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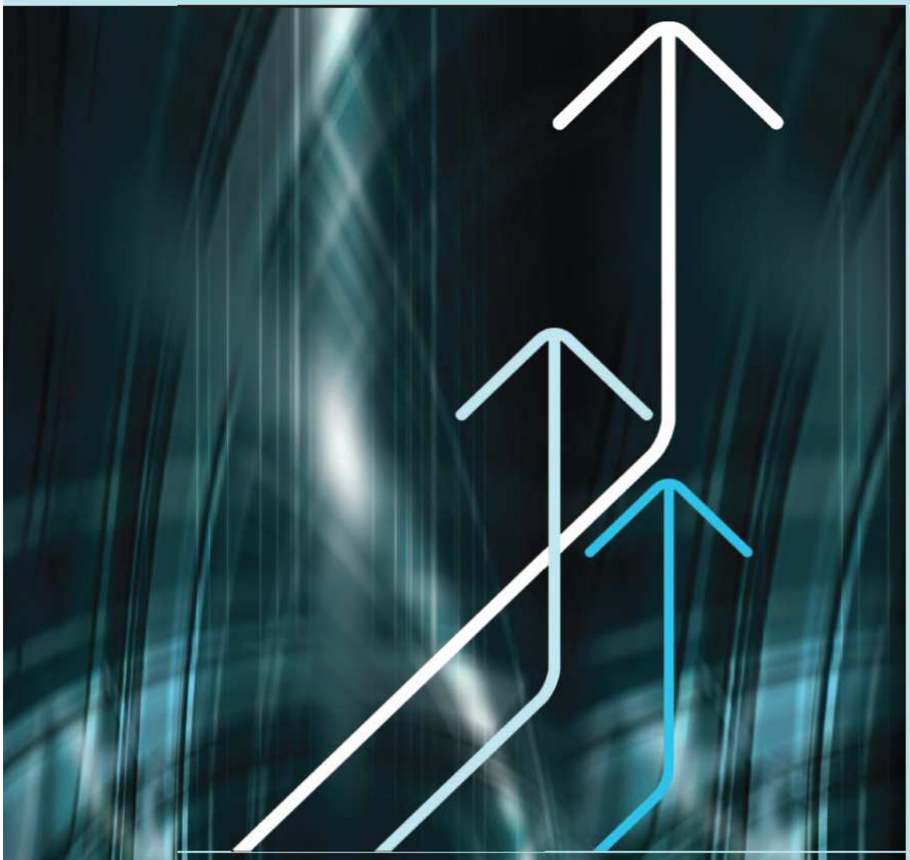

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“VICTOR SLĂVESCU” CENTRE FOR FINANCIAL AND MONETARY RESEARCH

FINANCIAL STUDIES

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CONTENTS

A COPULA-GARCH MODEL FOR A PROXY PORTFOLIO FOR BET-FI INDEX

Marius ACATRINEI, PhD [*]

Abstract

The paper fits a copula-Garch model for a proxy portfolio of BET-FI index and computes its Expected Shorfall. We used daily closing prices spanning for a two year period. The results indicate that the portfolio's Expected Shortfall computed with a copula-Garch is higher than otherwise reported by a naive Value at Risk. The VaR computed with variance-covariance method assumes a multivariate Gaussian distribution and produces results that constantly underestimates the risk due to incorrect distributional assumptions.

Keywords: Garch model, Copula function, Stock Market Indices, Expected Shortfall

JEL Classification: C32, C51

1. Introduction

In the financial econometrics literature it is accepted the idea that the equity returns are not normal, and are not independent. This stylized facts have consequences on the calculation of other risk measures for portfolio returns. For example the Value at Risk of a portfolio is usually computed with the variance-covariance matrix, but such a method is suitable only for elliptically distributed random variables. Since the equity returns are not elliptically distributed, the calculated risk measure (Value-at-Risk/Expected Shortfall) will underestimate the risk of the portfolio. Also by assuming a Gaussian multivariate distribution the tail risk is underreported.

The Garch models carried out good results in the financial literature when the task is the modelling of financial returns which usually have extreme returns.

In computing Value at Risk estimates, the Basel II Accord suggested a risk assessment for the next ten days, which is usually done by a scaling factor named "square root of time"; in practice what is meant is that the standard deviation of a security (portfolio of securities) is scaled up by a factor of $\sqrt{10}$. Using a Garch model we may draw 10 day forecast of volatility which are desirable to use since

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the scale factor underestimates volatility unless the volatility is a homoscedastic process.

Moreover when using the variance-covariance approach to an asset portfolio we assume that the marginal distribution are the same, while in practice it may be easily seen that they are not. By using a copula-Garch model it is possible to use different distributions for the margins. Therefore a copula function may deliver better results since in this way you can distinguish between the dependence structure and the marginal distributions. The copula is a measure of dependence between two or more variable.

The copula-Garch model was introduced by Rockinger and Jondeau (2002). Since only the marginal distributions are known for the equity returns, the authors used a copula function for linking the univariate models. Therefore the copula–Garch model allows the marginal distribution to be conditionally dependent through their dependency parameter, which is akin to the correlation parameter.

Patton (2006) investigated whether the exchange rates have a symmetric dependence structure which is assumed when using a bivariate normal or Student distribution. Dependency structures are created when the equity indices are falling due the joint increase in the risk aversion on the same/different market/s. Jondeau and Rockinger (2006) showed that dependency between European markets increased especially when the markets traded in the same direction. The authors captured the dependency structure using a Markov switching model. Micocci and Masala (2004) applied copula methods on the estimation of Value at Risk. Their research was applied to Italian equities companies. Embrechts and Dias (2003) showed the usefulness of Clayton's copula and survival copula while applied to the dependence structure of the tail of bivariate financial return in a study on high-frequency exchange rate returns. Hsu et al. (2008) proposed the use of the copula – Garch model for the estimation of the optimal hedge ratio as opposed to the regression based static approach. Chiou and Tsay (2008) used a copula model to price exotic derivatives and to assess Value at Risk of different assets.

2. A copula-Garch model

We use a copula-Garch model uses the marginal distributions of the returns and a Student t copula function to link the univariate models. The estimation of a copula-Garch model is carried out in two steps. In the first step a Garch model is fitted on the financial returns and the i.i.d standardized residuals obtained from filtration are transformed in uniform U(0,1) variables. In the second step the copula parameters are estimated.

The Garch model

A simple Garch model (1,1) may be written as

$$(1)\ r_t = \mu + \sum_{i=0}^{\infty} \psi_i \varepsilon_{t-i}$$

$$(2)\ \mu_t = E(r_t | F_{t-1})$$

$$(3)\ \sigma_t^2 = Var(r_t | F_{t-1})$$

$$(4)\ \sigma_t^2 = E[(r_t - \mu_t)^2 | F_{t-1}]$$

$$(5)\ \sigma_t^2 = Var(\varepsilon_t | F_{t-1})$$

$$(6)\ \varepsilon_t = \sigma_t z_t \text{ unde } z_t \text{ sunt i.i.d. cu } N(0,1)$$

$$(7)\ \sigma_t^2 = \omega + \sum_{i=1}^{m} \alpha_i \varepsilon_{t-i}^2 + \sum_{j=1}^{s} \beta_j \sigma_{t-j}^2$$

At this point we have to make assumptions about the distributions of the errors. The Gaussian distribution, the Student’s t, the skewed Student-t or GED distribution are usually used in practice. We have fitted a Garch(1,1) model with Student-t innovations.

By applying MLE or QMLE estimation procedure, we may estimate the unknown model parameters for each , k’ process

$$(8)\ \zeta_k = \mu_k, \alpha_k, \beta_k, \omega_k, etc$$

The number of parameters model may vary depending on the Garch model employed and the distribution assumed.

The copula function

If the returns do not have elliptical distributions, then the Pearson’s linear correlation is a misleading measure of association between the returns series. Rank correlations are non-parametric measures between the data based on ranked data. Spearman’s rho and Kendall’s tau are two rank correlation measures usually used in financial econometrics. Rank correlations are less sensitive to outliers.

For a sample with *n* observations we compute Kendall’s tau by comparing all possible pairs of observations.

$$(9)\ \tau = \frac{N_C - N_D}{\frac{n(n-1)}{2}}$$

where N_C are the concordant pairs and N_D are the discordant pairs. A pair of two variables is said to be concordant if x_1-x_2 has the same sign as y_1-y_2 for the continuous random variables X and Y.

Since the estimate of the Kendall's tau provides only the sample estimate of the return series, in order to define the population parameters a copula function is required for the joint distribution of the return series.

Using a copula function, the joint distribution of 'k' processes may be written as

$$(10)\ F(r_1, \dots r_k; \xi) = C\left(F_1(r_1;\zeta_1), \dots F_k(r_k;\zeta_k)\right)$$

where ξ is the parameter vector of the copula function and $F_1(\cdot), \dots F_k(\cdot)$ are the marginal distributions. The joint density is expressed as the product of the marginal distributions $f_1(\cdot), \dots f_k(\cdot)$

A Student t copula is defined as

$$(11)\ C_v(u_1, \dots, u_n; \Sigma) = t_{\Sigma,v}(t_v^{-1}(u_1), \dots t_v^{-1}(u_n))$$

where $t_{\Sigma,v}$ is a multivariate Student t distribution, t_v is an univariate Student t distribution with v degrees of freedom and Σ is the correlation matrix.

Estimation of the copula-Garch model

In the first step we estimated the parameters of the Garch model and determined the standardized residuals. At this step there is a set of tests to determine if the chosen Garch model is adequately capturing the underlying process. At this step a different model for modelling the financial returns may be selected.

In the second step we used the standardized residuals and calculated pseudo-uniform variables. This computing step may be carried out either parametrically from the assumed distribution or semi-parametrically from the empirical distribution function. Using the pseudo-uniform variable we estimate a copula model. Using the dependence structure determined by the estimated copula we generated a number of (N) data sets of random variates for the pseudo-variable uniformly distributed. After the N date sets were generated, we have computed the quantiles (95%) for the Monte Carlo draws. Since we have a weight vector for our portfolio, we use the quantiles in order to calculate the N portfolio return scenarios. In the final step we used the N portfolio scenarios to calculate the Expected Shortfall for a given confidence level usually 95% or 99%.

$$(12)\ ES_\alpha = E[r_t | r_t \leq VaR_\alpha]$$

3. Estimation results

Our dataset includes BET-FI index and Fondul Proprietatea (symbol:FP), SIF2, SIF3, SIF4. The closing prices for BET-FI index and Fondul Proprietatea (symbol:FP), SIF2, SIF3, SIF4 were extracted from Bucharest Stock Exchange website (www.bvb.ro) from January 2013 to April 2015. Daily returns are calculated from the closing prices according to the formula $R_t = \ln(P_t/P_{t-1})$ where P_t is the daily closing price of the index.

From the structure of the BET-FI index we have constructed a portfolio consisting of Fondul Proprietatea (symbol:FP), SIF2, SIF3, SIF4 between January 2013 and April 2015. We have constructed four different portfolios by varying the weights of the companies. In this way we achieve two results: 1) we carried a sensitivity analysis and 2) we compared our results with a standard VaR.

The log returns of the indices showed excess kurtosis and negative skewness meaning that the data are heavy-tailed and not normally distributed. The characteristics of the equity returns series justified the investigation with a GARCH model.

Since the GARCH models work only with stationary time series, we have tested the log-returns of the indices with the Augmented Dickey Fuller (ADF) test and the Kwiatkowski–Phillips–Schmidt–Shin (KPSS) test in order to estimate the presence of a unit root.

The ADF tests rejected the null hypothesis of a unit root process and the KPSS test accepted the null hypothesis of a stationary process. Both tests come to the same conclusion for all time series at high significance levels. We did not present tables with the test statistics, the p-values and the used lag orders for both stationarity tests for presentation reasons.

We have estimated the returns using a simple GARCH (1,1) model with Student distribution for the errors. For each model all coefficients are significantly different from zero and the stability requirement for GARCH(1, 1) models is not violated, that is, $\alpha + \beta < 1$. The estimates for the degrees of freedom parameter (v) have pointed out a distinct deviation from normality. Therefore all the estimates have heavy tails distribution. The constant in the mean (μ) and in the variance (ω) equation are not significant for the all the series except for the constant in the variance equation for SIF2. The Garch(1,1) fitted results are reported in Table 2 in the Annex.

We have extracted the standardized residuals and performed one-step-ahead forecast on the conditional variance in order to use them in the calculation of the pseudo-uniform variable.

Since a Gaussian copula does not allow for dependencies in the tails, we have estimated a Student-t copula based on Kendall'rank correlation. Then we have generated 100.000 random sets and we determined the spectrum of simulated losses for each company.

We have repeated the volatility forecasts for each simulation of random sets and then we have simulated the portfolio losses. The results were sorted by size and the expected shortfall at the 95% confidence level was expressed as the median of the 50.000 largest losses.

We have constructed four portfolios by varying the weights of the four companies and we calculated the Expected Shortfall for each of them using a copula-Garch model. Finally we have compared the results with a naive Value at Risk computed with variance-covariance method. The results are reported in table 1.

Table 1

Expected Shortfall

	FP	SIF2	SIF3	SIF4	Expected Shortfall (95%)	Value at Risk (95%)
	Weights					
1.	0.25	0.25	0.25	0.25	1.68%	1.57%
2.	0.35	0.35	0.15	0.15	1.54%	1.46%
3.	0.15	0.15	0.35	0.35	1.88%	1.74%
4.	0.05	0.25	0.35	0.35	2%	1.83%

By comparing the variance-covariance VaR results with the copula-Garch results, it results that when using a model which assumes that the equity returns are i.i.d and Gaussian distributed, the reported risk measure will underestimate the risk of the portfolio.

4. Conclusion

In this paper we have applied a copula-Garch model for computing the Expected Shortfall, a risk measure, for a proxy portfolio of the BET-FI equity index. Usually the portfolio risk measures such as Value-at-Risk or Expected Shortfall are computed using restricting distributional assumptions. Using a copula-Garch model some of these assumptions are relaxed and the results should show to which degree are they underreporting the risk of the portfolio.

Instead of assuming a multivariate distribution, a copula function may by used instead for modelling the dependence structure and the marginal distributions between returns. Since the equity returns are heavy tailed we have fitted a GARCH (1,1) model with a Student-t distribution.

The copula function copula is a measure of nonlinear dependence between two or more variable. By distinguishing between the dependence structure and the marginal distributions, a copula function will capture better the tail risk between the financial returns. When calculating risk measures such as Value at Risk or Expected Shortfall we are primarily interested in the estimation of the tail risks.

The results suggest that a copula-Garch model is to be preferred in practice to the variance-covariance Value at Risk measure. Although the differences are small, it should be noted that the evolution of the Romanian capital market for the last two years could be labelled as being in a normal market condition, meaning that it was characterized by a low volatility regime. The gap between the two methods should be markedly different under distressed market conditions. Also we should note that the VaR calculated with the variance method will lead to wrong results by constantly underestimating the risk due to wrong distributional assumptions.

Further work will be devoted for computing Expected Shortfall/Value at Risk with a time-varying copula function which allow for the parameters of the function to vary over the sample period.

5. Acknowledgement

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References

1. Breymann, W., Dias, A., & Embrechts, P. (2003). „Dependence structures for multivariate high-frequency data in finance”.
2. Chiou, S. C., & Tsay, R. S. (2008). “A copula-based approach to option pricing and risk assessment”, Journal of Data Science, 6(3), 273-301.
3. Hsu, C. C., Tseng, C. P., & Wang, Y. H. (2008). „Dynamic hedging with futures: A copula based GARCH model”, Journal of Futures Markets, 28(11), 1095-1116.
4. Jondeau, E., & Rockinger, M. (2002). “Conditional dependency of financial series: the copula-GARCH model”, FAME research paper, (69).
5. Jondeau, E., & Rockinger, M. (2006). “The copula-Garch model of conditional dependencies: An international stock market

application", Journal of international money and finance, 25(5), 827-853.

6. Micocci, M., & Masala, G. (2004). "Backtesting value-at-risk estimation with non-gaussian marginals" , University of Cagliari, Faculty of Economics.
7. Patton, A. J. (2006). "Modelling asymmetric exchange rate dependence", International economic review, 47(2), 527-556.

ANNEX

Table 2

Fitted Garch(1,1) models

Company	Estimate	Std.Error	T value	p value
FP	-0.0001	0.0002	-0.4240	0.6717
μ	0.0000	0.0000	2.0170	0.0437
ω	0.0001	0.4543	1.9610	0.0499
α	0.0167	0.1167	2.7150	0.0066
β	0.891	0.3643	7.0590	0.0000
υ	2.2573	0.0002	-0.4240	0.0000
SIF2				
μ	-0.0004	0.0004	-0.8640	0.3874
ω	0.0000	0.0000	1.8950	0.0581
α	0.1773	0.0759	2.3360	0.0195
β	0.6750	0.1262	5.3500	0.0000
υ	3.8550	0.6593	5.8470	0.0000
SIF3				
μ	-0.0006	0.0005	-1.2940	0.1957
ω	0.0000	0.0000	2.1860	0.0288
α	0.1734	0.0844	2.0540	0.0400
β	0.6965	0.1105	6.3040	0.0000
υ	3.5810	0.6052	5.9170	0.0000
SIF4				
μ	0.0000	0.0004	0.0990	0.9208
ω	0.0000	0.0000	1.8180	0.0691
α	0.1456	0.0612	2.3800	0.0173
β	0.7547	0.0899	8.3960	0.0000
υ	3.7190	0.6503	5.7190	0.0000

CENTRAL BANK POLICY DURING TIMES OF FINANCIAL INSTABILITY - EXPERIENCES OF SOME EUROSYSTEM'S CANDIDATES [1]

Adina CRISTE, PhD*

Abstract

The global financial crisis, the most severe form of financial instability, split up the global economy in two different periods before and after the global financial crisis. In the same way, at the European level, this crisis made another "cleavage": before and after the Lehman Brothers (LB) shock. One of the important pillars for managing the financial instability is the Central Bank, and the financial crisis occurrence has generated a variety of challenges, including those linked to the way in which these institutions have reacted. Based on the previous research made by the author related to the European economic integration and to the role of central banks regarding the managing of the financial instability, the present paper aimed at describing the Central Bank conduit of some of Euro Area candidate countries during times of financial instability marked after 2000's. The research results will show if the measures implemented by central banks from the selected countries could or could not be designed under a similar framework of managing the financial instability in the emerging Europe.

Keywords: macro-prudential tools, unconventional monetary policy tools, financial liberalization

JEL Classification: E52, E58, F36

1. Introduction

From the beginning of the 2000's until the start of the global financial crisis, the Central and Eastern European countries have been overrun by massive external capital inflows, in a period of general optimism, marked by global liquidity, low interest rates and with a positive perception of investors concerning the accession of these countries to the European Union. The positive expectations created attractive conditions for investments, including foreign banks,

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in the new European Union member states. Although the investment process of the foreign parent banks within the domestic banking system of these countries contributed to the quality improvement of the financial services and to the efficiency of the process of financial intermediation (Prasad and Rajan, 2008), it has also increased the risks to the financial stability of the domestic system. Thereby, the increasing competition between foreign banks which invested in this region, entailed banks to adopt aggressive strategies by enhancing the lending activity in order to acquire a larger market share. The shallow financial systems of these countries could not absorb the massive financial flows, which have been reoriented towards non-tradable sector (such as real estate), with more simple and accessible collaterals, generating in some of emerging European countries (Bulgaria, Latvia, Lithuania, Hungary, but also Romania and Poland) real estate asset price bubbles. The rapid credit growth generated by the competition pressure has been reflected in the credit quality deterioration, increasing the risks for financial instability.

After, the Lehman Brothers shock, considered the major event which triggered the financial crisis in the emerging Europe, the vulnerable national financial systems from Central and Eastern European countries have been subjected to instability and uncertainty, entailing negative effects in the financial market and in the real economy: restraining the economic growth, abrupt adjustments of current account deficits, sudden dropping of assets prices (bursting the speculative bubbles in the housing market, especially in Bulgaria, Latvia, Lithuania and Romania, but also in Poland and Hungary). The national currency of countries with flexible exchange rate regime, registered higher volatility (depreciation), which adversely affected the debt repayment ability of loans denominated in foreign currency, increasing, thereby, the volume of non-performing loans.

In such circumstances, it is interesting to analyse the role of the central banks from the emerging Europe countries in managing the different challenges of the financial system, before, and after the Lehman Brothers shock.

2. A short literature review

The stability of the financial system represents a topical concern for both the political authorities and academic researchers. There are various papers which highlights the necessity either to redefine the role of central banks in promoting the financial stability (Borio, 2011; Eichengreen et al., 2011; Svensson, 2013; Criste and Lupu, 2014), or to define the relation between the price stability objective and the financial stability objective (Borio, 2011; Cerna, 2012; Smets, 2013). In this context, there are studies which try to define macro-prudential measures and unconventional measures applied by central banks in times of financial system distress (Claessens, 2014, Santor and Suchanek, 2013). Lim et al. (2011) investigate the effectiveness of the macro-prudential measures in mitigating the systemic risk. Also, some papers studies the relation between the macro-prudential measures and the type of economic developments, asserting that the emerging countries tend to use more intensively such instruments (McCauley, 2009), as a way of managing the financial instability episodes. The literature signals that central banks which have a major role of intervention at the global level (Fed, European Central Bank, Bank of England, and Bank of Japan) extended the instruments of intervention in order to ensure and adjust the stability of the financial system.

Unlike the other papers, which are focused on the role of central banks in managing the effects generated by the global financial crisis, the present paper extended the period of investigation of this subject, considering that the financial instability should be revealed in times of risks accumulation concerning the financial system. In this way we try to depict the importance of special instruments used by some central banks from European emerging countries in managing the vulnerabilities of the financial system.

The research results could be a starting point for developing an empirical model of conduit for central banks candidate to the Eurosystem.

3. Methodology and data

Our study is limited to four European countries candidate to Euro Area, namely, Czech Republic, Poland, Romania and Hungary, in order to find out if under the same monetary policy strategy (inflation targeting), the national monetary authority managed the financial instability with the same instruments (levers), before and after the global financial crisis outbreak. For this purpose, we take into account the Lehman Brothers collapse as the major event which splits up two different periods, based on the challenges faced the central banks of Central and Eastern European countries.

In other paper (Criste 2014a), we highlight that the financial instability could be generated by the propagation of a shock into a financial system subject to previous accumulation of macroeconomic and financial imbalances which weaken the financial system. Therefore, our investigation starts from 2004, when Poland Hungary and Czech Republic become new member states of the European Union. From the central bank point of view, this period is marked by challenges related to managing the identified risks.

After the global financial outbreak, the central banks all around the world have increasingly involved in the financial stability policy. Smaga (2013) approaches this subject and remarks that the European central banks have different involvement degrees regarding the policy of financial stability, but we confine ourselves to the “operational” component for managing the financial instability (measures for addressing or mitigating the risks to financial stability).

Based on the Annual Reports of the National Central Banks from Czech Republic, Hungary, Poland and Romania, we selected information regarding the measures taken by these institutions in order to adjust the different vulnerabilities of the national financial systems.

Many emerging countries, subjected to massive capital inflows applied special monetary instruments (e.g. reserve requirements, limits on credit growth, capital requirements, limits on loan to value ratios), even before the global financial crisis outbreak, but their implementation was often justified by the monetary policy objectives (Claessens, 2014). Such tools are now qualified as macro-prudential policies , because they have also contributed to the redressing of the imbalances accumulation in the national financial system and operate as automatic stabilizers in times of financial distress. Starting from this observation, we selected only those measures which are directed towards redressing various vulnerabilities in the domestic financial system.

4. Landmarks for central bank in managing financial instability risks

4.1. Central banks challenges in times of financial liberalization

Before the Lehman Brothers shock, the capital liberalisation was a major challenge for the National Bank of Romania (NBR), because it generated a strong pressure on the exchange rate of national currency, an increasing of the liquidity in excess in the financial system. Besides, the credit to the private sector and foreign exchange loans to unhedged borrowers grew rapidly and the massive capital inflows seized the monetary transmission mechanism. A permanent concern for NBR in this period was to avoid an excessive currency appreciation, under the floating exchange rate regime. In this context, the NBR implemented a series of macro-prudential measures in order to slow down the credit growth rate, and to limit the individuals’ indebtedness and the currency risk (see Table 1, in the Annex).

The rapid increasing of the lending activity, especially in foreign currency, and the mortgage lending to households have imposed special measures applied by the National Bank of Poland (NBP) before 2008, in order to mitigate the credit and foreign exchange risk associated with lending to households, and to strengthen the capital and liquidity buffers for the banking system to prevent the liquidity crisis. These special measures, namely macro-prudential measures, were implemented in 2006, under the "Good Practices Regarding Mortgage-Secured Credit Exposures" (*Recommendation S*), and in 2007 (see Table 2, in the Annex). These macro-prudential measures proved to have positive effects, because they helped the banking system to meet the liquidity crisis of 2008-2009. Another major tool was the public communication made by the NBP regarding the potential risks associated with the mortgage lending in foreign currency.

The National Bank of Hungary (NBH) didn't apply special (macro-prudential) measures during 2004-2008. Instead, it has used intensively the communication tools with the public regarding the potential risks to the financial stability in order to raise the risks' awareness of the economic agents (borrowers and potential borrowers) and also to strengthen the confidence in the financial system. The main means of communication is the Report of Financial Stability (since 2000), but also other publications, including research studies. In addition to the communication tool, NBH applied some indirect tools in order to mitigate the financial instability risks, namely the performing of the macroeconomic analysis and monitoring the financial system in order to identify potential risks emerged from the external and internal indebtedness. By this conduit, NBH played the role of a "watcher" rather than a "regulator" for managing the financial instability risks.

The major role played by the NBH towards the implication in the financial stability policy was the cooperation with other national institutions (the Ministry of Finance and the Hungarian Financial Supervisory Authority) and set up the Financial Stability Committee, which had the first meeting in October 2004 (see Table 3, in the Annex).

One of the important measure taken by the NBH as a contribution to the financial stability support was the change in the exchange rate regime, since the beginning of 2008. Namely, the NBH adopted a flexible exchange rate regime, abandoning the band of fluctuation of ±15%. In this way, the NBH solved the potential conflict between the central bank's medium-term inflation target (3% ±1 pp) and the forint's trading band against the euro, which could be too low for the inflation objective.

In the same way as the National Bank of Hungary, The Czech National Bank did not apply special measures during 2004-2008 for managing vulnerabilities in the financial system, but it has an active conduit regarding the financial stability policy, since 2004 (see Table 4, in the Annex).

We must mention that the financial system of the Czech Republic was quite robust, given the lower domestic interest rates and the stable macroeconomic environment, which stimulated neither the euroisation phenomenon, nor the speculative bubbles assets. Also, the external financing needs were much narrowed and both the public and the private indebtedness were at low levels. Besides, the domestic banking system was net external creditor and the lending activity was financed by deposits of the residents, because the balance sheets of the banking system were dominated by the deposits and loans of residents in national currency (Czech koruna). Although these conditions did not create challenges for the CNB, we must highlights that the CNB used frequently, especially after 2004, the public communication tool as a warning signal about the potential risks to the financial stability. This active conduit of the CNB is reflected by the Financial Stability Report for 2006 in which it notified on both the existence of the typically over-optimistic expectations for peak phases of business cycles, and the risks accumulation in the housing market. This warning signal further increased the credibility of the CNB, one of the fundamental features that could offer a more relaxed use of systemic risk management tools.

4.2. New challenges for central banks after Lehman Brothers shock

After the Lehman Brothers shock, countries under the observation in this study have been indirectly hit by the global financial crisis, and the adverse effects emerged after this major event. Central banks from Romania, Poland, Hungary and Czech Republic have undergone to various challenges:

- preventing or reducing the disturbances in the interbank markets;
- maintaining or improving the banking system stability;
- avoiding or reducing the excessive exchange rate fluctuations, i.e. minimizing the exchange rate risk (for National Banks of Hungary, Poland and Romania);
- sustaining or stimulating the lending activity to companies, in order to ensure the financial stability (especially for National Banks of Hungary, Poland and Romania).

During 2008-2013, the analysed central banks have extended the policy tools in order to manage the effects of the financial instability after the Lehman Brothers shock, using a variety of special instruments: both macro-prudential measures and unconventional monetary policy measures. As we highlight in other paper (Criste, 2014b), the macro-prudential measures applied during 2008-2013 were intensively used by those central banks that previously applied them as a way of dealing with the massive financial inflows (Poland, Romania and, to a lesser extent, Hungary). The unconventional monetary tools have been more intensively used by the National Bank of Hungary and National Bank of Poland. Unlike the Czech National Bank and the National Bank of Romania, which applied to a lesser extent the unconventional monetary tools (see table 1), the National Bank of Poland and the National Bank Hungary, used a larger range of special measures in order to mitigate tensions in the domestic financial markets and to support the banking system financing. In Poland, this set of measures are included in the “Confidence Package” and was complemented in 2009 by others, in order to ease the restrictions of lending for companies, but also to prevent the disturbances in the interbank market (“Pact for the Growth of Lending in Poland”). The National Bank of Hungary had a very active conduit in managing the financial instability during 2008-2011 (see table 3) by supporting the foreign currency and forint liquidity of domestic banks.

