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Introduction

This work analysis micro and macro aspect of applied fiscal policy issues and it is divided in three chapters.

The aim of the first one is to investigate the extent to which local budget spending composition reacts to fiscal rules variations. I consider the budget of Italian municipalities and exploit specific changes in the Domestic Stability Pact's rules, to perform a difference-in-discontinuities analysis. The results show that not all rules are equally effective: imposing a cap on the total amount of consumption and investment is not as binding as two caps, one specific for consumption and a different one for investment spending. More specifically, the consumption variation is triggered by changes in the level of wages and services spending, while investment relies on infrastructure movements. In addition, there is evidence that when an increase in investment is achieved, there is also a higher budget deficit level.

The second chapter intends to analyze the extent to which fiscal policy shocks are able to affect macrovariables during business cycle fluctuations, differentiating among three intervention channels: public taxation, consumption and investment. The econometric methodology implemented is a Panel Vector Autoregressive model with a structural characterization. The sample includes 11 countries of the EMU using quarterly data in the period between 1999 and 2012. The results show that fiscal shocks have different multipliers in relation to expansion or contraction periods: output does not react during good times while there are significant effects in bad ones.

The third paper attempts to evaluate the effects of fiscal policy announcements by the Italian government on the long-term sovereign bond spread of Italy relative to Germany. After collecting data on relevant fiscal policy announcements, we perform an econometric comparative analysis between the three cabinets that followed one another during the period 2009-2013. The results suggest that only fiscal policy announcements made by members of Monti's cabinet have been effective in influencing significantly the Italian spread in the expected direction, revealing a remarkable credibility gap between Berlusconi's and Letta's governments with respect to Monti's administration.

Chapter 1

Fiscal rules and public spending: Evidence from Italian municipalities

Abstract

The aim of this chapter is to investigate the extent to which local budget spending composition reacts to fiscal rules variations. I consider the budget of Italian municipalities and exploit specific changes in the Domestic Stability Pact's rules, to perform a difference-in-discontinuities analysis. The results show that not all rules are equally effective: imposing a cap on the total amount of consumption and investment is not as binding as two caps, one specific for consumption and a different one for investment spending. More specifically, the consumption variation is triggered by changes in the level of wages and services spending, while investment relies on infrastructure movements. In addition, there is evidence that when an increase in investment is achieved, there is also a higher budget deficit level.

JEL codes: C21, C23, H72, H74, H77.
Key words: Fiscal rules, Difference-in-discontinuities, Public spending, Consumption, Investment, Deficit, Italian Municipalities.

1.1 Introduction

Rules for coordinating the financial relationship among different levels of government have the purpose of guaranteeing both macroeconomic stability and financial sustainability. The rationale of fiscal rules stems from two main concepts. The first one is the common pool problem, whereby the presence of imbalances financed by the common pool of national taxes through central transfers generates an incentive for local governments to excessively increase local expenditure (Rodden, 2002). The second concept is related to the fact that whenever a local administration defaults, the national level generally intervenes with transfers of more resources to the local level. This creates an insurance effect and a problem of moral hazard.

In case of Italy, local governments are subject to financial distress. As shown in Figure 1.1, in the period between 1989 and 2012 there are 460 municipalities where a default occurred[1]. This situation creates social and financial instability at the local level and might also affect the national level if the central government needs to reallocate resources. Indeed, a recent judgment of the European Court of Human Rights point in this direction[2]. In fact, the Court states that when a m suffers financial distress, the Central level has to guarantee for its debt refund. Consequently, fiscal rules play a central role and their ability to affect budget decisions is crucial.

Beyond this, subnational rules could also be implemented with the aim of fostering virtuous behaviors. Public spending can focus on consumption or investment. Ganelli and Tervala (2010) affirm that the reallocation of consumption in favor of capital spending might generate welfare gains. In the case of Italian municipalities, the amount of consumption compared to investment spending has changed over time. As shown in Figure 1, the overall consumption of municipalities was 3.96% of GDP in 1990, while investment was 2.47%. The distance between these two types of spending subsequently decreased in the following years: in 2005 consumption and investment reached 3.32%

[1]In addition, from the mid-1990s onwards, decentralized governments have made significant recourse to financial tools such as derivatives, mainly Interest Rate Swaps. The number of municipalities that had derivative transaction in 2007 was above 600 (as shown in the "Financial Stability Report" of Banca d'Italia in 2013). They have been exposed to market volatility, which has generated potential liability and, sometimes, financial distress. For instance, Milan signed a contract of derivatives for a total amount of 1.5 billion Euro in 2005 and after a few years had to face a potential loss of 200 million Euro. For this reason, the city of Milan called banks who proposed the transaction to court, arguing that the city had been duped. Moreover, smaller Municipalities have come up against this issue, such as Alessandria and Acqui Terme, who decided to stop paying their derivatives' liabilities to banks.

[2]See the European Court of Human Rights "Case of De Luca vs Italy", n. 43870/04 and the Il Sole 24 Ore's article of the article of September 24th, 2013 entitled "La Corte Ue condanna l'Italia: i debiti dei Comuni falliti vanno pagati".

Figure 1.1: Number of default of Italian Municipalities.

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	
Piemonte		1	2	1	1																				5
Lombardia		3	3	5	1	1					1												1		15
Liguria	1			2																			1		4
Veneto	1			1				1																	3
Emilia Romagna	1		4	1		1			1																8
Toscana	3	1																					1		5
Umbria	2	1				1																			4
Marche	2	1	1			1										1									6
Lazio	7	2	5	2	7	3	3	2		1		2		1			1	1		1	2	2	1		43
Abruzzo	6	1	1	4	1	1	3														1				18
Molise	4	4		1	2	1															1	2			15
Campania	18	18	10	12	22	14	2	1	5		2	1		1	1	1		2		1		3	4	3	121
Puglia	21	4	2	4	2		1												1						35
Basilicata	4	3	3	1	3	2	2	1																	19
Calabria	51	22	13	10	11	7	2	3	1		1		1	1	1					3		1	1	2	131
Sicilia	2	3	1	2	2	6	3	1			1						2	1					1		25
Sardegna	2													1											3
	125	**64**	**45**	**46**	**52**	**38**	**16**	**9**	**7**	**1**	**5**	**3**	**1**	**4**	**2**	**2**	**3**	**4**	**1**	**5**	**4**	**8**	**10**	**5**	**460**

Note: The period considered is between 1989 and 2012, divided by Regions. Source: Corte dei Conti.

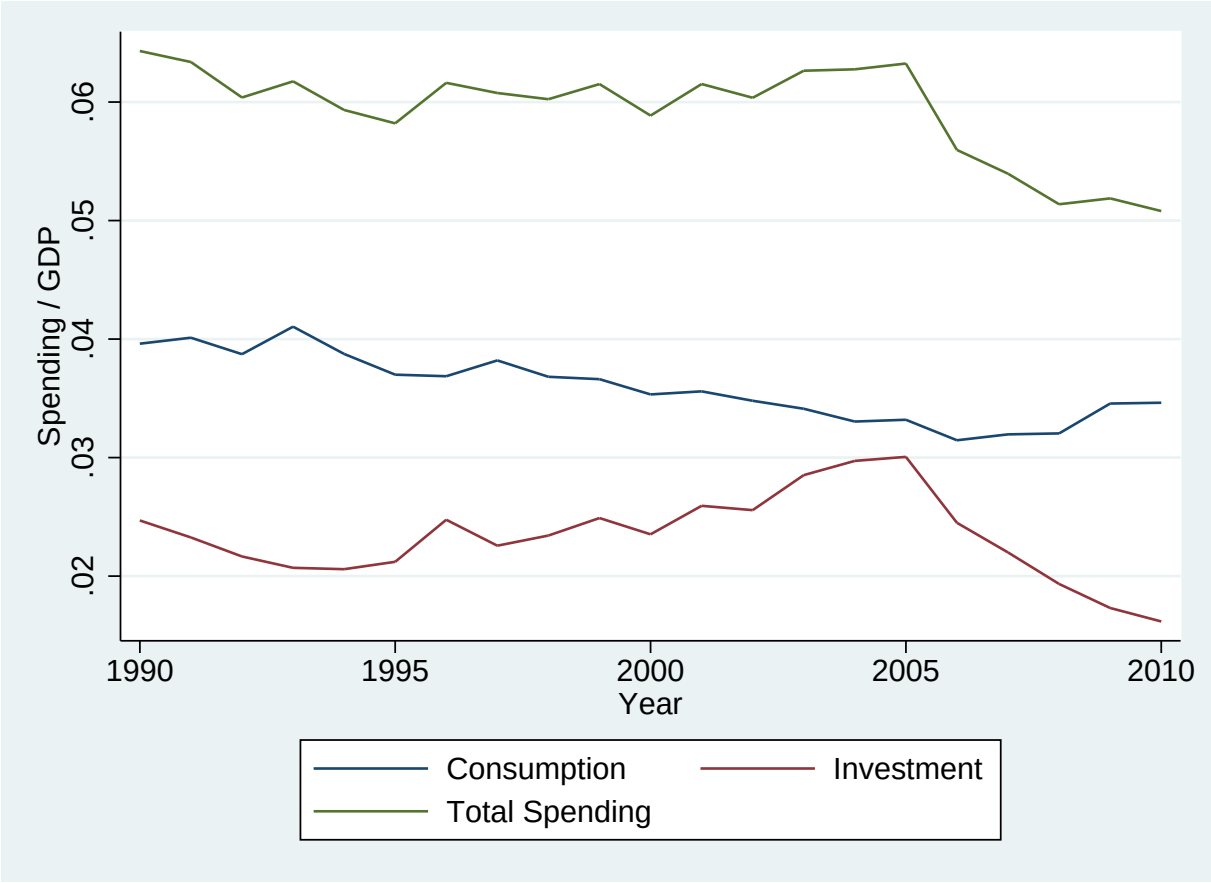
and 3.01% of GDP, respectively. However, starting from 2006 onwards, this trend has reverted.

The aim of this paper is to empirically assess the extent to which public spending of Italian municipalities is affected by fiscal rules. For this purpose, I exploit specific aspects of the Institutional framework. Since 1999 the Italian Government has implemented fiscal rules under the so-called Domestic Stability Pact (hereafter DSP), in order to coordinate and control subnational budget balances. Peculiar features of the DSP give the opportunity to study a natural experiment implementing a difference-in-discontinuity technique.

This paper provides evidence that fiscal rules are not equally effective, but rather they crucially depend on how they are designed. In particular, differences arise concerning whether it is imposed a cap on the overall amount of public spending or if there are two limits, differentiating between consumption and investment. In addition, this paper also highlights the extent to which the budget composition reacts to fiscal rules. When a reduction in consumption is imposed, there is a significant effect of the same sign on the quantity of services offered,whereas while when an increase in investment is allowed, there is a positive variation on the amount of infrastructure spending. Interestingly, there is also a significant increase in the deficit level in the latter case.

This evidence shows the existence of a trade-off, whereby rules that favor investment also cause deficit. The policy maker should take into account these design issues: on one hand only certain rules are actually binding while, on the other hand, rules might have

Figure 1.2: Spending of Italian municipalities.



Note: Level of spending as a percentage of GDP (period between 1990 and 2010). Source: Istat, author's calculations.

effects that go beyond the initial normative goal.

The reminder of this paper is organized as follows. Section 2 details the related literature, while section 3 analyses the normative framework. Section 4 provides the preliminary analysis and section 5 shows the identification strategy. Sections 6 illustrates the empirical findings, before section 7 concludes.

1.2 Literature review

Fiscal rules are generally justified because they substitute reputation when government policy is discretionary and time-inconsistent.

In the case of subnational fiscal rules, the debate is controversial, with the theoretical literature suggesting advantages and disadvantages. Authors such as Eichengreen and von Hagen (2004) and Rodden (2004) are in favor of these rules, believing that the scope for subnational fiscal rules is higher when there are severe fiscal imbalances, possibly increased by the decentralization process. In fact, when more functions are delegated to local governments, their spending power rises and imbalances might worsen. In addition, local governments have incentives to free ride on fiscal discipline for different reasons: they can rely on a common pool of national resources (Weingast, 2006); sometimes they are "too big to fail" (Wildasin, 1997), and private creditors on the capital market expect that central government will guarantee for local debts (Dafflon, 2002). Milesi-Ferretti (2004) argues against subnational fiscal rules, suggesting that local rules might lead to "ugly outcomes" for local governments, such as creative accounting and window dressing. Ter-Minassian (Ter-Minassian) affirms that fiscal rules should only be implemented if financial markets or cooperative arrangements across government levels cannot enforce or reach financial discipline.

From an empirical perspective, the DSP has captured the attention of different authors. Patrizii et al. (2006) have addressed the ability of regions and local governments to meet the DSP requirements, whereas Brugnano and Rapallini (2010) evaluate the effects of the DSP on local public borrowing requirements from 1999 to 2005. Bartolini and Santolini (2009) conduct a panel data analysis on the current expenditures of 246 Italian municipalities to capture the impact of the DSP on both the opportunistic behavior of incumbent politicians and the yardstick competition. They show that the introduction of the DSP significantly reduces the level of public spending but strengthens the opportunistic behavior of incumbent politicians in pre-electoral years. Other authors focus on the "effectiveness" approach, in dealing with the impact of

fiscal rules on local administrations's ability to achieve fiscal discipline and sustainability. In particular, Balduzzi and Grembi (2010) implement a difference-in-difference methodology on Italian municipalities considering the period 1999-2004 and show that the DSP has a positive and significant impact on current expenditures and taxes' revenues. Galli and Grembi (2010) focus the attention on "special" municipalities[3] between 1999 and 2000 using a difference-in-difference approach. Their results show that the revenue side is affected when the DSP is imposed, while there are not significant variations in relation to expenditures' decisions. Grembi et al. (2012) analyze Italian Municipalities between 1999 and 2004, implementing a difference-in-discontinuities approach. They highlight that relaxing fiscal rules provokes a deficit bias, shifting from zero to 2% of total budget, with this variation mainly driven by adjustment on the revenue side.

With respect to the previous literature, this paper contributes to the effectiveness branch of research. The novelty of this work stems from the analysis of specific fiscal rules designed to influence local public spending (i.e. caps on the expenditure side of the budget). It is shown that there are both effective and ineffective fiscal rules. Furthermore, when investment spending increases, there is also a positive reaction in terms of the deficit level.

1.3 Normative framework

Italian municipalities are subject to the Law for Local Authorities[4], which states goals and duties that have to pursue. Moreover, starting from 1999, the central government has set the DSP in order to honor commitment taken with the European Institutions. Since its introduction, the DSP has implemented different types of rules, particularly: a) a balanced budget, whereby the total amount of revenues has to equal the total amount of expenditures; b) expenditure caps, through which there might be ceilings on total current expenditure or specific expenditure items; c) ceilings on local level revenues, which allow the central government to limit local authorities' ability to increase revenue; d) limits on the stock of debt or the issuance of new debt; e) restrictions on the type of expenditure that can be financed by debt, which usually state that only investment expenditure may be financed through debt (known as "Golden Rule"), requiring a clear definition of investment

[3]Which are part of the so-called "special status" regions and provinces.

