DOCUMENT

DE TRAVAIL

N° 292

FISCAL DEVELOPMENTS IN THE EURO AERA BEYOND THE CRISIS: SOME LESSONS DRAWN FROM FISCAL REACTION FUNCTIONS

Gilles Dufrénot, Laurent Paul

October 2010

BANQUE DE FRANCE
EUROSYSTÈME

DIRECTION GÉNÉRALE DES ÉTUDES ET DES RELATIONS INTERNATIONALES

DIRECTION GÉNÉRALE DES ÉTUDES ET DES RELATIONS INTERNATIONALES

FISCAL DEVELOPMENTS IN THE EURO AERA BEYOND THE CRISIS: SOME LESSONS DRAWN FROM FISCAL REACTION FUNCTIONS

Gilles Dufrénot, Laurent Paul

October 2010

Fiscal developments in the euro area beyond the crisis: some lessons drawn from fiscal reaction functions

Gilles Dufrénot[♣] and Laurent Paul[*]

[♣] Banque de France, CEPII and DEFI, Université d'Aix-Marseille, Faculté de Sciences Économiques et de Gestion, 14 avenue Jules Ferry, 13621, Aix en Provence, Cedex, Email : gilles.dufrenot@banque-france.fr.

[*] Banque de France, Direction de la Conjoncture et des Prévisions Macroéconomiques, Service d'Étude des Politiques de Finances Publiques, 31 rue Croix des Petits Champs, 75049, Paris Cedex 01, Email : laurent.paul@banque-france.fr

Abstract

In this paper, we examine whether the fact that governments incorporate an objective of sustainability in their budgetary decisions is an element likely to increase the likelihood of a decrease in their deficit and debt ratios beyond the crisis (over the years from 2010 to 2015). We estimate a fiscal reaction function for the Euro area countries and demonstrate that the discretionary policies seem to be pro cyclical in average, thereby influencing the budget balance in the opposite direction than the automatic stabilizers. Our simulations of these rules over the next five years lead us to conclude that two groups of countries could emerge as regards their respective budgetary situations. On the one hand, some "virtuous" countries whose structural deficits will diminish whatever the "exit crisis" scenario envisaged, whereas on the other side, others will not succeed in stabilizing their national debt ratio, because their discretionary fiscal policy is less pro cyclical.

Résumé

En appliquant un nouvel estimateur sur données de panel, nous montrons que les fonctions de réaction budgétaires des pays de la zone euro font apparaître un biais pro cyclique. Celui-ci implique que deux groupes pourraient se dessiner au regard de leur position budgétaire respective dans le contexte actuel de sortie de crise. D'un côté, nous aurions des pays dont les déficits structurels se réduiraient dans tous les scénarios (reprise rapide ou molle) et qui parviendraient ainsi à stabiliser le ratio de leur dette publique. De l'autre côté, nous aurions des pays dont l'amélioration des soldes budgétaires serait fortement tributaire de l'ampleur de la reprise. Cette divergence semble montrer que les règles de surveillance du PSC ne sont pas suffisantes en soi pour inciter les pays de la zone euro à adopter un comportement budgétaire commun.

Key words : euro zone, exit crisis scenario, fiscal policy

JEL Classification : C23, H61, H63.

Acknowledgments. We owe thanks to several persons whose remarks helped improving an initial version of the paper. We are particularly grateful to Jérôme Creel, Carine Bouthevillain, Olivier De Bandt and Dominique Plihon. All remaining errors are ours.

Fiscal Developments in the European Union beyond the Crisis: Some Lessons drawn from Fiscal Reaction Functions

1.- Introduction

The purpose of this paper is to simulate the evolution of the budget balances of the euro area-countries beyond the current crisis, over a period of 5 years by 2015. We consider assumptions on the macroeconomic variables influencing budget balances (GDP growth rate, international environment, interest rates, etc) and also take into account the governments' budgetary behavior observed in the past.

The impact of economic conditions on budget balances depends, not only on the automatic stabilizers (mechanical effects of cyclical fluctuations on tax bases and several categories of expenditure[1]), but also on discretionary policies. This issue has been widely debated in the economic literature, especially in the case of the European Union. Before the subprime crisis of 2008/2009, a much debated question was whether the fiscal rules imposed on Member States by the Maastricht Treaty and the Pact of Stability and Growth (SGP) had restrained or not the use of discretionary policies, making fiscal policies less countercyclical compared to the years preceding the adoption of the Euro[2]. Since the crisis, the debate has shifted to another area of interest, namely the sustainability of public finances. Indeed, recovery plans adopted in the wake of the crisis have led Member states to significantly increase their fiscal deficits and to accumulate very high levels of debt. Several recent events suggest that financial markets do worry about the sovereign risk: in particular the downgrading of Greece, Spain or Portugal by the rating agencies and the rise of spreads in European sovereign bond spreads observed since early 2008. The recommendations to Governments by the European Commission on what should be their fiscal behavior during the coming years leave no doubt on the fact they have to consolidate their public finances, in order to stabilize their debt ratio, with the objective to go back to deficits below 3% of GDP within a close period of time (2012 to 2014 in all countries). This effort should not be limited solely to the unwinding of stimulus measures adopted during the crisis but should target, first a stabilization of debt ratios and then a drop in order to bring back them to the pre-crisis levels (and even lower when the level of debt before crisis was already considered unsustainable).

Even though there is already an abundant literature on the issue of fiscal consolidation for the European union, the current crisis context introduced several new aspects in the debate[3]. The first one concerns the

[1] Public expenditure which are considered to be sensitive to the economic cycle are mainly unemployment benefits.

[2] See for instance, Fatas and Mihov (2003), Gali and Perotti (2003), Von Hagen (2006), Candelon and al. (2009).

[3] The theoretical literature usually focuses on the issue of the macroeconomic impacts of fiscal consolidation and the composition of fiscal adjustments (tax increase versus spending reduction). For recent studies, see in particular Afonso (2006), Coenen and al. (2008), Guichard and al (2007).

size of fiscal adjustment in order to avoid in the future a default on sovereign debt, taking into account changes required on primary balances to go back to sustainable budget balances. A second aspect concerns the pace of fiscal consolidation with the possibility to follow different horizons of sustainability from one country to another in order to reflect the diversity of initial conditions and growth potential of each country. A third aspect in the current debate relates on which deadline to set for starting fiscal consolidation, in other words the time from which a country can no more refuse to adjust because consolidation could weaken the recovery. Finally, the current crisis is an opportunity to revive an old fiscal policy debate about the choice between rules and discretionary policies to complete the consolidation of public finances. The SGP is particularly subject to questions about its ability to foster a return to sustainable levels of deficits and debt. The rule that "Member states must meet a medium term objective of budget balance throughout a cycle" can be interpreted as a constraint of sustainability that countries must incorporate in their fiscal behavior. Such a rule is limiting the ability of countries to use discretionary policy except in exceptional and temporary ways like the current crisis. Therefore, the SGP can encourage governments to be pro cyclical when they exit form crisis in order to quickly attain the medium-term objective. But this strategy that emphasizes a balanced budget and compliance with rules of the SGP may be arbitrated with another strategy to pursue a counter-cyclical support for (or do not stop) economic growth. The evolution of budget balances in post-crisis times will depend on the respective importance given by Governments to these two strategic goals: economic stabilization and fiscal sustainability.

In this paper, we focus on the question of the trade-off between fiscal consolidation and economic stabilization. More specifically, we want to know whether the fact that European governments include a sustainability objective in their budgetary decisions is an element that will help deficit and public debt reduction over the next five years (2010 to 2015). We show that the fiscal reaction functions of the European Union exhibit a pro-cyclical bias with discretionary policies having an opposite effect of automatic stabilizers on budget balances. Furthermore, our estimates show that governments attach lower importance to the sustainability objective when fiscal policies are strategic - in the sense of game theory - and when the cost of fiscal adjustment is a reduction in output. In addition, the initial situation (in 2009) of cyclical budget balances strongly influences the projected developments in deficits and debt ratios.

Our simulations show that, even in an optimistic scenario of strong economic recovery from 2010 onwards, a number of countries encounter difficulties in stabilizing their deficits below the 3% threshold by 2015 and reducing significantly their debt ratios compared to the 2009 level, in particular countries where automatic stabilizers fail to offset the negative impact on budget balances of pro cyclical discretionary policies conducted during expansions (France, Italy, the United Kingdom Greece, Portugal). In a less optimistic scenario, characterized by weak economic recovery after the crisis, these countries would face important difficulties to reduce their deficits, due to the combination of negative cyclical effects and discretionary counter-cyclical policies. Overall, our results show that in crisis exit times, two groups of countries could be identified according to their fiscal behavior. On the one hand, we would have the "virtuous" countries,

which will reduce their structural deficit in all scenarios and succeed in stabilizing their debt ratio. On the other hand, we would have countries whose improvement of budgetary positions would be strongly dependant on the magnitude of the recovery.

The plan of the paper is as follows. Section 2 presents the fiscal reaction function (the empirical framework and estimation on a panel of countries in the European Union). Section 3 is devoted to the presentation of simulation results. Finally, Section 4 concludes the paper.

2 .- Estimating a fiscal reaction function for the European Union countries

2.1 .- The empirical framework

The reaction function of budgetary authorities is a reduced form equation, derived from an analytical framework where governments minimize a loss function under economic constraints. We assume that their objective is twofold. First, they seek to stabilize cyclical fluctuations, and, they also seek a public finance sustainability objective, their instrument for adjustment being the primary balance. The loss function is quadratic and is written:

$$L_t = \frac{1}{2}\left[(s_t - s_t^*)^2\right] + \frac{1}{2}(\Delta y_t^2), \qquad (1)$$

where the operator Δ denotes the first difference of a variable, s_t is the primary balance, s_t^* is the sustainable primary balance defined here as the level that stabilize the debt ratio[4], and y_t is the real GDP[5]. In the European context, this type of loss function can be interpreted as follows. Governments have an objective of economic stabilization, but they must take into account a constraint that is imposed from the European Commission in the form of a rule such as "being close to sustainable budget balances". Equation (1) corresponds to a flexible interpretation of the SGP but looks closer to the reality in the sense that Governments may recourse to a certain degree of fiscal activism. A stricter interpretation would imply the absence of any discretionary stabilization policy (only automatic stabilizers would be at play) and the GDP would not appear in the loss function.

