Discretionary versus Automatic Public Expenditure *

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Abstract

One of the main issues in the analysis of fiscal policy is the identification of discretionary policy changes. In this paper using disaggregated data of fiscal variables I separate the public outlay into two components: discretionary and automatic expenditure. Stylized facts show that in OECD countries these aggregates of public spending have different properties in term of volatility, persistence and correlation with GDP. Moreover, discretionary expenditure is not related to the business cycle, both during expansions and recessions. Hence, I use this component to identify an exogenous Government spending shock and with a Bayesian SVAR model I assess its impact on economic activity.

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1 Introduction

The debate about the impact of public spending on economic activity and the size of fiscal multiplier ignited during the Great Recession. The disagreement among economists and policy makers concerned, first, the effectiveness of fiscal stimuli applied in advanced economies in 2008 and 2009 to recover the economic growth and, then, the consequences of fiscal consolidation carried out in the UK and in most of the countries in the Eurozone from 2010 to stabilize public debts.

Economic theories offer different explanations of how an increase in public expenditure affects the economic activity. On one hand, frictionless neoclassical models predict a fiscal multiplier smaller than one. A rise in public expenditure results in a smaller increase in output. Forward-looking agents anticipate an increase in future taxation and the fiscal stimulus has a negative wealth effect. As a consequence, private consumption is crowded out and the labor supply surges. Moreover, a reactive monetary policy that increases nominal interest rate reducing investments can dampen the initial stimulus.

On the other hand, New Keynesian models with sticky prices and wages justify a countercyclical public expenditure sustaining economic activity with a multiplier greater than one. In the opposite direction, a fiscal consolidation leads to a decline in aggregate demand and thereby in output. Recent works point out that a fiscal stimulus may be more effective in a context of liquidity trap (Christiano *et al.* (2009), Woodford (2011)) and financial constraints (Carillo and Poilly (2010) and Fernandez-Villaverde et al. (2011)). In the case of zero lower bound, the nominal interest rate does not rise in response to a fiscal stimulus and the real interest rate falls spurring investments. With financial frictions, if agents cannot perfectly smooth their consumption, the Ricardian equivalence principle does not hold and the current consumption tracks more closely the current income.

By contrast, the expansionary fiscal contraction hypothesis, developed by the seminal

paper of Giavazzi and Pagano (1990), suggests that a fiscal adjustment that relies on spending cuts may have a positive impact on economic activity, by reducing the risk premium in the short run and the tax burden in the long run. In this case the fiscal multiplier could even be negative.

Empirical works give different results and do not solve doubts about the size of fiscal multiplier. Ramey (2011) conducts a survey on the literature of fiscal multiplier based on SVAR models, and deduces that the U.S. aggregate multiplier for a temporary, deficit-financed increase in government purchases should be between 0.8 and 1.5. Auerbach and Gorodnichenko (2010) find that the range is larger, distinguishing between expansions (from -0.3 to 0.8) and contractions (from 1 to 3.6). So it is not possible to conclude whether the fiscal multiplier is below or above 1, validating either neoclassical or New Keynesian theory. In addition, results are highly sensitive to the set of identifying restrictions imposed on the models. Hence, while there is considerable agreement about the qualitative effect of a monetary policy shock using SVAR models, there is much uncertainty as to the impact of a fiscal policy shock adopting the same methodology.

A main obstacle to determine the size of fiscal multiplier is the endogeneity of fiscal variables to the business cycle and the simultaneity in the determination of output and the budget. Tax receipts reduce and social transfers increase during recessions and show reversed movements during expansions. Hence, in order to assess the impact of public expenditure on economic activity, the primary task is to separate exogenous changes in fiscal policy from cyclically-induced variations that could bias the estimation of the fiscal multiplier.

In this paper I use disaggregated data of Government spending to characterize a discretionary change in fiscal policy. Following Coricelli and Fiorito (2009), I differentiate the public outlay into two components: discretionary expenditure and automatic expenditure. Stylized facts for a panel of 15 OECD countries show that two spending components have different volatility and persistence. Discretionary expenditure can

be modified more easily, while automatic expenditure follows a more inertial path. In addition, discretionary expenditure turns out not to be related to the business cycle, while the automatic spending behaves as automatic stabilizers. Thus, I consider this distinction to identify a discretionary and exogenous Government spending shock in a Bayesian SVAR model for the US economy and I assess the impact of a Government spending shock on economic activity and inflation. The main innovation of the empirical analysis is that instead of considering the total primary public spending I use only its discretionary components, excludnig all the spending acting as automatic stabilizers. Results suggest that a fiscal stimulus has an expansionary effect on economic activity in the short run. However, analyzing episodes of recessions I find that fiscal authorities in OECD countries does not increase discretionary spending during downturns.

Section 2 is a literature review on the different methods used to identify exogenous changes in fiscal policy and discretionary spending. Section 3 introduces the alternative measure for discretionary expenditure and shows its statistical properties. Section 4 presents the methodology and the identification scheme used for the SVAR model. Section 5 shows the Impulse response function and assess the predictability of Government spending shock. Section 6 analyzes the evolution of discretionary spending during recessions and Section 7 concludes.

2 Literature Review

Two main contributions of the economic literature try to identify episodes of exogenous changes in fiscal policy stance in order to evaluate the effect of fiscal consolidation on growth. Alesina and Ardagna (2010) define a discretionary fiscal adjustment when the cyclically-adjusted primary balance (CAPB) improve by at least 1.5 percent of GDP. However, this indicator is subject to measurement errors and it presents two main flaws. First, the cyclical adjustments correct government receipts and transfers for the cycle

in economic activity, but do not adjust revenues for cycles in asset prices, resulting in changes in the CAPB that are not necessarily linked to policy action. As a consequence, the CAPB could be overestimated during phases of boom and underestimated during phases of bust. Second, it does not include episodes of fiscal contraction followed by countercyclical discretionary stimulus after an adverse shock that offsets the initial fiscal consolidation. [1]

In order to overcome these issues, the Chapter 3 of the IMF World Economic Outlook (October 2010) uses an alternative approach to identify episodes of exogenous fiscal consolidation. Examining policy documents, such as presidential speeches and Government reports, this study selects discretionary changes in taxes and government spending motivated by the desire to reduce the budget deficit and not by a response to prospective economic conditions. This narrative approach has been introduced by Romer and Romer (1989, 2010) to identify exogenous monetary policy changes and exogenous tax changes. However, the IMF study only refers to fiscal consolidation episodes and not fiscal stimuli and this procedure does not eliminate completely doubts about endogeneity.

Focusing only on the expenditure side, Barro (1981) and Barro and Redlick (2011) suggest consideration of the military spending in order to measure the discretionary public expenditure as it is less correlated to the business cycle. Following this idea, Ramey and Shapiro (1998) identify Government spending shock as changes in military builds-up that occurred for reasons unrelated to the state of the economy or prospective macroeconomic development (in particular they consider World War II, the Korean War, the Vietnam War and the 9/11). Similarly, Fisher and Peters (2009)) use stock returns of large military contractors to identify unanticipated government spending shocks. Ramey(2008) use the narrative aproach to construct a " defense news" variable to measure the expected discounted value of Government spending changes. However, it is ques-

[1] See Giruard and André (2005) for a methodological explanation of the measure of CAPB and Giruard and Price (2004) for a more detailed discussion on the limits of CAPB. See Alesina and Perotti (2005) for a review of statistical methods to measure discretionary fiscal impulses.

tionable that wars are completely unrelated to the business cycles and these episodes are characterized by good rationing and capacity constraint so that the transmission mechanism of fiscal policy during wartime and peaceful time could be different. Moreover, conflicts *per se* may have a direct impact on macroeconomic variables. For instance, during wars labor supply could increase following a buoyant patriotic sentiment and not as a consequence of an expansionary fiscal policy.

