		Yes	No	
Did you work or have worked in Accounting? Yes	Count	40	3	43
	% of Total	61,5%	4,6%	66,2%
No	Count	17	5	22
	% of Total	26,2%	7,7%	33,8%
Total	Count	57	8	65
	% of Total	87,7%	12,3%	100,0%

A more in-depth analysis confirmed that AIS graduates employed in IT field have less technical jobs, therefore we consider that most of them are more likely employable in the ERP industry, which is known for the fact that require less technical skills. Within the questionnaire, we have addressed some questions that have investigated the daily tasks and match them with the jobs requirements

of some of the job titles from the ERP industry. This way we have discovered that 32 of the respondents (out of 57), respectively 56.1% are daily using an ERP product and, based on their job requirements, could perform the tasks required by jobs like: ERP manager or team leader, ERP consultant, CRM/SCM manager or Project manager.

4. CONCLUSIONS AND FUTURE RESEARCH PATHS

Our research is based on our or other colleague's previous papers which investigated some aspects of the Iasi's IT market and the specific of the AIS programme study (Fotache, D., Hurbean, L., 2015; Fotache, M., et al, 2015; Fotache, D., Pavaloaia, V.D., 2015) and was developed on a sample from the country's N-E region. We consider the results may be extended for other regions, especially for graduates of prestigious Romanian universities due to the similarities in the educational curricula. Within our study, all the research hypotheses have been confirmed, namely: At least a quarter of the students that graduate the AIS programme work in the IT area (1); Less than half the students that graduate AIS programme work in the Accounting area (2); The students that graduated AIS programme make a full use of IT during their daily tasks (3). The research also points out that the graduates of AIS programme are willing to engage into a lifelong learning process and some of them are already employed on the IT market. Their profile reveals that they have an average age of 24 years, 50% of them have at most 6 months since the last employment, the majority did not get promotions or salary increases, their academic performance are above the average of the sample and for half of the subjects studied, 75% of the AIS graduates employed in the IT industry have grades of at least 8 (on a 10-1 scale).

We appreciate that the AIS study programme is a competency-based one, brings a strong knowledge foundation and intends to offer a realistic learning environment. However, the firm and well-structured knowledge foundation can be even more applied in real or simulated professional situations - the theoretical knowledge should increasingly be aligned with actual professional practice and priority in the learning process should be given to issues that come up in real-world situations.

In the last three semesters of the study programme features from professional environment are offered, which helps the transition to a real professional practice.

Some disciplines' assessment include projects which involve group work and thus enable students to develop generic communicative and collaborative skills. Therefore, based on this project-oriented approach and also on the fact that students have at their disposal dedicated Information Systems lab, a well-designed electronic learning environment and a substantial library of both hard copy and digital sources relevant to the IT domain, we consider that this programme might also produce IT employable graduates.

Adjustments may be implemented based on a curriculum redesign, so the learning outcomes to expand to guide the students to the IT industry. A number of improvements should be acted out and one easy measure is to offer students more elective courses.

A new vision may be created with the ambition for the AIS programme to become a recognized player in the IT industry field. Such an ambition should be translated to innovations in the curriculum and the courses syllabi. A new framework should put greater emphasis on competence-based learning outcomes, where competency is understood as the ability to coherently apply knowledge, skills, and attitude in professional practice.

The current research (as well as any other articles consulted) did not perform either a study on the rate of IT disciplines/Accounting discipline or an investigation on the number of hours allocated for each IT discipline delivered to the AIS undergraduate program. For instance, the ERP course has allocated one hour/week of practical training. On certain occasions, different generations of graduates reported that this situation is not conducive for their training as they need more practical hours. Also, the fact that students don't select the elective course on Databases, delivered in the 2nd year of study, truncate their professional preparation for this domain. The remarks of the employers on this issue should "give food for thought" to the tutors of the AIS undergraduate program. These latter matters are intended to be studied in a different article and we believe they represent the study limitation but, on an optimistic note, lead a way for further research aims.

We conclude by suggesting that, by upgrading the AIS curricula or by pursuing additional specialization courses, the AIS graduate students could easily address other specific areas of current technology offer (Mobile technologies, Business Intelligence/Business Analytics, Big Data, Cloud Computing, Social

networks, Software as a Service) completing the necessary knowledge to become a good and reliable professional, consistent with the requirements of employers of this decade.

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QUANTUM REVOLUTION AND RETHINKING THE "ETERNAL TRUTHS" OF THE ECONOMIC SCIENCE

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Abstract: *Quantum physics requires a rethinking of basic postulates of economic science. The article presents the fundamental ideas of the hypothesis theory "The economy of creative imagination". Also, it identifies the reevaluation methods of mechanistic economic paradigms that were formulated through analogy with classical mechanics. The paper shows that the economic process is performed at two levels – first in individual imagination, and then in traditional workshops and factories. In individual's imagination, real goods are "truly created" at the subatomic level. As determinism principle dominates big material objects and the uncertainty principle operates at the quantum level, the author believes that rethinking the economic science refers primarily to the discovery of laws that enable us to predict the evolution of economic phenomena within the limitations imposed by the uncertainty principle.*

Keywords: *Economy, quantum physics, creative imagination, conscience, the factors of production.*

1. THE ROLE OF THEORETICAL PHYSICS IN THE EVOLUTION OF ECONOMICS

It has been long claimed that economics as a science has at its foundation mechanical physics. Although, other sciences such as psychology and mathematics have influenced its development, the foundation of economics is considered to be the classical mechanics "discovered" by the English scholar Isaac Newton (1642-1727). In his view, **the matter** is the basement of the Universe, and it can be divided into small solid and indivisible particles. There is a well-determined order in this Universe. Nothing can happen without a real reason. All events are subordinated to determinism principle. The Universe is ruled by certain objective

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laws, and this means that there is some interdependence and conditioning between all phenomena and processes taking place.

Starting with Newton's physics, other sciences such as chemistry, biology and economy had been later developed. So, departing from the mechanical interpretation of the Universe, the French scholar Francois Quesnay (1694-1774), and more importantly, Adam Smith (1723-1790) founded the Economic Science. In their perspective, all economic processes occur in accordance with specific laws, which are objective, general and eternal just as the rules of nature. Following this principle, the spiritual efforts of the individual , such as intentions, expectations, intuition, imagination or prayers, do not have any importance in the economic activity and do not influence in any way economic results.

At the beginning of the 20th century, the so-called "quantum revolution" was launched. According to its proponents, Max Planck (1858-1947), Albert Einstein (1858-1947) and Niels Bohr (1885-1947) , the main element which forms the Universe is not the matter as previously thought by Newton – but energy. The energy has the property of "becoming solid", that is turning into matter. Small particles, basic particles and sub-atoms are not solid and indivisible as the father of classical mechanics claimed. It may seem incredible but these particles, the so-called quantum, have a dual character of particle-wave. They manifest themselves depending on the person who creates them, and mainly, depend on his imagination and expectations. In concordance to these factors, the particles may appear as energetic waves or point-like particles. In time, scientists have concluded that there is no objective reality at the quantum level (as it has been thought to be in the world of big objects). But there is a "shaped" reality, "created" by the desires, imagination and expectations of the individual. In other words, "the observer creates the observed reality" in the Universe of material particles at the quantum level. The matter, in the shape of minuscule solid points, "appears" from an invisible world of eternal energies as a result of a "mystique collaboration" between human consciousness and energy waves.