Moreover, governments consider the effects of fiscal adjustment on output:

$$y_t = \omega_0(s_t - s_t^*) + \omega_1(s_{kt-1} - s_{kt-1}^*), + \omega_2\Omega_t + \omega_3(y_{t-1} - y_{t-1}^*)\Lambda_t, \qquad (2)$$

where the ω_i, i = 0, ..., 3 are vectors of constants, s_{kt} is the primary balance of a country k other than the domestic country, Ω_t is a vector of variables influencing GDP (interest rates, world growth et.), $(y_{t-1} - y_{t-1}^*)$ is the output-gap whose impact on GDP depends on institutional factors represented by the vector Λ_t (tax structure, size of automatic stabilizers, ...). The impact of the output-gap on GDP incorporates

[4] Several definitions of public finance sustainability have been proposed in the literature. One definition focuses on the sustainability of debt accumulation and the minimum budgetary surplus (or maximum deficit) that is appropriate to avoid a snowball effect of debt. We retain this approach here.

[5] Public balances are expressed as ratios to GDP.

the influence of supply constraints, namely that a country faces more difficulties to increase production in a given year when the previous year's level production was close to maximum level permitted by its production capacity.

Equation (2) is important insofar as the fiscal reaction function obtained by minimizing the loss function (1) must reflect the optimal adjustment of the primary balance in order to achieve the fiscal sustainability objective, but also taking into account the impact of this adjustment on economic activity. This reduced form equation could be derived from a model of aggregate supply and demand for an open economy with a public sector.

The first-order condition of the minimization program (1) under the constraint (2) leads to the following equation:

$$s_t = s_t^* + \frac{1}{1+\omega_0^2}\left[\omega_0^2(s_{t-1} - s_{t-1}^*) - \omega_0\omega_1(s_{kt-1} - s_{kt-1}^*) + \omega_0\omega_1(s_{kt-2} - s_{kt-2}^*)\right] + \frac{1}{1+\omega_0^2}\left[-\omega_0\omega_2\Delta\Omega_t - \omega_0\omega_3\Delta(y_{t-1} - y_{t-1}^*)\Lambda_t\right], \quad (3)$$

where $s_t^* = \frac{R_t - Y_t}{1+Y_t} d_{t-1}$, $d_{t-1} = -s_{t-1} + \frac{1+R_t}{1+Y_t} d_{t-2}$ (4)

(3) can be rewritten as follows:

$$s_t = (s_t^* - s_{t-1}^*) + \rho s_{t-1} + (1-\rho)s_{t-1} + A_t, \qquad 0 \leq \rho < 1 \quad (5)$$

with $\rho = \frac{\omega_0^2}{1+\omega_0^2}$ and $A_t = \frac{1}{1+\omega_0^2}\left[-\omega_0\omega_1(s_{kt-1} - s_{kt-1}^*) + \omega_0\omega_1(s_{kt-2} - s_{kt-2}^*)\right] + \frac{1}{1+\omega_0^2}\left[-\omega_0\omega_2\Delta\Omega_t - \omega_0\omega_3\Delta(y_{t-1} - y_{t-1}^*)\Lambda_t\right]$

Trade off between fiscal sustainability and economic stabilization

If ρ = 0, the objective of sustainability is achieved instantaneously (in this case, $s_t = s_t^*$). If ρ approaches 1, the government maintains the same gap adjustment from one year to another, since $s_t - s_t^* = s_{t-1} - s_{t-1}^* + A_t$. ρ being smaller or equal to 1, by assumption, the gap $s_t - s_t^* - (s_{t-1} - s_{t-1}^*)$ measures the degree of fiscal consolidation between two consecutive periods. The speed of adjustment ρ of the primary balance depends on the coefficient ω_0. This measures what the government "wins" in terms of increased production if it does not adjust instantaneously its primary balance to the sustainable level. Hence, ω_0 is assumed to be strictly positive. The speed of adjustment, or the degree of fiscal consolidation from one period to another is as the lower (ρ increases) as the production gain is high (ω_0 increases).

Fiscal policies substitutable or complementary

Equation (3) introduces fiscal activism externalities of other countries and therefore the strategic nature of fiscal policy in an economic union. We write:

$$X_t = (s_t - s_t^*) - \rho(s_{t-1} - s_{t-1}^*) \text{ et } Y_t = \omega_0\omega_1\left[(s_{kt-1} - s_{kt-1}^*) - (s_{kt-2} - s_{kt-2}^*)\right] \quad (6)$$

The reaction to fiscal policy of other countries intervenes with a lag of one period. Fiscal activism from the other countries is described by a positive variation of Y_t. Indeed, we interpret fiscal activism as to be, in a given year, a situation in which a country is more distant to the sustainable balance than it was in the previous year. Similarly, a positive variation of X_t reflects fiscal activism from the home country. Consider the first part of equation (3). A positive change of Y_t implies a positive change of X_t if $\omega_1<0$, and a negative change if $\omega_1 > 0$. Therefore, when the fiscal activism of a government increases production in the other countries ($\omega_1 > 0$), the latter do not need implementing fiscal activism to increase their production. They can therefore consolidate their public finances ($\Delta y_t < 0$). In this case, fiscal policies are substitutable. In the opposite case where the externalities of fiscal activism are negative (they yield to a decrease in the production of other countries), fiscal policies are complementary and are oriented in the same direction: all countries consolidate or in the contrary reduce their budget balances.

Discretionary countercyclical and pro-cyclical policies

The vector Λ_t includes two variables, namely the elasticity of tax revenues and government spending relative to GDP[6]. Let us denote $\varphi_1 = \omega_0\omega_{31}$ and $\varphi_2 = \omega_0\omega_{32}$ the coefficients representing these two variables, where ω_{31} and ω_{32} are the two components of the vector ω_3 of equation (2). They capture the discretionary fiscal adjustments and the operation of automatic stabilizers resulting from variations of income and cyclical expenditure. At the bottom of the cycle, the economic activity deteriorates and we observe a positive change in the output gap. In this case, revenue decline ($\Delta(y_{t-1} - y^*_{t-1})\Lambda_t < 0$) and/or expenditures increase ($\Delta(y_{t-1} - y^*_{t-1})\Lambda_t > 0$), so that automatic stabilizers imply a degradation of the primary balance. If the discretionary policy is countercyclical, it plays in the same direction as automatic stabilizers. In this case, the variable X_t in equation (6) increases (the primary balance is more distant to its sustainable level in year t that in year t-1). Note that this is the case if $\omega_{31} > 0$ and $\omega_{32} < 0$, in which case $\varphi_1 > 0$ and $\varphi_2 < 0$. If the discretionary policy is pro-cyclical, it plays in the opposite direction of automatic stabilizers and the sign of the coefficients is reversed if the stabilizers are of lower magnitude.

Impact of the world economic activity and monetary policy

The vector Ω_t is composed of the following variables: the product of real GDP growth rate of the OECD area and the degree of openness of each economy, and the real short term interest rate in the euro area (discount rate of the European Central Bank (ECB) minus inflation rate in the euro area). We assume that monetary policy is given, in the sense that the ECB does not react to the fiscal behavior of euro area governments. On the other hand, national fiscal policies are expected to react to monetary policy. Let us

[6] This variable better captures the effect of "institutional" factors than the tax burden (effectiveness of tax collection, tax regime, sharing of the tax burden between production factors, persons, etc….).

denote $\psi_1 = \omega_0\omega_{21}$ and $\psi_2 = \omega_0\omega_{22}$ the coefficients of these two variables, where ω_{21} and ω_{22} are the two components of the vector ω_2 in equation (2). A rise of world production increases domestic production (depending upon a country's degree of openness). In this case, $\omega_{21} > 0$ and governments increase their consolidation efforts (from equation (3) and definitions of fiscal variables in (6), we can see that the variation X_t is negative). Further, ω_{22} is negative in equation (2). Indeed, an increase in the ECB discount rate has a negative effect on production. Therefore, from equation (3), fiscal policy substitutes for monetary policy (X_t increases).

2.2. - Econometric methodology

2.2.1- The estimated equations

The estimated equation is based on the empirical framework presented in the preceding section. The data are taken from the annual database of OECD and cover thirteen European Union countries: Austria, Belgium, Germany, Spain, Finland, France, Greece, Ireland, Italy, Luxembourg, Netherlands and Portugal. The time period covers the years from 1994 to 2008. Our pooled panel thus comprises 195 observations. We begin two years after the adoption of the Maastricht Treaty and ends before the trough of the crisis (since the discretionary fiscal policies in 2009 were undertaken in exceptional circumstances). We consider only the most important countries in the European Union (for a detailed presentation of the variables used, see Appendix).

We consider an autoregressive equation with fixed individual effects:

$$s_{it} = \lambda_i + \varrho_1 s_{it-1} + \alpha\left[(s_{it-1} - s^*_{it-1}) - \tilde{\rho}(s_{k,t-1} - s^*_{k,t-1})\right] + \gamma_1 gap_{it-1} \times \Lambda_{1it} + \gamma_2 gap_{it-1} \times \Lambda_{2it} + \eta_1 \Omega_{1it} + \eta_2 \Omega_{2it} + \varepsilon_{it} \quad (7)$$

To take into account the inertia of the primary budget deficits, we add lag terms in the explanatory variables. It is noteworthy that the sustainable primary balance – the budgetary balance needed to avoid a non sustainable debt accumulation given by the equation (4) can be written as follows:

$$s^*_t = \frac{(R_t - \gamma_t)}{1+\gamma_t}\left[-\sum_{k=0}^{K-1} \Phi_{K-1} s_{t-k} + \Phi_K d_{t-K-1}\right], \ \Phi_k = \Phi_{k-1} R_1 R_k, \ \Phi_0 = 1, \ R_1 \ given \quad (8)$$

The term in brackets represents the "initial conditions" for a country, in the sense that the sustainable balance for a given year is the result of the primary balances and debts inherited from the past. A budgetary deficit one year, financed by borrowing, yields an increased in the debt ratio and this in turn feeds the fiscal deficits in the subsequent years (because debt service goes up). This makes the targeted fiscal balance time-varying and conditional on historical deficits.

