

# DOES THE MAASTRICHT CONVERGENCE CRITERIA WORK?

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*During its 13 year history, the euro area experienced the most severe economic downturn in the late 2000s as a result of the 2007 financial-economic crisis stemming from the US banking sector. The crisis in the monetary union, besides posting a significant economic and social cost, revealed several weaknesses not just of the currency block as a whole, but also of its constituting members, which were masked by the prosperous economic environment characteristic for the 2000s. These conditions have put to the test the solidarity among the euro zone members, or in other words the existence of the currency block. One important problem of the currency block is the lack of harmony between the fiscal and economic policies of the member states, creating several and occasionally very divergent parts of the currency block. The aim of this research is to enhance the Maastricht convergence criteria's and the Stability and Growth Pact's role as a monitoring mechanism, allowing them to become more informative tools for the policy makers.*

*For this, based on the relevant literature, we propose new potential explanatory variables which could enhance the role of the Maastricht convergence criteria and the Stability and Growth Pact. Some of the studied variables, like indebtedness of the private sector, capital flow compared to the size of the economy, government revenue compared to total public debt and current account balance help in enforcing the nominal convergence, while others (real labour productivity) contribute to the real convergence. The explanatory power of the proposed variables are investigated in the case of France, Germany, Greece, Ireland, Italy, Portugal and Spain for the period comprised between 2000Q1-2011Q4.*

*Results of the research show that with the exception of government revenue compared to total public debt, all proposed variables have significant explanatory power regarding the evolution of the state of the economy in all seven countries analyzed. France and Germany, characterized by healthy fiscal and economic policies is also exposed to risks stemming from the evolution of the private debt. In case of Greece, Ireland and Spain the high current account deficit represented a significant explanatory variable, while the outstanding loans to the private sector proved to be significant in the case of Ireland, Italy and Portugal. The significance of real labour productivity for Greece and Italy proves that real convergence should also be obtained beside nominal convergence by economies in the currency block. All significant variables had explanatory power through their lagged value, hence counterbalancing policies can be elaborated in a timely manner in order to stabilize the economy if signs indicate a potentially unsustainable economic path.*

*Keywords: Maastricht convergence criteria, real convergence, macroeconomic processes, private sector.*

*JEL codes: E61, E63, H12, H3, C51*

## **I. Introduction**

According to a comprehensive and thorough research conducted by the World Bank in 2001, in the period comprised between the end of the 1970s and the end of the 20th century there were 112 bank crises in 93 countries all over the world. A very large bulk of the studied crises caused significant economic downturns in developed countries, as in emerging economies as well (Wolf, M (2010)). Another research showed that since the early 1980s sovereign debt distresses grew exponentially until the mid 1990s (Cohen and Valadier 2010). Baldacci et al. (2011) based on a research found that from 1970 to 2010 there were 41 fiscal distress events in advanced economies and 135 events in emerging economies. The costs of these crises mainly reflected in the low

economic growth – which in most of the cases remained significantly under its potential level – and the nationalization of banks created a very large pressure on the society through the reduction of welfare. A very important feature of banking crises is the spillover effect which they can cause in the public sector (Freydl 1999; Laeven and Valencia 2008; and Rogoff and Reinhart 2009). The current sovereign debt crisis in Europe is a very recent and acute example for this. It is clearly not a desirable situation – from many point of view – to be in, when after seemingly resolving one crisis, the economic actors face themselves with another one. In order to avoid these costly crises or at least to create a more powerful monitoring mechanism, we propose a review of the Maastricht convergence criteria and an enhancement of its current form. The aim of this paper was to conduct an analysis which would provide a guide on what type of additional variables would be useful to include among the Maastricht convergence criteria.

## **II. Literature review**

There is a vast amount of researches regarding macroeconomic variables and their role in different Early Warning System (EWS) models. Most of these studies focus on currency and banking crises, with only a few papers assessing the risk of public debt default. The fundamental of this is that many crises from our recent history (last four decades) can be included in one of the two mentioned types of crises. These studies on EWS models can be differentiated according to: (i) the definition of crisis events; (ii) the methodology adopted; (iii) country coverage, and (iv) the set of indicators used. Country coverage tends to be limited due to the quality of data or its unavailability, hence there can be found only a few studies focusing on both advanced and emerging economies.

Baldacci et al. (2011), developed a fiscal stress index which provides a signaling tool to identify and assess exposure to fiscal sustainability risks and also helps identify the underlying factors which drive changes in fiscal stress risks. However, like similar signaling tools, the developed stress index does not attempt to predict crises, as these are typically triggered by the interaction of economic, financial and political events. Results show that the top predictors of fiscal stress are different for advanced and emerging economies. In advanced countries the top predictors of fiscal stress are indicators of gross financing needs and fiscal solvency concerns. In emerging economies, the best predictors of fiscal stress are risks associated with public debt structure and liquidity constraints.