Moreover, **the determinism principle does not act at the quantum level anymore**. The subatomic cells have a strange "behavior" and it is difficult to predict their future actions. In this case, the **uncertainty principle** is dominant. This principle was discovered by the German **Werner Heisenberg** (1901-1976) in 1927. It is understood as a physical Universe that does not exist in a well-

determined shape at the quantum level but as a "collection" of probabilities. Therefore, we ascertain the existence of two worlds, two levels of reality – the one of big objects studied by Newton mechanics) and another one of elementary particles (researched by quantum mechanics). In this case, one can probably ask if these two levels of reality form a whole which is governed by the same laws and rules, or are these two different worlds governed by different laws and principles. When trying to answer this question, the scientists and physicians reached two divergent views. In our opinion the position of those who support the laws and principles for both reality levels – elementary particles and big objects worlds (chairs, buildings, planets and galaxies) – have a more reasoned position. As the American physicians **Bruce Rozenblum** and **Fred Kuttner** stated, "the quantum mechanics is applied for everything, from baseball balls to atoms. But the technologies limit us when presenting the quantum phenomena on small objects." [1] In regards with the correlation between classical and quantum mechanics … American authors consider that "quantum physics does not replace the classical physics…It most probably contains the classical physics as a special case."[2]

By trying to sketch a "bridge" between the world of elementary particles and the world of small material objects (which are formed of these particles), we should underline that contemporary science and big world religions "prove" that the material Universe appeared suddenly, out of nothing – from blankness. And it will disappear some day. There is truly a huge difference between the scientific and the religious approach. "Big Bang" hypothesis states that the Universe appeared spontaneously, by itself, as a result of an explosion after which the pure energy turned into matter, free energy and information. On the other hand, religion claims that the material Universe was created by God gradually, consciously and wisely. It should be noted that in our opinion the biblical explanation of "the world's creation" seems to be closer to the quantum physics ideas (the observer creates the observed reality) than to the Big Bang theory.

However, the process of "creating the world" continues. On Earth, it is carried out by the one who was created by "the Face and Resemblance of God (Supreme Consciousness)" as the Bible states. In this context, we should go back to ideas of Isaac Newton, Albert Einstein, Max Planck, Thomas Edison who confirmed that "**Human consciousness is a part of Supreme Consciousness**", or the Consciousness which according to Religion created the material Universe.

At this point, we must ask ourselves if there is any coincidence in the fact that the Romanian equivalent for the word "brain" is "creier" and the words "creator" and "to create" have the same root.

There are several postulates in economic science. These are basic truths which are considered to be eternal. The production process, which according to the theory of economics, refers to gaining material goods and services through matching physical and intellectual efforts of the individual with turning natural resources into consumer goods. This process takes places in different workshops and factories. In this case, having some links to the concepts of classical mechanics about world, the economic science leaves aside human conscience, imagination, desires, prayers and faith and his expectations.

It is obvious that the economic resources are limited and the results of every production process are predictable and can be successfully planned or shaped in time. This was the initial view but quantum physics "forces" us to look differently at some aspects and makes us take into account not only the determinism but also the uncertainty principle.[3]

As we have seen previously, the elementary particles turn from energetic waves into solid particles but only when they interact with human consciousness. However, there occurs a real process of transformation of one thing into another at the moment of interaction. This can be applied to any production process. This circumstance and the "way" of "creating" the material Universe justifies our intention of suggesting a new perception of the production process, and more specifically, the formulation of a hypothesis according to which the so-called "production process" is a phenomena which occurs in two steps, and at both levels of reality, first, in human consciousness at the elementary particles level, and then, in traditional workshops and factories at the level of big objects.

First, we will look at the processes of production which takes place at the level of human consciousness within a theory-hypothesis which we call **"the economy of creative imagination"**.[4] According to our hypothesis, both the economic goods and their concrete conditions which allow them to "dress their visible clothes" are conceived and later created in the individual imagination. Secondly, the already "produced" goods in human consciousness, "dress" into their material shape, the shape that is designed for our consumption. Human

consciousness "opens the door" which leads to the inexhaustible "ocean" of pure energy- energy which creates the whole material reality through desires, expectations, imagination and faith. As W. Heisenberg observed, this ocean forms a world of possibilities, more than a world of things or real facts. Even this idea needs to be discussed in a special way, human consciousness does not only "open the door" but it "creates" goods and the expected life situations.

Thus, we can assert that the world of elementary particles (quantum world) represents a huge " storage of raw material" from which the human thought is able to produce anything it wants. To be more explicit, we will apply an analogy to the phenomena of "taking a picture". At the first stage, through pressing a button, the wished picture is "produced" although nobody can see it yet. Only after the film is developed, and the pictures are printed, we obtain the real picture in its material form.

Now, we will present the development of the "process of production" at the level of human consciousness. We will start this analysis starting with a recent discovery of the American physician William A Tiller, who proved through experiments that wishes and imagination of individuals are real physical forces and not sterile efforts. These "intimate" efforts become known in the entire Universe because as it has been proven by the Irish physician John Stewart Bell (1928-1990), each particle of the Universe is in a permanent "link" with the other particles wherever they may be. The desires, expectations, and creative imagination spoken with faith have the property of "bringing alive" , "mobilizing" the energies of specific frequencies and arranging them into a well-defined order, "creating" this way the life situations and the expected economic goods in the quantum world.

It is important to notice that this incredible idea has been known since Ancient times, Pythagoras (560-500 B. C.) and Plato (427-347 B. C) being sure that human's mind is able to "create" matter and to "produce" events, and situations which later are embodied in real life.

2. CONCLUSIONS

Creative imagination is the main factor of production and the most valuable capital of the individual. Due to lack of tools, in the "process of production" at the quantum level and in terms of human consciousness, we will use in this case the scientific categories investigating realities at the big objects level, and mainly at the

factories and workshop level. Starting with this premise, we conclude that "the process of production" at the level of human consciousness, takes place as: raw material – subatomic particles, tools – creative imagination, individual desires, faith and requests, work – in this case it constitutes the spiritual effort of the individual in concise form of the thought.

In our opinion the idea of the "production process" happening at two levels (quantum and big objects level) is presented in a special form in the *Saint Book* of Christians. Therefore, according to the Bible, in order to achieve the wished goods, the man has to work day by day but also pray. It seems that in order to receive these goods it is sufficient to choose one of two, or the man uses his muscles or intellect, or says a prayer. But it does not happen this way. The Bible asks the Christians to work and pray. Why both? We believe that prayer "actions" at the elementary particles level and work represents the physical and intellectual effort made with the help of tools at the material Universe level. Shortly, in order to achieve something, it is necessary to act at both levels.

But can some people manage to achieve everything they want without praying? We believe that the answer is easy: the individual's creative imagination acts like a prayer, where the prayer is replaced by pictures. This cannot be proved now through experiments using scientific tools.

Although the idea that the creative imagination is a distinct production factor is just a hypothesis, scientists discovered long time ago that every economic process started with individual's imagination. Therefore, the father of socialist doctrine, Karl Marx (1818- 1883) wrote: "… the bee builds its wax cells better than many human architects. But even the most incompetent architect is different from the best bee because before building his cell, he builds it first in his head first." [**5**]

It is true; Marx does not use the word imagination. However, to "build first in his head" does it mean "to imagine"?

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FROM RATIONAL TO SPIRITUAL IN THE ECONOMIC THOUGHT

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Abstract: *The paper examines the evolution in the patterns of human economic behavior across the history of economic thought. The author considers the development of the Homo Economicus concept in the view of the scarcity problem in economics and the Homo Socialis concept, with its extreme manifestation – Homo Sovieticus, attested in the former socialist countries of the world. In this context, the author examines the phenomenon of societal constraint on personality. Another prototype of economic behavior - Homo Informaticus and, its boundary manifestation - Homo Interneticus are discussed in the view of the informational constraint phenomenon. The author introduces the Homo Creativus 'character', whose behavior is characterized by the attempt to overcome the rational mind constraint. The paper considers the need to adopt the Homo Spiritualis paradigm within the frame of economic thought - a need already highlighted by notorious scholars. According to the writer the urge to develop this paradigm is implicitly determined by the spreading of the underground economy, the globalization and virtualization of the human activity, their impact on human personality. In her approach of the Homo Spiritualis concept the author supports the view that spirituality should not be confused with religion, although the two are related. In practical terms the issue of incorporating spirituality into economics and business courses is approached.*
Keywords: *constraints on personality, economic education, economic thought, homo creativus, homo economicus, homo interneticus, homo politicus, homo sovieticus, homo spiritualis, spirituality, underground economy*

