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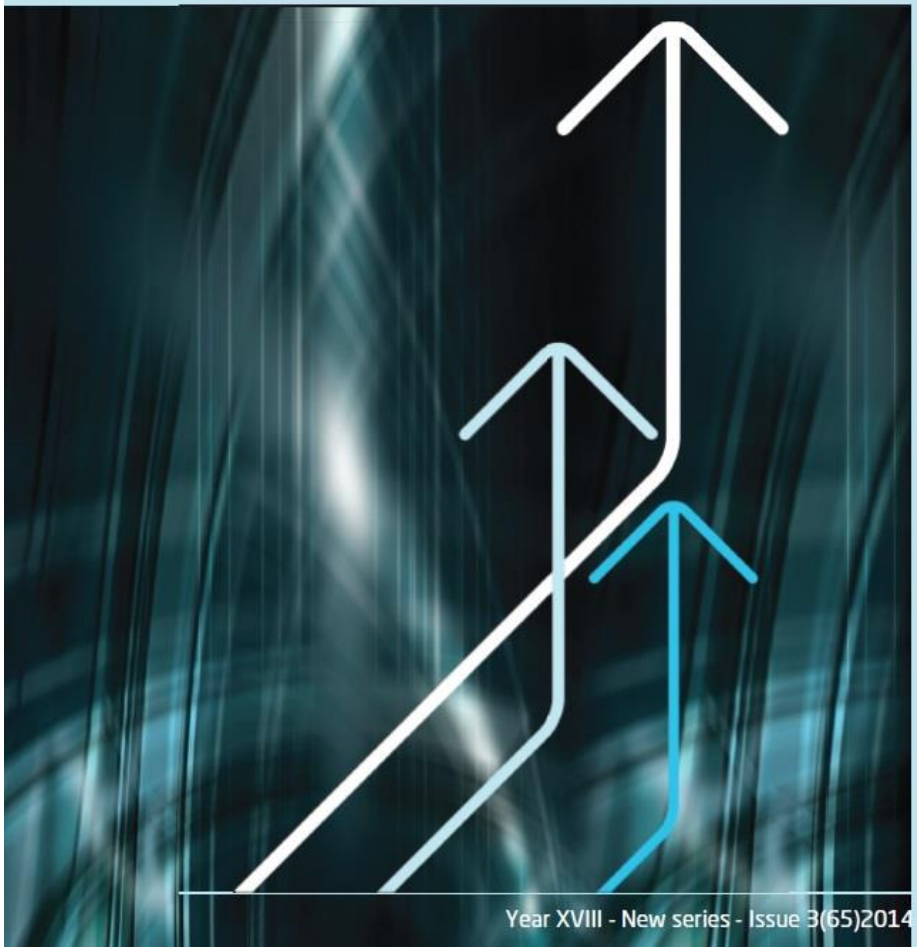

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“VICTOR SLĂVESCU” CENTRE FOR FINANCIAL
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FINANCIAL STUDIES

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CONTENTS

ASSESSING THE FORECASTS ACCURACY OF THE WEIGHT OF FISCAL REVENUES IN GDP FOR ROMANIA

Mihaela SIMIONESCU, PhD *

Abstract

The main aim of this research is to construct different forecasts for the weight of fiscal revenues in the GDP for Romania on short horizon (2011-2013) by using different types of econometric models. Using annual data from 1995, according to Granger causality test, there is a unidirectional relationship between weight of fiscal revenues (an indicator of fiscal pressure) and real GDP rate in first difference. 74.48% of the fiscal revenues weights is due to this variable, the influence very slowly decreasing till 72.56% at the 10^{th} lag. In the first period, the variation in transformed GDP rate explains 19.25% of the variation in fiscal pressure indicator. The predictions based on a vector-autoregressive model of order 1 (VAR(1)) outperformed the forecasts based on a Bayesian VAR model, moving average process (MA(2)) and dynamic factor model. The static and stochastic simulations based on VAR(1) generated the best predictions of the fiscal pressure indicator on the horizon 2011-2013, according to absolute and relative accuracy measures, excepting the mean error. In terms of sign and directional accuracy, all the types of forecasts performed the same.

Keywords: forecasts accuracy, fiscal revenues, VAR model, impulse-response function, forecast error

JEL Classification: C51, C53, E66

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Introduction

The main objective of this research is to construct different types of econometric models for the weight of fiscal revenues in GDP in order to assess the ex-post forecasts. The VAR approach allows us to evaluate the variance decomposition of each indicator. In this way, we can determine if the variation in the variable's evolution is mainly due to the other variable or to its own evolution. The model is applied for the Romania, the data series being from 1995 to 2013, and the predictions' horizon being 2011-2013.

European Commission has launched the famous Internal Market Programme that has different objectives, one of them being the harmonization of national tax system. Therefore, it is necessary to diminish the contrary incentives for capital movements, production and goods generated by national purposes. In the context of fiscal convergence the study of the relationship between fiscal pressure indicators and different factors is important.

The main results showed the superiority of VAR models in forecasting the weight of fiscal revenues in GDP in Romania. The static and stochastic simulations of VAR(1) model generated the best predictions for fiscal pressure indicator, the model including variables like the differentiated rate of consumption and the differentiated rate of real GDP. Our contribution is given by the utilization of the econometric models for Romanian indicator, proposing also other models than those used in literature in this context (BVAR model, dynamic factor model, moving average model).

The fiscal policies may determine consistent macroeconomic effects on short run, the use of different instruments conducting to various results (Skinner, 1992).

Compared to the researches based on DSGE models, the VAR models studies recover significant effects of fiscal expansions on GDP. These are more in accordance with a positive 'Keynesian' effect on consumption, if the eventual multiplier is clearly diminished (Perotti, 2005).

Blanchard and Perotti (2002) used a semi-structural VAR that utilized external institutional information on the elasticity of fiscal indicators to GDP. The cyclical reaction of fiscal balance is eliminated and we can observe shifts to the cyclically adjusted balance as discretionary fiscal shocks.Ramey and Shapiro (1998) showed that an important role in the transmission of shocks in fiscal policy brings from labour market. Some papers compared the effects of

consumptive government purchases to changes in public employment (Finn, 1998; Pappa, 2005; Cavallo, 2005). Perotti (2004) and Kamps (2004) studied the effects of government investment on GDP and labour market variables. Mountford and Uhlig (2002) obtained different types of fiscal shocks among those that conform to some a priori sign restrictions on the impulse response or variance decomposition of fiscal variables. Canova and Pappa (2002) considered only those shocks that satisfy formal sign restrictions on the responses conditional cross-correlation to the variables' orthogonalised shocks.

The article is structured as follows. After the brief introduction, the methodological background for assessing the forecasts accuracy is developed. The construction of econometric models and forecasts is presented in the next section, as well as the evaluation of predictions using the accuracy indicators. The last section concludes.

Methodological background

There are different methods used in literature to assess the forecasts accuracy. In practice, there are many cases when some indicators suggest the superiority of certain forecasts while other ones indicate that other predictions are more accurate. Therefore, it is proposed a new methodology to solve this contradiction given by the results of accuracy assessment. The method is based on different types of accuracy measures: statistics based on size errors, coefficients for comparisons and directional accuracy measures. These types of indicators were also used by Melander et al. (2007) but without any aggregation.

The prediction error at time *t* is the simplest indicator based on the comparison of the registered value with the forecasted one and it is denoted by e_t. Green and Tashman (2008) confirmed that there are two ways of computing the forecast error if $\hat{y}_t$ is the prediction at time t: $e_t = y_t - \hat{y}_t$or $e_t = \hat{y}_t - y_t$. Seven out of eleven members from International Institute of Forecasters recommended in a survey the use of the first variant ($e_t = y_t - \hat{y}_t$). This is the most utilized version in literature and it will also be used in this study.

The following summary statistics have been used: root mean squared error, mean squared error, mean error, mean absolute error, mean absolute percentage error. If the horizon length is h and the

length of actual data series is n, the indicators are computed as in the following table (Table 1):

Table 1 - Summary statistics for forecasts accuracy

Indicator	Formula
Mean error- ME	$ME = \frac{1}{h}\sum_{t=n+1}^{n+h}(y_t - \hat{y}_t)$
Mean absolute error- MAE	$MAE = \frac{1}{h}\sum_{t=n+1}^{n+h}\lvert y_t - \hat{y}_t\rvert$
Root mean squared error- RMSE	$RMSE = \sqrt{\frac{1}{h}\sum_{t=n+1}^{n+h}(y_t - \hat{y}_t)^2}$
Mean squared error- MSE	$MSE = \frac{1}{h}\sum_{t=n+1}^{n+h}(y_t - \hat{y}_t)^2$
Mean absolute percentage error- MAPE	$MAPE = 100 \cdot \frac{1}{h}\sum_{t=n+1}^{n+h}\left\lvert\frac{y_t - \hat{y}_t}{y_t}\right\rvert$

The aggregate statistic for comparisons is based on U1Theil's statistic, mean relative absolute error, relative RMSE and mean absolute scaled error. $RMSE_b$ is the RMSE for the benchmark. e_t^* is the benchmark error. In our case the benchmark is represented by the naïve projection (Table 2).

Table 2 - Statistics for comparing the forecasts accuracy

Indicator	Formula
U1 Theil's statistic	$U_1 = \frac{\sqrt{\sum_{t=n+1}^{n+h}(y_t - \hat{y}_t)^2}}{\sqrt{y_t^2} + \sqrt{\hat{y}_t^2}}$
Mean relative absolute error- MRAE	$MRAE = average\left(\left\lvert\frac{e_t}{e_t^*}\right\rvert\right)$
Relative Root mean squared error- RRMSE	$RRMSE = \frac{RMSE}{RMSE_b}$
Mean absolute scaled error-MASE	$MASE = average\left(\frac{e_t}{\frac{1}{n-1}\sum_{t=n+1}^{n+h}\lvert y_t - y_{t-1}\rvert}\right)$

If ME takes a positive value on the mentioned horizon with the proposed definition of the forecast error, the predictions are underestimated. For negative value of ME the forecasts are

overestimated. For optimal predictions ME is zero, but this value is also met when the errors offset each other perfectly.

MSE penalizes the predictions with high errors. It considers that the high errors are more harmful than the small errors.

The positive and the negative errors cannot compensate each other like in the case of ME, which is an advantage for MSE. There is not a superior limit for MSE and it has a different unit of measurement compared to actual data. The null value is the lowest value of the indicator and it is achieved for perfect precision of the forecasts.

RMSE is equal or larger then MAE. A higher difference between these two indicators implies a higher errors variance. The errors have the same magnitude if RMSE equals MAE. The minimum value of those measures is 0, but there is not a superior limit for them. A null value for the MAPE expressed as percentage shows a perfect forecast. If MAPE is smaller than 100% the prediction is better than the naïve one. MAPE has no superior limit.

The percentage of sign correct forecasts (PSC) shows how many percent of time is sign of prediction forecasted correctly. Percentage of directional accuracy correct forecasts (PDA) shows if the expert correctly anticipates the increase or decrease of the variable. It measures the ability to correctly predict the turning points. PDA and PSC are located between 0% and 100%. According to Melander et al. (2007) the success rate of the indicators should be greater than 50% (see Table 3).

Table 3 - Measures for directional and sign accuracy

Indicator	Formula	Conditions
Percentage of sign correct forecasts- PSC	$PSC = \frac{100}{h}\sum_{t=n+1}^{n+h} z_t$	$z_t = 1, y_t \cdot \hat{y}_t > 0$ $z_t = 0, otherwise$
Percentage of directional accuracy correct forecasts- PDA	$PDA = \frac{100}{h}\sum_{t=n+1}^{n+h} z_t$	$z_t = 1, (y_t - y_{t-1})(\hat{y}_t - y_{t-1}) > 0$ $z_t = 0, otherwise$

Econometric models used in forecasting the weight of fiscal revenues in GDP in Romania

The data are represented by the weight of fiscal revenues in GDP (weight_fr), the rate of real final consumption (r_consumption) and the rate of real GDP (r_GDP) for Romanian economy. The data series were provided by Eurostat, covering the period from 1995 to 2013. According to Ng-Perron test, only the data series for the weight

of fiscal revenues in GDP is stationary at 5% level of significance, for the other two series the first order differentiating being necessary to achieve the stationarity (dr_consumption and dr_GDP). The causality between the stationary data series is checked using Granger causality test as Table 4 shows.

Table 4 - The Granger causality tests

Assumption	F calculated	Prob.
dr_gdp is not Granger cause for dr_consumption	0.72193	0.5075
dr_consum is not Granger cause for dr_gdp	10.19908	0.0380
weight_fr is not Granger cause for dr_consumption	0.03390	0.9668
dr_consum is not Granger cause for weight_fr	0.62037	0.5555
weight_fr is not Granger cause for dr_gdp	9.63243	0.0496
dr_gdp is not Granger cause for weight_fr	0.88914	0.4386

Source: author's computations

There is a unidirectional relationship between consumption and GDP rate and between weight of fiscal revenues and GDP. For the other cases, a variable is not Granger cause for the other one (the associated probabilities to F statistics are higher than 0.05 and there are no reasons to reject the null hypothesis).

Table 5 - The lag selection for VAR model

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-117.2227	NA	278.8361	14.14385	14.29088	14.15846
1	-104.0251	20.18462*	174.7456*	13.65001*	14.23816*	13.70847*
2	-79.38374*	28.94714	178.31612	14.54797	14.56199	14.59989

Source: author's computations

Almost all the lag length criteria, excepting logL and HQ, at 5% level indicate that a VAR(1) model is the best model. All the tests necessary to be applied for checking the validity of the estimated VAR(1) model are displayed in Table 5.

The form of the VAR model is the following:

DR_CONSUMPTION = -
0.172079411481*DR_CONSUMPTION(-1) -

0.237511224857*DR_GDP(-1) + 1.01445272693*WEIGHT_FR(-1) - 29.4919062169

DR_GDP= 0.523052574718*DR_CONSUMPTION(-1) - 0.976530555311*DR_GDP(-1) + 1.70807592222*WEIGHT_FR(-1) - 48.8602780878

PONDERE_VF = 0.0327753296954*DR_CONSUM(-1) - 0.0184361823283*DR_PIB(-1) + 0.504205726203*PONDERE_VF(-1) + 14.3436867492

VAR Residual Portmanteau Tests are used to test the errors' autocorrelation for both identified model. The assumptions of the test are formulated as:

H0: the errors are not auto-correlated
H1: the errors are auto-correlated

For the lag 1 up to 12, the probabilities (Prob.) of the tests are greater than 0.05, fact that implies that there is not enough evidence to reject the null hypothesis (H0). So, we do not have enough reasons to say that the errors are auto-correlated. So, after the application of Residual Portmanteau Test, the conclusion is that there are not autocorrelations between errors for VAR(1) model as Table 6 shows.

Table 6 - Residual Portmanteau test for errors auto-correlation

Lag	Q Stat.	Prob.	Adjusted Q stat.	Prob.	Degrees of freedom
1	8.044918	NA*	8.547725	NA*	NA*
2	11.42414	0.2478	12.37751	0.1929	9
3	16.00770	0.5920	17.94326	0.4594	18
4	19.96533	0.8322	23.11863	0.6786	27
5	26.34884	0.8806	32.16193	0.6518	36
6	28.56549	0.9733	35.58766	0.8412	45
7	31.22570	0.9945	40.11002	0.9202	54
8	34.85677	0.9985	46.96871	0.9345	63
9	40.67122	0.9989	59.32442	0.8575	72
10	49.76132	0.9976	81.40037	0.4666	81
11	55.07805	0.9986	96.46445	0.3015	90
12	61.77958	0.9988	119.2496	0.0811	99

Source: author's computations

The homoskedasticity is checked using a VAR Residual LM test for the VAR(1) model. If the value of LM statistic is greater than the critical value, the errors series is heteroskedastic. LM test shows that there is a constant variance of the errors, because of the values

greater than 0.05 for the probability. The Residual Heteroskedasticity test is applied in Table 7 in two variants: with cross terms and without cross terms. In this case we applied the variant without cross terms.

Table 7 - VAR Residual Heteroskedasticity Tests

No Cross Terms (only levels and squares)

Chi-square stat.	Degrees of freedom	Prob.
47.79206	36	0.0904

Dependent variable	Chi-square	F(6,10)	Prob.	Chi-square (6)
res1*res1	0.158385	0.313654	0.9155	2.692552
res2*res2	0.121999	0.231585	0.9565	2.073982
res3*res3	0.535144	1.918676	0.1730	9.097454
res2*res1	0.135212	0.260588	0.9433	2.298606
res3*res1	0.427309	1.243572	0.3619	7.264259
res3*res2	0.290599	0.682734	0.6683	4.940186

Cross Terms

Chi-square stat.	Degrees of freedom	Prob.
63.74050	54	0.1712

Dependent variable	Chi-square	F(6,10)	Prob.	Chi-square (6)
res1*res1	0.262792	0.277254	0.9611	4.467469
res2*res2	0.215751	0.213971	0.9820	3.667771
res3*res3	0.865244	4.993962	0.0228	14.70914
res2*res1	0.221981	0.221912	0.9799	3.773676
res3*res1	0.468345	0.685158	0.7078	7.961859
res3*res2	0.344221	0.408259	0.8946	5.851762

Source: author's computations

The normality tests are applied under the Cholesky (Lutkepohl) orthogonalization. If the Jarque-Bera statistic is lower than the critical value there is not enough evidence to reject the normal distribution of the errors (Table 8).

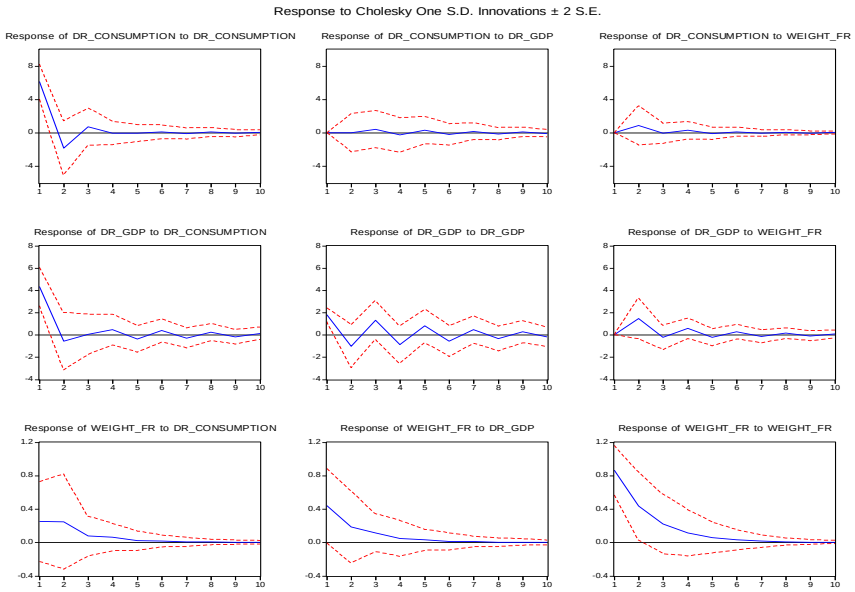
Table 8 - VAR Residual Normality Tests

Component	Jarque-Bera stat.	Degrees of freedom	Prob.
1	9.164150	2	0.0102
2	1.122952	2	0.5704
3	3.060270	2	0.2165
Common	13.34737	6	0.0378

Source: author's computations

The Residual normality test provided probabilities greater than 0.05, fact that implies that the errors series has a normal distribution when Cholesky (Lutkepohl) Orthogonalization is applied. The impulse-response analysis and the decomposition of error variance are made (Figure 1).

