MONETARY POLICY OF THE BALTIC STATES & TAYLOR RULE

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Abstract

The effervescence of the European economic model combined with the decline and disintegration of the USSR made it attractive for Estonia, Latvia and Lithuania to establish structural reforms to open their economies and then be eligible to be part of the European Union. However, the degree of compatibility between monetary policy followed by the Baltic state and optimal interest rates for each of their economies according to economic doctrine does not seem to be the same. The aim of this study is to compare the historical performance of the monetary policy in these three countries with the Taylor Rule, identifying structural changes over this period.

The results show that the estimation of the Taylor Rule on historical data of these countries allowed to confirm the removal of monetary policy against the Taylor Rule and created inflationary trends.

Keywords: Taylor Rule, monetary policy, interest rates, Estonia, Latvia and Lithuania.

INTRODUCTION

Ever since the creation of the European Monetary Union, the main goal of the Eurozone has been the stability of prices. The articles 3A and 105 (nowadays articles 119 and 127 of the Lisboa Agreement – TFEU) of the Maastricht Agreement from 1992 that introduce the constitutive principles of the European Monetary Union, defined the price stability as the main goal of the monetary policy and the European System of Central Banks. Moreover, the Agreement's new 3rd article concerning the European Union adopted at Lisbon in 2009, establishes the price stability as the general objective of the European Union (not only the Eurozone) providing this objective even more importance than the economic growth and job creation. Since its origins back in 1999, the European monetary policy has had the characteristics of the active monetary rules that search the stabilization of the monetary mass growth and to limit the inflation at a determined level according to a defined reaction function. One of the theoretical references of the active monetary norms is the Taylor Rule. Developed in 1993 by J.B. Taylor for the analysis of the monetary policy's historical behavior of the Unites States' Federal Reserve, presenting the Taylor Rule as a lineal reaction between the short term interest rate, the divergence between actual inflation and the inflation target and the actual GDP and the potential GDP (Davig et Leeper 2007).

Further studies have generalized and complemented the Taylor Rule (Svenson 1997) (Clarida, Galí et Gertler 1998) (Clarida, Galí et M., Monetary policy rules and macroeconomic stability: Evidence and some theory 2000). Besides, several studies have used the Taylor Rule to analyze the behavior of the European Central Bank's monetary policy (Fendel et Frenkel 2006) (Fourçans et Vranceanu 2004) (Gerlach 2007) as well as the historical behavior of the monetary policy of the Member States of the Eurozone (Gerlach, The Taylor rule and interest rates in the EMU area 2000) (Cadoret 2009). If the European Central Bank follows the Taylor Rule, it would mean that it takes into account not only the inflation but the output gap as well in order to determine its interest rates. Until now, few studies have been interested in the historical behavior of the monetary policy of the new European Union's or Eurozone's new Member States. The Baltic States (Estonia, Latvia and Lithuania) have been understudied even though they present interesting characteristics for the understanding of the Europeanization's dynamics regarding the monetary norms.

After the decline of the USSR[1] and the disintegration of the Rubble Zone, the Baltic States, whose economic organization directly depended on the Soviet Union, had to create new currencies, establish an autonomous monetary policy and perform structural reforms in order to open their economies. In no time, these States archived their inflation's reduction (reduction of 900% in 1992 to 20% in 1994) and the accomplishment of the economic conditions to ingress the European Union in 2004. Starting from 1992-1993, these countries implemented systems of currency board type: Estonia with the German Deutsche Mark, Latvia with the American dollar and Lithuania in usage of the special drawing rights of the IMF[2]. The Estonian Kroon established a currency board in 1999, the Latvian's Lats established a currency board with the Euro in 2005, and the Lithuanian Litas established a currency board with the Euro in 2002. Finally, Estonia adopted the Euro in 2011 and Latvia entered the Eurozone in 2014. Meanwhile, Lithuania holds the ambition of entering the Eurozone in 2015. Nevertheless, one question remains: ¿How adequate were the followed monetary policies regarding the inflation's control standards and the stimulation of the production?

The main goal of the present research is to compare the monetary policy's historical behavior of these three countries with the Taylor Rule and prove the hypothesis of Taylor Rule's no concordance for the Baltic States. Moreover, it is intended to identify the structural changes along this period. The article is structure into four sections: after the introduction, Taylor Rule is inspected from a theoretical point of view, in the third part the variables' construction and the used data sources are explained. In the fourth part an econometric model is estimated in base for the Taylor Rule for the Baltic States. Finally, some conclusions are exposed.

I. THE TAYLOR RULE

1.1. THEORETICAL RECORD

The current theoretical debates about the European monetary policy and the very own Taylor Rule are based on the currency's neutrality notions.

The quantitative theory of money is an antique idea having its origins on the Jean Bodin studies all the way back in the XVIII century. This idea was developed by the American economist Irving Fischer though a monetary trade equation. Fischer postulated the existence of a relation between the monetary mass, the money's circulation velocity, the general price index and the total volume of the transactions over a defined period. The equation is presented through the following simple form:

$$M * V = P * Y \quad (1)$$

Where M represents the monetary mass, V the money's circulation velocity, P the general price index and Y the total number of realized transactions over a period. It was proven that this relation is also maintained if the equation is expressed in terms of these variable's growth rates. In other words, $m_t = p_t + y_t - v_t$.

Given the chosen velocity's circulation constant of money, it can be assumed that the circulation's velocity variation rate is v = 0. According to this idea, posteriorly taken by Friedman and the monetarists, the inflation is a purely monetary phenomena (Friedman et Schwarz 1963) due to the fact that the only thing that can rise the general variation level of the prices, p, in the precedent equation is a more than proportional increase of the monetary mass variation, m, over the observed period compared to the variation of real transactions, y. This mathematical relation implies that the expansion policies of the monetary mass will no stimulate the real activity but instead they will only create more inflation in the economy. Nevertheless, empirical studies have proven that in the short term, the money's neutrality hypothesis is not accomplished due to various imperfections such as the imperfect anticipations of the economic agents or the prices and salaries rigidness. Expansion public policies of the monetary mass can have a short-term impact over the real activity. However, in the long term, the empirical studies agree in the confirmation of the money's neutrality hypothesis. The logic conclusion that comes from these studies is the fact that, throughout the term, the monetary policy should be focalized over the stability of prices. This theoretical consensus concerning the central bank's paper in the long term explains that the main goal of the European Central Bank (ECB) is the price stabilization.