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1. INTRODUCTION

The failure of the economic doctrine of the Marxian-Leninist school in the Central and Eastern European countries produced turmoil in the field of economic thought. It is against this background that the latter went to the opposite extreme – that of praising the Neoclassical and Neo-Keynesian economic models (the Neoclassical Synthesis) whilst ignoring the institutional factor. The radical change of the political ideology meant the beginning of the "reign" of the *Homo Economicus* concept regardless of the extent to which it suited the population's current mentality, the latter having proved to be much more inert in adapting to the 'new rules' of the game than expected. Consequently, we can see a detachment gradually occurring between the economic theory taught in the university classrooms and the economic reality in the Republic of Moldova - a reality defined by the inability of the state to overcome the economic recession of the transition period in the past 25 years. This detachment is also reflected in the fact that academic economic theory embraces the *Homo Economicus* concept as a "savior angel" in spite of the increasing evidence of its behavior as a "fallen angel". The "savior angel" version of Homo Economicus represents the rational economic behavior of a man confronted with the material constraint that derives from the fundamental dilemma of the economic activity in its 20th century formulation: *Limited Resources ↔ Unlimited Needs*. In reality, however, we witness a transformation of the "saviour angel" into a "fallen angel" when the former's rational economic behavior is subdued to the paltry self-interest and both the Christian orthodox moral values and the patriotic ones are sacrificed. At the moment, the Republic of Moldova proves to be an example of a state deeply affected by the unfortunate transformation mentioned above.

2. HOMO ECONOMICUS / POLITICUS / SOVIETICUS 'FALLEN' INTO THE UNDERGROUND ECONOMY

Theoretically, the behavior of *Homo Economicus* is supposed to promote the implementation of the "invisible hand" principle formulated by Adam Smith, which manifests itself in the self-regulating character of the market economy. It is worth noting that when the principle was first formulated, there was no suspicion of an underground economy arising from the works of market economy – a

phenomenon that starts taking shape in the context of the world economic crises and recessions of the 20th century. These economic changes have highlighted the need for control and supervision of the manifestations of self-interest in the public political and economic spheres. In his inaugural address of the year 1937, President Franklin D. Roosevelt testifies: "We have always known that heedless self-interest was bad morals; we know now that it is bad economics." [1] However, it is essential not to admit the negligence of associating the "heedless self-interest" solely with the private sector of economy. The crises that occurred at the end of the 20th century and, in particular, the one of the years 2007-2008 have shown the expansion and entrenchment of the underground economy into all the capitalist countries [2]. On this background we see the development of the concept of Homo Politicus [3] within the Institutionalist approach of the Economics of Politics. The former raises the issue of the moral-ethical grounding in the works of politicians/civil servants and sets the context for the concept of "State (Un)hidden Hand" [4] as opposed to Adam Smith's "Invisible Hand". On this line, we believe the problem of the behavior of Homo Politicus reflects the above-mentioned idea of Homo Economicus as a 'fallen angel'.

In the view of these changes, we see the academia questioning the sustainability of the Homo Economicus concept in the education of the young generation: "I hope (…) that you will find that the doctrines of Adam Smith are not to be taken in the form in which your professors are explaining them to you" (J. Robinson, 2007) [5].

In the Western society, the value of individuality holds strong and so the phenomenon of underground economy is supposedly determined solely by the Homo Economicus – Homo Politicus interaction. In the eastern society, however, we often face remnants of the Homo Sovieticus type of behavior [6], [7] inherited from the Marxist-Leninist past and the *social constraints* - the pressure that society exerts on one's personality - are still deeply felt. Therefore, in the case of former socialist countries, including the Republic of Moldova, the underground economy phenomenon, already attested during the socialist period [8], could be presented as the disastrous result of the interaction between the Homo Economicus, Homo Politicus, and Homo Sovieticus types of behaviour, as shown in Figure 1.

Figure 1. *Homo Economicus/Politicus/Sovieticus*
as 'fallen angels' in conditions of underground economy.
Source: author's own idea and concept; image created with the use of a web resource [17]

3. GLOBALISATION, VIRTUALIZATION AND HUMAN INTEGRITY

Putting aside the phenomenon of underground economy in the ex-socialist countries as well as in other countries of the world, we still find that the efforts directed towards replacing the economic systems of Marxist-Leninist origin with market economy contribute to the homogenization among the economic systems of the world countries and, implicitly, to globalization. According to Th. Friedman [9], the process of globalization involves three stages: countries globalizing; companies globalizing and individuals globalizing, the latter leading to the formation of the alleged "Flat World Platform". At this last stage, globalization embraces virtualization, which brings into view the idea of *informational constraint*. However, the fact that the economic theory began to recognize information as a production factor in its own right hasn't changed the formulation of the fundamental dilemma of economic activity in the 20th century. Accordingly, the concept of *Homo Informaticus* has been placed in the context of *Unlimited Needs ↔ Limited Resources*, within which information acquires an increasingly important role. Inheriting the rational character of Homo Economicus, we see *Homo Informaticus* entering the economic scene, behaving as an 'information hunter'. Meanwhile, the information 'avalanche' grows at a high rate and by the end of the 20th century, we

see the outline of *Homo Interneticus* as the fundamental dilemma of economic activity is turned upside-down, taking the form: U.R. ↔ L.N., where the Resources are defined as Unlimited (first quantitatively and then, qualitatively as well) while the Needs become Limited, or rather, controlled in a much more conscious way and namely by the *Human* 'from inside' the economic agent. It is from this *Human* that we expect a capability to transfigure himself into *Homo Spiritualis*, a concept which is currently being elaborated. Under these circumstances we see the problem of underground economy being reduced to what we call the 'fallen angel problem', which illustrates a Homo Economicus that has failed to transfigure himself into *Homo Spiritualis*, being excessively focused on his selfish ambitions. Such an individual is incapable of controlling his needs and moreover, unable to withstand the informational 'avalanche'. Ultimately, it is the loss of individual's human integrity that determines the major pressing problems the societies face around the world at present, such as corruption and extension of the forms of underground economy, behavior disturbances exhibited by political leaders in the context of degradation of the national elites of world countries, physically manifested terrorism, backed up by the informational one, and many others.

4. HOMO SPIRITUALIS IN THE EDUCATIONAL ENVIRONMENT

We are therefore faced with the need to approach the concept of *Homo Spiritualis*, obviously anchored in the notion of spirituality. At this point, it is essential to make a distinction between the notions of spirituality and religion. In the view of Stephen White [10], religion tends to be associated with an organization or institution, while spirituality tends to be more individualistic and personal. Thus, when approaching the concept of *Homo Spiritualis*, and seeking its defining characteristics, we do not talk about a specific *category* of people per se, or about a common set of explicitly manifested features. We rather bring into reader's view a life-path characterized by the constant pursuit of self-improvement, in the light of a deep consideration for the value of human being, a path that involves the individual not focusing on himself but rather being in a continuous search for the life's meaning. In other words, we see *Homo Spiritualis* acting in the light of his "connectedness to something greater than the self" [11].

To what extent does spirituality lend itself in the educational environment?