Figure 1 - The responses of each variable to own shocks or the other variable shocks



Source: author's computations

The variation of differences in consumption is due in the first period only to the evolution of own variable. This influence decreases in time in favor of other variables influence, the GDP weight having

the highest influence that arises to 2.06%. In the first period, 84.97% of the variation in real GDP rate differences is due to the same variable, while 15.02% of the variation is explained by changes in fiscal revenues weight and neither by variation in the differences of real consumption rates. The influence of differentiated GDP rates decreases in time, at the 10th lag 28.91% of the GDP variation being explained by fiscal revenues weights and 8.94% by changes in consumption rates. 74.48% of the fiscal revenues weights is due to this variable, the influence very slowly decreasing till 72.56% at the 10th lag. In the first period, the variation in transformed GDP rate explains 19.25% of the variation in fiscal pressure indicator (Figure 9).

Table 9 - Variance decomposition of the variables

Variance decomposition of dr_consumption	Standard error	dr_consumption	dr_gdp	weight_fr
1	6.136816	100.0000	0.000000	0.000000
2	6.463070	98.16262	0.000464	1.836923
3	6.515900	97.74541	0.439033	1.815560
4	6.528369	97.37893	0.613636	2.007434
5	6.535926	97.15752	0.827505	2.014980
6	6.541445	97.02549	0.928414	2.046091
7	6.544860	96.94514	1.003822	2.051039
8	6.547045	96.89881	1.043219	2.057971
9	6.548325	96.87130	1.068517	2.060179
10	6.549095	96.85542	1.082490	2.062089
Variance decomposition of dr_gdp	Standard error	dr_consumption	dr_gdp	weight_fr
1	4.687743	84.97632	15.02368	0.000000
2	5.053626	74.44557	17.03691	8.517520
3	5.230893	69.48996	22.35222	8.157816
4	5.355474	67.04202	24.00503	8.952952
5	5.431405	65.66057	25.47254	8.866886
6	5.480612	64.97130	26.07361	8.955089
7	5.509239	64.56426	26.49841	8.937329
8	5.526530	64.34385	26.70799	8.948162
9	5.536525	64.21359	26.84150	8.944909
10	5.542418	64.14004	26.91368	8.946279
Variance decomposition of weight_fr	Standard error	dr_consumption	dr_gdp	weight_fr
1	1.000478	6.258719	19.25267	74.48861
2	1.134517	9.632787	17.71349	72.65372
3	1.163925	9.575008	17.78986	72.63513
4	1.172002	9.710745	17.70739	72.58187
5	1.173936	9.708618	17.71862	72.57276
6	1.174479	9.717911	17.71090	72.57119
7	1.174608	9.717437	17.71291	72.56965
8	1.174647	9.718308	17.71205	72.56965
9	1.174656	9.718211	17.71241	72.56938
10	1.174659	9.718321	17.71232	72.56936

Source: author's computations

The VAR model is used to make fiscal pressure- tax weight in GDP- forecasts on the horizon 2011-2013 (Table 10). For the VAR predictions four types of scenarios are considered:

- S1 scenario (Dynamic-Deterministic Simulation);
- S2 scenario (Dynamic-Stochastic Simulation);
- S3 scenario (Static-Deterministic Simulation);
- S4 scenario (Static-Stochastic Simulation).

Table 10 - Predictions of fiscal revenues weight in GDP (%) based on VAR (1) models

Year	VAR(1) model (S1)	VAR(1) model (S2)	VAR(1) model (S3)	VAR(1) model (S4)	Registered values
2011	28.35830	28.35830	28.4124	28.4124	28.50000
2012	28.58781	28.72625	28.5589	28.5249	28.50000
2013	28.76088	28.76128	28.8224	28.9024	29.00000

Source: own computations

If the comparison with actual data is made, the fourth scenario of VAR(1) model generated the most accurate predictions of the weight of fiscal revenues in GDP over 2011-2013. This scenario might be used to make predictions for 2014 and 2015.

A moving average model of order 2 was estimated for the weight of fiscal revenues in GDP:

WEIGHT_FR = 28.72402679 + [MA(1)=1.313878625,MA(2)=0.6035075711,BACKCAST=1995]

According to Jarque-Bera test, we do not have enough evidence to reject the hypothesis of normal distribution for the errors that are not serial correlated (see Appendix 1).

A dynamic model was estimated, the log likelihood being determined using stationary Kalman filter and diffuse De Jong Kalman filter (see Appendix 2).

We also estimated the BVAR(1) model using Gibbs sampler algorithm, utilizing the program in Matlab provided by Qian (2010).

The regressors are: the real GDP rate and the real consumption rate. The order in lags is 1, the number of MCMC draws is 50 000, while the number of burn-in draws is 10 000. Bayesian VAR model is identical to SUR model. Conditional posterior Sigma follows inverse Wishart. Conditional posterior Beta follows N(Dd,D).

If the model has the form Y(t) = c + Phi(1)*Y(t-1) + ... + Phi(p)*Y(t-p) + ut, where ut ~ MVN(0,Sigma) and Y(t) has d component variables, the program will display the following outputs :

- posterior draws of phi(1),…,phi(p), d*d*p*R 4-dimension array
- posterior draws of covariance matrix, d*d*R 3-dimension array
- posterior draws of the intercept in the VAR model

The constant and the posterior coefficients could be assimilated to real values of coefficients and the forecasts could be made. The predictions based on MA(2) model, dynamic factor model and BVAR(1) model are shown in Table 11.

Table 11 - Predictions of fiscal revenues weight in GDP (%) based on MA(2) model, dynamic factor model and BVAR(1) model

Year	MA(2) model	Dynamic factor model	Bayesian VAR(1)	Registered values
2011	28.26591	28.4889	28.8348	28.50000
2012	28.57522	29,77	28.8812	28.50000
2013	28.72403	29,77	28.9923	29.00000

Source: own computations

The forecasts based on MA(2) model are quite close of the registered values, but for 2012 and 2013 the predictions based on dynamic factor model are quite larger than the registered values. Different types of accuracy measures are computed for the proposed predictions in Table 12.

Table 12 - The evaluation of forecasts accuracy measures for the weight of fiscal revenues in the GDP over the horizon from 2011 to 2013

Indicator	VAR(1) model (S1)	VAR(1) model (S2)	VAR(1) model (S3)	VAR(1) model (S4)	MA(2) model	Dynamic factor model	Bayesian VAR(1)
Mean error- ME	0.0977	**0.0514**	0.0688	0.0534	0.1449	-0.6763	-0.2361
Mean absolute error- MAE	0.1562	0.2022	0.1080	**0.0700**	0.1951	0.6837	0.2412
Root mean squared error- RMSE	0.1683	0.2068	0.1193	**0.0771**	0.2134	0.8575	0.2930
Mean squared error- MSE	0.0283	0.0428	0.0142	**0.0059**	0.0455	0.7353	0.0858
Mean absolute percentage error- MAPE	54.32%	70.47%	37.54%	**24.37%**	67.89%	238.32%	84.62%
U1 Theil's statistic	0.0029	0.0036	0.0021	**0.0013**	0.0037	0.0148	0.0051
Mean relative absolute error- MRAE	3599.9816	3571.5099	3568.1191	**3567.7690**	3845.6106	3648.7242	3569.0000
Relative Root mean squared error- RRMSE	0.2831	0.3478	0.2007	**0.1297**	0.3590	1.4426	0.4928
Mean absolute scaled error-MASE	0.0059	0.0072	0.0042	**0.0027**	0.0074	0.0299	0.0102
Percentage of sign correct forecasts- PSC	100%	100%	100%	100%	100%	100%	100%
Percentage of directional accuracy correct forecasts- PDA	66.67%	66.67%	66.67%	66.67%	66.67%	66.67%	66.67%

Indicator	VAR(1) model (S1)	VAR(1) model (S2)	VAR(1) model (S3)	VAR(1) model (S4)	MA(2) model	Dynamic factor model	Bayesian VAR(1)
Mean error- ME	0.0977	**0.0514**	0.0688	0.0534	0.1449	-0.6763	-0.2361
Mean absolute error- MAE	0.1562	0.2022	0.1080	**0.0700**	0.1951	0.6837	0.2412
Root mean squared error- RMSE	0.1683	0.2068	0.1193	**0.0771**	0.2134	0.8575	0.2930
Mean squared error- MSE	0.0283	0.0428	0.0142	**0.0059**	0.0455	0.7353	0.0858
Mean absolute percentage error- MAPE	54.32%	70.47%	37.54%	**24.37%**	67.89%	238.32%	84.62%
U1 Theil's statistic	0.0029	0.0036	0.0021	**0.0013**	0.0037	0.0148	0.0051
Mean relative absolute error- MRAE	3599.9816	3571.5099	3568.1191	**3567.7690**	3845.6106	3648.7242	3569.0000
Relative Root mean squared error- RRMSE	0.2831	0.3478	0.2007	**0.1297**	0.3590	1.4426	0.4928
Mean absolute scaled error- MASE	0.0059	0.0072	0.0042	**0.0027**	0.0074	0.0299	0.0102
Percentage of sign correct forecasts- PSC	100%	100%	100%	100%	100%	100%	100%
Percentage of directional accuracy correct forecasts- PDA	66.67%	66.67%	66.67%	66.67%	66.67%	66.67%	66.67%

Source: author's computations

In terms of directional and sign accuracy all the types of predictions have the same degree of accuracy. All the absolute and relative indicators, excepting the mean error, show that VAR(1) forecasts in the fourth scenarios are the most accurate. The lowest value for ME is registered by VAR(1) predictions after the second scenario. Excepting the anticipations based on dynamic factor model and BVAR(1) model, all the other forecasts are underestimated. The overestimations of the forecasts could be explained by the shocks in the economy that have not been taken into account by the econometric models. According to the values of MASE, all the predictions are better than the naïve ones. The errors for S4 scenario

are in average 24.37% of the actual value. The values of U1 are close to zero and under 0.25, the degree of accuracy being very high.

Conclusions

In this study different econometric models were employed to predict the weight of fiscal revenues in GDP in Romania on short run (2011-2013). Moreover, the predictions were assessed using different accuracy measures. Even if in literature the VAR models are employed in this context, the study used also BVAR, ARIMA and dynamic factor models. The predictions based on a vector-autoregressive model of order 1 (VAR(1)) outperformed the forecasts based on a Bayesian VAR model, moving average process (MA(2)) and dynamic factor model. The static and stochastic simulations based on VAR(1) generated the best predictions of the fiscal pressure indicator on the horizon 2011-2013, according to absolute and relative accuracy measures, excepting the mean error. In terms of sign and directional accuracy, all the types of forecasts performed the same.

The research might be continued by using also other quantitative forecasting methods like Markov chains. It is interesting to check if this method outperforms the econometric approach in terms of forecasts accuracy.

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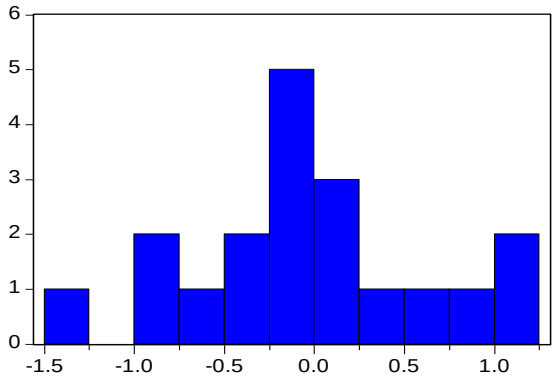
APPENDIX 1



Series: Residuals	
Sample 1995 2013	
Observations 19	
Mean	-0.055256
Median	-0.160387
Maximum	1.177417
Minimum	-1.483526
Std. Dev.	0.689137
Skewness	0.026896
Kurtosis	2.705403
Jarque-Bera	0.070997
Probability	0.965124

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
. |* . |	. |* . |	1	0.148	0.148	0.4867	
. *| . |	. *| . |	2	-0.121	-0.146	0.8304	
.***| . |	.***| . |	3	-0.396	-0.070	4.7438	0.29
. **| . |	. *| . |	4	-0.246	-0.008	6.3572	0.42
. *| . |	. **| . |	5	-0.109	-0.189	6.6945	0.082
. |* . |	. *| . |	6	0.124	-0.070	7.1699	0.127
. |* . |	. *| . |	7	0.088	-0.152	7.4271	0.191
. |**. |	. |* . |	8	0.285	0.178	10.381	0.110
. | . |	. *| . |	9	-0.004	-0.080	10.381	0.168
. **| . |	.***| . |	10	-0.304	-0.347	14.487	0.070
. *| . |	. |* . |	11	-0.123	0.074	15.247	0.084
. | . |	. *| . |	12	-0.038	-0.088	15.328	0.121

APPENDIX 2

Dynamic-factor model

Sample: 1996 - 2013 — Number of obs = 18

Wald chi2(1) = 4.08

Log likelihood = -27.31799 — Prob > chi2 = 0.0434

weight_fr	OIM Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
dr_gdp	.1110504	.0549907	2.02	0.043	.0032707	.2188302
_cons	28.6111	.2603924	109.88	0.000	28.10074	29.12146
Variance						
e.weight~r	1.218298	.4060995	3.00	0.001	.4223581	2.014239

Note: Tests of variances against zero are one sided, and the two-sided confidence intervals are truncated at zero.

INVESTIGATING THE DETERMINANTS OF LONG-RUN SOVEREIGN RATING[1]

Emilian - Constantin MIRICESCU, PhD*

Abstract

The significance of sovereign rating for local and international investors is essential because in recent period many countries had problems concerning the payment of public loans. In most European Union countries government debt to GDP ratio exceeds the Maastricht ceiling and investors may be cautious at sovereign rating modifying. This paper focuses on long-run sovereign rating assigned by Standard & Poor's for European Union countries. We will use the regression analysis in order to investigate quantitative and qualitative determinants of long-run sovereign rating.

Keywords: regression analysis, public debt, European Union member states

JEL classification: C01, F34

Acknowledgements: *This work was supported from the European Social Fund through Sectorial Operational Programme Human Resources Development 2007 – 2013, project number POSDRU/159/1.5/S/134197, project title "Performance and Excellence in Postdoctoral Research in Romanian Economics Science Domain".*

1. Introduction

In recent years many European Union countries faced problems regarding the payment of public loans. Long-run sovereign rating has a strong negative influence on yield spread of government bonds. As a consequence, public decision makers both from central

[1] *An earlier version of this paper was presented at the Annual International Scientific Conference, 2nd Edition Financial and Monetary Economics – FME 2014, organized by the Centre for Financial and Monetary Research "Victor Slăvescu" – Romanian Academy, October 24, 2014, Bucharest, Romania.*

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and local administration have to concentrate on quantitative and qualitative determinants of long-run sovereign rating.

We consider that (Canuto, Santos and Porto, 2012), stated an appropriate definition for sovereign rating as sovereign risk ratings are qualitative assessments of the probability of default by central governments. (Afonso, Gomes and Rother, 2007) declared that sovereign credit ratings are a condensed assessment of a government's ability and willingness to repay its public debt both in principal and in interests on time.

Miricescu (2011) emphasized that Standard & Poor's has 7 marks for short-run rating scale, less than long-run ratings scale that has 22 marks, consistent with table 1.

Table 1 - Long-run rating scale of Standard & Poor's

Investment grade	AAA	AA+	AA	AA-	A+	
Investment grade	A	A-	BBB+	BBB	BBB-	
Speculative grade	BB+	BB	BB-	B+	B	B-
Speculative grade	CCC+	CCC	CCC-	CC	SD	D

Source: Our results based on information provided by (Bran and Costică, 2003) and Standard & Poor's

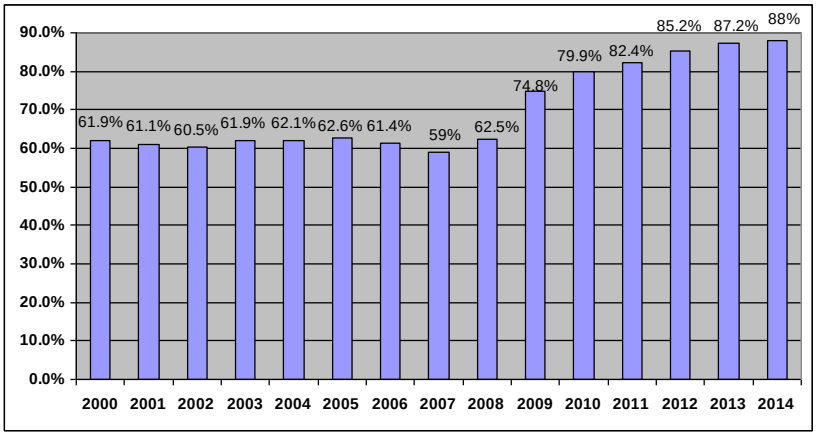
The paper is organised as follows: Section 2 reviews the literature regarding the determinants of long-run sovereign rating and describe the main issue, Section 3 presents research methodology and data sources, Section 4 analyzes the determinants of long-run sovereign rating for 28 EU member states and Section 5 concludes.

2. Literature review

(Cantor and Packer's, 1996); (Monfort and Mulder, 2000); (Eliasson, 2002); (Borio and Packer, 2004); (Bissoondoyal-Bheenick, 2005); (Afonso, Gomes and Rother, 2007); (Afonso, Gomes and Rother, 2011); (Canuto, Santos and Porto, 2012) found determinants of long-run sovereign rating, of which we specify quantitative variables as: (i) GDP per capita, (ii) real GDP growth, (iii) government debt to GDP ratio, (iv) external debt, (v) government deficit/surplus, (vi) inflation, (vii) foreign exchange reserves to imports ratio and so on and qualitative variables as: (i) political stability, (ii) government effectiveness, (iii) control of corruption and the rest.

We will analyse government debt to GDP ratio, as a possible determinant of long-run sovereign rating. Also, interest rates apply to public loans remaining to be paid.

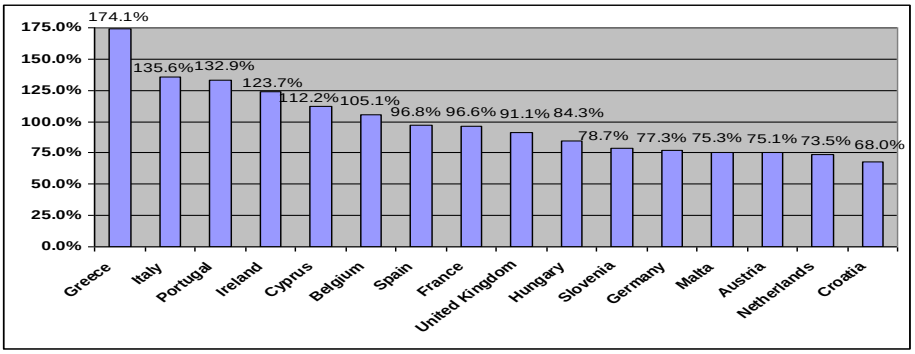
Figure 1 – Government debt to GDP ratio in the European Union



Source: Our results based on data provided by EUROSTAT

Following a relatively stagnation in the early 2000s, public debt burden increased sharply mainly during the last seven years. According to figure 1, in the European Union government debt to GDP ratio started from 61.9% in 2000 and attained to 88% in 2014. Data from figure 1 are since December of every year, excepting data from the end of the first quarter of 2014. As compared to 2000, the European Union countries registered an increase of 26.1 pp in their debt to GDP ratio at the first quarter of 2014.