One of the major unconventional monetary policy measures adopted by the NBH and NBP refers to the cooperation with the European Central Bank and the Swiss National Bank, in order to support foreign exchange operations of the National Banks from Hungary and Poland.

An important contribution to the lessening of the central banks burden and to the restoring of the international investor confidence for European emerging countries had the Vienna Initiative, in 2009 and the agreements of national authorities from Hungary, Romania and Poland with international organizations providing financial assistance. By reaching an international agreement with the IMF and European Commission, in October 2008, the Hungarian authorities received multilateral financial assistance with an overall amount of €20 billion.

Unlike the other three central banks, the Czech National Bank has not applied macro-prudential measure as reaction to the financial distress in late 2008. Instead, it applied some unconventional monetary policy, during 2008-2010. In fact CNB has a different pattern than the other three central banks included in this study, being similar to that from a developed country. The monetary policy interest rate has already reached the zero lower bound, since the end of 2012. This is the motivation for setting the exchange rate as an additional instrument for relaxing the monetary conditions (in November 2013). The koruna exchange rate becomes an additional tool in order to fulfil the inflation target when the policy interest rate is near zero.

Finally, after the Lehman Brothers shock, an additional lever for managing the financial instability of the analysed central banks was the ECB by the direct link between on the one side, the parent banks form the Euro Area that have benefited from the ECB's unconventional measures and on the other side, the domestic banking system of these countries dominated by these parent banks. This lever contributed to the reducing the burden of the National Banks.

5. Conclusions

The adverse effects of the financial crisis which occurred in the real economy and in the financial economy, shown in many papers of the literature and in the reports of the national and international institutions, confirm the idea that the financial instability is started by the propagation of a shock, on the background of previous accumulation of macroeconomic and financial imbalances which make the financial system become frail.

Observations arising from the short analysis show that there is not a common framework for the selected central banks in using levers for managing the financial instability. Each of them has its own framework for intervention in terms of financial instability, both before the Lehman Brothers shock and after that.

Before the Lehman Brothers shock, the main challenge was the financial liberalization, but the reactions were different, not only because the financial developments were quite different between these countries (the Czech Republic financial system developed towards a more robust position, while the financial systems of the three countries accumulated more vulnerabilities), but also because the levers for managing financial instability risks were various. While the National Bank of Romania and the National Bank of Poland used mainly macro-prudential tools, the National Bank of Hungary and the Czech National Bank used the public communication tool in order to notify the potential risks emerged from the macroeconomic and financial developments.

After the Lehman Brothers shock, our analysis depicts not only a broadening of the special instruments for managing the financial instability, but also an intensification of using these measures. The experience from the previous period (before 2008) played a major role for the National Bank of Romania and for the National Bank of Poland in using macro-prudential measures after LB shock, while the National Bank of Hungary experienced a period of intensively using of new tools, both macro-prudential and unconventional monetary policy tools after 2008. In fact, this national monetary authority was the most active of the four central banks in using those special levers.

6. Acknowledgment

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References

1. Borio C. (2011). “Central Banking Post-Crisis: What Compass for Uncharted Waters?”, BIS Working Paper no. 353.
2. Claessens S. (2014). “An Overview of Macroprudential Policy Tools”, IMF Working Paper 14/214. International Monetary Fund, December.
3. Cerna S. (2012). "The Monetary Policy in Post Crisis Period", Timişoara Journal of Economics, Vol. 5, Issue 17, pp. 58-78.
4. Criste A. (2014a). “Reference Points for Financial Instability”. Financial Studies Vol. 3 (65), 58-75.
5. Criste A. (2014b). “Monetary Policy Adjustment at the Global Financial Crisis Constraints”, Hyperion Economic Journal, vol. 2, issue 4, December, 3-11.
6. Criste A., Lupu, I. (2014). “The Central Bank Policy between the Price Stability Objective and Promoting Financial Stability”, Procedia Economics and Finance 8, Elsevier, pp. 219-225.
7. Eichengreen B, et al. (2011). “Rethinking Central Banking, Committee on International Economic Policy and Reform”. Brookings Institution; 2011. www.brookings.edu (accessed at: the 14th April 2015).
8. Lupu I. (2014). “Economic and Financial Risk Taking in Central and Eastern European Countries”, Financial Studies, Vol. 3 (65), pp.80-93.
9. Lim C., Columba F., Costa A., Kongsamut, P., Otani, A., Saiyid, M., Wezel, T. and Wu, X. (2011). “Macroprudential Policy: What Instruments and How to Use Them?”. Lessons from Country Experiences. IMF Working Paper Series, 11/238. International Monetary Fund, October.
10. McCauley, R (2009). “Macroprudential policy in emerging markets”. Paper presented at the Central Bank of Nigeria‘s 50th Anniversary International Conference on “Central banking, financial system stability and growth”, Abuja, 4-9 May.
11. Prasad E.S., Rajan R.G. (2008). “A pragmatic approach to capital account liberalization”. Journal of Economic Perspectives, vol. 22, no. 3, 149–172.

12. Santor E., Suchanek L. (2013). ”Unconventional Monetary Policies: Evolving Practices, Their Effect s and Potential Costs”. Bank of Canada Review. Spring 2013.
13. Smaga P. (2013). ”Assessing Involvement of Central Banks in Financial Stability”. Center for Financial Stability, Policy Paper. Retrieved from: http://www.centerforfinancialstability.org/ (accessed at 30th of March 2015).
14. Smets F. (2013). “Financial Stability and Monetary Policy: How Closely Interlinked?” Sveriges Riksbank. Economic Review No. 3, Special Issue, pp.121-59.
15. Svensson L.E.O. (2011). “Monetary Policy after the Crisis”, Speech at the Conference “Asia’s role in the post-crisis global economy”, Federal Reserve Bank of San Francisco; 29 November 2011. Available at: http://www.bis.org (accessed at 13th April 2015).

ANNEX

Table 1 Levers of the NBR for managing the financial instability risks

Before the LB shock	After the LB shock
Macro-prudential policy tools	
2004-2007: - Loan-to-Value (LTV) (2 measures) - Debt Service-to-Income (DTI) (3 measures) - Provisioning Requirement - Foreign Currency Lending Limits - Reserve Requirements (4 times)	**2008-2009:** - more stringent LTV and DTI for foreign currency loans than for domestic currency loans: 2 measures - increasing the capital adequacy ratio for individual banks - power for NBR to forbid or contain profit distribution until the financial standing is improved - reducing the reserve requirement on domestic currency liabilities (two times) -- reducing the reserve requirements on foreign currency liabilities (three times) - reducing the reserve requirements on foreign currency liabilities with maturity of less than 2 years **2010-2011:** - higher risks weights or capital requirements - setting specific maximum LTV levels for housing purposes, differentiated by currency and type of loan - reducing the reserve requirements on foreign currency liabilities with maturity of less than 2 years - removing reserve requirements for deposits with residual maturities over 2 years which have been rolled over.
Unconventional monetary policy tools	
	2008-2009: - repo transactions through auction procedures at fixed rates - foreign exchange (FX) swaps - reducing the maturity of standard deposit-taking operations

Source: author's compilation based on National Bank of Romania Annual Reports, 2004-2013; Lim et al. (2011)

Table 2 Levers of the NBP for managing the financial instability risks

Before the LB shock	After the LB shock
Macro-prudential policy tools	
2006-2007: - haircuts in collateral for foreign exchange loans - more stringent criteria for granting mortgage loans in foreign currency - increasing the risk weights for mortgage loans in foreign currency; - introducing the mandatory liquidity requirements	**2008-2010:** - more stringent DTI ratios for foreign currency-denominated loans to unhedged borrowers - DTI limits for newly extended FX mortgage loans - Recommendation S (II): banks which advance foreign currency-denominated loans should furnish their clients with reliable information on how they use foreign-exchange spread and of its impact on the loan cost; loan agreements should contain precise provisions on specifics of the loans; clients are allowed to change the method of repaying FX-indexed loans and repay them in the indexing currency. - restrictions on profits - reducing reserve requirements **2011-2012:** - higher risks weights for foreign currency-denominated retail exposures - more stringent LTV and DTI for foreign currency loans
Unconventional monetary policy tools	
	2008-2010: - repo operations for longer periods - expanding the range of acceptable assets as collateral for National Bank refinancing operations - expanding the scope of acceptable collateral in refinancing loans by foreign currency deposits - decreasing the value of collateral as compared to the amount of the credit obtained by commercial banks from NBP by the marginal lending facility - FX swaps (cooperation with Swiss National Bank) - FX swaps (cooperation with ECB) - providing the banking sector with longer-term liquidity - allowing rollover (renewal of the credit with the same collateral) - NBP bonds redemption before maturity

Source: author's compilation based on National Bank of Poland Annual Reports, 2004-2013; Lim et al., (2011)

Table 3 Levers of the NBH for managing the financial instability risks

Before the LB shock	After the LB shock
Common tools	**Macro-prudential policy tools**
- public communication (Financial Stability Report, since 2000; Lending Survey, since 2004; research studies) - analysis and monitoring the financial system - cooperation with the Ministry of Finance and Hungarian Financial Supervisory Authority - Floating freely exchange rate regime (since the early of 2008)	**2010:** - flexible minimum reserve system - reducing the reserve ratio - LTV and DTI limits for FX mortgages (more stringent for foreign currency loans than for domestic currency loans) - FX lending ceiling: ban on foreign exchange mortgage lending
	Unconventional monetary policy tools
	2008-2009: - FX swaps (cooperation with European Central Bank) - two-week and six-month loan tenders - auctions to purchase government securities - broadening the range of eligible collaterals (variable-rate and fixed-rate loan tenders) - narrowing the interest rate corridor around the key policy rate to ±50 basis points from ±100 basis points - extraordinary, 300 basis point increase in the base rate - gradually, widening the range of eligible assets - reducing the reserve ratio from 5% to 2% - Swiss franc liquidity facility (cooperation with Swiss National Bank) - new euro liquidity facility to boost corporate lending and stimulate banks' longer-term external borrowing (cooperation with ECB) - new euro liquidity facility (cooperation with ECB) **2010-2011:** - publication of a liquidity forecast for the banking system - National Bank's mortgage bond purchase programme - introduction of the HUFONIA swap **2013:** - Funding for Growth Scheme (refinancing loans and currency swaps)

Source: author's compilation based on National Bank of Hungary Annual Reports, 2004-2013; Lim et al., (2011)

Table 4 Levers of the CNB for managing the financial instability risks

Before the LB shock	After the LB shock
Common tools	**Unconventional monetary policy tools**
- public communication (Financial Stability Report, since 2004; research studies) - analysis and monitoring the financial system, since 2004	**2008-2010:** - extraordinary liquidity-providing repo operations aimed at supporting the functioning of the government bond market - FX swaps **Since the end of 2013**: exchange rate currency as additional instrument for monetary policy

Source: author's compilation based on Czech National Bank Annual Reports, 2004-2013

EUROPEAN EQUITY MARKET RETURN, VOLATILITY AND LIQUIDITY SPILLOVER DYNAMICS DURING THE EUROZONE DEBT CRISIS

Sorin DUMITRESCU, PhD*

Abstract

We investigate the interdependence among European Union equity markets during the Eurozone debt crisis by studying spillovers in returns, volatility and liquidity using the Diebold-Yilmaz (2009, 2011) Spillover Index. We identify the EU-wide shocks that are likely to have had the highest impact on these markets before and during the crisis episode. We then analyze the economic events that triggered the shocks and study how their unfolding might have caused spillovers from developed to emerging equity markets. We conclude that negative economic events have had in general disproportionate effects on member states, with the higher burden falling on those countries with less developed capital markets.

Keywords: contagion, spillover index, market liquidity, financial crisis

JEL Classification: C32, C53, G12, G15

1. Introduction

The literature on contagion and spillovers in financial markets has grown in the 1990s and early 2000s, a period marked by frequent financial crises whose negative effects tended to extend beyond the market or country of origin. Following a period of relative calm, the US subprime mortgage crisis and the subsequent Eurozone debt crisis have revived the interest of the academic community in this research area and have led to important contributions, especially related to the development of econometric techniques for identifying and measuring spillovers and contagion.

Contagion can be defined as an increase of common movements in a set of financial asset markets during a crisis period compared to those existing in a benchmark, non-crisis period (Forbes and Rigobon, 2002). A more comprehensive definition, by Allan and Gale (2012), interprets contagion as a consequence of excess

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spillovers. Spillovers result from the transmission of an unexpected but identified shock from one variable to receiving or responding variables in the system (Alter and Beyer, 2014). Under both definitions, contagion is the component that is unexplained and unexpected.

The new models of contagion typically rely on advanced econometric techniques in order to take into account the interdependencies and common factors among markets, such as trade linkages, systematic capital flows and banking linkages, before measuring the contagion component. In contrast, some models of spillovers can be constructed using only basic econometric techniques and still provide valuable information about contagion episodes.

In this paper we examine and interpret a simple measure of spillovers based on the VAR variance-decomposition Spillover Index developed by Diebold and Yilmaz (2009, 2011), using data for equity markets from all 28 EU member states. We study the exact spillover effects to and from every market in the European Union in relation to all other markets, while excluding global influences coming from outside the EU.

In addition to deriving the time-series of spillover indices of market returns and volatilities, we also derive spillovers in market illiquidity. In interpreting the variation of the spillover indices over time, we focus on the events that marked the Eurozone debt crisis of 2010-2011. This approach allows us to draw conclusions regarding the similarity of that period to more recent periods of market turmoil.

The paper is structured as follows: in Section 1 we discuss important contributions made to the literature of spillover and contagion modeling in recent years; in Section 2 we present the data and methodology employed for data transformation; in Section 3 we describe the Spillover Indices framework; in Section 4 we interpret the results and in Section 5 we conclude.

2. Literature review

Connectedness, or interdependence, is a central concept to modern risk measurement and management, having applications in market risk, credit risk, counterparty risk and grid-lock risk, as well as systemic risk (Diebold and Yilmaz, 2014). The most popular method of modeling connectedness is through correlation-based measures, which are based on linear Gaussian methods. Models that rely less on linear Gaussian methods have been recently proposed in the literature, including the CoVaR approach of Adrian and Brunnermeier (2009) or the marginal expected shortfall of Acharya et al. (2010).

One appealing way of modeling connectedness has been introduced by Diebold and Yilmaz (2009). They propose a measure of interdependence called the Spillover Index, based on variance decompositions associated with an *N*-variable VAR. The method is appealing because it does not require the definition of "contagion episodes"; instead, the framework allows the identification of such episodes in the dynamics of spillovers, which appear to be sensitive to economic shocks. However, being based on VAR variance-decomposition, the index is sensitive to variable ordering, which means that the correct interpretation of results requires a preliminary step that consists of ordering the VAR based on a-priori, model-free, judgment. In their article, Diebold and Yilmaz (2009) study spillovers in returns and volatility of global equity market indices and are able to identify and associate with meaningful economic events the episodes when the value of the indices, especially that of the volatility spillover index, abruptly rises or falls.

Diebold and Yilmaz (2012) build on their previous work to create spillover measures in volatility that are independent of the ordering used for forecast variance decomposition. Analyzing volatility spillovers from four asset classes in the United States, – stocks, bonds, foreign exchange and commodities, – they find that spillovers among markets may have been an important component of the global financial crisis of 2007. Their results indicate that bond and stock markets have been the most volatile, with FX and commondities less so. Moreover, volatility dynamics appear to be highly persistent and to exhibit high jumps.

More recently, Diebold and Yilmaz (2014) combine VAR variance-decomposition theory and network topology theory to propose measures of connectedness at all levels – from system-wise to pair-wise. They analyze the dynamics of these new measures over time, and then turn their attention to the financial crisis, starting from 2007 to the end of 2008.

Alter and Beyer (2014) extend the framework of Diebold and Yilmaz (2011) to quantify spillovers between sovereign credit markets and banks in the euro area during the Eurozone debt crisis. Their methodology assesses the systemic effect of an unexpected shock to the creditworthiness of a particular sovereign or country-specific bank index to other sovereign or bank CDS, between October 2009 and July 2012. Their results show clearly that during that period the interdependencies between banks and sovereigns had been growing, an indication of rising systemic risk. They also show that several policy interventions had mitigating impact on spillover risks.

Bubák et al. (2011) study volatility transmission in emerging European foreign exchange markets using a dynamic version of the Diebold-Yilmaz spillover index, and find that the magnitude of the volatility spillovers increases significantly during periods of market uncertainty. Their approach relies on model-free, non-parametric measures of ex-post volatility based on high-frequency data. One interesting finding of this study is that in the medium-term volatility increases for those countries with under-developed financial sectors.

Most of the literature concentrated either on different markets within one country, or on one market across different countries. One exception is the study by Ehrmann et al. (2011), who analyze the degree of financial transmission between money, bond and equity markets and exchange rates between the United States and the Euro area. Their results show that asset prices react strongest to other domestic asset prices, but also indicate a significant difference between the United States and the euro area in how financial markets react to domestic financial shocks. One explanation given by the authors is that the United States and the Euro zone have different economic structures, degrees of openness, as well as different policy objectives.

Two studies on Asian equity markets employ different methodologies to identify contagion episodes. Gallo and Otranto (2008) propose a Markow-Switching approach to characterize the transmission mechanism of volatility between markets. In their model, the state of one variable feeds into the transition probability of the state of the other. Forbes and Rigobon (2002) also use a Markov-Swiching model to the same effect, but base their analysis only on the behavior of correlation coefficients, and on a significant increase changing from a state of low to another of high volatility.

Baur and Fry (2009) propose a multivariate test based on the cross-sectional and time-series dimension of the data that controls for interdependencies and systematic risk through regional and global equity market indices. In their framework, contagion is analyzed through the significance of fixed time effects. The methodology of Baur and Fry (2009) controls for interdependencies arising through relationships with nearby countries, as well as from global financial crisis. Their test of contagion is applied to the equity markets of eleven countries during the Asian financial crisis of 1997-1998. They find that contagion in common volatility arising during a crisis period affects interdependencies rather than contagion, and that contagion had both negative and positive effects in all asset markets simultaneously.

In the context of the literature, our study uses the same methodology as Diebold and Yilmaz (2011), but focuses only on European Union equity markets. By excluding global markets from the analysis, we focus strictly on how shocks are transmitted among EU member states. Moreover, we contribute to the understanding of the relationship between market volatility and liquidity, by studying simultaneously volatility and liquidity spillovers.

3. Data

Data consists of equity market return indices band traded volumes of 28 European Union countries, downloaded from Thomson Reuters Datastream. We use 10-year daily series, from 4 April 2005 to 6 April 2015.

3.1. Returns

We first generate the stationary series[1] of daily returns by taking the logarithms of the ratio between the return index values measured on consecutive days. Then, we derive the weekly series by summing the five return values of each week. Descriptive statistics of weekly returns are provided in Table 1.

3.2. Volatility

The spillover analysis requires the derivation of measures of volatility and liquidity from the raw return index and volume series[2].

Volatility can be estimated using parametric or non-parametric methods. For example, Diebold and Yilmaz (2009) use in their study a non-parametric method that generates weekly volatility series based on high, low and close prices recorded every week.

We choose to estimate conditional daily and weekly volatility using a parametric model of the GARCH family. The model, proposed by Glosten et al. (1993), has been shown to perform well on equity data. The GJR(P,Q) model has *P* GARCH coefficients associated with lagged variances, *Q* ARCH coefficients associated with lagged squared innovations, and *Q* leverage coefficients associated with the square of negative lagged innovation. The specification of the model is given by:

$$y_t = \mu + \varepsilon_t$$

where $\varepsilon_t = \sigma_t z_t$ and

$$\sigma_t^2 = \kappa + \sum_{i=1}^{P} \gamma_i \sigma_{t-i}^2 + \sum_{j=1}^{Q} \alpha_j \varepsilon_{t-j}^2 + \sum_{j=1}^{Q} \xi_j I[\varepsilon_{t-j} < 0] \varepsilon_{t-j}^2$$

---

[1] Return series are usually stationary. We check our series by performing standard ADF stationarity tests.

[2] Both volatility and liquidity can be measured in various ways, ranging from very simple (such as the standard deviation of returns for a given period for volatility, or value turnover for liquidity) to the very complex. Since our interest is in measuring and interpreting spillovers in liquidity and volatility, we avoid using highly sophisticated methods and instead rely on measures that have been shown to capture well the main features of these variables while being relatively straightforward to derive.

The indicator function $I[\varepsilon_{t-j} < 0]\varepsilon_{t-j}^2$ equals 1 if $\varepsilon_{t-j} < 0$ and 0 otherwise. Thus, the leverage coefficients are applied to negative innovations, giving negative changes additional weight.

Although we use weekly data in our spillover analysis, it is useful first to analyze the evolution of daily conditional volatility over the entire sample. We therefore estimate a GJR-GARCH(1,1) model for each country in the sample and then plot all the conditional daily volatility series resulting from the model on the same chart using a data visualization technique called heat-map, as illustrated in the Figure 1.

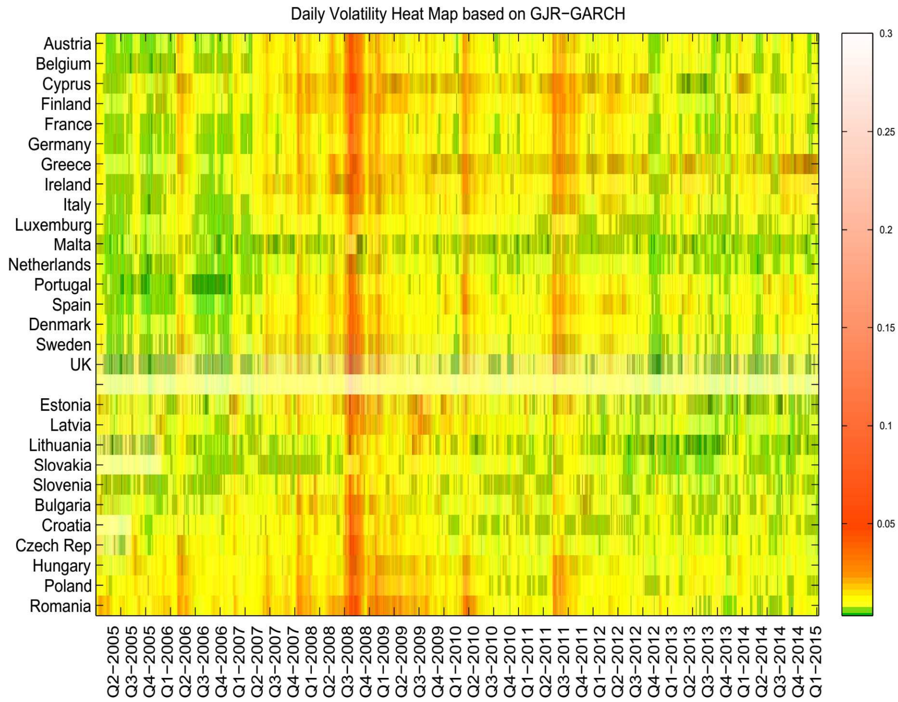
The volatility heat map provides interesting insights into the behavior of cross-country volatility over the previous ten years.

The financial crisis of 2008-2009 is marked on the chart by the red pattern that stretches vertically at the dates corresponding to the third quarter of 2008. This period is the first reference point on the chart. We see that the financial crisis affected all equity markets simultaneously. Another interesting fact revealed by the heat map is that, prior to the crisis, volatility regimes of developed and emerging markets in Europe were markedly different. While developed markets volatility was indicative of a low-risk regime (predominantly green pattern), emerging markets volatility was indicative of a moderate-risk regime (predominantly yellow pattern). Furthermore, the effects of the financial crisis on volatility persisted more in emerging countries, such as Romania, Poland and Hungary (red pattern stretching to the right for these countries), but faded relatively quickly in other countries.

The second relevant episode is the Eurozone debt crisis. This is shown by another red pattern stretching vertically through the chart. This time, the high-volatility regime has been less intense and can be observed in fewer countries. We notice that volatility in the equity markets of Latvia, Lithuania, Slovakia, Slovenia, Bulgaria, Croatia and the Czech Republic has been only moderate during that crisis episode, while Hungary, Poland and Romania appeared again to be more vulnerable.

Figure 1

Heat-map of daily volatility estimated using GJR-GARCH(1,1) models



The spillover analysis in the next section is performed on weekly series. We estimate again the GJR-GARCH models on the weekly return series and provide descriptive statistics of weekly volatility in Table 2.

3.3. Liquidity

Equity market liquidity is an important feature of capital markets. A market is often said to be liquid when the prevailing structure of transactions provides a prompt and secure link between the demand and supply of assets, thus delivering low costs of transaction (Gabrielsen et al, 2011). The characteristics of liquid markets are tightness, immediacy, depth, breadth, and resiliency (Sarr and Lybek, 2002). Because market liquidity has different dimensions, no single measure will be sufficient to capture all its characteristics. Gabrielsen et al. (2011) offer a recent survey of liquidity measures.

Since we use price and volume data aggregated at market level, an appropriate measure of market liquidity (or illiquidity, in this case) is the Amihud (2002) illiquidity indicator. This indicator falls into the category of volume-based liquidity measures and provides an understanding of the link between volume and price change, representing a rough measure of price impact.

The index is calculated using the following formula:

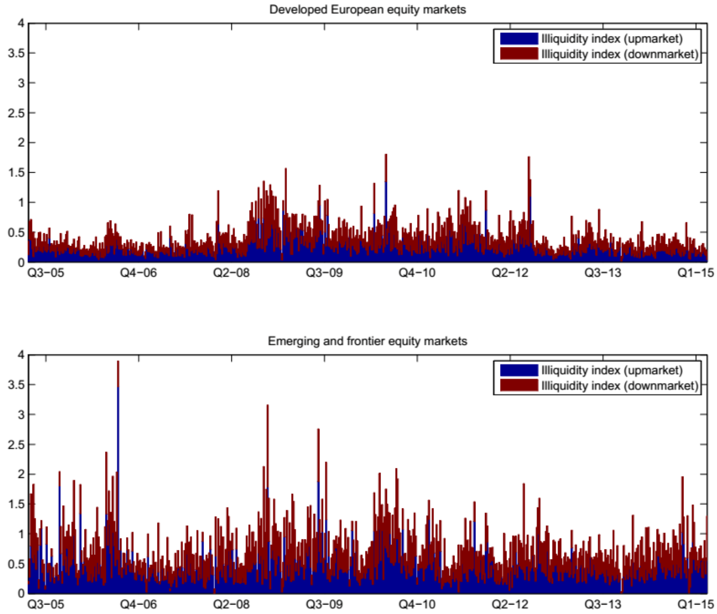
$$ILLIQ_T^i = \frac{1}{D_T}\sum_{t=1}^{D_T} \frac{|R_{t,T}^i|}{V_{t,T}^i}$$

where D_T is the number of days for which data are available (in our case, $D_T = 5$), $R_{t,T}^i$ is the return of the equity index *i* on day *t* of week *T*, and $V_{t,T}^i$ is the daily volume. We also compute upmarket *ILLIQ*, based only on $R_{t,T}^i > 0$ and down-market *ILLIQ,* based only on $R_{t,T}^i < 0$.

In Figure 2 we illustrate the evolution of the weekly Amihud illiquidity index calculated for the 10-year data sample. In the upper section of the figure we plot the evolution of the average index of developed EU markets, while in the lower section we plot the average index of emerging EU markets. In the figure, higher values of the index indicate less liquidity. Comparing with the volatility heat-map in Figure 1, we see that the aggregate behavior of the illiquidity index is not as easy to interpret. On the one hand, illiquidity tends to be higher in more volatile periods, but on the other hand, it displays a much more irregular pattern. The peaks of market illiquidity, especially in emerging markets, need more careful consideration before any conclusion can be drawn. What is obvious nonetheless from Figure 2 is that, on average, emerging markets are less liquid and are experiencing more liquidity volatility, as evidenced also by descriptive statistics in Table 3.

Figure 2

Variation of weekly up-market and down-market price-impact (Amihud) market illiquidity measure, EU developed markets [upper plot] vs. EU emerging markets [lower plot]. Higher value indicates less liquid markets



4. Methodology

The method used in this paper to analyze spillovers among EU equity markets has been introduced by Diebold and Yilmaz (2009), hereafter DY2009, and refined by Diebold and Yilmaz (2011), hereafter DY2011. DY2009 focus on total spillovers in a simple VAR frameworks (with potentially order-dependent results driven by Cholesky factor-orthogonalization). DY2011 address the order-dependency shortcoming by developing a measure of directional spillovers in a generalized auto-regressive framework in which forecast-error variance decompositions are invariant to variable ordering. We describe below how spillover indices are computed by DY2011.

We start from a covariance stationary *N*-variable VAR(p):

$$VAR(p), x_t = \sum_{i=1}^{p} \Phi_i x_{t-i} + \varepsilon_t$$

where $\varepsilon_t\,(0,\Sigma)$ is a vector of independently and identically distributed disturbances.