As mentioned by Hershey H. Friedman and Linda W. Friedman „In the past, professors have preferred to stay away from talking about spirituality, feeling that it was too close to religion. Since religion and science are seen as antagonists, most academics were reluctant to bring anything resembling religion into the classroom. In fact, recent scholarship about spirituality in the workplace seems to indicate that it is actually a "safe" subject to discuss and is an appropriate way to teach values to students. Spiritual values may provide students an alternative to the view that Homo Economicus is concerned with maximizing self-interest."[12] We find a similar opinion in the work of Dumitru Moldovanu, university professor and academician from the Republic of Moldova: „Although still surrounded by mystery and subject to obvious suspicion and distrust, a man's spiritual qualities can be `brought to life` and cultivated through education and training" [13]. In terms of economic thought curriculum, we see creativity in all its dimensions serving as a fuel for self-respect and respect for the others, implicitly contributing to the reinforcement of the `invisible hand` principle, formulated by Adam Smith. On this line, we believe that *Homo Creativus* - whose formation, according to some authors, "represents the main objective of the Higher Education" [14], is essentially characterized through his attempt to overcome the constraints imposed by the rational mind, similarly to Homo Economicus/Politicus striving to overcome the material constraint, Homo Socialis/Sovieticus seeking to deal with societal constraint, and Homo Informaticus/Interneticus trying to withstand the information constraint, or information 'avalanche' (Figure 2).
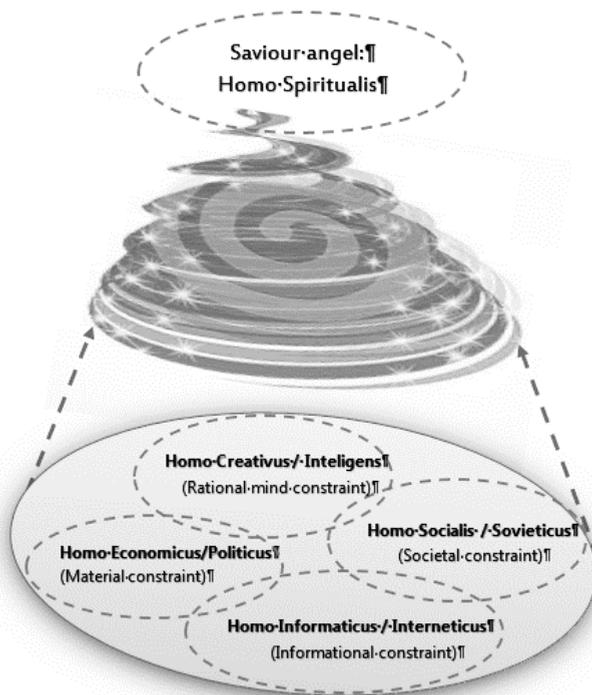
Figure 2. *Homo Spiritualis as a 'savior angel'*
in conditions of the constraints imposed on Humans.

Source: author's own idea and concept; image created with the use of a web resource [18]

As far as the concept of *Homo Spiritualis* is concerned, we believe that it proves itself suitable for being incorporated in the Economic Thought and Theory curriculum. It would also find its place in the Business curriculum, in the context of such phenomena as: learning organization, servant leadership and others.

5. CONCLUSION

We believe that valorizing the concept of *Homo Spiritualis* and that of spirituality within the Economic Thought has to be a challenge for the educational system and academia, a challenge that calls for an interdisciplinary approach, no longer rooted solely in the works of economists but also in the works of prominent personalities from other areas. To conclude, we bring forward the thought of Peter Drucker, the famous management scholar: "The individual needs the return to spiritual values, for he can survive in the present human situation only by

reaffirming that man is not just a biological and psychological being but also a spiritual being, that is creature, and existing for the purposes of his Creator and subject to Him" [15] and would also like to give an appreciation of its resonance with the statement of Mihai Eminescu - the great national Romanian poet: "God is not in the skies, neither on earth; God is in our heart. I realized that a man can have everything having nothing and nothing, having everything." [16]

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SUPPORT MANAGEMENT DECISIONS IN SMALL AND MEDIUM COMPANIES

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Abstract: *A system built to support management decisions and not only needs to be accurate and well adapted to the requirements of the decision and the variables involved in it, and this happens because a decision is still a human act in any type of business and institution. We can say that a decision support system has a part in it that cannot be determined by any software: the human decision which is not a determinist act. It depends on a lot of variables but also still involves the decision maker intuition and experience. This is why an important problem emerged to be discussed in this paper: the need to implement and develop an in house solution to help management decisions and not only, using existing tools and this with no additional fees. This can be a good opportunity to discover models and solutions. An identified solution using Microsoft Excel and Access is discussed in this paper and a model applied on a case study will be presented. The results of the case study showed a real support in making decisions and a better transparency in manipulating the data, improving also the time needed to collect, transform and present data. The model can be applied in any type of problem that needs a visual presentation of data as well as in situations that need working with a large amount of data, but especially in small and medium size companies.*

Keywords: *Decision Support Systems, Modern information systems, Decision making, Microsoft Access and Excel 2013, DSS model*

1. INTRODUCTION

A decision support system is a complex concept used to describe all the resources involved in the decision making process. The term resources involves physical, human and software capital. When the company or institution needs a

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tool for decision making, in many cases, the most used resources are the financial or statistical numbers, accounting figures or just some numbers in tables. The visual representation of data is very important in helping management or other types of decisions, because based on this, any decision can be improved. Historical data and comparisons are also helpful in improving any type of decisions in institutions or companies.

The road from a Decision Support System to Business Intelligence is in many cases a narrow one and needs more funds and fineness. Technically speaking, business intelligence is a broad category of applications and technologies for gathering, storing, analyzing, and providing access to data to help clients make better business decisions. The recognized functions of business intelligence technologies are: reporting, online analytical processing, analytics, data mining, business performance management, benchmarking, text mining, and predictive analytics (Airinei, Homocianu, 2010).

Getting performance when generating financial reports and doing auditing work currently require a real time management of multiple data formats and dimensions of analysis but also processing speed, flexibility, portability, automation and power of suggestion (Homocianu, 2015).

The most common problems in small and sometimes also in medium companies appear when:
- the company or institution has built in tools for different tasks and it does not own a single software solution like an Enterprise Resource Planning (ERP) or a dedicated Decision Support System (DSS), and needs specialized dashboards for business and economic decisions (Dospinescu,2013);
- the company or institution has a single tool to work with, but has no resources to pay or to build specialized software solutions to support business decisions;
- data privacy is very important for the company so in house solutions are more suitable for a DSS.

Nowadays almost every tool or software solution for data handling offers the possibility to export data in popular formats like text, csv or xls. This is a great opportunity to use the data and to transform it into powerful tools suited for a system that can support decisions.

This identified opportunity allowed our study to use the package Office 2013, importing data from an Excel file into an Access database (Melton, 2013) and to build complex dashboards to help management decisions and not only. The dashboards are built using pivot tables having charts attached to them. Pivot tables are a great way to summarize, analyze, explore and present data. But they are not enough to make data visible and help management decisions (Druzdzel, 2002). We also need charts, which are one of the main characteristics of a DSS and they are a powerful tool to make a decision if they are chosen in a suitable manner. A good decision for a chart can improve the decision. Depending on the situation, bar charts, line charts, or pie charts, trend lines and others are the best tools on our hands to make data visible.

Finally we can conclude that often in companies we have a large or medium amount of data in text, csv or xls format and we need to make it really visible in a suitable manner to support management decisions and not only. The solution for this problem, in our opinion, is one that does not need too much technical background, because in most cases the managers have a non IT profile. Therefore, taking into account all these restrictions related to resources, fees and technical skills, the purpose of this paper is to identify a model for a system that can be implemented successfully to help and support management decisions, using Microsoft Office 2013 Package and specifically using Access and Excel.

2. LITERATURE REVIEW

Decision Support Systems (DSS) have been in existence since the proliferation of computers and they have been used as an enabler for business decision-making (Wilson, 1994).

A Decision Support System (DSS) is an interactive, flexible, and adaptable computer based information system that utilizes decision rules, models, and model base coupled with a comprehensive database and the decision maker's own insights, leading to specific, implementable decisions in solving problems that would not be amenable to management science models (Tripathi, 2011). DSS serve the management, operations and planning levels of an organization and help to make decisions, which may be rapidly changing and are not easily specified in advance (Krishnaiyer, Chen, 2015).

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In the specialized literature, the main components (Druzdzel, 2002) of a system designed to support decision making are:

- The database, also known as Database Management System (DBMS) is the knowledge base or the data bank of the DSS. It stores large quantities of data that are relevant to the problem for which the DSS has been conceived.
- The model, known as Model-base Management System (MBMS), has the role to transform data from the DBMS into information that is useful in decision making.
- The user interface also known as Dialog Generation and Management System (DGMS)

The general architecture of a DSS is represented in the figure below.

Figure 1: *DSS Architecture*

The model and the database communicate with the user interface to help the user visualize the data and make decisions suited to the problem that needs to be solved with the help of those decisions. Although the arrow only goes from DBMS and MBMS to DGMS, this does not mean that the communication is only in one way. When any action is done using the user interface, the data that need to be shown are changed using the new selection/action, the DBMS returns the data with the help of MBMS.