[4]Law n. 367/2000. In particular, the actual functions are presented by the DPR 167/1996 and cover a wide range of subjects, such as general administration, justice, local police, public education (up to primary school and part of secondary school), culture, sport, tourism, local public transportation, urban development, social sector, economic development, productive local services.

expenditure to avoid current expenditure being transferred to investments; f) indicators of the ability to service the debt.

Considering that this paper aims to study the extent to which fiscal rules affect local public spending, I am particularly interested in rules designed to have an impact on it. The DSP has implemented this kind of rule twice. In particular, a cap on the total expenditures was set in 2005, which could not be higher than the average spending of the previous three years, augmented by 11.5%[5]. In the following year, the limit on the overall spending was removed, while different ceilings on current and capital expenditures were added. Consumption was the most penalized, with the rule imposing a cut of 6.5%. On the other hand, investment was allowed to increase by 8.1%[6]. For the purpose of this analysis, I should also highlight DSP rules in the year prior to the introduction of the caps, because I am analyzing the variation of public spending from one year to the next. Thus, in 2004 the DSP imposed the budget balance as target rule.

There is also another crucial element to consider, namely that the number of municipalities subject to the DSP has changed over time. The Pact only constrained municipalities with more than 5,000 inhabitants in 2004 and 2006, while in 2005 the threshold decreased to 3,000, as summarized in Table 1.1.

Table 1.1: Fiscal rules imposed by the Domestic Stability Pact to Italian Municipalities.

Year	Group A	Group B	Group C
t_1	None	None	Budget balance
t_2	None	Total expenditure cap	Total expenditure cap
t_3	None	None	Consumption and Investment caps

Note. t_1, t_2 and t_3 are respectively years 2004, 2005 and 2006. Group A, Group B and Group C represent, respectively, municipalities with a population below 3,000, between 3,000 and 5,000, above 5,000 inhabitants.

This normative framework provides an opportunity to study the extent to which fiscal rules can affect budget spending decisions at the local level through a natural experiment, as described in the following sections.

[5]Further details are shown in the Finance law n. 311, December 30, 2004 and Document of Ministry of Economy and Finance ("*Circolare della Ragioneria Generale dello Stato*") n. 4 of February 8, 2005.

[6]For both consumption and investment the benchmark level is the one of two years previously. Further details are shown in the Finance law n. 266, December 23, 2005 and Document of Ministry of Economy and Finance ("*Circolare della Ragioneria Generale dello Stato*") n. 8 of February 17, 2006.

1.4 Preliminary analysis

The normative framework shows that the analysis should focus on the period between 2004 and 2006. Data concerning local budgets is derived from the Italian Ministry of the Interior's website[7] and covets all Italian municipalities. The outcome of interest refers to budget values, and particularly consumption and investment spending[8]. Values are expressed in Euro per-capita and deflated using 2006 as the reference year.

The DSP is set at the national level, although the so-called "special autonomy" provinces and regions are treated differently and therefore had to be excluded from the sample[9]. The dataset also includes information from the National Institute of Statistics about the geographical characteristics of municipalities[10] which is useful when robustness checks are implemented.

According to the institutional framework, municipalities are grouped in relation to their number of inhabitants: Group A includes those with up to 3,000 people; Group B between 3,000 and 5,000, and Group C above 5,000. Arguably, small and large municipalities might have different behaviors in terms of budget policies and thus it seems reasonable to limit the sample to municipalities with between 1,000 and 7,000 inhabitants[11].

This preliminary analysis intends to explore consumption and investment spending to provide an intuition of possible DSP effects, with the aim of highlighting different behavior between the three groups during the examined period (2004, 2005 and 2006 are named t_1, t_2 and t_3, respectively). Subsequently, these findings will be further investigated through the empirical analysis (see section 6).

[7] See http://finanzalocale.interno.it/.

[8] Consumption spending is divided into the following categories: Employees, Raw Material, Services and Interests paid on Debt. Investment are detailed in Infrastructures, Goods for internal production, Durable goods, Consulting services, Transfers and Credits. Expenditures are composed by a further category which considers the amount of principal repaid on debt. Current budget revenues are divided in the following categories: Taxes, Fees & Tarrifs, Current Central Transfers, Current Regional Transfers, Extra-tributary revenues. Capital revenues are split into Alienations, Capital Central Transfers, Capital Regional Transfers, Real estate transfers, Deficit (defined as new loans stipulated by the municipality as shown in the balance sheet in "Titolo V - Entrate derivanti da accensioni di prestiti".). All the budget values represent the accrual basis of accounting.

[9] They have the power to bargain fiscal rules directly with the Central Government. Consequently, municipalities of the autonomous provinces of Trento and Bolzano and the autonomous regions of Sicilia, Sardegna, Valle D'Aosta, Trentino-Alto-Adige and Friuli-Venezia-Giulia have not been considered.

[10] In particular: i) total surface of each Municipality in square kilometers; ii) altitude of the Town hall in meters; iii) altitude zone: Inland mountain, Coastal mountain, Inland Hill, Coastal Hill, Plain; iv) macro-area: Northwest (Piemonte, Lombardia, Liguria), Northeast (Veneto, Emilia-Romagna), Centre (Toscana, Umbria, Marche, Lazio), South (Abruzzo, Molise, Campania, Puglia, Basilicata, Calabria).

[11] The number of municipalities analyzed is 42% of the total.

In t_2, the DSP imposed a cap on total spending to municipalities with more than 3,000 inhabitants. The sum of consumption and investment increased for the non-constrained group (Group A) by 2.8% from t_1 to t_2, while for Groups B and C it decreased by 2.3% and 3.1%, respctively. Table 1.2 shows the budget values.

In t_3, municipalities with more than 5,000 inhabitants had to face a different rule. Instead of having just one cap on budget spending, there were two different caps: one on consumption and another on investment. Interestingly, from t_2 to t_3, the constrained group (Group C) reported a different trend in terms of budget composition compared to the other groups, as shown in Figure 1.3. In particular, Group B reached a consumption level that was 1.76 times the investment in 2006. By contrast, Group C did not increase this relationship from t_2 to t_3. Such budget spending variation might be due to either a consumption or investment change. Table 1.2 shows the mean budget values for each group, highlighting that consumption changed between t_1 and t_3 by 1.5%, 0% and -4.5% respectively for Group A, B and C, mainly due to variation in services. On the other hand, investment changed by -6.3%, -20.4% and -15% for Group A, B and C, respectively, mostly due to infrastructure spending[12].

As a preliminary comment, there is evidence of a variation in the budget composition during the analyzed period, with the three groups demonstrating different behaviors. This can be due to fiscal rules imposed by the DSP, with the next section focusing on the identification strategy to exploit this possibility accordingly.

1.5 Identification Strategy

The institutional framework analyzed in section 3 explained that decisions related to the DSP rules are made by the central government, and are therefore exogenous with respect to local dynamics. Specifically, I would like to assess rules designed to influence budget spending, namely: (i) a total expenditure cap and (ii) consumption and investment caps. For this purpose, I need to identify a treated and control group, and a treatment. Considering Groups A, B, C and t_1, t_2, t_3 as defined in the previous section, the analysis involves two steps, each comprising two cases.

As shown in Figure 1.4, the first step focuses on Groups A and B, which are the control and treated group, respectively, and the threshold is set at 3,000 inhabitants. There are two cases in relation to the period analyzed. Case IA studies t_1 and t_2, where the treatment is the imposition of the total expenditure cap to Group B, while Case IB

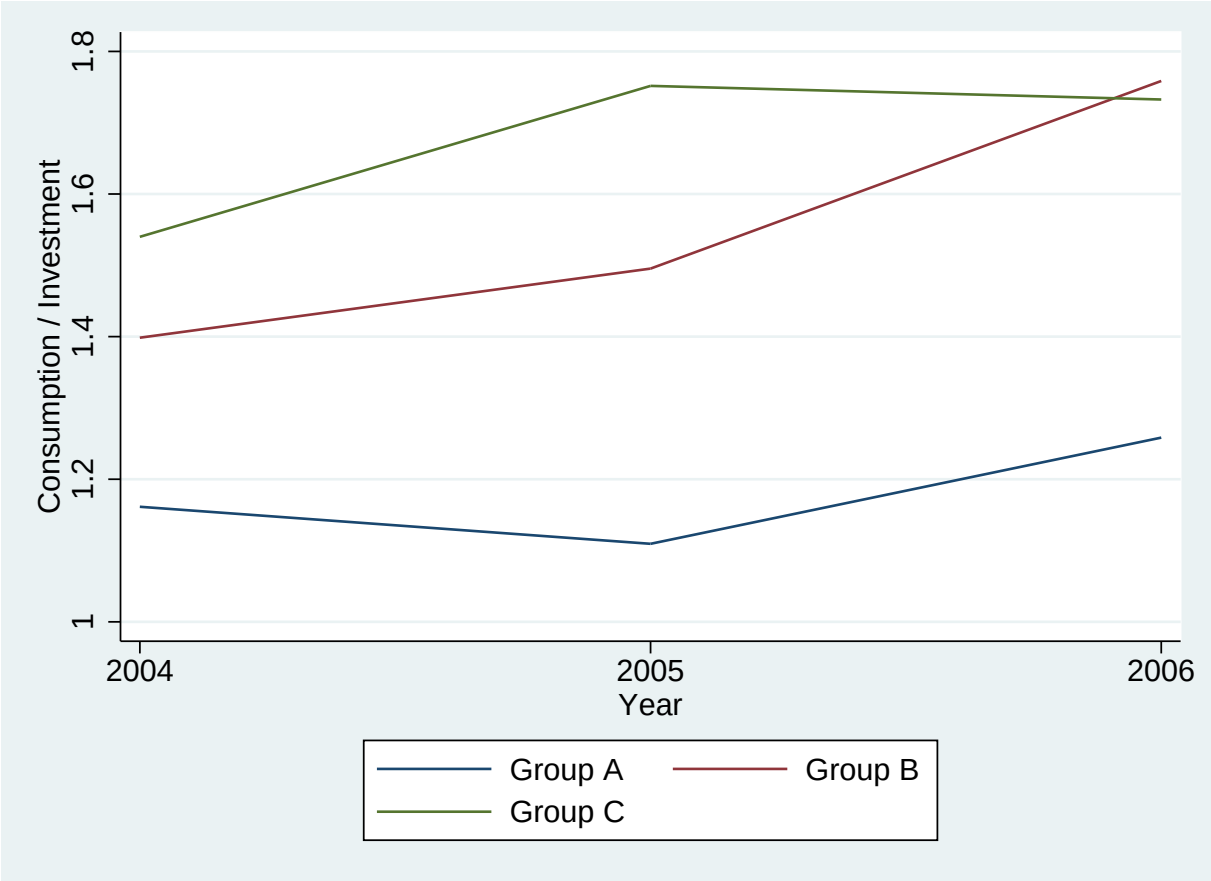
[12]Mean values have been tested using the t-test and groups have statistically different means at the 95% confidence interval.

Table 1.2: Budget values.

	Group A			Group B			Group C		
	t_1	t_2	t_3	t_1	t_2	t_3	t_1	t_2	t_3
Consumption	**717.91**	**723.04**	**729.04**	**664.28**	**666.52**	**664.49**	**616.51**	**627.09**	**588.51**
Wages	239.39	236.46	236.94	207.51	206.16	204.39	196.34	196.08	192.21
Services	235.85	242.39	254.22	248.78	254.37	259.76	239.03	247.58	224.00
Investment	**618.11**	**651.68**	**579.35**	**474.99**	**445.70**	**377.86**	**400.33**	**358.18**	**339.67**
Infrastructure	514.84	530.46	463.08	364.64	353.64	300.07	318.22	280.83	266.11
Obs.	2041	2041	2041	894	894	894	470	470	470

Note. t_1, t_2 and t_3 are respectively years 2004, 2005 and 2006. Group A, Group B and Group C represent, respectively, municipalities with a population below 3,000, between 3,000 and 5,000, above 5,000 inhabitants. Values are in Euro per-capita and deflated using as reference year t_3.

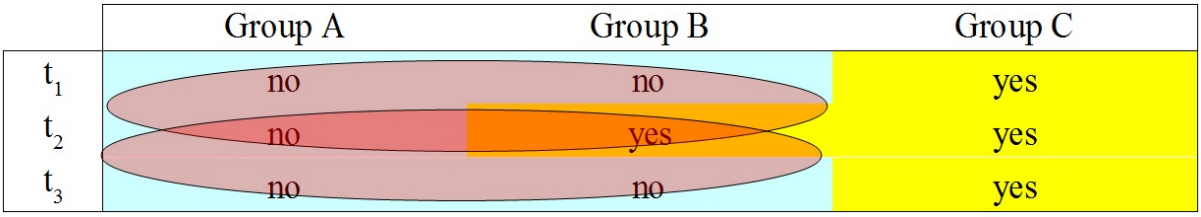
Figure 1.3: Level of Consumption over Investment spending.



Note: Data are shown for the three groups of Municipalities in the period between 2004 and 2006.
Source: Ministry of the Interior, author's calculations.

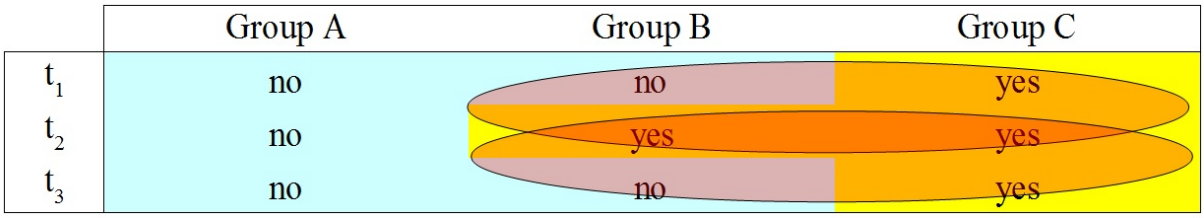
analyzes t_2 and t_3, whereby the treatment is the exemption from the total expenditure cap for Group B.

Figure 1.4: Identification strategy, Case IA and Case IB



The second step relies on results from the first step (as shown in the next section) and considers Group B and C, the control and treated group, respectively, with the threshold set at 5,000 (see Figure 1.5). As before, there are two cases in relation to the period analyzed. Case IB studies t_1 and t_2, where the treatment is the variation of the fiscal rule from "Budget balance" to "Total expenditure cap" for Group C, while Case IIB analyzes t_2 and t_3, whereby the treatment is the variation of the fiscal rules from "total expenditure cap" to "consumption and investment caps" for Group C.

Figure 1.5: Identification strategy, Case IIA and Case IIB



The reminder of the section focuses on the formal approach used for the aforementioned cases.