The moving average representation of the *VAR(p)* is:

$$x_t = \sum_{i=0}^{\infty} \mathrm{A}_i \varepsilon_{t-i}$$

where the *NxN* coefficient matrices A_i can be written as:

$$A_i = \sum_{t=1}^{p} \Phi_i \mathrm{A}_{i-t}$$

with A_0 an *NxN* identity matrix and $\mathrm{A}_i = 0$ for *i<0*.

The moving average coefficients are used to derive the variance decompositions, which allow the description of the forecast error variances of each variable into parts attributable to the various system shocks.

DY2011 rely on the generalized VAR framework of Koop, Pesaran and Potter (1996) and Pesaran and Shin (1998), which produces variance decompositions invariant to ordering.

Define own variance shares to be of the *H*-step-ahead error variances in forecasting the variables of interest x_i due to shocks in their own realizations, and cross variance shares, or spillovers, to be the fractions of the *H*-step ahead error variances in forecasting the variable of interest x_i due to shocks to other variables in the system.

We follow DY2011 in denoting the H-step-ahead forecast error variance decompositions by:

$$\theta_{ij}^{g}(H) = \frac{\sigma_{ii}^{-1} \sum_{h=0}^{H-1} (e'_i \mathrm{A}_h e_j)^2}{\sum_{h=0}^{H-1} (e'_i \mathrm{A}_h \Sigma A'_h e_i)}$$

Σ – variance matrix for the error vector ε

σ_{ii} – standard deviation of the error term for the *i*th equation

e_i – selection vector with one as the *i*th element and zeros otherwise

The sum of the elements of each row of the variance decomposition table is not equal to one.

Each entry of the variance decomposition matrix is normalized by the row sum:

$$\tilde{\theta}_{ij}^{g}(H) = \frac{\theta_{ij}^{g}(H)}{\sum_{j=1}^{N} \theta_{ij}^{g}(H)}$$

The total volatility spillover index is defined then as:

$$S^{g}(H) = \frac{\sum_{i,j=1, i\neq j}^{N} \tilde{\theta}_{ij}^{g}(H)}{\sum_{i,j=1}^{N} \tilde{\theta}_{ij}^{g}(H)} \cdot 100$$

The total spillover index measures the contribution of spillovers to volatility shocks across all markets to the total forecast error variance.

The directional spillover index is calculated using the normalized elements of the generalized variance decomposition matrix.

Directional volatility spillovers received by market *I* from all other markets *j* is:

$$S_{ij}^{g}(H) = \frac{\sum_{j=1, i \neq j}^{N} \tilde{\theta}_{ij}^{g}(H)}{\sum_{j=1}^{N} \tilde{\theta}_{ij}^{g}(H)} \cdot 100$$

Directional volatility spillovers transmitted by market *I* to all other markets *j* is:

$$S_{ji}^{g}(H) = \frac{\sum_{j=1, i \neq j}^{N} \tilde{\theta}_{ji}^{g}(H)}{\sum_{j=1}^{N} \tilde{\theta}_{ji}^{g}(H)} \cdot 100$$

5. Results

5.1. Spillover Tables

The full-sample analysis of the European equity return, volatility and illiquidity spillover indices, based on DY2011 methodology, is summarized in Tables 4, 5, 6, respectively.

The results are based on the full 10 year sample of data, including thus the financial crisis of 2007-2008 and the Eurozone debt crisis of 2010-2011.

The tables are structured as follows: the *ij*th entry in the table is the estimated contribution to the forecast error variance coming from innovations in country *j*. The off-diagonal column sums or row sums, when totaled across countries, give the numerator of the Spillover Index. The column sums or row sums, including diagonals, when totaled across countries, give the denominator of the Spillover Index.

We first remark by analyzing the Tables 4 to 6 that the European equity markets are quite interdependent, as the contribution from others to all countries (last column of the tables) is relatively high (close to 90% in the case of return and volatility spillovers). Moreover, we observe that the innovations in each country returns or volatilities are responsible in general for a modest percentage of error variations in forecasting the returns of other countries. In this respect, the analysis on European markets, which excludes global influences coming from outside the European Union, is different from an analysis at the global level, where possibly spillovers would mostly be caused by a predominant market such as the US.

The last cell of Tables 4 to 6 is the Spillover Index. The values of 85% for returns, 83% for volatilities indicate that the forecast error variance comes from spillovers among member states. We find, as DY2009, that return and volatility spillovers are of the same magnitude, but the values that we observe for the Spillover Indices are more than twice as high than those obtained by DY2009.

Dividing the country sample into developed and emerging markets, we note that, as we expect regarding return and volatility spillovers, the contribution to others from emerging markets is much lower than the contribution to others from developed markets. So, in other words, although in most cases the forecast error variance of all markets comes from innovations in other markets, emerging markets contribute less to others.

The illiquidity spillovers are different, in the sense that the contribution from others is significantly higher, on average, for developed markets than for emerging markets. Also, emerging markets contribute less to the illiquidity of other markets, including other emerging markets.

5.2. Spillover plots

Spillover plots in Figure 3 are based on the DY2009 methodology, using a 200 estimation window VAR and forecast horizons of 2 weeks and 10 weeks.

In Table 4 we see that the Eurozone debt crisis started unfolding on May 25, 2010, when the EU first offered support to Greece. However, by examining the spillover plots, we see that a structural break in the indices took place only the year after, starting around April 6, 2011, when Portugal requested the activation of the aid mechanism. After that date, there was an obvious increase in all the Spillover Indices, with the illiquidity index making the first jump after the return and volatility indices had already moved to a different regime. We see that the crisis was fully over after the EU summit of June 28, 2012, when the spillover indices swiftly started to trend downward.

It is interesting to point out that the turmoil in financial markets caused by the negotiations between Greece and its creditors taking place after the new Greek government came to power at the beginning of 2015 is showing again in the spillover indices, which seem to display a very similar behavior to that observed during the Eurozone debt crisis. Most strikingly, although the return and volatility spillover indices are still at lower levels than before, the illiquidity index is already higher than the previous peak. This suggests that the illiquidity spillover index could be this time a leading indicator for the other two. Further research is needed to confirm this finding and to understand the economic forces that cause liquidity to behave differently from the last crisis episode.

Figure 3

DY2009 Spillover indices at 10-week and 2-week forecast horizon, based on 200-week VAR estimation windows

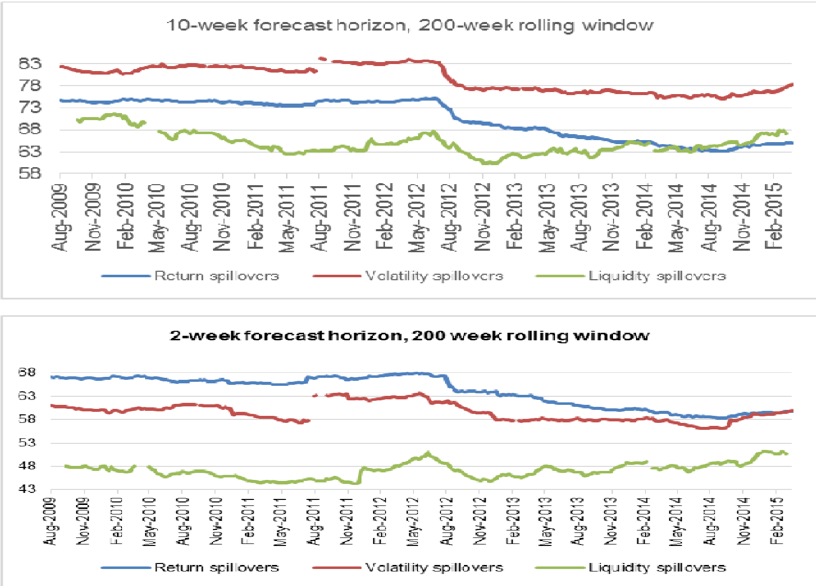


Table 4

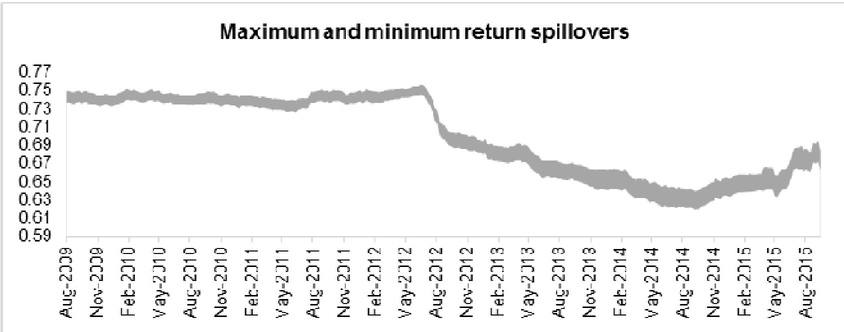
Significant events during 2010-2012

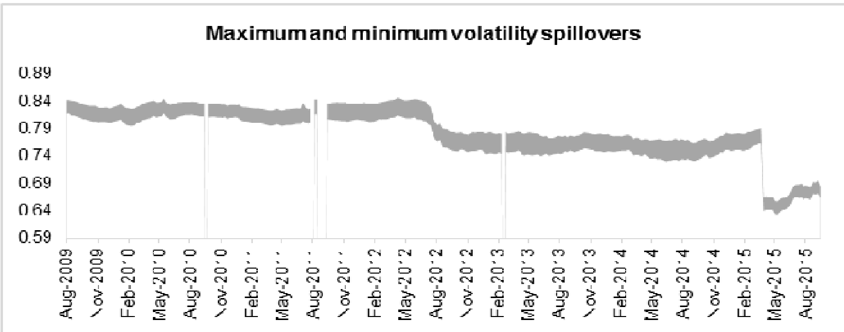
Date	Event
25-Mar-2010	EU offers support to Greece
10-May-2010	EU sets up the EFSF; ECB starts SMP
22-Nov-2010	Ireland seeks financial support
06-Apr-2011	Portugal requests activation of the aid mechanism
15-Jul-2011	EBA bank stress test results are published
06-Oct-2011	ECB announces second covered bond purchase programme
08-Dec-2011	ECB lowers interest rates by 25bps
22-Dec-2011	LTRO I
01-Mar-2012	LTRO II
10-May-2012	Spain seizes control of Bankia
18-Jun-2012	G20 summit
28-Jun-2012	EU summit

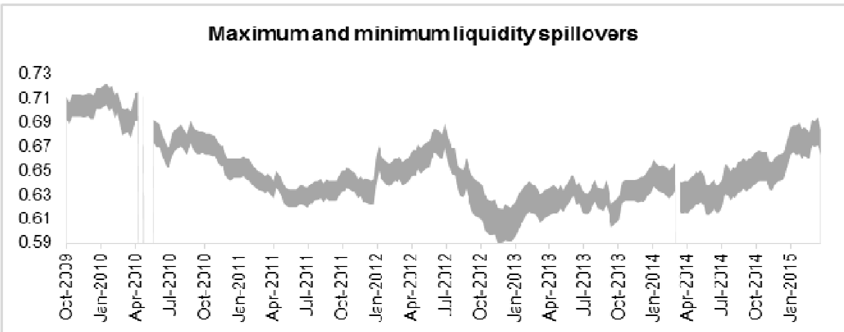
Source: Alter and Beyer (2014)

Figure 4

DY2009 minimum and maximum spillovers based on randomly rotated orderings, forecast horizon 10 weeks







5.3. Robustness

The spillover indices in Figure 3 are computed using the DY2009 methodology, which is based on a simple VAR variance-decomposition that depends on the ordering of variables in the VAR. We therefore check whether the results are robust to variations with respect to the ordering of the VAR and the forecast horizon.

We fix the estimation window width at 200 because, on the one hand, the VAR becomes unstable at small widths (has explosive roots) and on the other, any larger window would smooth out most interesting variations in spillovers.

In Figure 4 we illustrate the maximum and minimum volatility spillovers across a variety of alternative VAR orderings, using the fixed window size of 200 weeks and a forecast horizon of 10 weeks. The procedure checks for fifty randomly-chosen orderings. As expected, the results show that all spillover indices are robust to order variation.

6. Conclusions

The Eurozone debt crisis of 2010-2012 has been an important episode in the recent history of European financial markets, with consequences that extended to all European Union member states and beyond. The purpose of this paper has been to analyze the spillovers in equity markets caused by the Eurozone debt crisis and to draw conclusions regarding the nature of these spillovers between emerging and developed markets.

Our analysis is based on the methodology of Diebold and Yilmaz (2009) and Diebold and Yilmaz (2011), but differs from theirs in important respects. We model nominal returns instead of real returns, use local currencies instead of a fixed currency, estimate weekly volatility based on a GARCH approach, and, most importantly, we measure spillovers in illiquidity in addition to spillovers in volatility and returns.

The analysis revealed that, while emerging equity markets are reasonably well integrated in the European financial system, they are more likely spillover takers than givers, especially in what regards illiquidity, which makes them vulnerable to shocks originating in the more advanced economies. Given the Greek debt crisis that has grown in intensity from the beginning of 2015, it is important to understand the likelihood and the consequences of another crisis episode. Our results indicate that, when combined with a volatility spillover index, an illiquidity spillover index could help identify more precisely such episodes.

7. Acknowledgement

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Reference

1. Acharya, Viral V., Lasse Heje Pedersen, Thomas Philippon, and Matthew P. Richardson. "Measuring systemic risk." (2010).

2. Adrian, Tobias, and Markus K. Brunnermeier. CoVaR. No. w17454. National Bureau of Economic Research, 2011.
3. Allen, Franklin, and Douglas Gale. "Financial contagion." Journal of political economy 108.1 (2000): 1-33.
4. Alter, Adrian, and Andreas Beyer. "The dynamics of spillover effects during the European sovereign debt turmoil." Journal of Banking & Finance 42 (2014): 134-153.
5. Baur, Dirk G., and Renée A. Fry. "Multivariate contagion and interdependence." Journal of Asian Economics 20.4 (2009): 353-366.
6. Bubák, Vít, Evžen Kočenda, and Filip Žikeš. "Volatility transmission in emerging European foreign exchange markets." Journal of Banking & Finance 35.11 (2011): 2829-2841.
7. Diebold, Francis X., and Kamil Yilmaz. "Measuring financial asset return and volatility spillovers, with application to global equity markets*." The Economic Journal 119.534 (2009): 158-171.
8. Diebold, Francis X., and Kamil Yilmaz. "Better to give than to receive: Predictive directional measurement of volatility spillovers." International Journal of Forecasting 28.1 (2012): 57-66.
9. Diebold, Francis X., and Kamil Yılmaz. "On the network topology of variance decompositions: Measuring the connectedness of financial firms." Journal of Econometrics 182.1 (2014): 119-134.
10. Ehrmann, Michael, Marcel Fratzscher, and Roberto Rigobon. "Stocks, bonds, money markets and exchange rates: measuring international financial transmission." Journal of Applied Econometrics 26.6 (2011): 948-974.
11. Forbes, Kristin J., and Roberto Rigobon. "No contagion, only interdependence: measuring stock market comovements." The journal of Finance 57.5 (2002): 2223-2261.
12. Gallo, Giampiero M., and Edoardo Otranto. "Volatility spillovers, interdependence and comovements: A Markov Switching approach." Computational Statistics & Data Analysis 52.6 (2008): 3011-3026.
13. Glosten, L. R., R. Jagannathan, and D. E. Runkle. "On the Relation between the Expected Value and the Volatility of the Nominal Excess Return on Stocks." The Journal of Finance. Vol. 48, No. 5, 1993, pp. 1779–1801.
14. Koop, Gary, M. Hashem Pesaran, and Simon M. Potter. "Impulse response analysis in nonlinear multivariate models." Journal of Econometrics 74.1 (1996): 119-147.
15. Pesaran, H. Hashem, and Yongcheol Shin. "Generalized impulse response analysis in linear multivariate models." Economics letters 58.1 (1998): 17-29.

Table 1. Descriptive statistics of weekly nominal returns of the full 10-year sample (period 04 Apr 2005 – 06 Apr 2015).

	Austria	Belgium	Cyprus	Estonia	Finland	France	Germany	Greece	Ireland	Italy	Lithuania	Luxemburg	Malta
Mean	0.0%	0.1%	-0.3%	0.0%	0.1%	0.1%	0.1%	-0.3%	0.0%	0.0%	0.1%	0.2%	0.1%
Min.	-17.4%	-14.7%	-23.7%	-19.7%	-16.5%	-13.9%	-16.8%	-22.4%	-18.0%	-13.3%	-15.0%	-7.8%	-7.5%
Max.	15.3%	15.9%	17.0%	15.7%	13.7%	13.6%	11.6%	15.4%	16.1%	12.3%	14.2%	6.6%	10.8%
Skewness	-1.02	-0.94	-0.57	-0.69	-0.44	-0.47	-0.85	-0.42	-0.81	-0.39	-0.82	-0.36	0.34
Kurtosis	8.69	9.72	5.67	8.26	5.80	6.07	7.36	4.66	7.83	5.04	11.13	4.54	7.57
St. dev	3.2%	2.9%	4.8%	3.4%	3.3%	2.8%	2.7%	4.6%	3.4%	3.1%	2.6%	1.9%	1.9%

	Netherlands	Portugal	Slovenia	Spain	Bulgaria	Croatia	Czech Republic	Denmark	Hungary	Poland	Romania	Sweden	UK
Mean	0.1%	0.0%	0.0%	0.1%	-0.1%	0.1%	0.1%	0.2%	0.0%	0.1%	0.1%	0.2%	0.1%
Min.	-14.9%	-14.9%	-12.9%	-17.8%	-18.1%	-17.9%	-21.3%	-21.6%	-18.8%	-13.0%	-34.4%	-15.3%	-13.5%
Max.	13.3%	11.7%	9.6%	13.1%	12.4%	11.4%	12.4%	16.7%	27.6%	12.7%	19.0%	15.5%	14.2%
Skewness	-0.82	-0.84	-0.93	-0.49	-0.85	-0.98	-1.12	-1.31	0.29	-0.55	-1.13	-0.27	-0.42
Kurtosis	7.26	6.37	8.14	5.89	8.00	10.44	10.91	12.21	11.70	5.51	14.27	7.10	7.50
St. dev	2.9%	2.9%	2.4%	3.1%	3.4%	2.7%	2.9%	3.0%	3.6%	3.0%	4.3%	3.1%	2.6%

Table 2. Descriptive statistics of conditional standard deviation (volatility) of weekly nominal returns (period 04 Apr 2005 – 06 Apr 2015), estimated using GJR-GARCH models.

	Austria	Belgium	Cyprus	Estonia	Finland	France	Germany	Greece	Ireland	Italy	Lithuania	Luxemburg	Malta
Mean	2.8%	2.5%	4.6%	3.2%	3.2%	2.6%	2.5%	4.3%	2.9%	2.8%	2.4%	2.0%	1.8%
Min.	1.4%	1.3%	1.0%	1.2%	1.7%	1.2%	1.3%	2.0%	1.6%	1.4%	1.0%	1.0%	1.1%
Max.	10.9%	10.5%	14.0%	7.6%	7.8%	7.0%	7.8%	8.1%	9.1%	7.2%	7.1%	5.0%	4.5%
Skewness	2.70	2.88	0.81	0.58	1.39	1.41	2.01	0.22	1.99	1.34	2.06	1.71	1.69
Kurtosis	13.11	14.17	4.24	2.94	4.58	5.19	8.58	2.64	7.73	5.53	8.24	7.08	6.88
St. dev	1.3%	1.2%	2.1%	1.4%	1.2%	1.0%	0.9%	1.3%	1.3%	0.9%	1.0%	0.6%	0.6%

	Netherlands	Portugal	Slovenia	Spain	Bulgaria	Croatia	Czech Republic	Denmark	Hungary	Poland	Romania	Sweden	UK
Mean	2.6%	2.6%	2.2%	2.8%	3.4%	2.4%	2.7%	2.6%	3.2%	2.8%	4.1%	2.8%	2.3%
Min.	1.2%	1.3%	1.2%	1.6%	1.4%	0.8%	1.9%	1.6%	2.0%	1.8%	1.7%	1.3%	1.0%
Max.	9.7%	8.0%	5.5%	6.5%	9.7%	9.7%	9.5%	11.0%	10.6%	7.0%	16.7%	8.0%	7.0%
Skewness	2.41	1.67	2.14	0.95	1.42	2.10	3.40	3.04	3.07	1.57	2.54	1.52	1.77
Kurtosis	10.64	7.17	8.75	4.10	6.14	8.70	21.95	16.36	17.68	6.39	13.53	5.36	6.89
St. dev	1.2%	0.9%	0.6%	0.8%	1.3%	1.4%	0.8%	1.1%	1.0%	0.8%	1.9%	1.1%	0.9%

Table 3. Descriptive statistics of weekly Amihud illiquidity measure (period 04 Apr 2005 – 06 Apr 2015)

	Austria	Belgium	Cyprus	Estonia	Finland	France	Germany	Greece	Ireland	Italy	Lithuania	Luxemburg	Malta
Mean	0.07	0.09	0.58	0.37	0.26	0.05	0.11	0.59	0.48	0.07	0.38	5.66	0.59
Min.	0.01	0.02	0.03	0.03	0.04	0.01	0.01	0.05	0.05	0.01	0.05	0.14	0.03
Max.	0.28	0.29	2.80	5.68	1.40	0.41	0.36	2.49	2.63	0.48	1.68	47.64	11.86
Skewness	1.52	1.28	1.39	5.26	1.69	4.08	1.22	1.30	1.90	2.65	1.66	3.22	6.37
Kurtosis	6.54	5.13	5.18	39.58	9.23	43.62	4.47	5.37	7.98	15.12	6.39	16.42	63.01
St. dev	0.04	0.05	0.47	0.52	0.15	0.03	0.07	0.37	0.39	0.05	0.27	6.45	0.91

	Netherlands	Portugal	Slovenia	Spain	Bulgaria	Croatia	Czech Republic	Denmark	Hungary	Poland	Romania	Sweden	UK
Mean	0.15	0.47	48.21	0.05	4.89	0.53	0.18	0.08	0.16	0.10	1.31	0.19	0.03
Min.	0.03	0.04	3.03	0.01	0.19	0.03	0.02	0.01	0.02	0.01	0.14	0.02	0.00
Max.	0.59	2.44	327.59	0.28	63.16	2.39	0.86	0.28	0.49	0.49	6.15	0.66	0.11
Skewness	1.53	1.64	2.39	2.17	3.82	1.48	1.50	1.31	0.96	1.75	1.66	0.97	1.00
Kurtosis	5.92	6.49	14.34	12.23	33.26	6.32	5.61	5.06	4.27	7.20	6.09	3.83	4.10
St. dev	0.09	0.39	33.38	0.03	5.26	0.36	0.13	0.05	0.08	0.07	1.00	0.12	0.02

Table 5. DY2011 Spillover table, weekly Amihud index, period 04 Apr 2005 – 06 Apr 2015

	OE	BG	CP	ET	FN	FR	BD	GR	IR	IT	LN	LX	MT	NL	PT	SJ	ES	BL	CT	CZ	DK	HN	PO	RM	SD	UK	From Others
OE	23.9	4	1.2	1.2	3.7	5.4	3.6	2.7	0.6	5.3	1.2	0.3	0.7	6.9	4.8	3.3	7.9	0.3	0.3	0.9	2.4	3.1	1.7	0.3	7.5	6.9	76
BG	4.7	23	0.1	0.9	3.6	8.8	10.5	2.2	2.4	6.3	0.2	1.1	0.2	5.1	1.6	2.9	6.2	0.2	0.2	0.9	4.4	2.1	2.3	0.6	4.6	4.8	77
CP	1.7	0.2	66.3	0.3	1.1	2.2	2.3	6.7	0.9	0.6	0.3	0.4	0.1	1.3	5.5	0.8	1.8	0.6	0.6	0.3	0.4	0.3	0.2	1.4	0.6	3.1	34
ET	1.7	1.5	0.2	69.5	0.3	0.7	0.8	1.2	0.8	1.9	0.5	1.7	0.3	1.4	0.5	1.1	1.1	0.6	3.3	0.2	0.6	3	5.6	0.5	0.2	0.9	31
FN	3.3	3.3	1	0.1	21.7	10.1	4.5	1.2	2.9	5.6	0.2	0.2	0.4	11.1	4.6	2.1	4.9	0.1	0.1	0.4	4.6	1	1.2	0.5	7.3	7.4	78
FR	4	5.2	1	0.1	7.2	13.9	6.3	2.1	3.8	7.7	0.2	0.4	0.5	10	4	2.1	7.7	0.2	0.3	0.2	4.4	1.5	1.5	0.7	6.9	7.9	86
BD	3.1	9.1	1	0.3	5.2	9.4	22.7	1.5	2.9	6.2	0.2	0.8	0.3	7.3	2.2	2.5	5.2	0.3	0.2	0.7	3.2	1.6	2.5	1.2	4.8	5.6	77
GR	2.4	2.8	3.1	0.6	3	5.4	2.8	29.3	3.6	4	0.5	1.1	2.6	4.1	6.2	3.5	6	1.3	0.8	0.4	2.4	2.6	1.4	2.3	4.4	3.3	71
IR	1.1	2.6	1.2	0.4	5.4	7.6	4	4.3	25.2	3.9	0.1	2.7	1.1	6.6	5.3	2.9	3.9	0.3	0.7	0.4	8.3	0.4	1	1.7	5.9	3.1	75
IT	4	4.4	0.6	0.5	4.8	9.7	6.5	2	3.2	16.1	0.2	0.3	0.4	10.3	4.4	2.3	6.7	0.1	0.2	0.4	3.9	1.6	3.2	0.5	7.8	5.7	84
LN	3.4	1.8	0.6	0.7	3.6	4.8	2.8	0.5	1.7	3.7	47.3	0.2	0.2	6.5	1.3	2.1	5.3	0.4	0.5	0.2	2	1.1	0.4	0.6	3.9	4.2	53
LX	1.1	4.4	0.1	1.2	2.6	3.6	3.8	2.5	9	1.3	0.1	43.5	0.8	1.2	2.2	3.9	2.5	0.4	0.9	0.1	6.6	0.9	0.2	1.9	3.1	2.1	56
MT	1.4	0.9	0.1	2.6	0.6	1.1	0.7	1.3	0.8	0.7	0.2	0.7	68.9	2	4.5	0.4	5.1	0.2	0.7	0.1	1.1	1.5	0.3	0.1	3.4	0.6	31
NL	4.4	3.4	1.1	0.2	7.5	10	5.4	2.2	3.7	6.5	0.2	0.3	0.7	17.8	5.6	2.7	5.3	0.2	0.2	0.3	4.6	1.1	2	1	7	6.7	82
PT	4.5	1.8	2.3	0.3	5	5	3	4.8	3.7	3.6	0.4	0.1	1.4	8.7	26.9	4.3	4.9	0.4	0.2	0.4	4.5	1.3	1.2	1.4	4	5.9	73
SJ	4	1.1	0.7	0.5	4.9	3.5	2.4	2.2	3.6	1.4	0.8	1	0.8	4.7	6	44.8	1.8	0.8	0.3	0.3	3.6	1.8	0.6	2.2	3.3	3	55
ES	6.3	4.4	0.7	0.7	4.2	8.7	4.4	4	2.5	6.5	0.5	0.7	1.4	6.8	5.9	1.9	19.9	0.1	0.2	0.1	3.4	2.4	1.6	0.7	6	5.8	80
BL	0.3	0.9	0.8	0.2	5.2	7.1	1.9	1.3	1.9	7.3	0.5	0.1	0.1	6.8	0.5	1.3	3	47.6	1.7	0.2	2	2.5	1	1	3.2	1.4	52
CT	1.1	1	0.5	3	0.5	1	1.2	1.1	0.6	1.2	1.4	0.9	0.4	0.6	0.6	0.8	0.4	2.2	75.7	0.3	0.3	0.4	3.1	0.6	0.3	0.7	24
CZ	2.6	1.3	2.9	0.9	1.9	2.6	6.2	0.4	0.8	3.9	3.1	0.2	0.1	2.6	0.8	0.6	3.6	0.6	0.6	51.1	0.6	2.3	0.9	0.3	4.3	5.1	49
DK	4.1	4.6	1.2	0.3	6	7.3	4	2.8	5.1	3.7	0.5	1	0.4	8.5	7.3	3.8	4.2	0.2	0.4	0.2	17.8	0.5	2.5	2.3	5.4	5.8	82
HN	3.9	4.8	1.5	1.4	2.5	5.6	5.3	3.3	2.1	5.1	0.8	1	1.2	5.1	2.1	2.3	5.4	0.1	0.6	0.6	2.1	31	2.1	0.2	5.7	4.2	69
PO	3.6	4.8	0.4	2.3	1.9	4.9	6	2.5	2.1	7.7	1.6	0.7	0.2	6.7	1.4	1.7	2.5	0.8	1.5	0.4	2.5	1.5	37.3	0.9	2.4	1.4	63
RM	0.9	0.9	3.3	1.6	1.3	2.9	1.5	4.7	6.9	1.3	0.1	1	0.7	2.7	4.2	1.5	2	0.8	1	0.3	3	0.3	0.7	52.1	1.1	2.8	48
SD	4.7	3.5	2.4	0.1	5.5	7.4	5	2.2	3.3	6.3	0.7	0.8	2.3	7.9	4.3	2	8.1	0.1	0.3	0.6	4.5	1.6	1.1	0.3	17.1	7.9	83
UK	5.6	4	2.7	0.2	5.7	8.4	4.8	2.2	2.7	4.3	0.7	0.5	0.6	8.2	6.2	3.5	5.7	0.1	0.3	0.3	4.1	1.2	1.1	0.9	7.7	18.7	81
Contribution to others	78	77	31	21	93	143	100	62	72	106	15	18	18	143	92	57	111	11	16	9	80	37	39	24	111	106	1671
Contribution incl. own	102	100	97	90	115	157	122	91	97	122	63	62	87	161	119	101	131	59	91	60	97	68	77	76	128	125	64.30%