Although the classifications of these systems are various, the most suited classification for this paper is the one using the mode of assistance as a criterion, and Power (Power, 2001) identified five types of DSS:

- Communication-driven DSS: are targeted at internal teams and are used to facilitate communication between team member in order to help them make better decisions;
- Data-driven DSS: are targeted on managers and staff and are used to search for data by querying a database or a data warehouse to seek for specific answers in the decision making process;

- Document-driven DSS: are based on finding documents on a specific set of keywords or search terms and are targeted on a broad base of user groups;
- Knowledge-driven DSS: represents specialized knowledge and supports decision making in a particular domain;
- Model-driven DSS: are targeting managers and staff members of a business and are complex systems that help analyze decisions or choose between different options.

Spreadsheet packages can be used as DSS generators because: they offer instruments for building a variety of models (statistical, financial, optimization, simulation, representational), they offer graphic capabilities for data representation, can perform what-if analysis and can be used to develop quickly and easily a specific DSS. Spreadsheets can be used to build model – driven, data – driven and solver – based DSS and they are appropriate for building a DSS with small models, for building a DSS prototype or for testing the DSS models. This is why we have another type of DSS called spreadsheet – based DSS (Rus, Toader, 2008).

This classification is useful because it highlights the fact that the model of the DSS designed in this paper is not only based on DSS architecture, but also based on the purpose that the model serves for or the mode of assistance.

3. DATA AND METHODOLOGY

The data used to investigate and to develop this spreadsheet-based model was gathered for a period of 5 months, tested in many stages and analyzed to identify a possibility to standardize some operations in developing reports and dashboards useful in management decision making and not only. Large amounts of data were processed in different situations to observe the behavior of the emerging system. After failure or latency in most of the cases in loading, processing or representing the data, the solutions identified to solve the issues helped us to standardize the model steps and to apply it successfully for different subjects.

3.1. Microsoft Office 2013 DSS model for small and medium companies

The focus of this paper is to enumerate the development and successful implementation of a decision support systems encompassing quality, customer service and warehouse operations. The model was designed to fit the needs especially of small or medium companies.

The proposed model consists of data imported into a database from different sources, processed and loaded into an Excel file with the purpose of improving management decisions with attractive interactive dashboards. The final goal of the paper is to design a model that can work with large amounts of data and to load it fast enough into dashboards specialized on different domains.
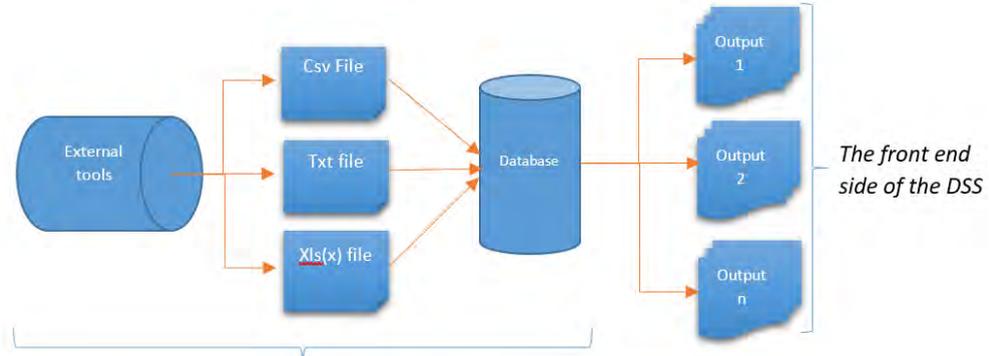

Figure 2: *Proposed DSS model for small and medium companies*

The model is presented in Figure 2 above and it represents an extension of the classical architecture of a DSS. The Database in our case is implemented using Access being the main DMBS and the user interface is contained in each output, using Excel. The external tools can be also included into DBMS as the file generated with their help is the main source of data. The MBMS is represented by all data processing operations that can be done in any stage of the workflow.

3.2. Model description

We know now that the most important resource in any field is knowledge. But to obtain it, we must process the increasing amount of data in information and after that, to transform it into knowledge. The data come now in different forms and formats, but inside an organization most data reside into a database or data warehouse and it can be visualized using different tools, most common being the web pages when the information needs to be accessed by multiple users. There are also systems that allow data exports (and this should be mandatory in our case) in formats that can be reused for other operations over those data. This need for export is given by the fact that the systems used by organizations work with incompatible database systems or technologies to manipulate the data. This

possibility to export data in simple formats like csv, txt and xls is also an opportunity to reuse data to create complex dashboards to help users' decisions.

The technologies used to create the model are the popular Excel and Access programs from Microsoft Office 2013 package. These applications are suitable for data manipulation and easy calculations (Hurbean, Fotache, Pavaloaia, Dospinescu, 2013). Excel is the most common tool used to manipulate and visualize small and medium amount of data. Excel 2013 has some notable improvements that help us build the model:

- recommended charts options;
- the possibility to create slicers for a simpler way to manipulate and visualize data in charts;
- the possibility to name the tables to better organize data;
- the possibility to import data from an external database;
- the possibility to create relationships between tables without using VLOOKUP or LOOKUP functions which are not all the time accurate.

Because Excel cannot work with large amounts of data (the maximum number of lines is 1.048.576), we included in our case study a database technology such as Access. The data used in our model and in DSS especially, needs most of the times to be aggregated. This, in Excel, can be done by using pivot tables which can work with small or large levels of data granularity. But when a table in Excel exceeds 100.000 lines this produces a delay in opening the file, especially when the specified file has some formulas in it, pivot tables and charts. It can also damage the file, making it unusable, although Office has implemented auto-backup facilities.

3.3. Methodology

The scientific approach that we have chosen for this article is the case study. Because many articles from the reviewed literature only presented tools or case studies based on Excel and VBA (Tatnall, Burgess, 2007) or just Excel (Palocsay, Markham, Markham, 2010) (Montondon, Marsh, 2006), some of them just describing the tools that Microsoft Office offers to help us build a DSS (Rus, Toader, 2008), we decided to encompass this science, to apply it and to develop a concrete model. In addition, many examples presented in the specialized literature used spreadsheets only to manipulate small amounts of data. The problem appears when large amounts of data need to be transformed and represented to help

management decisions. So while Microsoft Office 2013 has the economic advantage of being affordable and ubiquitous (Wang, Wang, 2014), it can also be used to solve this problem.

Our research has had several steps:
- Develop and test a model using only data pasted in Excel;
- Develop and test a model using data and Excel specific functions;
- Develop and test a model using Excel functions for specific needs and using a large amount of data, charts and pivot tables;
- Develop and test a model using Excel functions for specific needs and using a large amount of data, charts and pivot tables and specific lookup functions in other spreadsheets.

After many observations we noticed the following issues:
- the files were in some cases damaged by the action of the end user;
- each time we add a new feature into an Excel file, and the file grows in size, there can be the risk of failure and data loss;
- the bigger the file, the longer the time of response to end user actions;
- the file can be affected by human errors (over data) or network failures if it is stored on a shared folder.

In the end, we identified 3 types of issues related to:
- end user issues;
- speed issues;
- size issues.

Finally these models failed, because the needs were growing and the data were more complex. So we decided that we need a solution to build models with less data, but using the same initial information. This led us to our research questions:

1. How can we make a spreadsheet – based DSS, more efficient, rapid and safe in the sense of keeping the file healthy, away from crashes and also keeping the historical data?
2. Another important question was how to keep data safe from the end user actions?
3. What standard steps can we identify to implement the same model successfully in any other case?

The solution (represented in Figure 2 above) identified after the prior stages of the research needs the data to be stored locally or on a network location (and not

online), because network connections can fail when the system may be necessary. The main goal was to separate the data from its graphical representation and to transform the Excel file into a container for our data, as well as into a front end interface to manipulate and model the data. The backend of the DSS can only be manipulated by persons with technical background (or by a specialized interface for end users), while the front end of the DSS can be built by a technical person and handled by persons with basic knowledge of Excel.