In Equation (7) $\varepsilon_{it} \sim iid(0, \sigma_\varepsilon^2)$ and $\lambda_i = \lambda + \mu_i$. The indexes *i* and *k* indicate a country ($i \neq k$) and the index t refers to a given year. Since the size of the automatic stabilizers depends on the tax structure of the countries, the impact of the output gap on the primary balance is conditioned by the elasticities of the revenue and the expenditure to the GDP (variables described respectively by Λ_{1t} and Λ_{2t}). gap_t is the

output gap[7]. Ω_{1t} and Ω_{2t} correspond respectively to the product of the growth rate of the OECD area and the degree of openness, and, to the short term interest rate, s_t is the primary balance ratio to GDP. s_{t-1} is the lagged primary balance ratio to GDP. The coefficient ϱ_1 describes the inertia of fiscal policy and lies between 0 and 1. If it is close to 0 then the policy is discretionary and when it is close to 1 fiscal policy is very incremental. $(s_{t-1} - s^*_{t-1})$ measures the fiscal adjustment for the primary balance to correspond to the sustainable balance (lagged by one period)[8]. When $\tilde{\rho} = 0$, fiscal policy does not have a strategic nature in the sense that a government adjusts its own intertemporal budgetary constraint, without being concerned with adjustment efforts carried out by the other countries[9]. If $\tilde{\rho} = 1$, $[(s_{it-1} - s^*_{it-1}) - \tilde{\rho}(s_{kt-1} - s^*_{kt-1})]$ measures the difference between the adjustment effort of a country and the effort of the other countries. The "others" are captured here, either by a country of reference (Germany for example), or by the average behavior of the other countries in the sample.

On the basis of discussion in the preceding section, the expected signs of the coefficients are the following. $\varrho_1 \in]0,1[$ in regard to Equation (8)[10]. When $\tilde{\rho} = 0$, α is positive. Indeed, the condition 0≤ρ<1 in Equation (3) implies that a country carrying out an active fiscal policy in a given year ($\Delta(s_{it-1} - s^*_{it-1}) > 0$) must improve its budget balance the following year to meet its intertemporal budgetary constraint. When $\tilde{\rho}$=1, α is positive if fiscal policies are characterized by a strategic substitutability and negative if there is strategic complementarity. Indeed, let us suppose that the other countries implement a more active fiscal policy than the domestic country ($(s_{it-1} - s^*_{it-1}) < (s_{kt-1} - s^*_{kt-1})$) and the importance of adjustment efforts diverge in a given year, i.e. $\Delta[(s_{it-1} - s^*_{it-1}) - (s_{kt-1} - s^*_{kt-1})] < 0$. The home country can take advantage to improve its budget balance (if α is positive), or to adjust its fiscal stance in the same direction as the others by letting its primary balance worsen (if α is negative). Regarding the sign of the variables of control, γ_1 and γ_2 are respectively positive and negative (an increase in cyclical revenue improves the primary balance whereas an increase in unemployment expenditure deteriorates it). η_1 is positive (an improvement of the world economic situation raises the budget balance, and, this effect increases with the degree of openness of the economy). The expected sign of η_2 is also positive. A rise of interest rate also thwarts the automatic stabilizers and thus degrades the primary balance.

---

[7] To capture the influence of the cyclical expenditure, we retain the elasticity of unemployment to the GDP since the unemployment benefits increase during the slack periods and decrease when the economic situation improves. In addition, on the side of the expenditure, using the real GDP growth rate instead of the output gap, gives better results when one seeks to capture the impact of the cyclical expenditure related to unemployment on the primary balance.

[8] When it is negative, this variable is an indicator of "financial stress", because it reflects the fiscal adjustment effort a country must undertake to reach its sustainable balance. When it is positive, it rather describes the "fiscal space" of a country, i.e. the reduction of the primary balance it can undertake to attain the sustainable level.

[9] $\tilde{\rho}$ is not estimated, but supposed to be equal to 0 or 1 in two equations estimated separately according to whether fiscal policy has a strategic nature or not.

[10] For *K=2*, one defines a relation between $s_t$and s_{t-1} whose autoregressive coefficient is smaller than 1.

2.2.2. – The estimators used

Several empirical studies are available which propose estimates of the fiscal reaction functions for the countries of the euro area[11]. Their authors generally use two types of estimators, namely the method of the instrumental variables (IV) and the generalized moment method (GMM). However, when the number of the observations is weak, as it is the case here, these two methods can give biased estimates because of the big number of instruments when one uses for example the method of Arellano and Bover (1995). Alternative methodologies are therefore available to remote the bias in small samples (for example LSDV estimators). But, they do not take into account of a property generally affecting panel data when countries are members of an economic or commercial union, namely the existence of spatial correlation between the countries (correlation due to the presence of common factors or common components). Not taking into account this kind of correlation involves biases in the estimates[12].

As showed by empirical studies, the national fiscal policies of the European Union countries share common factors[13]. Those are related to the co-movements of the economic cycles, to monetary, financial and real symmetric shocks. Another explanation of the existence of common factors is the convergence of national fiscal policies for institutional reasons, namely the existence of common fiscal rules such as the Maastricht Treaty and the SGP[14].

In order to avoid biases related to the presence of common factors in the data of panel, various estimators were proposed in the literature. We use here the estimator of Westerlund (2007) which presents good properties for samples of small size. It has moreover the advantage of correcting possible endogeneity biases and autocorrelation/heteroscedasticity of the residuals through a non-parametric correction of the matrix of variance/covariance of the residuals which makes it comparable with a Fully-Modified estimator (FM). Lastly, this estimator takes account of the presence of unit roots in the variables[15].

The estimator of Westerlund (estimator BA presented in the appendix[16]) is initially applied to Equation (7) when the variables are expressed in variation with their individual average (Within transformation). Then, we deduce the individual fixed effects and the common intercept. This estimator is compared to the Fully-modified estimator (FM) and the estimator of quasi generalized least squares (GLS).

---

[11] See note 1 for some references.

[12] See for example Philips and Sul (2007) and the special issue of the Journal of Applied Econometrics (2007).

[13] See for example, Bénassy-Quéré and Cimadomo (2006), De Bandt and Montgelli (2000).

[14] We conclude in favor of the presence of common factors in our series by applying in a preliminary analysis the tests from Bai and Ng (2004). The results are available upon request tot the authors..

[15] “Biased adjusted”, i.e. corrected bias due to the presence of common factors.

[16] BA for “biased adjusted”.

2.2.3. – The results

Tables 1 through 3 present the results corresponding to the different estimators used[17]. For each estimator, we consider three equations. In Equation (1), we only take into account the fiscal adjustment by the domestic country ($\tilde{\rho}$=0). Equations (2) and (3) take into account the interdependence of fiscal policies in Europe. In Equation (2), the "other countries" are represented by Germany. In Equation (3), we consider the average of budget balances of the other countries in the sample.

Impact of the indicators of sustainability

In all equations, whatever the estimator used, we obtain a positive coefficient of α, which indicates that fiscal policies have been characterized by a strategic substitutability in the recent years. Governments have thus tended to adopt active fiscal policies when their partners were carrying out, on average, fiscal consolidation measures, and conversely. This result means that fiscal policies were not necessarily coordinated and have been driven by the interests of each government, in spite of the Maastricht criteria and the SGP. The estimates in Tables 1 and 2 show that the higher the fiscal adjustment efforts in the other countries, the lower the efforts made by a country to improve its fiscal position. For example, with the estimator BA, we obtain an estimated coefficient for α of 0,452 when the sustainability constraint is individual. This coefficient becomes equal to 0.4 when the fiscal adjustment is done according to the policy adopted by Germany and drops to 0.24 when one takes into account the average of the budgetary efforts of the other countries. The differences between the values of the estimated coefficient of α appear even more significant with the estimator FMOLS in Table 2 (the coefficient is reduced from 0.51 to 0.37, and then to 0,256). Note that, the coefficient $(\rho_1 + \alpha)$ measures the sluggishness of fiscal policy. In Table 1, its value is between 0.62 and 0.65, which means that the fiscal balance one year explains approximately two-thirds of the fiscal balance of the subsequent year.

Impact of the economic situation

An improvement of the economic situation (reflected here by a higher GDP growth rate or GDP increasing at a higher rate than its long-run trend) always reduces cyclical expenditure and therefore increases fiscal surplus (hence a negative coefficient γ_2). The impact on cyclical revenues is however ambiguous (γ_1 is either positive or negative). To understand why, it is necessary to differentiate between the effects due to the mechanical effects and those due to the discretionary policies (governments' reaction to a boom or a recession). To this end, we re-estimate the equations by supposing that the endogenous variable is the structural budget balance[18] (estimator BA). According to the estimates in Table 4, the discretionary

[17] Estimator GLS is biased in the presence of spatial correlation. We report the estimates however in order to compare it to the other estimators.

[18] Rigorously, we should retain the structural primary balance. However, the results are little changed since the debt burden is inelastic to the economic cycle. The coefficients γ_1 and γ_2 are hardly influenced by the choice of one or the other structural

policy seems to play at the opposite of the mechanical effects of the economic activity on the fiscal position and is pro-cyclical. In this case, γ_1 is negative. Consequently, during good times, governments tend to take advantage of the higher revenues generated by the favorable economic situation to increase their structural deficits, which triggers a degradation of the budget balance. Conversely, during periods of recession, they take advantage of the fall of tax revenue to reduce their expenditure, which allows an improvement of their budget balance. This result accords with several existing studies showing that, a general pro-cyclical bias in fiscal policy can uncover a strongly pro-cyclical bias during the expansion periods (the deficit is not reduced as much as it could be) and a slightly counter-cyclical bias during the recession phases (discretionary policy supports the operation of the automatic stabilizers leading to an additional widening of the deficit). In this case, this asymmetry involves a continuous degradation of structural deficits[19].

The comparison of the results in Tables 1 and 4 leads us to conclude that the positive effect of the economic situation on fiscal revenues comes from the mechanical effects of the economic activity on the budget positions, with the discretionary policy playing in average in the opposite direction. In some cases, the mechanical effects dominate (γ_1 carries a positive sign), but the effects of discretionary can also dominate (in this case γ_1 carries a negative sign).