One of the logic consequences of the money's quantitative theory is the realization that the Central Bank's intervention strategies should always be foreseeable, stable and based upon prearranged intervention norms. The European Central Bank's design precisely applied these principles during the creation of the ECB as an independent and transparent institution. In 1983, Barro and Gordon proved that the debate held between discretional intervention and passive rule can be solved thanks to a contingent rule (Barro et Gordon 1983) of intervention, which some authors denominate as an active intervention rule (Cadoret 2009).

On one hand, the idea developed by Barro and Gordon consists on the discretional intervention of the monetary authorities arriving to the discredit of these institutions, causing more inflation. On the other hand, the passive rules that have a stable inflation target leave little flexibility for the conjunctural variations. Therefore, due to the provided reasons, the contingent monetary rules allow the introduction of more flexibility in the Central Bank's interventions but eliminate the uncertainty degree level generated by the discretional interventions.

1.2. THE TAYLOR RULE FORMULATION

One of the clearest examples of the active monetary rule is the Taylor Rule. This rule is formulated as function of reaction of the Central Bank that is presented as a linear regression equation, so that:

$$i_t = \bar{r} + \pi_t + \lambda_1(\pi_t - \pi_t{*}) + \lambda_2 y_t \quad (2)$$

Were i_t represents the Central Bank's nominal interest rate in the short term, r represents the real equilibrium interest rate, π_t the inflation rate, π_{t*} the desired inflation rate and y_t the output gap, referring to the divergence between the actual GDP and the potential GDP. The λ_1 and λ_2 parameters are parameters that translate the political priorities of the monetary authorities. If the priority is just the inflation's stabilization, then the parameter $\lambda_1 = 0$. If $\lambda_1 > 0$, the monetary policy can adopt a certain amount of flexibility. In the case of the United States, Taylor defines the λ parameters at a 0.5 level. This coefficient is adjusted to the empirical data from the American monetary policy over the period studied by Taylor, dating from 1984 until 1992.

As Cadoret et al., notice, one of the difficulties of the Taylor's equations consists precisely in the estimation of the $\bar{r}$, equilibrium interest rate. One solution consists in picking $\bar{r}$ as a reference to the potential growth concept (Cadoret 2009). It can be considered that r = g; were g represents the economy's potential growth. In base of this transformation, the Taylor Rule can be expressed as follows:

$$i_t = g_t + \pi_t + \lambda_1(\pi_t - \pi_t{*}) + \lambda_2 y_t \quad (3)$$

In the long term, if the monetary policy archives its inflation target and the output gap null, the nominal interest rate is such that the real interest rate matches the neutral real rate or the potential growth (Cadoret 2009).

$$r_t = g_t + \pi_t \quad (4)$$

In the short term, the monetary policy can be restrictive $r_t > g_t + \pi_t$ or expansive $r_t < g_t + \pi_t$, depending on the actual inflation values and those of the output gap.

II. CONSTRUCTION OF THE VARIABLES

In this work, the Taylor Rule is used to analyze the historical behavior of the monetary policy of the 3 Baltic States (Estonia, Latvia and Lithuania) over the period from 1999 until 2011. This period has been masked for its great economic instability for the European countries and the important changes that took place on the Baltic countries. It is interesting to analyze the monetary policies' evolution of the European Union members that qualified themselves for the integration to the Eurozone during this period.

It is about young states whose independence did not occur more than twenty years ago and that presented their adhesion postulation for the European Union in 1995. The year 1999 was selected as the bottom limit of this study due to its belonging to the beginning of the adhesion negotiations of these three countries and the Eurozone creation. Meanwhile, the year 2011 has been chosen as top limit because it is the year Estonia integrated the Eurozone. The sample period also obeys the data availability.

2.1. Data

The used data comes from the European Statistics Office, Eurostat and the Statistical Data Warehouse of the European Central Bank. The used series are the following:

- Gross Domestic Product in volume (PIB_EE, PIB_LT, PIB_LV) corrected from the seasonality and the number of working days, in millions of euros with 2005 as the reference year (chained series). Trimestral data.
- Consumers' price index (CPI_EE, CPI_LT, CPI_LV) with base in 2005. Monthly data.

- Short-term interest rate (3 months) (TC_EE, TC_LT, TC_LV). The data is trimestral for Estonia and monthly for Latvia and Lithuania.

The short-term interest rates from Latvia and Lithuania are the only data pieces that come from the Statistical Data Warehouse from the ECB, every other data comes from Eurostat. The monthly data was converted into trimestral data for purposes of the study. The period of study is defined as: 1999:1-2010:4.

2.2. VARIABLE CONSTRUCTION

The annual inflation series was defined, π_t or CIPGA, as the annual variation in percentage from the Consumers' Price Index. Moreover, the series $(\pi_t - \pi_t{*})$, IBGE was defined, fixing a $\pi_t{*} = 2\%$ according the European normative.

The methodology suggested by Cadoret et al. was used for the construction of the potential GDP's variable. This variable is a fundamental element to calculate the output gap concept used in the Taylor's linear regression, y_t. These authors suggest the usage of a Hodrick-Prescott filter for the determination of the potential GDP This method allows the identification of the trending components of the data series. The filter is presented under the following formula:

$$\underset{\{\overline{y_t}\}}{Min}\left[\sum_{t=1}^{T} y_t^2 + \lambda \sum_{t=3}^{T}\left(\Delta\overline{y}_t - \Delta\overline{y}_{t-1}\right)^2\right]$$

$$y_t^0 = \overline{y_t} + y_t$$

Where y_t^0 represents the GDP's series in volume, $\overline{y_t}$ represents the trending component and y_t the cyclic component. Therefore, the weighted sum of the variance of the conjuctural or cyclic variations regarding $\overline{y_t}$ is minimized as well as the variance of the rhythmic changes of potential growth. In trimestral data, Hodrick and Prescott use one value of λ=1600, which is the same as a slow evolution of the variations of 1/8 of the percentage for the trending component ($\sigma_t = 1/8$) and 5% for the cyclic component ($\sigma_\eta = 5$); $\lambda = \sigma_\eta^2 / \sigma_t^2$. Various economists remember to consider the trending GDP as an equivalent of the potential GDP (Krugman 2012) (Giorno, et al. 1995).