This separation of data from the visual representation was very helpful in achieving the separation of the end user activities from the technical user activity. In addition, this separation was necessary because most managers in small companies but also in many medium companies (and the people that use DSS) are not all the time technical users, they are only end users. End user refers to the ultimate operator of an IT product. Precisely, an end user is a non-technical person who uses IT for his or her own needs but does not develop or maintain IT products for others (Wang, Wang, 2014).

3.4. Model Application and Results

Our main DBMS is represented by an Access database which allows us to make aggregations over large amounts of data, because not all the data are all the time necessary. In a decision support system sometimes we only need to count or sum some values and doing this inside the database, improves the performance and speed of the visual representation and presentation of data.

The DGMS used in our model will be represented by Excel charts, graphs, pivot tables and slicers. Those elements will be used to represent data in a visual and attractive way and in the same time interactive with the help of the new slicers.

We will build a model using the elements described before. We have a file containing the data that will be imported into the database. The file can be text or an excel file if we need to apply some Excel functions over the data we want to import. The file will represent the source data for our model. Starting with it, we decide what aggregated functions we need to apply using an Access database.

Our source in this model is represented by weekly data exported from another external source. The number of rows imported weekly start from 10.000 rows and grow to 12.000 from week 15 of the year until week 41. This means a minimum number of 26 weeks x 10.000 rows = 260.000 and a maximum number

of 26 weeks x 12.000 rows = 312.000 rows into an Excel file. If we want to apply some Excel functions over those data and after that to use it to represent data using pivots and charts, the file will load and represent data very slowly. A simple filter applied to this number of records on a laptop Intel Core I5 dual core processor with 4 GB RAM memory, lasts over 5 minutes. This is why the data are appended into a database, aggregated using queries and the new query is imported (Melton, 2013) into an Excel file that will represent a dashboard for assisting users and managers.

Our database is organized in three distinct sections:

- Imports: contains the files for imports (linked tables in Access);
- Queries: is used to create links with aggregated Access queries that we can use in our DSS;
- The physical database: contains the tables and the queries.

We can import our weekly data for the year 2015 into the database by using an appended query. The action of data import is useful to increase the speed on accessing the data from the Excel file and to create aggregated queries. The source of data for our dashboard will be built by creating a linked table to the external data source (weekly imports 2015.xlsx) and appending the data into a local table from the database, with the same structure as the linked table. The file for import contains 304.104 rows which will be appended using a Week parameter into our database, and it has the last 4 columns calculated using Excel dedicated functions such as Weeknum() and Year().

To import an Excel file into an Access database and to use it as a linked table, we will use in Access main menu External Data tab and we will choose the Excel option and try to locate the file for import. An important step is to select "Link to the data source by creating a linked table" option as the first step of the import.

Once we linked the file into the database, we can append the data into the database into the local table with the same structure as the linked file. This will be performed with the help of a dedicated appended query in Access. Once the data are appended into the local table, we can start to think about what functions we can apply to aggregate data or what other local tables we can use to complete the data into our query.

The data that we appended into the local table, called test data imported, are not aggregated, so we have 304.104 records into the local table. For management

decisions we do not need for example the code of the product and the review code fields (Figure3) therefore we will use a group by clause and a count function to aggregate data by the rest of the fields to find the number of classified items by user, category and complexity.

As we can see from the Select query, our local table (Test data imported) is related with two other tables into the database and the scheme of the query is shown in the figure 3 below.
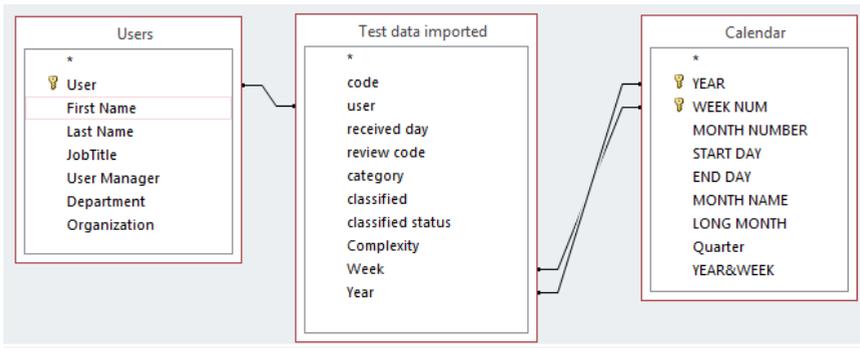

Figure3: *Relations inside the database*

In Access, every query has a name, so we will name the query that extracts the aggregated data from *Test data imported* table, *test_data_query*. The *test_data_query* uses a *Count SQL function* and a *GROUP BY clause*. This helps us gain some space, leading us to a result of 11.005 rows extracted from this query, instead of 304.104 records from the original table. This query will be imported into an Excel file that will become our dashboard.

The main file containing the dashboard is also organized into three sections: *Dashboard, Database Query and Pivots*. Those will become worksheets into an Excel file and each of them will play a different role in the decision system architecture:
- The *Dashboard* sheet will contain all the visual elements of the DSS;
- The *Database Query* sheet will contain the aggregated data from our Access query (test_data_query);
- The *Pivots* sheet is used to be the back end for the charts. It will use the *Database Query* sheet to create pivots which will be linked with charts contained in the *Dashboard* sheet.

The first step to build the system is to import our data from test_data_query into Database Query sheet. This will be done using in Excel the Data menu and selecting From Access option. This option will let us decide if we want to import a Table or a Query into our Excel file. As we discussed before, we will choose the query with fewer lines.

The second step will be to build the pivot tables using the data from our query. Now it is time to decide which data we need into our system that will support users and management decisions. We will build as many pivot tables as the number of charts necessary in this case of dashboard. We will build two pivot charts to show: the number of classified items by user and complexity and how many items from each category a user has classified.

In the end, we use Insert option in Excel menu to add our charts. The design and interaction elements such as slicers and a title bar, will be added in our dashboard to create visibility and accuracy in presenting the data. The slicers work like extensions for filters in Excel 2013. They can be connected to one or more pivot tables located in the same workbook and they create the impression of interactivity, by refreshing more pivot tables at the same time. Our dashboard and implicitly our DSS will have a DGMS presented in Figure 4 below.

Figure 4: *DGMS of the DSS represented by an interactive Dashboard*

The Excel file containing the dashboard has a simple workflow. It uses the query with the aggregated data from the database. It summarizes the data using pivot tables. It uses charts to show the data and slicers to create interactive responses for the user. This is very helpful because the user does not need to have a technical background to use the dashboard. The user will only see the graphical

interface if we will choose to hide the other worksheets and lock the workbook, so that no one will know what is behind that design.

At the end of this representation we can identify the following steps in creating an Office 2013 DSS model:

1. Identify the data source(s) or the subject we need to represent;
2. Define/decide the format for the selected data;
3. Import the data from external source(s) into the database;
4. Aggregate data and create relations, if there is the case, into the database;
5. Import the processed data into an excel file;
6. Create the necessary pivot tables;
7. Insert charts and slicers and create the connections.

These steps are closing our research subject, because they give us an answer to the third question of our research, by identifying the standard steps to use when one wants to create a safe and efficient DSS using this technology. From the presentation of these steps it can be easily noticed that the data source is separated from its visual representation. The dashboards are the front end part of the DSS model, while the database and data source are the backend of this discussed model.

When implementing the model, we did not identify any issue from those presented above. The data loaded faster, the data were safe from the user's actions, and none of the files used crashed.

The most important contribution of this work is the original implementation of a type of Spreadsheet-based decision support system on a high variety of small and medium companies from all economic environments.

4. CONCLUSIONS

The advantage of this design is the fact that we can separate the data from the visual representation. Operations over large amounts of data are done via Access queries. Data summarizing is achieved using pivot tables and the visualization is built using an interactive design with the help of charts and slicers. In this manner the file containing the dashboard is smaller (its size on disk), it opens faster and it operates faster on large amounts of data.