Table 1 - Estimate of fiscal reaction functions, 1994-2008, Estimator BA[2]

	Equation 1	Equation 2	Equation 3
Primary balance (-1)	0.202* (20.55)	0.233* (18.80)	0.384* (26.42)
Output-gap*elasticity of Gvt revenues with respect to GDP	-0.103* (-4.19)	0.013 (0.63)	0.047 (1.54)
Growth rate of the OECD countries(-1)*degree of openness (-1)	0.233* (5.19)	0.71* (16.44)	1.32* (21.15)
Short-term interest rate (real)	0.333* (7.28)	0.228* (3.86)	0.05 (0.71)
GDP growth rate(-1)*elasticity of unemployment with respect to GDP(-1)	-0.05* (-6.68)	-0.03* (-4.52)	-0.05* (-4.978)
Budgetary gap in domestic country(-1)[1]	0.452* (16.78)	-	-
Budgetary gap in domestic country - budgetary gap in Germany(-1)		0.4* (14.97)	-
Budgetary gap in domestic country – budgetary gap in the other countries(-1)	-		0.24* (5.73)

Note: 1 the budgetary gap is measured by the difference between the observed primary balance and the sustainable balance.

2 Between brackets, we report the t-ratios. *, ** indicate that a coefficient is statistically significant at respectively 5%,10% level.

variable. We retain the structural budget balance which is available in the indicators of OECD, instead of applying a filter (which would be prone to criticisms) to the variable of primary balance. One will note however that the structural component comprises only part of the discretionary component of the budget policy, the governments being able to use the expenditure or the receipts to react to changes in the economic situation as we noted during the crisis of 2008/2009.

[19] Other studies have shown that fiscal policy in the European countries turn to be acyclical or counter-cyclical during bad times and pro-cyclical during good times (see Deroose et al. (2008), Ayuso-i-Casal et al. (2009).

Table 2 - Estimate of fiscal reaction functions, 1994-2008, Estimator FMOLS[2]

	Equation 1	Equation 2	Equation 3
Primary balance (-1)	0.133* (13.53)	0.151* (12.18)	0.275* (18.92)
Output-gap*elasticity of Gvt revenues with respect to GDP	-0.09* (-3.66)	0.139* (6.77)	0.156* (5.10)
Growth rate of the OECD countries(-1)*degree of openness (-1)	0.174* (3.87)	0.551* (12.76)	0.999* (16.01)
Short-term interest rate (real)	0.333* (7.28)	0.322* (5.46)	0.129** (1.84)
GDP growth rate(-1)*elasticity of unemployment with respect to GDP(-1)	-0.05* (-6.68)	-0.03* (-4.53)	-0.05* (-4.97)
Budgetary gap in domestic country(-1)[1]	0.51* (18.94)	-	-
Budgetary gap in domestic country - budgetary gap in Germany(-1)	-	0.37* (13.85)	-
Budgetary gap in domestic country – budgetary gap in the other countries(-1)	-		0.256* (6.11)

Note: see Table 1.

Table 3 - Estimate of the fiscal reaction functions, 1994-2008, Estimator GLS[2]

	Equation 1	Equation 2	Equation 3
Primary balance (-1)	0.23* (4.78)	0.31* (3.53)	0.35* (4.77)
Output-gap*elasticity of Gvt revenues with respect to GDP	-0.06 (-1.59)	0.26* (2.89)	0.18** (1.92)
Growth rate of the OECD countries(-1)*degree of openness (-1)	0.13 (1.64)	0.22** (1.91)	0.33* (3.79)
Short-term interest rate (real)	0.23* (2.87)	0.38* (3.17)	0.28* (2.74)
GDP growth rate(-1)*elasticity of unemployment with respect to GDP(-1)	-0.0005 (-0.93)	-0.02* (2.58)	-0.02* (-4.04)
Budgetary gap in domestic country(-1)[1]	0.50* (7.06)	-	-
Budgetary gap in domestic country - budgetary gap in Germany(-1)	-	0.27* (5.18)	-
Budgetary gap in domestic country – budgetary gap in the other countries(-1)	-	-	0.35* (6.49)

Note: see Table 1.

Table 4 - Estimate of the fiscal reaction functions (structural balance), 1994-2008, , Estimator FMOLS[2]

	Equation 1	Equation 2	Equation 3
Primary balance (-1)	0.74* (11.15)	0.70* (21.58)	0.73* (27.15)
Output-gap*elasticity of Gvt revenues with respect to GDP	-0.14* (-2.61)	-0.14* (-4.52)	-0.12* (-7.21)
Growth rate of the OECD countries(-1)*degree of openness (-1)	0.105* (2.11)	0.126 (3.16)	0.124* (3.70)
Short-term interest rate (real)	0.12** (1.81)	0.08* (1.96)	0.128* (11.99)
GDP growth rate(-1)*elasticity of unemployment with respect to GDP(-1)	-0.01** (-1.91)	-0.003 (-0.78)	-0.01* (-2.81)
Budgetary gap in domestic country(-1)[1]	0.03 (0.59)	-	-
Budgetary gap in domestic country - budgetary gap in Germany(-1)	-	0.125* (6.58)	-
Budgetary gap in domestic country – budgetary gap in the other countries(-1)	-	-	0.05* (2.46)

Note: see Table 1.

Impact of the world economic situation and of the interest rate

In all the regressions, the coefficient η_1 has the expected positive sign. In Equations (2) and (3), the impact a world growth rate (the world being here the OECD) on the primary balance is stronger in terms of magnitude than that of the other explanatory variables.

η_2 is positive. When the short-term real interest rate goes up (or drops) the budget balance improves (deteriorates). This can be interpreted as follows. When the ECB increases its short-term interest rate, it affects public finances in several manners. Firstly, we observe an impact on debt because the central bank's rate modifies the yield curve. This results in a degradation of public deficit. In reaction, to achieve budgetary sustainability, governments have to increase their primary balance. In such a situation fiscal policy is subordinated to monetary policy. Secondly, the impact of changes in the short-run interest rate operates through the effects on the economy *via* a decrease in investment and consumption. This indirect effect on aggregate demand implies in turn a decrease in production and reduces budget balances. To achieve sustainability, governments would also have to raise their primary surplus. This situation implies that governments share the same ECB's price stability objective and do not use fiscal policy to increase growth and unemployment.

3. - Evolution of public finances beyond the crisis

We combine the estimates of the fiscal reaction functions with the assumptions describing the scenarios of crisis exit to obtain projections the evolution of the deficit and debt ratios over the years from 2010 to 2015. We thus fix the future values of the exogenous variables in the equation of the fiscal reaction functions, to deduce the future trend of the primary balance (expressed as a percentage of the GDP), and those of the total balance (also expressed as a percentage of the GDP) and of the debt ratio. These simulations are projected for each country, the heterogeneity of the individual situations being unobserved and captured by the individual fixed effects.

3.1. - Assumptions on the scenarios of crisis exit

We consider two scenarios of way out of crisis, one optimistic characterized by a rapid recovery from 2010 with real GDP rates coming back to their pre-crisis level, the second less optimistic with a sluggish remaining growth.

In the optimistic scenario, the recovery is due, either to a strong growth of the world GDP (OECD area), or to a high domestic growth rate as was recorded in 2007. In the less optimistic scenario, we consider a recovery in "square root" (after the strong recession of 2009, the growth rate of the real GDP is null in 2010, then stagnates at half of the growth rate of the period 2002-2007 in the following years.

The interest rate is supposed to go back to its level observed during the period from 2002 to 2007, whatever the scenario of crisis exit. This assumption is motivated by the following argument. The European Central Bank (ECB) will adopt a strategy in two steps, by first absorbing the excess liquidities injected into the banking sector thanks to its quantitative easing measures, and then returning to a more traditional monetary policy based on the control of its key rates.

To simulate the evolution of the total budget balance, we suppose that the interest rates on public debt do not vary significantly compared to their level of the period before-crisis between 2002 and 2007. In the worst case, we make them increase by 0.5% in case of a weak recovery, compared to the average of the 2002-2007 period. This assumption means that long-term interest rates will remain on average on their current level in crisis exit, which is justified if the level of inflation remains low in the euro zone, or if the financial solidarity of the other countries of the Euro area towards those whose public finances are in the most degraded situation is effective (which would make it possible to avoid a rise of the risk premiums required by the financial markets to continue to hold national debts[20]).

[20] At the time we are writing this paper, the interest rates on public debt has risen for some countries, for instance in Greece where they stand at nearly 7.30% (almost 3% higher than the interest rates asked by the markets to hold the German debt. This situation is likely to be the case for other countries like Portugal, Italy and Spain which have received lower grades from the notation agencies. Accordingly, our assumption on the interest rates may appear too optimistic. The consequence of envisaging a huge increase in these rates would be a more severe deterioration of the public finance situation in comparison to the results shown by the current simulations.

The assumptions retained concerning the evolution of the output gap are in adequacy with those retained on real growth rates of the GDP. In the optimistic scenario, we retain an assumption of output gap such as the economy is in bottom of the economic cycle (output-Gap positive or null, or corresponding to the situation of 2007). In the less optimistic scenario, the assumption on output-Gap implies that the economy is at the peak of the economic cycle with an output gap equal to half of its value of the period 2002-2007.

3.2. - Public finances in the way out of crisis

We present the simulations obtained from Equations (2) and (3) (estimator BA). Indeed, it seems worthy to take into account of the strategic nature of the fiscal policies, rather than to consider that the countries do not take account of the behavior of the other countries. Moreover, in the presence of correlation between the countries of the panel due to common factors, the estimator BA is more robust than the FMOLS estimator. The results are shown in Tables (6a), (6b), (6c) and (7a), (7b).

Optimistic scenario of crisis exit: all the exogenous variables return to their pre-crisis level

The simulations in Table (6a) show that a return to a pre-crisis situation (scenario 1) would widen the gap between two groups of countries.