Finally, Fatás and Mihov use residuals of a panel regression of public spending on GDP and economic controls to determine a measure of discretionary fiscal policy independent from the business cycle. However, this unobservable measure is subject to measurement errors and and is sensitive to the econometric specification. Moreover if the model is well specified the residual should be white noise with zero persistence, which seems unrealistic for public expenditure.

3 Discretionary and automatic public expenditure

3.1 Definitions

The primary fiscal deficit (PFD) is the result of three components: discretionary expenditure (GD), automatic expenditure (GN) and total revenues (T): [2]

$$PFD = (GN + GD) - T$$

GD includes public intermediate consumption, public investments, capital transfer (unrequired payments from the government or the debt cancellation without any counterpart being received in return), and subsidies paid to firms. GN encompasses public wages and salaries, retirement benefits and transfers (payments to individual health, subsistence, children care, invalidity and unemployment compensation). The data appendix gives

[2] I do not consider Government interest payment as it is largely determined by past fiscal policies and financial conditions and avoiding inflation-adjustment problems.

more details about the variables used in the analysis.

Figure 1 and table 1 show that for all 15 OECD GD expenditure is greater than GN, which is around 1/3 of total public spending (except for Iceland 43.7%, Japan 51.7% and Netherland 48.3%) and during the recent crisis the composition of public expenditure does not vary significantly (except for Iceland where the discretionary expenditure sky-rockets to 51% of total public spending due to banking rescue plans). For discretionary expenditure the main item is intermediate consumption, which represents between 20% and 25% of total primary public expenditure (in Japan and Netherlands is respectively 30% and 35%, while in USA 17.5%). Public investments are only between 5% and 10% of total spending and in 2009 their share reduced in most of countries. Capital transfers paid and other capital payment and subsidies are both less than 5% in all countries (except for UK where capital transfers are 5.7% and for Austria where subsidies are 8%). Capital transfers is the item that grew most during the crisis as it includes government interventions to support financial sector (especially in Finland, Belgium, Iceland, Ireland, Netherlands and USA). [3] Japan is the only country to experience considerable subsidy expansion. Social security benefits are the main spending of automatic expenditure especially in Italy, Austria and USA where they account for more than 40% of the primary spending. Public salaries and wages are between 20% and 30% of primary spending (except for Nordic countries where it is between 30 and 40% and Japan where it is only 17%).

3.2 Stylized facts

Stylized facts for the two components of public spending show some regularity for 15 OECD countries and they justify the distinction between discretionary and automatic expenditure. I apply the Hodrick-Prescott filter to the logarithm of real variables to

[3]The OECD Economic Outlook No. 84 reports how financial rescue plans are reflected in fiscal position.

remove the trend and analyze properties of cyclical fluctuations. [4] Table 2 reports the volatility, the persistence and the comovements of the series. As suggested by Ravn and Uhlig (1997), I used a smoothing parameter of 6.25 adjusting with the fourth power of frequency ratios, as the OECD data are yearly. [5] Volatility is calculated as standard deviation and relative standard deviation with respect to the output. Persistence is computed with the Q statistics of the Ljung-Box test for autocorrelation.

Stylized facts on public spending show two common results for almost all countries. First, discretionary expenditure is at the same time more volatile and less persistent than automatic expenditure (except for France). Second, discretionary expenditure is not contemporaneously correlated with GDP (except for Sweden where it is negatively correlated). The correlation between GDP and discretionary spending is low also at one lead, excluding a delayed response of discretionary expenditure to the GDP. By contrast, automatic expenditure is negative correlated with GDP (except for Austria, Norway, Spain and Sweden where is not correlated and Iceland and Ireland where is positively correlated, probably due to the spending cuts during the recent recession). The first result confirms the distinction between the discretionary spending, which can be modified more swiftly being more volatile, and the automatic spending, which is more inertial being more persistent. The fact that discretionary spending has high volatility and low persistence means that the variability of the error component of the autoregressive process is high and we can interpret this parameter as a measure of the discretionality of spending. The second result suggests that discretionary expenditure is not related to the business cycle while non discretionary expenditure reacts negatively to the economic activity. This finding is consistent with Darby and Melitz (2008) who using the same database finds that not only unemployment compensation, but also age- and health-

[4] A similar exercise is carried out by Fiorito (1997) for disaggregated public disbursement and receipts for OECD countries.

[5] As robustness test I also applied a smoothing parameter of 100, as recommended by Backus and Kehoe (1992) and largely used in the literature. I do not find significant differences for the properties of the series.

related social expenditure and incapacity benefits all react to the cycle in a stabilizing manner. Similarly, Fiorito (1997) analyzing the stylized facts for disaggregated OECD data finds that transfers, not constituted by pensions only but also by welfare and social assistance grant, act as a timely cyclical stabilizers for OECD countries and the wage component of government consumption are countercyclical. Finally, the correlation between the two components of public spending is null or weak.

All in all, empirical evidence suggests that we can consider a measure of public spending that is not only discretionary but also exogenous to the economic activity. These properties allow to use this aggregate of public spening to identify episodes of discretionary fiscal adjustments and to evaluate the impact of a Government spending shock on the economy.

I also calculate the persistence of total Government revenues, cyclically-adjusted budget balance and budget balance. For all countries stylized facts show that total Government revenues are higly correlated with GDP and for many OECD countries the cyclically-adjusted balance is more persistent than budget balance, casting some doubts on this indicator in removing the effect of business cycle. Since discretionary spending is the only component of primary fiscal balance which does not comove with the business cycle I use this indicator as a measure of discretionary fiscal policy. I define a fiscal adjustment as a negative variation of discretionary spending higher than 1 percent of GDP and I compare it with the similar episodes calculated by Alesina and Ardagna (2010) and the IMF (2010) in table 3. We can see that it is not straightforward to distinguish different regimes of fiscal policy, since different indicators and statistical methods suggest different years of fiscal consolidation.

4 The effect of a discretionary spending shock

The Model

In this section I use the SVAR methodology to study the fiscal policy transmission mechanism considering only the discretionary component of the public spending that can be changed more quickly and it is not related to the business cycle, avoiding problems of endogeneity. I focus only on the USA economy since it is the only country for which quarterly OECD data for disaggregated Government spending are available. Indeed, yearly data in SVAR models can arise problems of time-varying aggregation as shown by Faust and Leeper (1997). I consider the reduced form specification:

$$X_t = A(L)X_{t-1} + u_t \tag{1}$$

X_t is the vector of endogenous variables that includes the logarithm of real GDP (Y), the logarithm of real discretionary public expenditure (GD), the logarithm of real total revenues (T), the federal fund rate (i) and the inflation rate (π). A(L) is a 4th-order lag polynomial and u_t is a vector of reduced form disturbance with $\mathrm{E}[u_t] = 0$, $\mathrm{E}[u_t u_t'] = \Sigma$ and $\mathrm{E}[u_t u_s'] = 0$ for t$\neq$s. The model comprises an intercept and a quadratic time trend to remove low frequencies.