To estimate the potential GDP, a Hodrick-Prescott filter was used thanks to the Eviews 7 HPFILTER.SRC. broadcast's routine. Meanwhile, the output gap was defined as the difference between the GDP and the potential GDP, the potential growth, HPGA, as the annual variation of the potential GDP in percentage and GAP as the percentage variation of the breach between real GDP and potential GDP. For comparison purposes, a PIBGA series that represents the GDP's annual variation in percentage was also created. The growth in the trimestral data series in annual variations percentage was obtained thought the formula:

$$\left(\frac{x_t - x_{t-4}}{x_{t-4}}\right).100$$

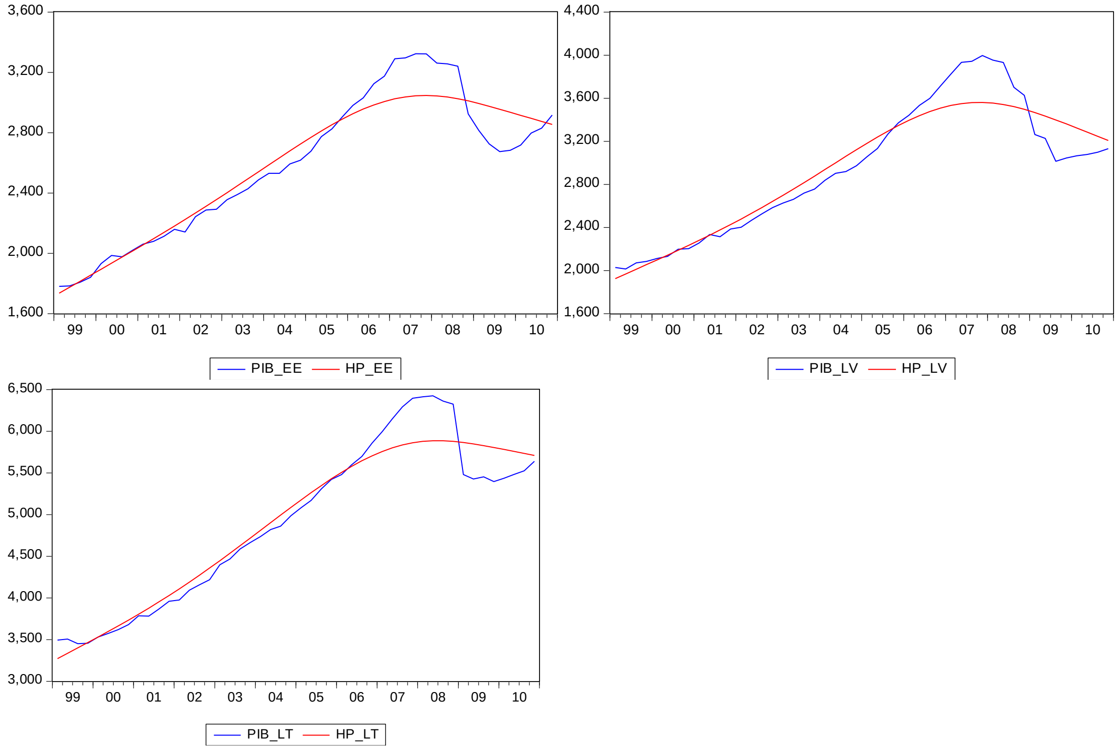
III. EMPIRICAL ANALYSIS

The study was proceeded in two stages: first, an evaluation though a simulation technique and, in second place, an evaluation for estimation by ordinary squared minimum.

3.1. EVALUATION THOUGH SIMULATION

In this section several actions are performed, in the first place, an evaluation of the historical evolution of the variables that enter the formulation of Taylor Rule's equation though a graphical analysis and, in second place, a simulation of Taylor's interest rates is effectuated, taking into consideration the fact that the coefficients of the equation are similar to the ones identified by Taylor in his original rule, in other words $\lambda_1 = \lambda_2 = 0.5$. The evolution of the real interest rates in short term is subsequently compared with Taylor's simulated interest rates.