1.5.1 General setting

To assess the causal effect of each fiscal rule (the treatment) on the treated group, it is necessary to consider a minimum set of assumptions to perform the analysis (Angrist et al., 1996). Potential budget outcomes Y are the variables of interest and the actual treatment D[13] depends on the variable Z, which is equal to 1 when a municipality is assigned to the treatment, while $Z = 0$ when it is assigned to the control group. The potential budget outcome of municipality m at time t depends on Z and D, which can

[13]The actual treatment is assumed to be beyond the researcher control (Angrist et al., 1996).

more formally noted as $Y_{mt} = Y_m(Z_t, D_t)$. Therefore, the outcome is $Y_{mt}(1)$ when the municipality is treated and $Y_{mt}(0)$ when it is not. The following assumptions should be considered:

(i) Stable unit treatment value assumption: the potential outcomes and treatments of unit m are independent from the potential assignment, treatments and outcomes of $n \neq m$. Consequently, when a municipality is subject to the treatment, it should not influence the other one (no general equilibrium effects);

(ii) non-zero average causal effect of Z on D: the probability of treatment must be different between the two groups. Therefore, it is required that whoever is assigned to the treatment actually gets the treatment, or at least part of the component of the treated group. In other words, some level of compliance is necessary[14];

(iii) the exclusion restriction should hold. Consequently, the assignment only affects the outcome through the treatment;

(iv) monotonicity. No one does the opposite of its assignment, regardless what the assignment is. Thus, the absence of defiers is required. Specifically, a defier would be a municipality that follows the DSP rules without any formal obligation;

(v) random assignment: all municipalities have the same probability of getting the treatment.

It should be noted that assumption (v) cannot hold due to the fact that the assignment is not random, but rather conditioned to the population level. In this case, a Sharp Regression Discontinuity Design (SRDD) could be implemented, imposing the following assumptions:

(vi) assignment to treatment must only depend on observable pre-intervention variables (i.e. the population level);

(vii) identification of the mean treatment effect is only possible at the threshold;

(viii) the continuity of potential outcome: limits of the expected values have to be identical at the cutoff. In other words, the budget outcomes of municipalities just before and after the cutoff level should be equal.

Under these assumptions, the SRDD can be written as (Angrist and Pischke, 2008):

$$\lim_{\delta \to c} E[Y_m | P_c < P_m < P_c + \delta] - E[Y_m | P_c - \delta < P_m < P_c] = E[Y_m(1) - Y_m(0) | P_m = P_c]$$

where P_c is the population at the cutoff level, δ represents a small number, Y_m and P_m

[14]In order to have a high compliance level, the DSP also introduces incentives. Patrizii et al. (2006) show that municipalities are compliant to the DSP.

are the potential budget outcome and population of Municipality m. The estimand of this nonparametric estimation strategy is the average causal effect, $E[Y_m(1) - Y_m(0)|P_m = P_c]$.

However, assumption (viii) raises some issues. In order to identify the causal effect at the cut-off point, any discontinuity in the relationship between the outcome of interest and the variable determining the treatment status must be fully attributable to the treatment itself. However, there is a confounding discontinuity policy at the cut-offs, due to a change in the wage level of local politicians. In fact, the three groups of municipalities guarantee different wages in relation to the population level, with a jump at 3,000 and 5,000 inhabitants (exactly at the cutoffs). As shown by Gagliarducci and Nannicini (2013), better-paid politicians are able to improve internal efficiency, sizing down the government machine. Consequently, there is a confounding policy that might alter the identification strategy. To overcome this issue, the approach described in the following subsection can be implemented.

1.5.2 Difference-in-Discontinuities

The confounding policy that inhibits the effectiveness of the SRDD strategy is constant over the analyzed period, and thus a Difference-in-Discontinuities (DiDisc) framework can be implemented, as shown in Grembi et al. (2012)[15]. This allows studying the sharp discontinuity at the threshold and, thanks to the Difference-in-Difference (DiD) design, remove the constant confounding discontinuity policies (i.e. different wage policies among municipalities). The assumptions that should hold are as follows:

(ix) the confounding discontinuity needs to be time invariant. This assumption requires that the effect of wage variations on budget outcome among groups not to vary with time;

(x) the interaction between the treatment and the confounding discontinuity has to be irrelevant. Therefore, different wage policies should not generate a different reaction compared to fiscal rules introduced by the DSP.

Under these assumptions, there is an estimator $\widehat{\phi}$ that identifies the local treatment effect ϕ:

$$\begin{aligned}\widehat{\phi} \equiv (&\lim_{P_m \uparrow P_c} E[Y_{mt}|P_m, t = t_1] - \lim_{P_m \downarrow P_c} E[Y_{mt}|P_m, t = t_1]) + \\ -(&\lim_{P_m \uparrow P_c} E[Y_{mt}|P_m, t = t_0] - \lim_{P_m \downarrow P_c} E[Y_{mt}|P_m, t = t_0])\end{aligned} \tag{1.1}$$

[15]This methodology combines the Difference-in-Difference strategy and a Regression Discontinuity Design.

where Y_{mt} is the potential budget outcome for municipality m at time t, P_m is the population level, t_1 is the year of the treatment and t_0 is the previous one.

For each case, the assignment to the treatment is given by the dummy D_{mt} which takes the value:

$$D_{mt} = \begin{cases} 0 & \text{if } t = t_0 \\ 0 & \text{if } P_m \leq P_c,\ t = t_1 \\ 1 & \text{if } P_m > P_c,\ t = t_1 \end{cases} \tag{1.2}$$

where P_c is the cutoff level. Having described the DiDisc strategy, we can now proceed to the empirical model.

1.5.3 Empirical models

To estimate the DiDisc estimator I use two different methods[16].

The first one is the "Local Linear Regression" (LLR) method, which fits the data with linear regression functions in a specific sample range. The interval is limited considering a certain distance "d", thus $P_m \in [P_c - d, P_c + d]$. The estimated model is:

$$\begin{aligned} Y_{mt} =& \alpha_0 + \alpha_1 \tilde{P}_m + G_m(\beta_0 + \beta_1 \tilde{P}_m) + \\ &+ t_1(\gamma_0 + \gamma_1 \tilde{P}_m + G_m(\delta_0 + \delta_1 \tilde{P}_m)) + \epsilon_{mt} \end{aligned} \tag{1.3}$$

where Y_{mt} is the budget outcome for municipality m at time t, $\tilde{P}_m$ is the normalized population size ($\tilde{P}_m$=$P_m - P_c$), G_m is a dummy equal to 1 when a city is part of the treated group and 0 otherwise, t_1 is the treatment year, α_0 is the intercept and ϵ_{mt} is the error term. Considering that the treatment is $D_{mt} = G_m t_1$, the coefficient δ_0 is the DiDisc estimator[17]

The second method is the "Spline Polynomial Approximation" (SPA), which relaxes the linearity assumption of the previous method and uses polynomial functions of order η to fit the relationship between the outcome of interest Y_{mt} and the population level P_c[18].

[16] See Imbens and Lemieux (2008) and Grembi et al. (2012).

[17] Standard errors are clustered at the municipal level and results are controlled considering different bandwidths.

[18] This is true on the right and left hand side of the cutoff level P_c and in the treatment year and previous one, for each case analyzed. Standard errors are clustered at the municipal level and robustness checks are performed considering different functional orders.

The estimated model is:

$$\begin{aligned} Y_{mt} = &\sum_{n=0}^{\eta}(\alpha_k \tilde{P}_m^{\eta}) + G_m \sum_{n=0}^{\eta}(\beta_k \tilde{P}_m^{\eta}) + \\ &+ t_1[\sum_{n=0}^{\eta}(\gamma_k \tilde{P}_m^{\eta}) + G_m \sum_{n=0}^{\eta}(\delta_k \tilde{P}_m^{\eta})] + \epsilon_{mt} \end{aligned} \tag{1.4}$$

where the variables and the DiDisc estimator are defined as in the LLR method.

1.6 Results

Empirical results are divided between the first (Case IA and IB) and second (Case IIA and IIB) step and focus on consumption and investment spending budget outcomes, showing the DiDisc estimator. The empirical models are represented by equations (3) and (4): the LLR is performed at two different bandwidths, b=1,500 (LLR_1) and b=1,300 (LLR_2), while the SPA is implemented at the second order of the polynomial.

The first step of the analysis is shown in Table 1.3. The effect of introducing a cap on total spending for municipalities with a population between 3,000 and 5,000 inhabitants during the period t_1 and t_2 (Case IA) does not produce a significant effect on either consumption or investment for any model specification. Moreover, moving forward of one period (Case IB), and thus studying the effects when the cap is removed, also does not provide any significant effects on both types of spending[19].

It can be affirmed that the cap on the overall level of public spending is not capable of significantly influencing the composition of the budget spending. Intuitively, the cap was not sufficiently binding (as shown in section 3, the fiscal rule allowed for a maximum increase of total spending of 11.5%, compared to the average of the previous three years) and both groups reported a behavior that was not significantly different between each other. Therefore, in this framework, the cap on overall spending is not effective and thus it can be seen as a placebo treatment with no effect on budget outcome decisions. These findings are confirmed by the graphical representation of the difference-in-discontinuity approach. In fact, Figure 1.6 shows the difference between budget outcomes, generated by the difference between t_0 and t_{-1}, between Group A and Group B. At the cutoff level,

[19]The effects are not significant, further deepening the analysis at subcategories of consumption and investment (consumption: wages, raw material, services and interests paid on debt; investment: infrastructures, goods for internal production, durable goods, consulting services, transfers and credits).

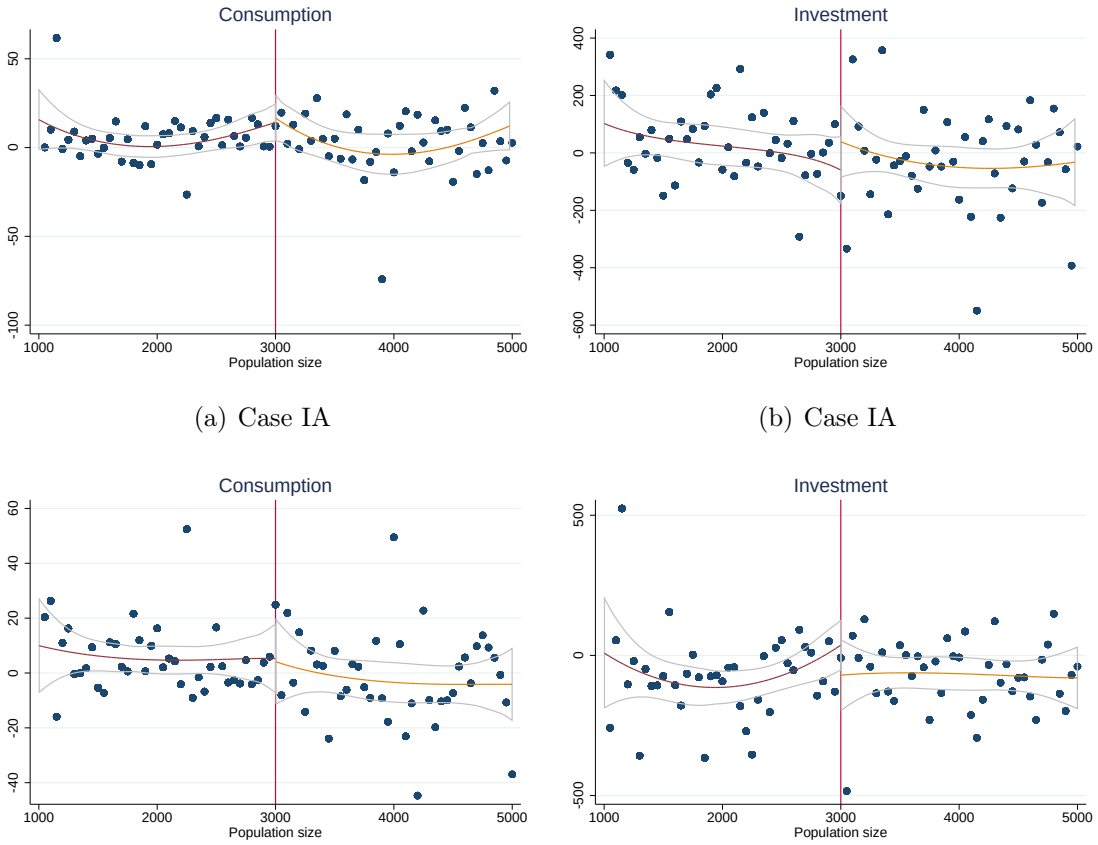
Table 1.3: Domestic Stability Pact effects in Case I.

	LLR_1	LLR_2	SPA
Case IA			
Consumption	6.78	7.54	7.70
	(9.32)	(10.58)	(11.54))
Investment	90.74	111.72	74.46
	(68.40)	(74.20)	(93.21)
Case IB			
Consumption	2.07	2.81	-5.59
	(8.06)	(9.31)	(12.50)
Investment	4.62	-22.04	-85.55
	(63.52)	(65.61)	(87.76)
Obs.	4,078	3,446	5,870

Note. Case I refers to Municipalities between 1,000 and 5,000 inhabitants. Case IA considers t_1 and t_2 while Case IB analyzes t_2 and t_3. LLR_1 and LLR_2 are Local Linear Regressor methods as in equation (3), with a bandwidth of respectively 1,500 and 1,300. SPA is the Spline Polynomial Approximation method of order 2, as in equation (4), and considers all the Municipalities. Values are in Euro per-capita and deflated using t_3 as reference year. Robust standard errors are in parenthesis and are clustered at the Municipality level. Significance at the 10% level is represented by *, at the 5% level by **, at the 1% level by ***.

there is a vertical line to highlight a possible discontinuity. Consumption does not show any discontinuity at the thresholds, while the jump shown by investment is not significant.

Figure 1.6: Difference-in-discontinuities in Case I.



(a) Case IA (b) Case IA

(c) Case IB (d) Case IB

Note: Threshold at 3,000 inhabitants. The central line is a SPA of order 2 and the later lines represent the 95% confidence interval. Scatter points are averaged over intervals of 50 inhabitants. On the vertical axis there are the t_0-t_{-1} budget values. On the horizontal axis there is the actual population size.

Before showing the results, it should be noted that there are potentially two contemporaneous treatment. In particular, in the period considered by Case IIA, Group B is exempted from the DSP in t_1 and subject to it in t_2, while there is a variation of the fiscal rule for Group C from "budget balance" to "total expenditure cap". Moving forward one period (Case IIB), Group B is no longer subject to the DSP in t_3 and there is a further variation from the "budget balance" to "consumption and investment caps" for Group C. In order to disentangle these two treatments, we need to rely on the evidence provided in the first step. The treatment assigned to Group B is claimed not to be effective in both t_2 and t_3 and therefore in Case II the treatment is the fiscal rule

variation for Group C. Consequently, Group B and C are the control and treated group, respectively.

We can now focus on the results. Case IIA shows the effect of a variation of the fiscal rule for Group C from the "budget balance" to the "total expenditure cap". As shown in the top part of table 1.4, there is no evidence for a significant effect of this variation. This result provides evidence in the direction of the first step, with Case IA, Case IB and Case IIA highlighting that the "total expenditure cap" does not have an impact in terms of affecting budget spending composition.

The last analysis (Case IIB) shows the effect of introducing two different caps: one for consumption and another for investment. As further explained in section 3, the fiscal rule imposed a decrease in consumption and allowed for an increase in investment spending. The bottom part of table 1.4 highlights that the outcome is consistent with the fiscal rule aim: from t_2 to t_3 consumption diminished by 28 Euro per-capita, while investment increased by 180 Euro per-capita. Considering subcategories of budget spending, there is evidence that consumption variations are mainly due to movements in wages (+11 Euro per-capita) and services (-35 Euro per-capita) spending. In terms of investment, the main subcategory to vary is infrastructure, which accounts for 83.5% of the overall variation.