The model can be applied and duplicated on many numbers of cases. The database can be as complex as we need and it can use more tables in relationships to show information from different sources unified in one single query. Small and

medium companies can use this model successfully because historical data can be imported and stored into a single place, from multiple sources with controlled dimensions. The historical data and imports must be designed to help the decision making and the model, starting with what data we need to show or aggregate, to support management decisions.

One of the major disadvantages appears when the number of rows that we need to process into our Access database is so big that the RAM memory is completely used, or the database size overcomes the database limitations, so the queries do not work, even if we need to work with one single table. This is why the model can be successfully applied to small and medium companies where the amount of processed data is not very high.

Granularity of data based on time factor is very helpful to split the imported data from our model, so that the resources of the PC that uses the data will not be overloaded.

Another important aspect to solve the resource disadvantages of this model is the possibility to develop small DSS based on a specific subject, to avoid Access Database limitations and this way the number of rows to be processed or stored by Access Database may increase.

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AN ECONOMIC RESEARCH INSPIRED BY THE FUNDAMENTAL PRINCIPLES OF THE QUANTUM PHYSICS

Iurie BADAR[*]

At the beginning of the XX-th century, after a glorious history of about two centuries, the Newton's classical physics enters into a great conceptual crisis, marked by the famous findings, which have subsequently represented the fundamentals of the quantum theory. They have thrown out the visions of the classical physics on the main laws of Universe development, the role of the human being and of knowledge in its functioning. Therefore, the quantum theory, confusing the traditional picture of its origin and evolution, gave birth to multiple conceptual issues related not only to physics, but disposing of obvious philosophical, ontological, cognitive and, more recently, economic aspects.

Plenty of disputes, caused by these findings, subsequently triggered in different scientific fields regarding the objective nature of the phenomena and processes of the surrounding world, the co-relationship between uncertainty, determinism and causality in their functioning, the participation of the human being in the creation of the material objects through spiritual activities (observations, visions, thoughts, desires, dreams, etc.), the visions which are not univocal on energy conversion into matter, on the validity of the quantum theory at macro level, have not ceased yet. They have represented the premises of an original economic work issued in 2014 at *Stiința* and *Arc* Publishing Houses, signed by the correspondent member of AŞM, **Dumitru Moldovanu,** entitled "**The Economy of Creative Imagination**".

Despite the extremely paradoxical and even controversial nature of the fundamental postulates of the quantum theory, which have represented the main

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element of the conceptual foundation of the work in question, the most famous promoters of the quantum physics (M. Planck, A. Einstein, N. Bohr, W. Pauli, W. Heisenberg, L. de Broglie, J.S. Bell et al.) received, in their era, the Nobel Prize, inclusively for the works drafted in the area concerned.

The innovative components of the basic principles of the quantum physics and their ambiguous treatment have determined a deep division of physicists themselves, to which one of the most famous philosophers and sociologists of the XX-th century, the founder of the critic rationalism, K. Popper, devoted a remarkable work entitled: "Quantum Theory and the Schism in Physics".[5]

The challenges of the quantum physics, but also the divergent interpretations of its postulates, have triggered in physics a real methodological crisis and, at the same time, several controversial methodological reactions in other scientific fields, mainly in philosophy. Subsequently, they have been assessed as a true drama of the formal logic.

In the same train of thought, we shall mention that the classical physics has not applied subjectivism in the natural phenomena treatment, this one being practiced in the human sciences fields only. Taken over by physicists by positivism (idealism) enforcement in the quantum theory and ennobled under the authoritarian umbrella of physics, subjectivism is brought back in philosophy in a new context. As a consequence of this transaction, philosophy has also registered a great schism, generated by the challenges of the quantum theory, which has also extended in the meantime on other knowledge fields. This work of the academician D. Moldovanu denotes that this schism is likely to be soon enforced within the economic theory too.

The starting point of the quantum theory is represented by the specific properties of the elementary particles and, first of all, the uncertain behavior caused by the impulses of the human observation and imagination on them. In this context, the author reiterates the main postulates of the quantum physics, adapting to the economic activity of production of the physical assets, the marvelous consequences of the hypothesis regarding energy conversion into matter. Among the most important of the aforementioned postulates of the quantum physics and of the economic conclusions drawn by the author, we shall mention:

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[5] Popper K. Квантовая теория и раскол в физике, Пер. с англ., Москва: Logos,1998

1. The Universe foundation is made of elementary (quanta) particles, as indivisible units. The latter represent energy impulses holding a dual nature, manifested as waves or in corpuscular form. *Starting from this dualist nature of the subatomic particles, the author argues the launch of a new type of economic activity;*

2. The elementary particles do not dispose of a stable localization and behave according to the expectations of the individual (researcher), who by his observation force, modifies the quantum state of the object. Heisenberg proves the deformation of the elementary particles by their very observation performed by the researcher. Therefore, the relationship between the observer and the object subject to the observation takes an absolutely new dimension. *Consequently, observer's emotions, desires can participate in the creation of a reality, hence becoming creative forces leading to changes of reality, inclusively of the material world;*

3. The concept launched by the author is built on the hypothesis, drafted and promoted within the quantum theory, according to which the principles of the quantum theory are valid not only for the processes and phenomena of the subatomic microphysics, but also for those related to the macro level, inclusively the planetary and universal ones. Starting from this hypothesis of the behavior of the elementary particles regarding the possibility of applying the effects of quantum physics on large objects, the *author supposes that the human being, by using his spiritual potential, would be capable, due to his imagination and creativity, of drafting/"producing" different physical assets necessary to his activity;*

4. This specificity of the subatomic particles, but also the eventuality resulting from the famous Einstein formula regarding the co-relationship between energy and matter ($E=mc^2$), the modern visions on the nature of matter, Big Bang theory concerning the origin of the Universe, serve to the *author as foundation for the promotion of the hypothesis according to which the human being disposes of the capacity of "producing" physical assets through the conversion, by means of consciousness, of energy into matter. This process, because of the inexhaustible potential of the universal energy, can become in the meantime, a new and practically unlimited principled source for human needs satisfaction;*

5. Based on the observation that, at the level of the large objects, energy conversion into matter confronts with enormous difficulties, which cannot be overcome based on the current theoretical and practical visions on the origin

and functioning of the Universe, the *author advances the concept of division of the production process into two stages: the one of the subatomic particles in which human imagination is involved as "working tool" and the one of the large objects which uses physical and intellectual work. Therefore, the assets created by the human imagination in the first stage, through physical and intellectual efforts, subsequently take a material form. According to the author, the contemporary human being, with rare exceptions, does not possess the capacity of focusing his attention and, consequently, the force to create assets by means of his imagination;*

6. In the development of the hypothesis regarding the capacity of the human consciousness to create physical assets and in the attempts to define the economic nature of imagination, the *author applies in its context the notion of "working tools", therefore involving it in the economic activity, giving it the appellation of "main" tool of this type;*

7. In order to assess the role of the spiritual capacities of the human being of building the physical reality, the *author supports the ideas launched within the "Econophysics", incorporating in the economic terminology such new categories and notions, such as "imagination – neo-factor of production", "imagination work", "spiritual work", etc. The results of the spiritual work, according to the author, manifest in physical and immaterial economic assets;*

8. *The current stage of the economic development is defined by the author as a transition one from the "homo oeconomicus" to the "creative human being" one. The latter is going to obtain in time the access to the universal information and knowledge, acquiring therefore advanced creative capacities.* According to the author, the aforementioned transition *could reduce the economic resources rarity. Moreover, the author thinks that the nature of the "creative human being" exceeds the unstoppable thirst of enrichment and focuses mainly on the values of the spiritual self-perfection.*

Among other innovative concepts and visions drafted and promoted within this work, we shall mention the following: the eventuality of introducing the spiritual activity within the object of the economic theory in parallel with the physical work and the intellectual one; the role of meditation and intuition in the economic activity; the co-relationship between consciousness and the economic crises; the enforcement of the positive thinking as an instrument to cross the economic crises; the practical methods and tasks of the training of the creative human being, but also the new

mission, in the same train of thought, of the universities, the opportunity of a rethinking of the economic training principles, etc.