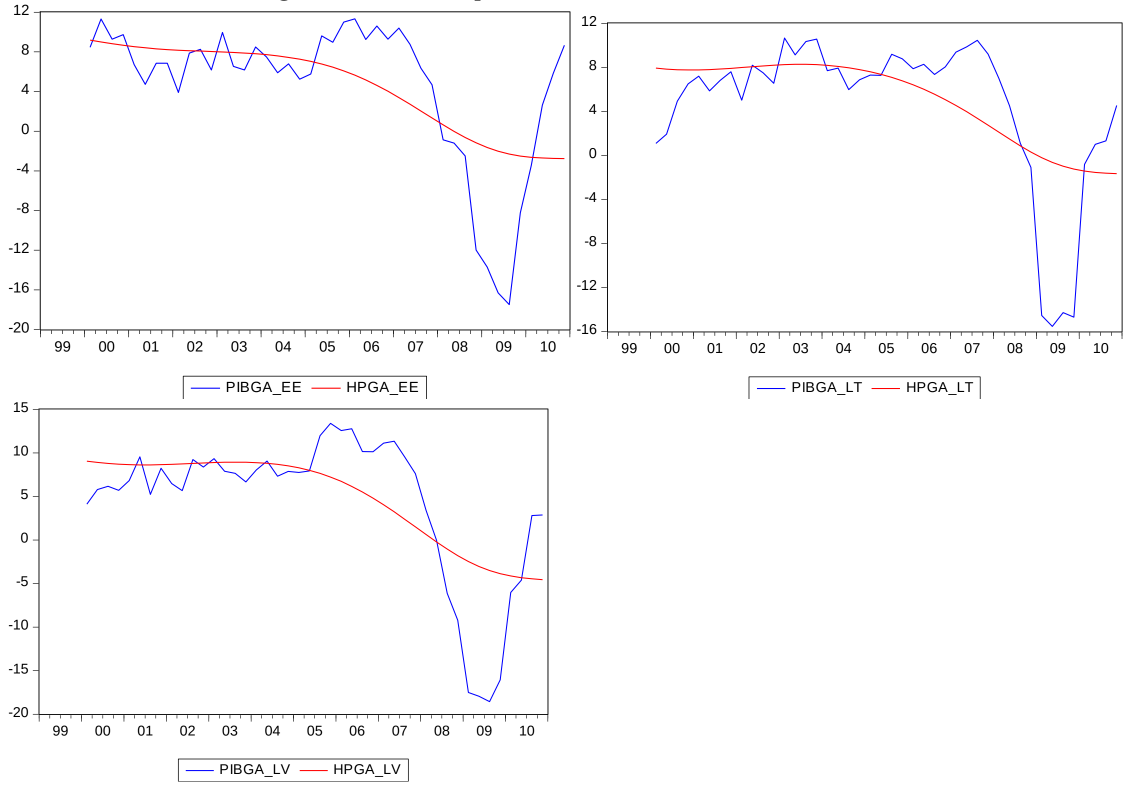
Table 1. GDP's evolution compared with the potential GDP



The graphic comparison of the real GPD's evolution and the potential GPD indicates a positive jump from the real GPD in comparison to the potential GPD as of 2005, that points out an economic acceleration on all three countries from 2005's first semester. This evolution starts to reverse itself around the second semester of 2008 and reaches its lower level around 2009's second semester. This real GDP's negative jump period corresponds to de diffusion of the economic crisis of the *subprimes* in these three countries.

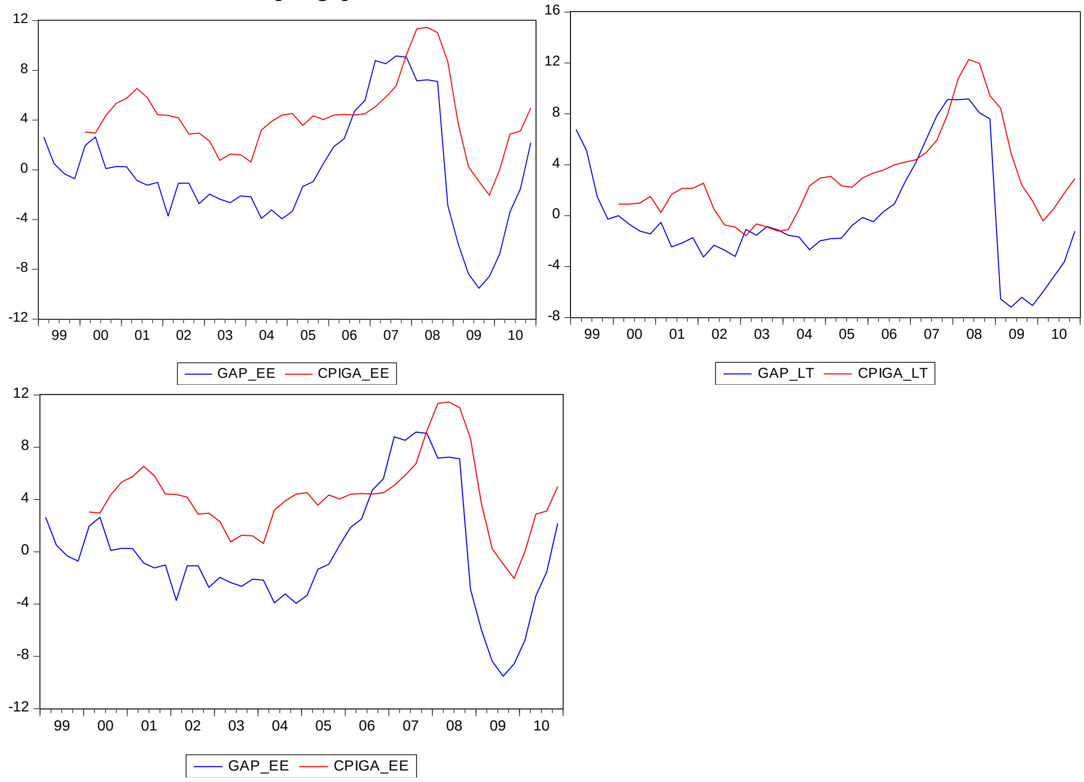
Another way to visualize the evolution of these series is to represent them in the form of growth rates. The variation's amplitude can be observed in a clearer way.

Table 2. Evolution of the growth rate of the potential GDP and real GPD



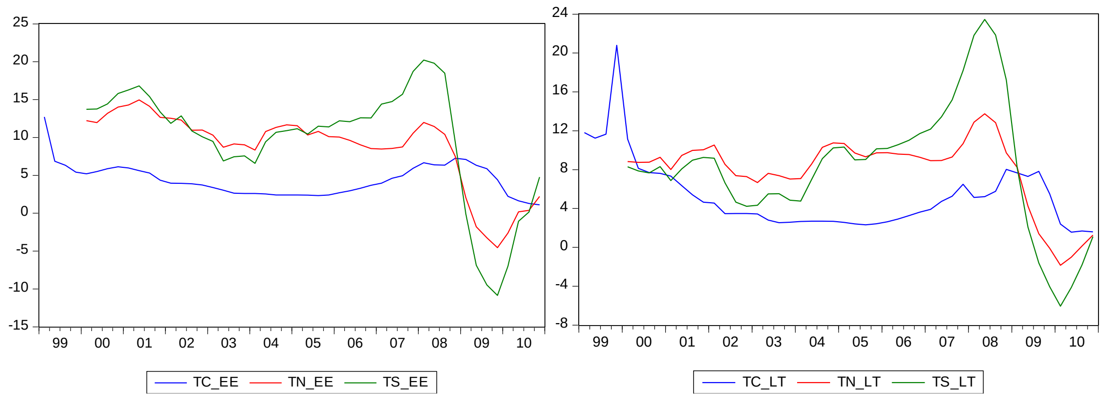
Finally, it is interesting to compare the actual inflation rates and the observed output gap over the period of study in order to create an idea of the relation's evolution between these two variables. When the output gap is negative, the inflation is increasing, while, on the contrary, a negative output gap dimities the inflation.