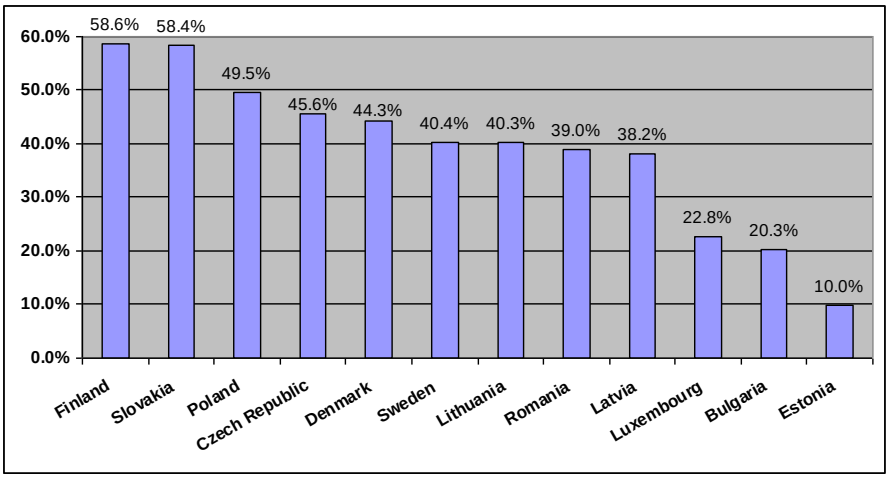
Figure 2 - Government debt to GDP ratio in the countries beyond the Maastricht ceiling



Source: Our results based on data provided by EUROSTAT

According to figure 2, in the first quarter of 2014 there are 16 EU member states with government debt to GDP ratio exceeding the Maastricht ceiling of 60%. For six of these countries (Greece, Italy, Portugal, Ireland, Cyprus and Belgium) the indicator is beyond 100%.

Figure 3 - Government debt to GDP ratio in the countries below the Maastricht ceiling



Source: Our results based on data provided by EUROSTAT

According to figure 3, in the first quarter of 2014 there are 12 EU member states with government debt to GDP ratio less than the Maastricht ceiling of 60%. For five of these countries (Romania,

Latvia, Luxembourg, Bulgaria and Estonia) the indicator is beyond 40%.

The main issue of this paper is to find the most important determinants for long-run sovereign rating.

3. Methodology and data sources

The analysis will be performed on annual data over the period 2000-2012 for 28 countries members of European Union by applying a regression analysis.

Long-run sovereign rating (Rating) is the dependent variable in our study and it is assigned by Standard & Poor's. In the mentioned above period, the ratings of European Union member states are from AAA to CC. In order to perform the regression analysis we achieved the linear transformation of long-run ratings, from qualitative variables in quantitative variables (see table 2):

Table 2 – Linear transformation

RATING	AAA	AA+	AA	AA-	A+	A	A-
Transformation	20	19	18	17	16	15	14
RATING	BBB+	BBB	BBB-	BB+	BB	BB-	B+
Transformation	13	12	11	10	9	8	7
RATING	B	B-	CCC+	CCC	CCC-	CC	
Transformation	6	5	4	3	2	1	

Source: Our results based on data provided by Standard & Poor's

After the linear transformation we applied the logistic transformation, according to (Afonso, Gomes and Rother, 2007).

We will use six quantitative and qualitative independent variables that are potential determinants of long-run sovereign rating:
(i) GDP growth (%) – quantitative variable;
(ii) GDP per capita (US$) – quantitative variable;
(iii) Inflation measured by the consumer price index (%) – quantitative variable;
(iv) Unemployment (%) – quantitative variable;
(v) Cash surplus/deficit (% of GDP) – quantitative variable;
(vi) Internet users (per 100 people) – qualitative variable.

Our analysis used data published by official sources as it follows:
i) GDP growth is from World Bank and OECD;
(ii) GDP per capita is from World Bank and OECD;

(iii) Inflation is from International Monetary Fund;
(iv) Unemployment is from International Labour Organization;
(v) Cash surplus/deficit is from International Monetary Fund, World Bank and OECD;
(vi) Internet users' index is from International Telecommunication Union.

4. Results obtained

We expect that independent variables have the next influence on dependent variable:
i) GDP growth – positive influence, as countries having economic growth have the chance to improve budgetary revenues;
(ii) GDP per capita – positive influence, as in such countries both population and legal entities may sustain better public debt service. We used the logarithmic function in order to compare this index for all 28 EU member states.
(iii) Inflation – negative influence, as the inflation decrease the purchasing power both of population and legal entities;
(iv) Unemployment – negative influence, as the unemployment is the population without work but available for employment;
(v) Cash surplus/deficit – positive influence, as such countries may sustain better public debt service;
(vi) Internet users – positive influence, as usually population that use internet is better educated.

We analyzed for the entire period 2000-2012, if six qualitative and quantitative variables influences transformed long-run sovereign rating, by using data panel regression.

First, we performed the stationary analysis, and we used the test Im, Pesaran, Shin (see table 3) both for dependent variable and also for independent variable. The unemployment variable is not stationary because the significance level is higher than the threshold of 0.05. We will stationary the unemployment series by using the difference operator. The 1st difference of unemployment series provides a significance level lower than the threshold of 0.01 that indicates stationary series. The other variables are stationary because the significance level is lower than the threshold of 0.01.

Table 3 – Im, Pesaran, Shin panel unit root test

Variable	IPS statistic	Significance level
Rating - level	-2.6	0.00
GDP growth - level	-2.5	0.00
LN(GDP per capita) - level	-4.4	0.00
Inflation - level	-8.5	0.00
Unemployment - level	-0.7	0.23
Unemployment – 1st difference	-2.5	0.00
Cash surplus/deficit - level	-3.1	0.00
Internet users - level	-8.9	0.00

Source: Our results

Second, we performed multiple iterations with the purpose to find the main determinants for long-run sovereign rating. The six independent variables have an explanatory power of 62.7%, but the public decision makers should focus only on a few variables in order to improve sovereign rating. Step by step, we eliminated from the regression model the following independent variables: GDP growth, Inflation, Cash surplus/deficit, Internet users.

Table 4 – Data panel regression results

Regression equation	
$Rating_t = -11.71 + 1.37 * \ln(GDP/capita_t) - 0.17 * \Delta Unemployment_t$ $(0.65)^{\clubsuit}$ $(0.07)^{\clubsuit}$ $(0.03)^{\clubsuit}$	
Adjusted R Square	**Significance level**
57.26%	0.00

Source: Our results

$^{\clubsuit}$Standard Error of OLS estimators, all estimators show significance at 1% level. For the entire period 2000-2012, F-values show significance at 1% level.

From the regression equation for the entire period 2000-2012 (see table 4), we found that logarithmic GDP per capita have a positive influence on transformed sovereign rating, and unemployment have a negative influence on transformed sovereign rating. The intensity relation between variables considered as panel data is strong as the model adjusted explanatory power is 57.26%.

5. Conclusions

Public decision makers should focus on improving both GDP per capita and employment rate in order to increase long-run sovereign rating. On the other side, long-run sovereign rating influence public debt interests and also public debt burden.

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EVALUATION OF THE FISCAL CONFORMANCE IN ROMANIA IN THE PRE AND POST EU ACCESSION[1]

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Abstract

By developing the paper assessment of tax compliance in Romania after accession, we aim to create a theoretical – methodological framework for the knowledge and understanding of tax compliance by describing the two forms of compliance, voluntary and forced, their dynamics and the measures implemented and applied by tax authorities to increase voluntary compliance. We will also try to identify the existence and consistency of certain "accumulation" in the matter of tax compliance obtained under the influence of the processes of democratization and European Integration of the Romanian society.

The goals will be achieved through researching relevant studies, statistical reports, strategies to prevent and combat tax noncompliance, tax administration studies in management by combining empirical analysis with comparative and logical analysis based on previous accumulations and those acquired in researching and drafting this paper.

Keywords: assessment, tax compliance, dynamic post-accession

JEL Classification: H2, H22, H3

1. Introduction

The fiscal system, in a simplified meaning, is the normative framework which regulates the taxation and interaction between the fiscal authorities and the taxpayers, with the purpose to achieve pre-

[1] *An earlier version of this paper was presented at the Annual International Scientific Conference, 2nd Edition Financial and Monetary Economics – FME 2014, organized by the Centre for Financial and Monetary Research "Victor Slăvescu" – Romanian Academy, October 24, 2014, Bucharest, Romania.*

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set targets of the fiscal system (financing, redistribution and economic adjustment). The fiscal authorities regulate, implement and monitor the way in which the fiscal regulations are applied and observed within the real economy. Besides this, the authorities also monitor the efficient collection of the fiscal duties, as efficiently as possible in term of the administrative costs.

The taxpayer, in its quality of payer, or taxable subject, has the duty of financial contributions towards the state for his/her income or intellectual rights. From this stance, the taxpayer feels the financial constraint of his/her incomes and properties and tries to understand and accept the contributions to the state. Within this space of fiscality, of the interaction between the fiscal authorities and the taxpayers, there is a specific attitude of the taxpayer that emerges, materialized in its fiscal behaviour, as manner of reaction to the fiscal duties, towards the fiscal policy and towards the manner of interaction with the fiscal authorities.

2. Methodology

In accomplishing the purpose of the paper, we will make a typology of the taxpayers according to their ethic behaviour, to the behaviour of the institutions and to the aspects of equity. The fiscal behaviour will be classified depending on the voluntary of compelled compliance of the taxpayers. Based on these classifications we will make an empirical, evolutive analysis of each type of behaviour, the positioning of the taxpayers in relation with the fiscal authorities and the preventive and control measures implemented by the authorities; we will also make a comparative analysis of the fiscal behaviour in the pre-and post-accession period of accession to the European Union.

3. Typology of the fiscal behaviour

The fiscal behaviour relies on the human behaviour of the individuals (taxpayers) and on the financial effects imposed by the sovereign state on the financial revenues and on the possession of ownership rights by the individuals, which thus become taxpayers. The literature distinguishes several taxpayer typologies, i.e., honest, social and antagonistic.

The *honest taxpayers* are those taxpayers who cooperate constantly; they don’t seek ways to decrease the value of the due

taxes, they behave honestly on the basis of absolute ethic norms. The motivation of this typology of taxpayers includes the feeling of duty, which motivates a person without compelling it. They are sensitive to the behaviour of the institutions, of the government and of the fiscal authorities; their willingness to cooperate depends on the institutional conditions, not on the behaviour of the other taxpayers.

The *behaviour of the social taxpayers* is determined by the anticipation of the social effects of unveiling the non-compliance fiscal behaviour. If in their occupational and/or social environment there are people that are relevant to them, they will adopt the behaviour of the latter towards paying the taxes, either compliance or non-compliance. The reason behind this taxpayer typology is given by the social norms of the group to which they belong. These taxpayers are sensitive to the behaviour of taxpayers that are relevant to them, but also to the behaviour of the fiscal institutions or authorities. This trend can be associated to "flock" behaviour. The relations of the social taxpayers with the government and fiscal authorities are associated with an implicit psychological contract between sides, which can amplify the cooperation and loyalty, or the distrust and non-compliance. The manifestation and perception of equity and of the fair behaviour build trust and lead to the development and observance of the psychological contract and, subsequently, to the fulfilment of the fiscal duties due to the compulsory social norms which regulate their interaction.

The *behaviour of the antagonistic taxpayers* reflects several hypostases of the negative relationship with the fiscal authorities. One hypostasis is the defiance of the fiscal authorities whose actions of fiscal control are perceived as being dominating, not in support of the taxpayers. A second hypostasis is the resistance of the taxpayers in their relation with the fiscal authorities, manifested by the social non-involvement and failure to identify consistent and sufficient reasons to interact with the fiscal authorities. The third hypostasis reflects as perspective of the taxpayers on the fiscal law, which is seen rather as adaptable to their purposes, than as a set of rules which have to be obeyed in their activities with fiscal incidence.

As noticed, the compelling character of the fiscal system and a particular opposition of part of the taxpayers towards paying the taxes or towards other aspects of taxpaying (problems of equity, of using public resources, of the amount and quality of the public goods)

generate the fiscal behaviour as form of manifestation which hinders the accomplishment or application of a fiscal norm or which imposes "conditions" in accomplishing its objective.

Two types of fiscal behaviour were outlined in the theory and practice of the fiscal behaviour, compliance and non-compliance. The behaviour of voluntary compliance, in turn, has two forms of manifestation: natural and compelled voluntary compliance. The voluntary compliance presumes paying the fiscal duties on the grounds of moral obligations, of supporting the state, of fulfilling civic duties. The compelled compliance appears when the payment of the fiscal duties is done due to the fear of not bearing the adverse effects of not paying the taxes.

The behaviour of fiscal non-compliance also has two forms: licit and illicit non-compliance by tax evasion or by breaking the fiscal legislation. The strategy of the fiscal authorities in their relation with the taxpayers must aim, simultaneously, both to strengthen and expand the behaviour of voluntary fiscal compliance by the conservation and consolidation of civic behaviour and of the fiscal morality of the taxpayers, and to fight and alleviate the behaviour of fiscal non-compliance, by adequate measures.

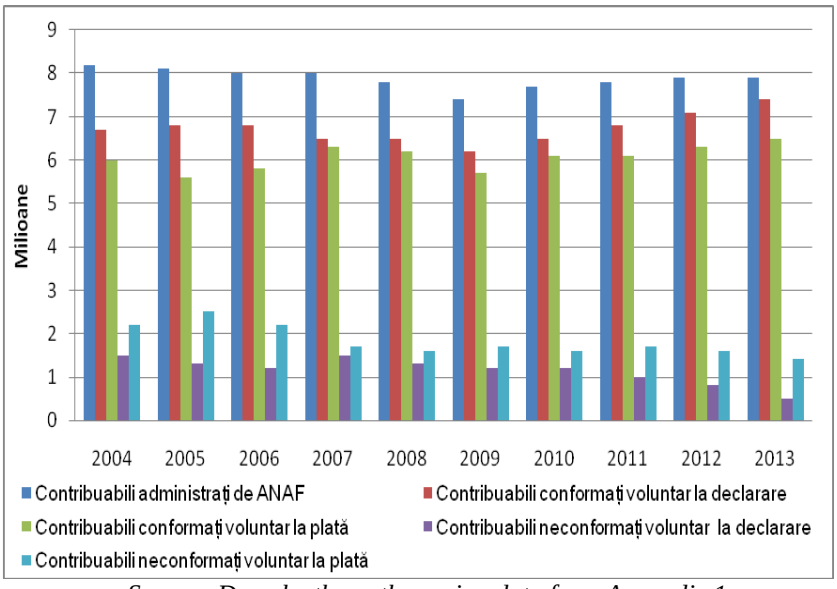
4. Dynamics of the fiscal compliance and non-compliance

We will make here an analysis of the fiscal behaviour of the Romanian taxpayers in 2004-2013, in order to capture the evolution of the fiscal compliance and non-compliance behaviour and to evaluate the efficiency of the measures implemented by the fiscal authorities in order to prevent and control the behaviour of fiscal non-compliance.

The analysis used data from the National Agency for Fiscal Administration (ANAF), which show the quantitative evolution of some aspects characteristic to the interaction between the taxpayers and the fiscal authorities.

The dynamics of the number of taxpayers administered by ANAF ranged from a maximum of 8.2 million in 2004, to a minimum of 7.4 million in 2009.

Figure 1- Evolution of the number of taxpayers administered by ANAF, complying and non-complying in declaring and paying the taxes in Romania in 2004 - 2013



Source: Done by the author using data from Appendix 1

This evolution, shown in Figure 1, reveals the existence of a direct correlation between the national fluctuations of the economic activity and the number of taxpayers administered by ANAF. We anticipate that this correlation is stronger for the legal persons taxpayers (running economic activities) and weaker for the natural persons taxpayers[2]. This situation can be observed through the variation of the number of administered taxpayers which, at the beginning of the analysed period, due to the implementation of stimulating fiscal measures (single taxation level for the incomes of the natural and legal persons) led to the increase of the number of legal persons taxpayers, while due to the economic depression which started in 2008, the number of legal persons taxpayers decreased by 0.8 million in 2009, compared to 2004.

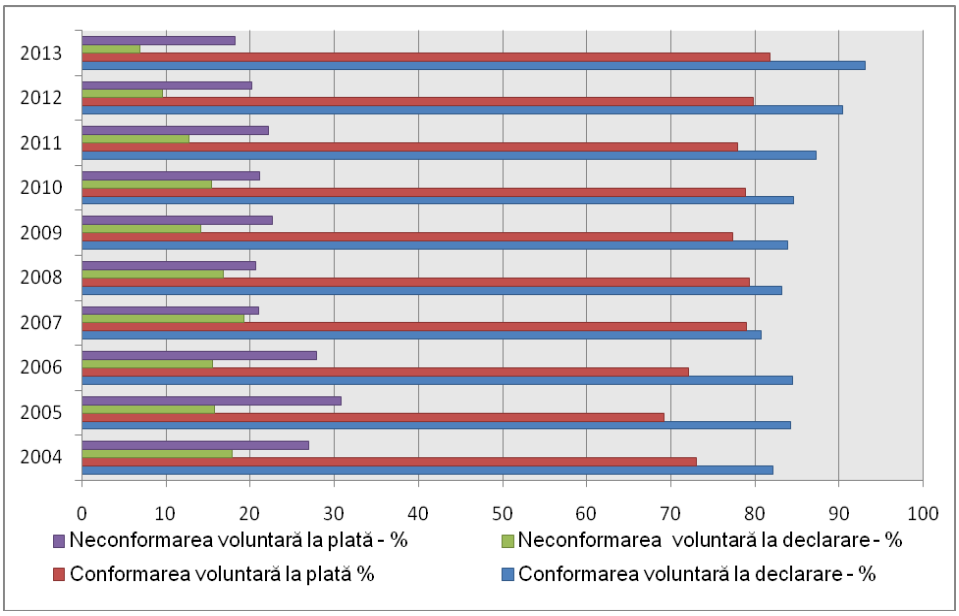
[2] *ANAF supplied data on the structure of the administered taxpayers only from 2009 on.*

The voluntary compliance for declaration and payment of the taxpayers increased significantly throughout the surveyed period, which, obviously, led to the decrease of the non-compliance proportion. Thus, the level of voluntary compliance for declaration increased from 82.1% in 2004, to 93.1% in 2013, while the level of voluntary compliance for payment increased from 73% in 2004, to 81.8% in 2013

This evolution shows that most taxpayers are honest, disciplined people, with positive orientation towards to observation of the law and fiscal authorities. This mass of taxpayers, increasing continuously, as shown in Figure 2, perceives the fiscal system as being correct and equitable, understands the necessity of taxes and due and their role within the society, feeling thus the moral obligation to pay the due taxes and to act in support of the collective interest.

Second, the gap between the level of compliance at declaration and the level of compliance at payment reveals the existence of a temporal lag between the declaration of incomes and the payment of taxes for them. It also shows the existence of a rather small mass of taxpayers (decreasing continuously) who display a conditioned behaviour, who evaluate the behaviour of the authorities by accepting the fiscal authorities and paying the taxes in agreement with the local and governmental objectives, as long as the authorities act in agreement with the fiscal legislation and abide by it, while the services provided in agreement with the fiscal legislation are perceived as correct (fair) and in support of the taxpayers. The negative evaluation of these above aspects generates delays or even non-compliance in the declaration and payment of the taxes.

Figure 2 - Dynamics of fiscal compliance and non-compliance in Romania in 2004 - 2013



Source: Done by the author using data from Appendix 1

Third, there is a minority mass of taxpayers (decreasing continuously), with a negative orientation towards the fiscal authorities manifested by the non-acceptance of them and by the non-compliance with the law. The control actions of the authorities are perceived as being dominating, rather than being in support of the taxpayers. They no longer identify reasons to interact with the fiscal authorities and don't perceive the support and counselling which they consider to be entitled to.

At the level of the fiscal administration, the positive dynamics of the behaviour of voluntary fiscal compliance reveals a permanent concern for the conservation and expansion of the class of taxpayers with high fiscal civil behaviour, as well as the prevention and control of the fiscal non-compliance behaviour by fitting the instruments used in order to enhance their efficacy.

