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MAY AUSTERITY BE COUNTERPRODUCTIVE?

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Contents

Abstract

This paper investigates the impact that fiscal policy has on economic activity and sovereign debt during economic downturns in the euro area, mainly Germany and Spain. Our theoretical and empirical framework shows that the feasibility of austerity measures depends crucially on the values of the fiscal multipliers. We find that, for the Spanish economy, even if policy makers just focus on the public debt ratio, ignoring output and unemployment, policies of deficit reduction are self-defeating. In fact, counter cyclical policies beat deficit consolidation policies in driving the sovereign debt ratio to a more sustainable path, no matter if shocks are on aggregate supply or aggregate demand. By contrast, in the German case, we cannot reject the hypothesis that austerity may be the proper alternative in a sluggish economy.

1. INTRODUCTION

It has already been five years since the so-called global Great Recession started (2008). Over this period, most developed economies have suffered increasing unemployment, soaring fiscal deficits, rising financial spreads, mounting sovereign debt and decreasing output. Countries that had been presented not that long ago as the paradigm of fiscal responsibility have been either bailed out (Ireland) or found themselves in the midst of a huge depression (Spain).

In order to have a proper understanding of the evolution of the global economy during the last years, it is essential to comprehend the role played by the public sector. It was not until 2010 that austerity measures were implemented; in fact, when the economic turmoil of 2008 became evident, expansionary fiscal programs were jointly undertaken across USA, Europe and Japan. However, such programs, along with the efforts to stabilize the financial system and the role of "automatic stabilizers" pushed fiscal deficits to frightening levels, raised the borrowing costs and rocketed the ratio of sovereign debt to GDP.

Christina D. Romer (2012) points out the two main lessons regarding fiscal policy learned during the crisis. First, fiscal policy actions have a relevant impact on the economy in the short run; moreover, such effects are in the standard direction (fiscal expansions are output expansionary and vice versa). Second, unsustainable fiscal deficits lead to a collapse of the economy. Scared about the latter and partially forced by the pressure from bond markets, policymakers across the European Union shifted their main policy target to stabilizing the public debt ratio. In order to achieve so, austerity measures were implemented.

There are two main views regarding the effects of austerity programs on the real economy. On the one hand, the hypothesis that fiscal consolidation improves the government's solvency, restoring confidence among investors, businesses and households; which revives economic growth in a short period of time. Latvia is used as an example of the success of austerity since, after seeing its economy shrunk by 24% for two years during the financial crisis, the government carried out a strict stabilization program that managed to get its economy back on track.

However, many economists believe that when the economy has a huge amount of slack resources and the aggregate demand is weak, the public sector should carry on spending while the private sector recovers its balance. In this situation, the risk of crowding out private investment would be void as a result of the slack resources. According to this view, far from managing to reduce the budget deficit, austerity worsens public accounts, since policies of deficit reduction depress the economy further reducing tax revenue, rising social spending and

exacerbating creditworthiness problems. Thus, the collapse in economic activity would make austerity self-defeating.

This "philosophical" debate has translated into a more "technical" one regarding the role of the so-called *fiscal multiplier*. The fiscal multiplier captures the effects that variations in the fiscal policy, both through taxes and public expenditure, have on final output. Analytically it may be express as:

$$\Delta Output = \beta \, \Delta Fiscal \; Policy$$

where β is the fiscal multiplier. Then, it is easy to see that, the larger the multiplier, the more harmful the fiscal consolidation is.

Since the IMF's World Economic Outlook (October 2012), stated that the values given to such fiscal multipliers could have been "too low", there has been a lot of discussion about the viability of austerity and its actual impact on the economy. In the models used in 2010 to recommend austerity, fiscal multipliers were supposed to be around 0.5. However, the latest studies claim that the actual values may be between 0.7 and 1.9[1] (See Baum and Koester, (2011) and Burriel et al. (2010)). If this is really the case, it would mean that the effects of fiscal consolidation in variables as unemployment or output would be twice or even three times larger than expected; which would help to explain why in Spain or Portugal aggregate demand collapsed and unemployment soared after implementing austerity measures.

Despite the broad range of estimates, there are, indeed, some common conclusions to most analysis: (i) fiscal multipliers are larger in downturns than in expansions, since in a sluggish economy the probability of government spending crowding out private consumption-investment is not significant due to the fact that excess resources are available in the economy (Baum, Ribeiro and Weber, 2012). (ii) Fiscal consolidations based on spending are less contractionary than through taxes, and (iii) front-load consolidation have greater contractionary effects than back-load austerity, since it shifts down the aggregate demand drastically.

This paper has as a chief objective to analyze the impact that the implementation of different fiscal policies has on output, unemployment, inflation and sovereign debt during economic recessions.

[1]World Economic Outlook, International Monetary Fund, October 2012

2. THE MODEL

The model represents the dynamics of an open economy integrated in a currency area. Throughout the entire paper we assume that all the trading partners take part within the currency area; therefore whatever may happen outside the monetary union is irrelevant for our analysis.

2.1. AGGREGATE DEMAND

The goods market equilibrium condition is:

$$(1)\quad Y = D + G + NX$$

where Y represents output, D stands for private demand, G is the public expenditure and NX is the trade of balance or net exports (exports minus imports). D and NX are given by:

$$(2)\quad D = D(\underset{+}{Y}, \underset{-}{T}, \underset{-}{r}, \underset{+}{E}, \underset{-}{u}, \underset{+}{v})$$

$$(3)\quad NX = X(\underset{+}{E}, \underset{+}{Y^{f-i}}) - M(\underset{-}{E}, \underset{+}{Y}, \underset{-}{T}, \underset{-}{r}, \underset{-}{u}, \underset{+}{v})$$

where Y^{f-i} is the output of the rest of the currency area, T is the tax rate, r is the real interest rate, u is the unemployment rate, v is the state of confidence and E measures the country's international competitiveness as the ratio of foreign inflation (Π^{f-i}) to national inflation(Π^{i}):

$$(4)\quad E = \frac{\Pi^{f-i}}{\Pi^{i}}$$

It seems reasonable to assume that the volume of exports varies positively with E as well as with Y^{f-i}, since the lower the relative price of domestic goods and the larger the international market, the greater the foreign demand for national commodities. Likewise, the volume of imports depends positively on Y and v and negatively on E, T, r and u.

We can rewrite (1) as:

$$(5)\quad Y = \tilde{D}(E, Y^{f-i}, Y, T, u, v) + G \quad ; \quad \tilde{D} = D + NX$$

$\tilde{D}$ may be interpreted as the private total (national and international) demand for domestic products.