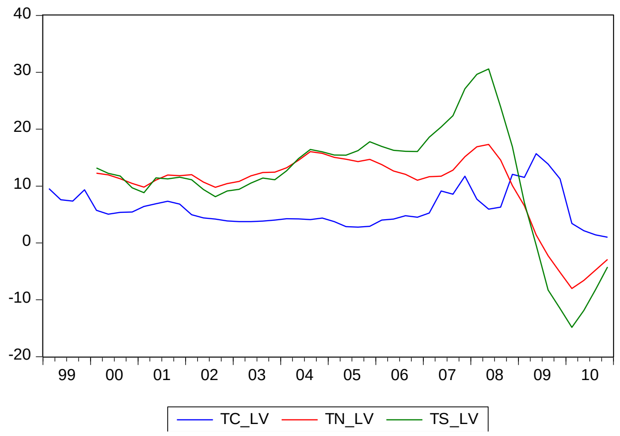
Table 3. Inflation and output gap



After the observation of the interest variable's behavior, the simulation of Taylor's rates was preceded. A TS variable was built for each country, parting from the Taylor's linear regression equation ts_x = $hpga_x$+ $cpiga_x$+0.5*$ecinf_x$+0.5*gap_x where *ts* represents the Taylor's interest rate, *hpga* represents the potential growth of the economy, *ecinf* the breach between the inflation target and the actual inflation and *gap* as the variation between the real GPD and the potential GDP. These interest rates were graphically compared with the short-term real rates and the neutral interest rates. The neutral interest rates were defined in the following way: tn_x=$hpga_x$+$cpiga_x$, that is to say that the neutral interest rate represents the potential growth of the economy plus the inflation.

Table 4. Short term actual rate, Taylor's rate and neutral rate





In general, the adequacy of Taylor Rule into the monetary policy of the Baltic States does not seem very adequate over the studied period. The variations between real interest rates and Taylor's interest rates and the neutral interest rates are extremely important. The Taylor Rule does not seem to allow the behavior of the monetary policy. Nevertheless, the behavior of the monetary policy in these three countries appears to have varied over this period. From 1999 until 2004, the breach between Taylor's interest rates and the real interest rates is reduced as well as the real interest rates appear to converge towards Taylor's rates. Dating from the fourth trimester of 2004, the real interest rates and the Taylor's rates start to diverge. Over the period 2005 until 2009, the short-term real interest rates are clearly inferior to Taylor's simulated ones and the neutral rates, fact that points into an expansionist monetary policy. This period matches the economic boom period observed in tables 1 and 2 and that follows the entrance of these countries into the European Union. As for the second trimester of 2008, the situation inverts and the policy become restrictive. This first part allowed the identification of the behavior of the main variables that enter the Taylor's formulations and simulate the curves in this rule. However, this equation has been mainly quantitative. To confirm these observations, an econometric estimation of the Taylor's model can be realized.

3.2. Evaluation by Estimation

An analysis for ordinary squared minimums of Taylor's model allows us to verify if the calculated coefficients correspond to the rule's coefficients over the studied period. The coefficients of inflation and potential growth can be fixed to 1 according to the long-term neutrality principle. In order to eliminate the multicollinearity, Cadoret *et al*. suggest the estimation of a restricted model where the endogenous variable of the short-term interest rates is transformed as a deviation variable facing the neutral interest rates. Since it was defined $tn_x=hpga_x+cpiga_x$ when calculating the regression under the form of deviations the problem of co-linearity is eliminated. Therefore, the model is calculates as:

$$EC_t = TC_t - TN_t = \alpha + \lambda_1 ECINF_t + \lambda_2 GAP_t + u_t \quad (5)$$

The α constant does not have a particular theoretical signification but it can be interpreted as a systematic measuring of the model's error. The obtained results were the following:

Table 5 : Estonian Regression

Dependent Variable: EC_EE
Method: Least Squares
Date: 07/21/13 Time: 15:34
Sample (adjusted): 2000Q1 2010Q4
Included observations: 44 after adjustments
HAC standard errors & covariance (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-3.980425	1.660370	-2.397312	0.0212
ECINF_EE	-0.317791	0.532929	-0.596310	0.5542
GAP_EE	-0.262554	0.370490	-0.708667	0.4825
R-squared	0.164559	Mean dependent var		-4.646106
Adjusted R-squared	0.123806	S.D. dependent var		5.041839

S.E. of regression	4.719425	Akaike info criterion	6.006997
Sum squared resid	913.1920	Schwarz criterion	6.128646
Log likelihood	-129.1539	Hannan-Quinn criter.	6.052111
F-statistic	4.037948	Durbin-Watson stat	0.050463
Prob(F-statistic)	0.025077		

Table 6 : Lithuanian Regression

Dependent Variable: EC_LT
Method: Least Squares
Date: 07/18/13 Time: 19:09
Sample (adjusted): 2000Q1 2010Q4
Included observations: 44 after adjustments
HAC standard errors & covariance (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-3.781562	0.838767	-4.508477	0.0001
ECINF_LT	0.152892	0.179254	0.852932	0.3987
GAP_LT	-0.519116	0.245570	-2.113918	0.0407

R-squared	0.253185	Mean dependent var	-3.444131
Adjusted R-squared	0.216755	S.D. dependent var	3.892660
S.E. of regression	3.445049	Akaike info criterion	5.377499
Sum squared resid	486.6029	Schwarz criterion	5.499149
Log likelihood	-115.3050	Hannan-Quinn criter.	5.422613
F-statistic	6.949894	Durbin-Watson stat	0.377731
Prob(F-statistic)	0.002517		