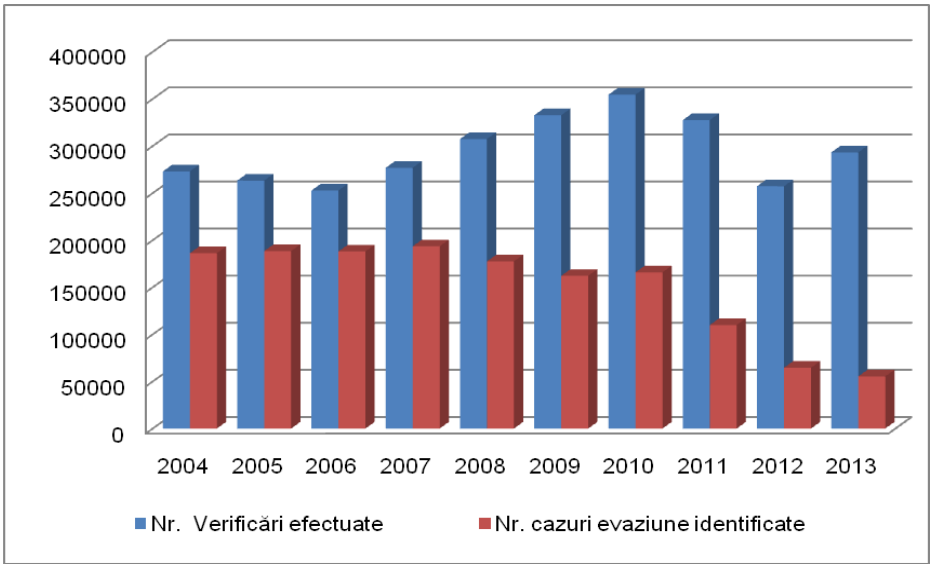
The main instruments used by the fiscal authorities are the control and the penalty/sanction. The intensity of controls is an important measure for the control and amendment of the fiscal non-compliance behaviour. In correlation with the number of identified

cases of tax evasion it gives an image of the efficacy of the used instruments.

During the analysed period, ANAF maintained a rather constant number of controls in the early part, with an average 260,000 verifications per year. Thereafter, on the background of the relaxation of the compliance at declaration, the fiscal authorities had intensified gradually the number of controls, reaching an annual average of 338,000 in 2009, 2010 and 2011.

The strategic dynamics of the number of actions/controls conducted by ANAF proved to be efficient, since the number of identified cases of tax evasion decreased.

Figure 3 - Dynamics of the controls and of the tax evasion cases identified in Romania in 2004-2013



Source: done by the author using data from Performance Reports and from the Quarterly fiscal bulletins of ANAF from the period of reference

Taking for instance the moment of accession to the European Union, in January 2007, we may see that the intensity of controls increased, while the frequency and number of identified cases of tax evasion decreased. This situation was possible both due to the strategy of preventing and controlling the fiscal non-compliance behaviour implemented by ANAF, and due to the intensified

processes of convergence of the macroeconomic policy of adjustment (fiscal and monetary), which required and still require a stronger fiscal-budgetary discipline, national and regional strategies to curb the informal economy and tax evasion within the European context.

Besides the measurable arguments mentioned in support of the positive dynamics of the fiscal compliance behaviour, there also are less measurable arguments which explain this dynamics. Such are the betterment and experience acquired by ANAF since its establishment in 2003, the accumulations regarding the typology of taxpayers according to various criteria (dimension, behaviour, etc.) and the adjustment of the measures of prevention and control of the fiscal non-compliance behaviour. We also speak of the experience accumulated by the taxpayers, who became aware of the need of income and intellectual rights taxation and/or had negative experiences with the fiscal authorities, thus adopting a behaviour of voluntary fiscal compliance.

5. Conclusions

The evolution of the level of voluntary fiscal compliance, observed between 2004 and 2013, shows that the interactional environment between the fiscal authorities and the taxpayers is on a positive path, with mutual accumulation of trust, which materialized in a permanent increase of the mass of honest taxpayers who declare and pay their fiscal duties on grounds of morality and equitable contribution to the development and education of their society.

The progressive evolution towards consolidation of the fiscal compliance behaviour was also supported by the accession to the European Union, by the signing of international agreements and treaties which relate to the conduct of the fiscal policy. Thus, Romania committed to abide by the criteria of nominal convergence set by the Maastricht Treaty (which also include a component regarding the improvement of fiscal revenues collection); the provisions of Lisbon Strategy 2000 and 2020, which monitor the progress in the consolidation of the macroeconomic and sectoral policies (including in the fiscal-budgetary field), identify the constraints and direct the policies; other international agreements which aim to consolidate the good fiscal governance (fiscal discipline) by improving the level of collecting the fiscal revenues through measures of

prevention, control and stimulation of the behaviour of voluntary fiscal compliance.

The "gains" obtained from the democratization of the Romanian society and from the accession to the EU, at the level of the fiscal community, start to be noticeable; they became a necessary stage of modernization of the Romanian fiscal system, with a rather short history, but which created experiences and outlined the evolution of the fiscal culture of the taxpayers, which facilitate the proper functioning of the fiscal-budgetary mechanisms and the progress in the consolidation of a good fiscal governance.

Besides the mentioned positive aspects, there also are other aspects which hinder the efficiency and efficacy of the interaction between the fiscal authorities and the taxpayers.

At the institutional level, they reside in the complexity of the fiscal legislation. The linguistic evaluation of the fiscal regulation reveals concrete problems of difficult understanding for the common taxpayers. Such forms are generally represented by the following types of situations: highly abstract language; long and complex phrasing; use of abbreviations; the wording addresses rather the experts than the ordinary taxpayers.

Another uncertain situation comes from the different perception of the fiscal authorities and of the taxpayers about the way of understanding and observing the fiscal regulations. There are uncertain or ambiguous areas of fiscal regulation, case in which the taxpayers and the authorities have different, although rational interpretations. The evaluation of the fiscal regulation in terms of incertitude and ambiguity generate three levels of difficulty: at the level of understanding the exact meaning of the legal wording; at the level of applying the law to concrete situations; at the level of the arguments considered sufficient in order to support the facts.

Another aspect is the frequency of legislative changes and the implementation of the new regulations in the fiscal code, as aspects which lead to the incomplete knowledge or adaptation to the new regulations; overlapping appears sometimes because the previous regulations regarding the same area of fiscal regulations were not amended.

At the level of the taxpayers, the aspects which hinder the efficiency and efficacy of the interaction between them and the fiscal authorities regard the behaviour of the antagonistic taxpayers,

characterized by the reluctance and opposition towards the fiscal legislation and fiscal authorities.

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APPENDIX 1

Evolution of the number of taxpayers administered by ANAF, of their voluntary compliance and non-compliance in the declaration and payment of taxes in Romania, in 2004 – 2013

Indicator	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Taxpayers administered by ANAF (millions)	8.2	8.1	8.0	8.0	7.8	7.4	7.7	7.8	7.9	7.9
Taxpayers with voluntary compliance in declaration (millions)	6.7	6.8	6.8	6.5	6.5	6.2	6.5	6.8	7.1	7.4
Taxpayers with voluntary compliance in paying taxes (millions)	6.0	5.6	5.8	6.3	6.2	5.7	6.1	6.1	6.3	6.5
Taxpayers with voluntary non-compliance in declaration (millions)	1.5	1.3	1.2	1.5	1.3	1.2	1.2	1.0	0.8	0.5
Taxpayers with voluntary non-compliance in paying taxes (millions)	2.2	2.5	2.2	1.7	1.6	1.7	1.6	1.7	1.6	1.4
Voluntary compliance in declaration (%)	82.1	84.2	84.5	80.7	83.2	83.9	84.6	87.3	90.4	93.1
Voluntary compliance in paying taxes (%)	73.0	69.2	72.1	79	79.4	77.4	78.9	77.8	79.8	81.8
Voluntary non-compliance in declaration (%)	17.9	15.8	15.5	19.3	16.8	14.1	15.4	12.7	9.6	6.9
Voluntary non-compliance in paying taxes (%)	27.0	30.8	27.9	21.0	20.6	22.6	21.1	22.2	20.2	18.2

Source: done by the author using data from Performance Reports and from the Quarterly fiscal bulletins of ANAF from the period of reference

AUTOMATIC SOCIAL STABILIZERS WHAT THEY ARE AND HOW THEY FUNCTION[1]

Alina Georgeta AILINCĂ, PhD Candidate*

Abstract

At the global level and especially in Europe, current economic and financial crisis has had a major impact on the economy, on the output and especially on the employment and incomes. As it is known in economy, as a natural process, some elements (e.g. progressive tax system) can help to counter or to mitigate the adverse evolution of the business cycle and the output fluctuation. Normally, in the recession, the collection of taxes decreases in order to support the private income and the aggregate demand and the unemployment compensation is increased. The fast response of the automatic stabilizers is mostly due to the fact that do not require any modification of the laws and any state discretionary action in order to obtain the necessary results, being usually unnoticed by the general public. Considering that social policy can provide important tools to counter the cyclical development of the economy, this article analyses the social security benefits in report to the GDP evolution, in Europe and in Romania and proposes some solutions for the improvement of the stabilization effect of those instruments.

Keywords: automatic social stabilizers, business cycle, output fluctuation

JEL Classification: E32, H24, H31

Introduction

The current economic and financial crisis has left its scars on disposable household incomes, companies' profits, private consumption and employment all over the world and especially in

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Europe. Thus, in the crisis times it is important to have some automatic, non-discretionary instruments (preferably both on revenue and expenditure side) to counteract output fluctuations and the downturn of economic cycle. This is the case of automatic stabilizers, especially fiscal ones. A part of the automatic fiscal stabilizers (i.e. progressive income taxes) are the automatic social stabilizers (from the sphere of social insurance contributions or social benefits and transfers, as unemployment insurance benefits). In the case of economic downturns, the stabilization effect of an economy is related to the ability of transfers and taxes to damp the adverse movements in aggregate demand and to stabilize incomes, in the sense that taxes net of transfers should act more pronounced in order to make disposable income less affected by the unfavourable business cycle (i.e. in the crisis fewer taxes are collected and more transfers are paid, thus automatic stabilizers sustain consumption and private incomes).

Automatic stabilizers act usually in a silent manner, beginning it compensatory anti-cyclical effect without requiring any new policy decisions. This is why, in the period between 1970s until the late 1990s, were almost unnoticed, until the economic thinking followed real business cycle theory and aggressive anti-inflation policies (Ghilarducci, T., Saad-Lessler, J. and Fisher E., 2011, p.p. 5-6).

The profound recession from 2008, reversed the global tendency to ignore the positive implications of automatic stabilizes on the economies of the world. Thus, social policies, which are often condemned to maintain a low competition on labour market, have quickly regain importance sustaining household consumption even when many employees lost their jobs, wages have stalled or even decreased, and other incomes have vanished. Social transfers, as is the case of unemployment insurance and safety nets programs, seem to be the solution for world economies, and especially for Europe, view shared by Dolls, Fuest, and Peichl (2010a) which have considered that “social transfers, in particular the rather generous systems of unemployment insurance in Europe, play a key role in the stabilization of disposable incomes and explain a large part of the difference in automatic stabilizers between Europe and the US”.

But not only unemployment insurance acts as an efficient automatic stabilizer, Darby and Melitz (2008) argue that expenditures on health, disability and retirement react significantly to economic cycles. Also, in their study, Ghilarducci, T., Saad-Lessler, J. and Fisher E., (2011, p.p 12) find that “The results show that the Social

Security program acts as an automatic stabilizer, as do the disability program, the unemployment compensation program, Medicare, and the income tax (for taxes, as the economy grows, tax collections grow). Among these government programs, the strongest impact comes from taxes, followed by unemployment compensation, Social Security, and disability, respectively". At the same time, according to their analysis, a significant destabilizing effect seem to have any pension plan that is financial market base, as is the case of 401(k) pension plans in United States (US.).

Although, the discretionary fiscal policy has important shortcomings as: implementation lags, irreversibility, inflexibility, crowding out effects, problems in calibrating needed fiscal stimulus at any particular point in time (Swanepoel and Schoeman 2003), and automatic stabilizers have not (Baunsgaard and Symansky 2009), their limited use is due to the lack of sufficient understanding of their functioning mechanism.

Taking into account the above, and agreeing with the views that consider social policy is an important tool to counter the cyclical development of the economy, this article analyzes the social security benefits in report to the GDP evolution, in Europe and especially in Romania.

Description of the problem

In periods of economic growth, public policy behaviour does not seem too important for public or specialists, but in a case of recession or even of economic crisis, the public policy stabilizing effect becomes crucial. Fiscal stimuli or spending cuts are fashionable in the analyses of economists, but is usually neglected the fact that an important part of stabilisation of the demand is achieved without any discretionary policy measures, through the automatic stabilisers. Furthermore, although does not involve additional costs, the role of automatic stabilizers in the economy is often overlooked. In my opinion the design of automatic stabilizers should be done in times of economic growth, while their calibration should be done especially considering their behaviour from the periods of recession or even economic crisis, when their proper functioning is tested.

We can say that, when economy suffers a downturn or is in a deep economic crisis, it affects population directly through the income modification impact on consumption and labour supply by the increase in unemployment rates, and indirectly through wealth effect

on consumption. Also, in a economic contraction, asset prices decrease, interest rates fall, business plans and investments are frozen and many people may intend to delay retirement, or contrary, if their job is insecure (knowing that older job seekers have difficulty finding work) they may intend to retire early (Coile and Levine 2009) and even young employees may find it more difficult to find a job in a limited labour market.

Also, the economic contractions usually affect households asymmetrically, some are more affected (losing their jobs and suffering a sharp decline in income) and some are less affected, their salaries being on short term unaffected. Losing a part of income is an important shock for some households, but being unemployed puts supplementary pressure on the household income drop, thus having a double shock. Also, not always a given shock to gross income translates into a change in disposable income, for example in the case of a progressive income tax the disposable income is less affected. At the same time, it is true that not all the changes of disposable income are translated into a modification of the current demand for goods and services, especially when households can use accumulated savings (including deposits) or can borrow some limited sums of money from banks in the idea that the changes in disposable income are transitory. In this case scenario, there is no need for a stabilization effect or the effect is null, but when the disposable income is affected in a permanent manner then the automatic stabilisers can be efficient.

Although there are many studies that analyze the behaviour of automatic stabilizers in certain parts of the world (especially in Europe and in the United States) and in different periods of time, however their mechanism of operation is still hiding important details that can reopen discussions or even new areas of research. An example can be given by the constraints imposed by the Maastricht criteria and the Stability and Growth Pact in Europe. According to Eichengreen (1996), “Fiscal federalism will not be available to offset recessionary shocks for the foreseeable future. The effects of coordination designed to internalize the cross-border spillovers of fiscal policies are too weak to solve the problems at hand. Freeing up fiscal policy to replace national governments' loss of monetary independence requires, at a minimum, allowing European countries' automatic stabilizers to operate. That in turn requires a flexible application of the Excessive Deficit Procedure and the Stability Pact.”

Literature Review

First we should clear out the concept of automatic stabilizers. Thus, according to the Ghilarducci, T., Saad-Lessler, J. and Fisher E. (2011), in Egle (1952) work, he shows three criteria for describing an automatic stabilizer, so the program must be: 1. permanently installed, 2. well-defined in its main provisions and purposes, and 3. reliably linked to cyclically sensitive criteria (indexes) in the sense that the device starts to operate counter-cyclically as soon as these criteria indicate the need for action. Eaton and Rosen (1980) define the automatic stabilizers as those elements of fiscal policy which mitigate output fluctuations without discretionary government action. Also, Eilbott (1966) describes automatic stabilizers as the "fiscal or monetary mechanisms that automatically reduce the flow of income or money to individuals and corporations during periods of expansion and which increase such flows (relative to what they would have been in the mechanisms' absence) in times of recession".

Dinga and all (2011) describe an automatic (fiscal) stabilizer as "a device of institutional type, of normative origin, with a structural nature, with a sphere of action macroeconomic and countercyclical and with a default (automatic) triggering, having as a final purpose the reduction of macroeconomic output volatility (the GDP volatility)".

According to van den Noord (2000), when we talk about of intensity of the stabilization effect, it is considered that the stabilizing property to be stronger in a more progressive tax system. In Europe, there is a widespread conception that tax progressivity is higher then in US (i.e. Alesina and Glaeser, 2004 or Piketty and Saez, 2007).

When we talk about the investigation techniques of the automatic stabilizers conduct the literature uses time series techniques and microsimulation models. In the time series approaches, stabilization effects for disposable income ranges from 30 % to 40 % for the US (Sachs and Sala-i-Martin, 1992 and Bayoumi and Masson, 1995), while in studies which use microsimulation models the estimations of the stabilization effects varies between of 32 % to 58 % for the countries of EU-15 (i.e. Mabbett and Schelkle, 2007). Also, some studies use macro data but are a few which use micro data as is the case of Auerbach and Feenberg (2000), Dolls, M., Fuest, C. and Peichl, A. (2010a, b) etc. This kind of approach allows an investigation of the causal effects of different types of shocks on household disposable income and on employment (simulation studies), holding everything else constant (thus avoiding

endogenous problems) (i.e. Bourguignon, F., Spadaro, A., 2006), which is more problematic in the case of using macro data. According to the study of Hofer, Hanappi and Müllbacher (2012), using microsimulation model on automatic stabilizers in Austria, examining the functioning of tax-benefit system in order to cushion macroeconomic shock, the authors conclude that 46 percent of the income shock is absorbed by automatic stabilizers, while in the case of an unemployment shock they find a stabilization coefficient of 68 percent.

In the study of Dolls, M., Fuest, C. and Peichl, A. (2010a), which analyzes the effectiveness of tax transfer systems in Europe and the US, they find that "automatic stabilizers absorb 38% of a proportional income shock and 47% of an idiosyncratic unemployment shock in Europe, compared to 32% and 34% in the US. Thus, the disposable income cushioning leads to demand stabilization of up to 30% in Europe and up to 20% in the US and they find also a great heterogeneity within Europe with stabilization being much lower in Eastern and Southern than in Central and Northern Europe". One argument can be that unemployment benefits from countries such as Greece, Italy, Portugal, Spain Poland, Slovenia or Estonia are low and their stabilization effect for low income groups is very weak. Another argument, in this authors view, is that the "government size is often positively correlated with per capita incomes, at least in Europe. The stabilization of disposable incomes will therefore be higher in high income countries, just as a side effect of a larger public sector". Also, according to Blanchard (2000), in the case of automatic stabilizers functioning, output volatility should be smaller in countries with larger governments. The idea is sustain also by the fact that, over the last century, the government size has increased, whereas output volatility has decreased (Romer, 1999). The study of Silgoner et al. (2003) support that idea by examining the smoothing impact of automatic stabilizers on business cycle volatility, for the period of 1970-1999, within a linear and nonlinear framework for a panel of EU countries, concluding that there is a negative relationship between the volatility of output and the government size.

Another important aspect is that the openness of an economy can influence the stabilization effect of the tax and transfer system, according to Rodrik (1998) income stabilization is greater in more open economies. At the same time, the degree of openness of an economy is increasing the spill over effect of discretionary measures between the countries. Maybe, this is why many open economies has

implemented weak stimulus programs and did not take into considerations the automatic stabilizers when fiscal policy is designed.