Table 6. DY2011 Spillover table, weekly nominal returns, period 04 Apr 2005 – 06 Apr 2015

	OE	BG	CP	ET	FN	FR	BD	GR	IR	IT	LN	LX	MT	NL	PT	SJ	ES	BL	CT	CZ	DK	HN	PO	RM	SD	UK	From Others
OE	8.3	5.3	2	2	5	6	5.6	2.7	4.6	5.5	1.7	2.5	0.1	6.2	4.1	1.6	4.8	0.9	1.4	2.7	4.6	3.7	4.1	3.5	5.3	5.8	92
BG	5.7	9	1.9	2.1	4.4	6.2	5.6	2.3	5.3	5.2	1.5	2.5	0.2	6.8	4	1.6	4.9	0.6	1.6	2.3	5.4	3.3	3.2	3	5.4	5.9	91
CP	4.5	3.9	18	1.3	3.6	4.6	3.7	6.1	3.4	4.5	1.6	1.4	0.3	4.5	3.5	2.4	4.6	1.2	1.7	3	3.3	3.1	4.2	3.4	3.8	4.1	82
ET	5.4	4.6	1.6	16.3	4.4	4.3	3.9	1.4	3.7	3.4	6.5	2.7	0.4	4.8	2.4	2.6	3.3	1.4	1.9	2.5	4.6	3.3	3	3.3	3.6	4.5	84
FN	5.6	4.6	1.8	1.9	9.1	6.8	6.4	2.4	4.2	5.8	1.3	2.3	0.3	6.3	4.1	1.3	4.9	1	1.3	2.4	5.1	2.8	3.1	2.4	6.2	6.4	91
FR	5.5	5.3	1.9	1.6	5.6	7.7	6.5	2.4	4.5	6.4	1.1	2.4	0.2	6.6	4.5	1.3	5.7	0.7	1.3	2.3	4.8	3.1	3.6	2.7	5.9	6.4	92
BD	5.6	5.1	1.7	1.6	5.7	7.1	8.3	2.3	4.5	5.9	1.1	2.6	0.3	6.8	4.2	1.3	5	0.6	1.3	2.2	4.9	3.1	3.7	2.4	6.3	6.4	92
GR	5.2	4.1	5.4	1.2	4.2	5.1	4.3	15.6	3.5	5.9	1.3	1.4	0.1	4.7	5.3	1.5	5.3	0.5	0.9	2.7	3.7	2.9	4.1	2.7	3.9	4.5	84
IR	5.7	6.3	1.8	1.5	4.7	6.2	5.7	2.3	10.4	5	1.1	3.1	0.1	6.7	3.8	1.3	4.5	0.6	1.3	2	5.2	3.1	3	2.8	5.5	6.2	90
IT	5.6	5	2.1	1.5	5.3	7.1	6.1	3.2	4.1	8.6	0.9	2.3	0.2	6.4	5.1	1.3	6.5	0.7	1.1	2.1	4.4	3.1	3.4	2.6	5.3	6	91
LN	5.7	3.9	2.3	8.4	4.2	3.7	3.1	2.2	3.5	2.7	20.7	2.6	0	4.2	2.2	1.9	2.6	1.9	1.8	2.5	3.5	2.9	3.4	3.2	2.9	3.8	79
LX	5.2	4.9	1.3	1.7	4.5	5.7	5.3	1.5	5.5	4.6	1.3	17.8	0.1	6	3.6	1	3.5	1.3	0.9	1.3	4	3.1	3.2	2.6	5	5.1	82
MT	2.2	1.3	1.1	1.5	1	1.4	1.9	0.4	2	1.9	0.9	1.5	65	1.9	1.6	0.8	1.5	0.8	0.7	1.7	2	1.3	1.1	1.8	1.3	1.7	35
NL	5.8	5.9	1.9	1.7	5.3	6.7	6.3	2.3	5	5.8	1.1	2.8	0.3	7.7	3.8	1.5	4.9	0.7	1.5	2.3	4.8	3.3	3.6	2.7	5.8	6.4	92
PT	5.4	4.8	2.2	1.5	4.9	6.4	5.5	3.8	4	6.6	1.1	2.4	0.1	5.5	11.2	1.4	6.6	0.9	1	2	4.8	2.7	2.9	2.3	4.7	5.4	89
SJ	4.7	3.7	3	3.1	3.4	3.7	3.4	2.3	3.3	3.4	2	1.6	0.3	4.4	2.8	21.3	2.9	2	4.6	3	4.9	2.5	3.1	4.2	2.7	3.7	79
ES	5.4	5.1	2.4	1.7	4.9	6.9	5.7	3.1	4	7.1	1	1.8	0.1	5.9	5.6	1.3	9.4	0.6	1.3	2.4	4.2	3.2	3.3	2.8	5	5.6	91
BL	4.4	2.3	2.9	1.9	3.7	3.3	2.7	1.7	2.5	2.8	2.2	2.8	0.2	3.8	3.6	3.2	2.3	30.3	1.6	2.9	4	2.1	3	2.6	2.9	4.1	70
CT	4.2	4.3	2.4	2.8	3.7	4.1	3.5	1.6	3.5	3.2	1.9	1.4	0.5	4.8	2.2	4.7	3.2	1.6	22.1	3.1	4.1	3	2.5	3.6	3.5	4.6	78
CZ	5.2	3.9	2.5	1.7	3.9	4.6	4.2	2.8	3.1	3.8	1.4	1.6	0.2	4.5	2.8	2.2	4	1.2	1.8	15.6	5	4.9	5.7	4.7	4.1	4.6	84
DK	5.3	5.7	1.8	2.4	5.1	5.9	5.6	2.1	4.8	4.9	1.5	2.3	0.3	5.9	4.1	2.3	4.2	1.1	1.7	3.1	9.8	2.8	2.9	2.8	5.7	5.8	90
HN	5.7	4.8	2.1	1.7	4	5.3	4.8	2.4	3.9	4.8	1.2	2.3	0.3	5.5	3.2	1.2	4.5	0.6	1.3	4.1	4	13.1	5.6	3.8	4.7	5.2	87
PO	5.8	4.3	2.7	1.3	4	5.6	5.3	3.1	3.4	4.7	1.5	2.2	0.3	5.4	3.1	1.5	4.2	0.9	1.2	4.4	3.6	5.3	11.8	3.5	5.3	5.6	88
RM	6	4.6	2.5	2.2	3.5	4.8	4	2.5	3.7	4.3	1.9	2.7	0.2	4.8	2.9	2.7	3.9	1.3	2	4.1	3.9	4.8	4.4	13.5	4	4.8	87
SD	5.5	5.3	1.8	1.6	5.7	6.7	6.6	2.1	4.5	5.4	1	2.6	0.2	6.5	3.7	1.2	4.7	0.7	1.5	2.4	5.3	3.2	3.9	2.6	8.9	6.5	91
UK	5.6	5.3	1.8	1.8	5.5	6.7	6.2	2.3	4.7	5.7	1.2	2.3	0.2	6.6	4	1.4	4.9	0.9	1.6	2.4	4.9	3.2	3.8	2.9	6	8	92
Contribution to others	131	114	55	52	110	135	122	61	99	119	40	56	5	136	90	45	107	25	38	66	109	80	88	75	115	129	2203
Contribution incl. own	139	123	73	68	119	143	130	77	110	128	60	74	70	143	101	66	117	55	61	82	119	93	100	88	124	137	84.70%

Table 7. DY2011 Spillover table, weekly conditional volatility, period 04 Apr 2005 – 06 Apr 2015

	OE	BG	CP	ET	FN	FR	BD	GR	IR	IT	LN	LX	MT	NL	PT	SJ	ES	BL	CT	CZ	DK	HN	PO	RM	SD	UK	From Others
OE	9.3	5.7	0.3	1.8	6.4	6.2	6.1	2.5	6.4	5.2	1.4	4.1	0	7.8	4.4	0.9	3.7	0	0.2	3	5.2	2.1	3.5	0.5	6.1	7	91
BG	6.5	9.5	0	1.8	5.4	6.8	6	2.3	6.3	5	1.6	3.5	0.1	8.6	4.3	1.7	4.6	0.1	0.4	3	5.1	1.8	3.2	0.2	5.4	7	91
CP	8	3.8	29	3	8.1	2.9	3.3	0.7	4.6	2.1	4.3	0.5	0.4	6.3	2.3	0.2	1.3	0.2	0.2	1.7	4.7	0.5	1.5	2.7	3.9	4.4	71
ET	7	5	0.4	14	4.3	4.3	4.9	0.9	7.2	3.1	6.5	6.4	0.3	6.3	3.1	0.9	2.6	0.6	0.7	2.4	4.6	1	3.1	0.7	4.1	5.6	86
FN	6.5	4.5	0.3	1	11	7.3	7.2	1.9	5.5	6.3	1	2.9	0	8	3.8	0.5	5.1	0	0.3	2.6	5.1	1.4	2.5	0.6	7.4	7.6	89
FR	6.1	5.9	0	1.2	6.7	8.9	7.6	2.4	5.2	6.8	0.7	2.1	0	8.3	4.8	0.7	6	0	0.3	2.4	4.7	1.8	2.5	0.4	6.7	7.7	91
BD	6.7	5.6	0.2	1.5	7	7.6	9	2.1	5.3	6	1.2	2.6	0	8	4.4	0.6	4.7	0	0.3	2.4	5	1.8	3.1	0.7	6.9	7.4	91
GR	6.8	4.9	0	1.1	5.5	5.4	4.8	14	5.2	6	1.2	3.7	0	6.6	6.8	1	4.8	0	0.2	2	5.5	2.1	2.3	0.1	3.6	6	86
IR	6.1	6.3	0.5	1.9	5.5	6.4	5.3	1.5	14	4.6	1.2	5.9	0.3	7.7	4.3	1.5	3.4	0.1	0.2	2	5.2	1.3	2	0.1	5.5	6.9	86
IT	5.6	5.2	0	1	6.9	8.2	7.2	3	5.3	9.5	0.6	2.2	0	8.4	5.1	0.7	7	0.1	0.3	2.4	4.8	1.7	1.9	0.4	5.6	7.1	90
LN	6.5	3.3	0.7	7.9	3.6	1.7	4.1	0.7	6.1	1.5	26	10	0.2	4.6	2.3	1.4	0.6	1.4	1.6	2.4	4.9	0.4	1.8	0.5	2.8	3.2	74
LX	6.1	4	0.1	1.2	5.8	5.7	6.3	1.2	8.4	5.6	0.6	19	0	6.5	4.1	1.5	4	0.1	0.3	2.1	4.8	1.3	1.7	0.2	3.9	5.4	81
MT	0.8	0.7	0.2	0.9	0	0.2	0.5	1.1	0	0.4	0.2	3.4	80	0.5	0.4	0.1	0.2	2	0.4	0.3	2.3	2.4	0.6	0.9	0.8	0.4	20
NL	6.5	6.6	0.1	1.5	6.6	7.4	6.8	2.2	6.6	5.8	1.2	3.5	0	9.5	3.9	0.9	4.7	0	0.2	2.7	5.1	1.6	2.7	0.4	5.9	7.6	91
PT	5.9	6.1	0	1.3	4.8	7.2	5.5	4.4	3.9	7	1.2	2.2	0	7.2	13	1.1	6.2	0.1	0.6	2.5	4.7	1.6	2.9	0.4	4.4	5.9	87
SJ	5.8	5.1	0.6	1.7	4.8	3.8	3.7	0.9	7.4	2.9	2.2	2.5	0	5.7	3.1	19	2.4	0.2	3.9	5	6.9	1.1	3.9	0.1	2.9	4.3	81
ES	5	5.5	0	1.6	6.2	8.6	6.5	3.1	3.8	8.2	0.6	1.9	0.1	8	6	0.9	12	0	0.3	2.1	4.3	1.8	1.7	0.4	5	6.8	88
BL	3.9	2.5	0.4	2.3	3.6	2.1	1.2	0.4	6.1	0.8	5.9	4.9	1.3	2.9	0.9	2.4	0.4	43	3.4	2.7	2.5	0.2	1.2	0.7	1.7	3.1	57
CT	4	3.7	0.1	1.8	4.3	3.6	3	0.8	5.6	2.7	1.8	3	1.1	4.9	2.7	6.7	2.7	1.4	19	4.6	6.2	2.6	6.7	0.1	2.4	4.5	81
CZ	6.8	5.3	0.1	1.7	4.9	5.1	5.1	1.8	6	4.3	1.2	5.2	0.1	6.4	2.2	1.7	3	0	0.5	12	5.7	3.7	5.3	0.3	5.6	5.9	88
DK	6.5	5.7	0.2	2	6.4	6.2	6.3	2.2	6.4	5.7	1.5	3.3	0	8	4	1.3	4.3	0	0.7	3.3	8.5	1.6	2.8	0.4	5.7	7	92
HN	7.5	4.5	0.1	1.5	5.6	5.8	5.4	2.3	6.3	4.5	0.7	4.4	0.2	7.3	2.7	0.6	3.3	0	0.2	4.4	4	12	4.4	0.4	5.5	6.8	88
PO	7.6	5.9	0.1	1.7	5.5	5.8	6.2	1.9	5.4	4.1	1.3	4.9	0	6.7	3.2	0.8	3	0	0.4	4.7	4.4	2.8	9.5	0.2	6.9	6.8	91
RM	6.1	4.7	1.3	2.7	5.1	4.6	4.5	1.5	5.1	4.4	1.6	4	0.2	6.8	3.8	1.6	4.1	0.2	0.5	4.6	5.5	2.6	3.7	11	4.4	5.5	89
SD	7.4	5.6	0.2	1.4	7.1	7.1	7	1.5	6.3	5.5	1	3.6	0.1	7.9	3.9	0.4	4	0	0.2	2.5	5.1	1.6	2.7	0.6	9.9	7.6	90
UK	6.5	5.7	0.1	1.6	7.1	7.6	7.1	2.4	6.1	5.6	1	2.7	0	8.1	4	0.7	4.8	0	0.4	2.6	5.2	1.7	2.9	0.5	6.8	8.8	91
Contribution to others	152	122	6	47	137	138	132	46	140	114	42	93	5	167	91	31	91	7	17	70	122	43	70	13	120	147	2161
Contribution incl. own	162	131	35	61	148	147	141	60	155	124	67	112	85	177	104	50	103	49	36	82	130	54	80	23	130	156	83.10%

FINANCIAL INTEGRATION IN THE EURO AREA AND SMES' ACCESS TO FINANCE: EVIDENCE BASED ON AGGREGATE SURVEY DATA[1]

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Abstract

The paper deals with the issue of access to finance for small and medium-sized enterprises (SMEs) in the euro area and explores whether the linkages among the euro area financial markets do affect the capital structure of the SMEs in the same area. Using a logit model specification, aggregate country-level data and several price and quantity-based measures of financial integration, the results reveal statistically significant positive effects of increased financial markets integration on SMEs' debt ratio. The impact of sovereign debt crisis in GIPSI countries is also investigated and significant evidence of its impact is documented.

Keywords: cross-border loans, interest rate spread, GIPSI, debt ratio

JEL Classification: F36, G15, G32

1. Introduction

This paper aims at exploring the determinants of SMEs' debt ratio – as an expression of their capital structure – by integrating, besides traditional firm-level and even country-level factors, factors acting at the international level. In this way, the paper aims at capturing the impact of linkages among euro area financial markets on SMEs financing decisions. Therefore, the paper is theoretically built on two streams of literature. On one hand, it deals with the issue of financial structure which was traditionally studied by modelling the determinants of leverage. On the other hand, it integrates insights from the literature focusing on (co)integration among financial markets. The previous literature (Lucey and Zhang, 2011; Popov and Ongena, 2011) shows that financial integration does indeed (positively) impacts on firms' financial decisions. However, few recent papers concerned with the issue of SMEs' financial structure, take

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into account the potential effects of financial integration (e.g. Popov and Ongena, 2011).

Thus, there are still opportunities for research that this paper seeks to exploit in a novel manner.

The paper uses aggregate country-level data coming from the European Central Bank' survey on SMEs' access to finance in the euro area (SAFE) for 2009H1-2014H1 and employs a conditional probability model specification. The empirical findings show that the financial markets integration measures significantly impact on the debt ratio of euro area SMEs. Regarding the banking market, the results indicate the positive impact of increased volume of cross-border lending and, additionally, the positive impact of reduction in interest rate spreads (over Germany) to loans granted by monetary financial institutions (MFIs) to non-financial corporations. Increased integration in stock euro area markets seems to be negatively correlated with debt ratio which is according to the expectations.

The paper contributes to the existing literature in several ways. First, it uses recent data which allows exploring the impact of the fragmentation in financial – especially banking – markets brought about by the sovereign debt crisis (see ECB, 2014). Second, aiming at a holistic approach, it considers also the stock market besides the banking market which is usually investigated. Thirdly, the novelty of this study stems from the focus on the SMEs sector given that previous papers usually rely on large (public) firms data.

The paper is structured as follows: the next two sections present relevant findings from the previous literature and the research methodology, respectively; the third section deals with the empirical results and their interpretations while conclusions are given in the last section.

2. Literature review

Compared with the literature on corporate capital structure, in general (Sunder-Shyam and Myers, 1991; Rajan and Zingales, 1995; Frank and Goyal, 2003; and others), research on SMEs' financial structure is relatively new (e.g. Mateev et al., 2013; Lopéz-Gracia and Sogorb-Mira, 2008). Also relatively new is the interest in financial integration which was stimulated by the outbreak of the financial crisis. Other topics stimulated by the recent financial crisis include the investigation of the determinants of long-run sovereign rating (Miricescu, 2014), the assessment of the systemic risk (Cimpoeru, 2015) and even the long-term fiscal sustainability of public sector entities' finances (Kršekova and Pakšiova 2014). The reason why financial integration is important for firms and their access to finance lies in the benefits they are expected to reap from acting on integrated financial markets. According to Lucey and Zhang (2011), these benefits can be hypothesized as follows: broader access to finance; and lower cost of capital. In the present paper the focus is on testing the first of the two alleged benefits

Based on the law of one price, two markets are considered integrated if identical assets are identically priced regardless the geographical location (Yeyati et al., 2009). Bekaert and Harvey (1995) define same-class assets essentially in terms of their risk profile. Concerning the time-varying nature of financial integration, frequently mentioned in literature (Berger and Pozzi, 2013; Kim et al, 2005; and others), previous research has shown that both credit and stock markets followed a consistent trend towards financial integration for more than a decade, among the old as well as the new EU member states (Pungulescu, 2013) and among the Central and Eastern European countries (Gjika and Horváth, 2013; Demian, 2011). Unfortunately, this trend was reversed by the recent financial crisis and Pungulescu (2013) documents that the reversion took place both in credit and capital markets in the old as well as in the new member states. However, the general integration trend resumed since 2012 (ECB, 2014).

Previous literature has showed that financial integration does indeed affect firms' financial decisions. Referring to public firms from emerging markets, Lucey and Zhang (2011) have shown that greater credit markets integration is positively associated with leverage while equity markets integration correlates negatively. Moreover, they show that the positive effects are not equally spread across all firm-size classes with the large firms benefiting more than small firms from increased credit markets integration; similarly, the negative impact on leverage from integration in stock markets is stronger for large firms. Restricting the analysis to small firms, from both old and new EU member states, Popov and Ongena (2011) brought evidence on the positive impact of interbank markets integration on small firms financing through the channels of easier borrowing conditions and lower interest rates.

Firms' financial structure was more than often investigated using debt ratio as a proxy. The driving factors of leverage are usually derived from the theories of capital structure, of which the best known are the trade-off theory and the pecking order theory. For an in-depth description of both theories, see e.g. Sunder-Shyam and Myers (1999). The main purpose of the present paper is not to test any of the capital structure theories but, building on the theoretical framework they represent, to explain the dynamics of the debt ratio for the euro area SMEs by using a set of potential explanatory factors that includes factors derived from these theories. Traditionally, these factors are represented by firm-level characteristics such as (Rajan and Zingales, 1995; de Jong et al., 2008; Wu et al., 2009; Kayo and Kimura, 2011): tangibility or assets structure; growth opportunities; size; profitability; and risk, including bankruptcy risk. In the present paper, firm-level factors are used as control variables but their choice is substantially limited by the nature of the data set. The main focus is instead on variables measuring financial integration. Further research (de Jong et al., 2008; Gungoraydinoglu and Öztekin, 2011; Kayo and Kimura, 2011) has proved that factors at superior levels – industry, country – help explaining the variation in corporate leverage. Hence, investigating the effect of integration in financial markets on (small) firms' leverage seems legitimate and this is where the present paper seeks to make a contribution to the literature.

The specific research hypotheses to be tested in the present paper are built on the recent findings by ECB (2014) and especially Lucey and Zhang (2011) and they will be formally stated in the next section.

3. Research methodology

3.1. Data

The main data set comes from the SAFE survey conducted by the ECB starting with 2009 in order to investigate the evolution of the financing conditions in the euro area in the past six months. The research presented here is based on the first 11 waves of the survey (2009H1-2014H2). The data set contains firm-level data aggregated at country-level for the following 11 euro zone countries: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal and Spain. This data set will be used to construct the dependent variable (change in debt ratio) and proxies for firm-level characteristics (size, age, risk etc.) that will be used as controls. For defining variables measuring financial integration, data retrieved from the ECB and Eurostat is used.

3.2. Variables

The dependent variable was constructed using the information regarding the evolution of the debt ratio reported by firms for the last six months. Since data is aggregated at country level, the shares of firms that reported an increase / a decrease for each country and for each wave of the survey were used to calculate the net percentage as the difference between the share of the firms that reported an increase and the share of the firms that reported a decrease. Next, a dummy variable taking the value of 1 if the net percentage was positive (more firms reported an increase than a decrease) and 0 otherwise was constructed. This will allow using a logit model specification.

Concerning the explanatory variables, several firm-level control variables were defined based on capital structure theories framework. Firstly, two variables (coded SIZE and AGE) were defined as the proportion in the national samples of firms located at the lowest extreme of size and age classes, respectively. For this purpose, information regarding the share of the two smallest (based on turnover brackets) and the two youngest (based on the number of years since registration) classes of firms, respectively, were summed to form the two variables. Their choice is motivated by the alleged greater vulnerability of firms located at these extremes. The capital structure theories suggests that both a positive and a negative correlation between size and leverage could be expected (Rajan and Zingales, 1995; Kayo and Kimura, 2011), the positive correlation being predicted by the trade-off theory while the negative one by the pecking order theory (de Jong et al., 2008). Regarding age, Lopéz-Gracia and Sogorb-Mira (2008) suggest that correlation is predicted to be negative according to the pecking order theory and positive according to the trade-off theory.

In order to capture information about the growth rate, a variable based on the change in turnover (TURN) over the past six months was constructed. Most authors (de Jong et al., 2008; Rajan and Zinagles 1995) agree on a negative expected sign for this variable while others consider that the predicted sign differs according to the theory – negative under the agency theory but positive under the pecking order theory (Kayo and Kimura, 2011). Profitability was included in the analysis through a variable built on the change in profit (PROF) over the past six months. Given that, according to the pecking order theory, more profitable firms need less external funds, a negative correlation is thus predicted (Kayo and Kimura 2011; Wu et al., 2009; de Jong et al., 2008). On the contrary, the trade-off theory predicts a positive correlation (Kayo and Kimura, 2011). An alternative measure used to proxy for firm's access to internal resources was the share of firms that reported the use of internal funds (retained earnings or sale of assets) over the past six months (INTUSE). The impact of the risk of the firm was investigated through using the information contained in the evolution of the firm's credit history (CREDHIST) over the past six months as perceived by the firm itself. It can be thought of as an inverse proxy for the bankruptcy risk. Generally, the theory predicts a negative correlation between operational (Wu et al., 2009; de Jong et al., 2008; Lopéz-Gracia and Sogorb-Mira, 2008) or bankruptcy risk (Kayo and Kimura, 2011) and corporate leverage.

Because the main concern in this paper is related to the impact of financial integration of SMEs' financing decisions which is supposedly highly dependent on the overall economic environment (see ECB, 2014), it becomes interesting to additionally investigate the impact of changes in economic outlook on leverage. To capture this effect, a variable (ECONOUT) was constructed based on the firms responses on the perceived recent evolution of the economy. This variable along with CREDHIST, PROF and TURN were constructed based on the net percentage and then assigned a value ranging from 1 to 4 using the quartiles of their respective distribution in the sample.

Two other demographic variables were included. The first one refers to the economic sector and it was defined using the shares of firms coming from the main four sectors (construction, industry, services and trade). They were regrouped as follows: the first two and the last two. The rationale behind it resides in their greater similarity with respect to the fixed assets intensity. Therefore, firms in construction and industry can be considered as exhibiting higher shares of fixed to total assets compared to firms in the latter two. The results reported here are derived using the sum of the first two shares (SECT). Hence, this variable can convey information about the assets structure of the firms; its influence on leverage is usually predicted to be positive (Kayo and Kimura, 2011; de Jong et al., 2008; Rajan and Zingales, 1995). The second variable refers to the ownership structure (OWNSTOCK) and gives information about the share of the firms in the national samples reporting public shareholders and thus listed on the stock exchange. The effect of this feature was less investigated empirically, at least for SMEs, and has the ability to shed more light on how access to public capital markets influence SMEs' financial decisions given that the presence of such ownership can help alleviate the problems associated with informational opacity, which is considered an intrinsic feature of SMEs (see e.g. Agostino and Trivieri, 2008).

To investigate the impact of financial integration, two types of measures were used following the recommendations in the literature (ECB, 2014; Friedrich et al., 2013): *quantity-based* and *price-based measures*. For the banking markets integration both types were used. The price-based measures are given by the interest rate spread to loans granted to NFCs by euro area MFIs. The spreads are taken over the corresponding value for Germany as in Pungulescu (2013) and Popov and Ongena (2011). Four different interest rates were used, as follows: (1) interest rate to new loans of up to 1 year maturity and up to and including EUR 1 million amount (IRSNLS); (2) interest rate to outstanding loans of up to 1 year maturity and total amount (IRSOLS); (3) interest rate to outstanding loans of over 1 year maturity and total amount (IRSOLL); (4) interest rate to outstanding loans of total maturity and total amount (IRSOLT). The interest rates were taken as averages over the period most close to the period of the survey wave. The second type of measure was the share to quarterly country's GDP of the quarterly cross-border lending (outstanding amounts at the end of the period) to the non-MFI sector by MFIs located in the other euro area countries (CBLOANS_GDP), for the quarters most close to wave of the survey. The same approach was used to proxy for equity market integration applied to data referring to the cross-border holdings of shares and other equities by MFIs located in the other euro area countries towards the unspecified sector counterpart (which usually includes the private sector also) in the reference country (SHARES_GDP).

Consequently, the hypotheses to be tested here are the following:

1. There is positive correlation between the level of cross-border lending by MFIs to NFCs and the SMEs' debt ratio.
2. There is negative correlation between the interest rate spreads on loans by MFIs to NFCs and the SMEs' debt ratio.
3. There is negative correlation between the cross-border holdings of shares by MFIs and the SMEs' debt ratio.

Given that our sample includes the countries (Greece, Italy, Portugal, Spain and Ireland) hit by the sovereign debt crisis, a dummy variable (GIPSI) was included in order to investigate the potential impact that the membership to this group (value 1) could exert on the access to external finance for SMEs. Based on ECB (2014), the sovereign debt crisis is one of the causes that led to fragmentation in the euro area financial markets; thus, firms located in the troubled economies are expected to face tighter conditions when accessing bank finance and a negative correlation with debt ratio is hypothesized.

3.3. Model

The choice of a binary logit model is motivated by the dichotomous nature of the dependent variable. A thorough description of the theoretical underpinnings of the model can be found in Wooldridge (2009, p.574-587) and Stancu (2011, p. 305-319). Essentially, the model will estimate the probability of an increase in SMEs' debt ratio conditioned on the values of the covariates presented above. Obviously, Germany was excluded from all the regressions.