Considering that municipalities are only allowed to generate new debt[20] to finance investment spending, it seems reasonable to verify what happened to this specific category. For this reason, Table 1.4 includes a row related to the deficit level for Case IIB. In line with the Golden Rule, the variation of investment and deficit have the same sign and a comparable magnitude, thus providing evidence that an increase in investment fosters a higher deficit level.

The empirical findings are supported by Figure 1.7. In Case IIA the behavior of Group 2 and Group 3 is substantially the same, while in Case IIB there is evidence of a discontinuity due to a variation in services and infrastructure spending. In addition, this is also confirmed by the jump in deficit spending.

1.6.1 Robustness checks

Smaller municipalities have, on average, a higher level of consumption and investment, which might be due to geographical factors[21].

In order to assess the results' robustness, specific aspects of the municipalities are taken

[20] Which is named deficit, as explained in section 4.

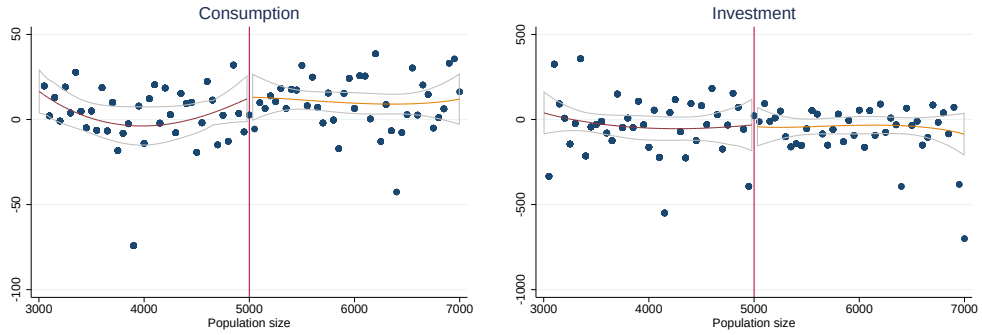
[21] Municipalities situated on the mountains have different issues compared to those located in a plain area, such as higher spending for street maintenance and costs related to the snow. In the empirical analysis there are dummies to control for it.

Table 1.4: Domestic Stability Pact effects in Case II.

	LLR_1	LLR_2	SPA
Case IIA			
Consumption	9.60	-2.05	4.69
	(9.49)	(12.62)	(15.77)
Investment	4.44	6.70	-44.68
	(80.13)	(90.19)	(119.15)
Case IIB			
Consumption	-27.97***	-23.03*	-28.54*
	(10.20)	(11.84)	(14.61)
Wages	11.03***	12.93***	10.73**
	(3.00)	(3.53)	(4.40)
Services	-35.40***	-34.05***	-37.22***
	(6.72)	(7.67)	(9.49)
Investment	179.58***	188.45**	193.83**
	(69.04)	(76.66)	(93.59)
Infrastructure	149.97***	164.44***	171.69**
	(54.03)	(60.12)	(73.21)
Deficit	103.22**	110.40**	141.07**
	(41.28)	(46.17)	(56.96)
Obs.	1,880	1,618	2,728

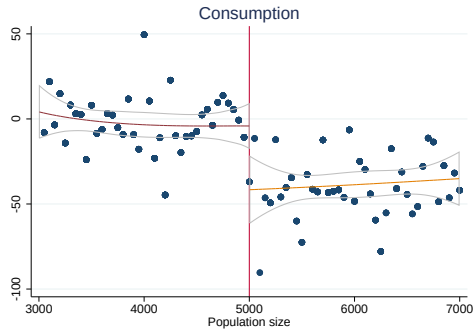
Note. Case II refers to Municipalities between 3,000 and 7,000 inhabitants. Case IIA considers t_1 and t_2 while Case IIB analyzes t_2 and t_3. LLR_1 and LLR_2 are Local Linear Regressor methods as in equation (3), with a bandwidth of respectively 1,500 and 1,300. SPA is the Spline Polynomial Approximation method of order 2, as in equation (4), and considers all the Municipalities. Values are in Euro per-capita and deflated using t_3 as reference year. Robust standard errors are in parenthesis and are clustered at the Municipality level. Significance at the 10% level is represented by *, at the 5% level by **, at the 1% level by ***.

Figure 1.7: Difference-in-discontinuities in Case II.

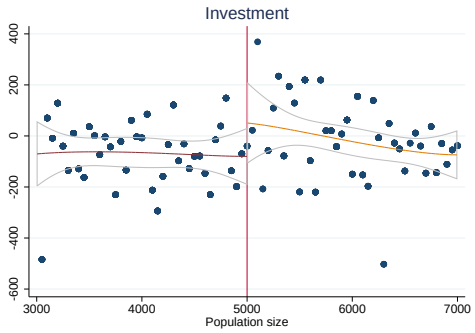


(a) Case IIA

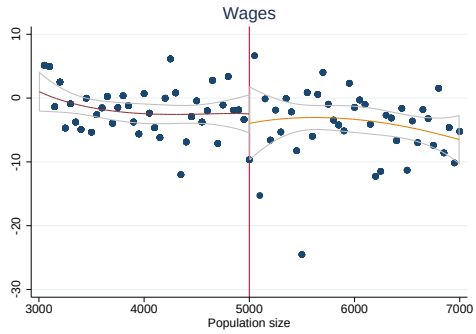
(b) Case IIA



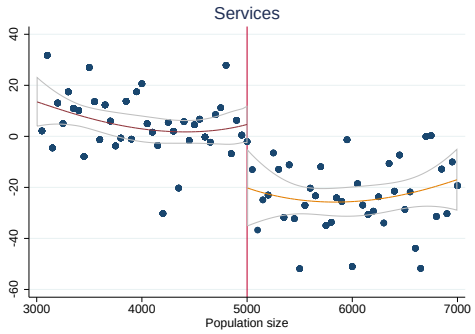
(c) Case IIB



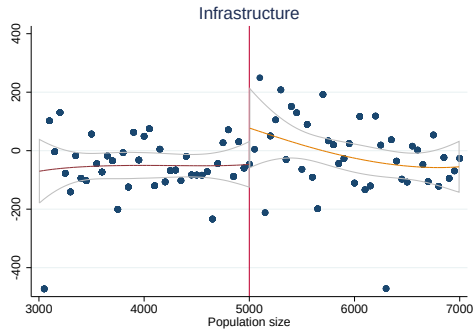
(d) Case IIB



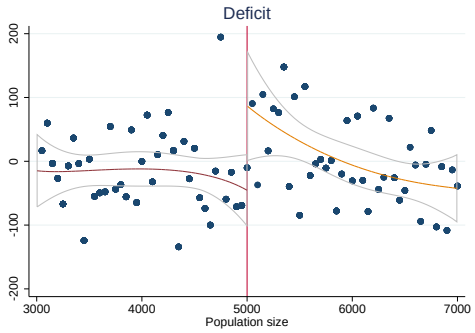
(e) Case IIB



(f) Case IIB



(g) Case IIB



(h) Case IIB

Note: Threshold at 5,000 inhabitants. The central line is a SPA of order 2 and the later lines represent the 95% confidence interval. Scatter points are averaged over intervals of 50 inhabitants. On the vertical axis there are the t_0-t_{-1} budget values. On the horizontal axis there is the actual population size.

into account, including further peculiarities, as follows: (i) Surface (in Km^2): different territory extensions would likely require a dissimilar budget structure spending. For instance, a wider area would probably include more paved roads and therefore involve higher maintenance costs; (ii) Altitude level (in meters); (iii) Macro-areas dummies: Italy is characterized by economical and cultural differences between the north, center and south, therefore I control for North West, North East, Centre and South areas; (iv) Geographical dummies: factors such as mountains, hills, plains and coasts might affect spending choices; thus, the following dummies are also included: inland mountain, coastal mountain, inland hill, coastal hill, plain.

The LLR model (3) becomes:

$$\begin{aligned} Y_{mt} =& \alpha_0 + \alpha_1 \tilde{P}_m + G_m(\beta_0 + \beta_1 \tilde{P}_m) + \\ &+ t_0(\gamma_0 + \gamma_1 \tilde{P}_m + G_m(\delta_0 + \delta_1 \tilde{P}_m)) + \boldsymbol{\phi}\mathbf{X} + \epsilon_{mt} \end{aligned} \tag{1.5}$$

where $\mathbf{X}$ is a vector of the covariates and $\boldsymbol{\phi}$ is a vector of the related coefficients. The SPA model (4) becomes:

$$\begin{aligned} Y_{mt} =& \sum_{n=0}^{\eta}(\alpha_k \tilde{P}_m^{\eta}) + G_m \sum_{n=0}^{\eta}(\beta_k \tilde{P}_m^{\eta}) + \\ &+ t_0[\sum_{n=0}^{\eta}(\gamma_k \tilde{P}_m^{\eta}) + G_m \sum_{n=0}^{\eta}(\delta_k \tilde{P}_m^{\eta})] + \boldsymbol{\phi}\mathbf{X} + \epsilon_{mt} \end{aligned} \tag{1.6}$$

where $\mathbf{X}$ and $\boldsymbol{\phi}$ are defined as in model (5).

Tables 1.5 and 1.6 confirm the main findings for the four Cases examined. The only result that it is not robust is the wage variation: there are no significant effects of an impact of the DSP on it.

1.6.2 Comments

Through the empirical analysis, it has been possible to show that the Domestic Stability Pact is a vehicle for the central government to implement different kinds of local fiscal rules. Specifically, the cap on total spending did not have a significant effect on the budget composition either for municipalities that were not subject to the DSP the year before its implementation (as shown in Case IA and Case IB) or those already constrained (Case IIA). It is possible that the policy maker wanted to implement a more binding rule and for

Table 1.5: Robustness checks in Case I.

	LLR (b=1,500)	LLR (b=1,300)	Spline (order 2)
Case IA			
Consumption	3.21	4.78	2.28
	(9.87)	(11.09)	(11.48)
Investment	56.86	74.74	37.72
	(68.01)	(73.31)	(93.26)
Case IB			
Consumption	-2.09	-1.19	-8.66
	(7.95)	(9.22)	(12.28)
Investment	-35.89	-56.85	-115.28
	(63.58)	(66.02)	(88.55)
Obs.	4,078	3,446	5,870

Note. Case I refers to Municipalities between 1,000 and 5,000 inhabitants. Case IA considers t_1 and t_2 while Case IB analyzes t_2 and t_3. LLR_1 and LLR_2 are Local Linear Regressor methods as in equation (5), with a bandwidth of respectively 1,500 and 1,300. SPA is the Spline Polynomial Approximation method of order 2, as in equation (6), and considers all the Municipalities. Values are in Euro per-capita and deflated using t_3 as reference year. Robust standard errors are in parenthesis and are clustered at the Municipality level. Significance at the 10% level is represented by *, at the 5% level by **, at the 1% level by ***.

Table 1.6: Robustness checks in Case II.

	LLR (b=1,500)	LLR (b=1,300)	Spline (order 2)
Case IIA			
Consumption	6.84	-4.86	4.42
	(9.59)	(12.74)	(16.13)
Investment	-26.75	-29.78	-77.15
	(79.36)	(89.42)	(119.29)
Case IIB			
Consumption	-32.32***	-27.57**	-29.68**
	(10.44)	(12.18)	(15.03)
Wages	4.57	5.22	4.65
	(2.90)	(3.35)	(4.21)
Services	-30.57***	-28.19***	-30.33***
	(6.76)	(7.72)	(9.61)
Investment	142.38**	144.22*	156.04*
	(68.75)	(76.37)	(93.41)
Infrastructure	119.25**	127.30**	141.68*
	(53.43)	(59.36)	(72.91)
Deficit	97.15**	102.67**	134.51**
	(41.58)	(46.48)	(57.23)
Obs.	1,880	1,618	2,728

Note. Case II refers to Municipalities between 3,000 and 7,000 inhabitants. Case IIA considers t_1 and t_2 while Case IIB analyzes t_2 and t_3. LLR_1 and LLR_2 are Local Linear Regressor methods as in equation (5), with a bandwidth of respectively 1,500 and 1,300. SPA is the Spline Polynomial Approximation method of order 2, as in equation (6), and considers all the Municipalities. Values are in Euro per-capita and deflated using t_3 as reference year. Robust standard errors are in parenthesis and are clustered at the Municipality level. Significance at the 10% level is represented by *, at the 5% level by **, at the 1% level by ***.

this reason changed it in the following year (t_3), imposing different caps on consumption and investment spending. This new fiscal rule was able to significantly influence budget composition, generating a negative variation in the amount of services provided by more than 3% of the total budget, as well an increase in infrastructure spending by about 15% (compared to the unconstrained municipalities).

1.7 Conclusions

Coordination rules between state and local government levels are fundamental to guarantee overall sound public finance. Unsurprisingly, the European integration process considers fiscal rules as a central subject for stability and growth purposes. This paper studies the effects of the Domestic Stability Pact on Italian municipalities budget composition and thanks to the peculiar framework that characterizes the Pact, has been able to perform a natural experiment implementing a Difference-in-Discontinuity design. The analysis provides two main contributions.

Firstly, there is a discrimination between effective and ineffective fiscal rules. What emerges from the analysis is that the DSP is not effective per se, but rather the kind of fiscal rule implemented is crucial. In fact, it has been shown that imposing a cap on the overall level of current and capital expenditure does not affect budget decisions. Interestingly, imposing separate caps on consumption and investment spending creates an effective boundary, capable of affecting budget composition.

Secondly, effective fiscal rules do not equally affect all the types of spending. In particular, imposing a cut on consumption generates a decrease in the amount of services provided. Allowing for an increase in investment creates an increase in both infrastructure spending and the deficit level.

Therefore, fiscal rules set at the national level are able to significantly affect spending choices at the local level, both in statistical and economic terms. This evidence shows the existence of a trade-off, whereby rules that favor investment also cause a deficit. The policy maker should take into account these design issues: on one hand, only certain rules are actually binding and, on the other hand, rules might have effects that go beyond the initial normative goal.

Chapter 2

Fiscal policy during good and bad time in the EMU

Abstract

This chapter intends to analyze the extent to which fiscal policy shocks are able to affect macrovariables during business cycle fluctuations, differentiating among three intervention channels: public taxation, consumption and investment. The econometric methodology implemented is a Panel Vector Autoregressive model with a structural characterization. The sample includes 11 countries of the EMU using quarterly data in the period between 1999 and 2012. The results show that fiscal shocks have different multipliers in relation to expansion or contraction periods: output does not react during good times while there are significant effects in bad ones.

JEL classification: E62, H30.
Keywords: Fiscal policy, Consumption, Investment, Panel VAR, EMU, Business cycle.

2.1 Introduction

The ability of fiscal policy to stabilize the macro economy and smooth business cycle fluctuation does not have, in the economic literature, an unanimous view. During the last decades, different economic theories have been able to legitimize conflicting policies (Blinder, 2004)[1].