Data are quarterly and cover the period from 1980:I to 2011:III taking account the the structural change in the US economy represented by the Great Moderation. [6] Perotti (2005) and Bilbiie *et al.* (2008) show that the transmission mechanism of fiscal policy modified after 1980 because of the change in the conduct of monetary policy and the consequence of the increse in asset market participation on private consumption.

The reduced form innovations are linear combinations of structural shocks: $u_t =$

[6] See the Data Appendix for a description of the data used in the SVAR

$A_0 e_t$, which are mutually independent and normalized to be variance 1. Hence:

$$\Sigma = E[u_t u_t'] = A_0 A_0' \tag{2}$$

Identification and estimation

The identification of the structural impact matrix A_0 is achieved via sign restrictions. This approach has been introduced in SVAR methodology by Uhlig (2005) to identify monetray policy shocks, and has been applied by Mountford and Uhlig (2009) and Pappa (2009) to identify fiscal policy shocks. [7]

Five structural shocks are identified: three standard shocks, supply (e_t^S) monetary policy (e_t^M), demand non-policy (e_t^D) and two fiscal shocks, Government spending (e_t^G) and Government revenue (e_t^T). The set of restrictions on the structural impact matrix at zero is summarised in the following table. This set of restrictions is sufficient to separate the various shocks from one another, achieving identication.

	Shocks				
Variables	e_t^S	e_t^M	e_t^D	e_t^G	e_t^T
GDP	+	-	+	+	-
GD				+	
T		-	+	+	+
i		+	+	+	-
π	-	-	+	+	-

[7] Canova and De Nicolo' (2002) impose sign restrictions on the cross-correlations between the variables in response to shocks, rather than directly on the Impulse Response Functions

The benchamark for this identification is Mountford and Uhlig (2009). With respect to them, I add one more shock to disantangle the effect of a shock in Government expenditure from a shock in demand non-policy. In addition, I impose more restrictions to the shocks. At the cost of many additional hypothesis, I use more information to increase the precisions of results as stressed by Paustian (2007). Finally, restrictions are imposed only on impact and not for four quarters after the shock.

The identification of supply, monetary policy and non-demand policy shocks is close to the scheme of Benati (2008). The transitory supply shock is identified as a shock that has a positive impact on GDP and a negative impact on inflation, while fiscal variable are left unconstrained. Monetary policy shock is characterised by a rise in the federal fund rate and a consequent decrease in GDP, Government revenues and inflation. The demand non-policy shock has a positive impact on GDP, Government revenues, the federal fund rate and the inflation. Following Forni and Gambetti (2010), the Government spending shock is characterized as a shock having a positive impact on Government expenditure, GDP, federal fund rate, inflation and tax receipts. The positive effect on GDP and inflation is imposed to distinguish the shock from a systematic spending reaction to a recessionary shock stemming from the private sector. The positive effect on tax revenues means that expenditure is not totally deficit-financed even though I do not impose a balanced budget. The Government revenues shock has a a postive impact on Government revenues, while has a negative impact on GDP and the federal fund rate.

The structural impact matrix A_0 is computed via the procedure introduced by Rubio-Ramirez *et al.* (2010), to ensure that it respects equation (2) and satisfies the imposed pattern of signs. Specifically, let $\Sigma = PDP'$ be the eigenvalue-eigenvector decomposition of the VAR's covariance matrix Σ and let $\tilde{A}_0 = PD^{\frac{1}{2}}$. I draw a NxN matrix K from the N(0,1) distributions, I take the QR decomposition of K - that is, I compute matrices Q and R such that K = QR - and I compute the structural matrix as $A_0 = \tilde{A}_0 Q'$, with

Q'Q=I. If the draw satisfies the restrictions I keep it, otherwise I discard it and I repeat the procedure until the restrictions are satisfied.

The VAR coefficients matrices and the variance-covariance matrix are estimated by the Bayesian method adopted by Uhlig (2005). The parameters are drawn jointly from a prior proportional to a Normal-Wishart density. To draw inference from the posterior I take 1000 draws from the VAR coefficients and variance-covariance matrix of the reduced-form residuals. For each draw I calculate the impulse response function, and if the sign restrictions are satisfied I keep the draw, otherwise i proceed to the next. The draws which has been kept are used to calculate errors bands.

5 Results

Generalized impulse response function

Figures 2-6 display the generalized impulse responses (GIRF) to a transitory supply, monetary policy, Government expenditure and Government revenues shocks. The black line represents the median and red lines the 16% and 84% quantiles. Figure 2 shows the effect of a positive supply shock. As restrictions impose, real GDP increases on impact but the effect is temporary as the shock is absorbed after 4 quarters. The reaction of inflation is negative and persistent, suggesting that price adjustment is sluggish. Discretionary expenditure, which is left unconstrained, does not contemporaneously react to a supply shock, confirming that this aggregate of public spending is inelastic to the business cycle. On the other hand, Government revenues track the reaction of GDP, since its elasticity is high

Figure 3 shows the effect of a negative monetary policy shock. The tightening of monetary policy has a contractionary effect on GDP in the short term and a persistent negative impact on inflation. The effects of supply and monetary policy shocks on output and inflation are in line with the finding of Benati (2008). Government revenues react

negatively to the tightening of monetary policy, while Government expenditure react positively on impact. The response of fiscal variables to a monetary policy shock is different from Mountford and Uhlig (2009) who find that total primary Government spending does nor react contemporaneously and Government revenues net the transfers increases persistently.

Figure 5 displays the effect of a positive Government spending shock. This shock has a keynesian effect in the short run. GDP increases with a peak after 3 quarters and it reverts after one year. Reversing the sign of the shock, a fiscal adjustment based on spending cuts has a contractionary effect on GDP in the short run. The increase in Government spending has a positive and transitory impact on inflation that increases for 5 quarters.

Figure 6 shows the effect of a positive Government revenues shock. The response of GDP is negative in the short run, but after 3 quarters it becomes positive for 12 quarters with a peak in the 6th quarter. The revenue shock is also accompanied by a reduction in Government spending in the second quarter, while inflation decreases persistently for 10 quarters. The contractionary effect of fiscal adjustment based on tax hikes and spending cuts has a similar effect on economic activity in the short term, but it seems expansionary in case of tax hikes in the medium term

5.1 Predictability of Government spending shock

Having assumed sign restrictions on impact in the SVAR identification, it is crucial to verify the predictability of discretionary spending shock. Because of the lag between the legislative decision and the implementation of fiscal measures (outside lag), private agents can anticipate fiscal policy changes, so the estimation of the impact of public spending shock on the economy may be biased. Empirical evidence based on reduced-form and case studies well documents that private agents respond to expected changes of tax

rates [8] Instead, Government spending foresight has received relatively little attention. Ramey (2009) assess whether the Surveys of Professional Forecasters Granger-causes Government spending shock calculated as residual from a VAR model. She concludes that Government spending shock is predicted by private forecasts. Analogously, Forni and Gambetti (2010), test if Government shock obtained from a structural factor model is Granger-caused by professional forecasts.