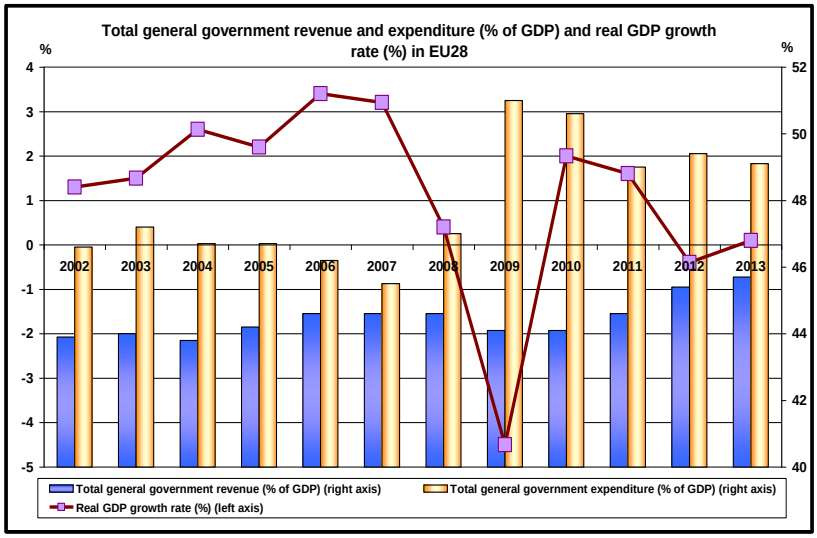
Methodology and data sources

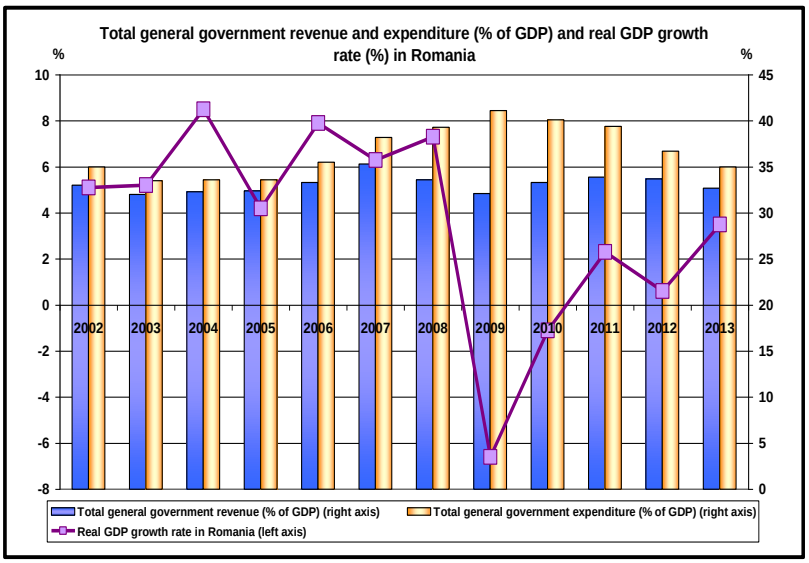
The article is based on a methodology using a logical analysis, in order to clarify some conceptual issues of what automatic stabilizers are and what they do, but at the same time, based on Eurostat data, I tried to show some links between real GDP evolution and social contributions and social benefits (calculated as a percentage of GDP) in Europe and especially in Romania. The present study of the behaviour of automatic stabilizers is not intended to be a rigid or a restrictive one, based only on previous experiences. Though it contains many references from literature, the article aims to have the freedom to share or not the visions of other authors.

Results obtained

As we know, automatic stabilizers may be defined as those elements of revenue and expenditure which adjust automatically to the economic cycle, but when we look at the behaviour of real GDP growth rate and the total general government revenue and expenditure in European Union (with 28 countries) and Romania, for a period from 2002 – 2012, the above affirmations are not so clear all the time (see Fig.1). Mostly expenditures are decreasing with the increase of real GDP growth rate, and are growing when GDP collapses, as it is the case of year 2009 (both for EU28 and Romania), but they still have a series of structural or conjectural rigidities, which don't allow them to react deeply or immediately to changes in economic cycle. Still, higher stiffness can be observed in the case of revenues, they hardly fit to the evolution of real GDP, but it is difficult to say if these realities are due to the discretionary or non-discretionary (automatic) aspects of fiscal-budgetary policy. According to Kennedy et all (2004), revenues are more responsive to variations in output than expenditures, thus tax policy can make automatic stabilizers to have important effects on output.

Figure1 – Total general government revenue and expenditure and the real GDP growth rate in EU28 and in Romania



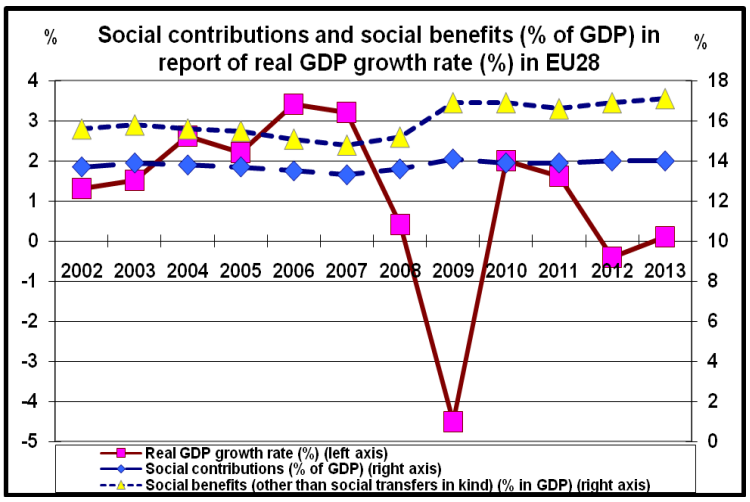


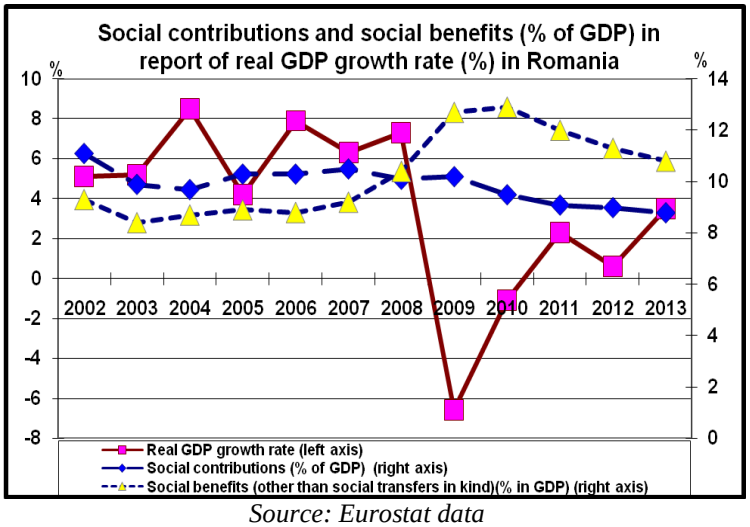
Source: Eurostat data

When we look at the evolution of social contributions and social benefits in report of the real GDP growth rate (see Fig.2), we can see that contributions are pretty stable and have little to do with

GDP evolution, but social benefits act prominently countercyclical, both at EU28 level and in Romania.

Figure 2 – Social contributions and social benefits (% of GDP) in EU28 and in Romania



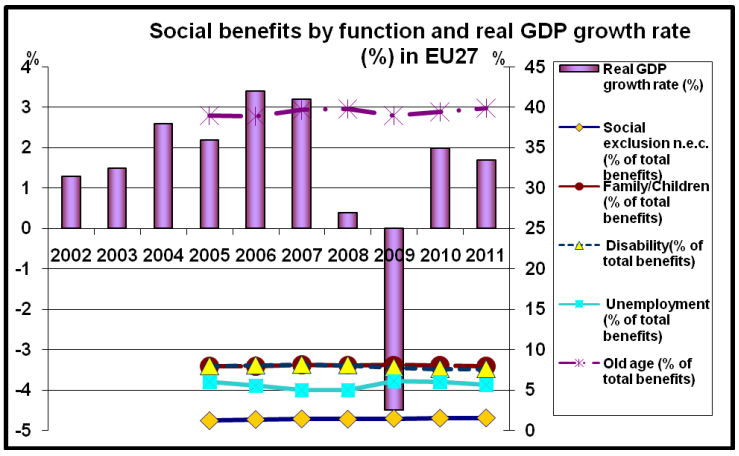


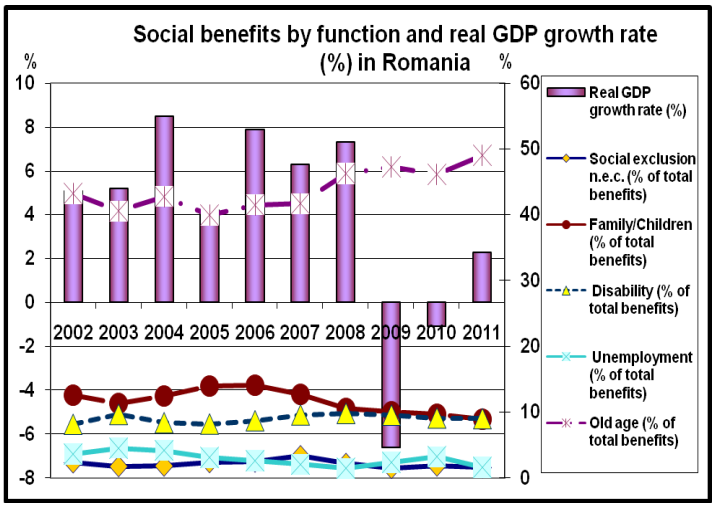
Source: Eurostat data

If we take into consideration the components of social benefits (evaluated as % of total benefits) (see Fig. 3) some of them act rather in the same direction with the economic cycle or they keep

unchanged their trajectory and do not seem to have a negative feed-back to the real GDP growth rate as is suppose to have any automatic stabilizer. Thus, it is important to know how much of a component of social benefit system is affected by discretionary policy action.

Figure 3 Social social benefits by function and real GDP growth rate (%) in EU27 and in Romania





Source: Eurostat data

Conclusions

Administrative, legislative and political factors may be important elements in disrupting the normal functioning of macroeconomic policy, argument for which discretionary (fiscal) policies should be avoided as much as possible. Discretionary policies create important costs and implementation lags, irreversibility in an automatic manner according to the needs of economic cycle and they can possibly generate deficits and accumulation of debt. These flaws are not found in automatic (fiscal) stabilizers, which practically offer a quick decision making process. From automatic fiscal stabilizers a particular class of stabilizers can be considered the social. On the side of expenditure, as an important automatic stabilizer it is considered unemployment insurance benefits, but the results from literature and personal findings are rather not so clear, especially considering the particularities of different countries and the evolution over specific moments in time (i.e. crisis periods).

In the context of Stability Growth Pact, which widened the rule-base policies in the sense of imposing tough fiscal rules, the role of automatic stabilizers and stabilization policies became once again important, being numerous voices which are calling for their consolidation in the European Union.

This aspect is reinforced by the discrepancy between the north and south countries of the European Union in terms of managing the social component of the budgetary system. The positive effect is given by the size of state in the Nordic countries and especially of their involvement in providing adequate social protection. Thus, providing a social policy, implicitly a wage policy unitary, consistent, transparent and fair in the EU could better cushion any negative shocks affecting EU countries as a whole.

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REFERENCE POINTS FOR FINANCIAL INSTABILITY IN THE EURO ZONE CANDIDATES COUNTRIES[1]

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Abstract

The issue of financial instability has been intensely debated over the past few decades both within the academia and by the economy decision-makers. The complexity of the concept and the range of meanings hinder the development of a general, unanimously accepted definition. However, the historical analysis of the episodes of financial instability, which were rather frequent particularly after World War Two, as well as the specific literature, may outline some characteristics of the state if financial instability. Starting from these general aspects, this article aims to identify some traits which define the financial instability in the countries candidate to the Euro zone, taking into account the European integration and all the challenges of this process. The ideas presented in the paper will be used to analyse the actions taken by a national central bank candidate to the Euro zone, to cope with the challenges of the financial instability.

Keywords: banking credits, fragility of the financial system, European integration

JEL Classification: E58, F36, G01

1. Introduction

The long-term deflationist depression of Japan throughout the 1990 and 2000 years, after the prosperous 1980 years, the 1980 and 1990 years currency crises from the Latin America, the Asian

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financial crisis of the late 1990 years, and more recently, the global financial crisis, started in the USA and propagated in Europe too, are serious examples of financial instability which show the importance of understanding the way in which the functioning of the financial mechanisms may contribute to the production of financial instability.

Although this is a subject intensely studied lately, given the history of the recent global financial crisis which started in 2007, there is enough space for debates on this subject and many questions to be answered. Given the challenges of the process of monetary integration within the candidate countries, it is important to identify markers which define the financial instability in this region.

The paper starts with a brief review of the literature on the financial instability and with some remarks on the manifestation of some episodes of financial instability after World War Two (more precisely, during the period of neoliberal capitalism development), which highlight the main elements which define this concept. The analysis of the financial instability continues with the situation of the emerging European countries, taking into consideration the characteristics entailed by the trends of globalization and by the accession to the European Union (EU). The selected countries are those candidates to the Euro zone: Bulgaria, Lithuania (which will adopt the Euro in 2015), Poland, Czech Republic, Romania and Hungary, as well as Latvia which, although has already adopted the Euro as of January first 2014, is an important case of analysis for the financial instability. The purpose of the analysis is to identify features which describe the financial instability in these countries.

The study leaves from the assumption that the onset of a financial crisis is the most serious consequence of the financial instability, the sign of a deficient functioning of the financial system. The seriousness of the economic, social and politic effects of the financial crisis is enough motivation to identify in time the sources of the financial instability, so that efficient correction measures can be designed, because, usually, the knowledge of the causes which determine the financial instability sketch the directions of prevention and correction.

2. Approaches of the concept of financial instability in the literature

The concept of financial instability doesn't have a unanimously accepted definition, just like the concept of financial sustainability since an analytical framework for the evaluation of the financial (in)stability is yet to be developed.

According to Crockett (1997), financial instability is the situation in which the economic performance is potentially affected by the price fluctuation of the financial assets or by the incapacity of the financial institutions to meet their contractual duties. Mishkin (1999) also defines the financial instability highlighting the importance of the asymmetric information in its generation, on the basis of its role of intermediary within the banking system which supplies financial resources towards the real economy. Davis (1999, 2002) defines the financial instability as a period of events which amplify the risks of a financial crisis, i.e. the collapse of the financial system which affects the payment services and the allocation of funds for investments. Although the author considers that the volatility of the price for assets should be excluded from this definition, it is known that the systemic risk can manifest by the absence of liquidity from the market and by the jamming of the market infrastructure too. On the other hand, Ferguson (2002), defines the financial instability taking into consideration the element excluded by Davis (1999, 2002), the volatility of the price for the financial assets, considering that if the prices of particular important financial assets deviate significantly from the normal and if there may be distortions in market operation and availability of the credit (internal and international), so that the aggregate expenditure deviates or tend to deviate significantly from the level at which the economy is able to produce, then the conditions for financial instability are met. Ferguson's definition (2002) also includes the effects of the financial instability on the macroeconomic variables (on the aggregate expenditure).

Chant (2003) considers that the financial instability is determined by the conditions in which the financial markets disturb or threaten to disturb the economic performance through their impact on the operation of the financial system, making distinction between the financial instability and the macroeconomic instability. The author considers that the financial instability also contains different forms of instability (banking crises, crash of the stock market), depending on the segment which is disturbed (banking system or stock market). He

draws attention to the dynamic character of the financial markets which leads to permanent changes in the conditions and prices on thee markets, which requires that the definition of the financial instability makes distinction between the "normal" changes and those which have a potential impact on the real economy.

Allen and Wood (2006) defined the financial instability from the perspective of the real economy taking into consideration the non-financial sector too (households, companies, governments) which is confronted with financial "crises" too, but the definition is much too general and it includes elements which cannot be directly influenced by the monetary authority in order to promote the financial stability.

Another concept used by the literature, closely tied to the issue of financial instability, refers to the *financial fragility*. Minsky (1995) developed a *theory of the financial market fragility* on the basis of which he explains the appearance and propagation of the financial crises, highlighting that the financial fragility is caused by the build up of debts within the private sector during the economic cycle. According to this theory, during the periods of prosperity, the increase of the cash-flow over the necessary amount for the payment of the debts leads to a phenomenon of speculative euphoria which creates a credit bubble. Gradually, the speculative phenomenon generates the excess growth of the debts, which leads to the contraction of the economy. The formulation of this theory contributes to the understanding of the way in which the financial markets operate and of the relation between the financial system and the real economy, showing that the financial system fluctuates between solidity and fragility, and that these fluctuations are part of the process which generates the economic cycles. Actually, Minsky depicts very well the behaviour of the capitalist financial system which, by definition, is a complex and sophisticated financial system affected by internal processes which generate instability (Minsky, 2011).

Issing (2003), considers that the financial fragility is a characteristic of that economy which neared its critical level, that particular level after which the resources are allocated inefficiently. The fragility of the financial system can be caused by endogenous factors specific to the financial environment (deficient functioning of the financial system components, build up of imbalances determined by particular conjunctural conditions, inadequate regulations which increase the moral hazard, etc.), or by exogenous factors, from the wider macroeconomic environment (lower rate of economic growth,

poor foreign payments balance , higher inflation rate, poorer international competitiveness of the economy, deterioration of the exchange rate, etc.). These factors put a specific "pressure" on the financial system, which accumulates vulnerabilities in terms of infrastructure and relations between the entities, thereby wrecking the entire system.

When a financial system is fragile, an insignificant shock may lead, through contagion, to significant effects. A financial system fragile due to its internal structure, with no adequate mechanisms of auto correction, increases the risk that any shock generates internal crises of the financial system, which may expand and lead to financial instability. On the other hand, an endogenous shock, such as the bankruptcy of a bank or a major fluctuation in the price of the assets, cannot always be regarded as a proof of financial instability, but rather as a correction reaction against some abnormalities within the financial system. Issing (2003), stated that the major fluctuations in the price of the assets which may determine the bankruptcy of the financial and monetary institutions due to the propagation of an important real and financial shock, might be a proof of the stability and self-regulation capacity of the system (in agreement with the Schumpeterian vision of "creative destruction"), as long as an efficient financial intermediation and an efficient process of financing can be maintained.

Chant (2003), distinguished the three states of a vulnerable financial system – fragility, instability and crisis, depending on the operational capacity of the particular financial system. Thus, the financial fragility is that state in which the financial system fulfils its functions under the conditions of an obvious vulnerability; the financial instability is that state in which the vulnerabilities start affecting the operation of the financial services, while the financial crisis is the most serious state of financial instability, in which n the normal operation of the financial system ceases. Lupu (2011) concluded that the financial crisis is a manifestation of the financial instability which burdens the real economy with significant costs.

On the basis of Chant's idea (2003), we consider that the financial instability has a premises the financial fragility and, thus, the markers defining the financial instability are those elements which determine in time the financial instability.

3. Brief history of the episodes of financial instability

David Kotz (2013) depicted the characteristics which define the capitalism after World War Two. He considers that the financial instability which characterizes the period after the 1970 years (as shown by the high frequency of the financial crises) is generated by the major changes in the global capitalist system, the USA and the United Kingdom being the promoters of this process. The changes which actually drafted the neoliberal current (through the Washington consensus) were considered to be the necessary elements to solve the crisis period of the regulated capitalist system, which existed at that time and which had been established after World War Two. Thus, in the early 1980 years, the new form of capitalism was setting the grounds for new institutions, for new policies and ideas, first in the USA and United Kingdom, spreading thereafter to other countries. The neoliberalism, relying on liberalization, privatization and stabilization, meant on the one hand the stimulation of the development of capital and investments by the liberalization of the financial flows and, on the other hand, the reduction of the social programs of the government, restrictive monetary policies oriented towards price stability and additional efforts for budget balancing. Such orientation of the economic development meant the domination of the capital over the work, unlike the regulated capitalism (relying on Keynesianism), which ensured a balance between these two variables. By encouraging the investments in capital, concomitantly with the stagnation of the real wages, this new form of capitalism stimulated overproduction and the maintenance of the economic expansion encouraged consumption in excess of the incomes and the establishment of speculative bubbles. The financial cycles increased in amplitude, and the financial instability became a major concern for the macroeconomic policies.