4. Results and discussion

Before presenting the empirical results, the pattern of debt ratio over time as well as across the sampled countries will be described. A pattern of deleveraging describes the SMEs' debt ratio across the whole country sample given that in 2009H1 the average net percentage was positive although small (0.68%) after which it continues on a general trend of decreasing and reaches -12.02% in 2013H2. The first half of 2014 marks a turning point with an average value of -7.95% meaning that the euro area SMEs starting getting more debt to finance their activity. Regarding the pattern across the 11 countries, the data shows that all the non-GIPSI countries exhibit high (absolute) negative average values over the period, which means that they generally deleveraged; Finland reaches the maximum (absolute) average value of -17.34%. Among the GIPSI countries, the pattern is not well defined. Ireland resembles the non-GIPSI group pattern (-7.10%) while the rest of the countries present negative or positive values but close to zero (Portugal -1.94%, Spain -0.27%, Greece +0.57%) or high positive values (Italy +13.96%). This suggests that SMEs in the distressed countries took on more debt than those in the other group, even during the crisis period.

The overall negative trend for the euro area SMEs debt ratio following the outbreak of the financial crisis raises questions about the potential reasons for this evolution. Specifically, it can be asked the question whether the high fragmentation in the euro area financial markets for most of the period under analysis, as documented by the ECB (2014), could explain this adverse evolution and could thus point towards a tightening of the financing conditions for SMEs.

Table 1 presents the results of estimating the model with and without the interest rate spreads given that that they were found to be correlated with the GIPSI dummy variable. Results in table 1 show that all the estimated models are statistically significant given the significant (at 1%) LR statistic. Moreover, they fit well the data as the Hosmer-Lemeshow goodness-of-fit measure highlights; the insignificant statistic means that there are not significant differences between the fitted values and the real values. Also the McFadden R-squared exceeds 73% in all the cases. Some variables (SIZE, PROF and TURN) were dropped out given that they led to high correlations with other variables in the model or that their explanatory power became insignificant (QINTUSE).

Table 1

Results of estimating the baseline models (with / without the interest spreads)

Explanatory variable	Model 1	Model 2 (IRSNLS)	Model 3 (IRSOLS)	Model 4 (IRSOLL)	Model 5 (IRSOLT)
SECT	77.193 (0.007)*	65.594 (0.003)*	67.451 (0.002)*	45.615 (0.046)**	59.038 (0.007)*
AGE	38.954 (0.052)***	20.507 (0.087)***	22.916 (0.043)**	23.841 (0.039)**	23.033 (0.046)**
OWNSTOCK	-73.123 (0.049)**	-50.160 (0.089)***	-52.528 (0.067)***	-42.411 (0.124)	-46.289 (0.101)
INTUSE	11.627 (0.036)**	-	-	-	-
CREDHIST	-4.352 (0.014)**	-6.261 (0.001)*	-6.529 (0.001)*	-6.583 (0.001)*	-6.488 (0.001)*
ECONOUT	1.138 (0.178)	0.937 (0.158)	1.241 (0.080)***	1.302 (0.088)***	1.274 (0.080)***
SHARES_GDP	-207.326 (0.029)**	-168.907 (0.009)*	-186.142 (0.007)*	-180.273 (0.008)*	-185.873 (0.006)*
CBLOANS	40.582 (0.021)**	38.386 (0.007)*	41.516 (0.005)*	38.581 (0.006)*	40.540 (0.005)*
IRspread	-	-94.762 (0.082)***	-83.701 (0.143)	-299.233 (0.086)***	-158.404 (0.117)
GIPSI	8.290 (0.056)***	-	-	-	-
c	-38.424 (0.012)**	-17.053 (0.024)**	-18.945 (0.011)**	-13.137 (0.105)	-16.782 (0.032)**
McFadden R-sq.	0.767	0.742	0.731	0.744	0.735
LR statistic (Probab.)	92.320 (0.000)	89.236 (0.000)	87.893 (0.000)	89.532 (0.000)	88.393 (0.000)
H-L Statistic (Probab. Chi-sq.)	0.359 (1.000)	3.439 (0.904)	5.868 (0.662)	2.305 (0.970)	2.407 (0.966)

Source: author's own analysis; () p-values; *, **, *** - significant at 1%, 5%, 10%.

Regarding the significance of individual variables, it can be seen that they are significant at the conventional levels of significance (1%, 5%, 10%) except for the OWNSTOCK (models 4 and 5), ECONOUT (models 1 and 2) and the interest spreads (models 3 and 5). Thus, the evolution of SMEs' debt ratio is influenced both by firm-level factors as well as country- and international level factors including financial integration measures. The specific impact of the firm-level factors is next discussed.

The age of the firms seems to significantly matter in their financial decisions in the sense that younger firms (less than ten years here) take on more debt. This can be due to the fact that younger firms have less internal funds to rely on and thus they need to use more debt. When the share of older firms (10 years or more here) is considered, age and debt ratio are negatively correlated. This finding can bring support to the negative correlation between age and debt hypothesized by the pecking order theory (Lopéz-Gracia and Sogorb-Mira, 2008). It is interesting that all the variables become more significant when the share of young firms is considered, especially the financial integration measures.

The positive strong correlation between the cumulative share of SMEs in construction and industry and leverage confirm that their assets structure is more fixed-assets intensive than in the other two sectors so that their stronger tangibility eases access to debt. The positive impact found in Kayo and Kimura (2011) and others is thus confirmed for euro area SMEs. When the share of the other two sectors is included, the correlation with leverage becomes negative; all other results hold.

Regarding the ownership structure, its negative impact is not highly significant across all the models; however, it can still indicate that SMEs being listed on stock exchange are less leveraged, possibly suggesting that they are less financially constraint so that they can access public capital markets more easily and thus substitute equity financing for debt financing, although in most sampled countries less much than 10% of SMEs reported such ownership. Firms that reported having used internal sources are more prone to use debt, given the significant positive coefficient for INTUSE. This finding could be taken as support for the trade-off theory (see Kayo and Kimura, 2011).

Regarding risk, although the impact of SMEs' credit history on debt is highly significant, meaning that this variable captures indeed information relevant for bank financing, the negative correlation is counter-intuitive since an improvement in the firm's credit history would be equivalent with a decrease in its (bankruptcy) risk level. This unexpected result could mean that as SMEs improve their credit history they switch towards other forms of external finance, such as debt securities or external equity but this hypothesis needs to be investigated.

The perceived evolution of the economic outlook in the past six months, although not significant in all the models, suggests that as the economic outlook improves banks are perceived by SMEs as being more willing to lend (the two are significantly positively correlated, 0.65) and thus SMEs' debt ratio increases.

Regarding the impact of the financial integration measures, it is generally highly significant. Concerning the banking markets, the deepening of the integration on this segment positively impacts on

SMEs' access to debt. This is especially true for the cross-border lending by MFIs located in different euro area countries which is significant at 1% in 4 out of the 5 models estimated. This finding is consistent with Lucey and Zhang (2011) for public firms.

The impact of the price-based measures of integration in banking markets does not yet appear to be very significant. The only significant impact (at 10%) is observed for the interest rate spreads to new short-term loans (IRSNLS) and for the outstanding log-term loans (IRSOLL); the most important thing to be noticed from these initial results is the negative correlation with the debt ratio suggesting that more fragmented euro area banking markets, documented by the ECB (2014), raises the cost of borrowing for NFCs and therefore restricts their access to credit. This finding is supported by Lucey and Zhang (2011) who argued that a lower cost of capital is one of the alleged benefits stemming from financial integration. Moreover, the result is consistent with Popov and Ongena (2011) who brought evidence that the interbank markets integration positively impacts on SMEs access to finance by lowering the interest rates charged to them on the credit markets.

As regards the stock markets, the findings in this paper are again consistent with the Lucey and Zhang (2011) considering the (high) significant negative correlation between the measure of stock market integration and SMEs' leverage. Therefore, as euro area stock markets become more integrated firms, even SMEs, seem to be stimulated to substitute equity finance for debt finance. This finding is strengthened by the ECB's goal to promote the developing of direct capital market solutions for SMEs, for medium to long-term financing (ECB, 2014).

Despite the limits associated with interpreting covariates coefficients in logit models (see Wooldridge, 2009, p. 574-587), it can be noticed that all the coefficients of the financial integration measures are large which is consistent with Lucey and Zhang (2011) and Popov and Ongena (2011) who showed that financial integration has not only a statistically significant effect on firms' leverage but also an important economic effect. The results reported so far provide full support for the hypotheses 1 and 3 while the second one in partially confirmed.

Table 2

Correlation between GIPSI dummy and interest rate spreads

	IRSNLS	IRSOLS	IRSOLL	IRSOLT
GIPSI	0.784 (0.000)*	0.737 (0.000)*	0.367 (0.000)*	0.563 (0.000)*

Source: author's own analysis; () p-values; * - significant at 1%.

As the descriptive analysis (not fully reported here in order to save space) revealed, SMEs in the countries affected by the sovereign debt crisis used more debt than those in countries outside of this group. This is confirmed by the significant positive correlation (at 5%) between the dummy variable GIPSI and the debt ratio. The GIPSI variable was not included in models 2-5 due to the high significant (positive) correlations between the GIPSI membership and all the four interest rate spreads, as table 2 reveals; three out of the four coefficients exceed 0.5. This is not unexpected and was previously confirmed in the literature (ECB, 2014; Maudos, 2013) that showed that the GIPSI countries did face higher borrowing costs for NFCs.

The previous results opened a new avenue for investigation in the sense that it became interesting to test the existence of a potential (negative) simultaneous effect on debt ratio induced by interest rate spreads and GIPSI membership. The results of empirically testing this hypothesis are given in table 3 where the models 6-9 include an interaction term between the interest spreads and GIPSI dummy. All the models are statistically robust according to the criteria presented earlier. Regarding the significance of the individual variables, the previous results generally hold even if the significance of some of them is slightly reduced. The same is noticed for the quantity-based measures of integration in both banking and stock markets.

However, an important difference appears with regard to the cumulative impact of the interest rate spreads and GIPSI membership. All the interaction terms are highly significant (at 5%, generally). The GIPSI membership alone is significant only when the interest rate spread to new short-term loans is considered. The negative correlations with the debt ratio suggest that the higher lending rates for NFCs in the distressed countries exerted an additional (negative) effect on SMEs access to debt by forcing them to deleverage. This partially offsets the positive effect induced by the GIPSI membership alone which is now significant (at 10%) only in model 6 although it is not far from statistical significance in models 7 and 9 as well. These findings suggest that the negative impact of the sovereign debt crisis was strongest with regard to new short-term and small amount loans (IRSNLS) and they are important from the perspective of SMEs financing patterns. First of all, they confirm the importance of bank financing for SMEs highlighted in literature. ECB (2014) argues that SMEs are more bank dependent compared to large enterprises given their higher informational asymmetries and transaction costs induced to external investors. Alternatively, Agostino and Trivieri (2008), based on the same arguments, consider that SMEs' access to capital markets (equity and bonds) is hampered and, therefore, they are more dependent on (local) banks. Second, the interest rate spread that led to the most significant results refers to small amount loans i.e. up to and including EUR 1 million which are considered by ECB (2014) as proxy for SMEs loans. Last but not least, the same interest rate spread refers to short-term loans i.e. up to 1 year maturity and this may be extremely relevant given that SMEs are considered to be more prone to use short-term debt, according to Titman and Wessels (1988) and Daskalakis and Psillaki (2008), due to, inter alia, the greater transaction costs associated with long-term loans.

Table 3

Results of estimating the models with the interaction terms between the GIPSI dummy and the interest rate spreads

Explanatory variable	Model 6 (IRSNLS)	Model 7 (IRSOLS)	Model 8 (IRSOLL)	Model 9 (IRSOLT)
SECT	69.832 (0.007)*	83.441 (0.010)*	46.181 (0.090)***	74.562 (0.022)**
AGE	37.389 (0.048)**	39.233 (0.046)**	25.330 (0.185)	35.072 (0.076)***
OWNSTOCK	-55.848 (0.107)	-63.439 (0.089)***	-37.187 (0.268)	-50.214 (0.162)
CREDHIST	-4.020 (0.029)**	-5.742 (0.008)*	-5.272 (0.022)**	-5.694 (0.011)**
ECONOUT	0.723 (0.351)	1.383 (0.108)	1.568 (0.110)	1.619 (0.092)***
SHARES_GDP	-228.880 (0.013)**	-320.032 (0.028)**	-289.183 (0.020)**	-354.622 (0.031)**
CBLOANS	45.564 (0.012)**	61.407 (0.020)**	53.119 (0.019)**	65.567 (0.025)**
IRspread*GIPSI	-194.500 (0.027)**	-211.760 (0.051)***	-560.846 (0.026)**	-392.457 (0.035)**
GIPSI	7.613 (0.068)***	6.368 (0.111)	3.208 (0.330)	5.945 (0.134)
c	-29.525 (0.018)**	-32.792 (0.025)**	-18.136 (0.109)	-30.028 (0.041)**
McFadden R-sq.	0.791	0.776	0.789	0.785
LR statistic (Probab.)	95.207 (0.000)	93.417 (0.000)	94.955 (0.000)	94.496 (0.000)
H-L Statistic (Probab. Chi-sq.)	6.720 (0.567)	0.723 (0.999)	0.436 (0.999)	0.495 (0.999)

Source: author's own analysis; () p-values; *, **, *** - significant at 1%, 5%, 10%.

Overall, the latter results suggest that SMEs located in the troubled economies have been more severely affected compared to their counterparts located in the non-troubled countries and they fully supports hypothesis 2.

5. Conclusions

The research presented in this paper aimed at investigating the impact of the integration in banking and stock euro area markets – measured through both quantity- and priced-based measures – on the euro area SMEs' access to external finance proxied by the evolution in their debt ratio. Using data coming from the ECB's SAFE survey on SMEs' access to finance, the research showed that financial integration in the euro area positively impact on SMEs' access to debt finance.

Specifically, the paper brings evidence that cross-border lending by MFIs in the euro area is positively correlated with the evolution in SMEs' debt ratio while the interest rates spreads (over Germany) on loans to NFCs negatively impact on it. On the contrary, more increased stock markets leads to lower usage of debt by SMEs. The impact induced by the interest rate spreads is stronger for new and small short-term loans which are considered especially relevant for SMEs; moreover, their impact is stronger for SMEs located in the troubled GIPSI countries. These findings imply that more efforts are needed at European level to reduce the existing fragmentation on the financial markets, especially with respect to lending interest rates. Further research should consider using a more robust dataset, expand the range of market segments considered and explore different model specifications.

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References

1. Agostino, M., Trivieri, F. (2008) "Banking Competition and SMEs Bank Financing. Evidence from the Italian Provinces", Journal of Industry, Competition and Trade, vol. 8, pp. 33-53.
2. Bekaert G., Harvey C.R. (1995) "Time-Varying World Market Integration", The Journal of Finance, vol. L, 2, pp. 403-444.
3. Berger T., Pozzi L. (2013) "Measuring time-varying financial market integration: An unobserved components approach", Journal of Banking and Finance, vol. 37, pp. 463-473.

4. Cimpoeru, S. (2015) “A logistic model on panel data for systemic risk assessment – evidence from advanced and developing economies”, Journal of Applied Quantitative Methods, vol. 10, issue 1, pp. 15-29.
5. Daskalakis, N., Psillaki, M. (2008) “Do country or firm factors explain capital structure? Evidence from SMEs in France and Greece”, Applied Financial Economics, vol. 18, issue 2, pp. 87-97.
6. de Jong, A., Kabir, R., Nguyen, T. T. (2008) “Capital structure around the world: The roles of firm- and country-specific determinants”, Journal of Banking and Finance, vol. 32, pp. 1954-1969.
7. Demian C.V. (2011) “Cointegration in Central and East European markets in light of EU accession”, Journal of International Financial Markets, Institutions and Money, vol. 21, pp. 144-155.
8. Frank, M. Z., Goyal, V. K. (2003) “Testing the pecking order theory of capital structure”, Journal of Financial Economics, vol. 67, pp. 217-248.
9. Friedrich C., Schnabel I., Zettelmeyer J. (2013) “Financial integration and growth – Why is Emerging Europe different?”, Journal of International Economics, vol. 89, pp. 522-538.
10. Gjika D., Horváth R. (2013) “Stock market comovements in Central Europe: Evidence from the asymmetric DCC model”, Economic Modelling,vol. 33, pp. 55-64.
11. Gungoraydinoglu, A., Öztekin, Ö. (2011) “Firm- and country-level determinants of corporate leverage: Some new international evidence”, Journal of Corporate Finance, vol. 17, pp. 1457-1474.
12. Kayo, E. K., Kimura, H. (2011) “Hierarchical determinants of capital structure”, Journal of Banking and Finance, vol. 35, pp. 358-371.
13. Kim, S. J., Moshirian F., Wu, E. (2005) “Dynamic stock market integration driven by the European Monetary Union: An empirical analysis”, Journal of Banking and Finance, vol. 29, pp. 2475-2502.
14. Kršekova M., Pakšiova R. (2014) “Long-term fiscal sustainability of public sector entities’ finances”, Proceedings of the 16th International Scientific Conference Finance and Risk 2014 vol. I, p.115, 24-25 November 2014, University of Economics in Bratislava, ISBN 978-80-225-3991-3.
15. Lopéz-Gracia, J., Sogorb-Mira, F. (2008) “Testing trade-off and pecking order theories financing SMEs”, Small Business Economics, vol. 31, pp. 117-136.
16. Lucey B. M., Zhang Q. (2011) “Financial integration and emerging markets capital structure”, Journal of Banking and Finance, 35, pp. 1228-1238.

17. Mateev, M., Poutziouris P., Ivanov K. (2013), "On the determinants of SME capital structure in Central and Eastern Europe: A dynamic panel analysis", Research in International Business and Finance, vol. 27, pp. 28-51.
18. Maudos, J. (2013) "Fragmentation of the European financial market and the cost of bank financing", SEFO – Spanish Economic and Financial Outlook,vol. 2,issue 3, pp. 5-15.
19. Miricescu, E.C. (2014) "Investigating the determinants of long-run sovereign rating", Financial Studies, vol. 3, pp. 26-32.
20. Popov A., Ongena S. (2011) "Interbank market integration, loan rates, and firm leverage", Journal of Banking and Finance, vol. 35, pp. 544-559.
21. Pungulescu C. (2013) "Measuring financial market integration in the European Union: EU15 vs. New Member States", Emerging Markets Review, vol. 17, pp. 106-124.
22. Rajan, R. G., Zingales, I. (1995) "What Do We Know about Capital Structure? Some Evidence from International Data, The Journal of Finance, vol. 50, issue 5, pp. 1421-1460.
23. Sunder-Shyam, L., Myers, S. (1999) "Testing static tradeoff against pecking order models of capital structure", Journal of Financial Economics, vol. 51, pp. 219-244.
24. Stancu S. (2011) "Econometrie. Teorie şi aplicaţii utilizând EViews", Editura ASE, Bucureşti, ISBN 978-606-505-462-2.
25. Titman, S., Wessels, R. (1988) "The Determinants of Capital Structure Choice", The Journal of Finance, vol. 43, issue 1, pp. 1-19.
26. Yeyati, E. L., Schmukler, S.L., Van Horen, N. (2009) "International financial integration through the law of one price: The role of liquidity and capital controls", Journal of Financial Intermediation, vol. 18, pp. 432-463.
27. Wooldridge, J. M. (2009) Introductory Econometrics. A Modern Approach, South-Western Cengage Learning, Mason, 4th edition, ISBN 9780324660548.
28. Wu, G., Pasquariello, P., Bharath, S. (2009) "Does Asymmetric Information Drive Capital Structure Decisions?", The Review of Financial Studies, vol. 22,issue 8, pp. 3211-3243.
29. European Central Bank (April 2014) Financial integration in Europe, ISSN 1830-7140 (print), ISSN 1830-7159 (online).
30. European Central Bank, Survey on the access to finance for SMEs in the euro area (SAFE), Statistical Data Warehouse, sdw.ecb.europa.eu/.

MODELLING AND PREDICTING THE INDIRECT TAXES IN ROMANIA

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Abstract

The main aim of this study is to model and predict the quarterly indirect taxes in Romania. This variable provides important information for the standard levelling in a country. for data covering the period from 2004:Q1 to 2014:Q2, some econometric models were proposed (multiple regression model, trend model and a vector-auto-regression-VAR model. 45.52% of the variation in differentiated data series of logarithmic indirect taxes is explained by GDP and share of social assurance. According to Granger causality test for stationary data, at 5% level of significance the GDP index evolution is a cause for the indirect tax. In the first period almost 97.08% of the variation in indirect taxes is due to the changes in the values of this variable while only 2.923% of its variation is determined by the changes in GDP index. For the first 10 periods, the influence of GDP index does not exceed 3%. For the first quarter of 2014, the trend model provided the best prediction while for the second one the VAR process performed the best. For the next quarters of 2014 all the models predicted a decrease in indirect taxes in Romania.

Keywords: indirect taxes, forecasts, trend, VAR model

JEL Classification: C51, C53, H20

1. Introduction

Everyone has a private interest in the tax policy which brings gainers and losers. The main advantage of models for taxes is the support to rational policy analysis. The policy-makers can make their judgments by analysing the consequences of alternative policies.

The taxes, the main source of revenue for the public budget have a direct impact on GDP and final consumption. If the level of taxes is high, the population standard of living is low and the final consumption is directly correlated to it. According to Albu (2013) the GDP should increase in the next period, the economic crisis having a negative impact on economic growths and policy measures should be taken in order to grow the standard living.

Indirect taxation is a part of a mix of various revenue-raising and tax tools including taxes on property, income, and social security

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levies on employment income that households and other agents from economy face.

The main aim of this article is to model the quarter indirect taxes in Romania, some predictions being provided for 2014. Therefore, some econometric models were proposed (multiple regression model, trend model and a vector-auto-regression-VAR model). After the presentation of data and evolution of indirect taxes in Romania, the econometric models are proposed and several forecasts are provided.

2. Literature review

There is not a formal definition for the indirect taxes, according to Capéau, Decoster and Phillips (2014). In the common sense, the indirect taxes are those taxes that are levied on the sale of services and goods, being gathered and remitted by vendor. Two main characteristics have been identified for indirect taxes: the consumer can't be identified and the taxes schedule is linear. The assessment of tax policy reform considers two dimensions that were identified by Feltenstein, Lopes, Porras-Mendoza and Wallace (2014): equity of the tax code and its efficiency.

The selection of a certain model for taxes depends on the type of the analysed policies. The policy question may be related to various problems like the income implication of a specific tax or the redistributive effects and cost of a large number of taxes. The small models for explaining the taxes could help in providing useful principles for tax reform. The large tax models suppose the existence of teamwork and, consequently, the cost of such models raises. Most of the large models for taxation are non-behavioural, no assumptions being made on the effects of tax changes on population consumption plans or supply on labour market. In the case of these models, no econometric estimation is required. The consequences of changes in policies are evaluated using graphs and tabulations for different groups of people.

The impact of taxes and transfers measurement has been analysed in literature by many studies, Lambert (1993) providing many details. The author considered elements like: horizontal inequity effects, progressivity, social welfare and inequality. The measurement procedures include index comparisons and dominance checks. For making comparisons in income distributions Lambert (1993) used social welfare and inequality tests.

Indirect taxes became an increasingly important revenue raising instrument for developed states governments. Most of the studies regarding indirect taxes incidence consider the taxes that are paid by different groups. The paid taxes are seen as the loss in the real income. Sahn and Younger (2003) estimated the incidence of indirect taxes in developing countries. Creedy (1999) used his expertise to make a deep analysis of indirect taxes, insisting on these taxes modelling. Creedy (2002) described the econometric models used to represent the evolution of indirect taxes, many details being provided for the MITTS (Melbourne Institute Tax and Transfer Simulator) model, a microsimulations model. It takes into account the feedback effects. For example, large modifications in the tax structure for increase the participation on labour market may influence the labour demand. On the other hand, the modifications of transfer and tax system are assumed to have no consequence on wage rates. A microsimulation model was also developed by Bardazzi, Parisi and Pazienza (2004) for business sector. It model is used to analyse the effects of the fiscal changes in Italy and ex-post implicit tax rates are estimated. Moreover, two scenarios are proposed: one that studies the impact of tax modification during 1998-2001 and another one that considers the effects of the recent tax reform. O'donoghue, Baldini and Mantovani (2004) described a model used to simulate the indirect taxes in 12 countries from European Union using EUROMOD tax-benefit model. There is also made a classification of indirect taxes in the selected countries. A decomposition of the redistributive effect of indirect taxes is made by employing the tax from various commodity groups. The authors also analysed the progressive character and the redistributive effect of indirect taxes making comparison with income taxes, principal social benefit groups and social insurance contributions in all the countries from EU.

A policy simulation was made by Decoster, Loughrey, O'Donoghue and Verwerft (2010) who used the EUROMOD program for microsimulations and expenditures as input. The standard VAT rate is increased and the contributions to social security are lowered in order to keep the neutrality of government revenue. Several important conclusions were drawn: the indirect taxes are regressive compared to disposable revenue but it is progressive or proportional compared to overall expenditures, the indirect taxes are less progressive than other elements of tax system.

The impact of indirect taxes modifications was analyzed for some European countries by Figari and Paulus (2012) using tax-benefit simulation model at microeconomic level. The data are provided by income survey without expenditure data.

The modelling of impact of taxes needs data from microeconomic level, but the limit is given by the small data sets. In a recent study, Savage and Callan (2015) used microeconomic data to evaluate the sensitivity of distributional effects of indirect taxes in Ireland. Moreover, as micro-simulation analysis was conducted for simultaneous indirect tax, direct tax and welfare reform.

For endogenous consumption demands, the presentation of indirect taxes changes may require the elaboration of an auxiliary incidence model for taxes. In these auxiliary models, the impact on consumer prices could be traced under certain assumptions regarding the tax shifting degree. For example, in Australia there are a lot of indirect taxes in different phases of production process. A tax incidence model is likely to rely on input-output data, a model for Australia being built by Scutella (1999).

In the previous 40 years, many studies examined the effects of changes in indirect taxation by employing comparative static general equilibrium models. Dixon and Rimmer (1999) studied the modifications in indirect taxes in Australia by using a dynamic general equilibrium model. Moreover, the consequences of policy changes are analysed as deviations from explicit predictions that are essential for the results of government policies. For Australia the effects of employment on short-run depend on salary response, the exporters of merchandise have many advantages but the tourism is affected while the welfare effects on long term are more probably negative. The last observation implies an increase in compliance costs and a trade decrease. A detail presentation of computational general equilibrium (CGE) models for modelling indirect taxes is presented by Feltenstein, Lopes, Porras-Mendoza and Wallace (2014). CGE models are a traditional tool for analyzing the efficiency of tax reforms in some countries. They are used to assess the economy-wide impact of distortionary taxes. For indirect taxation, CGE models make a link between household utility functions, indicating the taxes welfare costs, as Ahmed and O'Donoghue (2007) showed. However, in the CGE framework used for microsimulation the household feedback is not taken into account in the macroeconomic framework. Moreover, the microsimulation based on this type of models does not ensure coherence between the macroeconomic structure and the microeconomic one.

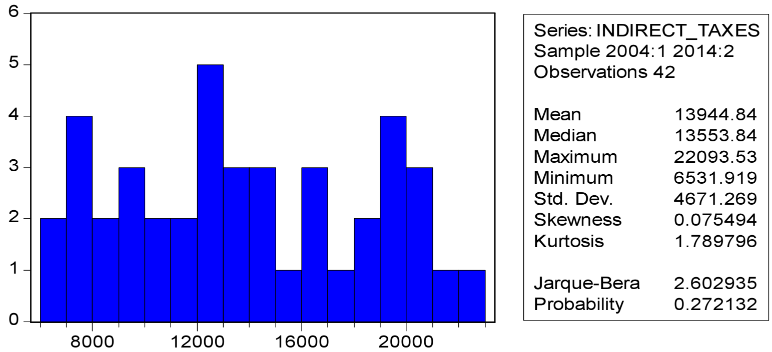
The CGE models can be linked with the microsimulation models (MSM) by multiplying the nominal pre-tax incomes, the consumer prices,m welfare and transfer in the microsimulation model by percentage modifications in the corresponding values of the CGE variables. A CGE-MSM model was built for Norway by Avitsland and Assness (2004) in order to study the tax policy.

3. Data

For explaining the relationship between indirect taxes and other macroeconomic variables like GDP in constant prices and share of social assurance, quarterly time series were used for the period from Q:2014-Q2:2014. The data are provided by the National Institute of Statistics and National Bank of Romania.

Figure 1

Histogram and descriptive statistics for indirect taxes in Romania during Q1:2004-Q2:2014

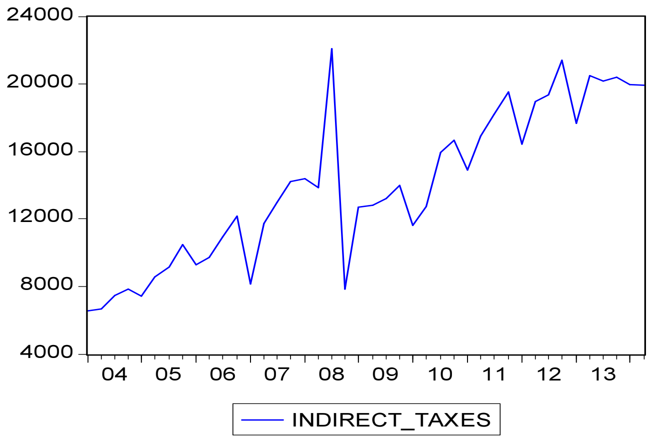


Source: author's graph

The distribution of indirect taxes in Romania is almost skewed, the Jarque-Bera test not rejecting the normality assumption. There is a quite high range and a coefficient of variation of 33,49%, the data series being relative homogenous during Q1:2004-Q2:2014.