Following Ramey (2009), I consider the government spending growth from the Surveys of Professional Forecasters published by the Federal Reserve Bank of Philadelphia from the third quarter of 1981. I assess if one-quarter ahead professional forecasts Granger-cause the discretionary public spending shock. Table 4 shows that professional forecasts do not predict the shock at a confidence level of 0.05. This result may suggest that the interventions of fiscal authority to modify discretionary public spending are less anticipated than for total spending, as it represents the component that can be adjusted more swiftly and easily. For instance, a change in the public intermediate consumption is less complex than a reform to modify retirement system, whose implementation may occur with some lags and consequently its effects are anticipated by private agents

6 Discretionary public expenditure during recessions

I examine the dynamics of discretionary expenditure during recessions to assess how fiscal authorities react during a downturn and verify a possible non-linearity between discretionary expenditure and economic activity. In section 3.2 I showed stylized facts for the whole business cycle, here I focus only on the year of a contraction of economic activity.

In particular, I analyze the cyclical deviations of discretionary spending from its trend during recessions, defined as negative variation of real GDP, and negative cycles,

[8] See Leeper*et al.* (2009) for a survey.

characterized by a negative output gap. I calculate the average of the square of the cyclical deviations. Although this indicator cannot gauge the procyclicality or countercyclicality of the discretionary expenditure, it evaluates the intensity of the response of fiscal policy. For instance, if in recessions the square of deviations is higher than in expansions it means that fiscal authorities are more active during downturns. I compare the cycles of discretionary expenditure during recessions and expansions, with positive and negative output gap and for the 4 possible combinations of recessions-expansions and positive-negative output gap, following Coricelli and Fiorito (2009). In particular, phase 1 is an expansion with a positive output gap, phase 2 is a contraction with a positive output gap, phase 3 is a contraction with a negative output gap and phase 4 is an expansion with a negative output gap. I also differentiate between mild recessions (GDP growth between 0% and -2%) and strong recessions (GDP growth less than -2%). Table 5 reports the averages of the squares of deviations of discretionary expenditure during different states of business cycle. The countries considered experience 74 episodes of recessions and 574 episodes of expansions, while for 308 periods the economy is above its trend and for 340 is below. Deviations from the trend are slightly higher during recessions than during expansions, but surprisingly the highest values are associated with mild recessions and not with strong recessions neither with the Great Recessions. Moreover, fiscal policy is more active when the output gap is positive than when it is negative. Decomposing the business cycle in four stages, we can see that for the discretionary expenditure the cycles are bigger when the economy is contracting and below its trend, but there is not a significative difference with the other phases. [9] All in all, it does not emerge a diverging behavior of fiscal authorities during different business cycle stages. Figure 1 plots the cycles of discretionary expenditure and the cycles of GDP. Discretionary expenditure seems to be completely inelastic to the output gap.

[9]From the database I drop the observation for Ireland 2010, as the magnitude of the deviation is very high and its presence alter the general results, so I treat it as an outlier. Considering this observation the average of the square of the deviations of discretionary expenditure are considerably higher in the phase 3

To confirm this finding, I construct a window of 3 years before and after a recession. During this interval I calculate the average of discretionary expenditure over GDP and the average of discretionary expenditure over the total primary spending. When a recession lasts for a longer period of time, only the year with a deeper fall in output is considered, and when an overlapping year belongs to two different spells I retain the year in the aftermath of a recession. Figure 7 displays that the ratio of GD over GDP is almost flat during recessions and the slight increase is mostly due to the reduction of GDP. In addition, there are not significant changes in the composition of the primary public expenditure, as shown by figure 8. Thus, the different spending items are complement one another and not substitute during recessions. I differentiate between shallow recessions (contraction of GDP less than 1%) and deep recessions (contraction of GDP more than 1%) and between the Great Recession (2008-2010) and previous recessions to verify if the evolution of discretionary expenditure changes in different episodes. No differences emerge.

Table 6 matches the episodes of fiscal expansion, defined as an increase in discretionary expenditure more than 1.5 percent of GDP, with recessions. Only few cases of fiscal stimuli occurred in a recessionary year. Similar results are obtained considering the year after a recession to take into account a possible implementation lag.

If the discretionary expenditure is quite stable during the Great Recession, what are the drivers for the surge in primary deficit, which most accounts for the debt-to-GDP ratio increase in Euro countries? I compare the evolution of the three components of primary deficit (GD, GN and T) during the Great Recession, calculating the contribution of each component for the variation of primary balance. In 2009 all countries experienced a worsening of the primary balance with respect to 2007. In all cases, this deterioration of public accounts is due to the reduction in total revenue and not to an increase in public spending. Concerning the expenditure side, Tables 7 and 8 show the evolution of Government spending aggregates in percentage of GDP and the total public

spending from 2007 to 2009. The total public spending over GDP ratio increases in all the countries. This variation is mostly due to a rise in the automatic expenditure. Indeed, in all the country - except Japan, Netherlands, Sweden and UK - the variation of the discretionary expenditure accounts for less than 50% of the increase in total public expenditure over GDP and the share of the discretionary expenditure enhances slightly and in Austria, Ireland, Spain and USA it decreases. Among the components of the discretionary expenditure less resources are devoted for public investments whose share declines in all the countries, but Austria, Norway, Sweden and UK, while the share of capital transfers expands especially in Ireland, Iceland, Netherlands, UK and USA because of the rescue plans for the banking system.

7 Conclusions

Primary public expenditure can be divided into two components with different properties: discretionary and automatic expenditure. The discretionary spending is exogenous to the business cycle and it is more volatile and less persistence suggesting that this aggregate is more easy to modify for fiscal authorities. For these reasons, I evaluated the impact of a discretionary Government spending shock using a SVAR model. Results suggest that a fiscal stimulus has an expansionary effect only in the short run and it increases inflation. However, during the past recessionary episodes Governments did not use discretionary spending to stimulate the economy. Moreover, as in all countries discretionary spending is relative low fiscal authorities have less scope for the interventions to sustain economic activity.

Further research will consider a nonlinear SVAR model in order to analyze the effect of a variation in discretionary spending during different phases of the business cycle and different economic environment.

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Table 1: Primary Government Spending

	% of total primary spending		% of GDP	
	Mean	St. Dev.	Mean	St. Dev.
Government final non-wage consumption	21.3	4.8	8.8	2.1
Government fixed capital formation	7.6	3.2	3.1	0.9
Capital Transfers paid and other capital payments	3.2	1.3	4.3	2.2
Subsidies	4.3	2.2	1.8	1.0
Government final wage consumption	29.3	4.9	12.2	2.9
Social security benefits paid by general government	34.1	6.2	14.4	3.8
Discretionary expenditure	36.6	7.0	15.1	2.8
Automatic expenditure	63.4	7.0	26.7	5.8
Total Primary expenditure	100		41.8	6.4