Regarding the methodology used in the studies, two approaches are common: the univariate “signaling” approach and the multivariate regression analysis of the crisis determinants. Kaminsky, Lizondo and Reinhart (1998) presented the “signaling” approach on determinants of currency crises. Berg and Patillo (1999) and Berg et al. (2005) use the multivariate regression analysis to predict crises episodes. Most of the researches which compared the performance of these two approaches concluded that overall, the signaling performance depends on the type of crisis risk assessed (Baldacci et al. 2011).

Abdih et al. (2009) propose the investigation of the impact of remittances on the sustainability of government debt. The results indicate that countries with differing balance of payments structures should consider developing and evaluating alternative measures of debt sustainability. In particular, remittance-dependent countries may need to monitor the state of the economy through several indicators, including both debt-to-GDP and debt-to-GDP adjusted with remittances.

Articles regarding the Maastricht convergence criteria and the creation of the euro started to spread immediately after the signing of the Maastricht Treaty back in 1992. Many observers and economists warned against establishing EMU without adequate fiscal controls (Glick 1991, Walsh 1992, Schuknecht et al. 2011). In the same times there were numerous academic economists who questioned the economic rationale behind the convergence criteria of the Maastricht Treaty (Kenen 1992). A very important question mark for the skeptics was that the Maastricht Treaty aimed for a rather nominal convergence for the future members of the currency

block (Jonung and Drea 2009). The Stability and Growth Pact – which ensures that after an EU member state joins the currency block it will continue to meet the fiscal convergence criteria – has also been identified with many weaknesses (Schuknecht 2005).

### III. Methodology

The relationship between the state of the economy and the Maastricht convergence criteria is studied with the help of the classical linear regression model:

$$Y_t = \beta_1 + \beta_2 \cdot X_{t2} + \beta_3 \cdot X_{t3} + K + \beta_k \cdot X_{tk} + u_t, \quad t = \overline{1, n}, \quad (1)$$

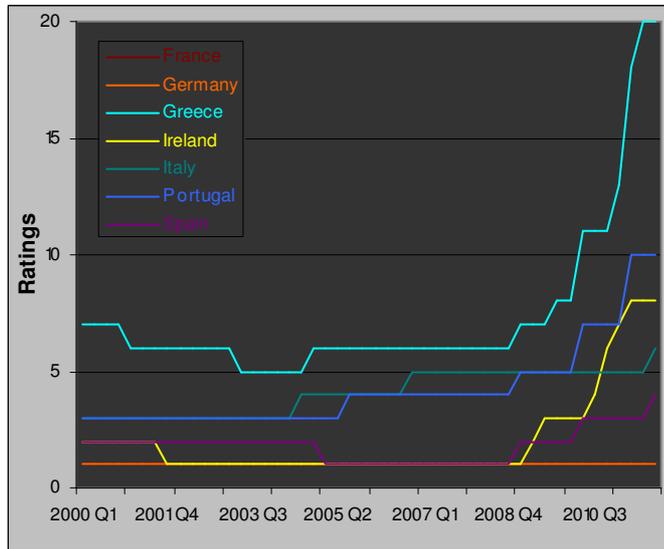
where  $Y_t$  denotes the state of the studied economy in quarter  $t$ ,  $n$  is the number of quarters,  $k-1$  is the number of explanatory variables,  $\beta_i$  is the coefficient estimate for variable  $i$  ( $i = \overline{1, k}$ ),  $X_{it}$  represents the value of variable  $i$  in quarter  $t$ , while  $u_t$  is the error term in quarter  $t$ . In order to achieve a more robust estimation process, the effects of the different explanatory variables were tested both in a bivariate and a multivariate regression model. As a time series analysis is undertaken, a great attention has been allocated for the assurance that the studied variables are stationary. For the testing of the stationary property of a variable, the augmented Dickey-Fuller (ADF) test has been used.