Tabla 7: Latvian Regression

Dependent Variable: EC_LV
Method: Least Squares
Date: 07/21/13 Time: 16:32
Sample (adjusted): 2000Q1 2010Q4
Included observations: 44 after adjustments
HAC standard errors & covariance (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.789476	2.097160	-1.330121	0.1908
ECINF_LV	-0.458670	0.573854	-0.799280	0.4287
GAP_LV	-0.287887	0.591564	-0.486654	0.6291

R-squared	0.212864	Mean dependent var	-4.127827
Adjusted R-squared	0.174467	S.D. dependent var	7.688085
S.E. of regression	6.985306	Akaike info criterion	6.791241
Sum squared resid	2000.574	Schwarz criterion	6.912890
Log likelihood	-146.4073	Hannan-Quinn criter.	6.836354
F-statistic	5.543779	Durbin-Watson stat	0.121784
Prob(F-statistic)	0.007396		

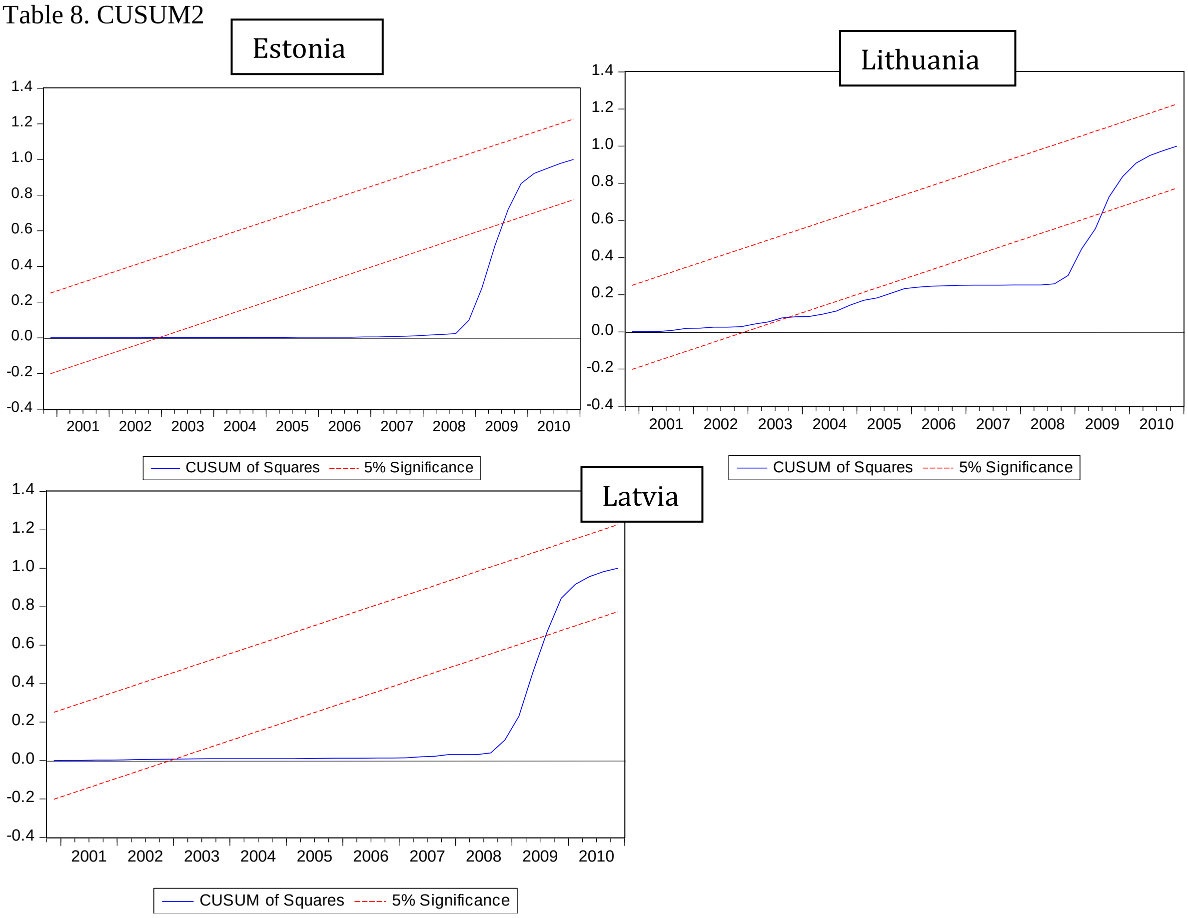
The results of the regression analysis over the period dating from 2000q1 until 2010q4 indicate an inadequate factor of Taylor's model for the monetary policy's determination of the three Baltic States. Taylor's interest rates were graphed and estimated just like the short term interest rates (see annexes). Neither of the λ_1, λ_2 coefficients are significant at a 5% level. Various coefficients are also negative, thing that is a direct contradiction to the theory. The realized Wald tests confirm the fact that the λ coefficients are significantly different from 0.5.

The parameter R^2 is low but, since it indicates variance of the short term interest rates' deviations regarding the neutral interest rates in front of the variables GAP and "Informal Urban Economy", the R^2 level could be explained by variations in the neutral interest rates. Furthermore, the Dublin Watson's statistical is considerably low for each one of this regressions, thing that could indicate the auto-correlation or a poorly specified model. The presented results are corrected from the HAC calculation to correct the heterocedasticity and the auto-correlation in the standard deviations. These results confirm some of the observations realized in base of the previously run simulations. The extremely low values of the Durbon Watson's statistical can indicate the parameters' instability. One possible explanation for the model's unfitness over the studied period can be the great instability observed in tables 1 and 2.