The economic and financial history of the past 30 years, which passed under the sign of neoliberalism, confirms the endogenous character of the financial instability specific to the market-oriented capitalist system. Through the 1980-2000 years, many regions of the world were confronted with periods of financial instability, both in developed countries (New Zealand, Australia and the Scandinavian states, Japan, USA), and in emerging countries (the Latin America countries, the Asian countries, Russia).

The deregulations in the financial-banking system and the removal of the control of the capital which were produced within favourable financial conditions in various parts of the world in the 1980 and 1990 years, produced resembling local effects, of financial stability, by the excessive stimulation of the credits and by increasing the price of assets on various markets (real estate, stock exchange). The financial instability which we consider as an aggravating for of the financial fragility started to show up together with the propagation of shocks within the financial system (oil shock, change of the monetary or fiscal policy behaviour, etc.), which generated the burst of the speculative bubble which had formed in time. Table 1 shows the stages of financial instability, with their characteristics, in several countries.

Table 1

Characteristics of the stages of financial instability in different countries (1980-1990)

Country	Period of the financial fragility (the 1980 years)		Period of the financial instability (end of the 1980 years - the 1990 years)		
	Changes in the macroeconomic policies	**Effects (formation of the speculative bubble)**	**Shocks**	**Effects during stage I (burst of the speculative bubble)**	**Effects during stage II**
Japan	Capital inflows Relaxed monetary policy	Stimulation of the credit Higher price of the assets	Changed behaviour of the monetary policy (restrictive policy) to curb inflation	Higher interest rates Decreasing price of the assets, including the real estate price.	Payment incapacity Lower prices Long deflating phenomenon
Norway	Capital inflows Real negative interest rates for the debts of the private sector	Stimulation of the credit Extreme financing of the demand for credits Higher price of the assets	Oil shock (falling oil price)	Deterioration ratio of the high wages and production Currency speculations to the detriment of the national currency	Banking crisis Economic recession
Finland	Capital inflows Budgetary expansion	Effervescence of the credit Higher real estate prices	Restrictive monetary policy (higher interest	Lower growth of the credits Shrinking commercial activity	No prolonged effects because the banking system was

			rates and reserves requirements) Fall of the Soviet Union	Strong decrease of the price of assets	supported by the government
Sweden	Capital inflows	Stimulation of the credit Effervescence of the real estate market	Restricted credits Higher interest rates	Problems within the banking system (some banks had major difficulties based on overestimated values of the assets)	Recession
Mexico	Privatization of the local banks Capital inflows Cancellation of the reserves requirements	Stimulation of the credit for companies Development of the stock exchange market	Political shock (assassination of a candidate to the Presidency)	The political instability crashed the prices of the stock exchange and of other financial assets	Crises of the financial system (banking and currency crises)

Source: author's diagram

The above observations support the idea of a pattern of the financial instability manifestation, at least for the period 1980-1990. A shock which occurred on the background of the financial system fragility marked the beginning of the period of financial instability.

Although the financial instability became more complex after the 2000 years, as it was shown many times during the recent debates on the causes of the global financial crisis, its pattern maintains and is like a prolongation of the episodes of financial instability of the 1990 years. The financial deregulation, accompanies by the strong development of the financial system (financial innovations, globalization and technological development) determined the strong increase of the credit and the boost of consumption and investment using borrowed resources, which created the conditions for the development of speculative bubbles. The subsequent burst of that speculative bubble generated several adverse effects on the financial market and within the real economy.

It is interesting to see whether such a pattern maintains in the specific case of the countries candidate to the Euro zone. The concern of the decision-making factors for the liberalization of the

capital account, which meant the possibility of making free transactions in the form of direct foreign investments or the purchase of extreme securities, had different motivations in different countries. Thus, while for the USA and the United Kingdom, the liberalization of the capital account was largely motivated by the fact that they had the statute of issuers of global reserve money, and by the fact that they were international financial centres, for Europe, the liberalization was motivated particularly by the objective of European integration and establishment of the common market.

4. Premises of the financial fragility in the countries candidate to the Euro zone

In the early 1990 years, the European emerging countries were encouraged, by the evolution of the financial markets and by the direct or indirect suggestions of the international institutions, to remove the barriers to the cross-border transactions and to start a broad process of financial liberalization. The opening towards the exterior of the economies from these countries was done in the hope for foreign capital and for its efficient allocation within the economy, as productive investments, which would have long-term beneficial effects on the economic growth. However, the process of liberalization didn't take into account the structure of the internal financial system of these countries, which was insufficiently adapted to such opening. The financial liberalization implanted within an insufficiently developed institutional framework created favourable conditions for the build up of systemic risk factors.

Although the episodes of financial instability at that time were testimonies to the risks of financial liberalization in the form of excessive assumption of risks, high macroeconomic volatility and strong exposure of the economy to the episodes of financial crisis and instability, it was considered that the advantages of the financial liberalization would outmatch the adverse effects.

The inflows of foreign capital were drawn to these countries in a period of optimism, with global liquidity, with low interest rates and with high rates of economic growth in this region (particularly during the 2000 years, up to the start of the global financial crisis). Besides the worldwide favourable conditions, there also was a positive perception of their accession to the EU. The fulfilment of the pre-accession conditions increased the confidence that there is a favourable internal climate and that the economies will have a

convergent evolution with the evolution of the older EU member states. Such expectations determined the reduction of the risk premium for the new EU member states and created attractive conditions for investment for the foreign banks. These, particularly the banks from the Euro zone, invested massively in the region, as shown by the significant increase of their assets within the total assets of the banking system from these countries. Theoretically, the investments of the foreign banks within the national banking system should improve the quality of the financial services and the efficiency of the process of financial intermediation (Prasad and Rajan, 2008). Actually, the higher attractiveness of this region increased the number of banks from the national markets and thus, the competition, within the national banking system. Under these conditions, many of these institutions adopted aggressive strategies of gaining an as large as possible market share, by orienting their activity mainly towards the financing of economy through credits. However, the insufficiently developed financial systems of the analysed countries could not absorb the massive financial flows, and they reoriented towards non-tradables (such as real estate), with more simple and accessible collaterals. The pressure on the market of the non-tradable increased their price and the value of the collaterals, which increased further the activity of crediting (Evans et al., 2000). The accelerated increase of the bank credits generated by the competitional pressure reflected in the deterioration of the credit quality by the assumption of increasing risks, this effect being very difficult to manage by the monetary authority, because usually, during the periods of effervescence, the accelerated dynamics of the financial system make it difficult the short-term increase of the analytical and monitoring capacity.

The liberalization of the banking sector also favoured the expansion of the non-banking financial institutions and of the securities market. These trends amplified the access to foreign capital and the range of investment possibilities, thus increasing the level of investments while reducing the internal saving.

The structural reforms, the opening of the capital and financial account, the financial liberalization and the domination of the foreign banks, with easy access to financing from the mother-banks, were the factors which generated financial instability before the onset of the global financial crisis, because they decreased rapidly the cost of borrowing, particularly in hard currency, and amplified very much the credits to the private sector. The effervescence of the credit before

the onset of the crisis consolidated the bond between the financial intermediators and the real economy. Thus, on the one hand, the excessive increase of credits disturbed the macroeconomic stability by the higher aggregate demand in excess of the potential capacity of the economy. This deteriorated the foreign balance by increasing the current account deficit of the foreign payment balance and impacted on the foreign debt of the private sector. On the other hand, the massive inflows of capital within a poorly developed financial system put pressure on the price of the financial assets (shares, exchange rate) and of the real estate assets, generating speculative bubbles which intensified the credits.

5. Elements of the financial fragility in the countries candidate to the Euro zone

Analysing by country the elements which generated financial instability before the onset of the global financial crisis, one can notice a fast increase of the credit towards the private sector in the Baltic states, Bulgaria, Poland, Hungary and Romania, which deepened the current account deficit by stimulating consumption (trough indebting), thus favouring a higher financial instability. Also in these countries, one may notice the preference for hard currency credits (Euro, mainly), because the hard currency risk was perceived as being very low in the countries whose national currency was anchored to the Euro (Bulgaria and the two Baltic states), while in the countries with a flexible exchange rate (Poland, Romania and Hungary), the national currency was expected to appreciate in relation to the Euro.

Furthermore, in Bulgaria, Latvia and Lithuania, the high level of Euro use, the poor development of the financial sector and the presence of the foreign banks with fast access to foreign financing, were important factors which generated financial instability because they affected the adequate functioning of the mechanisms for monetary policy transmission, thus hampering the implementation of the monetary authority measures.

The amplification of the trend of foreign financing of the credits also generated balance mismatch for the currencies (credits to the private sector in national currency, from currency funds borrowed from abroad). Even in the situation in which the currency exposure remained within acceptable limits, the currency credits became risky due to the mismatch between the sources denominated in hard currency and the sources in the national currency. Such risks

occurred throughout 2002-2005 in Latvia, Lithuania, Bulgaria, Romania and Hungary.

The deterioration of the credit conditions because of the higher competition on the market was stronger in Bulgaria, Hungary and the Baltic states. The credit risk also increased in Latvia and Lithuania because the credits concentrated in the non-tradable sector (mortgages) and in household consumption.

The stable macroeconomic and financial evolution from Czech Republic, in this period, didn't lead to the build up of distortion within the financial system which was robust in Czech Republic, not fragile like in the other countries. In Czech Republic, before the start of the financial crisis, the low internal interest rates and the stable macroeconomic environment didn't encourage the excessive use of the Euro or the development of major speculative bubbles, and the need for foreign financing was limited. Thus, the banking sector (dominant within the financial sector, like in the other analysed countries), was characterized by a conservative balance structure, meaning that it was predominated by deposits and credits of the residents in the local currency (Czech crown)[2]. Furthermore, the banking sector was net external creditor, the credits being granted mainly using the deposits of the population. There also was a low level of indebting, both of the public sector, and of the private sector, with currency equilibrium of the balance sheets. The exchange rate flexibility and the high credibility of the central bank policy also played an important role in the positive evolution of the Czech banking system.

Synthesizing the results of this analysis, we may identify several common elements which weakened the national financial systems before the onset of the crisis, and which had different intensities, as shown in Table 2.

[2] *According to a study by the International Monetary Fund (IMF, 2012), just 20% of the volume of credits are denominated in hard currency, and all were given to companies, which limits the indirect currency risk.*

Table 2

Specific elements of weakening of the national financial system in the countries candidate to the Euro zone before the start of the global crisis

Elements of the financial fragility	Countries						
	BG	CZ	LV	LT	PL	RO	HU
Higher indebtedness of the private sector, particularly in hard currency							
Excessive use of the Euro within the economy							
Higher foreign debt of the banks							
Development of the real estate market by increasing the price of real estate assets (formation of the speculative bubble)							
Deterioration of the credit conditions							
Currency mismatch							
Level of financial fragility							

Source: author's representation based on the information from the ECB reports on the financial stability (ECB, 2012 and ECB, 2014) and in Ötker-Robe et al. (2007)
Notes: The characteristics of the financial fragility are shown in different colours function of the seriousness of their manifestation within the economy – from darker colours (strong manifestation) to lighter colours (less strong, even insignificant manifestation); BG - Bulgaria; Czech Republic - CZ; LV - Latvia; LT - Lithuania; PL - Poland; RO - Romania; HU - Hungary.

On the basis of Table 2, we may group the analysed countries in three groups, for the period before the start of the global financial crisis, depending on the intensity of the factors which generate financial instability. Thus, the countries with the most fragile weakened system, with the highest risks towards the financial stability

(direct and indirect exposure of the banks to the currency risk, exposure to the liquidity and refinancing risk due to currency mismatch, relaxed credit conditions, exposure to the market risk and to the credit risk) are Bulgaria, Latvia and Lithuania. Hungary, Poland and Romania form the group of the countries with a medium fragility, while Czech Republic is the only country which has a robust financial system, the least exposed to the episodes of financial instability.

After the start of the global financial crisis, the already weakened national financial systems have been submitted to episodes of instability and incertitude which affected their financial market and their real economy: slower economic growth, sudden corrections of the current account deficits and of the real estate prices (burst of the speculative bubble), particularly in Bulgaria, Latvia, Lithuania and Romania, and to a lesser extent in Poland and Hungary. The exchange rate volatility increased in the countries with a flexible exchange rate, especially the depreciation, which affected the payback capacity of the credits in foreign currency. This generated a higher volume of non-performing credits within the banking system and a higher risk of withdrawal of the foreign banks from the national markets (by limiting the exposure of the foreign banks on the local markets). Furthermore, the Baltic states, with a fixed currency regime, were confronted with the unemployment problem, low wages and a high level of governmental indebtedness.

The experiences highlight the role of the financial system fragility in the generation of the episodes of instability. Also, the experience of Czech Republic, the only country among the surveyed countries which was not directly affected by the crisis, confirms the importance of not having financial fragility in the prevention of the episodes of financial instability. Actually, the onset of the global financial crisis practically blocked any factor which could have activated the speculations on the Czech real estate market. The monetary authority (Czech National Bank) played an important role since it has warn the public, even before the financial crisis had actually started (in the 2006 report on the financial stability), on the overoptimistic expectations specific to the peak stages of the economic cycles and on the build up of risks on the real estate market.

The characteristic elements identified in relation with the fragility of the financial system in the countries candidate to the Euro zone are sources that generate financial instability and premises for

the more detailed study of the relation between the seriousness of the financial instability and the seriousness of the financial instability manifested through the adverse effects of the initial shock of the global financial shock.

6. 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.

Theoretically, the financial fragility accumulated in time can be generated either by the promotion and implementation of internal macroeconomic policies inadequate to the structure of the financial system and to its environment, which allows the build up of imbalances within the system (endogenous causes), or by the propagation of shocks within the financial system which affect sufficiently important elements of the system ("contagious" character) to affect the functionality of the whole (exogenous causes), or by the unsustainable relation of the system with the outer environment (penetration of imbalance-generating factors - factors of accumulation), situation specific particularly to a formerly closed system which opens up (mixt causes).

The financial instability of the 1980-1990 years had endogenous causes: the neoliberal ideology adopted by the developed countries and transposed in the internal macroeconomic policies stimulated speculative behaviours which generated financial instability.

The countries candidate to the Euro zone, surveyed in this paper, and which went through the specific conditions of the process of accession to the EU and of adopting the Euro, passed from a closed, restricted financial system, to a liberalized one. This characteristic favoured the financial instability because the fragility of the acquired financial systems resulted from the accumulation of imbalances generated by the regional wave of changes. Although it seems that the nature of the changes is endogenous, the transition from one regime to another was much more complex and it involved both internal and external factors, at least under the form of the

recommendations formulated by the international institutions and of the external influence which generated an adaptive behaviour by ***imitation***. Furthermore, the structure of the internal financial system of these countries was not adapted to such opening – the lack or insufficient development of the financial sector didn't allow the absorption of the large volume of financial capital. The financial liberalization applied to an insufficiently developed institutional framework created favourable conditions to the accumulation of factors with systemic risk. The massive inflows of capital on the national market and the predominant presence of the foreign banks which adopted aggressive strategies of increasing their market share generated the excessive increase of the credit, particularly of the hard currency credits. This trend was encouraged by the direct relation of these institutions with the mother-banks abroad, which ensured a fast access to liquidity.

The specific elements which made more fragile the financial systems from the countries candidate to the Euro zone and which represent sources generating financial instability refer to the increasing foreign indebtedness of the economy (particularly of the private sector) through the banking system and of the proportion of the debts in relation with the revenues, but the internal conditions of these countries generated different nuances of the financial fragility. A strong fragility was noticed in the case of the Baltic States and of Bulgaria, a medium fragility was noticed in Romania, Poland and Hungary, while no fragility (robust financial system) was observed in Czechia.

The identification of the elements which define the financial instability is important to the monetary authority if it has available the special instruments needed to correct the possible fragility of the financial system. One of the conditions necessary for the management of the financial instability is the collaboration of the central bank with the other financial institutions and authorities for the exchange of information of mutual interest (Criste, Lupu, 2014). On the other hand, however, given the direct relation between the national economies of the countries candidate to the Euro zone and the activity of the foreign banks in these countries, the financial instability acquires a broader meaning than that circumscribed to the responsibilities of national central bank. The financial instability from EU member states crossed the national borders. It must be seen through the prism of the link between the interest of the foreign banks

and the interest of the national economy in which the foreign banks operate, and one of the conditions for the management of the financial instability within the European Union is the cooperation between countries and between the private institutions (the large commercial banks) and the national public authorities.

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TESTING STOCK MARKETS' INTEGRATION FROM CENTRAL AND EASTERN EUROPEAN COUNTRIES WITHIN EURO ZONE[1]

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Abstract

Stock market integration gives the opportunity of risk diversification on international level. The main effects of this integration are the development of stock markets and economic growth. This paper analyses the integration of stock markets from Central and Eastern Europe using convergence. Beta-convergence gives us information about integration's speed and sigma-convergence presents information about the degree of integration of stock markets from Central and Eastern Europe on the stock market of Euro Zone.

Keywords: return, beta convergence, sigma convergence

JEL Classification: C51, G15

Introduction

The financial and economic crisis broken out in 2008 in the USA and caused by the roaring bankruptcy of the Lehman Brothers bank has also impacted the European countries. The Central and East European countries which are the last ones that adhered to the Economic European Union are characterized by the prevailing development of the banking system. As a consequence, the economy financing is performed mainly through the banks while the stock markets hold a secondary place even though these help to obtain the

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capital at a smaller price than the one obtained through the bank loans.

In an economy affected by a financial and economic crisis, the issue of identifying all the elements that determine the economic growth is highly debated. Devereux and Smith (1994) as well as Obstfeld (1994) reach the conclusion that the integrated capital markets through the possibility of risk diversification at international level determine economic growth.

Equity markets from Romania and the countries of Central and Eastern Europe have been the subject of many research studies. Research focuses on: the statistical properties of returns and their behavior (Harrison, B., Lupu R., Lupu I. (2010), V. Chirila, Chirlă C. (2012), Lupu R. (2006)), the presence of heteroskedasticity (Lupu R., Lupu R . (2012)), the analysis of market efficiency (S. Dumitrescu, Stroe A. et al. (2011)), Pele D. T, Voineagu V. (2008), contagion (Lupu I. (2012) Lupu I. (2013)) but also on the analysis of integration in European market (Horobeţ A., Lupu R. (2009)).

This study focuses on the analysis of the integration of Central and East Europe stock markets within the Euro Zone of the European Union. The integration of stock markets is tested by means of the beta-convergence and sigma-convergence indicators as well as by the integration level. The analysis has been undertaken for the entire period under consideration as well as for two periods separated by the start of the year 2008 which is considered the beginning of the occurrence of the financial and economic crisis.

This study is structured as follows: the second chapter presents the main studies regarding the convergence of the stock markets, the third chapter minutely describes the methodology considered and the data source and then it continues with the empirical study and the conclusions.

Description of the problem

Babecký, J. et al. (2013) taking into account the results obtained by Agenor (Agenor P. R. (2003), Agenor P. and al. (2011)) underline that the financial crisis has more benefits than costs both during the economic growth periods and during the economic downturn times if the mechanisms of financial stability function.

The studies concerning the financial integration vary both from the point of view of countries considered and from that of the methodology used. In order to determine the financial integration, the

most frequently used methods are: cointegration analysis, vector autoregression, beta and sigma-convergence and conditional correlations. The cointegration analysis offers the possibility to determine the stability of the return or of the prices of the capital markets on a long term. The vector autoregression method highlights the dynamics of the short-term returns of the capital markets but it also provides the possibility to determine the causality between the returns considered. The conditional correlations through the GARCH-type heteroscedastic models highlight the lack of linearity of volatility of the capital markets. The beta-convergence and sigma-convergence have been taken from the literature of economic growth and offer the possibility to determine both the integration speed and the integration level. It is the methodology that was chosen to be used in the present paper.