Source: Author's calculation

Table 2: Stylized facts

VARIABLES	Stand.Dev.		Corr(G(t-j),Y(t))			Corr(GD,GN)	Persistence
	%	relative	-1	0	+1		
AUSTRIA (1960:2010)							
GD	3.12	2.89	-0.20	-0.03	0.08	-0.236	12.19
GN	1.22	1.13	-0.06	-0.06	-0.18	(0.175)	19.90
Y	1.08	1					23.67
BELGIUM (1980:2010)							
GD	3.76	3.93	0.07	-0.16	0.11	0.123	18.07
GN	1.17	1.22	-0.32	-0.64	-0.13	(0.148)	21.50
Y	0.96	1					14.98
DENMARK (1970:2010)							
GD	2.53	1.76	-0.23	0.06	-0.03	0.047	7.59
GN	1.43	0.99	-0.03	-0.55	-0.46	(0.154)	46.80
Y	1.45	1					22.01
FINLAND (1970:2010)							
GD	2.30	1.06	-0.13	-0.01	0.02	0.093	13.87
GN	2.04	0.95	-0.39	-0.55	-0.16	(0.150)	29.25
Y	2.16	1					34.89
FRANCE (1978:2010)							
GD	0.98	1.07	0.07	-0.08	0.22	-0.038	12.40
GN	0.82	0.89	-0.06	-0.45	-0.29	(0.161)	10.01
Y	0.92	1					26.15
ICELAND (1980:2010)							
GD	10.49	4.46	-0.22	0.13	0.23	-0.17	3.68
GN	4.48	1.91	0.08	0.48	0.41	(0.171)	36.40
Y	2.35	1					28.90
IRELAND (1990:2010)							
GD	15.37	7.44	-0.25	-0.27	-0.40	0.23	9.33
GN	4.48	1.91	0.08	0.48	0.41	(0.171)	36.40
Y	2.06	1					17.17
ITALY (1963:2010)							
GD	2.66	2.13	0.09	-0.13	0.14	-0.42	15.74
GN	1.86	1.49	0.01	-0.34	0.00	(0.168)	20.41
Y	1.24	1					26.60

VARIABLES	Stand.Dev.		Corr(G(t-j),Y(t))			Corr(GD,GN)	Persistence
	%	relative	-1	0	+1		
JAPAN (1966:2010)							
GD	3.95	2.70	0.15	-0.06	-0.04	-0.081	14.05
GN	1.19	0.82	-0.05	-0.29	-0.28	(0.164)	8.86
Y	1.46	1					13.17
NETHERLANDS (1969:2010)							
GD	4.26	3.88	-0.20	-0.04	0.15	0.015	11.53
GN	1.35	1.23	-0.32	-0.41	0.06	(0.156)	16.03
Y	1.09	1					27.42
NORWAY (1962:2010)							
GD	1.71	1.67	-0.38	-0.23	0.00	0.211	20.04
GN	1.14	1.11	-0.37	-0.07	-0.09	(0.141)	29.47
Y	1.45	1					22.01
SPAIN (1965:2010)							
GD	3.42	3.01	-0.05	-0.11	0.17	-0.041	16.92
GN	1.90	1.68	-0.29	-0.151	0.26	(0.161)	20.31
Y	1.13	1					19.85
SWEDEN (1963:2010)							
GD	3.20	2.24	-0.21	-0.38	-0.20	0.297	17.88
GN	1.40	0.98	-0.02	0.03	0.08	(0.132)	29.41
Y	1.42	1					25.08
UK (1970:2010)							
GD	3.47	2.45	-0.41	-0.02	0.26	-0.02	12.58
GN	1.88	1.33	-0.10	-0.64	-0.45	(0.159)	21.12
Y	1.41	1					27.17
USA (1960:2010)							
GD	2.22	1.56	-0.23	-0.26	0.21	0.417	30.72
GN	1.33	0.94	-0.01	-0.54	-0.40	(0.131)	27.01
Y	1.42	1					33.89

Source:Author's calculation

Note: The standard errors for the correlation of GD and GN are in parenthesis. Persistence is calculated by the Ljung-Box statistics with 10 lags. All series are deflated, in logarithms and detrended with the HP filter applied with a smoothing parameter of 6.25

Table 3: Large Discretionary Contraction Episodes

COUNTRY	Author's Calculations	IMF Calculations	Alesina and Ardagna's Calculations
AUSTRIA	2001, 2004	1981, 1997	Not reported
BELGIUM	1983, 2005	1982, 1983 , 1987	1982, 1984, 1987,2006
DENMARK	1981, 1982	1983, 1984	1983, 1984, 1985, 1986, 2005
FINLAND	1990	1993, 1994, 1995	1981, 1984,1988, 1994, 1996, 1998, 2000
FRANCE	1981, 1982, 1984		
IRELAND	1982, 1982, 1990, 1999, 2001, 2007, 2008, 2010	1987, 1998, 2009	1984, 1987, 1988, 1989, 2000
ITALY	1998, 2001	1991, 1992, 1993, 1994, 1995, 1996	1980, 1982, 1990, 1991, 1992, 1997, 2007
JAPAN	1998, 2005		1984, 1999, 2001, 2006
NETHERLANDS	1995, 2001, 2002, 2006, 2007, 2008, 2009	1981, 1982, 1983, 1984, 1985, 1986, 2004	Not reported
SPAIN	1981, 1982, 1983, 1984, 1985, 1989, 1990, 1993, 2004	1983, 1994, 1996, 1997	1986, 1987, 1994, 1996
SWEDEN	1982, 1983, 1989, 1992, 1999	1993, 1995, 1996	1981, 1983, 1984, 1986, 1987, 1994, 1996, 1997, 2004
UK	1981, 1989, 1990, 2001, 2003, 2008		1982, 1988, 1996, 1997, 1998, 2000
USA			

Source: IMF WEO October 2010 and author's calculation

Table 4: Granger-causality test

H_0: private forecasts do not Granger-cause discretionary spending shock	
F-stat	critical value
2.9689	3.9229

Note: For the professional forecaster test, the VAR shock in period t is regressed on the forecast made in period t-1 of the growth rate of real federal spending from t-1 to t. The Number of lags in the model is chosen according to the BIC criterion. Alpha=0.05

Table 5: Average of Square of cyclical deviations of Discretionary expenditure during different phases of business cycle

Phase of business cycle	Cyclical deviations (%)	Number of episodes
Recessions	.183	73
Expansions	.148	574
Mild recessions	.276	24
Strong recessions	.137	49
Great recession	.141	27
Negative output gap	.123	339
Positive output gap	.184	308
Phase 1	.187	290
Phase 2	.153	18
Phase 3	.193	55
Phase 4	.109	284

Table 6: Fiscal Stimuli and Recessions

COUNTRY	FISCAL EXPANSIONS
AUSTRIA	2001, 2004
BELGIUM	1983, 2005
DENMARK	**1981**,**1982**
FINLAND	1990
FRANCE	1981, 1982, 1984
ICELAND	1981, 1982, **1983**, 1984, 1985, 1986, **1988**, 1989, 1990, **1991**, 1999, 2001, 2006, 2007, 2008
IRELAND	1982, 1982, 1990, 1999, 2001, 2007, **2008**, **2010**
ITALY	1998, 2001
JAPAN	**1998**, 2005
NETHERLANDS	1995, 2001, 2002, 2006, 2007, 2008, **2009**
NORWAY	1986, 1987
SPAIN	**1981**, 1982, 1983, 1984, 1985, 1989, 1990, **1993**, 2004
SWEDEN	1982, 1983, 1989, **1992**, 1999
UK	**1981**, 1989, 1990, 2001, 2003, 2008
USA	

Source: Author's calculation
Note: In bold the years of recessions

Table 7: Differences of Government Spending Components (% of GDP) between 2007 and 2009