The sluggish of economic growth of the last years have generated an increasing attention on the power of fiscal policy to stimulate the economy, with a particular attention on the differences between expansion and recessions period. Auerbach and Gorodnichenko (2011) estimate the effect of fiscal policies over the business cycle, finding that they are more effective in recession than in expansions. Furthermore, a recent IMF document titled "Greece: Ex Post Evaluation of Exceptional Access Under the 2010 Stand-By Arrangement"[2] highlighted that multipliers have been miscalculated, leading to a higher effect of austerity measure than previously expected. In fact, the Fund predicted a contraction in Greece's economy of 5.5% and an unemployment rate of 15%. However, the GDP contracted by 17% and unemployment raised up to 25%[3].

The aim of this paper is to analyze the extent to which fiscal policy shocks are able to affect macrovariables during good and bad times, differentiating among three intervention channels: public taxation, consumption and investment. I implement a Panel Vector Autoregressive model with a structural characterization of 11 EMU countries. There is evidence that multipliers differs according to the business cycle: consumption and investment shocks are not effective during expansions, but there is a significant effect during a recession period, positive for consumption spending and negative for investment.

The rest of the paper is divided as follows. Section 2 review the related literature and section 3 shows the data. Section 4 focuses on the econometric methodology, while section 5 highlights the reaction of macrovariables triggered by fiscal shocks. Section 6 highlights the robustness checks and section 7 concludes.

[1] As described by Blinder (2004), the birth of fiscal policy may be dated in 1936 and until 1966 has been dominated by Keynesian ideas which emphasized fiscal over monetary policy for fiscal stabilization purposes, underlining the crucial role of discretionary action. During the following decade, in the US economy the consensus about the ability of the fiscal policy to stabilize the economy collapsed (due to the inflation followed by the heavy government spending for the Vietnam War). In the following years, when the goal to reduce public debt was considered the most important, the use of fiscal stimulus policies was not under discussion (the so called "Clintonomics"). On the other hand, since 2001, deficit expansions and tax reduction were the main economic policies undertaken by George W. Bush.

[2] The document has been issued on the 5^{th} of June 2013. To see the full text: http://www.imf.org/external/pubs/cat/longres.aspx?sk=40639.0.

[3] Blanchard and Leigh (2013) investigate the relation between growth forecast errors and planned fiscal consolidation during the crisis.

2.2 Literature review

The theoretical background relies on two main different views: the Neoclassical and Keynesian ones. The distinction between the two approach is based on different reaction of macro variables to variations in government spending.

Starting from the Neoclassical literature, it is shown that private consumption and real wage decreases when government spending increases, while employment augments. This path is explained by models ascribable to Real Business Cycle family as shown by Edelberg et al. (1999), Burnside et al. (2004) and Eichenbaum and Fisher (2005). In these papers the agent's wealth is reduced by an exogenous positive shock in government spending through a lump-sum taxes. The effect is a decrease in the agent consumption level, generating an incentive to increase the working time and therefore a fall in real wage.

The Keynesian approach is built on a specific assumption: a government spending rise generates an increase in private consumption. The works of Linnemann (2006), Ravn et al. (2006) and Gali et al. (2007) are examples of this link, where the Keynesian behavior is implemented using a modified utility function for which consumption and employment are complements, a good-specific habit into a model with monopolistic competition or a rule-of-thumb consumer into a model with nominal rigidities respectively. Taking into account other macro variables, these papers agree that fostering public spending leads to an increase in employment. However, there are discrepancies in the behavior of real wages: while they increase for Linnemann (2006), the other two papers show an opposite result. Clearly, the different assumptions made to build each model affect the results provided. Due to the fact that, to a certain extent, different theories may be able to explain conflicting results, the empirical evidence may help in the attempt to discriminate among competing theories.

The empirical literature, once the benchmark reduced-form VAR model[4] is set, differs in relation to the approach chosen to identify the fiscal shock. There are four main groups: first, Sims (1980) introduced the recursive approach which has been applied by Fatás and Mihov (2001); second, Blanchard and Perotti (2002) proposes the Structural approach where institutional information are taken into account, subsequently extended in Perotti (2004); third, the sign-restrictions approach developed by Uhlig (2005) and applied by Mountford and Uhlig (2009); forth, Ramey and Shapiro (1999) introduced the event-study approach, also used by Edelberg et al. (1999), Eichenbaum and Fisher (2005), Perotti (2007) and Ramey (2011).

[4]See section 3 for further details.

The empirical evidence can be analyzed according to the Government budget composition. Respect to tax shocks, most studies believe that unanticipated tax increases have negative effects on output, as shown by Blanchard and Perotti (2002), Mountford and Uhlig (2009), Romer and Romer (2010), Baum and Koester (2011). Thus, implementing different identification tools, they reach the same conclusion[5]. By contrast, Perotti (2004) disagrees with these findings and suggests that output does not react to tax shocks. In regards to spending shocks, the literature agrees that positive spending shocks cause a persistent output increase. What happens on private consumption? Unfortunately, the empirical evidence provides conflicting results, and a final word able to discriminate between neoclassical and Keynesian views cannot be written. In fact, a positive spending shock generates a positive and persistent reaction of private consumption according to Fatás and Mihov (2001), Blanchard and Perotti (2002) and Perotti (2004), while Ramey (2011) predicts an opposite reaction. Other authors, such as Mountford and Uhlig (2009) and Edelberg et al. (1999), show that private consumption response is not statistically significant and close to zero.

The recent literature that studies differences in government fiscal multipliers during periods of slack refers, among others, to Owyang et al. (2013), who studies quarterly data for US and Canada, finding that there is no evidence of different multipliers for the US while they are substantially higher for the latter country. Furthermore, Auerbach and Gorodnichenko (2011) and Auerbach and Gorodnichenko (2012) analyze US data (both quarterly and annual) since 1985 and they find a multiplier near 0 during good times and between 1.5 and 2 during recessions. In addition, Batini et al. (2012) examine the multiplier in the US, Europe and Canada, suggesting that "smooth and gradual consolidations are to be preferred to aggressive consolidations, especially for economies in recession facing high risk premia on public debt".

Respect to the existing empirical literature, the main contribution of this paper is to assess the effect of fiscal shocks on macrovariables during business cycle fluctuations, differentiating public spending shocks between consumption and investment.

2.3 Data

The data used in this study come from Eurostat and cover the period between the first quarter of 1999 to the last quarter of 2012 for the 11 countries that have been part of the

[5]Romer and Romer (2010) implement a narrative approach which is similar to the event-study approach.

EMU since 1999[6]. The main constrain in working with VAR in the fiscal policy context is the availability of quarterly data and this issue is present also in this case. Eurostat provides quarterly homogeneous data for EMU countries starting from 1999[7] and pooling countries data together allows to have a higher number of observations. Therefore I decided to perform a Panel VAR relying on overall 616 points for each variable. The fiscal variables considered are three. In particular, on the revenue side there are data for direct, indirect and social security taxes. Summing these three items up and subtracting transfers generate net taxes, which represent one of the fiscal variables. On the expenditure side, following Blanchard and Perotti (2002), I focus on government goods and services spending (or consumption spending) and investment spending. The macrovariables of interest are the same as in Perotti (2004), therefore Output, GDP deflator inflation rate (or Inflation), 10-years nominal bond interest rate (or Interest rate). All the variables are seasonally adjusted through Tramo-Seats specification[8] and (excepted for Inflation and Unemployment) in per-capita terms, deflated by the gdp deflator and in log.

In order to analyze the effects of fiscal policy during good and bad times I split the sample in two parts: the first one represents the growth time and the second one the recession time. Technically, a country is in recession after two consecutive quarters of negative economic growth measured by a country's GDP. Considering the 11 countries, in the first quarter of 2009 Austria, Belgium, Finland, France, Germany, Ireland, Italy, Netherlands and Portugal where in recession, while Spain here had the first negative quarter and Luxembourg a positive one (after two negatives). The necessity to fix a threshold equal for all the countries, brings to the fact that it seems reasonable to consider the period between 1999 and 2008 as the expansion period (model 1, M1) and the period between 2009 and 2012 as the recession one (model 2, M2)[9].

2.4 Econometric methodology

The econometric methodology used to analyze fiscal policy shocks' effects relies on Vector Autoregressions (VAR) analysis, firstly introduced by Sims (1980). This technique had

[6]The EMU countries are: Austria, Belgium, Finland, France, Germany, Ireland, Italy, Luxemburg, Netherlands, Portugal and Spain.

[7]See the Eurostat website: http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home/.

[8]The software used is Demetra, downloadable from the following webpage: http://circa.europa.eu/irc/dsis/eurosam/info/data/demetra.htm.

[9]It should also be noticed that performing an analysis to verify the presence of structural change through the Chow test, there is evidence of this circumstance.

quickly become widely used, supplanting traditional Simultaneous Equations Systems[10].

The VAR analysis may be divided in three different steps. The first one defines the benchmark reduced-form VAR model, where the endogenous and deterministic variables are specified. The second step transforms the reduced-form in a structural form, and the third one identifies restriction in order to highlight the relevant innovations and impulse responses. In the following subsections these steps are analyzed in greater details.

2.4.1 Reduced and Structural form

The starting point of the VAR analysis, considering that the analysis is based on 11 EMU countries, is the benchmark reduced-form Panel VAR model, which includes the following endogenous variables: the log of per-capita real government spending in good and services g_t (or consumption spending), the log of per-capita real government capital spending c_t (or investment spending), the log of per-capita real net revenues τ_t (defined as the sum of government revenues from direct, indirect and social security taxes minus government transfers), the log of per-capita real output y_t, the GDP deflator inflation rate π_t and the 10-year nominal interest rate i_t. The reduced-form model can be specified as follows:

$$y_t = A(L)y_{t-1} + u_t \tag{2.1}$$

where $y_t \equiv [g_t \quad c_t \quad \tau_t \quad y_t \quad \pi_t \quad i_t]'$ is a (6×1) vector of endogenous observable time series variables, A(L) is (K × K) coefficient matrix, $u_t \equiv [u_t^g \quad u_t^c \quad u_t^\tau \quad u_t^y \quad u_t^\pi \quad u_t^i]'$ is a six-dimensional vector of reduced-form disturbances with $E[u_t] = 0$, $E[u_t u_t'] = \Sigma_u$ and $E[u_t u_s'] = 0$ for $s \neq t$[11]. Quarterly dummies are not included because the data are detrended. The model includes also countries fixed effect. Considering that data are quarterly and one year period seems to be adequate for the analysis of fiscal policy shocks, the number of polynomial lags is set equal to four[12]

The reduced-form VAR is a VAR model where impulse responses could be estimated in order to recognize relations between the variables. However issues rise when it is needed to interpret which set of impulse responses generate the ongoings in a given system, due to the fact that the same underlying VAR produces different sets of impulses. Thus, to

[10]Sims (1980) strongly criticized the specification methodology of large scale macroeconomic models, arguing that there were methodological weaknesses.

[11]It should be noted that the same framework is applied when youth unemployment is taken into account. The difference is that this new macrovariable substitutes the 10-years bond interest rate one.

[12]This is the same number of lags used by Blanchard and Perotti (2002). However, when robustness checks are implemented, both a higher and lower number of lags are studied.

classify the relevant innovations, it is required the identification of structural restrictions through non-sample information.

Before focusing on structural restrictions and to overcome the issue that in general reduced-form disturbances are correlated, the reduced-form VAR should be transformed in a structural VAR, pre-multiplying equation (1) by the (kxk) matrix A_0:

$$A_0 y_t = A^*(L) y_{t-1} + B_0 \epsilon_t \tag{2.2}$$

where $A^* = A_0 A$. This is the so-called AB-model[13], where the relation between the reduced-form disturbances u_t and the structural shock ϵ_t is described by:

$$A_0 u_t = B_0 \epsilon_t \tag{2.3}$$

The structural errors are assumed to be white noise with $\epsilon_t \sim (0, I_K)$. A simultaneous equations system is formulated from the errors of the reduced form, accounting for the shift from specifying direct relations for the observable variables to formulating relations for the innovations. The reduced form residual is obtained from equation (3) as $u_t = A_0^{-1} B_0 \epsilon_t$ and therefore $\sigma_u = A_0^{-1} B_0 B_0' A_0^{-1'}$.There are $K(K+1)/2$ equations and $2K^2$ elements considering both matrices A and B. Setting the diagonal elements of A equal to one, K elements are set. However, further restrictions are needed and, more specifically, $2K^2 - K - [K(K+1)]/2$ restrictions should be set for identification purposes[14]. If no restrictions are imposed in A_0 and B_0, the structural model is not identified. The following subsection delineates the identification scheme implemented.

The reduced-form benchmark model is (1), as described in the previous section. To correctly estimate a VAR process it is necessary to impose some assumptions on the model behavior. A preliminary analysis should therefore be implemented to evaluate if the required conditions hold, in order to derive the consistency and asymptotic normality of the estimators. With this attempt, it is studied for each variable of the model whether or not they follow a stable process. Implementing the Augmented Dickey-Fuller test, there is evidence that all variables (expect for Inflation and Interest rate in M1 and for Inflation in M2) are integrated of order 1, therefore they are stationary after differencing once. Even if a stationary process may be preferred for stability purposes, it should be

[13]For a given regression, I assume that the matrices A and B are invariant across time and countries.
[14]For further details about the AB-model see Lütkepohl (2005), chapter 9.

considered that differencing could distort the relationship between the original variables generating misleading results. The analysis of cointegration between the variables is performed according to the rank and the maximum eigenvalue tests and there is not an unequivocal result. Considering also the absence of peculiarities that shows a priori long-run relationship among variables, it seems plausible not to impose any cointegrating restriction. Consequently, the VAR is estimated with the variables entering in levels[15]. In addition, the number of lags to be included in the benchmark VAR model has been set in four (as specified in section 3). Checking this choice more formally, for Model 1 the AICC ans SBC/BIC tests suggest respectively six and two lags. For Model 2, these tests suggest 2 lags. Following Blanchard and Perotti (2002), the benchmark model is constructed using four lags, but different numbers of lags are considered when robustness checks are implemented.

2.4.2 Identification scheme

The identification scheme chosen to describe restriction relies on Blanchard and Perotti (2002), subsequently expanded in Perotti (2004), who studied fiscal policy shocks effects in the United States. Blanchard and Perotti (2002) used a three-variable VAR model, including taxes, government expenditures and output, while Perotti (2004) used five-variables, considering also inflation and interest rate. This methodology relies on a two-step procedure. The first step is aimed to exploit institutional information about tax and transfer systems and about the timing of tax collections. This piece of information is used to evaluate cyclically adjusted taxes and government expenditure. The second step estimates the effects of fiscal shocks through Impulse Response Function.