On the one side, some countries would manage to quickly reduce their deficits, the budget balances becoming even positive at the horizon 2015. This first group comprises, either small countries (Belgium, Ireland, Luxembourg) which have a high degree of openness of their economy and can thus benefit from the resumption of the growth on their partners, or countries characterized by a strong fiscal discipline during the phases of economic expansion (Austria, Finland and the Netherlands). In this first group of country, the debt ratio decreases significantly compared to the level of 2009. The comparison between the simulations in Table (6a) and those of Table (6c) lead to conclude that budget balances of this first group of country are very sensitive to the non-discretionary components of their public finances (the total balances are much higher than the structural balances).

On the other hand, the second group is composed of countries which would not manage to reduce to a significant degree their deficits (France, the United Kingdom, Greece, Italy and Portugal). Admittedly, these countries start in 2009 with budgetary positions more degraded than those of the first group, but that does not explain all (Spain and Ireland have an initial deficit higher than France, and yet, these two countries manage more quickly to reduce their deficits during the following years). The simulations in Table (6c) make it possible to provide some explanations. In the United Kingdom and in Greece, the evolutions observed are explained by structural deficits which drop slowly and thus attenuate the positive impact of the non-discretionary components of public finances on the total balance. In France, Italy and in Portugal, the discretionary policies seem to be very pro-cyclical during the phases of economic expansion. They affect not only the medium-term balances (the structural deficits decrease only slowly), but also their short-term position (which means that the cyclical component of the budget balances of these countries captures a part

of the discretionary policies). As one can note, by comparing Tables (6a) and (6c), the total budget balances of these countries are more degraded than their structural balances (see also Figures 1 and 2).

The independent factor opposing these two groups of country is thus not so much) the initial situation of their total balance, but the initial cyclical balance (which is calculated as the difference between the total balance and the structural balance and which comprises a very important discretionary component taking into account the stimulus packages adopted during the crisis). Moreover, the pro-cyclic character of the discretionary policy does not help a rapid reduction of the deficits.

The situation of Germany lies between these two opposed groups' but resembles that of France, Italy and Portugal. The situation of Spain is rather similar to that of the United Kingdom and Greece (the difference being that the reduction of the deficits is more rapid).

The simulations in Table (6b) show that one needs a very strong sensitivity of the budget balances to the economic situation (either domestic, or international) so that the positive effect of the mechanical effects of a stronger growth compensate the negative influence of the discretionary policies and makes it possible for the budget balances to improve significantly.

The debt dynamics is the result of the accumulated deficits. The debt ratio starts to drop only when the improvement of budget balances is significant. We observe situations where the debt exhibits a snowball effect, while at the same time the deficits starts to decline (it could be the case for example of countries in the second group).

Less optimistic scenario of crisis exit: all the exogenous variables return to half their pre-crisis level in 2010 and then remain on this level until 2015.

In the less optimistic scenario, domestic and world growth rates remain only at half their pre-crisis level (average of the period 2002-2007). In the countries where the output-gap was negative during this period, we assume that it will not "close" entirely compared to the situation observed in 2009: we suppose it to be equal to its average value of the period 2002 to 2007. In the countries where the output-gap was positive, we suppose that in 2010, it is equal to 50% of its mean value of the period 2002 to 2007. The assumptions on the other exogenous variables are the same ones as in scenario 1.

Apart from the small countries (Belgium, Finland, Luxembourg), budget balances would remain very degraded in all the other countries by 2015, particularly in France, in the United Kingdom, in Greece, in Italy and in Portugal (see Table 7a and Figures 1,2). The consequence would be then a snowball effect, the debt dynamics producing a continuous increase in the debt ratios. In spite of this degradation observed in most countries, it is necessary to distinguish two types of countries: those whose degradation can be attributed to the economic situation only (the discretionary policy of these countries is strongly pro-cyclical when the activity is weak and results in a reduction of the structural deficits) and those whose discretionary policy does not contribute to a drop in the structural deficits (the policy being then slightly pro-cyclical, even counter-cyclical if we consider that the cyclical component situation of the total balance capture a part of the

reaction of governments in the case of a weak recovery). Table (7c) shows that, in spite of the context of weak recovery, the structural deficits would decrease significantly in Austria, in Belgium, in Germany, in Spain, in Ireland and in the Netherlands (they would turn positive in Finland and in Luxembourg). On the other hand, the structural deficits would decrease little in France, in the United Kingdom and in Portugal, and, would increase even in Greece and Italy.

The deficits observed would be less important in a context where budget balances would be strongly sensitive to the economic situation, as shown by the simulations in Table (7b).

4. - Conclusion

Several lessons can be drawn from this work. First of all, it highlights the critical situation of public finances of some countries, whatever the scenario of way out of crisis (fast recovery or weak growth) if governments do not modify the budgetary behavior they followed in the past. If the recovery were to be weak, then budget balances would be strongly degraded under the combined effect of the economic situation and a widening of the structural deficits, the discretionary policies being slightly counter-cyclical when the activity is weak. France would belong to this group of countries concerned with this situation, besides the United Kingdom, Greece, Italy and Portugal. Even in the event of strong recovery, one would need a strong action of the mechanical effects of a positive growth on the budget balances to compensate for pro-cyclical discretionary policies in phase of economic expansions which tend to degrade budget balances. The second conclusion to be drawn is a divergence of the budget situations of France and Germany in crisis exit. This divergence is observed in particular in the evolutions of the structural balances. In Germany, this balance improves, whatever the scenario of way out of crisis (it could even become positive in the event of strong recovery). In France, the deficits would fall slowly and would remain above 3% of GDP at least until 2015. The third conclusion is the emergence of two groups of countries as regards the budgetary behaviors, which we will call “virtuous” and “lax”. The first group is composed of countries where budget balances improve in the event of fast recovery and where the structural deficits are reduced in the event of weak recovery. Germany, Austria, Belgium, Luxembourg, the Netherlands and Ireland belong to this group. The second group is composed of the other countries. The discretionary policy is less pro-cyclical there and the improvement of their budget balances remains strongly dependant on a strong recovery.

These results raise the question of the effectiveness of the budgetary rules in Europe. The Treaty introduced the thresholds of 3% for the public deficit and 60% for the public debt for the entry into the Monetary Union. The SGP set up a procedure of monitoring with respect to the countries already member of the euro area to make lasting compliance with these thresholds. However, the multiplication of the procedures for excessive deficit since the beginning of the Monetary Union demonstrates that the Member states continue to privilege their individual strategy to the detriment of the common fiscal rules. The 2005 reform of the SGP aimed at introducing more flexibility by taking better into account the individual situations of each country but it does not seem to have been able to deal with the central problem of the pro-

cyclicality of the national fiscal policies in the phases of economic expansion in a large number of countries which let those enter the crisis with degraded budgetary positions already.

If each country keeps an interest not to coordinate with its partners in the short run, this individual behavior involves medium-term important risks as a whole. Indeed, an increasing divergence of the budget positions as our scenarios put in evidence creates risks for the cohesion of the zone. How can one envisage that the Member states accept in the future to give up their past budgetary behaviors for a more coordinated strategy with the objective of regaining balanced budget positions?

There exists a first possible answer of an institutional nature: improve the effectiveness of the common fiscal rules, in particular by reinforcing the monitoring of the budgetary positions of the countries when they are not (still) in excessive deficit so that they do not develop a pro-cyclical bias at that period. However, this solution seems rather hypothetical at least in the short run: not only an additional reform of the PSC is not on the agenda, but also it is not warranted that new fiscal rules can modify the budgetary reaction of the governments in the absence of credible sanctions.

The second possible answer is the effect of discipline exerted by the financial markets. Since the entry in the monetary Union until 2008, Member states enjoyed very attractive conditions to finance their national debt with risk premiums maintaining at very low levels. The membership of the euro zone was regarded by the investors as a security guarantee vis-à-vis a possible default even for countries with degraded public finances. The current crisis modified this perception with a significant in the risk premiums allowances for the most indebted countries (Greece, Portugal). In the absence of a bail-out which remains excluded by the Treaty, this new attention paid by the investors on sovereign risk in the European Union should put a very strong pressure on the least virtuous member countries so that they modify their past budgetary behaviors.

There are several extensions to this paper. Firstly, one could assume that the gain of non-adjustment in terms of production (which is captured here by ω_0) varies with the potential growth. Therefore, we could imagine that the speed of consolidation could depend upon past potential growths. An interesting question raised by the recent crisis was whether the depression involved a deterioration of production capacities, human capital and of the other variables playing an influence on potential output. In case of a lower potential growth, governments may search to activate policies aiming at upgrading the medium term capacity level of the economies (which would imply for instance a higher financing of supply policies and thus a degradation of public finances).

References

Afonso, A., 2006, “Expansionary fiscal consolidations in European: new evidence”, Working Paper Series 675, European Central Bank.

Arellano, M, et O. Bover, 1995, “Another look at the instrumental variable estimation of error-component models”, *Journal of Econometrics* 68, 29-51.

Ayuso-i-Casal, J., Deroose, S., Flores, E. and L. Moulin, 2009, *Policy instruments for sound fiscal policies*, Palgrave.

Bai, J. et S. Ng, 2004, "A PANIC attack on unit roots and cointegration", *Econometrica* 72(4), 1127-1177.

Bénassy-Quéré A. et J. Cimadomo, 2006, "Changing patterns of domestic and cross-border fiscal policy multipliers in Europe and the US", CEPII Working Paper n°2006-24.

Candelon, B., Muysken, J. et R. Vermeulen, 2009, "Fiscal policy and monetary integration", *Oxford Economic Papers* 45, 1-27.

Coenen, G., Mohr, M. et R. Straub, 2008, "Fiscal consolidation in the euro area: long-run benefits and short-run", *Economic Modelling* 25(3), 912-932.

De Bandt, O. et F.P. Mongelli, 2000, "Convergence of fiscal policies in the Euro area", in Buti, Von Hagen, J. et C. Martinez-Mongay (eds), *The behavior of fiscal authorities*, Palgrave, Chapter 4, 53-75. .

Deroose, S. Larch, M. and A. Schaechter, 2008, "Constricted, lame and pro-cyclical? Fiscal policy in the euro area revisited", Economic Paper 353, European Commission, Economic and Financial Affairs.