Country	Δtot	Δgd	gd/tot	Δcgnw	Δigaa	Δtsub	Δtkpg
Austria	4.15	1.37	32.97	0.98	0.12	0.34	-0.08
Belgium	5.07	2.17	42.69	1.31	0.11	0.27	0.48
Denemark	6.64	2.05	30.91	1.32	0.16	0.42	0.14
Finland	7.16	2.44	34.05	1.72	0.36	0.14	0.22
France	3.80	1.41	37.21	0.93	0.14	0.26	0.08
Iceland	4.72	2.18	46.11	2.13	-0.67	0.09	0.63
Ireland	10.35	3.14	30.36	1.01	-0.56	0.10	2.60
Italy	4.25	1.53	35.89	1.12	0.17	0.06	0.17
Japan	5.27	2.72	51.65	1.81	0.29	0.18	0.45
Netherlands	6.62	4.48	67.68	2.56	0.45	0.31	1.16
Norway	5.71	2.25	39.40	1.40	0.54	0.32	-0.01
Spain	6.57	1.79	27.29	1.25	0.42	0.06	0.07
Sweden	4.18	2.46	58.68	1.92	0.48	0.10	-0.04
UK	6.82	3.68	53.91	1.78	0.79	0.01	1.09
USA	5.88	1.81	30.83	0.48	0.37	0.04	0.92

Table 8: Differences of Government Spending Components (% of Total public spending) between 2007 and 2009

Country	Δgd	Δcgnw	Δigaa	Δtsub	Δtkpg
Austria	-0.37	0.23	0.04	0.06	-0.70
Belgium	0.71	0.09	-0.17	0.08	0.71
Denemark	0.10	-0.05	-0.21	0.19	0.17
Finland	0.45	0.42	-0.14	-0.18	0.35
France	0.22	0.18	-0.25	0.28	0.01
Iceland	0.27	2.21	-2.93	-0.35	1.34
Ireland	-2.02	-2.55	-4.64	-0.11	5.28
Italy	0.20	0.45	-0.14	-0.10	-0.02
Japan	0.44	-0.05	-0.49	0.23	0.74
Netherlands	2.25	-0.15	-0.20	0.23	2.37
Norway	0.78	0.62	0.12	0.08	-0.05
Spain	-1.94	-0.48	-0.72	-0.32	-0.42
Sweden	2.13	1.89	0.39	-0.06	-0.10
UK	2.68	-0.14	1.02	-0.14	1.94
USA	-0.11	-1.70	-0.60	-0.09	2.28