In order to perform the first step, the reduced form residuals of the fiscal variables should be further analyzed. In particular, they may be seen as linear combination of three components. The first one is the random discretionary shocks, which represents the structural shocks to be estimated. However, there are other components that may prevent the correct estimation. In fact, another component is represented by the automatic response of taxes and government spending to innovations in the macroeconomic variables (for example, an economic expansion would generate an increase in taxes for given tax rates). The third component is the systematic discretionary response of policymakers to macro innovations (i.e. variation in the tax rates according to a recession or an economic expansion). In order to understand this

[15]The same process has also been followed by Giordano et al. (2008) and previously has been theoretically supported by Sims et al. (1990).

point more in deep, it is useful to write down the equations that explain the relationship between the reduced-form disturbances u_t and the structural disturbances ϵ_t, as follows:

$$u_t^g = \alpha_{gy}u_t^y + \alpha_{g\pi}u_t^\pi + \alpha_{gi}u_t^i + \beta_{gc}\epsilon_t^c + \beta_{g\tau}\epsilon_t^\tau + \epsilon_t^g \tag{2.4}$$

$$u_t^c = \alpha_{cy}u_t^y + \alpha_{c\pi}u_t^\pi + \alpha_{ci}u_t^i + \beta_{cg}\epsilon_t^c + \beta_{ct}\epsilon_t^\tau + \epsilon_t^c \tag{2.5}$$

$$u_t^\tau = \alpha_{\tau y}u_t^y + \alpha_{\tau\pi}u_t^\pi + \alpha_{\tau i}u_t^i + \beta_{\tau g}\epsilon_t^g + \beta_{\tau c}\epsilon_t^c + \epsilon_t^\tau \tag{2.6}$$

$$u_t^y = \alpha_{yg}u_t^g + \alpha_{yc}u_t^c + \alpha_{y\tau}u_t^\tau + \alpha_{y\pi}u_t^\pi + \alpha_{yi}u_t^i + \epsilon_t^y \tag{2.7}$$

$$u_t^\pi = \alpha_{\pi g}u_t^g + \alpha_{\pi c}u_t^c + \alpha_{\pi\tau}u_t^\tau + \alpha_{\pi y}u_t^y + \alpha_{\pi i}u_t^i + \epsilon_t^\pi \tag{2.8}$$

$$u_t^i = \alpha_{ig}u_t^g + \alpha_{ic}u_t^c + \alpha_{i\tau}u_t^\tau + \alpha_{iy}u_t^y + \alpha_{i\pi}u_t^\pi + \epsilon_t^i \tag{2.9}$$

Considering equations (4), (5) and (6), the structural fiscal shocks are represented by ϵ_t^g, ϵ_t^c, ϵ_t^τ. These shocks are mutually uncorrelated, but they are correlated with the reduced form residuals[16]. In addition, the coefficients α_{jk} capture the other two effects previously described: the automatic elasticity of the fiscal variable j to the macroeconomic variables k (i.e. y, π and i) and the discretionary change in the fiscal variable j that the policymaker implements in response to an innovation in the macroeconomic variables. Therefore, equation (4) states that unexpected movement in government spending in goods and services within a quarter may be due to innovation in the macroeconomic variables or to structural shocks to the fiscal variables. The same is true for equations (5) and (6). Equation (7) states that unexpected movement to Output within a quarter may be due to innovation in the other macroeconomic variables or to a structural shock of the Output. The same concept can be applied to equations (8) and (9).

How is it possible to disentangle the automatic and systematic discretionary response of fiscal variables on macro innovations included in coefficients α_{jk}? As shown by Blanchard and Perotti (2002), it is crucial to consider decision lags in fiscal policy and institutional information about the automatic elasticity of fiscal variables to real GDP, inflation and government bond interest rate. It has been noted that generally policymakers take more than a quarter to enact discretionary measures in response to innovation, due to the fiscal time needed to learn about the unexpected variations, decide which is the correct decision to undertake, approve a new law through the legislative body and implement it. Thus, it can be assume that this path takes more than three months, which is the frequency of data used in this analysis. As a consequence, it may be possible to affirm that α_{jk} does not include the systematic

[16]Therefore, they cannot be studied by estimating an OLS of (4), (5) or (6).

discretionary response, therefore only the automatic one is left in. External information on the elasticity of taxes and spending to macro variables can be used to define the coefficients of α_{jk} for equations (4), (5) or (6). As a consequence, cyclically adjusted fiscal shocks can be constructed as linear combination of the three fiscal structural policy shocks, as follows:

$$u_t^{g,CA} \equiv u_t^g - (\alpha_{gy} u_t^y + \alpha_{g\pi} u_t^\pi + \alpha_{gi} u_t^i) = \beta_{gc}\epsilon_t^c + \beta_{g\tau}\epsilon_t^\tau + \epsilon_t^g \tag{2.10}$$

$$u_t^{c,CA} \equiv u_t^c - (\alpha_{cy} u_t^y + \alpha_{c\pi} u_t^\pi + \alpha_{ci} u_t^i) = \beta_{cg}\epsilon_t^c + \beta_{ct}\epsilon_t^\tau + \epsilon_t^c \tag{2.11}$$

$$u_t^{\tau,CA} \equiv u_t^\tau - (\alpha_{\tau y} u_t^y + \alpha_{\tau\pi} u_t^\pi + \alpha_{\tau i} u_t^i) = \beta_{\tau g}\epsilon_t^g + \beta_{\tau c}\epsilon_t^c + \epsilon_t^\tau \tag{2.12}$$

Focusing on the variance-covariance matrix of the reduced-form disturbances, it is possible to set the coefficients of the automatic response of fiscal variables. I assume that variations in Output are not able to affect either consumption or capital expenditure in the same quarter[17], therefore $\alpha_{gy} = 0$ and $\alpha_{cy} = 0$. Net taxes are assumed to increase in relation to Output expansions, therefore $\alpha_{\tau y} = 1$. In addition, nominal current, capital and taxes items are believed not to be affected by changes in the price level [18], therefore the effect in real term is fixed as follows: $\alpha_{g\pi} = -1$, $\alpha_{c\pi} = -1$, $\alpha_{\tau\pi} = 1$. Considering that interest payments paid and received by the government are excluded from the definition of spending and net taxes, α_{gi}, α_{ci}, α_{ti} are set equal to zero. In order to identify the system, further restriction should be made on the reduced-form disturbances. In particular, I assume that the 10-years nominal interest rate can be affected contemporaneously by shocks in output and inflation, and inflation can be affected contemporaneously by shocks in output. This means, on the other hand, that in the same quarter the interest rate does not affect output and inflation, while inflation does not affect output. However, after a quarter the variables in the system can freely interact between each other. This set up is also used to consider fiscal policy effects on youth unemployment, including this variable in place of 10-years bond interest rate one[19].

Focusing on the variance-covariance matrix of the structural disturbances, restrictions should be made on fiscal policy shocks. In particular, I assume that government decision

[17] As noted by Giordano et al. (2008), the length of the procedures related to the majority of payments does not allow that a change in real GDP affects expenditure in the same quarter.

[18] It is likely that when a contract is signed by the public administration, variations of the inflation do not alter the nominal purchase in the same quarter. Considering net taxes, most of them are expressed as percentage of the nominal price, therefore the inflation increases public revenues.

[19] It should be noted that this setting is equal for all the countries included in the analysis. Manipulations of the benchmark coefficients are taken into account when robustness checks are implemented, leading to minor variations in the results.

on spending in goods and services are taken before the ones on spending in capital ($\beta_{gc} = 0$). Moreover, decisions on spending are taken before decisions on revenue ($\beta_{g\tau} = 0$ and $\beta_{c\tau} = 0$). Equations (10), (11) and (12) can be written as follows:

$$u_t^{g,CA} = \epsilon_t^g \tag{2.13}$$

$$u_t^{c,CA} = \beta_{cg}\epsilon_t^c + \epsilon_t^c \tag{2.14}$$

$$u_t^{\tau,CA} = \beta_{\tau g}\epsilon_t^g + \beta_{\tau c}\epsilon_t^c + \epsilon_t^\tau \tag{2.15}$$

Summing up all the restrictions made on the parameters, it is possible to write the following matrix, that shows the relationship between the reduced-form and the structural disturbances:

$$\begin{bmatrix} 1 & 0 & 0 & 0 & 1 & 0 \\ 0 & 1 & 0 & 0 & 1 & 0 \\ 0 & 0 & 1 & -1 & -1 & 0 \\ -\alpha_{yg} & -\alpha_{yc} & -\alpha_{y\tau} & 1 & 0 & 0 \\ -\alpha_{\pi g} & -\alpha_{\pi c} & -\alpha_{\pi\tau} & -\alpha_{\pi y} & 1 & 0 \\ -\alpha_{ig} & -\alpha_{ic} & -\alpha_{i\tau} & -\alpha_{iy} & -\alpha_{i\pi} & 1 \end{bmatrix} \begin{bmatrix} u_t^g \\ u_t^c \\ u_t^\tau \\ u_t^y \\ u_t^\pi \\ u_t^i \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 \\ \beta_{cg} & 1 & 0 & 0 & 0 & 0 \\ \beta_{\tau g} & \beta_{\tau c} & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} \epsilon_t^g \\ \epsilon_t^c \\ \epsilon_t^\tau \\ \epsilon_t^y \\ \epsilon_t^\pi \\ \epsilon_t^i \end{bmatrix} \tag{2.16}$$

Having defined the setting of the reduced form VAR, it is possible to focus on how the fiscal multiplier and error bands are constructed.

2.4.3 Fiscal multiplier and Error bands

There are different ways to compute the fiscal multiplier and therefore it may be useful to specifically define how it is illustrated in this work. The fiscal multiplier is defined as the change in Output caused by a one-unit increase in the fiscal variable at a certain forecast horizon. It can be expressed as follows:

$$Multiplier(T) = \frac{\sum_{t=0}^{T} \Delta y_t}{\sum_{t=0}^{T} \Delta f_t} \frac{1}{f/y} \tag{2.17}$$

where y_t is the response of Output at period t, f_t is the response of the fiscal variable at period t, f/y is the average share of the fiscal variable in Output over the sample time span. In order to have the same kind of interpretation, I extend this approach

also to the other macrovariables of interest. Results always show the median multiplier. As usual in the literature, the "Impact Multiplier" (IM) is the multiplier when T=0. I also consider outcomes at different point in times, therefore taking into account the "Cumulative Multiplier".

In addition to the multiplier structure, it is important to understand how the impulse responses are generated, because they form the basis on which the multiplier is built. In particular, they are constructed assuming a shock equal to one per cent of a certain fiscal variable, considering its average share of Output over the sample time span. Only one fiscal variable per time is being shocked. To evaluate whether a result is statistically significant, error bands should be taken into account. Considering that Sims and Zha (1999) point out that error bands corresponding to 0.50 or 0.68 probability are often more useful than 0.95 or 0.99 bands[20], it seems reasonable to use a lower and upper bands of respectively sixteenth and eighty-fourth percentiles of the distribution of the responses at each horizon[21], which approximately coincides with the 0.68 probability level. Therefore, an estimate it is claimed to be statistically significant when the error bands do not include zero. Bands are measured using Monte Carlo simulations with 1,000 iterations[22].

Next subsections analyze the effects of a shock, respectively, in government consumption, investment and net taxes.

2.5 The response of macroeconomic variables

The analysis of macrovariables reaction triggered by a shock of fiscal variables is detailed in this section. In order to provide a clear representation of the outcome, there are also figures of cumulative multipliers which allow to have an immediate view of the total effect after a certain number of quarters. Furthermore, results are rescaled thus they can be read as the effect of a 1% increase in the fiscal variable. Due to the fact that variables enter in the system log (i.e. Consumption, Investment, Net taxes, Output) or in percentage (i.e. Interest), it is possible to read the effects in percentage points' variations of the macrovariable.

[20]Because the latter ones do not generally have probabilities close to their coverage probabilities

[21]The same strategy to define the significance of the results has been followed by Giordano et al. (2007).

[22]I implemented the Montesvar procedure in Rats (created by Tom Doan), which is designed to estimate Monte Carlo Impulse Responses for overidentified SVARs. For further details, see the following link: http://econpapers.repec.org/software/bocbocode/rtz00119.htm.

2.5.1 Government consumption shock effects

A shock in Government consumption, which is represented by an increase of 1% of expenditures in goods and services, has different effects in relation to the considered period.

During good times (see Figure 2.1, left column) the Output has an IM of -0.11 percentage points, reaching 0.09 in the 4^{th} quarter and 1.32 in the 10^{th} quarter, but they are not statistically different from 0. Inflation reacts positively and significantly to an increase in spending for goods and services (IM of 0.29), while decreases in the subsequent quarters. Interest rate has an IM of -0.02 and this result decreases in the following period, reaching -0.19 in the 4^{th} quarter and -0.87 in the 10^{th} quarter.

Considering the crisis period (see Figure 2.1, right column) results change substantially. The reaction of Output is economically higher than the previous period and statistically significant, having an IM of 0.09, which increases to 1.53 in the 4^{th} quarter and to 4.34 in the 10^{th} quarter. Inflation has an IM slightly negative (-0.07), but it is already positive after the first quarter (0.26), reaching 1.24 after 10 quarters. Interest rate does not react to this shock.

2.5.2 Government investment shock effects

This subsection studies the effect of 1% shock in government investments. The scheme used in the previous subsection is also followed here. I therefore start to analyze the outcome of Model 1 (see Figure 2.2, left side), followed by results of Model 2 (see Figure 2.3, right side).

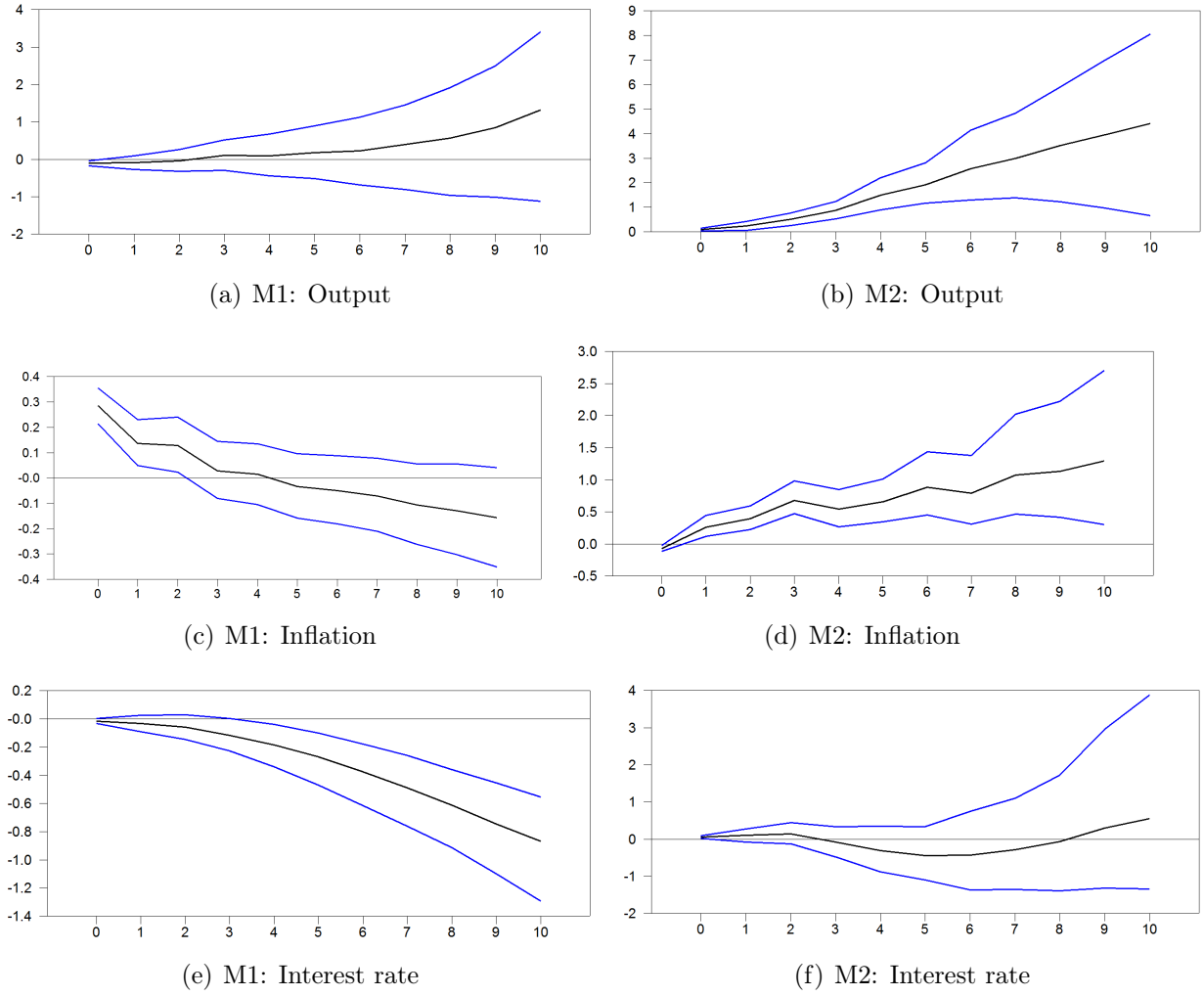
During good times, government investment shocks do not seem to have an impact on macrovariables taken into account. In fact, the confidence intervals of output, inflation and interest rate state that variation in investment does not lead to result statistically different from zero.