Fatas, A. et I. Mihov, 2003, "On constraining fiscal policy discretion in EMU", *Oxford Review of Economic Policy* 19, 112-131.

Gali, J. et R. Perotti, 2003, "Fiscal policy and monetary integration in European", *Economic Policy* 18, 534-572.

Guichard, S. , Kennedy, M., Wurzel, E. et C. André, 2007, "What promotes fiscal consolidation : OECD country experiences", OECD Economics Department Working Paper 553, OECD, Paris.

Journal of Applied Econometrics, 2007, "Heterogeneity and cross-section dependence in panel data models: theory and application", Special Issue 22(2).

Phillips, P.C. et D. Sul, 2007, "Bias in dynamic panel estimation with fixed effects, incidental trends and cross-section dependence", *Journal of Econometrics* 137(1), 162-188.

Von Hagen, J., 2003, "Fiscal discipline and growth in Euroland: experiences with the stability and growth pact", Working Paper n°1306, ZEI, Bonn.

Westerlund, J., 2007, "Estimating cointegration panels with common factors and the forward rate unbiasedness hypothesis", *Journal of Financial Econometrics* 5(2), 491-522.

Wyplosz, C., 2006, "European monetary union: the dark side of a major success", *Economic Policy* 21, 208-261.

Table 6a. - Ratios of the deficits and the national debt (% GDP) in the optimistic scenario Simulation of equation 2 (estimator BA)

Total balance (% GDP)	Aut	bel	deu	esp	fin	fra	gbr	grc	irl	ita	lux	nld	prt
2009	-4,3773	-6,0589	-3,6979	-11,2601	-2,9955	-8,8658	-13,2152	-12,3084	-12,1084	-5,8045	-1,9779	-5,3503	-8,3006
2010	-7,5703	-5,8262	-4,5231	-9,8197	-2,3044	-8,6779	-11,9606	-11,3123	-12,5095	-6,7786	-2,2616	-4,6015	-9,2449
2011	-5,7941	-1,7785	-4,8056	-8,4897	-0,6273	-8,3377	-11,1943	-11,7566	-7,9350	-8,5451	6,5713	-2,1638	-9,3041
2012	-2,6884	3,4457	-3,0975	-5,4036	2,2239	-6,4186	-8,2621	-8,5059	-0,9293	-6,0795	13,0716	1,4044	-7,4439
2013	-0,6309	7,0317	-2,0153	-3,3266	4,1482	-5,2035	-6,3709	-6,3122	3,7591	-4,4745	17,2628	3,8222	-6,2834
2014	0,7707	9,5899	-1,3134	-1,9301	5,4811	-4,4308	-5,1397	-4,8263	6,8443	-3,4105	19,8580	5,5193	-5,5627
2015	1,7623	11,5042	-0,8420	-0,9923	6,4364	-3,9358	-4,3273	-3,8147	8,8258	-2,6785	21,3615	6,7658	-5,1184
National debt (% GDP)	Aut	bel	deu	esp	fin	fra	gbr	grc	irl	ita	lux	nld	prt
2009	69,1000	97,2000	73,1000	54,3000	41,3000	76,1000	68,6000	112,6000	65,8000	114,6000	15,0000	59,8000	77,4000
2010	73,9337	98,9398	75,9688	60,3301	41,8948	81,8462	77,0484	115,8828	73,1580	117,3830	16,1088	62,0897	83,6985
2011	76,7998	96,5587	79,0553	64,6094	40,7879	87,0308	84,2978	119,3758	75,3655	121,8355	8,2995	61,8532	89,8164
2012	76,4467	89,0536	80,3638	65,5038	36,8756	90,0967	88,2440	119,3691	70,3945	123,6672	0,0000	58,0575	93,8412
2013	74,0500	78,2780	80,5604	64,2589	31,2009	91,8293	90,0969	117,1690	61,1243	123,8300	0,0000	51,9909	96,5524
2014	70,3467	65,3972	80,0507	61,7043	24,4283	92,7224	90,6238	113,6400	49,4946	122,9231	0,0000	44,4617	98,4396
2015	65,7984	51,1437	79,0811	58,3902	16,9807	93,0862	90,3112	109,3510	36,7939	121,3158	0,0000	35,9770	99,8106
	Aut	bel	deu	esp	fin	fra	gbr	grc	irl	ita	lux	nld	prt
Deficit in 2009	-4,3773	-6,0589	-3,6979	-11,2601	-2,9955	-8,8658	-13,2152	-12,3084	-12,1084	-5,8045	-1,9779	-5,3503	-8,3006
bar of the -3% (date)	2012	2011	2013	2014	2009	>2015	>2015	>2015	2012	2015	2009	2011	>2015

Table 6b. - Ratios of the deficits and the national debt (% GDP) in the optimistic scenario Simulation of equation 3 (estimator BA)

Total balance (% GDP)		Aut	bel	deu	esp	fin	fra	gbr	grc	irl	ita	lux	nld	prt
	2009	-4,3773	-6,0589	-3,6979	-11,2601	-2,9955	-8,8658	-13,2152	-12,3084	-12,1084	-5,8045	-1,9779	-5,3503	-8,3006
	2010	-6,4803	-4,9462	-3,7501	-8,6757	-0,9874	-7,5039	-10,6006	-9,9023	-10,9395	-5,8286	-1,1016	-3,4915	-8,1749
	2011	-3,9648	-0,3010	-3,5080	-6,5768	1,5730	-6,3702	-8,9052	-9,3915	-5,3184	-6,9531	8,4964	-0,3029	-7,5114
	2012	-0,3390	5,3433	-1,4243	-2,9747	5,0309	-3,8965	-5,3173	-5,4907	2,3724	-4,0370	15,4872	3,7914	-5,1465
	2013	2,1018	9,2382	-0,0552	-0,5521	7,3853	-2,2761	-2,9438	-2,8513	7,4972	-2,1004	19,9792	6,5944	-3,6176
	2014	3,8016	12,0358	0,8820	1,0753	9,0354	-1,1915	-1,3405	-1,0570	10,8491	-0,7783	22,7457	8,5891	-2,6138
	2015	5,0387	14,1461	1,5602	2,1666	10,2358	-0,4430	-0,2259	0,1704	12,9825	0,1668	24,3336	10,0786	-1,9396
National debt (% GDP)		aut	bel	deu	esp	fin	fra	gbr	grc	irl	ita	lux	nld	prt
	2009	69,1000	97,2000	73,1000	54,3000	41,3000	76,1000	68,6000	112,6000	65,8000	114,6000	15,0000	59,8000	77,4000
	2010	72,8437	98,0598	75,1958	59,1861	40,5778	80,6722	75,6884	114,4728	71,5880	116,4330	14,9488	60,9797	82,6285
	2011	73,9236	94,2383	77,0021	61,6323	37,3251	83,9346	80,7183	115,7013	71,3018	119,3266	5,3035	58,9252	86,9945
	2012	71,3350	84,9332	76,6839	60,3057	30,7491	84,5976	81,9029	112,9413	63,3472	119,2032	0,0000	52,8558	88,8293
	2013	66,4081	72,1243	75,0038	56,6490	22,0910	83,6147	80,6533	107,7387	50,8906	117,1476	0,0000	44,2181	89,0654
	2014	59,9765	57,0563	72,4244	51,6202	12,1411	81,5850	77,8645	101,1129	36,0573	113,8415	0,0000	33,9195	88,2887
	2015	52,5625	40,5115	69,2252	45,8510	1,4027	78,8850	74,1039	93,7321	20,2519	109,7055	0,0000	22,5297	86,8674
		aut	bel	deu	esp	fin	fra	gbr	grc	irl	ita	lux	nld	prt
Deficit in 2009		-4,3773	-6,0589	-3,6979	-11,2601	-2,9955	-8,8658	-13,2152	-12,3084	-12,1084	-5,8045	-1,9779	-5,3503	-8,3006
bar of the -3% (date)		2012	2011	2012	2012	2009	2013	2013	2013	2012	2013	2009	2011	2014

Table 6c. - Ratios of balances structural balances (% GDP) in the optimistic scenario Simulation of equation 2 (estimator BA)

Structural balance (% GDP)	aut	bel	deu	esp	fin	fra	gbr	grc	irl	ita	lux	nld	prt
2009	-3,1500	-1,6000	-1,5600	-5,9200	1,2400	-5,0400	-10,4620	-4,3060	-7,2900	-2,1800	0,0280	-3,4300	-3,8200
2010	-2,9484	-1,2930	-1,0503	-5,0120	2,4537	-4,4708	-8,8745	-4,7131	-5,9722	-2,0649	1,4871	-2,6321	-3,5111
2011	-2,6416	-1,1997	-1,2432	-4,7620	2,7581	-4,5435	-8,5831	-5,7188	-5,7951	-3,0278	3,0586	-2,2211	-3,7648
2012	-1,7709	-0,3408	-0,7941	-3,8590	3,5495	-4,0499	-7,5481	-5,4307	-4,4145	-2,6717	4,5474	-1,2725	-3,3516
2013	-1,0547	0,3670	-0,4322	-3,1026	4,2011	-3,6453	-6,6931	-5,1841	-3,2603	-2,3791	5,7523	-0,4914	-3,0129
2014	-0,4655	0,9506	-0,1413	-2,4709	4,7370	-3,3139	-5,9869	-4,9729	-2,3013	-2,1393	6,7150	0,1521	-2,7354
2015	0,0196	1,4320	0,0920	-1,9452	5,1771	-3,0426	-5,4033	-4,7921	-1,5100	-1,9420	7,4719	0,6825	-2,5084

Balance of the economic situation initial in % of the GDP (in 2009)

aut	bel	deu	esp	fin	fra	gbr	grc	irl	ita	lux	nld	prt
-1,2273	-4,4589	-2,1379	-5,3401	-4,2355	-3,8258	-2,7532	-8,0024	-4,8184	-3,6245	-2,0059	-1,9203	-4,4806

Table 7a. - Ratios of the deficits and the national debt (% GDP) in the less optimistic scenario - Simulation of equation 2 (estimator BA)