Figure 1: Discretionary and automatic public expenditure over GDP

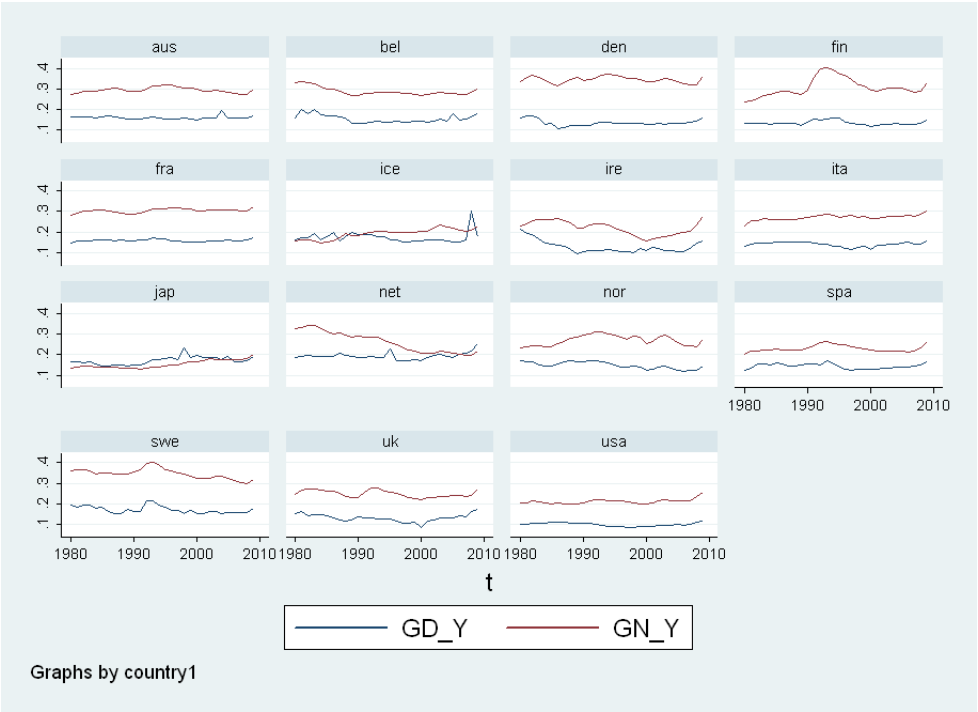


Figure 2: Supply shock

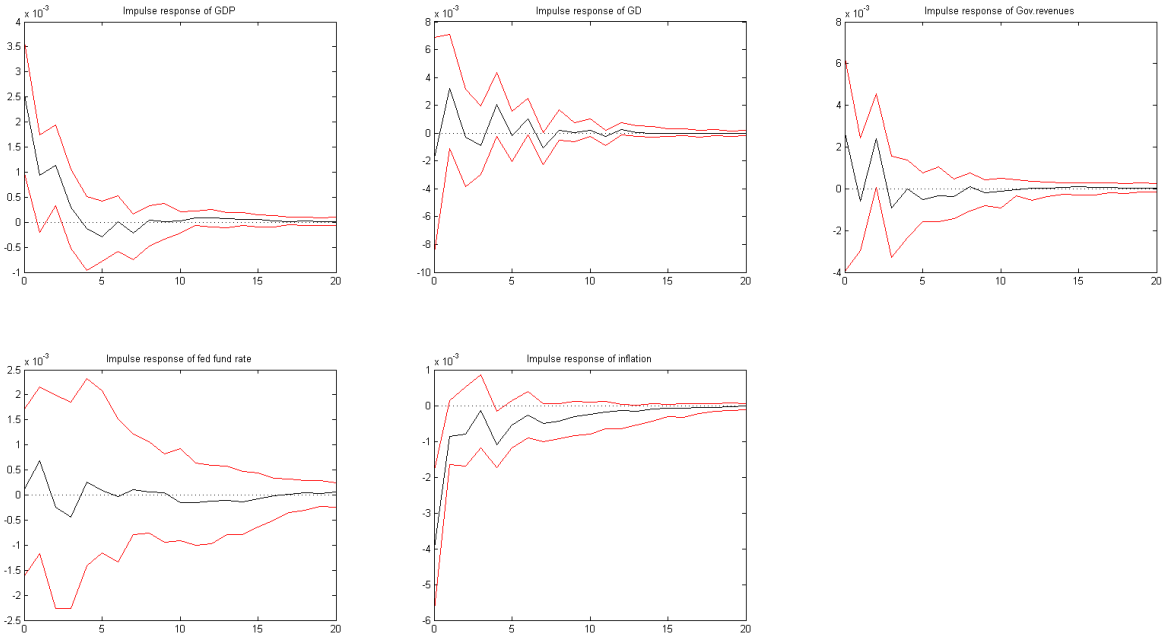


Figure 3: Contractionary monetary policy shock

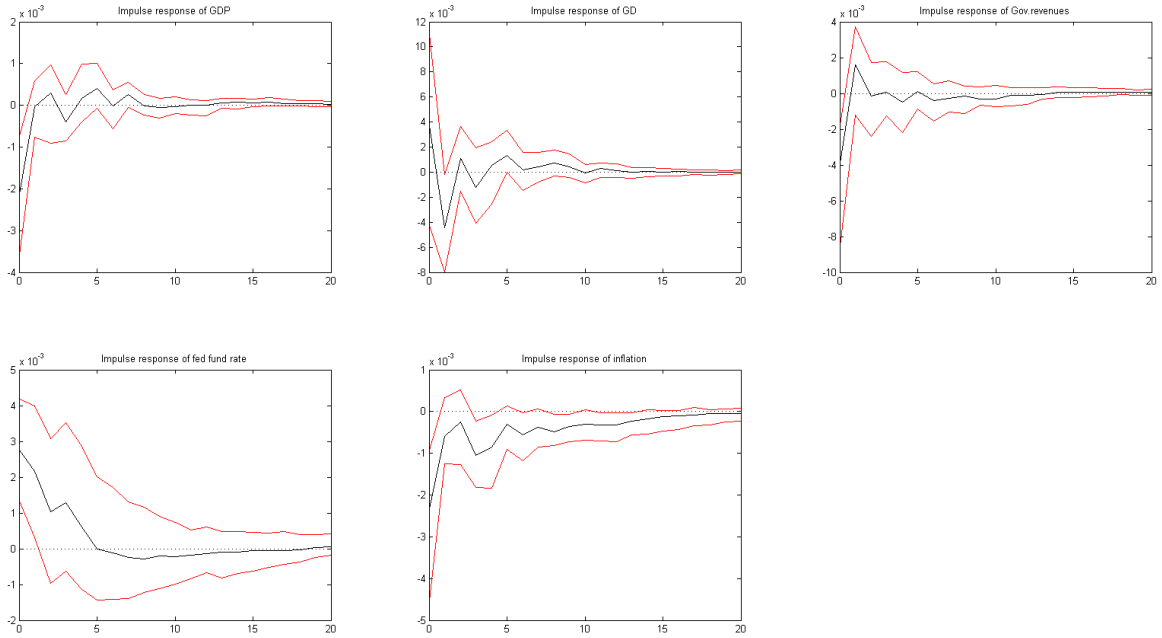


Figure 4: Demand non-policy shock

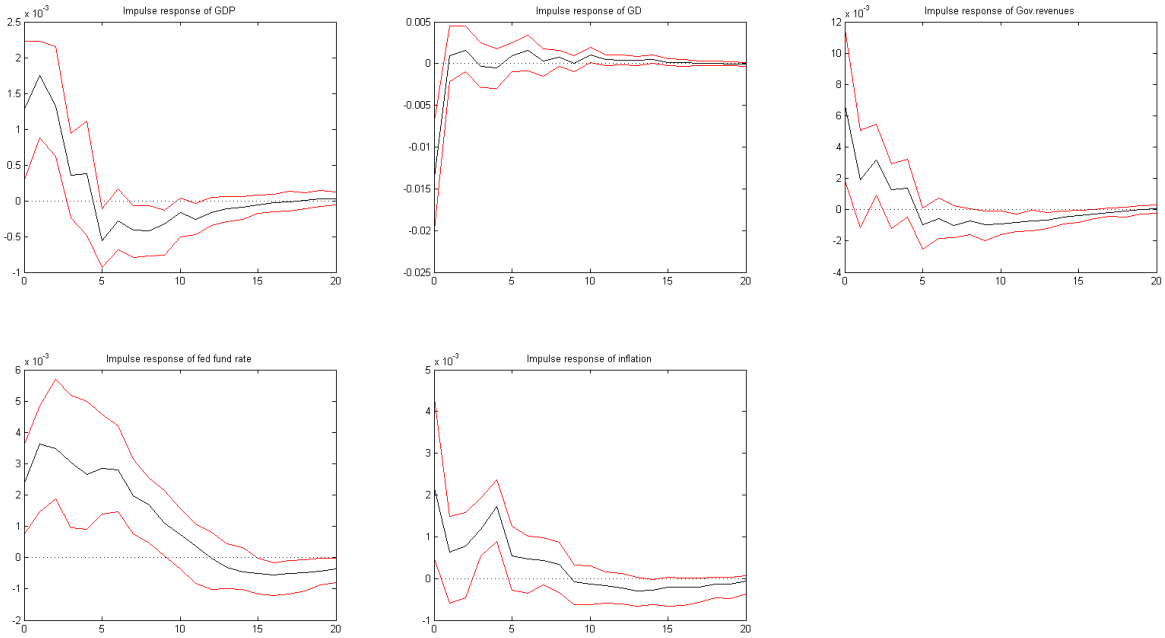


Figure 5: Expenditure shock

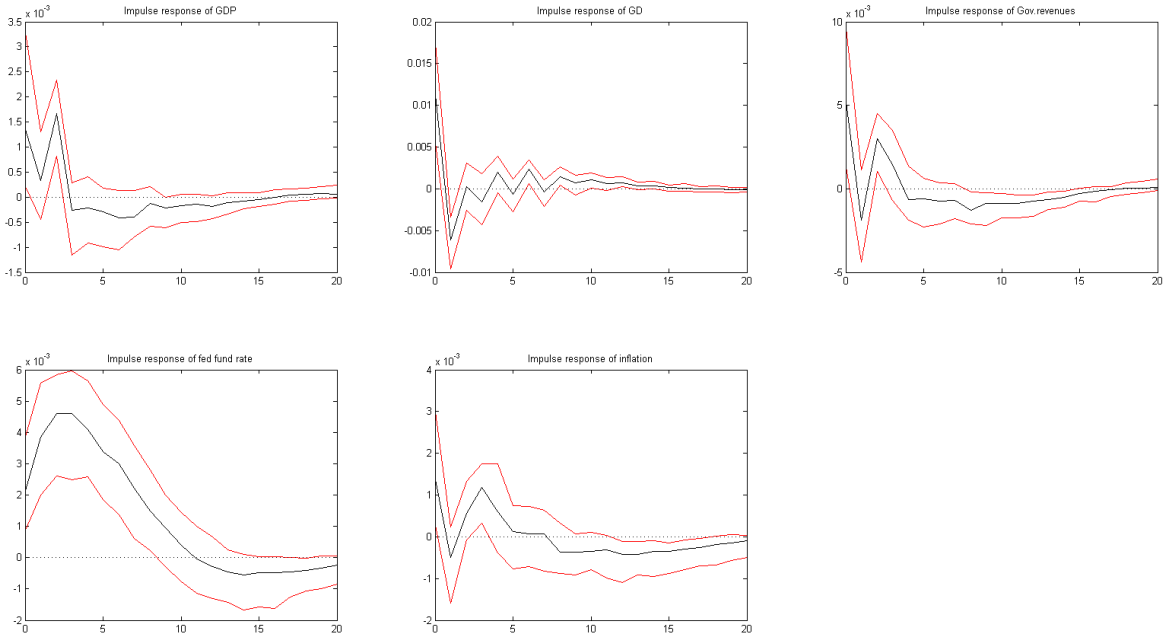


Figure 6: Revenue shock

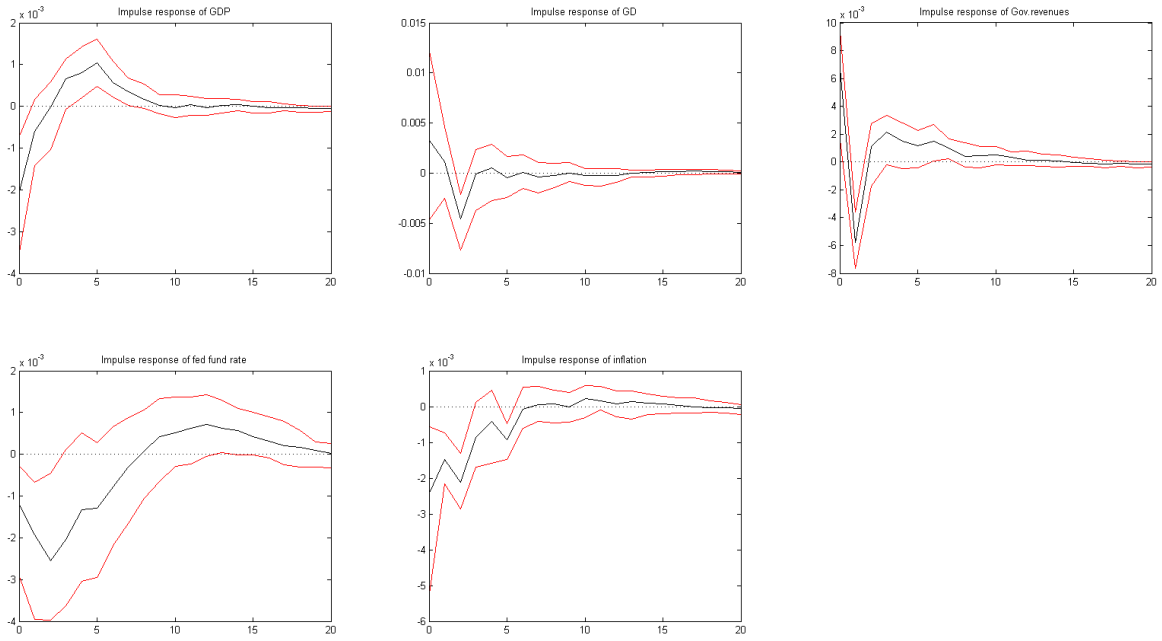


Figure 7: The average of GD / GDP during recessions

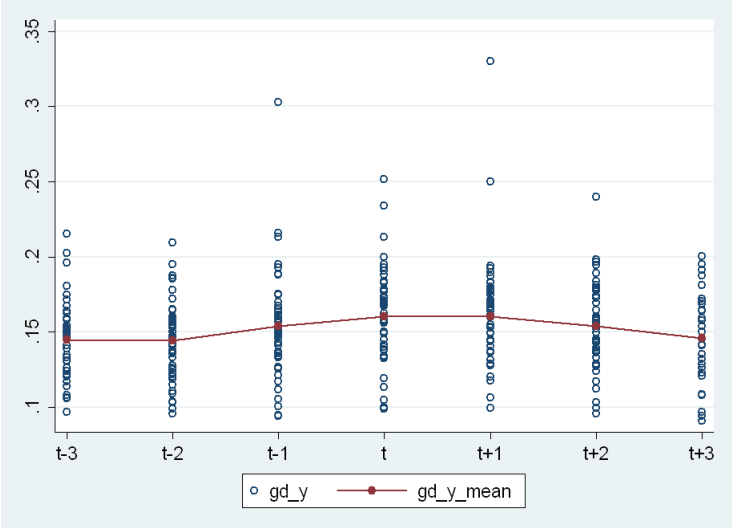
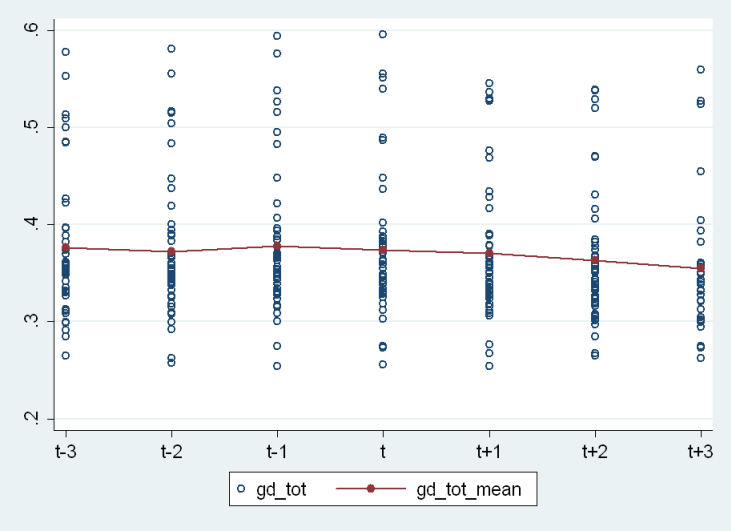


Figure 8: The average of GD / total public spending during recessions



Data appendix

This appendix provides details on data source and data definitions

7.1 Data for discretionary and automatic public expenditure

Data are extracted from the OECD Economic Outlook No. 90 (December 2011)

GOVERNMENT ACCOUNTS:

CGNW: Government final non-wage consumption expenditure, value

CGW: Government final wage consumption expenditure, value

CG: Government Total Consumption, value (CGWN+CGW)

GGFL: General government gross financial liabilities, value

IGAA: Government fixed capital formation, value, appropriation account

NLGX: Government primary balance, value

SSPG: Social security benefits paid by general government, value

TKPG: Capital Transfers paid and other capital payments, value

TSUB: Subsidies, value

NLGXA: Cyclically adjusted government primary balance, value

DEFLATORS:

PCG: Government final consumption expenditure, deflator