Figure 2

The evolution of indirect taxes in Romania during Q1:2004-Q2:2014



Source: author's graph

For the total taxes we observed a tendency of increase followed by a sudden decrease. The indirect taxes have grown by

3.06 times in the second quarter of 2014 compared to the first quarter of 2004, a lower increase compared to direct taxes. The data having a quarterly frequency, the seasonal adjustment have been made, then the stationary character of the data series have been checked using Augmented Dickey-Fuller test. The level of significance used in this research is 5%. Some transformations are made to the data series in order to achieve the stationary character. Therefore, the logarithm and the first differentiation were applied to indirect taxes and to the GDP index. The data set for share of social assurance is stationary in level.

4. Models and predictions

Firstly, a model valid with trend has been estimated for the indirect taxes in Romania:

LOG(IND) = 8.9465 + 0.0261*TREND

The estimation results and the residuals' test results are presented in Appendix 1. Passing from a quarter to another, the logarithm of indirect taxes grows in average with 0.0261. The errors are independent as Breusch-Godfrey for a lag equaled to 1 indicated and the errors are also homoscedastic according to White test (the probability associated to LM statistic is greater than 0,05, the null hypothesis of homoscedasticity not being rejected at 5% level of significance). However, the Jarque-Bera test suggests that we do have reasons to reject the assumption of a normal distribution for the errors.

Moreover, for the stationary data series of indirect taxes a multiple regression model was proposed. 45.52% of the variation in differentiated data series of logarithmic indirect taxes is explained by GDP and share of social assurance. There is a weak correlation between the explanatory variables, according to correlation matrix, so the multi-colinearity problem is solved. The errors are independent as Breusch-Godfrey for a lag equalled to 1 indicated and the errors are also homoscedastic according to White test (the probability associated to LM statistic is greater than 0,05, the null hypothesis of homoscedasticity not being rejected at 5% level of significance). However, the Jarque-Bera test suggests that we do have reasons to reject the assumption of a normal distribution for the errors (results in Appendix 2).

Table 1

Granger causality test for log of indirect taxes and GDP index

Null Hypothesis:	Obs	F-Statistic	Probability
LOG_INDIRECT TAXES does not Granger Cause D_LOG_IGDP	37	0.43482	0.65115
D_LOG_IGDP does not Granger Cause LOG_IND		5.31889	0.01013

According to Granger causality test for stationary data, at 5% level of significance the GDP index evolution is a cause for the indirect tax. A vector-autoregressive model of order 3 (VAR(3)) model was estimated and the variance decomposition for the logarithm of indirect taxes suggests the following: in the first period almost 97.08% of the variation in indirect taxes is due to the changes in the values of this variable while only 2.923% of its variation is determined by the changes in GDP index. For the first 10 periods, the influence of GDP index does not exceed 3%.

Table 2

The variance decomposition of logarithm of indirect taxes

Period	Standard error	D_log_GDP	Log_indirect_taxes
1	0.172253	2.923398	97.07660
2	0.172520	2.958726	97.04127
3	0.192196	2.386634	97.61337
4	0.199638	2.369032	97.63097
5	0.206429	2.875895	97.12411
6	0.214641	2.662388	97.33761
7	0.218533	2.589169	97.41083
8	0.222525	2.575706	97.42429
9	0.227006	2.952698	97.04730
10	0.230378	2.867358	97.13264

Source: author's computations

The forecasts for the third and the fourth quarter of 2014 are made under the assumptions of keeping for index of GDP and share of social assurance the values in the second quarter of 2014.

Table 3

Forecasts of indirect taxes in Romania during 2014:Q1-2014:Q4

Quarter	Predictions based on:			Actual values
	Trend model	Multiple regression model	VAR(3) model	
2014:Q1	**20535.32**	20398.19	22119.21	20672.3
2014:Q2	20790.47	21089.91	**20418.6**	20033.8
2014:Q3	20148.32	20438.51	22961.45	-
2014:Q4	20034.1	20062.5	21568.3	-

For the first quarter of 2014, the trend model provided the best prediction while for the second one the VAR process performed the best. For the next quarters of 2014 all the models predicted a decrease in indirect taxes in Romania.

5. Conclusions

The indirect taxes are in correlation with GDP from a country and it reflects indirectly the living standard. If the revenues from taxes cover a large amount from current expenses, we have a fiscal policy that negatively influences the long-run economic growth and the potential GDP by overtaxing the current benefits.

The evolution of indirect taxes should carefully be observed, some econometric models being employed to analyse its evolution. Moreover, some short-run forecasts were made and we expect a decrease in indirect taxes in the last half of 2014 in Romania.

6. Acknowledgement

This work was financially supported through the project "Routes of academic excellence in doctoral and post-doctoral research - READ" co-financed through the European Social Fund, by Sectorial Operational Programme Human Resources Development 2007-2013, contract no POSDRU/159/1.5/S/137926.

References

1. Ahmed, V., & O'Donoghue, C. (2007). "CGE-microsimulation modelling: a survey" MPRA Paper, No. 9307.
2. Albu, L. L. (2013). "Foreign trade and FDI as main factors of growth in the EU", Journal for Economic Forecasting, (2), 7-17.
3. Åvitsland, T., & Aasness, J. (2004). "Combining CGE and microsimulation models: Effects on equality of VAT reforms", Discussion Papers No. 392, October 2004, Statistics Norway, Research Department.
4. Bardazzi, R., Parisi, V., & Pazienza, M. G. (2004). "Modelling direct and indirect taxes on firms: a policy simulation" Austrian Journal of Statistics, 33(1), 2.
5. Capéau, B., Decoster, A., & Phillips, D. (2014). "Consumption and Indirect Tax Models", Handbook of Microsimulation Modelling (Contributions to Economic Analysis, Volume 293) Emerald Group Publishing Limited, 293, 223-273.
6. Creedy, J. (1999). "Modelling indirect taxes and tax reform", Edward Elgar Publishing.
7. Creedy, J. (Ed.). (2002). "Microsimulation modelling of taxation and the labour market: the Melbourne Institute tax and transfer simulator", Edward Elgar Publishing.
8. Decoster, A., Loughrey, J., O'Donoghue, C., & Verwerft, D. (2010). "How regressive are indirect taxes? A microsimulation analysis for five European countries", Journal of Policy analysis and Management, 29(2), 326-350.

9. Dixon, P. B., Rimmer, M. T. (1999). “Changes in Indirect Taxes in Australia: A Dynamic General Equilibrium Analysis“, Australian Economic Review, 32: 327–348.
10. Feltenstein, A., Lopes, L., Porras-Mendoza, J., & Wallace, S. (2014). 3. “Modeling tax reform in developing countries“, Taxation and Development: The Weakest Link?: Essays in Honor of Roy Bahl, 69.
11. Figari, F., & Paulus, A. (2012). “The impact of indirect taxes and imputed rent on inequality: a comparison with cash transfers and direct taxes in five EU countries“, GINI DP, (28).
12. Lambert, P. J. (1993). “Evaluating impact effects of tax reforms“, Journal of Economic Surveys, 7(3), 205-242.
13. O'donoghue, C., Baldini, M., Mantovani, D. (2004). "Modelling the redistributive impact of indirect taxes in Europe: an application of EUROMOD (No. EM7/01)”, EUROMOD Working Paper.
14. Savage, M., & Callan, T. (2015). “Modelling the impact of direct and indirect taxes using complementary datasets“ (No. 8897). Institute for the Study of Labor (IZA).
15. Sahn, D. E., & Younger, S. D. (2003). “Estimating the incidence of indirect taxes in developing countries“, The impact of economic policies on poverty and income distribution: evaluation techniques and tools, 27-40.
16. Scutella, R. (1999). “The final incidence of Australian indirect taxes“, Australian Economic Review, 32(4), 349-368.

ANNEX 1

Regression model with trend for logarithm of indirect taxes

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	8.946503	0.049924	179.2033	0.0000
T	0.026166	0.002096	12.48208	0.0000

R-squared	0.795712	Mean dependent var	9.482908
Adjusted R-squared	0.790605	S.D. dependent var	0.359856
S.E. of regression	0.164669	Akaike info criterion	-0.723309
Sum squared resid	1.084637	Schwarz criterion	-0.640563
Log likelihood	17.18950	F-statistic	155.8024
Durbin-Watson stat	1.998397	Prob(F-statistic)	0.000000

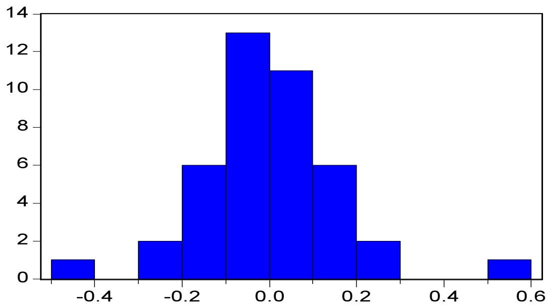
Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.012683	Probability	0.910912
Obs*R-squared	0.013654	Probability	0.906979

White Heteroskedasticity Test:

F-statistic	1.740784	Probability	0.188734
Obs*R-squared	3.442101	Probability	0.178878

The errors distribution



Series: Residuals	
Sample 2004:1 2014:2	
Observations 42	
Mean	1.23E-15
Median	-0.011227
Maximum	0.585547
Minimum	-0.475900
Std. Dev.	0.162649
Skewness	0.497768
Kurtosis	6.618130
Jarque-Bera	24.64342
Probability	0.000004

ANNEX 2

Multiple regression model for indirect taxes

Dependent Variable: D_LOG_INDIRECT_TAXES
Method: Least Squares

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.021402	0.027601	0.775399	0.4429
D_LOG_IGDP	0.430831	0.128856	3.343496	0.0019
D_SA_SHARE	18.49902	3.781778	4.891620	0.0000

R-squared	0.455247	Mean dependent var	0.027201
Adjusted R-squared	0.426576	S.D. dependent var	0.232782
S.E. of regression	0.176273	Akaike info criterion	-0.563206
Sum squared resid	1.180747	Schwarz criterion	-0.437823
Log likelihood	14.54573	F-statistic	15.87821
Durbin-Watson stat	2.604012	Prob(F-statistic)	0.000010

Breusch-Godfrey Serial Correlation LM Test:

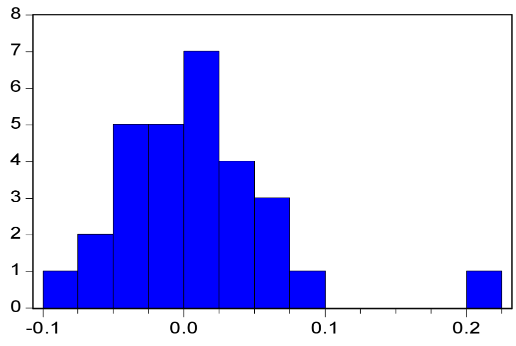
F-statistic	0.586630	Probability	0.451515
Obs*R-squared	0.000000	Probability	1.000000

ARCH Test:

F-statistic	0.098822	Probability	0.755757
Obs*R-squared	0.106021	Probability	0.744721

White Heteroskedasticity Test:

F-statistic	0.512714	Probability	0.726982
Obs*R-squared	2.283029	Probability	0.683861



Series: Residuals
Sample 2007:2 2014:2
Observations 29

Mean	0.011226
Median	0.001704
Maximum	0.206601
Minimum	-0.075738
Std. Dev.	0.056239
Skewness	1.349114
Kurtosis	6.200084
Jarque-Bera	21.17117
Probability	0.000025

THEORETICAL AND PRACTICAL ASPECTS REGARDING THE TENSIONS ON THE MONETARY MARKET FROM ROMANIA – BRIEF ANALYSIS OF THE EXCHANGE RATE

Alina Georgeta AILINCĂ, PhD Candidate*

Abstract

Many publications and reports on the financial stability and the global risks highlight several threats to the regional or world economic financial stability. However, these menaces have been enumerated and evaluated to the extent they could have been identified, since there are many other negative aspects that are difficult to track and classify as risks, vulnerabilities, incertitude, etc. While the vulnerabilities and risks are approached a lot in the relevant literature, it cannot be said the same about the concept of tensions. Thus, this article tries[1] to clarify the concept of tension, while presenting various typologies of the tension, which may facilitate the identification of several tensions specific to the monetary market. The paper also analyses how much the evolution of the exchange rate from January 2005 to January 2015 can show important tensions for the monetary market from Romania.

Keywords: monetary market, tensions, risks, exchange rate

JEL Classification: F36, E58, F31, E65

1. Introduction

The economic growth is yet to come worldwide, and the significant gaps between the nominal and real economy continue to deepen, being accompanied by much more rigid financial-banking conditions than those from the period before the onset of the global economic and financial crisis. The architecture of the world financial-banking system changes rapidly, and we still don't know clearly how it will look in the next period, because there still are fundamental and formal problems to be solved, which have implications on the regions and countries of the world. Within a strongly globalized environment,

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the problem of communication and coordination of the public and private policies and strategies is vital. Otherwise, there will be conditions favourable for the development of potential tensions, vulnerabilities and risks to the international, regional and national financial stability. This too, is the situation with the monetary policy and monetary market in Romania, which receives the international changes in the public and private policies with a specific lag, the effect being sometimes even brutal.

The internal structural problems of the Romanian financial-banking system add to some phenomena such as financial de-intermediation and fragmentation and decisional isolation, which currently affect all or almost all regions of the world and which develop faster in Europe. Thus, the identification of the possible vulnerabilities, tensions and risks on the monetary market from Romania is not only useful, but also necessary for the proper management of the reality.

This article aims to clarify the concept of tension on the monetary market, while describing several typologies of tensions, which will help us identify the tensions specific to the monetary market from Romania. At the same time, the paper will make a case study of the exchange rate of the national currencies into the main hard currencies from January 2005 to January 2015, which affects the credits on the Romanian monetary market. The analysis of the exchange rate aims to identify its relation with the tensions on the monetary market from Romania.

2. Description of the problem and methodology

This article aims to make a theoretical study of the tensions from the monetary market in Romania, applying it to the evolution of the exchange rate of the Romanian RON in relation with the Swiss francs, with the Euro and with the USD. The objectives of the paper include the clarification of the concept of tension on the monetary market and the identification and analysis of the tensions which generate instability on the monetary market from Romania, with particular reference to the exchange rate from January 2005 to January 2015. The methodology presumes the use of logic, statistic, comparative and descriptive analyses, the interpretation of the reality and a literature review.

3. Literature review

Extensively treated by the literature, the concepts of hazard, vulnerability, risk, threat and challenge, dominated the final decades of the past century and the beginning of this century. Thus, Buzan (1983, p. 75-83), distinguished, within the broad category of threats, the economic threats (incapacity to pay the debt, currency control, practices regarding the export and limitations of the import, elements pertaining to the internal stability, etc.), highlighting the necessity to understand the vulnerabilities and the causes of the threats, which can be controlled (reduced or even eliminated) through political actions.

The concept of threat has often been substituted, even mistaken for the concept of challenge, while the term of vulnerability has been better analysed and defined in dictionaries and encyclopaedia, being generated, according to Barnett (2001, p. 132-133) by the social, economic and political processes. Vulnerability has also been defined by O'Riordan (2002, p. 369) as „the incapacity to avoid danger, or to be uninformed of impending threat, or to be so politically powerless and poor as to be forced to live in conditions of danger", while Oliver-Smith (2004, p. 10) said that "vulnerability can become a key concept in translating that multidisciplinarity into the concrete circumstances of life that account for a disaster", the disasters being perceived by society as risks which affect the political, social and economic institutions and actions. At the same time, Nathan (2007) sees in vulnerabilities a complex process with multiple interconnected dimensions and sets two distinct traits of them: exposure and insufficient capacities. The general direction in terms of concept has recently turned global. Thus, Cardona (2004, p. 37-51), suggested rethinking the vulnerabilities and risks from a holistic perspective, in his vision, the physical destruction being often caused in the developing countries by social economic, cultural and educational aspects, vulnerability being related to the lack of resilience. According to Brauch (2005, p.41), vulnerability is „always socially constructed. In the end, therefore, 'vulnerability' is how the analyst or policy-maker has defined it and which of the many definitions have become accepted by a consensus within the respective research community". Peduzzi (2000, p.2) defined vulnerabilities as "expected percentage of population loss due to socio-politico-economical context", and the risks according to Tobin and Montz (1997) are „a measure of the expected losses due to hazard event of a particular magnitude occurring in a given area over a specific time period".

The concept of risk has evolved even from the 15th century, being defined and analysed in various forms, going as far as extremely individualized areas such as the "theory of risk", the "risk premium", the "risk analysis" and "risk management" (Grüske and Schneider 2003, p. 456). Thus, risk is often defined within the context of a present incertitude, Jaeger, Renn, Rosa and Webler (2001, p. 17) speaking about risk as "a situation or event in which something of human value (including humans themselves) has been put at stake and where the outcome is uncertain".

Although the concepts presented above abound in clarifications, several aspects still are extremely confuse, while the term of tensions is often neglected, and when it is used it gets unclear. Thus, tensions are described either in a manner which is external to the economic environment (geopolitical, social, cultural, military tensions) or in a rather obscure manner, such as "monetary market tensions", rather describing a permutation of the adverse effects at the level of the same domain, but with no clear identification of the tensions. Hence, this article is a novelty because it attempts to clarify, at least partially, this concept and to show a practical application of it, the case of the exchange rate.

4. Thorough presentation, particularisation and conceptual delimitation of the term of "tension" in relation with similar, complementary or opposed concepts and presentation of several typologies of tensions

Starting from the definitions given by different dictionaries of the Romanian language, the concept of tension denotes: the state of strain, stretch, "anxiety", "nervousness", interior force that appears within a body or system due to external forces, "the difference of potential", the pressure (generally treated as a limit or normal value), "agitation", "feverishness", joint effort, accumulation of energies or forces which, being in a closed environment, tend to get away. Therefore, the tension is a trait, a feature of something which needs three elements for an adequate description: the environment of action, the factor of phenomenon exposed to tension and the force or group of forces which determine a particular form of manifestation of the factor within that environment.

In medicine, for instance, the pressure (blood pressure, for instance), describes the pulsatile pressure which results from the regular contraction of an organ (the heart, for instance), which creates a system of forces which propel a particular substance (blood, for instance) through all the "arteries" of the body. From this definition we may draw the conclusion that the pressure is a natural, physiological state of a living organism or system; only if it exceeds the "normal" limits it may signal problems with the state of "health" of the particular system.

If, generically speaking, we consider that the macroeconomic system is a logically vivid system[2], then the financial-monetary

[2] *Also see Dinga, E. (2009). On the Logically Vivid System. Theoretical and Applied Economics.- General Association of the Economists from Romania - AGER. - Vol. 05(534).2009, 05(534), p. 45-62.*

market, which has a strong human component, may also be regarded as having the characteristics of the logically vivid systems. Therefore, if we consider that the financial stability is the state of "health" of the financial and monetary systems and markets, and the financial instability describes the state of "disease" or "severe disturbance", then the tensions observed on these markets can be seen as a state of "pre-disease" or "feverishness", which signal the imminent break of the "disease" (either an uncontrollable high volatility or, even worse, collapse or isolated bankruptcy of an element, or the generalized bankruptcy of an important part of the financial system, or even of the entire financial system of a country, which starts financial crises). Within this context, the tension can be seen as a signal for the change of the normal physiological state of that particular financial-monetary system, being a relevant indicator of the imbalance of "disease" to be soon noticed.

Thus, we can make a first typological classification of the tensions as:

- Independent tensions, physiologically normal, of tonus, stagnant, stable, adaptive, inherent;
- Acute tensions, which signal a „disease", anomaly or imbalance, which accumulates and can get worse in time;
- Chronic, transformative tensions, which will invariably change, sooner or later, turning into risks.

We must also notice the distinction which involves the occurrence, with high probability, of an adverse, often irreversible, phenomenon. The tensions can be considered as irreversible in many situations, momentary and even positive sometimes, describing the normal state of the "tonus" of the financial-monetary market (Pop, 2008), under the conditions of a low or moderate volatility. In this direction, tension can be described as a characteristic of the automatic stabilizers. The tensions can be also generated by a latent, often hardly identifiable and altered state of manifestation of the risks, being influenced by specific factors or forces, shifting, under specific environmental conditions, to the state of threat or risk.

As mentioned in previous papers[3], an important source of macroeconomic imbalances, thus a factor which fuels tensions, incertitude, vulnerabilities and risks on the international markets (the financial-monetary markets included), is the disconnection of the price from the intrinsic value of the goods and services. In this direction, a

[3] *See Ailincă, A.G., Iordache, F. and Milea C. (2013). Theoretical Fundamentals Concerning the Transmission Channels from the Perspective of the External Equilibrium, Annals. Economic Sciences series, vol. XIX/2013 Faculty of Economic Sciences, "Tibiscus" University, Timişoara.*

natural measure to reduce the tensions, vulnerabilities and risks is to correct or normalize, in a rational manner, the price in the proximity of the costs and tougher measures taken by the market surveillance and control organisms.

If we consider the occurrence of the imbalance or the manifestation of the “disease” of the financial system (crisis, for instance), the state of recovery can be a state of tension too, because it will be difficult to say whether that adverse phenomenon will pass rapidly or will persist and if it will generate new side effects which are sometimes hard to predict. The recovery, reconstruction, return to a previous state cannot be immediate and demands time, being thus a period of “convalescence”; from this angle, the crisis can be beneficial, a state of re-seeking and repositioning towards a new state of balance. The institutional (central banks, governments, international bodies, etc.) “medication” or “cure” and the “dose” to be used when the “disease” or crisis breaks out on the monetary market are extremely important, since they can hurry the “healing” or, on the contrary, can prolong indefinitely the return to a state of balance, and may even trigger again even more serious imbalances on the financial-monetary markets.

When the tensions, vulnerabilities and risks occur gradually, it is easier to identify the disturbing factor which caused the imbalance, therefore the “treatment” comes faster, it is easier to give and to bear. A sudden burst, often with no previous “symptoms”, of an adverse phenomenon can make it difficult to identify correctly the cause and the proper “treatment”. Therefore, in this situation, there are no warning tensions, or they cannot be identified, only the risks being visible. So, according to their manner of manifestation, the tensions can be slow, diluted, insignificant in time or fast.

The tensions describe a specific level of integration of the unwanted events. Thus, within the general macroeconomic framework, some aspects become relevant and can be included in the concept of “tension”, and as the adverse phenomenon “worsens” it may transform into vulnerability and then in risk. Therefore, according to this perspective, the tensions belong to the sphere of risks, being a structural element of those.

The factor or system on which the tensions act is extremely important particularly in terms of its size, of its importance for the economy, country or region of the world where it acts, in terms of the size of the cross-border activities and of its interconnection with the system in which its acts or with the financial system which it influences. The more these elements are towards maximal levels, the more the tensions that act on the phenomenon which has these significant characteristics can turn into elements generating vulnerability and even risks.

Another vision is that the tensions are distinct, even opposed sometimes to the problems of risks, being considered momentary anomalies of the general environment of action.

The tensions can also be classified as: exogenous or endogenous to the analysed system, the monetary market in our case. According to this approach, the tensions are considered rather exogenous, which don't belong to the studied phenomenon and framework. For instance, the risks can be readily identifiable and ascribed to the internal abnormalities of the monetary market, while the tensions can be of a different nature: social, political, cultural, psychological, environmental, etc. so they can be out of the strict control of the monetary or even governmental authorities from a particular country, groups of countries, or region of the world. According to this classification, the tensions cannot be mistaken for the risks, being rather changes of the general economic environment which describe a state of structural external relocation, cyclical or conjunctural in relation with the analysed system. This vision is closer to what the literature analyses often, being a problem external to the framework of analysis, often difficult to control (see the stability reports of ECB, IMF, BNR, etc.). Considering the above classification, and also counting the phenomenon of aggregation within the framework of activity, the *tensions can be seen as horizontal or vertical*, since they can occur in a horizontal plane, at the level of the same domain (for instance, generating the transmission of the effects between the monetary markets from different countries or regions of the world), or they may gather effects coming from different environments or domains (for instance, tensions of the monetary market manifesting simultaneously with social and/or geopolitical tensions).

The tensions can be positive or negative. For instance, the injections or withdrawal of currency by the national banks, in "homeopathic" doses can be an example of positive tensions, which ensure the proper operation of the internal financial-monetary market, the tensions being in this case a normal state of pre-regulation of the balance on this market.

Speaking of their effects, the tensions can be dissipative or accumulative. The dissipative tensions are those tensions which dissipate, dilute, diffuse, regulate or accommodate the state of the adverse phenomena. Such example could be the measures taken by the central banks which, anticipating a wrong direction towards which the commercial banks are heading, issues regulations which dissipate, "dilute" the risks that might occur on the financial-monetary market. The accumulative tensions are those which gather, store a negative phenomenon, or several adverse phenomena, behaving like a true centralizer of macroeconomic problems and disturbances, acting directly or indirectly on the monetary market.

To the extent in which they can be circumscribed to the functioning of the economic cycle, the tensions can be cyclic or anticyclic. They can also be periodical, succeeding regularly or sporadically, accidentally, appearing only under particular circumstance (for instance, the tensions appear due to regional and political events).

When the tensions appear due to the change of the monetary market structure or if they belong to the general macroeconomic conjuncture, they can be classified as structural or conjunctural tensions.

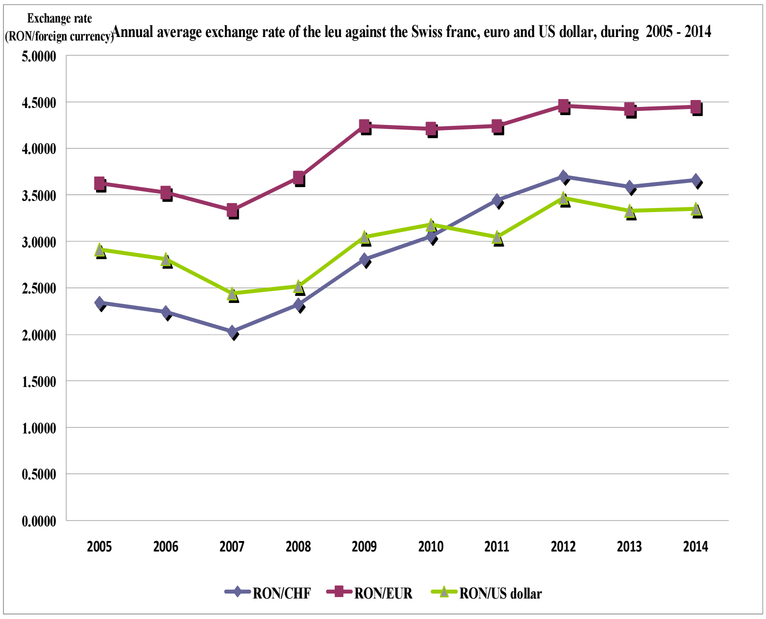
Because the multitude of typologies doesn't allow an exhaustive approach of each type, this article will only approach the endogenous-exogenous nature of them. Given the difficulty of analysing the exogenous tensions (social, political, religious, cultural, environmental, etc.) on the monetary market, the paper will focus on the endogenous approach. The analysis will concentrate on the tensions that may occur due to the higher volatility of the exchange rate, with reference to the period between January 2005 – January 2015, analysing particularly the extent to which the evolution of the exchange rate of the national currency, RON, in relation with the main hard currencies, fits to the concept of tensions and its typologies.

5. Case study on the exchange rate of the Romanian RON in relation with the Swiss franc, Euro and the USD, in the period January 2005-January 2015

Although the analysis focused on the exogenous approach, if we look the extremely fluctuating episode of the exchange rate RON/Swiss franc, in early 2015, we may say that the effects which occurred on the Romanian monetary market had an external cause, the changed strategy of the National Swiss Bank (BNS). Thus, BNS wanted to unlock the exchange rate between the Swiss franc and the euro, on the grounds that the forced administration of a rigid exchange rate is too costly, and they warned that there will also be further episodes of "liberalization" of the exchange rate. However, the manner in which BNS implemented this strategy raised fear and panic on the international markets and affected the financial-banking sector by material and credibility losses. The price of the shares of Swiss companies and of the Swiss financial-banking system decreased on the capital markets. The banks from Central and East European countries which provided products and services in Swiss francs were confronted with a strong fluctuation of the exchange rate. This phenomenon might increase the number of nonperforming credits, in these countries, depending on the proportion of credits in Swiss francs out of the total volume of credits. While Hungary, Croatia and Poland already took measures to protect the debtors and to find solutions for the conversion of the Swiss francs credits into national currency or in Euro, Romania, and BNR, particularly, considered that no such measures are needed, proposing individual solutions between the debtors and their banks.