Hardouvelis and al. (2006) analyze the integration of 11 Euro zone countries within the European Union for the period 1992-1998. The results obtained confirm for the first part of the period the existence of integration with ups and downs while for the second part of the period the stock markets tend towards full integration.

Bekaert and al. (2013) take into consideration 33 countries, most of them members of the European Union, and analyze the integration of the stock markets and the economic integration by means of the segmentation method of the markets. The results confirm that the countries which become European Union members register an increase in the integration. The adoption of the Euro currency does not determine an increase in the integration of financial markets. The inclusion in the analysis of the last period of the financial and economic crisis does not significantly change the results.

The global integration of the capital markets is analyzed by Schackman J. D. (2006). The results obtained confirm that there is a direct, positive correlation between the capital markets and the excess return even if previous studies presented a reversed correlation.

Babecký, J. et al. (2013) analyze the integration of stock markets from Russia and China within the USA, Euro Area and Japan. The results obtained both at national and regional level confirm the existence of the beta-convergence which is not influenced by the financial and economic crisis from 2008-2009 while the sigma-convergence shows that there are significant differences at regional

level determined by the crisis and China is more integrated than Russia in the countries considered.

Methodology and data sources

Of the methodologies previously presented for the determination of the integration of stock markets we chose the one that was proposed in the economic growth literature by Barro and Sala-i-Martin (1991, 1992) and taken over by Adam et al. (2002): sigma-convergence and beta-convergence. When determining the beta-convergence one may identify the speed with which are decreased or even eliminated the differences between the return of the stock market under analysis in comparison with the benchmark market.

To measure the beta-convergence the following regression model is estimated:

$$\Delta R_t = \alpha + \beta_t R_{t-1} + \sum_{l=1}^{L} \gamma_1 \Delta R_{t-1} + \varepsilon_t$$

where: $R_t = r_t - r_t^B$

r_t - the rate of the continuous compound return (or log-return) of the market index portfolio. It is computed according to the relation:

$$r_t = \left(\ln\left(V_t\right) - \ln\left(V_{t-1}\right)\right) \cdot 100$$

V_t - the value of the market index portfolio under analysis;

r_t^B - the rate of the continuous compound return of the benchmark market index portfolio;

$$r_t^B = \left(\ln\left(V_t^B\right) - \ln\left(V_t^B\right)\right) \cdot 100$$

V_t^B - the value of the benchmark market index portfolio;

Δ - the difference operator

l - the lag length. The maximum value for the lag is chosen according to the values of the Schwarz criterion.

The beta-convergence is determined by the estimation of the β parameter and it measures, as we previously mentioned, the convergence speed. This indicator may take values between -2 and 0 and it is interpreted in the following manner:

if β takes the value 0 or -2 it shows that the convergence phenomenon of the capital markets is not present;

if β takes values between -2 and -1 it shows that the convergence phenomenon of the capital markets is present;

the more β approaches the value -1, the higher the convergence speed of the analyzed capital markets.

Sigma-convergence is determined as the standard deviation of the difference between the return of the analyzed market and the return of the benchmark market at a given moment of time. It is computed according to the formula:

$$\sigma_{j,t} = \sqrt{\frac{1}{N}\sum_{i=1}^{N}\left(r_{i,j,t} - \overline{r}_{j,t}\right)^2}$$

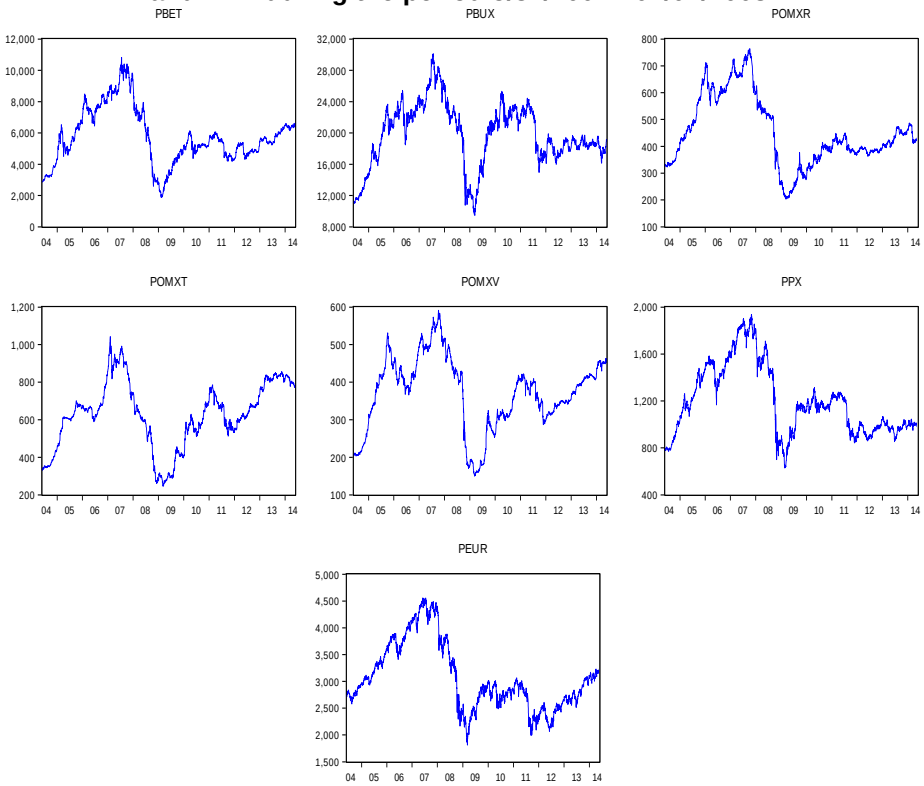
where: $\overline{r}_{j,t}$ - represents the mean of the returns for the market j at the moment t.

The convergence is reached if the standard deviation of returns decreases in time. When the standard deviation tends towards zero, full integration is reached.

Results obtained

The analysis of the stock markets integration was conducted for several countries in the Central and East Europe: Romania, Hungary, Latvia, Lithuania, Estonia and Czech Republic. The indices taken into account are the blue chip indices from the stock markets in Bucharest – BET, Budapest – BUX, Riga – OMXR, Vilnius – OMXV, Tallinn – OMXT and Prague – PPX. In order to determine the convergence in the European Union we took into consideration the Euro STOXX 50 index which expresses the general trend of the stock markets in the European Union.

Figure 1 - The evolution of the indices BET, BUX, OMXR, OMXT, OMXV and PPX during the period 5/31/2004 - 01/01/2008



The evolution of these indices is presented in figure 1. The stock exchanges considered present a similar evolution during the analyzed period. At the end of the year 2007 and beginning of the year 2008 the stock exchanges had a general descending trend determined by the financial and economic crisis.

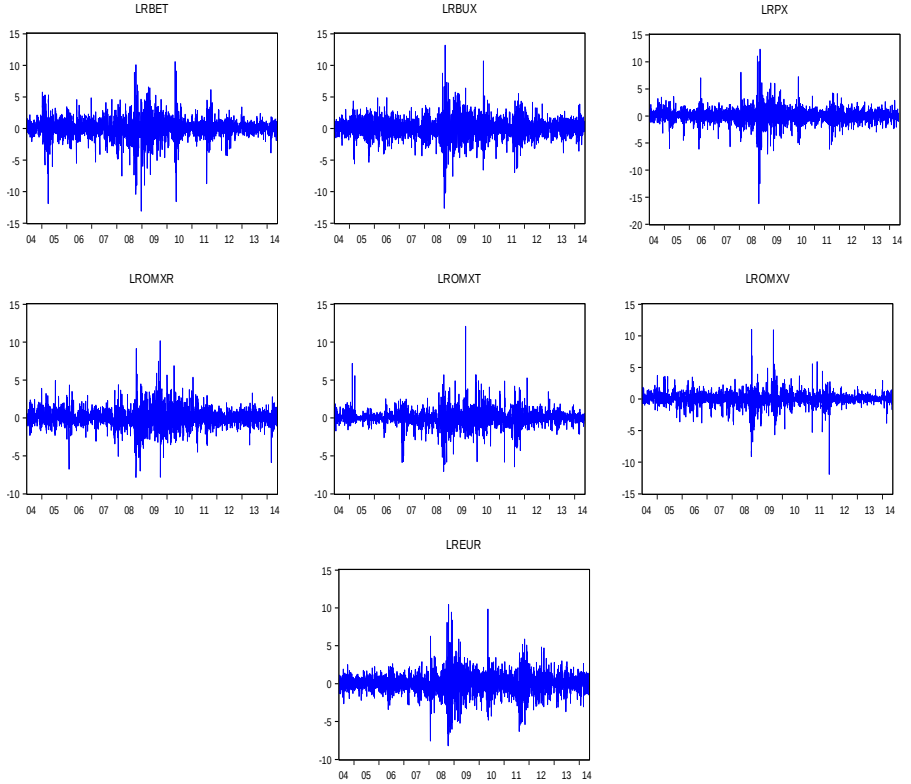
Table 1 - The indicators of the descriptive statistics for the returns of the stock exchanges from Bucharest (LRBET), Budapest (LRBUX), Riga (LROMXR), Vilnius (LROMXV), Tallinn (LROMXT), Prague (LRPPX) and Europe (LREUR) for the period 5/31/2004 - 01/01/2008

	LRBET	LRBUX	LROMXR	LROMXT	LROMXV	LRPX	LREUR
Mean	**0.032791**	0.020468	0.009775	**0.032975**	0.029733	0.009829	0.006348
Median	0.020832	0.000000	0.000000	0.017349	0.000000	0.008284	0.000178
Maximum	10.56451	13.17775	10.17979	12.09448	11.00145	12.36405	10.43765
Minimum	-13.11676	-12.64895	-7.858646	-7.045882	-11.93777	-16.18547	-8.207879
Std. Dev.	1.695880	1.647948	1.276774	1.159188	1.154563	1.509375	1.415121
Skewness	-0.649942	-0.093297	0.164402	0.213045	-0.360136	-0.554533	0.015972
Kurtosis	11.13255	9.864812	10.10871	13.27151	21.54407	18.06786	9.800462
Jarque-Bera	7370.653	5124.771	5503.082	11484.49	37424.96	24805.38	5025.540
Probability	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Observations	2608	2608	2608	2608	2608	2608	2608

The stock exchanges reached a minimum at the beginning of the year 2009 after which an ascending tendency was noticed. At the middle of the year 2011 the stock markets recorded a decrease but not as strong as the one registered at the start of the year 2009.

The graphical representation of the returns of the stock markets considered highlight the presentation of their volatility by clusters: during the downturn periods the volatility is higher than during the growth periods.

Figure 2 - The evolution of the returns of the stock exchanges from Bucharest– LRBET, Budapest – LRBUX, Riga – LROMXR, Vilnius – LROMXV, Tallinn - LROMXT, Prague - LRPPX and Europe LREUR for the period 5/31/2004 - 01/01/2008



Source: Own results obtained by means of the Eviews software programme

Table 1 presents several descriptive statistical indicators of the returns of the stock markets under consideration. Since the returns are stationary we could consider the average returns as being the returns expected by the investors. The Bucharest and Tallinn stock exchanges offer the highest expected return followed closely by the Vilnius and Prague stock exchanges. The European market offers the lowest expected return.

Table 2 - The estimation of beta-convergence

Country/Stock exchange	Index	Beta coefficient 5/31/2004-01/01/2008	Beta coefficient 1/01/2008-5/29/2014	Beta coefficient Entire period
Romania/Bucharest	BET 10	-0.905284	-1.660812	-1.370315
Hungary/Budapest	BUX	-0.953304	**-1.083487**	**-1.048413**
Latvia/Riga	OMXR	-1.051251	-1.112442	-1.101317
Estonia/Tallinn	OMXT	-0.975032	-1.097970	-1.076057
Lithuania/Vilnius	OMXV	-0.956169	**-1.078281**	**-1.052776**
Czech Republic/Prague	PX	-0.984722	-1.303302	-1.321039

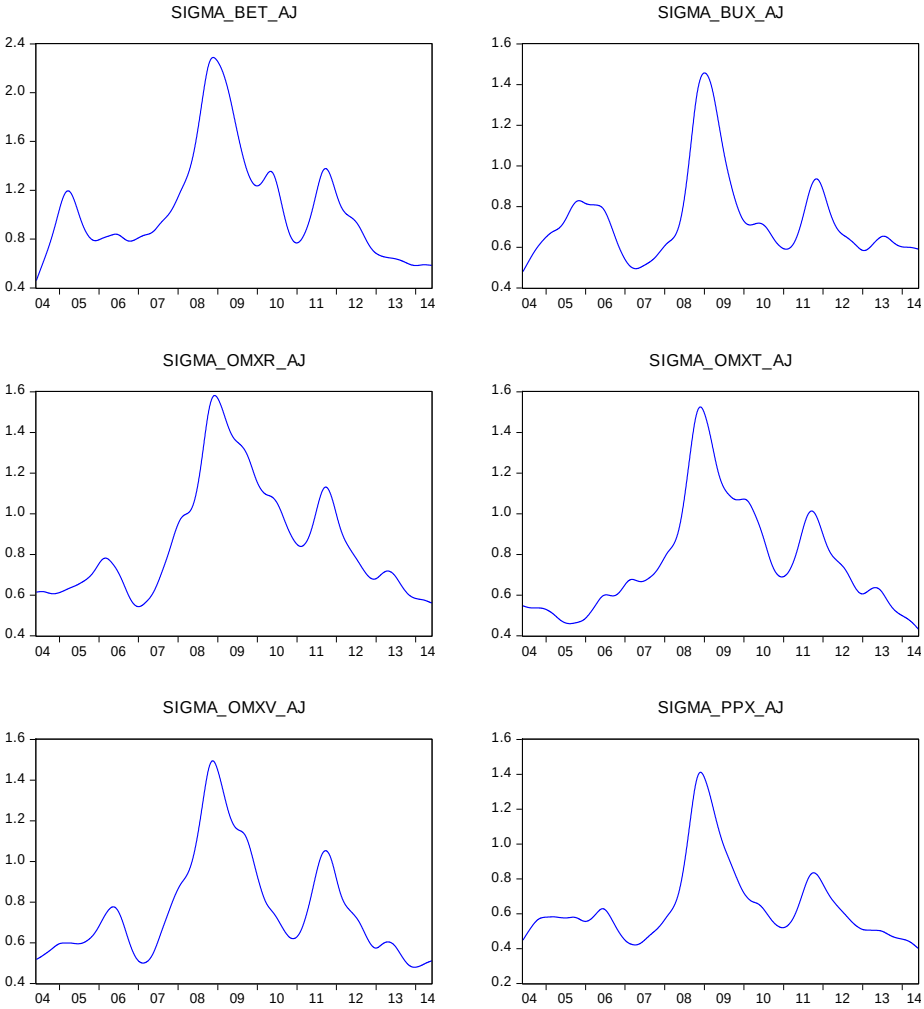
Source: Own results obtained by means of the Eviews software programme

In order to determine the beta-convergence we took into consideration the entire period analyzed then two periods determined by the start of the year 2008 which was the moment when the financial and economic crisis made its presence in a significant manner.

The results obtained for the beta-convergence indicator are presented in table 2.

The beta-convergence coefficients for the entire period take values between -2 and -1, which proves the existence of the convergence phenomenon. If the period under study is analysed according to two sub-periods, for the first part of the period 5/31/2004-01/01/2008 only one market, the one from Latvia (Riga), has a beta-convergence coefficient very close to -1 suggesting the existence of the convergence phenomenon while the other countries have beta coefficients with values not comprised between -2 and -1 and therefore they do not present the convergence phenomenon. The second part of the period, after the beginning of the financial and economic crisis, highlights the occurrence of the convergence phenomenon in all stock exchanges, the highest convergence being recorded by the stock exchanges from Lithuania (Vilnius) and Hungary (Budapest). Thus, we ascertain a change in the convergence of the stock markets determined by the financial and economic crisis.

Figure 3 - The evolution of sigma-convergence of the stock exchanges in Bucharest - LRBET, Budapest - LRBUX, Riga - LROMXR, Vilnius - LROMXV, Tallinn - LROMXT, Prague - LRPPX for the period 5/31/2004 - 01/01/2008



Source: Own results obtained by means of the Eviews software programme

The trend of standard deviations determined for the sigma-convergence has been highlighted by means of the Hodrick-Prescot filter and are presented in figure 3.

The figure above emphasized similar patterns of the sigma-convergence of the stock markets in Romania, Hungary, Slovenia,

Slovakia, Estonia and Czech Republic. The economic and financial crisis affects the sigma-convergence. Only after 2011 a significant reduction of the indicator has been noticed, suggesting the trend towards a total sigma-convergence.

Conclusions

The deepening of the economic and financial relationships determined by the integration of the Central and East European countries into the European Union questions the financial integration and more specifically the integration of stock markets. This study focused on the determination of the integration of stock markets from several Central and East European countries by means of the beta-convergence and sigma-convergence. The beta-convergence obtained underlines the fact that after the financial and economic crisis from 2008 the highest integration speed is registered by Lithuania and Bulgaria, being followed by Estonia, Latvia, Czech Republic and Romania on the last place. The sigma-convergence highlights that during the last period analyzed all the countries tend towards full integration.

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CO-MOVEMENTS OF REGIME SHIFTS IN GBP CURRENCY PAIRS AROUND BOE QUANTITATIVE EASING ANNOUNCEMENTS

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Abstract

In the current post-crisis era, the events with the highest probability to move the financial markets are the announcements of financial authorities concerning the quantitative easing decisions. The objective of this paper is to build an analysis of the existence of connections among the GBP currency pairs in terms of regime switching that could be related to the moments when the Bank of England generated announcements about its monetary decisions.

Keywords: quantitative easing, regime shifts, foreign exchange market

JEL Classification: G14, F34, E44

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Introduction

In the turbulent financial environment of 2009 the Bank of England (BOE) observed the necessity to focus on its monetary policy. This focus was supported by a battery of conventional and unconventional elements that represented a counteractive action against the adverse phenomena that characterized the global financial system. With the policy rate at the level of 0.5 percent by the

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spring of 2009, BOE had to rely on a set of measure known as quantitative easing. The cornerstone of this approach was the large scale asset program that assumed the acquisition of private and public financial assets in a bid to force money into the economic system and thus kick-start its recovery. By instilling a constant stream of money the BOE hoped to boost the market liquidity and therefore extend asset prices. This action should have minimized borrowing costs determining a larger inclination towards investments and consumption.

BOE's reaction was by no means singular. Similar actions were conducted by other major central banks such as the European Central Bank, the Bank of Japan or the Federal Reserve.

Quantitative easing was from its genesis an interesting topic for the academic literature. This interest resulted in a robust and fast developing literature that tries to determine whether these initiatives met their foreseen goals.

The main part of this literature gravitates around the measures taken by European Central Bank (Beirne et al. (2011), Peersman (2011), Szczerbowicz (2012) or Albu et al (2014b)); Bank of Japan (Bernanke et al (2004), Ugai (2007), Wieland (2009), or Lupu and Calin (2014)); Federal Reserve (Hancock and Passmore (2011), Gagnon et al. (2011), Krishnamurthy and Vissing-Jorgensen (2011), D'Amico et al (2012), or Stroebel and Taylor (2012)) and the Bank of England (Joyce et al. (2010), or Kapetanios et al. (2012)).

In this paper we try to demonstrate the effects induced by the British quantitative easing measures on a battery of currency pairs containing the GBP. In a Markov Switching scenario we seek to determine the connections of the dynamics of these pairs in relation to the QE announcements. The remainder of the paper is constructed on the following structure. Section II offers a brief literature review on the BOE's QE. Section III discusses the data used and the methodology. Section IV exhibits our results and section V concludes.