We could compute the total differential of (5) expressing it in terms of relative changes of the different variables[2]:

$$(6)\quad \frac{Y-\bar{Y}}{Y}=\frac{\bar{T}\tilde{D}_T}{\bar{Y}(1-\tilde{D}_Y)}\times\frac{T-\bar{T}}{\bar{T}}+\frac{\tilde{D}_r(r-\bar{r})}{\bar{Y}(1-\tilde{D}_Y)}+\frac{\bar{E}\tilde{D}_E}{\bar{Y}(1-\tilde{D}_Y)}\times\frac{E-\bar{E}}{\bar{E}}+\frac{\bar{Y}^{f-i}\tilde{D}_{Y^{f-i}}}{\bar{Y}(1-\tilde{D}_Y)}\times\frac{Y^{f-i}-\bar{Y}^{f-i}}{\bar{Y}^{f-i}}$$
$$+\frac{\bar{G}}{\bar{Y}(1-\tilde{D}_Y)}\times\frac{G-\bar{G}}{\bar{G}}+\frac{\tilde{D}_u(u-\bar{u})}{\bar{Y}(1-\tilde{D}_Y)}+\frac{\bar{v}\tilde{D}_v}{\bar{Y}(1-\tilde{D}_Y)}\times\frac{v-\bar{v}}{\bar{v}}$$

Defining $x\equiv\ln X$ for $x=\{Y,T,E,Y^{f-i},G\}$ and taking into account that:

$$\frac{X-\bar{X}}{\bar{X}}\simeq\ln\frac{X}{\bar{X}}=x-\bar{x}$$

We may express (6) as:

$$(7)\quad y-\bar{y}=\beta_1(e-\bar{e})+\beta_2(r-\bar{r})+\beta_3(y^{f-i}-\bar{y}^{f-i})+\beta_4(t-\bar{t})+\beta_5(g-\bar{g})+\beta_6(u-\bar{u})$$
$$+\beta_7(\ln v-\ln\bar{v})$$

where:

$$\beta_1=\frac{\bar{E}\tilde{D}_E}{\bar{Y}(1-\tilde{D}_Y)}\quad\beta_2=\frac{\tilde{D}_r}{\bar{Y}(1-\tilde{D}_Y)}\quad\beta_3=\frac{1}{(1-\tilde{D}_Y)}\quad\beta_4=\frac{\bar{T}\tilde{D}_T}{\bar{Y}(1-\tilde{D}_Y)}$$
$$\beta_5=\frac{\bar{G}}{\bar{Y}(1-\tilde{D}_Y)}\quad\beta_6=\frac{\tilde{D}_u}{\bar{Y}(1-\tilde{D}_Y)}\quad\beta_7=\frac{\bar{v}\tilde{D}_v}{\bar{Y}(1-\tilde{D}_Y)}$$

We assume that in the long run:

$$(8)\quad \Pi^{f-i}=\Pi^i\ \Leftrightarrow\ \bar{E}=1\ \Leftrightarrow\ \bar{e}=\ln\bar{E}=0$$

Then, in the short term:

$$(9)\quad e=\ln\Pi^{f-i}-\ln\Pi^i$$

As a result of labour market rigidities, we assume that unemployment does not react automatically to changes on output, so there is a lag. Then:

$$(10)\quad u_t-\bar{u}=a(y_{t-1}-\bar{y})\ ;\ a<0$$

Regarding fiscal policy, spending and taxes paths are given by:

[2] Throughout the entire analysis, a bar over a variable represents the long run level of such variable.

(11) $g_t - \bar{g} = \theta(u_t - \bar{u}) + \varepsilon(d_{t-1} - \bar{d})$

(12) $t_t - \bar{t} = \mu(u_t - \bar{u}) + \omega(d_{t-1} - \bar{d})$

where d is the primary government budget balance; excluding interest payments. Expansionary fiscal policies require θ to be positive, μ negative and ε and ω close to zero. On the other hand, austerity measures demand ε to be positive, ω negative and θ and μ near zero.

As for monetary policy, common to the whole currency area, the nominal interest rate (i^p) is set following:

(13) $i^p = \bar{r}* + \Pi^f + h \ln \frac{\Pi^f}{\Pi*}$

where $\bar{r}*$ is the risk free interest rate in the long run, Π^f is the overall inflation rate of the currency area and h is a positive parameter meaning that the central bank undertakes a "tight" monetary policy when inflation is above its target and a "loose" monetary policy in the opposite situation. Π^f follows:

(14) $\Pi^f = \sum_{i=1}^{n} \Pi^i \frac{Y^i}{Y^f}$

Throughout our analysis we assume that Π^{f-i} is defined as:

(15) $\Pi^{f-i} = \Pi* + \Omega(Y^{f-i} - \bar{Y}^{f-i})$

Assuming that:

(16) $\bar{r}* = \bar{r} - \bar{\rho}$

(17) $r = i^p + \rho - \Pi^f$

Where ρ stands for premium risk and inserting (16) into (13) and then (13) into (17):

(18) $r - \bar{r} = (\rho - \bar{\rho}) + h \ln \frac{\Pi^f}{\Pi*}$

In addition, we link the country's premium risk (or spread) to the amount of sovereign debt, assuming there is some correlation between the size of the debt ratio and the perceived possibility of default. Then:

$$(19) \quad \rho_t - \bar{\rho} = \phi(b_{t-1} - \bar{b}) \quad ; \quad \phi > 0$$

where b is the ratio national debt over output. Inserting (19) into (18), we obtain the path followed by the real interest rate:

$$(20) \quad r - \bar{r} = \phi(b_{t-1} - \bar{b}) + h \ln \frac{\Pi^f}{\mathrm{H}^*}$$

Inserting (9), (11), (12) and (20) into (7):

$$\begin{aligned}(21) \quad y_y - \bar{y} = {} & \beta_1(\ln \Pi_t^{f-i} - \ln \Pi_t^i) + \beta_2\left[\phi(b_{t-1} - \bar{b}) + h(\ln \Pi_t^f - \ln \Pi^*)\right] + \beta_3(y_t^{f-i} - \bar{y}^{f-i}) \\ & + \beta_4\left[\mu(u_t - \bar{u}) + \omega(d_{t-1} - \bar{d})\right] + \beta_5\left[\theta(u_t - \bar{u}) + \varepsilon(d_{t-1} - \bar{d})\right] + \beta_6(u_t - \bar{u}) \\ & + \beta_7(\ln v_t - \ln \bar{v})\end{aligned}$$

Using the definition $\pi = \ln \Pi$ and solving for the domestic inflation, we rewrite (21) as:

$$\begin{aligned}(22) \quad \pi_t^i = {} & -\frac{1}{\beta_1}(y_t - \bar{y}) + \pi_t^{f-i} + \frac{\beta_2}{\beta_1}\phi(b_{t-1} - \bar{b}) + \frac{\beta_2}{\beta_1}h(\pi_t^f - \pi^*) + \frac{\beta_3}{\beta_1}(y_t^{f-i} - \bar{y}^{f-i}) \\ & + \frac{\beta_4\mu + \beta_5\theta + \beta_6}{\beta_1}(u_t - \bar{u}) + \frac{\beta_4\omega + \beta_5\varepsilon}{\beta_1}(d_{t-1} - \bar{d}) + \frac{\beta_7}{\beta_1}(\ln v - \ln \bar{v})\end{aligned}$$

Finally, subtracting π* from both sides of the equation (22) we obtain the aggregate demand:

$$(23) \quad \pi_t^i - \pi^* = -\frac{1}{\beta_1}(y_t - \bar{y}) + \frac{\beta_2}{\beta_1}\phi(b_{t-1} - \bar{b}) + \frac{\lambda}{\beta_1}(u_t - \bar{u}) + \frac{m}{\beta_1}(d_{t-1} - \bar{d}) + \frac{1}{\beta_1}z_t$$

Where

$$\lambda = \beta_4\mu + \beta_5\theta + \beta_6$$

$$m = \beta_4\omega + \beta_5\varepsilon$$

$$z_t = \beta_1(\pi_t^{f-i} - \pi^*) + \beta_2 h(\pi_t^f - \pi^*) + \beta_3(y_t^{f-i} - \bar{y}^{f-i}) + \beta_7(\ln v - \ln \bar{v})$$

We expect *λ* to be negative, since when unemployment is above its natural rate, aggregate consumption is weak, and therefore prices fall. Likewise, *m* has to be greater than zero, since a consolidated balance budged should have positive effects on output gap, by lowering the real interest rate and the bond spread.