In accordance with the historical observations and given the heterocedasticity's correction that was realized, several Chow tests were ran (in 2005q1 and 2009q2) for each one of the Baltic States in order to prove the hypothesis of a structural instability over the studied period. The realized Chow tests do not allow the rejection of the null hypothesis of nonstructural rupture in this two reference years (see annexes) while they also indicate a structural instability. This two rupture points correspond to the economic growth increase in this three countries (and the fixation of one fixed currency type for the euro in Latvia's case) and the European economic crisis explosion. Besides, a Chow test was made for Lithuania over the year 2002q1 that corresponds to a modification of its currency type but this test rejects the null hypothesis of structural exchange during this specified year.

In addition to the Chow test, several CUSUM and CUSUM2 tests were tried out to test the model's stability over this time, resulting in both tests identifying a rupture structural point around 2009q2. Nonetheless, the test CUSUM didn't identify a rupture point in 2005 while the CUSUM2 identified one shortly before 2005 according to the mentioned countries. Here are presented the CUSUM2 graphics for all three countries (CUSUM graphics are included in the annexes).

Table 8. CUSUM2



Since both the Chow tests and the CUSUM and CUSUM2 tests confirmed certain instability of the parameters, the realization of an estimation for ordinary squared minimums over three sub-periods was decided:

1) Period 1: 1999q1-2004q4
2) Period 2: 2005q1-2009q1
3) Period 3: 2009q2-2010q4

Here is presented a summary of each period's results for all three countries:

Table 9. Summary of each period´s results,
Period 1

	Estonia	Latvia	Lithuania
C	-6.285	-4.867	-0.946
Prob.	0.000	0.000	0.637
λ_1	-0.633	-0.858	-0.087
Prob. $\lambda_{1=0}$	0.000	0.000	0.851
Prob. $\lambda_{1=0.5}$	0.000	0.000	0.216
λ_2	0.259	0.501	1.765
Prob. $\lambda_{2=0}$	0.001	0.024	0.037
Prob. $\lambda_{2=0.5}$	0.002	0.995	0.123
Prob. Fischer	0.000	0.000	0.011
R2	0.911	0.812	0.411
DW	1.188	0.508	0.551

Period 2

	Estonia	Latvia	Lithuania
C	-5.866	-4.503	-6.294
Prob.	0.017	0.298	0.000
λ_1	0.363	-0.025	0.217
Prob. $\lambda_{1=0}$	0.151	0.942	0.552
Prob. $\lambda_{1=0.5}$	0.574	0.428	0.439
λ_2	-0.195	-0.271	-0.116
Prob. $\lambda_{2=0}$	0.589	0.619	0.626
Prob. $\lambda_{2=0.5}$	0.069	0.303	0.018
Prob. Fischer	0.523	0.615	0.623
R2	0.089	0.615	0.065
DW	0.407	0.343	0.790

Period 3

	Estonia	Latvia	Lithuania
C	1.025	1.374	-0.882
Prob.	0.426	0.597	0.333
λ_1	-0.615	0.509	-0.609
Prob. $\lambda_{1=0}$	0.261	0.134	0.021
Prob. $\lambda_{1=0.5}$	0.076	0.975	0.048
λ_2	-0.601	-1.565	-0.785
Prob. $\lambda_{2=0}$	0.146	0.006	0.007
Prob. $\lambda_{2=0.5}$	0.030	0.002	0.000
Prob. Fischer	0.003	0.017	0.033
R2	0.947	0.870	0.743
DW	1.026	2.509	1.457

The sub-periods divisions of the sample show evidence of the strong variability of the estimated coefficients.

On the first period, every λ_1, λ_2 coefficient is significant at a 5% level with exception of Lithuania's λ_1 coefficient, which is not significant. In Lithuania's case, we cannot reject the hypothesis about the λ_1 coefficient being equal to 0 at a 5% significant level. Nevertheless, it is observed that the λ_1 coefficients are negative, fact that contradicts the Taylor Rule theory. The λ_2 coefficients are positive and significant in this period, matching the theory. The α coefficients of the constant are significant at a 1% level for Estonia and Latvia, plus they are negative. However, for Lithuania, the α coefficient is negative but not significant. The negative constants indicate an expansionist monetary policy for these countries during the first period. Either way, when it comes to the global significance of the model, the Fisher's F test is significant for all three countries. The kindness of the indicated adjustment by the R^2 coefficient is high for Estonia and Latvia, being respectively 0.91 and 0.81 while the lowest belongs to Lithuania with a 0.41. For all the countries, the statistical Durbin Watson levels lie low but also are definitively higher than the original regression over the whole sample. When realizing the individual Wald tests over the coefficients to verify if theory comes near the theoretical level of 0.5 in Taylor Rule, only Latvia's λ_2 coefficient seems to significantly come close this level. The λ_1, λ_2 coefficients do not come close these theoretical levels.

For the second period, neither of the λ_1, λ_2 coefficients are significant, not even at a 1% level, nor 5% or 10%. The coefficients of the Estonian and Lithuanian constant are significant at the 5% and also are negative. Besides, the F (Fischer) test is not significant, reason why the "all coefficients are equal to cero" hypothesis cannot be rejected. The model does not apply to this sub-period.

For the third period, the λ_1, λ_2 coefficients are not significant for Estonia or Latvia but they do are for Lithuania at the 5%. The coefficients of the α constant are not significant for any of the evaluated countries. On the contrary, the F test is significant at the 5% for all three countries. Meanwhile, neither of the $\lambda 1$, λ_2 coefficients are significantly closes to the theoretical levels of 0.5.