Irrespective of the measures taken by the central banks from the region, the shock of a strong variation of the exchange rate can affect the entire financial-banking system from a particular country or region and it may even disturb the balance of that economy or area. Such shock can also come from the variation of the exchange rate of a nonconventional or "exotic" currency, which has been used actively, from various reasons, for the promotion of the offer of credits.

Chart 1



Source: BNR data processed by the author

Chart 1 shows that the evolution of the exchange rate of the Romanian RON in relation with the Euro, USD and Swiss franc, displayed an increasing trend over the period 2005-2014. While the USD largely followed the trend of the European currency in its relation with the Romanian RON, the Swiss FRANC appreciated constantly, the RON/FRANC exchange rate increasing almost constantly over the period 2007-2012.

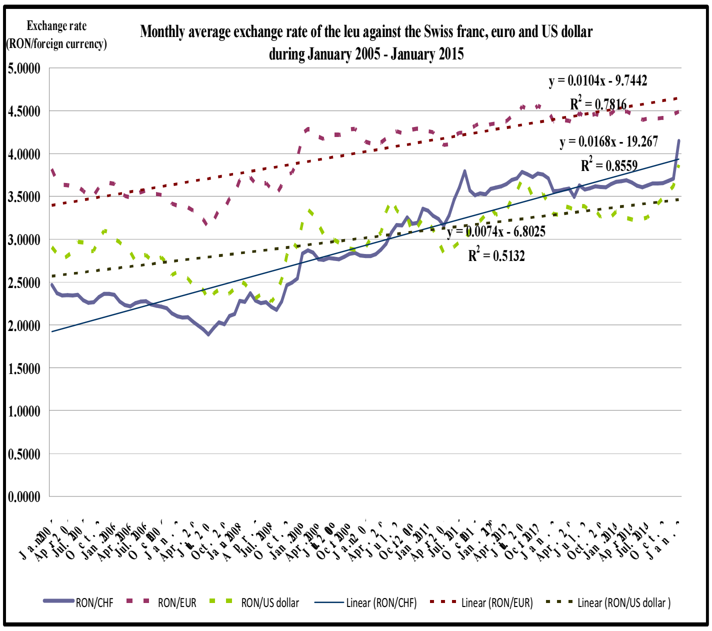
Returning to the definition of the tensions and to their classification, we may say that the evolution of the exchange rate RON/EURO and RON/USD, was according to the typology of the adaptive, slow, physiologically normal, inherent tensions, while RON/FRANC exchange rate displayed an accumulation or worsening in time, belonging rather to the acute type of tensions.

The evolution of the exchange rate of the national currency in relation with some hard currencies may produce tensions in economy, particularly if the products and services expressed in that particular currency hold an important share or they are influenced by the variation of that currency, the level of interconnection of the system (for instance, the financial-banking system) with the rest of the economy ort with the regional economies also being extremely important.

If we analyse strictly the evolution of the RON/Swiss franc exchange rate in January 2015, we may see that it is related to an exogenous tension, because it doesn't belong strictly to the national monetary market, being "imported" through the channel of the RON/Swiss franc exchange rate. We may also see that it is a horizontal type of tension, its effects being transmitted between the monetary markets from different countries, BNS decision being a spot decision, not anticipated by the central banks from Europe or worldwide, or by the markets, which shows that the evolution of the RON/Swiss franc exchange rate is sporadic, or accidental.

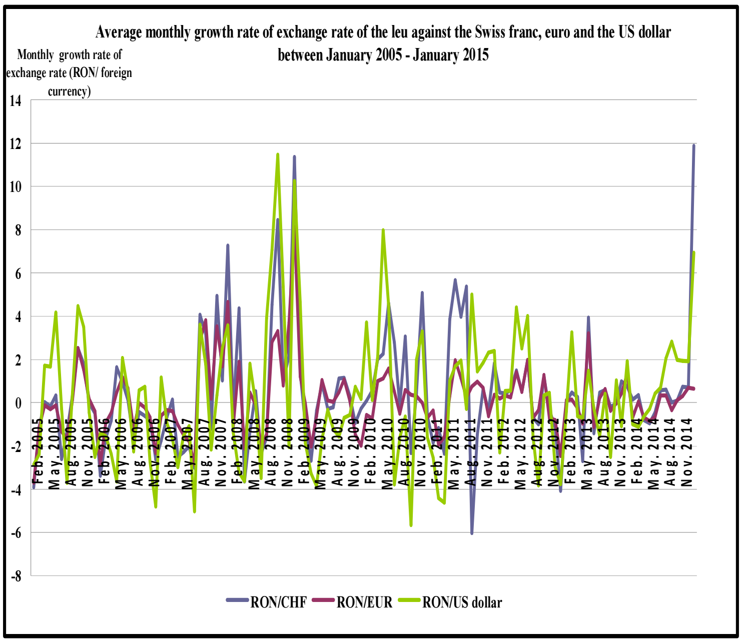
However, if we analyse the monthly evolution of the exchange rate of the Romanian RON in relation with these three hard currencies (Chart 2), we may notice that the evolution of RON/euro and particularly RON/Swiss franc exchange rates, is not that accidental, or unpredictable, as it may look at first sight.

Chart 2



Source: BNR data processed by the author

Chart 3



Source: BNR data processed by the author

The rate of increase of the RON/USD exchange rate cannot be considered too stable either, the monthly data showing strong variations in late 2008 and early 2009, May 2010, October 2010 and September 2011, slowing down somehow until late 2014 and early 2015, when it reached again high levels.

Thus, taking into account the above, we may say that the evolution of the exchange rate may generate significant tensions on the monetary market from Romania, not so much regarding the conventional currencies (although they are not spared either of important hazards!), but more regarding those currencies which escaped the vigilance of the financial and banking surveillance institutions, and which accumulated adverse effects which turned into vulnerabilities an even risks to the financial stability.

6. Conclusions

Although the problem of tensions often eludes a rigorous analysis of the weaknesses of an economy and even of the whole financial-banking system, the analyses focusing on the identification of the conditions of incertitude, vulnerabilities and risks, the fundamental and methodological clarification of the tensions (implicitly regarding those affecting the monetary market) may provide important theoretical bearings and may fundament the possible decisions for a better management of these tensions.

The article includes two levels of analysis: on the one hand, a theoretical and methodological study regarding the tensions, and on the other hand, an exemplification of the extent to which an important element of the monetary market – the exchange rate – fits the theoretical facts about the tensions, with punctual reference to the period January 2014 – January 2015.

Monitoring the annual (2005-2014) and monthly evolutions of the exchange rate of the Romanian RON against the Euro, the Swiss franc and the USD, we may notice an obvious increasing trend, which allows us saying that:

- Largely, the tensions generated by the evolution of the exchange rate, except for the period when the international crisis broke out, may be included in the category of the normal tensions, of state, adaptive, particularly regarding the exchange rate against the Euro; at the same time, the evolution of RON/Euro and RON/franc is confirmed significantly by trends;
- The monthly data from January 2005 to January 2015 regarding the rate of increase of the exchange rate show some tensed moments ("saw teeth") particularly for the RON/USD and RON/Swiss franc exchange rates, which calls utmost prudence on the side of the authorities;

- Although in January 2015, the decision of the Swiss National Bank to loosen the exchange rate of the Swiss franc against the Euro was unexpected, based on the obvious increasing trend of the RON/franc exchange rate in 2007-2012, it could have been somehow anticipated; would it have been announced earlier, its effects might have been less "painful" for the debtors in Swiss francs, both in Romania and abroad;

- Although the financial-banking legislation is extremely rigorous, the actors of the financial and monetary market (the commercial banks especially) can find ways to avoid or slacken the effects of the legislation, particularly of the prudential one, hoping for higher profits (such as services and products presented in an attractive manner without highlighting the potential losses and the risks assumed by the debtors, the currency risk in this case), creating serious problems for the financial stability.

References

1. Ailincă, A.G., Iordache, F., C.,Milea, 2013. "Theoretical Fundamentals Concerning the Transmission Channels from the Perspective of the External Equilibrium", Revista Anale. Seria Ştiinţe Economice, vol. XIX/2013 Facultatea de Ştiinţe Economice, Universitatea "Tibiscus" din Timişoara.
2. Barnett, J., 2001. "The Meaning of Environmental Security. Ecological Politics and Policy in the New Security Era", Ed. Zed, London.
3. Brauch, H.G., 2005. "Threats, Challenges, Vulnerabilities and Risks in Environmental and Human Security", „Studies of University: Research, Counsel,Education" – Publication Series of United Nations University, Institute for Environment and Human Security (UNU-EHS), nr.1/2005, Bonn, Germany.
4. Buzan, B., 1983. "People, States & Fear. The National Security Problem in International Relations". Ed. Harvester Books, Brighton.
5. Cardona, O.D., 2004. "The Need for Rethinking the Concepts of Vulnerability and Risk from a Holistic Perspective: A Necessary Review and Criticism for Effective Risk Management", in: Bankoff, Greg; Ferks, Georg; Hilhorst, Dorothea (Eds.): Mapping Vulnerability. Disasters, Development & People. Ed. Earthscan, London – Sterling, p.37-51.
6. Dinga, E., 2009. "On the Logically Vivid System. Theoretical and Applied Economics". Asociaţia Generală a Economiştilor din România - AGER. - Vol. 05(534).2009, 05(534), p. 45-62.
7. Grüske, K.-D.,Schneider, F., 2003. „Wörterbuch der Wirtschaft". Ed. Kröner, Stuttgart.

8. Jaeger, C. C., Renn, O., Rosa, E. A.,Webler, T., 2001. „Risk, Uncertainty, and Rational Action", Ed. Earthscan, London-Sterling.
9. Nathan, F., 2007. "Natural Disasters, Vulnerability and Human Security", in: Brauch H.G.; Grin, J.; Mesjasz, C.; Behera, N.; Chourou, B.; Oswald Spring, U.; Liotta, P. H. ; Kameri-Mbote. P. (Eds.): Facing Global Environmental Change: Environmental, Human, Energy, Food, Health and Water Security Concepts. (Berlin – Heidelberg – New York – Hong Kong – London – Milan – Paris – Tokyo: SpringerVerlag).
10. Oliver-Smith, A., 2004. "Theorizing Vulnerability in a Globalized World: A Political Ecological Perspective", in: Bankoff, Greg; Ferks, Georg; Hilhorst, Dorothea (Eds.): Mapping Vulnerability. Disasters, Development & People. Ed. Earthscan, London-Sterling, p.10-24.
11. O'Riordan, T., 2002. "Precautionary Principle", in: Tolba, Mostafa K. (Ed.): Encyclopedia of Global Environmental Change, vol. 4: Responding to Global Environmental Change. Ed. John Wiley, Chichester, UK, p. 369.
12. Peduzzi, P., 2000. "Insight of Common Key Indicators for Global Vulnerability Mapping", Presentation for the Expert Meeting on Vulnerability and Risk Analysis and Indexing, Geneva 11-12 September, UNEP/DEWA/GRID-Geneva.
13. Pop, N., 2008. "Virtuţi ale politicii monetare", Editura Expert, Bucureşti, România.
14. Tobin, G. A., Montz, B. E., 1997. „Natural Hazards. Explanation and Integration". Ed. Guilford Press, New York.

PUBLIC REVENUES AND SOCIAL POLARIZATION IN ROMANIA

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Abstract

Romania's public revenues to GDP are among the lowest in the EU, 34% of GDP in 2014 due to tax evasion, and the structure of GDP, some components which are not subject of taxation or taxed less. A low percentage of government revenue in GDP can be a positive factor for a functional market economy that allow more financing sources for investments in private sector. However, tax evasion is very dangerous for the economy because the tax burden is borne only by the fair of economic agents which may go in bankrupt or cannot develop. GDP per capita in Romania is less than a quarter of the EU average. Social polarization is high in Romania, the Gini coefficient is quite high for Romania, 34% in 2013, which demonstrates the high degree of poverty for some social categories. Aligning EU prices for electricity and gas can generate lower standard of living and serious social tensions.

Keywords: public revenues, expenditures, tax collection, social polarization

JEL Classification: A11, B22, F02, G18.

1. Application of Laffer's theory to the realities of Romania

Macroeconomist Arthur Laffer was one of the architects of modern American economic policies. Laffer's theory (Laffer Curve) says that under certain conditions, tax cuts stimulate the economy and can bring greater public budget revenues, while tax increases may lead to reduced budget revenues if it passes a certain level of endurance tax burden.

An efficient tax system to ensure that economic development can be achieved by simplification, fewer tax to ensure those revenue necessary for the functioning of the state. Arthur Laffer present the benefits of applying flat tax on the economy which are very high especially in developing countries with relatively high degree of corruption and legislative instability. Tax amnesty is seen as a turning point for a tax system that is trying to become more accurate.

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Replacing a tax system where corruption is widespread with another fairer, simpler, transparent is good to be preceded by amnesty tax.

A modern tax system should encourage work should not pay lazy, non-working, and those workers who are supporters of functional economy not to overly taxing. A balance must be found, even if people do not like unpleasant things, and taxes must be made less unpleasant as possible. Spending public money must be based on the principle of efficiency and tax collection to be in the least harmful to the functioning economy.

Tax evasion can be combated only by a institution built on moral principles and professional competence. National Agency for Fiscal Administration must have personal integrity, from the inspectors to directors of administrations.

Creating a database with information related tax payers must be supported by analyzing the results of tax audits. You need a more elaborate economic sectors prone to great evasion and inspections must not be left to the discretion of the inspector but they must be made from a program well done, a soft match.

In Western countries eCommerce bring their significant contribution to the formation of public revenues and therefore in this area is necessary based on a thorough and appropriate software.

Production, purchase and import of energy products, alcoholic beverages should be carefully controlled and monitored.

Romanian Banking Association (ARB) and the National Agency for Fiscal Administration founded the electronic setting / lifting attachment of money held by borrowers at commercial banks.

All taxpayers should have an access to their tax file, which should be integrated into an electronic database more transparent. Tax returns should be much simpler and can be submitted electronically.

In western countries where assistance is provided online to contributors using the Internet, information technology and communications to us this is still a desideratum.

Collection of public revenues to the budget should be on the principles of efficiency and effectiveness and expertise of advanced states can be very useful. No expensive software must be purchased and unusable but some relatively cheap and good applicability to the realities of the economy of Romania.

Romania is the second smallest size of government revenue to GDP from EU data found in Table1.

Table 1

Public revenues as percentage in GDP

COUNTRY/ YEAR	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
EU(28)	43,8	44,2	44,6	44,6	44,6	44,1	44,1	44,6	45,4	45,7
Belgium	48,9	49,3	48,8	48,1	48,7	48,1	48,7	49,6	51,0	51,8
Bulgaria	40,4	38,3	36,2	40,4	40,1	37,1	34,3	33,6	35,0	37,2
Czech Rep.	40,4	39,8	39,6	40,3	38,9	38,9	39,1	40,0	40,3	40,9
Denmark	56,4	57,8	56,6	55,6	54,8	55,3	55,0	55,7	55,5	56,3
Germany	43,3	43,6	43,7	43,7	44,0	45,2	43,7	44,3	44,8	44,7
Estonia	35,6	35,2	36,1	36,4	36,7	42,8	40,7	38,7	39,2	38,1
Ireland	35,1	35,6	37,4	36,9	35,4	34,5	34,9	34,0	34,5	35,9
Greece	38,1	39,0	39,2	40,7	40,7	38,3	40,4	42,2	44,4	45,8
Spain	38,8	39,7	40,7	41,1	36,9	35,1	36,7	36,2	37,2	37,8
France	49,6	50,6	50,6	49,9	49,9	49,2	49,5	50,7	51,8	52,8
Croatia	41,4	41,2	41,4	42,1	41,5	40,8	40,5	40,3	41,0	41,2
Italy	44,0	43,4	45,0	46,0	45,9	46,5	46,1	46,1	47,7	47,7
Cyprus	38,3	40,7	41,4	44,8	43,1	40,1	40,9	39,9	39,4	40,3
Latvia	34,8	35,4	37,7	35,3	34,7	34,5	35,3	34,9	35,1	35,1
Lithuania	32,5	33,5	33,7	34,3	34,6	35,5	35,0	33,2	32,7	32,2
Luxembourg	41,5	41,5	39,9	39,9	42,3	44,5	42,8	42,7	44,0	43,6
Hungary	42,6	42,2	42,7	45,6	45,5	46,9	45,6	54,3	46,6	47,7
Malta	39,0	40,7	40,4	39,5	38,7	38,8	37,7	38,6	39,8	40,9
Netherlands	44,3	44,5	46,1	45,4	46,7	45,8	46,3	45,6	46,4	47,3
Austria	49,2	48,2	47,5	47,6	48,3	48,5	48,3	48,3	49,1	49,7
Poland	37,2	39,4	40,2	40,3	39,5	37,2	37,5	38,4	38,3	37,5
Portugal	41,4	40,1	40,6	41,1	41,1	39,6	41,6	45,0	40,9	43,7
Romania	32,3	32,4	33,3	35,3	33,6	32,1	33,3	33,9	33,7	32,7
Slovenia	43,4	43,6	43,0	42,2	42,2	42,3	43,6	43,5	44,4	44,7
Slovakia	35,3	35,2	33,3	32,4	32,8	33,5	32,3	34,1	33,7	35,9
Finland	52,5	53,0	53,3	52,7	53,6	53,4	53,0	54,1	54,5	56,0
Sweden	54,6	55,8	54,9	54,5	53,9	54,0	52,3	51,5	51,2	51,6
United Kingdom	39,1	40,0	40,8	40,5	42,1	39,6	39,8	40,3	42,0	41,4
Iceland	44,0	47,1	48,0	47,7	44,1	41,0	41,5	41,8	43,6	44,2
Norway	56,2	56,8	58,3	57,6	58,6	56,7	56,3	57,5	57,2	55,5
Switzerland	33,8	34,1	33,8	33,1	34,0	34,9	34,1	34,4	33,8	:

Source: http://epp.eurostat.ec.europa.eu

This report on the size of public revenues is positive in that they allow the private sector to reach higher amounts of money, which theoretically can spur economic growth, and having some less good, by remaining less money for infrastructure and public investment and much of the public goods of social programs such as education, health, should be covered from income population of firms.

The solution of the problem and a possible path to economic recovery is finding that optimal level of taxation to which the public or private sector plus must be greater than minus private or public sector.

Prestigious economist Arthur Laffer explanation was remarkable not only that it provided a link between the rate of taxation and state revenues from tax collection, but put in front the two effects, economic and arithmetic.

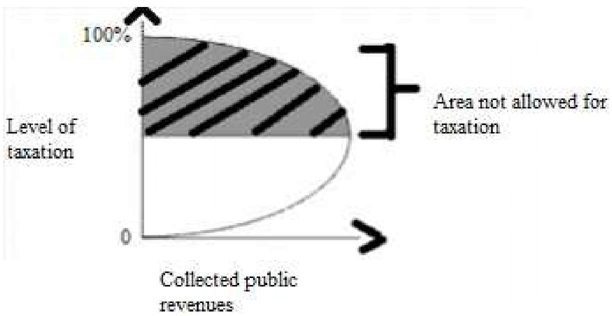
Laffer Curve shows that income grows faster in lower levels of taxation. As the rate increases, income increases at a decreasing rate until it reaches the maximum level of revenue collected by the state, the equilibrium point. Beyond this limit, any increase in the tax rate causes people to work less or find effective methods by which to evade the payment obligations to the state, reducing government revenue.

In other words, the revenue collected by the state in terms of a lower rate of income tax is the same as that obtained at a considerably higher tax rate.

Laffer study shows how governments can get the same income in two different ways: either by collecting high taxes from a smaller number of people, either by imposing a small tax to a number of people.

Figure 1

Laffer Curve (connection between the tax rate and taxable income)



Source: Adaptation of the Graphic provided by Garrett T and Leatherman J.C. An Introduction to State and Local Public Finance, Regional Research Institute, West Virginia,2000

Laffer's theory shows that at a tax rate of 0%, the government will collect no income tax, as would happen at a rate of 100% because no one would work without receiving any money. This theory confronts two effects, one economic and one arithmetic. Basically, after passing a certain level of endurance, increase tax rates will reduce revenues collected by the state. Lower tax rates have a positive effect on employment growth, employment and production, they are incentives for economic growth. Increasing tax rates can lead to economic downturn.

Fiscal policy objective should not be to maximize government revenue but sustainable growth while opening new business opportunities. Often economic recovery appears to enter into force as soon as major tax cuts. However reductions in taxation is not sufficient to reduce the budget deficit strengthened if nothing is done and the efficiency of public spending.

Currently more economically advanced countries provide a policy of high taxes resulting in a modest growth. Laffer theorists propose a reduction in tax rates to stimulate growth and increase household savings and businesses. In the United States, in 1990, George Bush administration increased taxes, then Clinton administration has raised further in 1993 and decreased again economies. The US economy had instead a very good monetary policy during this time managing to keep savings to acceptable levels while maintaining the company's capital accumulation stimulating technical progress, discoveries and developments. The solution to the problem of the federal budget should include also spending restrictions. Tax cuts are not sufficient to reduce the deficit. Raising taxes in order to balance the budget, to reduce the deficit proved on many occasions as the worst solution, this measure is pro-cyclical and leads to a increased economic recession. The discussion is still on, some left economists say the economy can not grow, and inflation can be kept at reduced rates while decreasing the high income taxes. However a fiscal relaxation, which is a stimulant of growth can be successful with implementing a mechanism to reduce tax evasion.

It is a philosophy of the right policies that says as the best way to help the poor is not to make the rich poorer, but to make the poor richer. All Americans as a whole have got richer as a result of policies offer pro-growth. Obama administration, pulled out the US of deep economic crisis and promoted a tax system where the rich should pay more, big companies, the pillars of economy are paying highest fees and provide the largest part of the American public revenues.

2. Income distribution in Romania

Overall, nominal convergence is closeness absolute values or nominal growth rates of indicators such as the budget deficit, public debt, inflation and exchange rate. In the strict sense, is closeness of the level of prices in different countries.

Real convergence means comparing living standards in a country with the others considered to be standard. The national economy must be rebuilt and strengthened in European spirit not through pension cuts, layoffs or salary but by cooptation of minds, of high moral economists who will focus the nation's creative effort to bring large projects capable of sustainable growth and Sustainable Development. A great thinker, Gandhi said: ,,There are enough resources for everyone's needs, but not for everyone's greed". A better allocation of resources, equitable implies a more efficient use of public spending relative to public needs. Step towards to market economy hasn't brought Romania, the growth of our dreams or a standard of living much better. Compared with the communist period, social polarization has increased dramatically, disparities are huge social and infrastructure deficits have widened.

The accumulation of wealth is back often looting public money. If 1989 was a net creditor country, now we can say that we ought sold debt at the end of May Romania is 78 billion euros according to National Bank of Romania and GDP is about 150 billion euros for the year end of 2014. Basically, Romania living on credit for 25 years, consumer credit, because the economy hasn't experienced a massive refurbishment and therefore relies mainly on "Services". Services occupy 52% of GDP, only 30% industry, 11% construction, agriculture 7%. The governors didn't pay for unsatisfactory results, it isn't a responsibility for public spending or for the massive debt for future generations.

In the developed countries the Government can increase deficits and state debt do only after Parliament's vote, here is at the pleasure of those who succeed in government.

We are in search of moral guidelines both in the economy and in society. The disappearance of the centralized system destroyed unfortunately a scale of values, based on professional criteria and often put in place imposture, mediocrity, theft.

To build a solid edifice must overcome the crisis of national dignity, this gray period in which we minimize the efforts, sacrifices and sufferings. Romanian people is a respectable Christian people that formed two thousand years ago in Dacia, from the union of Dacians and Romans. In just a few years we will celebrate one hundred years from the Great Union, the culmination of the centuries of Romanians dreams. A new spirit must be felt to be buried hatred and division to follow national interest, economic growth resulted in a higher standard of living and affirmation in European context of deeply and spiritual Romanian values. As we had political leaders and economists who have contributed to the creation of the modern Romanian state, so now the creative effort of this nation must concentrate for major infrastructure projects that will bring prosperity and value added. Instead brakers of monuments, the cutters of wages, social benefits should have moral people to build a state of prosperity as our aspirations and possibilities given by the education and training of the Romanians, the riches of the soil and subsoil, by location and varied landforms.

Membership in the European Union and NATO should we make our life much easier. In the table below we see how big is the national salary (GDP) per capita of Romania, a quarter of the EU average (Table 2).

Table 2

GDP per capita of Romania in Euro

GEO/TIME	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
European Union (28 countries)	22.100	22.400	23.100	23.800	23.700	22.600	23.000	23.300	23.200	23.200
Belgium	28.600	29.000	29.500	30.200	30.200	29.200	29.600	29.800	29.600	29.500
Bulgaria	2.800	3.000	3.200	3.400	3.700	3.500	3.500	3.700	3.700	3.800
Czech Republic	9.600	10.200	10.900	11.500	11.700	11.100	11.400	11.600	11.500	11.300
Denmark	37.500	38.300	39.400	39.900	39.300	36.900	37.300	37.500	37.200	37.200
Germany	26.800	27.000	28.000	29.000	29.300	27.900	29.100	30.000	30.200	30.200
Estonia	7.600	8.300	9.200	9.900	9.500	8.100	8.400	9.100	9.500	9.800
Ireland	37.800	39.200	40.300	41.000	39.300	36.400	35.900	36.500	36.400	36.200
Greece	17.100	17.400	18.300	18.900	18.800	18.200	17.400	16.200	15.100	:
Spain	20.600	21.000	21.500	21.800	21.700	20.700	20.600	20.600	20.200	20.100
France	27.000	27.300	27.800	28.200	28.100	27.000	27.400	27.800	27.600	27.600
Croatia	8.000	8.400	8.800	9.200	9.400	8.800	8.600	8.600	8.400	8.400
Italy	24.500	24.500	24.900	25.100	24.700	23.200	23.500	23.500	22.800	22.400
Cyprus	18.000	18.400	18.900	19.400	19.600	18.700	18.500	18.100	17.400	16.400
Latvia	5.200	5.800	6.500	7.200	7.000	5.900	5.900	6.400	6.800	7.100
Lithuania	5.800	6.300	6.900	7.700	8.000	6.900	7.100	7.700	8.100	8.500
Luxembourg	62.700	65.000	67.200	70.400	68.700	63.700	64.500	64.200	62.600	62.400
Hungary	8.400	8.800	9.200	9.200	9.300	8.700	8.800	8.900	8.800	9.000
Malta	11.900	12.200	12.500	12.900	13.400	12.900	13.400	13.500	13.500	13.800
Netherlands	30.900	31.500	32.500	33.700	34.200	32.700	33.100	33.200	32.700	32.300
Austria	29.300	29.800	30.800	31.800	32.100	30.800	31.300	32.100	32.200	32.200
Poland	6.200	6.400	6.800	7.300	7.600	7.800	8.000	8.300	8.500	8.700
Portugal	14.600	14.600	14.800	15.100	15.100	14.600	14.900	14.700	14.300	14.300
Romania	3.600	3.700	4.100	4.400	4.800	4.500	4.500	4.600	4.700	4.800
Slovenia	13.800	14.400	15.100	16.100	16.600	15.200	15.300	15.400	15.000	14.800
Slovakia	6.700	7.100	7.700	8.500	9.000	8.600	8.900	9.200	9.400	9.500
Finland	29.300	30.000	31.200	32.700	32.700	29.700	30.600	31.300	30.900	30.300
Sweden	32.200	33.000	34.300	35.100	34.700	32.600	34.500	35.200	35.300	35.600
United Kingdom	30.200	31.000	31.700	32.500	32.100	30.200	30.500	30.600	30.200	30.600
Iceland	41.800	44.300	45.100	46.700	46.100	43.100	41.500	42.500	42.800	43.800
Liechtenstein	:	:	:	:	:	:	:	:	:	:
Norway	51.900	52.900	53.700	54.600	53.900	52.400	52.000	52.000	52.800	52.500
Switzerland	40.400	41.300	42.500	43.800	44.200	42.800	44.200	44.500	44.600	45.000
FYR of Macedonia	2.300	2.400	2.500	2.600	2.800	2.700	2.800	2.900	:	:
Serbia	2.600	2.700	2.800	3.000	3.100	3.000	3.100	3.100	3.100	:
Turkey	5.300	5.700	6.000	6.300	6.200	5.800	6.300	:	:	:
United States	34.700	35.600	36.200	36.500	36.000	34.700	35.300	35.600	36.200	36.700
Japan	28.500	28.800	29.300	29.900	29.700	28.100	29.200	29.200	:	:

Source: http://epp.eurostat.ec.europa.eu

Regarding national salary (GDP) per capita of Romania at purchasing power parity it is half the EU average (Table 3).