2.2. AGGREGATE SUPPLY

A conventional Phillip's Curve is adopted as the aggregate supply:

$$(24) \quad \pi_t^i - \pi_{t-1}^i = \gamma(y_t^i - \bar{y}^i) + s_t$$

Where the term s_t captures supply shocks.

2.3. PUBLIC DEBT DYNAMICS

Assuming that the government cannot appeal to the monetary authority to monetize the national debt, the sovereign debt ratio evolves according to:

$$(25) \quad b_t = -d_t + (1 + i_t^p - n_t - \pi_t) b_{t-1}$$

Where n is the real growth rate. The evolution of the sovereign debt is driven by both the balance budget and the *snowball* effect, which is the difference between the nominal interest rate and the nominal GDP growth rate. Notice that a higher inflation both diminishes the stock of debt and the cyclical components of deficit, since it boosts output, reduce unemployment cost and raises tax revenues.

2.4. SOLVING THE MODEL

The model may be summarized by:

$$AD: \quad \pi_t^i - \pi^* = -\frac{1}{\beta_1}(y_t - \bar{y}) + \frac{\beta_2}{\beta_1}\phi(b_{t-1} - \bar{b}) + \frac{\alpha}{\beta_1}(u_t - \bar{u}) + \frac{m}{\beta_1}(d_{t-1} - \bar{d}) + \frac{1}{\beta_1} z_t$$

$$z_t = \beta_1(\pi_t^{f-i} - \pi^*) + \beta_2 h(\pi_t^f - \pi^*) + \beta_3(y_t^{f-i} - \bar{y}^{f-i}) + \beta_7(\ln v - \ln \bar{v})$$

$$AS: \quad \pi_t^i - \pi_{t-1}^i = \gamma(y_t^i - \bar{y}^i) + s_t$$

$$Together\ with: \quad b_t = -d_t + (1 + i_t^p - n_t - \pi_t) b_{t-1}$$

Solving it for the output gap and the inflation gap, we obtain the dynamics of both variables over time:

$$(26)\quad y_t^i - \bar{y} = \tilde{\beta}\left[(y_{t-1}^i - \bar{y}^i) + \beta_2\phi(b_{t-1} - b_{t-2}) + \lambda(u_t - u_{t-1}) + m(d_{t-1} - d_{t-2}) + z_t - z_{t-1} - \beta_1 s_t)\right]$$

$$(27)\quad \pi_t^i - \pi^* = \tilde{\beta}\left[(\pi_{t-1}^i - \pi^*) + \gamma\left\{-\beta_2\phi(b_{t-1} - \bar{b}) + \lambda(u_t - \bar{u}) + m(d_{t-1} - \bar{d}) + z_t\right\} + s_t\right]$$

Where:

$$\tilde{\beta} = \frac{1}{1 + \beta_1\gamma}$$

The path which should be taken by the fiscal policy during economic downturns depends on which of either effects on output gap dominants, whether it is the contractive influence of the mounting sovereign debt (given by β_2 and ϕ) or whether it is the expansionary effect of a "Keynesian fiscal policy" (given by α and m). The answer to this question lies on the value of fiscal multipliers and the credit market access for public institutions, businesses and households.

2.5. UNDERSTANDING THE MODEL

In order to fully understand the model, Table 2 offers a simple definition of all the relevant parameters.

Table 1. Relevant Parameters of the Model

	Definition
β_1	It captures the effect of inflation differentials on output gap.
β_2	It measures the impact that changes in the real interest rate have on output gap.
β_3	How sensitive domestic output is to changes in the international environment.
β_4	How aggregate demand responds to changes in taxes.
β_5	How aggregate demand responds to changes in government spending.
β_6	Impact of changes in the unemployment rate on output gap.
β_7	It captures the effects of *state of confidence* on domestic production.
γ	It is the slope of the aggregate supply.
a	It measures how unemployment reacts to output gap (Okun's Law).
Ω	It measures the impact of euro zone output on the common inflation.
h	How sensitive the nominal interest rate is to changes on inflation.
ϕ	It captures the effect of sovereign debt on risk premium.

β_1 is expected to be greater than zero, due to the fact that a rise in national inflation worsens external competitiveness and the balance trade. In fact, the greater β_1, the stronger the reaction of net exports to variations in the relative inflation and therefore the faster the economy converges to its long term output level.

Regarding β_2, its sign is determined by three effects:

- Wealth effect. For countries with a net external asset position, the wealth effect is positively correlated with the real interest rate, since a rise in the latter implies an increase in interests received from the rest of the world. But when there is a net external debt, a raise in the interest rate has a negative wealth effect.
- Intertemporal-substitution effect. A rise in the interest rate stimulates individuals to work more in the current period.
- The cost of borrowing: it rises with the interest rate; therefore, there is a negative relationship between investment demand and interest rates.

The size and direction of these effects determines whether β_2 is positive or negative.

Under no circumstance should we expect β_3 to take a negative value. The degree of openness and the trade geographical diversification, among others, determine the size of this parameter. Since a tax increase means a reduction in the disposable income and therefore a contraction in consumption and savings, β_4 is expected to be negative. A rise in government spending increases aggregate demand; hence, β_5 is expected to be positive. It is plain to see that β_6 must be lower than zero since a rise in unemployment reduces disposable income. Regarding β_7, due to the fact that the variable *state of confidence* is not observable; we use it to introduce demand shocks that are not encompassed in our model such a change in the consumers' preferences or liquidity constrains.

The slope of the aggregate supply is crucial to determine the performance of the economy. The final impact of spending cuts or raising taxes will not only depend on the fiscal multipliers (shifts on AD) but on the slope of the aggregate supply.

3. CALIBRATION

Our analysis is focused on just two economies: Germany and Spain. Nevertheless, we also provide the parameters for Finland, France and Portugal to facilitate comparisons. Such a sample enables us to study the differences between the economies from the North and South of Europe. Table 2 shows our estimations for all relevant parameters[3].

Table 2. The Empirical Model

	Country Specific					Euro Zone
Parameter[4]	Finland	France	Germany	Portugal	Spain	
β_1	1,08	0,74	0,32	1,05	0,95	-
β_2	-0,10	-0,15	-0,04	-0,08	-0,13	-
β_3	1,30	1,89	0,71	1,56	1,80	-
β_4	-0,96	-1,43	-0,58	-1,29	-1,35	-
β_5	0,68	1,01	0,34	0,69	0,74	-
β_6	-1,98	-2,72	-2,72	-3,73	-1,17	-
β_7	-	-	-	-	-	0,50
γ	0,18	0,26	0,21	-	0,21	-
a	-0,50	-0,37	-0,37	-0,27	-0,85	-
Ω	-	-	-	-	-	0,25
h	-	-	-		-	0,58
ϕ	0,03	0,02	-	0,01	0,02	-

At a first glance, the values obtained for β_3 may look odd; being the German or the Finnish economies more linked with international markets, its output should be more dependent on the international environment than, for instance, the

[3] In this section, we just summarize our findings. A deeper description of the estimation methodology can be found in the Appendix.