During bad times, there are some variations in the outcome. In particular, analyzing the effect on Output, the IM is close to zero (-0.01) and the CM after 4 and 10 quarters are respectively -0.36 and -1.61. Inflation reacts positively, with an IM of 0.01 and a CM of 0.05 and 0.16 after 4 and 10 quarters. Interest rate does not provide significant results.

2.5.3 Government net taxes shock effects

The third fiscal variable of the model is represented by net taxes. What are the effects of 1% increment in net taxes? As before, the analysis is divided between good (see Figure

Figure 2.1: Cumulative multiplier triggered by a shock to government consumption.



(a) M1: Output

(b) M2: Output

(c) M1: Inflation

(d) M2: Inflation

(e) M1: Interest rate

(f) M2: Interest rate

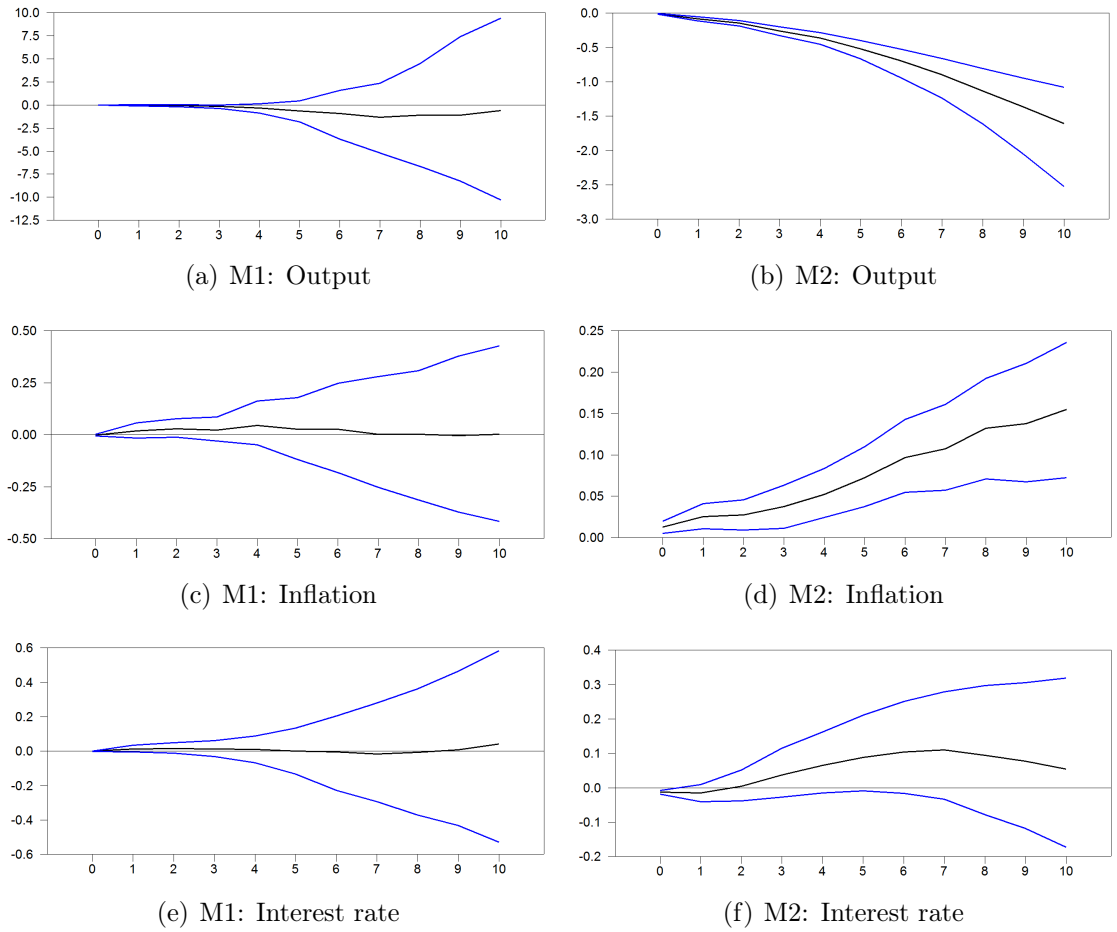
Note: The cumulative multiplier is at different quarters of Output, Inflation and Interest rate during good (left side, M1) and bad (right side, M2) times. Blue lines represent the confidence interval based on Monte Carlo simulations.

3, left side) and bad (see Figure 2.3, right side) times.

In the first case, a net taxes shock generates a decrease in output. The IM is equal to -0.01 and the CM decreases in the following quarters, reaching -0.42 after 1 year and -1.99 after 2 years. Subsequently, results become not significant. Inflation has the highest multiplier after 2 quarters (0.15) and thereafter decreases and becomes not significant. Interest rate react positively between the 6th and 8th quarter with a CM of respectively 0.23 and 0.35.

Considering the period between 2009 and 2012, output decreases until the 3rd quarter, with a CM of -0.34. After that, results are not statistically different from 0. The level

Figure 2.2: Cumulative multiplier triggered by a shock to government investment.



(a) M1: Output

(b) M2: Output

(c) M1: Inflation

(d) M2: Inflation

(e) M1: Interest rate

(f) M2: Interest rate

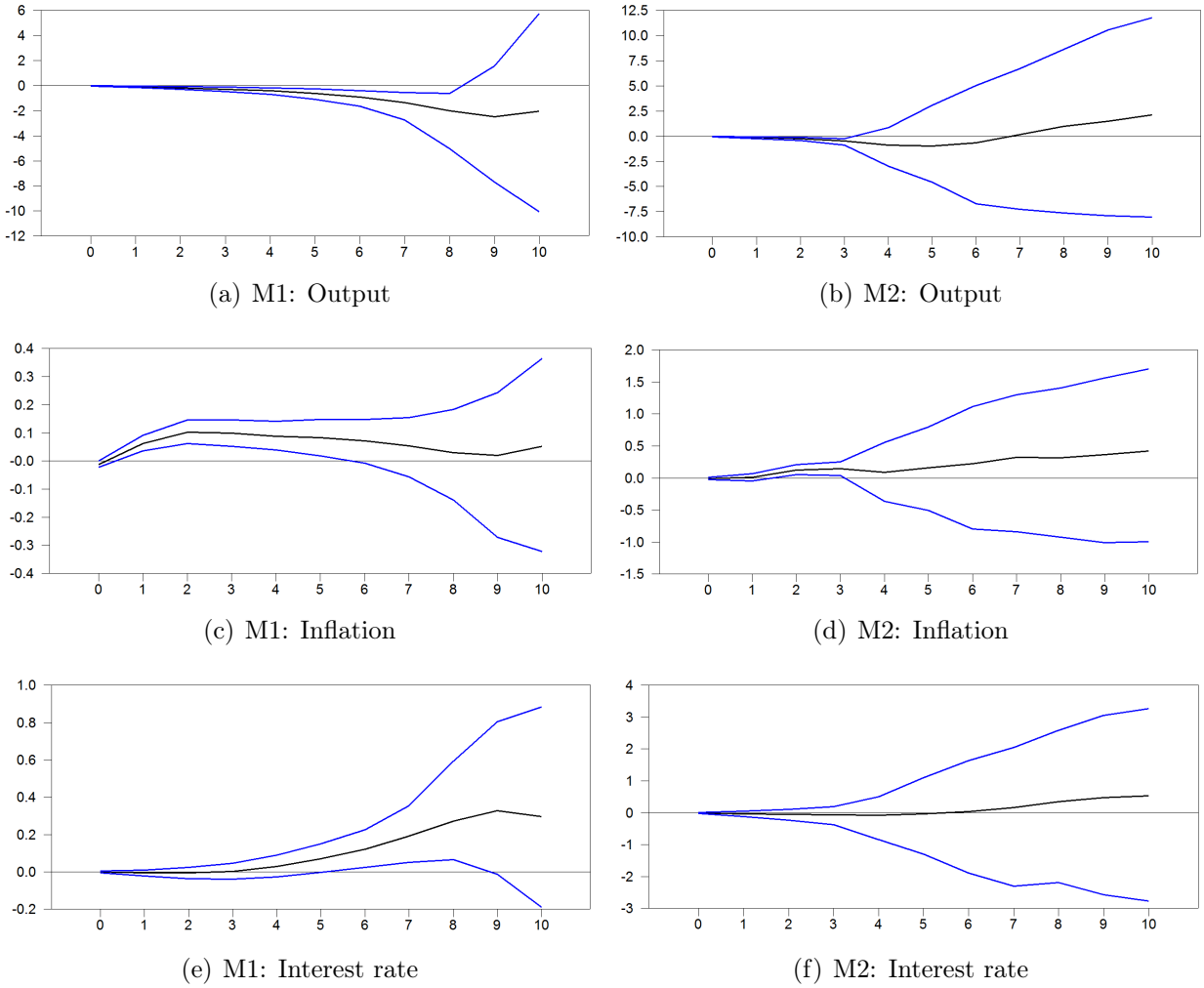
Note: The cumulative multiplier is at different quarters of Output, Inflation and Interest rate during good (left side, M1) and bad (right side, M2) times. Blue lines represent the confidence interval based on Monte Carlo simulations.

of inflation increases until the 3rd quarter, with a CM equal to 0.15. Inflation does not react to an increase in net taxes.

2.5.4 Comments

The analysis provided in the previous subsections shows that fiscal policy has an important role in affecting macroeconomic variables. Furthermore, the effect is different whether it is considered a good or a bad period. In fact, the benchmark model shows that during good times a positive shock in the level of government spending for goods and services has an effect on output not statistically different from 0, while during bad times there is evidence of a significant positive effect. In fact the CM reaches, after 10 quarters, a level

Figure 2.3: Cumulative multiplier triggered by a shock to net taxes.



(a) M1: Output

(b) M2: Output

(c) M1: Inflation

(d) M2: Inflation

(e) M1: Interest rate

(f) M2: Interest rate

Note: The cumulative multiplier is at different quarters of Output, Inflation and Interest rate during good (left side, M1) and bad (right side, M2) times. Blue lines represent the confidence interval based on Monte Carlo simulations.

as high as 4.34. Therefore, it s confirmed the fact that fiscal policy affect the economy differently in relation to the economic conditions.

The fact that in this study consumption and investment are treated separately allows to compare their effects. In terms of output, it seems clear that consumption spending is more effective in stimulating the economy than investment spending, in particular in the period 2009-2012. In fact, the basic model shows a CM after 10 quarters of respectively 4.34 and -1.61.

2.6 Robustness checks

In this section I intends to check the robustness of the results shown in the previously.

Firstly, I consider a variation in the fiscal variables' order. In the benchmark model government consumption is ordered first, followed by investment and taxes. Modifying this assumption and imposing that taxes are chosen first, results still hold.

Secondly, the elasticity levels may be debatable and therefore I run the analysis with different coefficients. Instead of assuming that net taxes increase in relation to output expansions with an elasticity $\alpha_{\tau y} = 1$, I impose a higher rigidity level, therefore (i) $\alpha'_{\tau y} = 0.5$. A further variation taken into account is the effect of inflation on fiscal variables. The basic assumptions, as specified in section 3, are $\alpha_{g\pi} = -1$, $\alpha_{c\pi} = -1$, $\alpha_{\tau\pi} = 1$. In case contracts signed by the public administration can be bargained in relation to inflation variations, it may be the case that a higher inflation rate does alter, at least partially, nominal purchases, leading to (ii) $\alpha'_{g\pi} = -0.5$ and $\alpha'_{c\pi} = -0.5$. It could also be true that public revenue has a higher level of rigidity respect to the benchmark model, with (iii) $\alpha'_{\tau\pi} = 0.5$. Implementing (i), (ii), and (iii), results still hold.

Thirdly, I consider different endogenous variables' lags, generating new models with 5 and 3 lags. The findings that have been shown in the benchmark model mostly hold also in these cases.

2.7 Conclusions

The ability of fiscal policy to stabilize the macro economy and smooth business cycle fluctuation is a crucial issue in the literature. The sluggish of economic growth of the last years have generated an increasing attention on this topic, particularly in relation to the power of fiscal policy to stimulate the economy during a recession.

This paper analyzes 11 EMU countries considering three fiscal intervention channels: consumption, investment and net taxes, focusing on the effects on output, inflation and 10-years bond interest rate. Furthermore, there is a comparison between the pre-crisis and crisis period, in order to assess whether there are remarkable differences in the fiscal policy intervention power.

Results show that an increase in consumption spending generate a higher positive stimulus on output during bad times. Investment spending during the economic downturn produce a negative output variation. Either a shock in consumption or in investment spending generates an increase in the inflation rate during the crisis. (higher in the first case). In relation to a positive variation in net taxes level, output decreases up to 8

quarters in the pre-crisis years and up to 3 quarters considering the period 2009-2012.

This evidence may have some policy implications. In case the national public authorities intends to stimulate the economy through a fiscal stimulus during an economic downturn, it seems that an increase in net taxes is not the right tool. On the other hand, public spending may be an engine for output growth, in particular through consumption spending, but this generates also an increase in inflation.