Table 3

GDP per capita at purchasing power parity Romania

Country\Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
EU (28 countries)	100	100	100	100	100	100	100	100	100	100
Belgium	121	119	117	115	115	117	120	120	120	119
Bulgaria	34	36	37	40	43	44	43	44	45	45
Czech Republic	79	80	81	84	82	83	81	83	82	82
Denmark	125	123	124	122	123	123	126	126	125	124
Germany	116	116	115	116	116	115	119	122	123	122
Estonia	55	60	64	69	68	62	63	68	71	73
Ireland	143	145	146	147	132	128	129	130	130	130
Greece	95	91	93	91	93	94	87	77	74	73
Spain	100	101	103	103	102	101	98	95	94	94
France	110	110	108	107	106	108	108	108	107	107
Croatia	57	58	58	61	64	62	59	60	61	61
Italy	108	107	106	105	106	105	104	103	101	99
Cyprus	97	99	99	100	105	105	102	96	93	89
Latvia	48	51	55	60	60	53	53	57	60	64
Lithuania	50	53	56	61	63	57	60	65	69	73
Luxembourg	246	242	257	254	256	247	254	265	264	257
Hungary	62	62	62	61	63	64	65	65	65	66
Malta	81	81	79	78	81	84	86	84	84	86
Netherlands	133	133	135	136	139	137	135	135	132	131
Austria	128	125	125	123	124	126	126	128	129	128
Poland	49	50	50	53	55	59	62	64	66	67
Portugal	77	80	80	79	79	81	81	78	76	79
Romania	34	35	38	42	48	49	50	51	53	55
Slovenia	86	86	86	87	89	85	83	83	82	82
Slovakia	57	60	63	67	71	71	73	73	74	75
Finland	117	116	115	118	120	116	115	117	115	113
Sweden	129	124	125	128	127	123	126	127	126	127
United Kingdom	125	125	123	118	114	112	108	106	107	109
Iceland	132	130	123	123	125	123	117	115	116	119
Norway	163	175	182	179	189	174	177	182	190	186
Switzerland	134	132	135	139	144	145	147	159	162	163
Montenegro	:	30	35	39	42	41	40	41	39	40
FY R of Macedonia	27	30	31	31	33	35	35	34	34	36
Albania	:	22	23	24	26	29	28	28	28	28
Serbia	:	32	33	33	36	37	36	36	37	37
Turkey	38	41	43	44	45	45	48	51	52	53
Bosnia and Herzegovina	:	24	24	25	27	27	27	28	28	29

Source: http://epp.eurostat.ec.europa.eu

It is very difficult to talk of prices paid by Romanians in a correlation with the EU, especially in electricity, gas, heating when our revenues are so small compared to theirs, less than a quarter of the EU average in nominal terms.

Power consumption by the population continue to be subsidized because income Romanians are far from the European Union.

Real life differences are even greater than the GDP / capita shows, for us is much greater social polarization. Adjustments must be made carefully to avoid causing social explosions. In neighboring

Bulgaria, a government was changed overnight by people onto the streets because the government increased electricity prices.

It is good for economic reforms, budgetary changes or price sensitive social impact to be done as a result of the public consultation because an important role in publishing budget law is to make government responsible to the public for actions taken. The perfect moment for a viable reform must be a boom period because this reform process creates reserve money for times of crisis and requires a logical distribution of funds in emergency situations, such social costs would be more tolerable and the freedom of choice is not altered as is happening in the time of a crisis.

The Italian economist Corrado Gini coefficient invented in 1912, the Gini coefficient which measures inequality of income distribution, the share of national wealth held by each social category. Its value ranges from 0 to 1. The ratio is even lower as the differences in the distribution are smaller. World Gini values lie between 0.24 (24%) in Sweden and 0,707 (70.7%) in Namibia. In the table below is attached Gini coefficient for Romania and EU countries.

In 1989, the Gini coefficient for Romania was 0.23, which means that, in terms of equity income distribution we were close to the level that is now Sweden. In 2013, the coefficient reached 0.34, Romania with a high level in terms of inequality of income distribution. Basically costs are unfairly distributed exiting recession and social explosion hazard is greater (Table 4).

Table 4

Gini coefficient on the distribution of disposable income

Country\Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
EU (28)	:	:	:	:	:	:	30,5	30,8	30,4	30,5
EU (27)	:	30,6	30,3	30,6	30,9	30,5	30,5	30,8	30,4	30,5
EU (15)	30	29,9	29,6	30,3	30,8	30,5	30,6	30,9	30,5	30,4
Belgium	26,1	28	27,8	26,3	27,5	26,4	26,6	26,3	26,5	25,9
Bulgaria	26	25	31,2	35,3	35,9	33,4	33,2	35	33,6	35,4
Czech Republic	:	26	25,3	25,3	24,7	25,1	24,9	25,2	24,9	24,6
Denmark	23,9	23,9	23,7	25,2	25,1	26,9	26,9	27,8	28,1	27,5
Germany	:	26,1	26,8	30,4	30,2	29,1	29,3	29	28,3	29,7
Estonia	37,4	34,1	33,1	33,4	30,9	31,4	31,3	31,9	32,5	32,9
Ireland	31,5	31,9	31,9	31,3	29,9	28,8	30,7	29,8	29,9	:
Greece	33	33,2	34,3	34,3	33,4	33,1	32,9	33,5	34,3	34,4
Spain	31	32,2	31,9	31,9	31,9	33	34,4	34,5	35	33,7
France	28,2	27,7	27,3	26,6	29,8	29,9	29,8	30,8	30,5	30,1
Croatia	30	30	28	29	28	27	31,6	31,2	30,9	30,9
Italy	33,2	32,8	32,1	32,2	31	31,5	31,2	31,9	31,9	32,5
Cyprus	:	28,7	28,8	29,8	29	29,5	30,1	29,2	31	32,4
Latvia	:	36,2	38,9	35,4	37,5	37,5	35,9	35,1	35,7	35,2
Lithuania	:	36,3	35	33,8	34	35,9	37	33	32	34,6
Luxembourg	26,5	26,5	27,8	27,4	27,7	29,2	27,9	27,2	28	30,4
Hungary	:	27,6	33,3	25,6	25,2	24,7	24,1	26,8	26,9	28
Malta	:	27	27,1	26,3	28,1	27,4	28,6	27,2	27,1	27,9
Netherlands	:	26,9	26,4	27,6	27,6	27,2	25,5	25,8	25,4	25,1
Austria	25,8	26,3	25,3	26,2	27,7	27,5	28,3	27,4	27,6	27
Poland	:	35,6	33,3	32,2	32	31,4	31,1	31,1	30,9	30,7
Portugal	37,8	38,1	37,7	36,8	35,8	35,4	33,7	34,2	34,5	34,2
Romania	31	31	33	37,8	36	34,9	33,3	33,2	33,2	34
Slovenia	:	23,8	23,7	23,2	23,4	22,7	23,8	23,8	23,7	24,4
Slovakia	:	26,2	28,1	24,5	23,7	24,8	25,9	25,7	25,3	24,2
Finland	25,5	26	25,9	26,2	26,3	25,9	25,4	25,8	25,9	25,4
Sweden	23	23,4	24	23,4	24	24,8	24,1	24,4	24,8	24,9
United Kingdom	:	34,6	32,5	32,6	33,9	32,4	32,9	33	31,3	30,2
Iceland	24,1	25,1	26,3	28	27,3	29,6	25,7	23,6	24	24
Norway	25,2	28,2	29,2	23,7	25,1	24,1	23,6	22,9	22,5	22,7
Switzerland	:	:	:	30,4	31,1	30,7	29,6	29,7	28,8	28,5

Source: Eurostat Database Interactive

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References

1. Bradley J., Untiedt G., Mitze T., 2007. "Analysis of the impact of cohesion policy", a note explaining the HERMIN-based

simulations.
2. Campbell R., McConnell L. Brue, 1998, Economics, Editor Richard D. Irwin, Boston.
3. Dobrescu E.M., Barna C., 2010, “Fonduri structurale şi depăşirea crizei economice”, Annales Universitatis Apulensis Series Oeconomica, vol. 2, issue 12.
4. Ederveen S., Groter J., De Mooji R., Nahuis R., 2002, “Funds and games: The economics of european cohesion policy”. Special Publication 41, CPB Netherlands'Bureau for Economic Policy Analysis, The Hague.
5. Gramlich E., 1994, “Infrastructure investment: A review essay”. Journal of Economic Literature, 32(3):1176-1196.
6. Ederveen S., Groot H., Nahuis R., 2006, “Fertile soil for structural funds? a panel data analysis of the conditional effectiveness of European cohesion policy”. Kyklos, Blackwell Publishing.
7. Garrett T and Leatherman J.C., 2000 “An Introduction to State and Local Public Finance”, Regional Research Institute, West Virginia.
8. Gros D., 2008, “How to achieve a better budget for the european union?” CEPS Working Document 289, Center for European Policy Studies, Brussels.
9. Herve Z., Holzmann R., 1998, “Fiscal Transfers and Economic Convergence in the EU : An Analysis of Absorption Problems and an Evaluation of the Literature”. Nomos Verlagsgesellschaft, Baden-Baden.
10. Jones C.I., 1995, “R&D-based models of economic growth”. Journal of Political Economy.
11. Jula D., Jula N.M., 2010, “Metode de prognoză”, Editura Mustang.
12. Jones C.I., 2002, “Source of U.S. economic growth in a world of ideas”. American Economic Review.
13. Katz L.F., Murphy K.M., 1992, “Changes in relative wages”, 1963-1987: Supply and demand factors. Quarterly Journal of Economics.
14. Ratto M., Roeger W., Veld J., 2008, “Quest III: An estimated DSGE model of the euro area with fiscal and monetary policy”. Economic Modelling (forthcoming), also published as: European Economy Economic Paper no.335, European Commission Directorate-General for Economic and Financial Affairs, Brussels.
15. Roeger W., Varga J., Veld J., 2008, “Structural reforms in the EU: A simulation-based analysis using the QUEST model with endogenous growth”. European Economy Economic Paper 351, European Commission Directorate-General for Economic and

Financial Afairs, Brussels.
16. Varga J., Veld J., 2009, “A Model-based Assessment of the Macroeconomic Impact of EU Structural Funds on the New Member States”. European Commission Directorate-General for Economic and Financial Affairs, Brussels).
17. * *, 2003, “Impactul Fondurilor Structurale în România, evaluare cu ajutorul Modelului structural HEROM”, Program Phare Ro 2003/005-551.02.03, Centrul Român de Politici Economice.
18. * *, Baza de date interactivă 2001-2014, EUROSTAT, Biroul de statistică al Uniunii Europene.
19. * *, Raport anual 2012 şi buletinele lunare 2009 – 2014, Baza de date interactivă 2001-2014, Banca Naţională a României.
20. * *, “Anuarul Statistic al României 2005-2014”, Institutul Naţional de Statistică, Bucureşti.
21. * *, “Baza de date interactivă 2001-2015”, Ministerul Finanţelor Publice.

BRIEF ANALYSIS OF THE PATH FROM BANK-BASED FINANCIAL INTERMEDIATION TO SECURITIZATION

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Abstract

Financing through securitization can be seen most probably as one of the most important financial innovations in the second part of the last century, unfortunately as we all know the rapid growth of the securitization market was also a primary factor in the 2008 global financial crisis. This paper shall shortly outline the transition from banking intermediation to a structural shift away from financing by banks and the role of securitization in this process. Within the securitization process, a company is able to obtain funds in the capital markets at a lower cost, than if it could have raised the funds directly by issuing more debt or equity. This technic allows for credit to be provided directly to market rather than through financial intermediation, which can be seen in an increasing trend towards disintermediation, also often referred to as "cutting out the middlemen." However, the financial crises taught us that banks should keep a critical role in the finance system, guaranteeing that their interests are aligned with those of investors thus trying to prevent the excesses of the total disintermediation models that have substantially led to subprime crisis.

Keywords: securitization, banking, ABS, capital market, structured finance, intermediation

JEL Classification: G21, G 23, G24

In this paper, I am giving a short overview on the nature of financial intermediation, on the birth of financial disintermediation and the rise of securitization as a method of financial intermediation. The latter is often seen as a method facilitated by banks and other financial institutions, but unlike the traditional banking activity the institution does not stand as a permanent intermediary between debtor and creditor.

1. Review of financial Intermediation and its advantages

A market with a perfect competition structure, so called *"in vitro"* case, can be described as a market with no transaction costs,

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whose players operate in a rational manner in the absence of any restrictions. Both buyer and seller own complete information on a particular product offered as well as on the prices charged by each company. I would also refer to a perfect market as one with pure competition, the other side of the coin being describing a monopoly market.

According to Riegler (2004), a perfect competition market should meet the following features:

- Competition is perfect - there are numerous companies and none of them holds a significant market share; no manufacturer and no purchaser may influence the price;
- Perfect information, complete information - meaning that the market prices precisely reflect the existing information; the prices set by all the companies are known to all manufacturers and consumers;
- There are no frictions generated by the transaction costs and taxes; all goods may be traded or distributed according to the needs, meaning that there are no constraints / limits for absorption or deposit of capital;
- The products are homogeneous and the company may easily enter or exit the respective branch. Homogeneous products means that similar products of various companies may be substituted for each other
- The market players maximize their expected likely profit.

In a perfect financial market, the gain of the financial intermediaries is zero. The banks, rating agencies or insurance companies could not exist as financial intermediaries in such a perfect market.

Ignoring however this ideal form of financial market, one can notice that there are two types of economic subjects in a real world modern economy based on work division. On the one hand, there are those who obtain much higher income than they need to cover their planned expenses and, on the other one, there are those whose income is not sufficient in order to cover their necessary expenses. In a real market, a balance between the two groups is always precarious, and I think most of the time being impossible to reach. The financial intermediaries are making use of the market imperfections, taking over some of its functions - more precisely, transferring the surplus payments of the first group to the second one, that need resources for investment.

In theory, the definitions actually designate as financial intermediaries those institutions mediating between those who offer capital and the beneficiaries, guaranteeing to the latter the satisfaction of their financial preferences. The banks, which take over capital from various depositors, in order to make it afterwards available to those requiring financing, in the form of loans, may be regarded as financial intermediaries in a limited sense, as described by Hartmann-Wendels et al. (1998). During the last years it could be noticed that gradually, the circle of financial intermediaries extended considerably, including in a broad sense, in addition to traditional banks, building societies, insurance companies, companies such as venture-capital funds, credit card companies, as well as leasing companies. Consequently, this broad sense includes those institutions facilitating or simplifying trade between those who have and those who need capital.

The appearance of the financial intermediation is first of all the result of the will to save the transaction costs and simplify the transmission of information (Paul, 2003).

If there were neither organized capital markets nor intermediaries, those offering capital would be forced to look themselves, among potential applicants, for those corresponding to their own expectations in terms of risk, benefits and time horizon. However, such search would generate high costs with the initiation of the deal, with its conclusion and performance, with the control operations, etc. considerably reducing the chances to sign such contracts. The financial intermediation facilitates the reduction of the costs related to transactions, starting from the fact that these institutions specialized in operating with concrete, valuable information regarding the respective market, having the possibility to provide to the creditors and credit beneficiaries a meeting space, which reduces both the transaction costs and the insecurity related to the borrower's creditworthiness. The price for such an operation is much smaller than in the case of direct contacts.

The asymmetrical transmission of the information is a second reason for increasing the role of the financial intermediaries. According to Avado (2013), depending on their education level, the contractual partners, a principal and an agent, may face several problems:

- Some hidden information may arise throughout the Principal – Agent relationship. The Agent's actions may be transparent or observable, but the Principal has limited information and cannot have a comprehensive understanding of the operation modality of the agent. The Agent's opportunism to the disadvantage of the Principal is called Moral Hazard
- Just like the "hidden information", "hidden action" may also arise during the P-A relationship. The agent may choose negotiation modalities which are not known or are hidden from the Principal that the latter may use only with additional payments. The Principal shall have the solution but it does not know how the result was reached – either by a turn of events or due to the agent (Spreman, 1990).

By such asymmetrical distribution of the information, one of the participants in the negotiations could have additional advantages and, for this reason, the financial intermediaries facilitate a balanced distribution of the information. For a quantitative and qualitative balancing of the offer with the demand for capital, the financial intermediation has the following functions: transfer, sizing of the capital volumes, supervision of loan maturity terms and turning them into liquidities, balancing the risks undertaken by the parties, transfer of logistics, services and information.

2. Disintermediation - a new trend on the financial market

One of the most revolutionary changes in the financial markets is the increasing trend towards disintermediation, also often referred to as "cutting out the middlemen." Financial disintermediation can take different forms, from traditional bond issuance to direct lending to companies by non-bank investors up to securitization. Disintermediation has become increasingly important in financial markets, largely because of the increasing use of securities to raise capital from capital markets, rather than from banks.

At the beginning of the 80's, a trend of the investors and debtors to get rid of the intermediaries was noted for the first time in the financial markets. An increasing number of institutions, who held consistent reserves of liquidities, started to bypass the companies dealing with intermediation and to directly reach the investors in the capital market (Franzen, 1988). The direct relationship between those who offer capital and those benefiting from such, bypassing the intermediary, has been defined as Disintermediation. Companies that would once have financed themselves with bank loans are increasingly looking for finance from the bond markets. As disintermediation one can name any situation that occurred whenever bank lenders could be offered a better deal from non – banking alternatives. It was mainly driven by high deposit insurance premiums above the ceilings set by the old Regulation Q, high cost of raising bank capital and very often also by the impossibility of even obtaining it, Napoli and Baer (1991). Capital seekers started to meet their financing needs not with bank loans but with securities issues, as well as investors who turned away from investing in time- or savings deposits respectively other long-term refinancing instruments, to directly investing on the capital market. As a response to this behavioural change, financial institutions do no longer play a mediating role in the traditional banking transaction but initiate disintermediation and increasingly start to act as facilitators or conduits of financial transactions.

As mentioned above, a first aspect of the process of disintermediation is the listing of numerous companies on the stock exchange market or their opening to the foreign capital markets, bypassing the banks as secured or unsecured lenders. A second aspect is the “birth” of the so-called asset-based financing (Bertl, 2004), the concept of securitisation going hand in hand with the trend of disintermediation. Historically, although perceived as a financial innovation of the 80’s, securitisation existed as a trend as early as the 50’s, when an important part of the new issues were industrial bonds. Asset based securitisation can be seen as indirect disintermediation – while disintermediation emulates traditional financial intermediation, securitisation breaks with it and changes the form of claims from loans to securities.

Mainly, three steps of the Disintermediation phenomenon may be identified. The first, called banking intermediation, is characterized by the fact that the bank takes over, in its capacity as financial intermediary, the function of liaison between the investor and the debtor. The bank develops independent relations with each of the two players. The intermediated market, the second stage, consists in facilitating / the possibility of concluding the contract only by the existence of intermediary institutions between the parties involved - creditor and borrower. Finally, the third step is the direct relationship between the two parties, who assume all the risks of the transactions. The credit institution, as intermediary, is excluded from the financing process and, consequently, what is called “disintermediation” is a complete action.

However, the financial intermediaries have no fears of the risk of a possible complete elimination or obsolescence of their function up to the point that they are no longer used. This trend represents, however, for the financial intermediaries, the replacement of the interest-based business with an off-balance sheet built around fees. Thus, the question “why do we still need the banks”, asked by Engels (1993), receives an answer: the private budgets of the small and medium-sized entrepreneurs find it impossible nowadays to find - without the help of the credit institutions as intermediaries - a way to financing of securities. Nowadays, banking loan (still) remains the most flexible lending modality.

3. Securitisation: Introduction to the major financial innovation of the 20th century

Explained in simple words, securitization allows depository institutions, finance companies and other non – financial institutions to obtain liquidity from non – tradable assets they own, that otherwise could not be sold in liquid markets but would remain on their balance sheet until their maturity. Within the securitization process, a company partially “deconstructs” itself by separating certain types of illiquid assets from the risks generally associated with the owning company and is able to obtain funds by using these in the capital markets at a lower cost, than if it could have raised the funds directly by issuing more debt or equity. This technic allows for credit to be provided directly to market rather than through financial intermediation. Asset securitization, as a form of disintermediation, enables a company to raise reduced-cost financing through bypassing of intermediaries such as bank lenders, which previously stood between a company and the ultimate source of money, the financial markets.

Within the general securitisation trend, two main directions may be noticed:

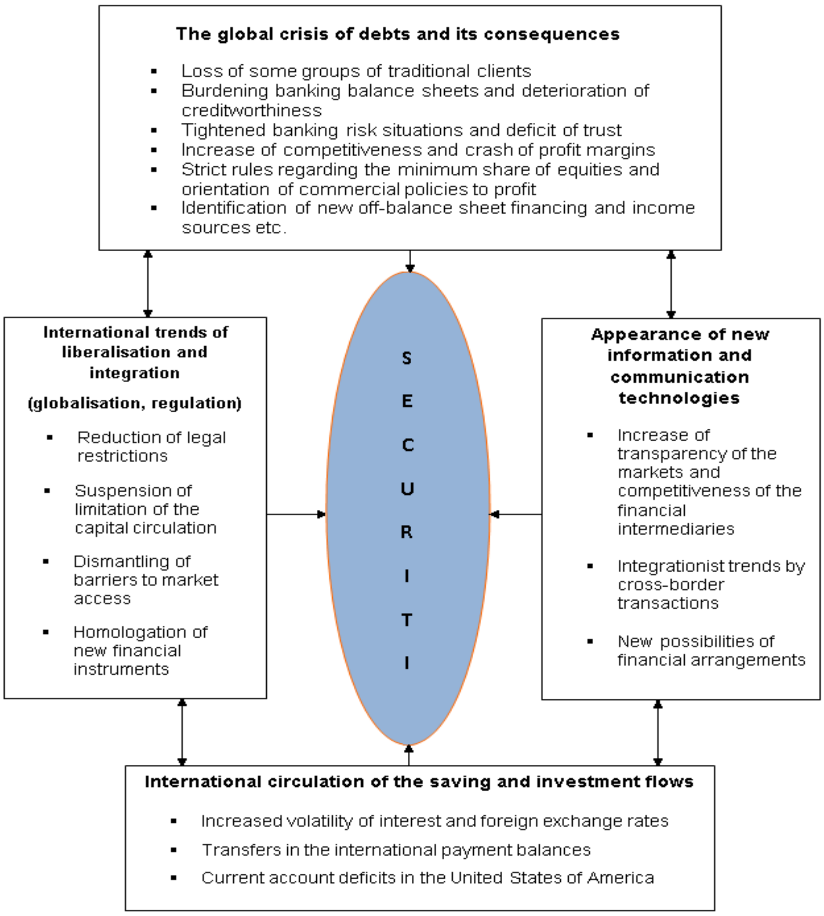
- Securitization in the broad sense, referring to obtaining capital by issuance of negotiable instruments on the capital market (this may also include regular industrial bonds); an increasing number of entrepreneurs choose to issue securities instead of absorbing traditional financial instruments, such as loans; in this respect we can describe this translation as a displacement process.
- Securitization in the strict sense, also known as asset-backed securitisation, is perceived as the most recent form of Securitisation, the conversion of assets, formerly not liquid, into securities with a high quality of credit, sustainable and marketable backed by assets such as credit card receivables, home equity loans, consumer loans, student loans and auto loans. Previously existing receivables are converted to securities and issued on the capital market. This innovative process allows firms to obtain liquidity from assets that, otherwise, cannot be sold in liquid markets. From an economic perspective, securitisation of assets replaces traditional financial methods offered by banks, excludes financial intermediaries and as such avoids increased transaction costs charged by intermediary financial institutions. It also offers the possibility for a company to raise funds economically based on allocation of risks assessed by rating agencies. This form of financing opens the capital market to those entrepreneurs whose rating does not give them the possibility of accessing low cost financing. In this type of financing, the rating of the receivable is more important than the rating of the issuing company. Securitisation is facilitated by banks or other financial institutions, differing from standard bank activity due to the fact that the institution does not stand as a permanent intermediary between capital seeker and provider.

The graph below based on Baer (2004) shall give a deeper insight of the reasons of assets securitisation (see Figure 1).

The financing by securitisation of assets may be regarded as a financing technique, in which an entrepreneur (for instance, an industrial company), a bank or a leasing company sells to an asset based security type company, either directly or through a special purpose vehicle (SPV), a pool of assets, chosen based on mutually agreed criteria and with effect of balance sheet discharge. The originator receives in exchange liquid means of the value of the offered services, minus the fees and other costs. The SPV is refinances itself on the capital market through issuance of securities usually purchased by institutional investors. The purpose of the financing vehicle is exclusively to purchase the assets, selling them afterwards for refinancing purposes.

Figure 1

Causes and fundamental reasons for Securitisation with assets



Source: *Bär, H.P. (2000) „Asset Securitisation: Die Verbriefung von Finanzaktiven als innovative Finanzierungstechnik und neue Herausforderung für Banken“*

The central aspects of *Asset-backed securities (ABS*) financing are, on the one hand, diversification of the risks and, on the other hand, avoiding the concentration of individual risks. In the case of a loan in a traditional sense, the bank undertakes all the risks resulting from granting such. In the case of asset backed securities financing, a distribution of the risks may be obtained, which belong either to the investors or are transferred to a third party. In the case of a company which is not necessarily a credit institution, the risks such as non-payment or default of payments are taken over by their off-balance sheet recording.

In order to balance the high risks, adequate equity is necessary. In general, this accumulation of equities is considered as too expensive and this disadvantage is eliminated by the concept of securitisation. For this purpose, a substantial pool of receivables, as homogeneous as possible, is extracted from the entrepreneur's balance sheet and is offered for sale to an independent, legal and economic SPV. According to Baer (2000),the volume of the seller's equities is reduced by this sale, which discharges the balance sheet (Off-Balance-Sheet).

In the USA, the following are perceived as main instruments for securitisation of assets: various types of *ABS,* as well as *Real estate mortgage-backed securities* (MBS), to which loans secured by a mortgage are attached. This difference has historical circumstances, even if the rights consist in mortgage loans: the mortgages were the first securitised assets. Regarded from the current perspective, MBS are also part of the ABS class, which means that a distinction between them does not seem to make a lot of sense.

In Europe, a more precise distinction is necessary between the types of ABS depending on the type of the receivable:

- ABS itself;
- Collateralised debt obligations (CDO);
- Mortgage-backed securities (MBS).

For the issuance of the asset-backed securities, almost all the types of receivables may be used if they fulfil certain requirements. The possibility to transfer civil rights over the property, the right to divide the assets put for sale, as well as the existence and predictability of a flow of liquidities derived from these assets can be found among these requirements.

The fundamental idea of *securitisation with assets* consists in allowing the entrepreneurs with a pool of strong financial assets to obtain low cost financing in the capital market, through these instruments. The most important feature of securitisation is the legal independence of the establishment of a homogeneous fund of assets.

4. Conclusion

The direct, traditional relationship between capital borrowers and lenders, core business of commercial banking, has changed over years and has probably declined in value. Increased volatility of interest and foreign exchange rates, international trends of liberalisation and integration, appearance of new information and communication technologies, increased competition from foreign banks and other intermediaries have favoured securitisation on the long run. On the other side, volatility in financial asset prices, 2008 global financial crisis have slowed down the rapid growth of the securitization market. Overall, all that factors have permitted the securitisation markets to replace traditional intermediation in many ways.

Still, one comes to question itself - are these developments healthy for our financial markets? Are Disintermediation and Financial Innovation techniques good or bad?

One the one side, there are clear benefits of slowly moving away from banking business model, such as lower costs as less money are going to intermediaries, innovative and varied sources of funding are definitely improving the negotiating power of corporate treasurers,

But there is also the *dark side*. Disintermediation of financial institutions goes hand in hand with disintermediation of human judgment, leaving more to the sometimes impulsive markets. Intermediaries offer added value in this respect and have a role to play just as they do for example in securitizations. Also markets often show a tendency to turn reasonable ideas to unreasonable extremes. Investors get fast interested in new products with high return and underestimate the chance that some of these products might eventually blow up. Used recklessly, financial innovation techniques can be dangerous, as proven by the subprime mortgage crisis.

References

1. Avado, P., (2013) “Banks, Informal Money Lenders and Asymmetric Information: A theoretical approach to explain the peculiar structure of credit markets in LDCs”.
2. Bär, H.P. (2000) „Asset Securitisation: Die Verbriefung von Finanzaktiven als innovative Finanzierungstechnik und neue Herausforderung für Banken“, Bern / Stuttgart / Wien 2000.
3. Bertl, A. (2004) „Verbriefung von Forderungen: Entstehungsgeschichte und heutige Struktur von Asset Backed Securities“, Wiesbaden 2004.
4. Engels, W. (1993) „Wozu braucht man noch Banken? in Bank und Markt“, issue 04/1993, pp 17-22.
5. Franzen, C. (1988) “Finanzinnovation – was ist das?“, Die Bank, 01/1988, pp 18-20.
6. Hartmann-Wendels, T., Pfingsten, A. and Weber, M. (1998) “Bankbetriebslehre“, Berlin 1998.

7. Napoli, J. and Bär, H.P. (1991) "Disintermediation marches on", Chicago Fed Letter (January): 1-4.
8. Paul, S. (1993) "Asset Backed Securities (ABS)“, Die Betriebswirtschaft, 53. Jg., Heft 06/1993, pp. 848-850.
9. Riegler, V. (2004) "Asset Backed Securities: Instrument zur Risikostreuung in österreichischen Regionalbanken?“, Wien 2004.
10. Spreman, K. (1990) "Asymmetrische Information in Zeitschrift für Betriebswirtschaft“, issue 5,6/1990, pp. 561-586.

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