[4] Regarding the sample period:

- β_1, β_2, β_3, β_4 and β_5 have been calculated using quarterly data from 1995 to 2011.
- Both β_6 and *a* have been taken from the paper: *Okun's Law: Fit 50,* by Ball, Leigh and Loungani (2012). They used annual data from 1980 to 2011.
- Both γ and Ω have been calculated using annual data from 1980 to 2011.
- "h" has been taken from the paper: *Does the ECB rely on a Taylor Rule? - Comparing Ex-Post with Real Time Data,* by Belke and Klose (2011). The quarterly data covers the sample period 1999 to 2010(Q2).
- ϕ has been obtained using annual data from 1995 to 2012

Spanish economy. The answer to this puzzle might be obtained from the following:

- Their exports are characterized by high quality and technological content, so international demand for their products is more inelastic.
- Their exports are highly diversified across countries and continents; while the Spanish or Portuguese exports are more focused on the euro area.

Regarding fiscal multipliers (β_4 and β_5), it is plain to see that increasing taxes in the South (Spain, Portugal, and even France) is much more contractionary than in the North (Germany and Finland). Likewise, public spending cuts have a stronger negative impact in the South than in Germany. The combination of these two facts will explain why austerity measures could work out in Germany but, not in Spain or Portugal. Notice that these results give us some clues about whether austerity is a "*universal recipe"* to the crisis, or whether some countries would be better off if countercyclical policies were implemented. In any case, for all countries, we find that fiscal consolidation based on spending is less contractionary than through taxes.

With respect to the Okun's Law, Spain is the country where the ratio of change in unemployment to variations in output is larger, a measure of labor rigidities. This may be explained by the fact that temporary contracts are more common in the Spanish labor market, so that firms find easier to adjust employment rather than wages in the face of output variations (Ball, Leigh and Loungani, 2012).

Finally, concerning the credit market, we find a positive correlation between sovereign debt and the risk premium but with different coefficients across countries. Spanish and Portuguese are more volatile, and their deviations are not necessarily due to mounting sovereign debt. That is the reason why we obtain a lower ϕ for southern countries.

4. SIMULATION RESULTS

In this section, we analyze the consequences of demand and supply shocks for Germany and Spain. In our simulations, fiscal policy may follow three different paths[5]:

- The government implements counter cyclical policies; lowering taxes and increasing spending when unemployment is below its natural level and vice versa.
- The government's main goal is to balance its budget. Thus, if there is a budget deficit in the previous period, the government will raise taxes and/or cut spending, and vice versa.
- The government follows a fixed fiscal policy regardless the economic situation.

Through the analysis we assume without loss of generality that:

- The structural deficit is zero.
- The initial ratio stock of sovereign debt over GDP is 40%
- The long run economic growth is 2%
- The inflation target is 2%

[5] Recall from equations 10 and 11 that we could simulate the implementation of different fiscal policies by modifying θ, ε, μ and ω. For our analysis, we assume that:

- Counter Cyclical policies θ=- μ=0,4 and ε=ω=0
- Austerity Measures ε=- ω=0,4 and θ= μ=0
- No Fiscal Policy θ = μ = ε = ω = 0

4.1. NEGATIVE DEMAND SHOCKS

It is highly reasonable to think that the current economic turmoil partly has its origin in strong negative demand shocks[6]. In the face of such kind of shocks, our model predicts[7]:

Figure 1. Negative Demand Shocks: Output Gap

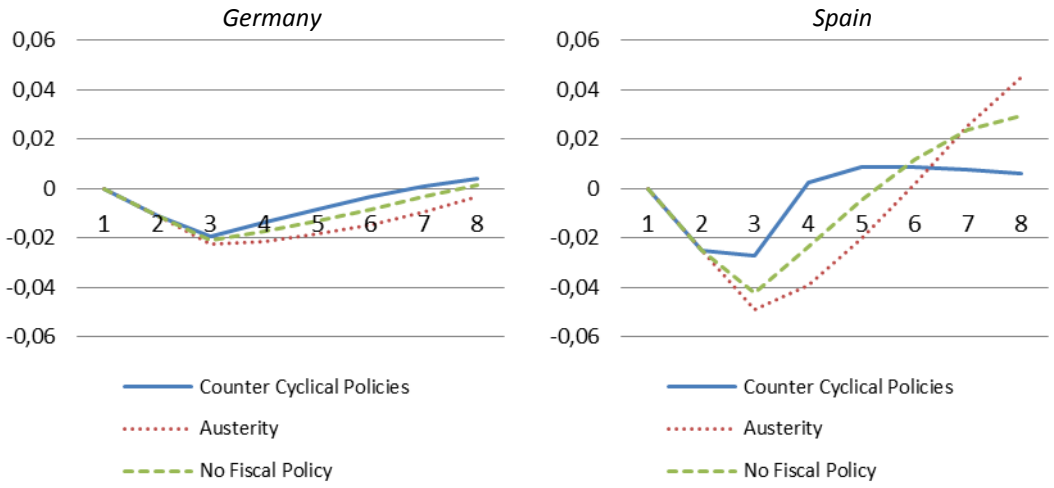
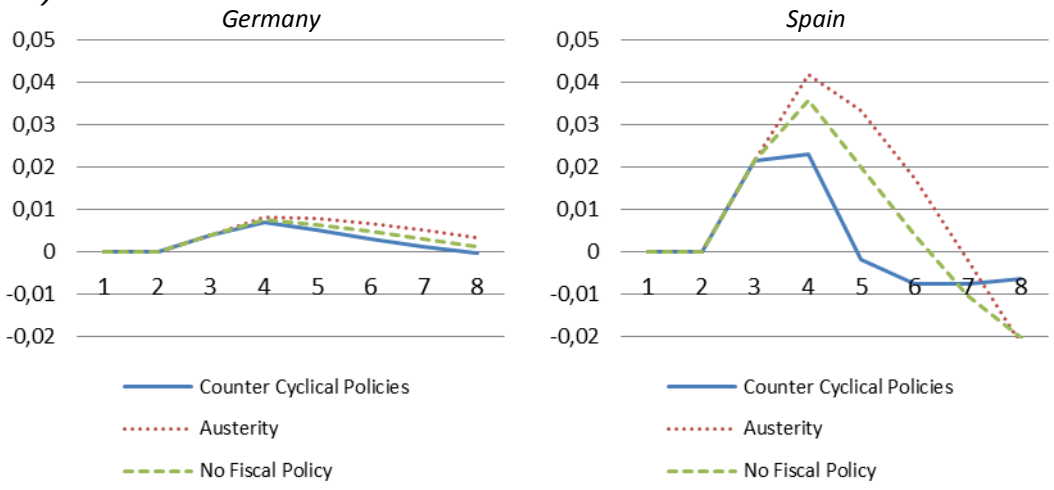


Figure 2. Negative Demand Shocks: Unemployment (deviations from its natural rate)



[6] In 2008 Spain's housing bubble burst which, combined with the international liquidity restriction, had a strong negative effect in confidence, employment, consumption and investment demand.