PCGW: Government final wage consumption expenditure, deflator

PCP: Private final consumption expenditure, deflator

PGDP: Gross domestic product, deflator, market prices

PIG: Government fixed capital formation, deflator

PIT: Gross total fixed capital formation, deflator

REAL VARIABLES:

IGAAQ = IGAA / PIG CGWNQ = CGWN / PCGWN

CGQ = CG / PCG

CGNWQ = CGQ – CGWQ

TSUBQ = TSUB / PGDP

SSPGQ = SSPG / PCP

GDPQ = GDP / PGDP

TKPGQ = TKPG / PIG

[10]

AGGREGATE SPENDING:

Discretionary expenditure: GD = IGAA + CGNW + TKPG + TSUB

Automatic expenditure: GN = SSPG + CGW

7.2 Data for SVAR

Seasonally adjusted series for real GDP and the GDP deflator (acronymus are GDPC1 and GDPPCTPI respectively) are from the Bureau of Economic Analysis. Quarterly average of effective federal fund rate (acronymus is FEDFUNDS) is from the Board of Governors of the Federal Reserve System. Quarterly data for fiscal variables are from the OECD Economic Outlook No. 90. Real discretionary government expenditure is the sum of real Government final non-wage consumption expenditure, real Government fixed capital formation and real capital transfers paid and other capital payments. Subsidies are not included as they are not available in quarterly data. Governmenet revenues are Total receipts, general government (acronymus YRGT). Surveys of Professional Forecasters is from the Federal Reserve Bank of Philadelphia. Data are the mean response on Real Federal Government Consumption Expenditures & Gross Investment (RFEDGOV)

[10] for Italy and Spain IGAA and TKPG have been deflated by PIT as PIG is not available