### IV. Data and empirical results

#### 1. Data

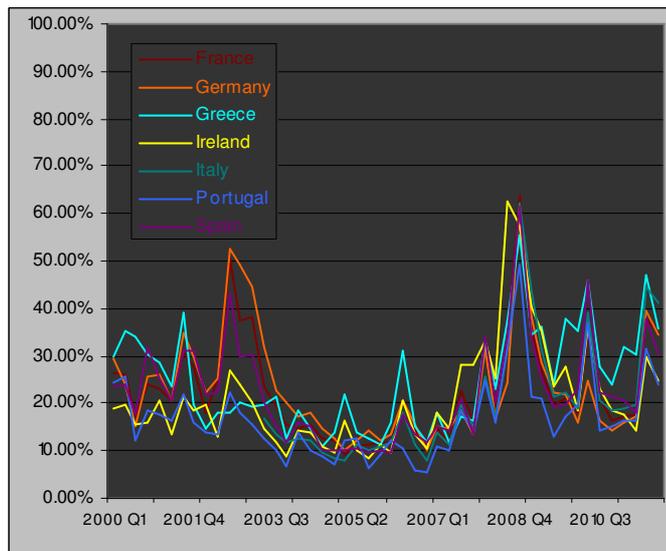
The dependent variable of the regression model needs to represent through a quantitative measure the state of the economy. Two approaches were considered: (i) ratings of long term sovereign debt and (ii) yearly volatility of benchmark stock market indices. Ratings of long term sovereign debt are published periodically by Standard and Poor's rating agency division (S&P, 2012). The theory behind using ratings of sovereign debt as a measure of instability of an economy is that the public sector has a very strong relationship with the other three main sectors of an open economy (1). The second approach has its basis coming from the empirically proved fact that evolution of stock indices represents the opinion of the market participants with respect to the outlook of the economy. Stock market indices tend to forecast, usually in advance with a year the evolution of the real economy. Hence, a sharp decline in the stock prices represents a potentially significant decline in the economic activity. Volatility in the context of stock market prices stands as an important parameter to capture the uncertainty surrounding an asset's price. In this paper we use the benchmark indices of the analyzed economies in order to capture its state.

The empirical research was conducted for seven economies: France, Germany, Greece, Ireland, Italy, Portugal and Spain. The first two economies are in focus due to their healthier fiscal positions and higher growth prospects, while the remaining five economies are closely monitored as a consequence of the difficulties which they have encountered in recent years. The proposed variables for inclusion in the Maastricht convergence criteria and the Stability and Growth Pact have their grounding coming from the optimum currency area theory. In order to achieve a more functional currency block, the member counties need to achieve not only a nominal convergence but a real convergence as well. Beside the inclusion of variables representing real convergence, other variables for nominal convergence should also be considered. The proposed variables are as follows: indebtedness of the private sector, capital flow compared to the size of the economy, government revenue compared to total public debt, current account balance and real labour productivity. The data used for the analysis refer to the period comprised between 2000Q1 – 2011Q4.



**Figure 1: Evolution of sovereign ratings**  
Source: Standard and Poor's

Figure 1 shows the evolution of the ratings for long term sovereign debt (2). During the analyzed period, Germany and France retained their AAA rating. The other analyzed countries were downgraded as a consequence of the severe effects of the 2007 financial-economic crisis, signaling a more instable state of the economies. The volatility of the benchmark stock market indices were generally under 30% throughout the mid-2000s, however in the last quarter of 2008, when many financial institutions were exposed to the risk of default, the volatility reached its peak value of 60%. Due to governmental interventions, the state of many economies has been stabilized, hence the volatilities dropped, however, not in case of all the studied economies. For Greece, Portugal, Spain and Italy volatility remained at an elevated level (Figure 2).



**Figure 2: Yearly volatility of benchmark stock market indices**  
Source: authors' calculation

## ***2. Results for the econometric analysis***

The estimations did not yield significant results in the case when sovereign ratings were used as dependent variable. A possible reason for this could be the very low variability of sovereign ratings. Table 1 presents the estimated coefficients and *p* values for each analyzed country in the case when volatility of the benchmark stock market indices were used as dependent variables of the regressions.

For France two variables were found to have significant impact on the evolution of the stock index volatilities. Both variables belong to the group of indicators regarding private sector debt. The anticipated positive sign of the variables show, that continuous growth of private debt and its raising share in GDP will eventually lead to increased volatility levels. Other studies also showed similar relationships between debt levels and corporate default rates. In the case of Germany we have also two significant variables. During the 2000s Germany was one of the few euro area economies with relatively healthy macroeconomic policies, however this does not mean that it can afford itself to loosen policies with respect to private debt. It is important to see that for the two biggest economies of the euro area the evolution of the private debt holds an important role in determining the state of their economy.

Turning to the countries which currently face important pressure both from market participants and European politicians to implement socially painful austerity measures in order to bring back their economies on a sustainable path, we can notice that real convergence has a significant effect on their stability. Focusing on Greece will highlight the importance of three variables: current account balance, financial account balance and real labour productivity. All three variables' coefficients have the expected signs. Sustained increase in the indebtedness of the public and private sector, inflow of foreign capital and decline in real labour productivity will all lead to an increase in instability. It is not a surprise to see the significant influence of the financial account balance, as Greece funded its growth mainly through loans from foreign creditors. The effect of lag of more than four quarters suggest that if an adequate monitoring of the mentioned variables is implemented, counterbalancing policies could be elaborated in a timely manner in order to stabilize the economy.