Therefore, the author aimed at achieving an audacious and practically unprecedented task in the economic literature in our country: the settlement of an interdisciplinary issue regarding an eventual principled new source of physical assets, whose actuality is at heuristic level only. Of course, it disposes of an increased complexity, confirmed by the fact that it provokes the lucid minds of the humankind from its very beginnings, and it constitutes at present the core of an eventual economic paradigm.

We must regretfully notice that no scientific branch has significantly moved over the time in solving the sacramental issue: Where, how and who created the material world? Certain scientists only indirectly confirm the solutions proposed in the holy books about two millennia ago. In this context, we shall mention that the enforcement of the quantum theory creates trust in the capacity of the contemporary science of closing to the settlement of this extremely current, difficult and mysterious issue. Its obvious complexity, in the version exposed in this work, is also amplified by the fact that the object of the research – the creation activity is the very instrument of investigation.

Despite certain significant achievements, the quantum theory has been affected by numerous methodological difficulties. They are related to the uncertainty of the behavior of the elementary particles, the controversial nature of energy conversion into matter, but also the one of the reduced applicability of the functioning principles of the elementary particles on the large objects. These impediments caused a lot of headaches, and even scared and discouraged very much the authors of the quantum theory. It is incredible that even the acceleration of the scientific-technical progress has failed to determine, over the last 60-70 years, the overcoming of these difficulties.

In the same train of thought, we cannot neglect the significant contribution in the settlement of certain of the aforementioned difficulties of the French philosopher of Romanian origin Ştefan Lupaşcu, highly appreciated by C. Noica, A. Dumitriu, but also by the Western researchers. His works devoted to the antagonism and contradictory logic, the ontological, gnoseological and axiological approaches of the matter and knowledge have been suggestively

appreciated by the specialists in the field as a promotion of a philosophical conception for the third millennium.[6]

As a consequence of the extremely pronounced specific of the approached object, acad. D. Moldovanu drafted this work in a different manner as compared to the traditional economic literature which meets the features of an essay exposed in a manner which does not necessarily impose the compulsoriness of arguing and proving the proposed concepts. The application of the essay, which has become a star-genre over the XX-th century, is natural for a certain manner of approaching certain less researched phenomena, often of the ones exceeding the proper object of the traditional scientific paradigms, in advancing new hypotheses, whose perception is restricted by the lack of certain veridical methodologies and scientific terminologies or of the experimental data only in proving the advanced postulates.

The aforementioned approach gave the author the freedom of the heuristic presentation of the respective phenomena and processes, as a matter of fact extremely complex, without the elaboration of certain objective propositions in order to overcome their functional difficulties, limiting to the launch and promotion of certain scientific hypotheses regarding their nature and origin. Concomitantly, this literary genre imposes to the author a less strict and stringent language within the enforcement of the scientific terminology.

Therefore, the use of such a treatment is also the most appropriate for the launching of the economic paradigm proposed by the author. In the same train of thought, we shall mention that the respective paradigm is largely associated to the one of transition of the society of knowledge, as they both rely on economic factors different than the material ones, on which the traditional economy is based – on the intellectual and spiritual resources.

In our opinion, the current economic theory and practice, for the time being, is not capable and available to identify and achieve an economic paradigm, edified on the principles of the quantum physics. At present, it is not fully inclined to focus its efforts on ensuring the transition to the valorization of the paradigm resulting from the enforcement of society potential to the knowledge directed towards the innovative development of the economy, aiming at achieving much more rational

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[6] See in detail: Untilă V. Ştefan Lupaşcu and contradictory philosophy – a radiograph of contradiction: Bucharest, Editura Fundaţiei "România de mâine", 2015.

objectives, close to the traditional ones, disposing of a much more advanced degree of scientific argumentation and of obvious real economic connotations and dimensions. Of course, this state of affairs is the consequence of an inertia, which, in our opinion, can only be overcome in a more prolonged perspective.

The work largely applies a totality of notions extremely sensitive in the imaginary, mentality, spirituality field, etc., the meaning of certain of them being even close to the esotericism, occultism and mystics. The author uses them with a particular delicacy, so that their framing in this work manifests as a natural and unavoidable one.

Moreover, we cannot neglect the fact that for the post-socialist area still affected by approaches inspired by the over-politicized and ideologised dialectic orthodox materialism, the paper opens absolutely new horizons, located beyond the purely material phenomena. Of course, certain of the exposed hypotheses contradict the traditional scientific postulates, on the methodological positions of which the enforcement of the quantum theory principles appears as a transcendental one. As a consequence, the author, in our opinion, must be indulgent before the eventual non-univocal treatments. This is the destiny of all authors whose works generate challenges to any status-quo.

In this regard, the risk of this work, in our opinion, also consists in the fact that it is surrounded by the perspective of a critical treatment imposed not only by the traditions of the purely materialistic scientific approaches of the economic phenomena, but also by the enforcement of the rationalist methodology of knowledge.

It is obvious that the author is aware of these dangers and sweetens the anti-materialist and anti-rational pill (in the traditional vision of the matter) of the economic potential of the creative imagination, by the dilution of the production process in two stages (levels): the imaginary one and the one carried out in the economic unit. In his opinion, it is only in the final stage, carried out in enterprises, that the proper assets get the material "clothes". But, this treatment leads us towards an over-achieved objective. To tell the truth, this state of the economic development has been already achieved through the division into the production of the physical assets and the elaboration (production) of the immaterial (intellectual) assets.

Another disadvantage of the work is the fact that the main hypothesis promoted by the author with regard to the perspective of energy conversion into matter by resorting to the imagination can be used for discouraging the physical and intellectual efforts directed towards the creation of welfare, the tendencies of achieving an advanced professional performance.

In this context, we shall also notice the fact that, in our opinion, the author prematurely "buries" the market economy mechanism. We must not forget that it created and still creates economic prosperity and, in the XX-th century, it was the target of a wide social and tragic experiment which has resulted in a massive failure. Within it, the fundamental principles of the market have been abandoned on an area of about a half of the world, to notice then the inadmissibility of this step and to come back to the natural state of the economic and social development. In this context, we shall also mention that the developed countries are permanently concerned in promoting the fundamental principles of the market and, first of all, of the values of the free competition, monitored by the anti-monopoly bodies, which are among the most authoritarian within the institutions regulating the economic activities.

Despite the fact that the work proposes certain solutions for the eternal issues concerning the humankind over several millennia, a large part of the society is not yet sufficiently disposed to accept them.

Moreover, we shall highlight that, physicists have not reached a consensus so far in the treatment of the eventuality to extend the discovered behavior of the quanta from micro to the macro-level. In these conditions, the economic theory can only take over the principles of the quantum physics as hypotheses, provided that subsequent verifications at conceptual and experimental level are carried out within certain additional enhanced studies, which would confirm the veracity of its fundamental postulates. Therefore, the new economic paradigm proposed by the author, based on the production of physical assets through spiritual efforts, can be considered as a mere hypothesis drafted based on the uncertain principles of the quantum physics, which has not a fundamental scientific coverage.

Over the last two decades, the situation has gradually changed; the visions on the fundamental issues of the Universe based on the quantum theory have gained more and more ground, both in the scientific area and in the public opinion one. What is very important is that the uncertainty, on which the respective

paradigm is based, impairs future predetermination, rendering a spiritual dimension to the Universe, to life – a mainly creative meaning, offering therefore to the economic research new perspectives of elaboration and enforcement of the immaterial values.

Being equally a philosophic and economic one, as the economic theory is not concerned about the origin of the economic factors, but preponderantly about the optimization and streamline of their use, the work will certainly revitalize the interest for the conceptual issues of their origin. The fact that, in parallel with the proposition of certain solutions, it generates multiple new issues is natural, because of their complexity, the insufficient research degree and the enormous role for the society destinies.

Finally, we shall mention that in the society of knowledge and transition to the innovational method of the economic growth, prosperity creation is already largely carried out, by enforcing creativity results, which are practically a consequence of imagination. Therefore, imagination, creativity and their results as products of the intellectual activity have become an important instrument of the economic development and their role is a decisive one.

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