[7] Notice from equation 7 that by modifying v_t we can simulate internal demand shocks. In fact, the same equation allows us to recreate external demand shocks by modifying $\left(y^{f-i}-\bar{y}^{f-i}\right)$. Since the outcome from our model is quite similar for both shocks; we just simulate the external demand shocks in order to keep the analysis as simple as possible. Thus, we impose that $\left(y^{f-i}-\bar{y}^{f-i}\right)_1=\left(y^{f-i}-\bar{y}^{f-i}\right)_2=-0,015$

Figures 1 and 2 replicate the observed stylized facts of the current economic turmoil:

i. As a result of its low fiscal multipliers, the impact of counter cyclical fiscal policies in Germany is low; in other words, such policies are not effective and austerity measures are innocuous.

ii. Austerity measures have a fatal impact on Spanish real variables, both in terms of intensity and duration. As a matter of fact, the economy performs better under no fiscal policy than under policies of deficit reduction. On the other hand, counter cyclical policies works in stabilizing the economy, improving output gaps and unemployment and achieving a faster recovery.

iii. Spain's unemployment is highly sensitive to output. Therefore, austerity measures cause a harmful feedback on public accounts: policies of deficit reduction contracts the economy, raising unemployment, reducing tax revenues and increasing public spending ("automatic stabilizers"). As a result of the deterioration of the public accounts, further austerity is needed to balance the budget, which contracts the economy even more, increasing unemployment…

To sum up, according to our model, in economies with relatively high fiscal multipliers, as the Spanish one, policies of deficit reduction are totally unfeasible as a result of the strong contraction on economic activity; in other words austerity measures are self-defeating. In fact, the economy would be better off in the absence of any kind of fiscal authority. Nevertheless, when the fiscal multipliers are relatively low, policies of deficit consolidation may be a proper solution.

4.2. NEGATIVE SUPPLY SHOCKS

Supply shocks are those facts that have an impact in the production function and/or production process, like liquidity restrictions and high input prices. In the face of such situation, our model predicts[8]:

[8] Recall from equation 23 that by modifying s_t we can simulate supply shocks. In this case, we assume that $s_1 = 0{,}02$

Figure 3. Negative Supply Shocks: Output Gap

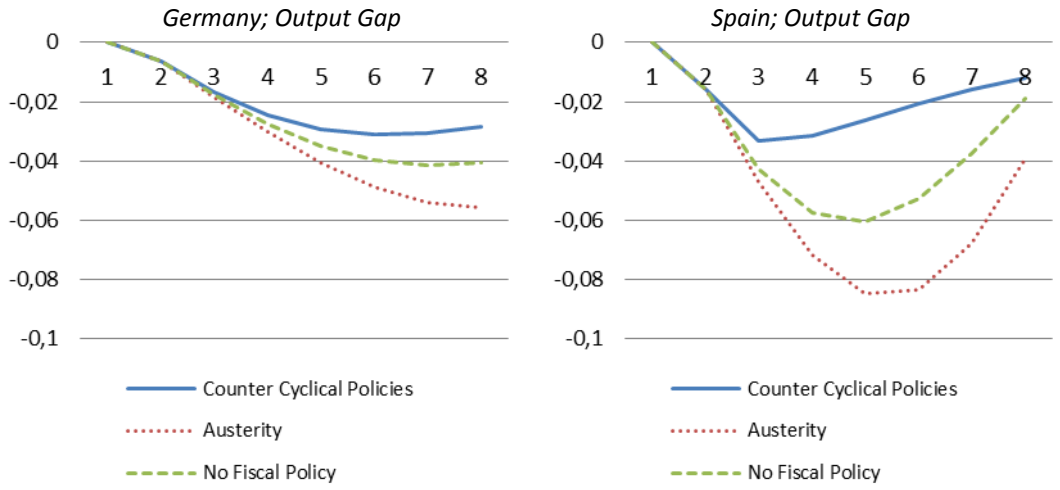
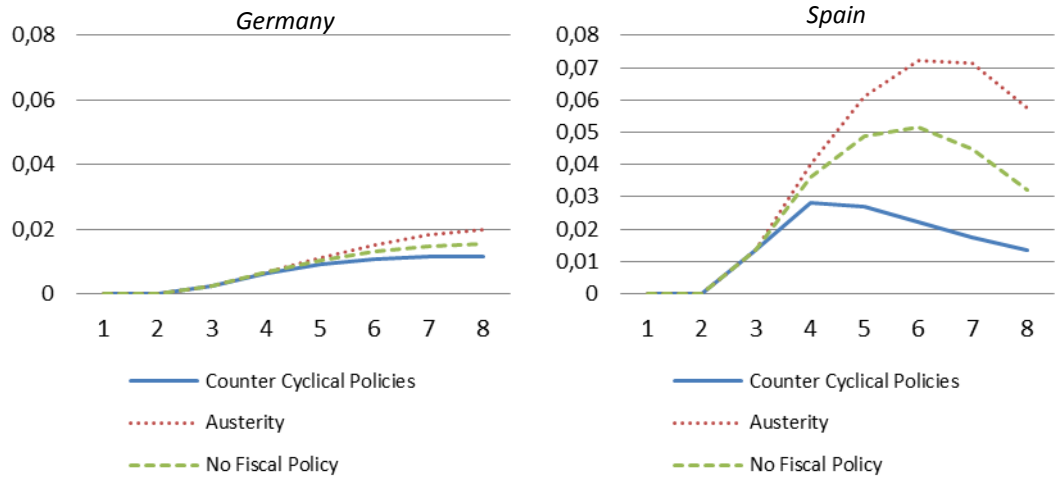


Figure 4. Negative Supply Shocks: Unemployment (deviations from its natural rate)



In the face of a negative supply shock, counter cyclical fiscal policies undoubtedly perform better than austerity measures. One could see austerity as a tradeoff between short-term pain and long-term gain; arguing that even if fiscal consolidations are quite harmful during the economic downturns, the recoveries are much stronger; therefore, policies of deficit reduction are justified for the sake of a brighter future. However, there are several facts that undermine such argument:

i. Households want their consumption path to be as smooth as possible over time. If capital markets imperfections were null, oscillations in output or unemployment would not be a problem, since households could freely lend or borrow to achieve a flat consumption stream. Unfortunately,

capital markets do have limitations; hence fluctuations which cause an uneven income stream affect negatively the welfare of individuals.

ii. Long term unemployed individuals may lose their work skills, becoming unemployable. Hence, unemployment becomes a structural problem.

iii. During recession, income losses are concentrated in the poorer individuals, while during expansion the upper part of the income scale captures a larger part of the gains. Therefore, ample fluctuations increase economic and social inequality.

iv. Large output oscillations make more complicated to achieve price stability; hence, they increase the risk of shrinking people's savings, distorting the tax system, causing a loss of business confidence…

v. Delong and Summers (2012) points out that recessions have long run negative effects, since they reduce investment, increase structural unemployment… Thus, there is a clear link between current and future potential output.

Thus, it is reasonable to think that high volatility on the economic cycle reduces social welfare. From this approach, counter cyclical policies seem to be recommended, since the economy is more stable.