Total balance (% GDP)		aut	bel	deu	esp	fin	fra	gbr	grc	irl	ita	lux	nld	prt
	2009	-4,3773	-6,0589	-3,6979	-11,2601	-2,9955	-8,8658	-13,2152	-12,3084	-12,1084	-5,8045	-1,9779	-5,3503	-8,3006
	2010	-7,6335	-5,9220	-4,5614	-9,8965	-2,3373	-8,7419	-12,0510	-11,4970	-12,5997	-6,8657	-2,2776	-4,6528	-9,3085
	2011	-7,6208	-4,8968	-6,1080	-9,7274	-2,1057	-9,4653	-12,4841	-13,2054	-11,2256	-9,7302	1,8663	-4,5715	-10,6145
	2012	-6,3116	-2,5771	-5,6122	-8,2516	-0,5595	-8,9174	-11,1789	-12,4776	-7,4157	-8,8520	5,0439	-3,0809	-10,2523
	2013	-5,5836	-1,0719	-5,4343	-7,3708	0,4545	-8,7406	-10,5732	-12,1481	-4,9451	-8,4443	7,1539	-2,1552	-10,2272
	2014	-5,2123	-0,0577	-5,4555	-6,8644	1,1428	-8,7976	-10,4028	-12,0694	-3,3312	-8,3316	8,5712	-1,5728	-10,4169
	2015	-5,0617	0,6625	-5,6050	-6,5937	1,6329	-9,0049	-10,5071	-12,1494	-2,2655	-8,4027	9,5387	-1,1987	-10,7471
National debt (% GDP)		aut	bel	deu	esp	fin	fra	gbr	grc	irl	ita	lux	nld	prt
	2009	69,1	97,2000	73,1000	54,3000	41,3000	76,1000	68,6000	112,6000	65,8000	114,6000	15,0000	59,8000	77,4000
	2010	75,3376	101,0349	76,8248	62,2331	42,7644	83,3473	78,8488	119,9338	75,7191	119,4325	16,6782	63,2741	85,2067
	2011	81,4364	103,7623	82,0535	69,7104	43,9662	91,1756	89,2613	128,7048	83,8599	127,0437	14,1454	66,5984	94,1680
	2012	86,1028	104,1114	86,7267	75,4414	43,5965	98,3022	98,0951	136,4237	87,8592	133,6417	8,5361	68,3666	102,5931
	2013	89,9469	102,9479	91,1685	80,0845	42,2206	105,1122	106,0912	143,5278	89,2249	139,7150	1,0411	69,1742	110,8297
	2014	93,3421	100,7951	95,5806	84,0534	40,1855	111,8453	113,7068	150,2906	88,9211	145,5677	0,0000	69,3836	119,0962
	2015	96,5182	97,9684	100,0917	87,6080	37,7033	118,6535	121,2266	156,8833	87,5640	151,3878	0,0000	69,2147	127,5325
		aut	bel	deu	esp	fin	fra	gbr	grc	irl	ita	lux	nld	prt
Deficit in 2009		-4,3773	-6,0589	-3,6979	-11,2601	-2,9955	-8,8658	-13,2152	-12,3084	-12,1084	-5,8045	-1,9779	-5,3503	-8,3006
bar of the -3% (date)		>2015	2012	>2015	>2015	2009	>2015	>2015	>2015	2015	>2015	2009	2013	>2015

Table 7b. - Ratios of the deficits and the national debt (% GDP) in the less optimistic scenario- Simulation of Equation 3 (estimator BA)

Total balance (% GDP)	aut	bel	deu	esp	fin	fra	gbr	grc	irl	ita	lux	nld	prt
2009	-4,3773	-6,0589	-3,6979	-11,2601	-2,9955	-8,8658	-13,2152	-12,3084	-12,1084	-5,8045	-1,9779	-5,3503	-8,3006
2010	-7,6335	-5,9220	-4,5614	-9,8965	-2,3373	-8,7419	-12,0510	-11,4970	-12,5997	-6,8657	-2,2776	-4,6528	-9,3085
2011	-7,6208	-4,8968	-6,1080	-9,7274	-2,1057	-9,4653	-12,4841	-13,2054	-11,2256	-9,7302	1,8663	-4,5715	-10,6145
2012	-6,3116	-2,5771	-5,6122	-8,2516	-0,5595	-8,9174	-11,1789	-12,4776	-7,4157	-8,8520	5,0439	-3,0809	-10,2523
2013	-5,5836	-1,0719	-5,4343	-7,3708	0,4545	-8,7406	-10,5732	-12,1481	-4,9451	-8,4443	7,1539	-2,1552	-10,2272
2014	-5,2123	-0,0577	-5,4555	-6,8644	1,1428	-8,7976	-10,4028	-12,0694	-3,3312	-8,3316	8,5712	-1,5728	-10,4169
2015	-5,0617	0,6625	-5,6050	-6,5937	1,6329	-9,0049	-10,5071	-12,1494	-2,2655	-8,4027	9,5387	-1,1987	-10,7471
National debt (% GDP)	aut	bel	deu	esp	fin	fra	gbr	grc	irl	ita	lux	nld	prt
2009	69,1	97,2000	73,1000	54,3000	41,3000	76,1000	68,6000	112,6000	65,8000	114,6000	15,0000	59,8000	77,4000
2010	75,3376	101,0349	76,8248	62,2331	42,7644	83,3473	78,8488	119,9338	75,7191	119,4325	16,6782	63,2741	85,2067
2011	81,4364	103,7623	82,0535	69,7104	43,9662	91,1756	89,2613	128,7048	83,8599	127,0437	14,1454	66,5984	94,1680
2012	86,1028	104,1114	86,7267	75,4414	43,5965	98,3022	98,0951	136,4237	87,8592	133,6417	8,5361	68,3666	102,5931
2013	89,9469	102,9479	91,1685	80,0845	42,2206	105,1122	106,0912	143,5278	89,2249	139,7150	1,0411	69,1742	110,8297
2014	93,3421	100,7951	95,5806	84,0534	40,1855	111,8453	113,7068	150,2906	88,9211	145,5677	-7,5717	69,3836	119,0962
2015	96,5182	97,9684	100,0917	87,6080	37,7033	118,6535	121,2266	156,8833	87,5640	151,3878	-16,8078	69,2147	127,5325
	aut	bel	deu	esp	fin	fra	gbr	grc	irl	ita	lux	nld	prt
Deficit in 2009	-4,3773	-6,0589	-3,6979	-11,2601	-2,9955	-8,8658	-13,2152	-12,3084	-12,1084	-5,8045	-1,9779	-5,3503	-8,3006
bar of the -3% (date)	>2015	2012	>2015	>2015	2009	>2015	>2015	>2015	2015	>2015	2009	2013	>2015

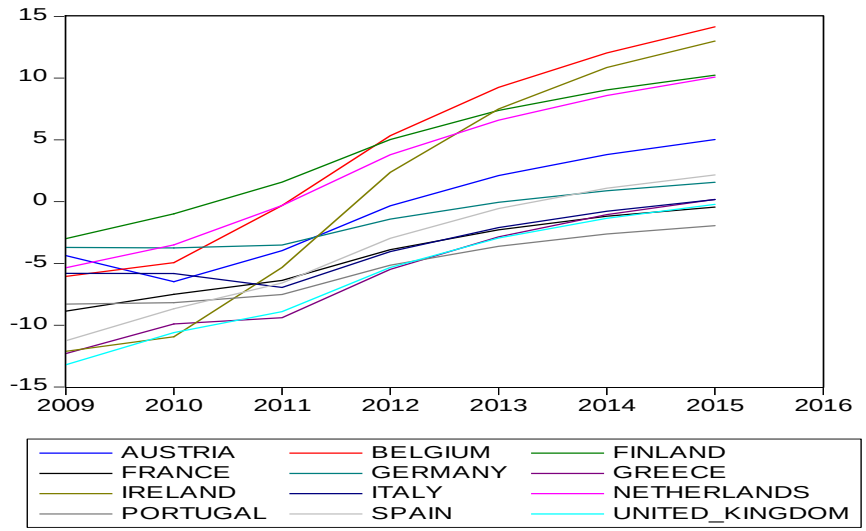
Table 7c. - Ratios of the structural deficits in the less optimistic scenario - Simulation of equation 2 (estimator BA)

Structural balance (% GDP)	aut	bel	deu	esp	fin	fra	gbr	grc	irl	ita	lux	nld	prt
2009	-3,1500	-1,6000	-1,5600	-5,9200	1,2400	-5,0400	-10,4620	-4,3060	-7,2900	-2,1800	0,0280	-3,4300	-3,8200
2010	-2,9484	-1,2930	-1,0503	-5,0120	2,4537	-4,4708	-8,8745	-4,7131	-5,9722	-2,0649	1,4871	-2,6321	-3,5111
2011	-2,8928	-1,6558	-1,4351	-4,9535	2,5447	-4,6947	-8,7243	-5,9035	-6,1746	-3,1900	2,3754	-2,5695	-3,9360
2012	-2,4044	-1,4284	-1,2495	-4,4450	3,0674	-4,5180	-8,0448	-6,2591	-5,4056	-3,2185	3,2453	-2,0544	-3,8534
2013	-2,0171	-1,2542	-1,1143	-4,0283	3,5027	-4,3923	-7,5180	-6,5604	-4,7670	-3,2608	3,9591	-1,6422	-3,8029

2014	-1,7120	-1,1236	-1,0205	-3,6871	3,8670	-4,3086	-7,1160	-6,8172	-4,2366	-3,3157	4,5428	-1,3136	-3,7789
2015	-1,4739	-1,0286	-0,9608	-3,4079	4,1739	-4,2596	-6,8159	-7,0378	-3,7960	-3,3812	5,0181	-1,0531	-3,7771