Ireland was also a victim of private sector indebtedness, mainly due to the financial sector. This is signaled by the significance of the current account balance, financial account balance and the share of private sector loans in the GDP. For Italy besides having to deal with a high public debt, issues in the labour market are also creating significant pressure on the economy's stability. Further decrease in labour productivity could lead to more pressure from financial markets. Portugal is also one of the countries with major issues due to high public and private sector debt. Spain had a quite solid fiscal position prior to the financial-economic crisis, though it also had a fragile private sector due to the continuous current account deficits. Ultimately private sector imbalances will spill over to the public sector, mainly as a result of decreased economic activities and bailouts, hence assuring a balanced private sector could create the premises for a balanced public sector.

## **V. Conclusions**

The 2007 financial and economic crisis and the 2010 sovereign debt crisis in the euro area are a symptom of policy failures and deficiencies in – among other things – financial regulation and fiscal and economic policy coordination. Our aim with this research was to assess the relationship between the state of the economy and macroeconomic processes in the case of seven euro area economies for the period comprised between 2000Q1-2011Q4. In our analysis we propose a new set of variables, in order to enhance the Maastricht convergence criteria and also the “preventive arm” and “protective arm” of the Stability and Growth Pact. The studied variables are as follows: indebtedness of the private sector, capital flow compared to the size of the economy, government revenue compared to total public debt, current account balance and real labour productivity.

Stability of economies with healthy fiscal and economic policies is also exposed to risks stemming from the evolution of the private debt. During the analyzed period in case of Greece, Ireland and Spain the high current account deficit represented a significant explanatory variable for the state of the economy. Outstanding loans to the private sector proved to be significant for Ireland, Italy and Portugal. The significance of the current account balance and the outstanding private loans indicate that macroeconomic variables regarding the private sector should also be included in the Maastricht convergence criteria and the Stability and Growth Pact. Real convergence should also be obtained along nominal convergence by economies in the currency block, this being underlined by the significance of real labour productivity in the case of Greece and Italy.

Overall, all of the proposed variables except for the government revenue compared to total public debt have a significant explanatory power regarding the evolution of the state of the economy. All significant variables had explanatory power through their lagged value, hence counterbalancing policies can be elaborated in a timely manner in order to stabilize the economy if signs indicate a potentially unsustainable path of the economy.

There are several unexploited areas of this paper's topic which still need to be investigated thoroughly. For instance a future research could address the problem of modeling the state of the economy using sovereign ratings. Most probably the development of a composite index using different variables would be the most adequate approach. Another important area would be the assessment of critical threshold values for the variables proposed in this paper.

## **VI. Notes**

(1) An open economy has four main sectors: government sector, enterprise sector, household sector and external sector. The enterprise and household sector together represent the private sector of an economy.

(2) Sovereign rating classes are ranked in order to transform them into a quantitative variable. The highest rating class received rank 1, while the lowest rating class received rank 21.

**Table 1: Results for the econometric analysis**

	France		Germany		Greece		Ireland		Italy		Portugal		Spain	
	Coefficient	Lag of variable	Coefficient	Lag of variable	Coefficient	Lag of variable	Coefficient	Lag of variable	Coefficient	Lag of variable	Coefficient	Lag of variable	Coefficient	Lag of variable
Constant	-0.0505673 (0.69657)	-	0.226036*** (0.00001)	-	0.143012*** (0.00096)	-	0.0301129 (0.53902)		-0.404413*** (0.00288)	-	-0.255922** (0.02274)	-	0.138669*** (0.00237)	-
Current account balance (% of GDP)			-0.0271445* (0.06129)	5	-0.00678573** (0.01665)	4	-0.0148713*** (0.00727)	3					-0.0136455** (0.04063)	6
Financial account balance (% of GDP)					0.00678349** (0.03797)	5	0.00395759** (0.01255)	4						
Total general government revenue (% of total public debt)														
Real labour productivity (% chg. compared to corresponding period of the previous year)					-0.0176071*** (0.00778)	4			-0.0164217* (0.05602)	1				
Outstanding loans to the private sector (% change on previous period)	3.02948** (0.01547)	6	6.43668** (0.01554)	4							1.95729** (0.01609)	4		
Outstanding loans to the private sector (% of GDP)	0.0662135* (0.07833)	5					0.0219377*** (0.00879)	4	0.170061*** (0.00003)	4	0.0714857*** (0.00041)	5		
Adjusted R-squared	0.147217		0.106662		0.406375		0.437279		0.430875		0.240245		0.078169	
Log-likelihood	35.41320		34.37431		43.38117		46.73907		34.40020		51.81721		34.65704	

Source: authors' calculations

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