4.3. A COMBINATION OF SHOCKS: THE GREAT RECESSION

Since the financial crisis started back at 2008, the vast majority of economies across the European Union have experienced negative supply shocks, like strong liquidity restrictions for business, and negative demand shocks like bursting housing bubbles or the fall in exports demand as a result of the global recession that has kept output below its trend. This experiment recreates the current economic situation[9]:

[9] Following the same process as before, we assume that $s_1=s_2= 0,02$ and $\left(y^{f-i}-\bar{y}^{f-i}\right)_1=\left(y^{f-i}-\bar{y}^{f-i}\right)_2=-0,015$

Figure 5. The Great Recession: Output Gap

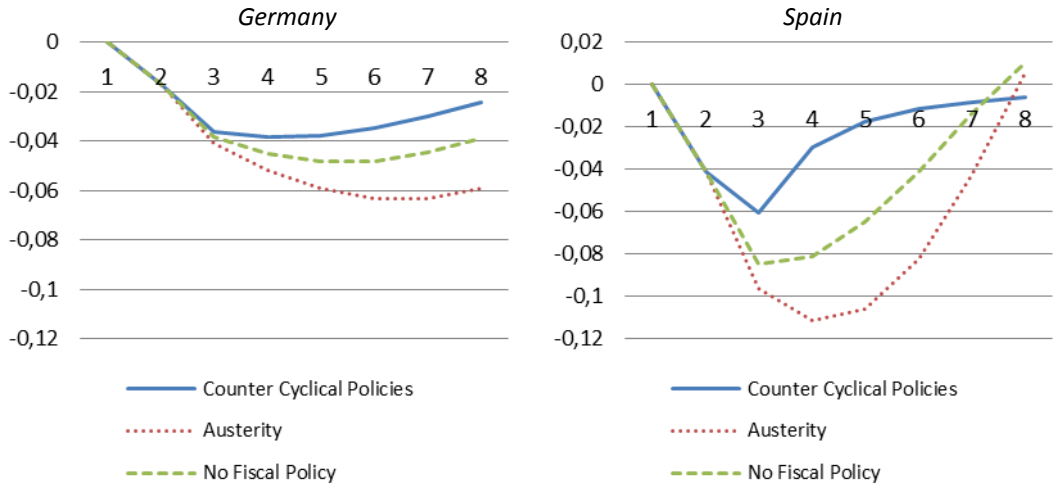
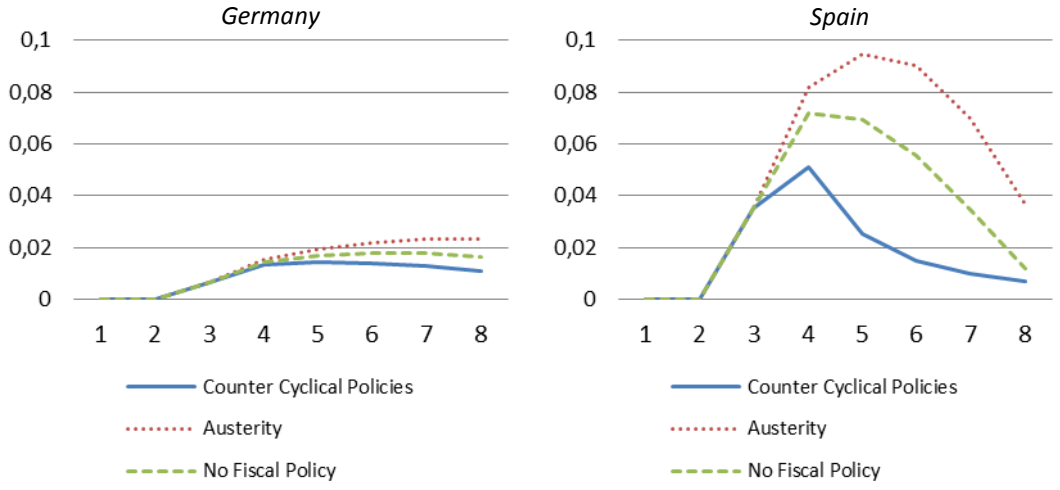


Figure 6. The Great Recession: Unemployment (deviations from its natural rate)



As in the two previous simulations, austerity measures fails to stabilize the economy having, especially in Spain, extremely fatal effects on output and unemployment.

5. MAY AUSTERITY BE COUNTERPRODUCTIVE?

In the previous section, we saw how austerity could be self-defeating in terms of economic activity when fiscal multipliers were relatively high, as in the Spanish case. However, many would argue that fiscal expansions finance current spending with future revenues, mounting sovereign debt, which is irresponsible and "unfair" for future generations. Under this view, fiscal consolidations, even if they cause real losses and strong pain in the short term, are the proper way to act since they stabilize the debt ratio. Nevertheless, such view does not take into account the fact that both real growth and inflation reduce the debt ratio, since they diminish the cyclical deficit and the denominator of such ratio. Therefore, even if austerity measures are successful in reducing the structural fiscal deficit, they may erode both the cyclical component of the public deficit and the debt ratio to GDP. The following simulations show that in Germany the results are not conclusive. However, in Spain austerity policies are clearly counterproductive, since the debt ratio worsens with consolidation policies.

Figure 7. Negative Demand Shocks: Spanish Inflation Rate and Sovereign Debt Dynamics

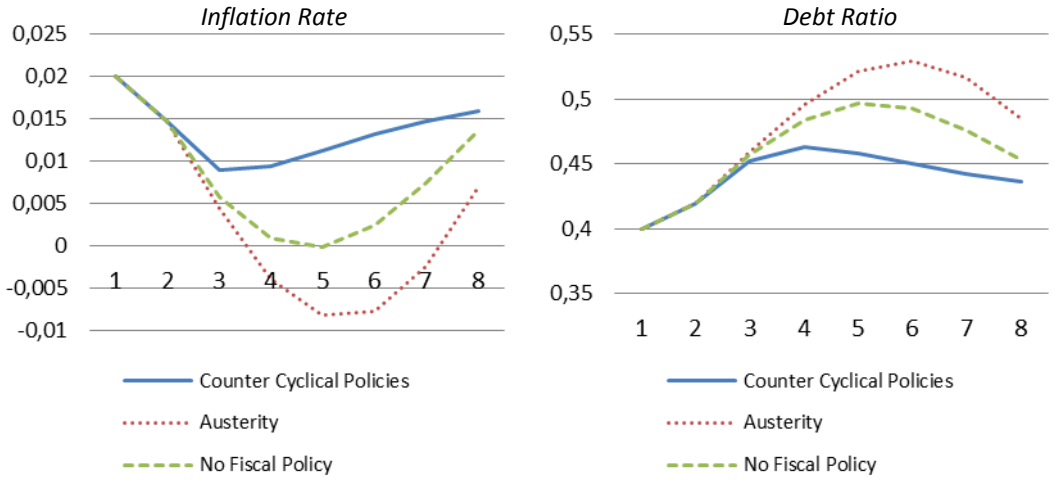


Figure 8. Negative Supply Shocks: Spanish Inflation Rate and Sovereign Debt Dynamics