Literature review

Joyce, Tong and Woods (2011) conduct an extensive review of the United Kingdom's quantitative easing measures. In a parallel initiative, Joyce et al. (2011) concentrate on the effect of British QE on asset prices. After discussing the relation between the concepts indicated above and arguing on the asset price channels, the authors bring forth three empirical analyses. The first two use econometric

event study methodologies while the last relies on a VAR estimation. In this way the authors investigate the reaction of the gilt market, the response of other assets and a series of portfolio balance effects. One important conclusion of the study is the fact that the QE seemed to cause a decline in gilt returns of about 100 basis points. In addition to this, Joyce et al. (2011) find that other assets behave in similar way. A similar investigation is present in Breedon et al. (2012).

Joyce et al (2014) turn to the study of QE effects on the evolution of insurance companies and other pension funds. The authors use a reduced-form modeling scenario based on a set of variables that are invariant in relation the BOE's asset purchasing program. The investigation offers a set of interesting results, among which we notice the fact that there is correlation between QE and net investment in risky assets.

Christensen and Rudebusch (2012) conduct a comparative analysis between BOE and the Federal Reserve in terms of reducing government bond yields through QE. Christensen and Rudebusch (2012) also rely on an event study methodology for each of the studied markets, but also incorporate a a dynamic term structure model in order to decompose yields into two main components: the expected short rate and a component specific to term premium. The results for the British market show that the entire reduction of gilt yields was influenced by seven UK announcements.

Albu et al (2014a) develop an ample investigation on the impact of quantitative easing on financial instruments, focusing on nine 5-years CDSs and a wide battery of QE announcements issued by the four main central banks mentioned earlier. In an event study approach, the authors find a clear influence of the UK QE on the evolution of CDSs.

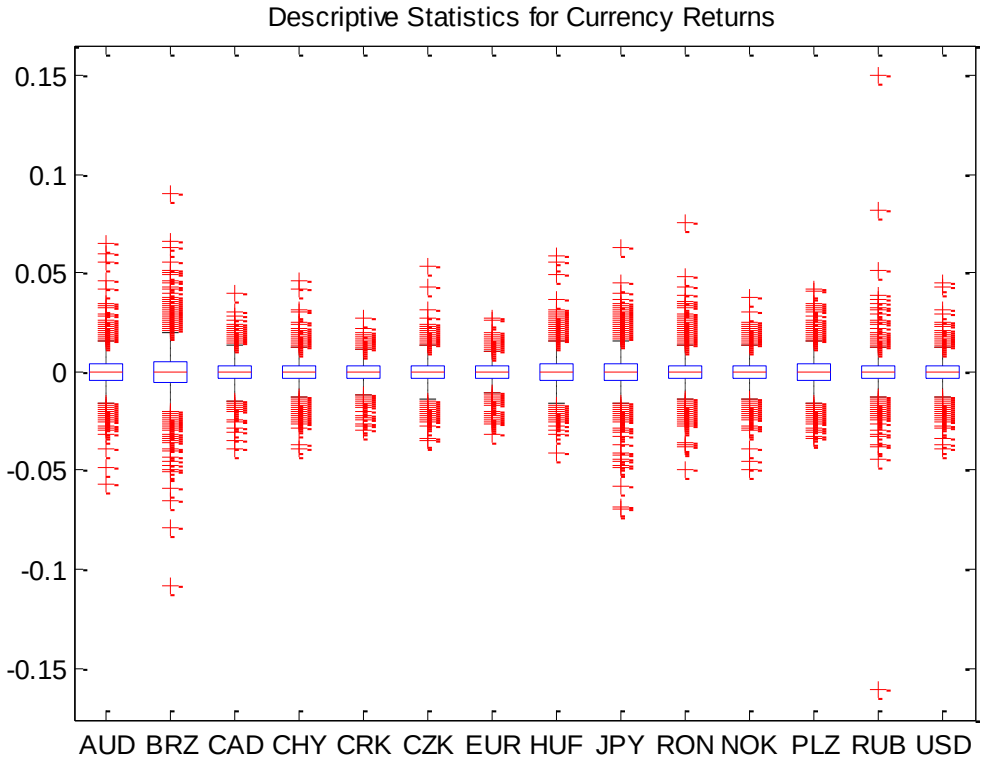
Joyce and Spaltro (2014) investigate the influence of the BOE's quantitative easing policy on bank lending and bank balance sheets in general. The authors employ a set of non-publicly available data and a two-period equilibrium model and conclude that QE might have increased bank lending through a deposit ratio mechanism.

Data and methodology

We are using daily values of GBP against fourteen currencies: Australian Dollar, Brazilian Real, Canadian Dollar, Chinese Yuan, Croatian Kuna, Czech Koruna, Euro, Hungarian Forint, Japanese Yen, Romanian Leu, Norwegian Krone, Polish Zloty, Russian Rouble

and the US Dollar. Our regime shifting analysis covers the period from January 2001 until August 2014. The data was organized in a common sample of log-returns covering 3907 realizations. We are providing in figure 1 a general presentation of the statistical properties of these currencies. We also employ a set of 48 events of quantitative easing announcements issued by the Bank of England between January 2011 and August 2014.

Figure 1 - Boxplots of the returns of GBP currency pairs



Source: Reuters-Datastream and authors' computations

We can notice that the currency returns have similar statistical properties, with means and standard deviations that are situated at approximately the same levels and with large probabilities in the tails. We notice large outliers on one hand especially in the case of Brazilian Real, Romanian Leu, Japanese Yen and the Russian Rouble.

Our methodology relies on the classic Markov Switching modeling scenario. This is given by a process characterized by:

$$y_t = \mu S_i + \epsilon_t$$

The two state progression considered here has the following form:

$$first\ state\ y_t = \mu_1 + \epsilon_t \quad \epsilon_t \sim (0, \sigma_1^2)$$
$$second\ state\ y_t = \mu_2 + \epsilon_t \quad \epsilon_t \sim (0, \sigma_2^2)$$

For the estimate phase we rely on the maxim likelihood method which has the following expression.

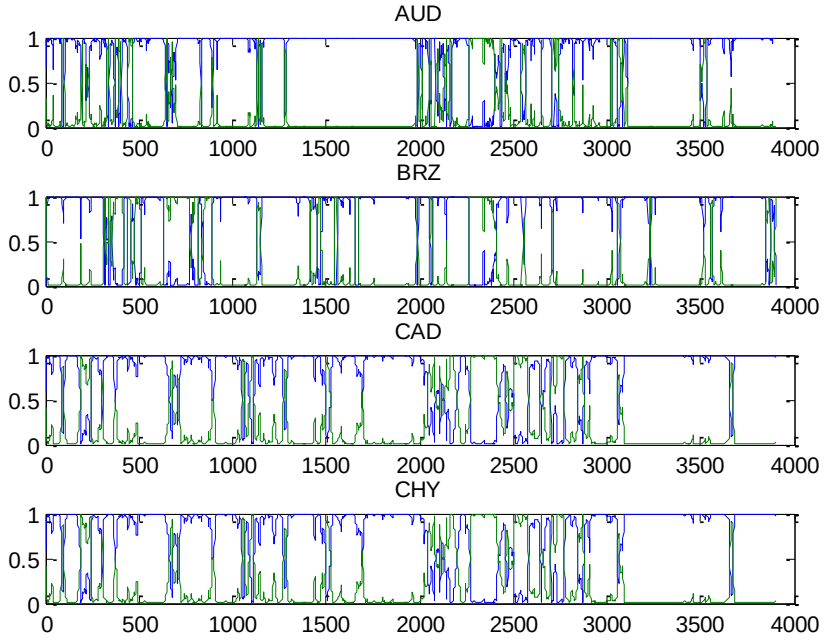
$$\ln L = \sum_{t=1}^{T} ln\left(\frac{1}{\sqrt{2\pi\sigma^2}} exp\left(-\frac{y_t - \mu S_i}{2\sigma^2}\right)\right)$$

Results

The fitting of the Markov Switching model with two states to our series determined the estimation of the dynamics of the transition probabilities.

We organized the results in four different charts, containing results for four (figures 2 and 3) and three (figures 4 and 5) currencies.

Figure 2 – Dynamics of Probabilities for the two states at the univariate approach for Australian Dollar, Brazilian Real, Canadian Dollar and Chinese Yuan



Source: authors' computations

We notice the fact that, with the exception of the Slovenian economy, there is very little dependence of the economic growth on the stock market dynamics. Latvia shows also a larger significance of the MIDAS regression coefficients, but there is not a particular significant contribution found for the whole sample in the rest of the cases.

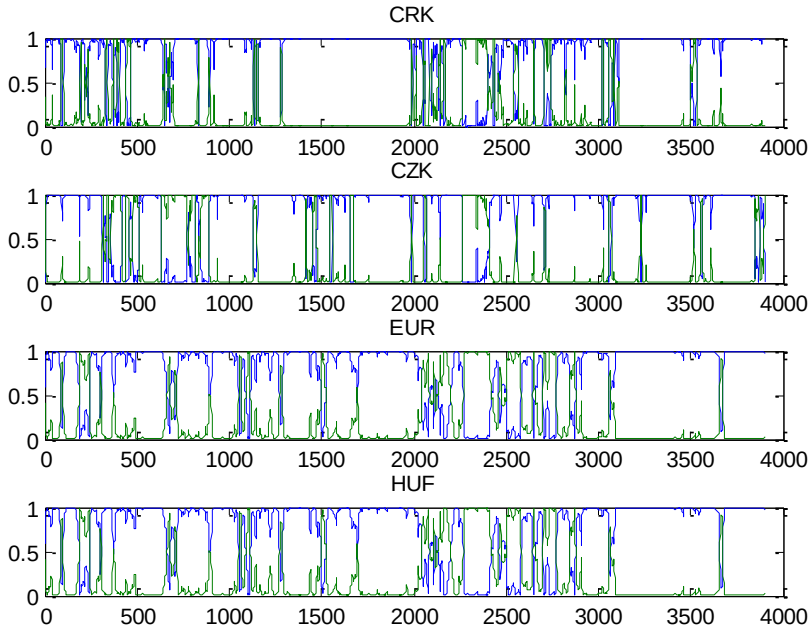
Considering the horizontal axis (that exhibits the time) we notice that the four currencies share a lot of moments in which regime shifting is present at the same time. We notice a larger level of comovement among the Canadian Dollar, the Chinese Yuan and the Brazilian Real.

On the other hand, in figure 3 we also acknowledge a set of simultaneous changes of regime shifts for the Euro and the

Hungarian Forint and to a lesser degree for the Croatian Kuna and the Czech Koruan.

The existence of these simultaneous changes of regimes could be explained by the fact that they could be generated by the same fundamental phenomena. The existence of monetary decisions announcements could be in theory the result of such changes at a certain moment in time.

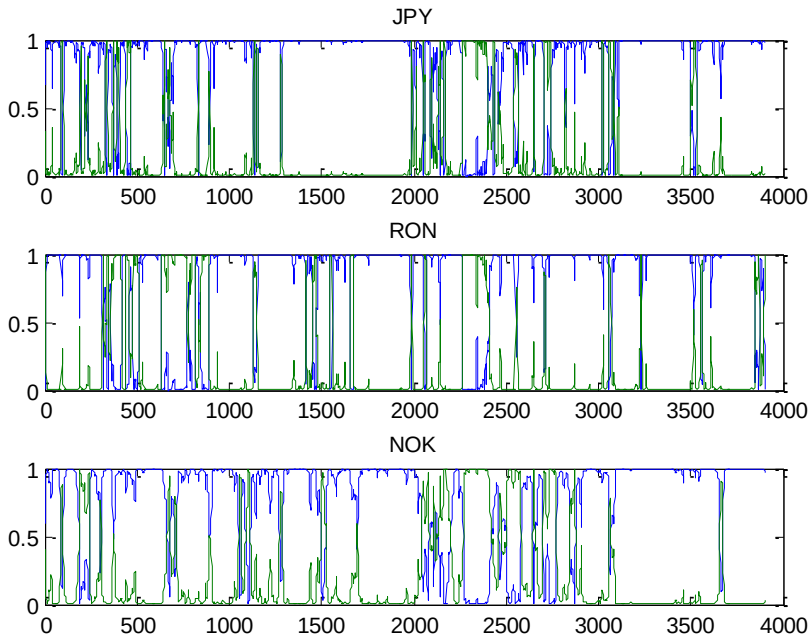
Figure 3 - Dynamics of Probabilities for the two states at the univariate approach for GBP currency pairs with Croatian Kuna, Czech Koruna, Euro and Hungarian Forint



Source: authors' computations

Figure 4 reveals the fact that there is an important level of simultaneity for the Romanian Leu and the Norwegian Krone, which is a possible proof of the fact that the GBP currency tends to react in the same way when it is rated with respect to many of the currency counterparts.

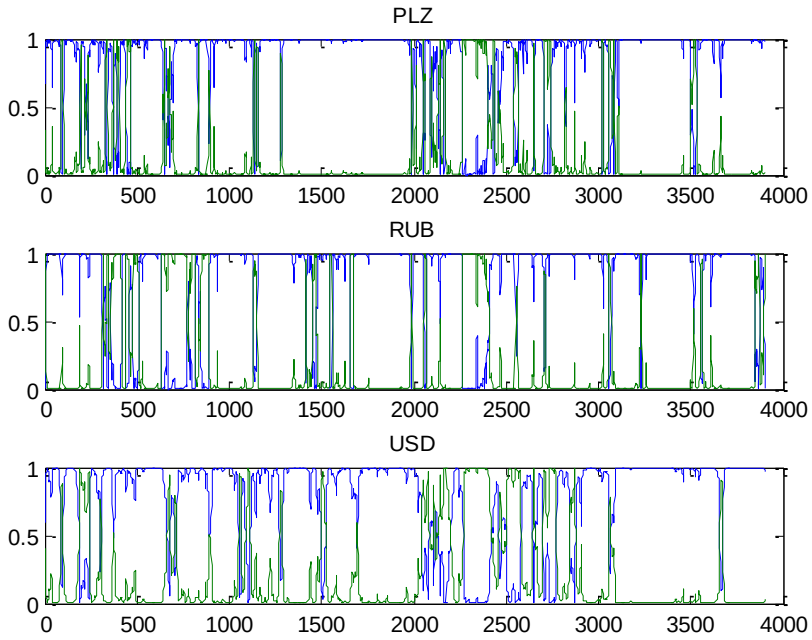
Figure 4 – Dynamics of Probabilities for the two states at the univariate approach for Japanese Yen, Romanian Leu and Norwegian Krone



Source: authors' computations

Figure 5 shows the same type of reaction for the Rouble and the US Dollar and a less simultaneous reaction from the perspective of the Polish Zloty, especially in the first part of the sample. There are however many other situations that reveal large levels of simultaneity when regimes move from one state to another.

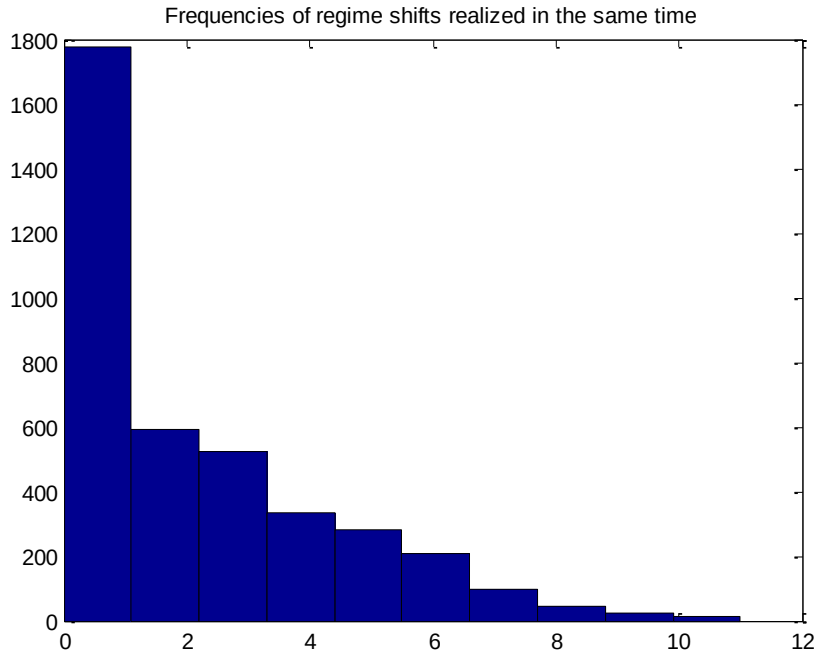
Figure 5 – Dynamics of Probabilities for the two states at the univariate approach for Polish Zloty, Russian Rouble and US Dollar



Source: authors' computations

In order to provide an analysis of the situations when we can notice simultaneous movements from one regime to another, we decided to count the number of simultaneous changes across all the fourteen financial assets under investigation and we built a histogram of the situations in which we found such phenomena. Figure 6 presents this map of frequencies of simultaneous regime shifts. We notice the fact that approximately 1800 situations show no change (out of the 3902 simultaneous returns in our sample), which means that the rest reveal a lot of simultaneous phenomena. We consider that we found evidence for a large number of simultaneous changes for the GBP currency pairs.

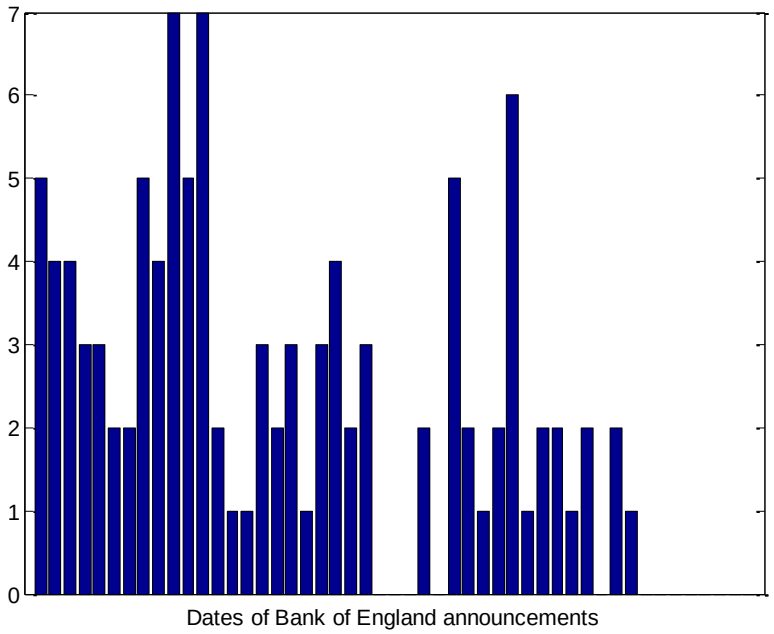
Figure 6 – Histogram of appearances of common regime shifts across all GBP pairs



Source: authors' computations

As mentioned previously, one reason for such simultaneous changes could be driven by the fact that fundamental events are realized at the moments when we notice such regime shifts. Looking at the moments when the Bank of England issued monetary decisions we cross checked the simultaneity analysis and observed that most of the days in which we acknowledged such policy decisions were also days in which we observed simultaneous regime shifts. Figure 7 presents the number of simultaneous shifts that happened in the same time with Bank of England announcements.

Figure 7 – Simultaneity of regime shifts at the moment of the Bank of England Announcements



Source: authors' computations

The analysis comprises 49 such events, covering the period from January 2011 until August 2014.

Concluding remarks

This paper represents an analysis of the simultaneity of regime shifts in the dynamics of fourteen GBP currency pairs, with a daily frequency. A Markov Switching model with two states that take into account the dynamics of both the means and the standard deviations was employed. This investigation reveals the fact that there the sample covering January 2001 until August 2014 exhibits a large amount of simultaneity when as far as the regime shifts are considered. Since these changes are simultaneous, there are sufficient arguments to support the idea that maybe they are the result of some fundamental phenomena, such as the decisions of

monetary policies issued by the Bank of England. We found evidence that many of the changes were simultaneous during these events.

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