Figure 1a.- Projected deficits (% GDP) – Optimistic scenario

Figure 1b.- Projected deficits (%GDP) – Pessimistic scenario



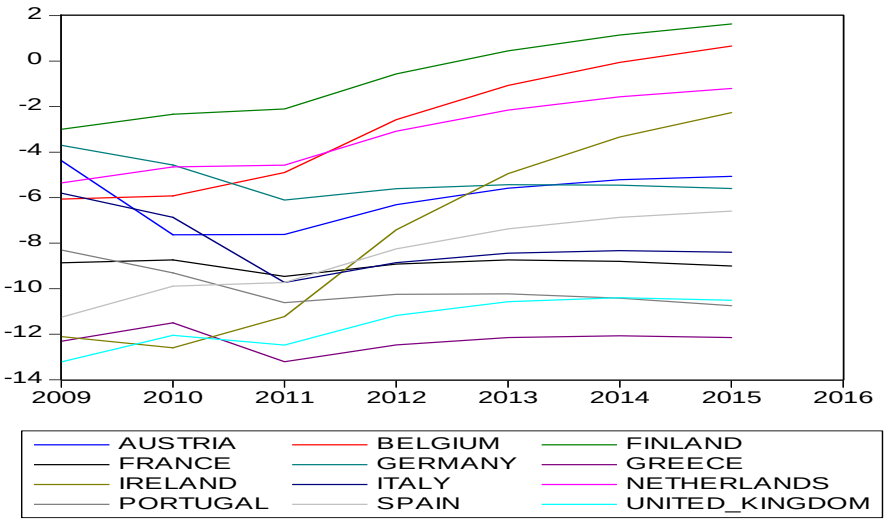
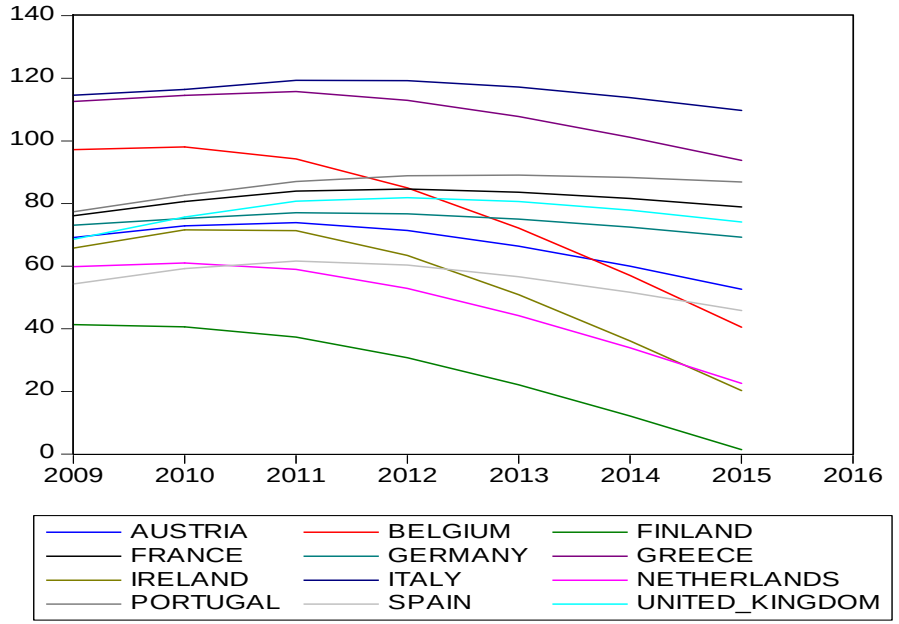
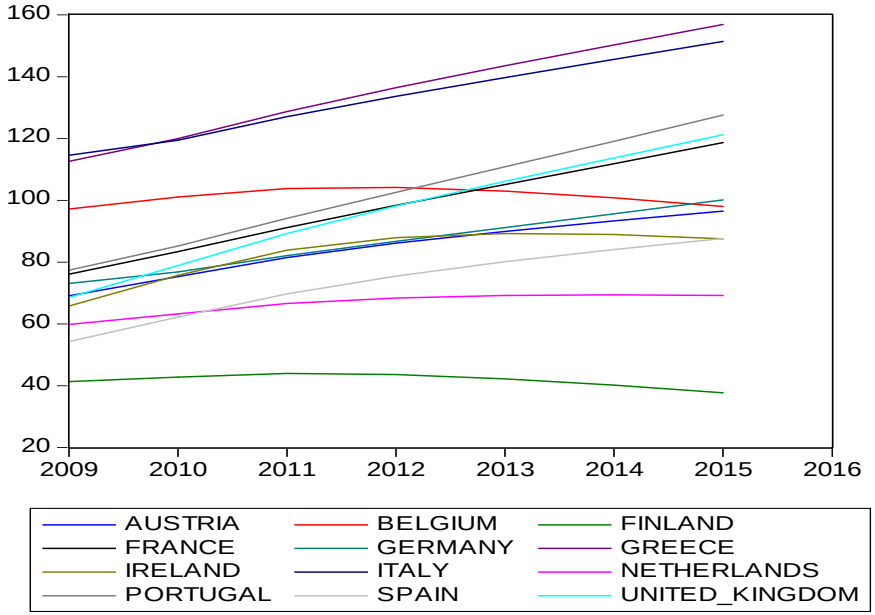


Figure 2a.- Projeted debt (% GDP) – Optimistic scenario

Figure 2b.- Projected debt (%GDP) – Pessimistic scenario


140
120
100
80
60
40
20
0
2009
2010
2011
2012
2013
2014
2015
2016
AUSTRIA
BELGIUM
FINLAND
FRANCE
GERMANY
GREECE
IRELAND
ITALY
NETHERLANDS
PORTUGAL
SPAIN
UNITED_KINGDOM


160
140
120
100
80
60
40
20
2009
2010
2011
2012
2013
2014
2015
2016
AUSTRIA
BELGIUM
FINLAND
FRANCE
GERMANY
GREECE
IRELAND
ITALY
NETHERLANDS
PORTUGAL
SPAIN
UNITED_KINGDOM

Appendix. – Data description and definition of the variables

The data are taken from the annual database of OECD and cover thirteen European Union countries: Austria, Belgium, Germany, Spain, Finland, France, Greece, Ireland, Italy, Luxembourg, Netherlands and Portugal. The time period covers the years from 1994 to 2008. Our pooled panel thus comprises 195 observations. The simulations are done over the years from 2010 to 2015.

Definition of the variables used and codes in the OECD database

1.- Primary balance as ratio of GDP

- NLG : financial balance of public administration
- GDP : nominal GDP

We compute the ratio of both variables

2. Output-gap

- GAP : output-gap of the economy

3.- Elasticity of government revenues with respect to GDP

The elasticity is computed using the GDP and YRGT (total revenues of public administrations)

4.- Growth rate of OECD countries

We compute the growth rate of OECD GDP

5.- Degree of openness

We compute the sum of MGS (imports of goods and services in local currency)+XGS (exports of goods and services in local currency) as share of GDP

6.- Short term-interest rate (real)

We compute the difference between IRS (nominal short-term interest rate) and the growth rate ofr CPI (consumer price index)

7.- Elasticity of unemployment rate to GDP

Computed using UNR (unemployment rate and GDP)

8.- Sustainable primary balance an budgetary gap

Defined as the primary balance implying a stability of debt ratio:

$$s_t^* = \frac{(R_t - \gamma_t)}{1 + \gamma_t} d_{t-1}$$

R is defined as GNINTP (interest rate expenses (net) paid by public administration) over GGFL(-1) public debt. γ is the growth rate of GDP and *d* is GGFLQ(public debt as share of GDP).

We then define the domestic budgetary gap as the difference $(s_t - s_t^*)$. We also define the budgetary gap of the other countries by considering the average of $(s_t - s_t^*)$ across countries except the domestic country.

Documents de Travail

280. D. Durant et L. Frey, “Une Première comparaison des droits à pension des ménages français et américains,” Avril 2010

281. G. Bertola, A. Dabusinskas, M. Hoeberichts, M. Izquierdo, C. Kwapil, J. Montornès and D. Radowski, “Price, Wage and Employment Response to Shocks: Evidence from the WDN Survey,” May 2010

282. J. Montornès and J-B. Sauner-Leroy, “Wage-setting Behavior in France: Additional Evidence from an Ad-hoc Survey,” May 2010

283. R. Bourlès, G. Cette, J. Lopez, J. Mairesse and G. Nicoletti, “Do product market regulations in upstream sectors curb productivity growth? Panel data evidence for OECD countries,” June 2010

284. Ph. Askenazy, Th. Breda and D. Irac, “Innovation and Advertising: Theory and Evidence,” May 2010

285. M. Lemoine and C. Mougin, “The Growth-Volatility Relationship: New Evidence Based on Stochastic Volatility in Mean Models,” July 2010

286. C. Bouthevillain and G. Dufrénot, “Are the effects of fiscal changes different in times of crisis and non-crisis? The French Case,” July 2010

287. S. Avouyi-Dovi, D. Fougère and E. Gautier, “Wage rigidity, collective bargaining and the minimum wage: evidence from french agreement data,” July 2010

288. P. Askenazy, C. Célérier et D. Irac, “Vente à distance, internet et dynamiques des prix,” juillet 2010

289. G. Dufrénot, P. Frouté and C. Schalck, “The French Regions’ Borrowing Behaviours,” july 2010

290. C. Bordes and L. Clerc, “The ECB art of central banking and the separation principle,” August 2010

291. R. Jimborean and J-S. Mésonnier, “Banks' financial conditions and the transmission of monetary policy: a FAVAR approach,” September 2010

292. G. Dufrénot and L. Paul, “Fiscal development in the euro aera beyond the crisis: some lessons drawn from fiscal reaction functions, october 2010

Pour accéder à la liste complète des Documents de Travail publiés par la Banque de France veuillez consulter le site :
http://www.banque-france.fr/fr/publications/documents_de_travail/documents_de_travail_10.htm

For a complete list of Working Papers published by the Banque de France, please visit the website:
http://www.banque-france.fr/fr/publications/documents_de_travail/documents_de_travail_10.htm

Pour tous commentaires ou demandes sur les Documents de Travail, contacter la bibliothèque de la Direction Générale des Études et des Relations Internationales à l'adresse suivante :

For any comment or enquiries on the Working Papers, contact the library of the Directorate General Economics and International Relations at the following address :

BANQUE DE FRANCE
49- 1404 Labolog
75049 Paris Cedex 01
tél : 0033 (0)1 42 92 49 55 ou 62 65 ou 48 90 ou 69 81
email : jeannine.agoutin@banque-france.fr
michaelbrassart@banque-france.fr
veronique.jan-antuoro@banque-france.fr
nathalie.bataille-salle@banque-france.f