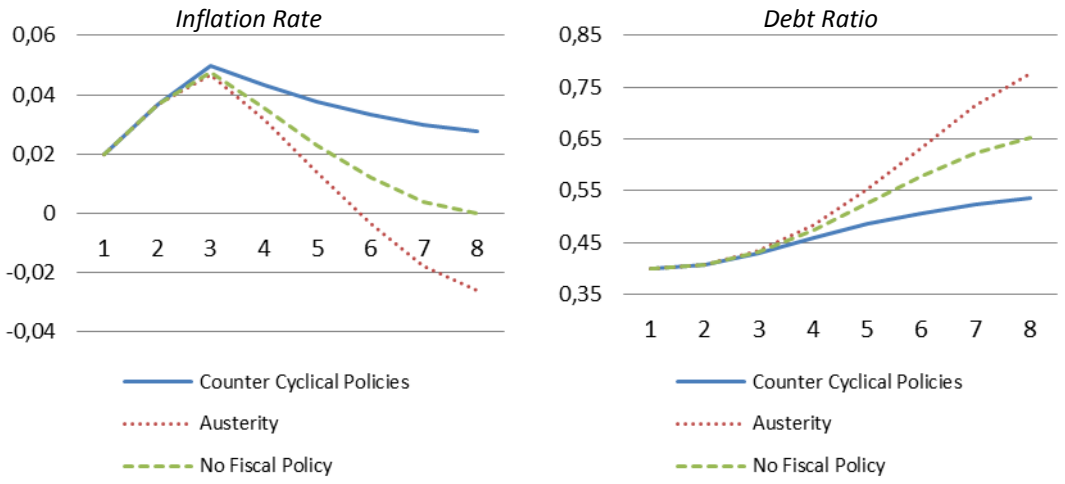
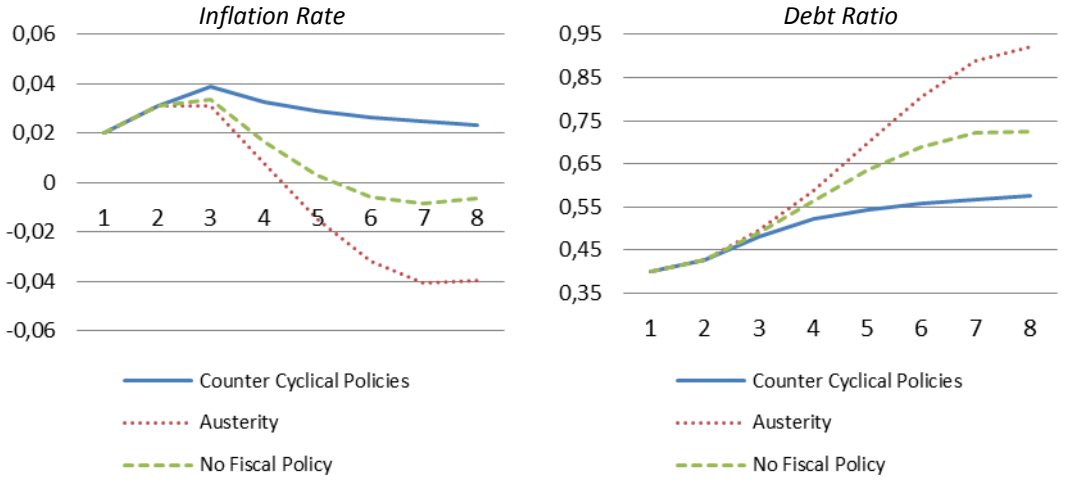


Figure 9. The Great Recession: Spanish Inflation Rate and Sovereign Debt Dynamics



As a result of the fatal impact that austerity has on ouput and inflation, fiscal consolidation are unable to stabilize the debt ratio in the Spanish economy. Policies of deficit reduction do not manage neither to balance the budget nor to reduce the old debt burden; making them ineffective. On the other hand, counter cyclical policies do succeed in stabilizing both output and inflation. That is the reason why, in the Spanish case, **counter cyclical policies drive the debt to a more sustainable path than policies of deficit consolidation**; in other words, transitory expansionary fiscal policies are self-financing during economic downturns.

Despite the fact that Keynesian fiscal policies generally perform better than austerity during recession, we should consider the possibility that under *certain*

conditions fiscal consolidations may be the feasible alternative. Exact specification of those certain conditions is not within this paper. However, we can point out some of their characteristics

i. *Origin of the Shock.* Advance economies are extremely complex, which makes them to face an extraordinary large number of exogenous shocks. Each shock must be met differently, since they have asymmetric features and properties. For instance, liquidity restrictions in the credit market must not be confronted with the same set of policies as the busting housing bubble.

ii. *Duration and Intensity of the Shock.* According to our model, the shorter and lighter the crisis, the more likely austerity measures are to succeed.

iii. *Fiscal Multipliers.* The impact that variations in fiscal policy have on the real economy are highly dependent on the fiscal multipliers. Hence, for economies with relatively low fiscal multipliers, austerity is more likely to succeed. Notice that economies with high price rigidities, like Spain, tend to have higher fiscal multipliers since producers react to augments in aggregate demand by raising prices, not by increasing output. On the other hand, the more open the economy, the lower the fiscal multipliers, since part of the effects of the fiscal policy leak abroad (Boussard, De Castro and Salto, 2012).

iv. *Zero Lower Bound.* Policies of deficit reduction might be justified when the risk of crowding out private investment is real. Nevertheless, note that during economic downturns the output gap is negative and the inflation is likely to be below its target; forcing central banks to undertake "loose" monetary policies. Thus, if the nominal interest rate is close to zero, government spending helps to raise inflation expectations, lowering the real interest rate, and then, boosting consumption and investment.

Thus, there is not a *"universal recipe"* to face all kinds of shocks. Furthermore, blueprint across countries is not a feasible option, due to the fact that political, economic and social institutions are heterogeneous.

6. CONCLUDING REMARKS

When austerity measures were first implemented in the European Union back in 2010, there was a clear objective: to reduce governments' debts and deficits, boosting international competitiveness and business confidence. Austerity measures have had a fatal impact on economic activity within the euro area, mainly the southern countries. Unemployment has dramatically gone up, output has permanently decreased, poverty has increased… Sadly, much of the pain caused by austerity measures may have been in vain; almost four years later, not even one country has managed to significantly reduce its sovereign debt ratio after implementing policies of deficit consolidation.

This paper tries to shed some light on the reasons of such a disappointing performance. Its main findings may be summarized as follows:

- Overall, we find that counter cyclical policies work in stabilizing the economy, improving output gaps and unemployment and achieving a faster recovery. On the other hand, policies of deficit reduction collapse the aggregate demand, aggravating the initial impact of the shocks. Furthermore, fiscal consolidation based on spending is less contractionary than based on taxes.

- The larger the fiscal multipliers, the more costly fiscal consolidation are. In economies with relatively high fiscal multipliers, like the Southern European countries, austerity measures are extremely painful and highly ineffective in the medium term.

- Furthermore, in some cases, as in the Spanish one, fiscal consolidation is unable to stabilize the debt ratio given its impact on the cyclical component of the public deficit and on inflation and nominal growth. In fact, counter cyclical policies drive such ratio to a more sustainable path than austerity policies.

To sum up, transitory fiscal policies are self-financing during recessions. Thus, as John Maynard Keynes argued: "*the boom, not the slump, is the right time for austerity*".

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8. APPENDIX: ESTIMATION METHODOLOGY

In this section, the process and mechanisms used to obtain all the parameters from our model are shown[10].