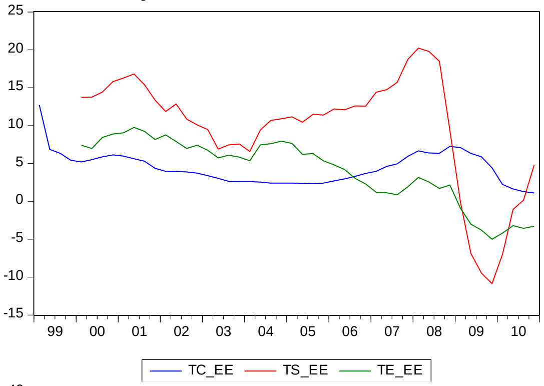
The analysis in sub-periods shows a great variability on the λ_1, λ_2 coefficients. There is no real convergence towards the 0.5 coefficient values of Taylor's model or towards any common coefficient. In the first sub-period, where the coefficients of the estimated model's variables are statistically significant for Estonia and Latvia, there are observed coefficients that present several common characteristics. Both countries present elevated negative coefficients on the α constant, matter that seems to indicate slightly expansionist monetary policies for both countries. This observation corresponds with the previously evidenced historical facts. The λ_1 coefficients are negative but hold a level superior to -1 while the λ_2 coefficients are positive. The behavior of the coefficients and the inflation rates in this period point towards a convergence of these two countries' monetary policy. Ever since 2005, all three countries face an elevated growth followed by a serious recession ever since 2009 that seems to alter their monetary policy's behavior. The situations start to reestablish itself at the end of 2009.

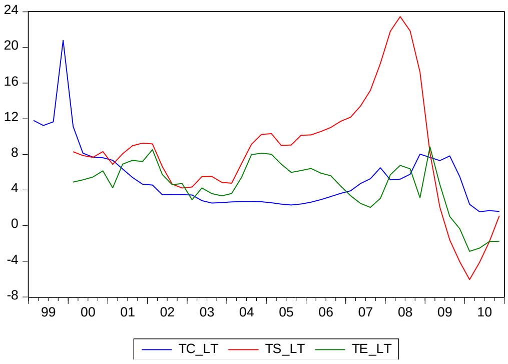
CONCLUSION

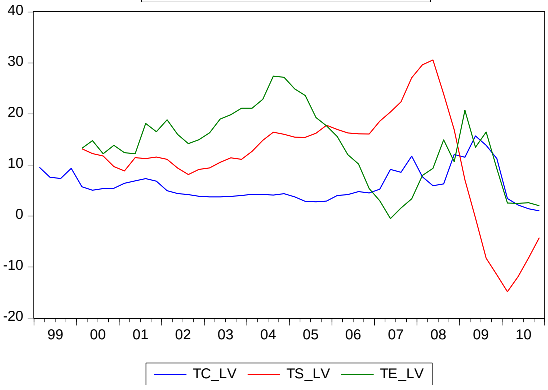
The Baltic States monetary policy was analyzed under the monetarily active Taylor Rule. It could be proven that the monetary policy of the Baltic States did not follow the behavior of Taylor Rule. This result is no surprise since the Baltic States applied a fixed monetary exchange attached to other currencies and controlled by monetary committee. Nevertheless, the simulation of Taylor's rates and the comparison of the real interest rates allows the extraction of some interesting conclusions about the compatibility degree between the monetary policy followed by the Baltic States and the optimum interest rates for their economies according to their monetary theory. While the previous studies showed the utility of the currency board's system as an inflation limiter for these countries (De Haan, Berger et Van Frassen 2001), it could be proven that, for Estonia who attached its currency to the euro since its introduction, the chosen short term interest rates from 1999 until 2005 were extremely low, fact that contributed to the creation of an economic bubble in this country ever since 2005. In a similar way, Latvia and Lithuania, who attached their currencies to the special drawing rights of the IMF and the American dollar respectively, chose too low short term interest rates compared to what the Taylor's rates would have generated. The Taylor Rule estimation about the historical data of these countries allowed the confirmation of their monetary policy remoteness facing the Taylor Rule and the created inflation tendencies.

ANNEXES

Estimated Taylor's rates, Interest rests in the short term and simulated Taylor's rates







Chow's tests

Estonia

Chow Breakpoint Test: 2005Q1
Null Hypothesis: No breaks at specified breakpoints
Varying regressors: All equation variables
Equation Sample: 2000Q1 2010Q4

F-statistic	16.75837	Prob. F(3,38)	0.0000
Log likelihood ratio	37.08637	Prob. Chi-Square(3)	0.0000
Wald Statistic	50.27510	Prob. Chi-Square(3)	0.0000

Chow Breakpoint Test: 2009Q2
Null Hypothesis: No breaks at specified breakpoints
Varying regressors: All equation variables
Equation Sample: 2000Q1 2010Q4

F-statistic	31.90805	Prob. F(3,38)	0.0000
Log likelihood ratio	55.36049	Prob. Chi-Square(3)	0.0000
Wald Statistic	95.72414	Prob. Chi-Square(3)	0.0000

Latvia

Chow Breakpoint Test: 2005Q1
Null Hypothesis: No breaks at specified breakpoints
Varying regressors: All equation variables
Equation Sample: 2000Q1 2010Q4

F-statistic	9.774090	Prob. F(3,38)	0.0001
Log likelihood ratio	25.16382	Prob. Chi-Square(3)	0.0000
Wald Statistic	29.32227	Prob. Chi-Square(3)	0.0000

Chow Breakpoint Test: 2009Q2
Null Hypothesis: No breaks at specified breakpoints
Varying regressors: All equation variables
Equation Sample: 2000Q1 2010Q4

F-statistic	40.08527	Prob. F(3,38)	0.0000
Log likelihood ratio	62.77157	Prob. Chi-Square(3)	0.0000
Wald Statistic	120.2558	Prob. Chi-Square(3)	0.0000

Lithuania
Chow Breakpoint Test: 2005Q1
Null Hypothesis: No breaks at specified breakpoints
Varying regressors: All equation variables
Equation Sample: 2000Q1 2010Q4

F-statistic	3.892410	Prob. F(3,38)	0.0161
Log likelihood ratio	11.79026	Prob. Chi-Square(3)	0.0081
Wald Statistic	11.67723	Prob. Chi-Square(3)	0.0086

Chow Breakpoint Test: 2009Q2
Null Hypothesis: No breaks at specified breakpoints
Varying regressors: All equation variables
Equation Sample: 2000Q1 2010Q4

F-statistic	14.69897	Prob. F(3,38)	0.0000
Log likelihood ratio	33.89383	Prob. Chi-Square(3)	0.0000
Wald Statistic	44.09691	Prob. Chi-Square(3)	0.0000

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