Estimating β_1

Recall that in our model:

$$(28) \quad \beta_1 = \frac{\bar{E}\tilde{D}_E}{\bar{Y}(1-\tilde{D}_Y)} \leftrightarrow \beta_1 = \frac{\frac{\bar{M}}{\bar{Y}}(\eta_X - \eta_M - 1) - \frac{\bar{D}}{\bar{Y}}\eta_D}{1-\tilde{D}_Y}$$

Where η_x, η_M and η_D are the exports, imports and private demand price elasticities. Both η_x and η_M are obtained from *Trade Elasticities, a Final Report for the European Commission,* by J. Imbs and Isabelle Méjean (2010).

Table 3. Price Elasticities of Exports and Imports

	Sample	η_x	η_M
Finland	1996-2000	1,62	-2,41
France	1996-2000	1,67	-1,74
Germany	1996-2000	1,67	-1,34
Portugal	1996-2000	2,11	-1,37
Spain	1996-2000	1,93	-1,72

*Source: *Trade Elasticities, a Final Report for the European Commission,* 2010

Regarding η_D, since imports account for about 30% of the aggregate demand, a 1% rise in the relative price of imported goods may reduce the real purchasing power of households by 0,3%. Thus, we can assume that η_D=0,3.

In order to compute the partial derivative of the total private demand for domestic products with respect to domestic output we set up:

$$(29) \quad \tilde{D}_Y = \frac{\partial \tilde{D}}{\partial Y} = \frac{\partial D}{\partial Y} - \frac{\partial M}{\partial Y}$$

To compute both derivatives from equation 29, we take as our instrumental

[10] Whenever we find that the error terms are correlated, we use the Newey-West estimators instead of ordinary least squares.

Throughout the entire calibration process, the level of significance is 0,05, except in Table7 where such value is 0,10.

A bar over a variable represents the long run level of such variable.

variable the gross domestic product of the Euro Zone; using Two- Stage Least Squared.

Table 4. Partial derivatives of Private Demand and Imports with respect to domestic GDP

	$\frac{\partial D}{\partial Y}$	R-squared	$\frac{\partial M}{\partial Y}$	R-squared
Finland	0.78 (0.01)	0,99	0.55 (0.02)	0,93
France	0.84 (0.02)	0,99	0.37 (0.01)	0,94
Germany	0.57 (0.01)	0,98	0.98 (0.03)	0,97
Portugal	0.8 (0.02)	0,98	0.44 (0.02)	0,93
Spain	0.8 (0.02)	0,98	0.36 (0.02)	0,94

*Sample 1995:1-2011:4

Standard errors are displayed in brackets. Inserting the estimates from Tables 3 and 4 into (28), we obtain β_1.

Estimating β_2

This parameter is defined as:

$$(30)\quad \beta_2 = \frac{\tilde{D}_r}{\bar{Y}(1-\tilde{D}_r)}$$

In order to compute the partial derivative of the total private demand for domestic products with respect to the real interest rate, we set up:

$$(31)\quad \frac{\tilde{D}}{\bar{Y}} = \alpha_1 + \alpha_2(Ten\,Years\,Treasury\,Yields) + \xi$$

Table 5. Partial derivative of Total Demand for Domestic Products with respect to Ten Years Treasury Yields

	α_2	R-squared
Finland	-0.08 (0.01)	0,6
France	-0.08 (0.01)	0,59
Germany	-0.05 (0.00)	0,56
Portugal	-0.05 (0.00)	0,41
Spain	-0.07 (0.01)	0,47

*Sample 1995:1-2011:4

Inserting the data from Tables 4 and 5 into (30), we obtain β_2.

Estimating β_3

Recall that in the model,

$$(32) \quad \beta_3 = \frac{1}{(1-\tilde{D}_Y)}$$

Inserting the data from Table 4 into (32), we obtain β_3

Estimating β_4

In our model,

$$(33) \quad \beta_4 = \frac{\bar{T}\tilde{D}_T}{\bar{Y}(1-\tilde{D}_Y)}$$

The tax level is expressed as the fiscal pressure; defined as tax income over gross domestic product. We need to obtain the relationship between total private demand for national products and the tax level. In order to do so, the next regression is run:

$$(34) \quad \frac{\tilde{D}}{\bar{Y}} = \alpha_1 + \alpha_2(FiscalPressure) + \alpha_3(Tax\,Income) + \xi$$

Table 6. Partial derivative of Total Demand for Domestic Products with respect to the Fiscal Pressure

	α_2	R-squared
Finland	-1.39 (0.07)	0,98
France	-1.52 (0.06)	0,99
Germany	-1.83 (0.03)	0,99
Portugal	-2.08 (0.08)	0,97
Spain	-1.97 (0.10)	0,98

* Sample 1995:1-2011:4

Inserting the data from Table 4 and 6 into (33), we obtain β_4:

Estimating β_5

This parameter is defined as:

$$(35) \quad \beta_5 = \frac{\bar{G}}{\bar{Y}(1-\tilde{D}_Y)}$$

Inserting the data from Table 4 into (35), we obtain β_5:

Estimating β_6

As an approximation for β_6 we use the results obtained by Ball, Leigh and Loungani in their paper: *Okun's Law: Fit 50?* (2012).They set up the following relationship between unemployment and output:

$$(36) \quad U - U^* = \mu(Y - Y^*) + \xi$$

Where U* and Y* are the natural rates based on Hodrick-Prescott filter. Their data covers goes from 1980 to 2011. Since we are interested in how deviations from the natural rate of unemployment affect the output gap, we may establish that $\beta_6 = 1/\mu$.

Estimating a

For our analysis we assume that *a*= 1/ β_6.

Estimating Ω

$$(37)\quad \Omega = \sum \gamma_i \frac{\bar{Y}^i}{\bar{Y}^f}$$

where γ_i is the slope of the AS for each country and Y_i / Y_f measures the relative size of each economy in the currency area. For our analysis, almost the 17 countries for the Euro Area are taken into account when computing Ω (only Estonia, Luxembourg, Malta, the Slovak Republic and Slovenia are left out as a result of the lack of data for such countries).

Table 7. Slope of Aggregate Supply Country by Country

	γ	R-squared	$\frac{\bar{Y}_i}{\bar{Y}_f}$
Austria	0.15 (0.06)	0,1	0,04
Belgium	0.23 (0.13)	0,1	0,05
Cyprus	-	-	0
Finland	0.18 (0.04)	0,25	0,03
France	0.26 (0.14)	0,12	0,28
Germany	0.21 (0.09)	0,15	0,37
Greece	-	-	0,03
Ireland	0.23 (0.09)	0,07	0,02
Italy	-	-	0,23
Netherlands	0.35 (0.14)	0,15	0,08
Portugal	0.98 (0.45)	0,32	0,02
Spain	0.21 (0.07)	0,14	0,12

*Sample 1980-2011

Inserting the data from Table 7 into (37), we obtain Ω.

Estimating ϕ

In order to obtain ϕ, we run the following regression:

$$(38)\quad Risk\ Premium 10yr\ Bonds = \phi\ (Amount\ of\ Sovereign\ Debt) + \xi$$

Where

$$Risk\ Premium = Country's\ Government\ 10yr\ Bond\ Yields - German\ Government\ 10yr\ Bond\ Yields$$

Notice that according to the above definition of Risk Premium (or spread) the German spread is always zero.

Table 8. Estimating ϕ

	ϕ	R-squared
Finland	0.03 (0.01)	0,22
France	0.02 (0.00)	0.25
Portugal	0.01 (0.00)	0,61
Spain	0.02 (0.00)	0,46

*Sample 1980-2011