Chapter 3

Fiscal Policy Announcements of Italian Governments and Spread Reaction during the Sovereign Debt Crisis

(with Matteo Falagiarda)

Abstract

This paper attempts to evaluate the effects of fiscal policy announcements by the Italian government on the long-term sovereign bond spread of Italy relative to Germany. After collecting data on relevant fiscal policy announcements, we perform an econometric comparative analysis between the three cabinets that followed one another during the period 2009-2013. The results suggest that only fiscal policy announcements made by members of Monti's cabinet have been effective in influencing significantly the Italian spread in the expected direction, revealing a remarkable credibility gap between Berlusconi's and Letta's governments with respect to Monti's administration.

JEL codes: E43, E62, G01, G12
Keywords: Fiscal policy announcements, sovereign debt crisis, GARCH models

3.1 Introduction

The recent economic crisis challenged the ability of national governments to guarantee economic stability and the sustainability of sovereign debt. There is empirical evidence that countries that do not have sound public finance, such as substantial fiscal deficit or an excessively high debt level, are likely to face higher risk premia required by financial market's participants (Schuknecht et al., 2009). Since 2009 the spread between long-term government bond yields in some euro area countries vis-à-vis the German ones experienced not only a dramatic increase, but also an augmented differentiation among countries. Recent contributions show that the determinants of the recent widening of sovereign bond premia in euro area countries are related to both general factors, such as liquidity risk, international risk aversion and contagion effects, and country-specific factors, such as fiscal positions and macroeconomic fundamentals (Attinasi et al., 2009; Gerlach et al., 2010; Arghyrou and Kontonikas, 2012; De Santis, 2012; Giordano et al., 2013)

Showing that a major part of sovereign spread changes in euro area peripheral countries was not related to increases in debt-to-GDP ratios, De Grauwe and Ji (2012) argue that the recent movements of government bond yield differentials cannot be explained using only economic and financial determinants. They show that the surge in the spreads of Portugal, Ireland, Greece and Spain in the period 2010-2011 was not linked to the underlying increases in the debt-to-GDP ratios, but was connected to negative market sentiments.

A factor that could play an important role in shaping sovereign spread movements is political communication. Although a formal definition seems to be difficult to provide, Denton and Woodward (1990) and McNair (2011) define, in a broad sense, political communication as a discussion about the allocation of public resources with a particular emphasis on the purpose and intentionality of political actors in affecting the political environment. This includes discussions that are public and therefore could be related, for instance, to public speeches, interviews and press releases. Clearly, mass media play a crucial role in transmitting political communication and thus making them public knowledge (Gade et al., 2013). A provocative question made by The Economist in 2011 in an article titled "Loose lips sink the euro?"[1] has increased the attention on the effects of political communication in the context of the euro area sovereign debt crisis.

The effects of statements made by politicians on financial markets have been the focus of many recent studies. Carmassi and Micossi (2010) analyze critical changes in

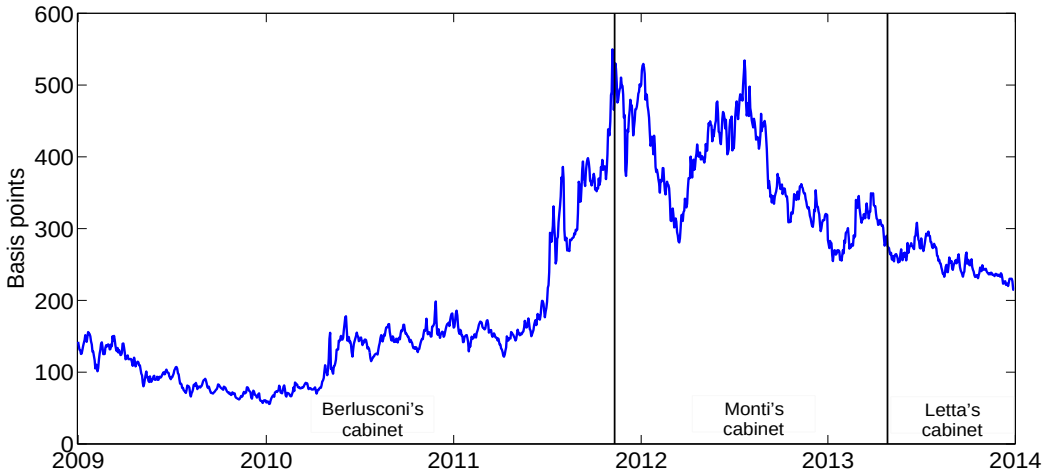
[1]The Economist, 16th of September 2011.

the 10-year government bond spread of Portugal, Italy, Greece, Spain and France versus Germany between December 2009 and June 2010, pointing out that communications by governments have fueled the financial turmoil. The messages by policy-makers were not able to convince the markets about their ability to effectively address economic imbalances. Mohl and Sondermann (2013) analyze news agencies report from May 2010 to June 2011, finding that a higher level of statements' frequency from different euro area governments generated an increase in the bond spreads. In addition, they find that statements from AAA-rated countries' politicians have had a significant impact on sovereign bond spreads. The main finding is therefore the fact that political communication mattered substantially during the financial crisis. Goldbach and Fahrholz (2011) analyze whether political events that worsened the credibility of the Stability and Growth Pact have generated a shared default risk premium for euro area countries. They show that the European Commission has played an important role in affecting investors' evaluations. The effects of ECB communications about unconventional monetary policy operations on the Italian spread during the recent sovereign debt crisis has been studied by Falagiarda and Reitz (2013), who find that the announcements of these measures have been able to reduce substantially Italian long-term government bond yield spread relative to German counterparts. Gade et al. (2013) investigate the extent to which political communication, defined as "policy-makers' pronouncements on fiscal policy and public finance", had an impact on the sovereign bond spreads in euro area countries, showing that this effect is evident in Greece, Ireland and Portugal.

This paper intends to study the effects of political announcements by Italian government's members on the perceived sovereign risk of Italy, measured as the differential between the Italian 10-year government bond yield and the German one. As depicted in Figure 3.1, the Italian spread has experienced very high volatility between 2009 and 2013, increasing from around 140 basis points at the beginning of 2009 to more than 500 basis points at the peak of the sovereign bond crisis at end of 2011, and then declining to about 220 basis points at the end of 2013. As already mentioned, the volatility of sovereign risk is potentially connected to the ability of governments to address their duties in terms of sound public finance and debt obligations, and, particularly, to provide credible long-term prospects. The recent Italian political experience motivates an intriguing comparison among the three different cabinets that followed one another during the period 2009-2013: Berlusconi's cabinet, in office until the 12th of November 2011, Monti's cabinet, in office until the 27th of April 2013, and

Letta's cabinet. Therefore, it seems natural to conduct a comparative econometric analysis to assess the effectiveness of announcements by members of the three different administrations.

Figure 3.1: Evolution of the Italian spread vis-à-vis Germany (2008-2013)



Source: Data from Thomson Reuters-Datastream.

Our definition of *announcement* is consistent with Gade et al. (2013) and includes policy-makers' public pronouncements on fiscal policy and public finance. In order to collect and classify announcements, we rely on the ECB Real Time Information System, which includes news media releases from the following agencies: Bloomberg, Reuters, Dow Jones Newswires and Market News International. Overall, our dataset consists of 197 announcements by Italian government members. We examine their effects on spread movements by using GARCH models to control for time-varying volatility. The findings indicate that only fiscal policy announcements made by members of Monti's cabinet have been effective in influencing significantly the Italian spread in the expected direction, revealing a remarkable credibility gap between Berlusconi's and Letta's government with respect to Monti's administration. Moreover, we check the robustness of the results by changing the set of controls and by using both the Italian CDS and the Italian 10-year government bond yields as dependent variables.

The remainder of the paper is structured as follows. Section 2 presents the dataset and the empirical methodology. Section 3 discusses the results. Robustness checks are conducted in section 4 and section 5 concludes.

3.2 Empirical Analysis

3.2.1 A Fiscal Policy Announcement Indicator for Italy

Data on fiscal policy communications are obtained through the ECB Real Time Information System, which includes news media releases from the following agencies: Bloomberg, Reuters, Dow Jones Newswires and Market News International. In particular, we collect any announcement from Italian government members regarding fiscal policy and public finance from 2009 to 2013. Each announcement is judged in order to assess the direction of its effects on the Italian spread vis-à-vis Germany, and thus to determine the extent to which an announcement has its intended effects. Fiscal policy announcements are classified according to their content, and then coded on a numerical scale as follows:

$$FISC_t = \begin{cases} +1 & \text{if the announcement is perceived to increase the spread} \\ 0 & \text{if the announcement is perceived to be neutral} \\ -1 & \text{if the announcement is perceived to reduce the spread} \end{cases} \tag{3.1}$$

Negative (positive) values are assigned to announcements that are perceived to reduce (increase) the spread, whereas a zero is assigned to announcements that are perceived as neutral. Since this approach of classifying fiscal policy announcements is necessarily subjective, several double checks from the authors have been performed separately to avoid misclassification.

To give some examples, the following announcements are classified as potentially able to reduce the spread:

> " [...] *the Italian government is working on adding an article to the country's constitution requiring a balanced public budget.*" (Giulio Tremonti, Ministry of Finance, 4 August 2011)

> " [...] *there are many proposals aimed at cutting Italy's towering 1.9 trillion Euro in government debt, and our priority is to stabilize current public finances.*" (Mario Monti, Prime Minister, 29 December 2011)

> " [...] *Italy's exit from the European Union's excessive deficit procedure is a priority for the country and will it give it more leeway in pushing forward growth-boosting measures.*" (Enrico Letta, Prime Minister, 21 May 2013)

The following announcements are instead classified as expected to increase the Italian spread:

> " [...] *I am not concerned about increasing Italy's already large public debt to help the rising numbers of unemployed hit by the global economic downturn.*" (Silvio Berlusconi, Prime Minister, 31 March 2009)

> "*Letta's administration suspended all key economic decisions pending a clear backing from the parties in the governing coalition.* [...] *There is no guarantee of government and parliamentary continuity.*" (Letta's office, 28 September 2013)

Overall, our fiscal policy announcement indicator includes 197 announcements from Italian government members over the period 2009-2013: 23 in 2009, 26 in 2010, 84 in 2011, 33 in 2012 and 31 in 2013. We identify 118 announcements by members of Berlusconi's cabinet, 53 by members of Monti's cabinet, 26 by members of Letta's cabinet. Lastly, we also collect fiscal policy announcements related to Italian fiscal policy and public finance coming from domestic sources other than the government (Italian parliament, Bank of Italy, trade unions, industrial associations, etc.) and external sources (European Commission, European Council, ECB, foreign governments, IMF, rating agencies etc.). These statements are classified in the same way as domestic government announcements and are used as control variables in the estimation exercises.

3.2.2 Econometric Model

In order to investigate the effect of fiscal policy announcements on the Italian spread, we need a tool capable of modeling the high time-varying volatility of the spread highlighted in Figure 3.1. Therefore, a standard Generalized Autoregressive Conditional Heteroskedastic (GARCH) model, originally proposed by Bollerslev (1986), is adopted. The conditional mean of the model is an augmented autoregressive process:

$$\Delta S_t = \alpha + \beta \Delta S_{t-1} + \gamma FISC_t + \boldsymbol{\delta} \Delta \mathbf{X_t} + \varepsilon_t, \tag{3.2}$$

where ΔS_t is the first difference of the spread between Italian and German 10-year government bond yields (Gerlach et al., 2010; Attinasi et al., 2009; Arghyrou and Kontonikas, 2012), $FISC_t$ is our fiscal policy indicator, calculated as explained in the previous subsection, and $\mathbf{X_t}$ is a vector of controls. Let the error process be such that

$\varepsilon_t = \nu_t\sqrt{h_t}$, where ν_t is an i.i.d. sequence with zero mean and $\sigma_\nu^2 = 1$. The conditional variance of ε_t is modeled as an ARMA(1,1) process:

$$h_t = c + a\varepsilon_{t-1}^2 + bh_{t-1}. \tag{3.3}$$

Consistently with previous works on the determinants of sovereign spreads, the vector of control variables $\mathbf{X_t}$ contains: a) A volatility index for the euro area (VIX_t) to control for financial turmoil, as in Arghyrou and Kontonikas (2012) and Glick and Leduc (2012). We expect a positive relationship between ΔS_t and $\Delta EuroVIX_t$. b) The *total stock market index* for the EU ($EUDS_t$) to control for market-wide business climate changes in the EU, as in De Bruyckere et al. (2012). We expect a negative sign for the coefficient of $EUDS_t$ in the model. c) The TED spread (TED_t), calculated as the three-month LIBOR rate less the US Treasury bill rate, to control for perceived credit risk in the global economy, as in Gerlach et al. (2010). The expected sign of the coefficient of this variable is positive. d) The credit default swap (CDS) of Greece ($CDSGreece_t$) to control for the turbulences due to the Greek sovereign crisis. We expect a positive relationship between this variable and the Italian spread. e) A dummy variable to control for ECB non-standard monetary policy measures, extending the list of events reported by Falagiarda and Reitz (2013). f) Weekday dummies to control for seasonality. g) Lastly, we also use as controls any announcement related to the Italian fiscal policy situation coming from domestic sources other than the government and external sources, such as the European Commission, the ECB, other governments, international institutions and rating agencies.

Parameters are estimated by (quasi-) maximum likelihood using the Broyden, Fletcher, Goldfarb and Shanno (BFGS) numerical algorithm with robust standard errors. The model is estimated using daily data, collected for the period 01:01:2009-31:12:2013. Details on the data are reported in the Appendix.

3.3 Results

The goal of the paper is to check whether the effect on the Italian spread of fiscal policy announcements of the three cabinets that followed one another during the period 2009-2013 differs. To this purpose, the estimation is carried out over three different periods: a) 1 January 2009 - 12 November 2011 (Berlusconi's cabinet); b) 13 November 2011 - 27 April 2013 (Monti's cabinet); c) 28 April 2013 - 31 December 2013 (Letta's cabinet).

Table 3.1 reports the parameter estimates of the GARCH model as in equation (3.2) and (3.3). For each administration, we specify four different models by adding

progressively additional control variables. Ljung-Box (LB) Q-statistics are computed to test for autocorrelation in standardized and squared standardized residuals. The p-values of the calculated LB-Q values show that the null hypothesis of no-autocorrelation up to five and ten orders cannot be rejected. Moreover, the estimated coefficients of the variance equation are statistically significant at conventional levels,[2] revealing clustering and long memory of the spread volatility. Therefore, the GARCH model is reasonably specified.

Turning to the estimates of the mean equation, we find that the sign of the control variables is generally as expected and their coefficients are, in most cases, statistically significant. For example, changes in the European risk measure $EuroVIX_t$ are always positively and significantly (at the 1% percent level) related to the Italian government bond spread during Berlusconi's and Letta's administrations, whereas during Monti's administration the coefficient is significant only in the first two specifications. The results also suggest some contagion effects from the Greek government debt crisis during the years of Berlusconi's administration. There seems to be no influence from Greece during the other two periods. In contrast, an improved business climate ($EUDS_t$) is associated with a significant reduction of the Italian spread, at least during the first two administrations considered. Lastly, the Italian spread reacts positively to changes in the global risk measure TED_t only under Letta's cabinets.

By considering our fiscal policy indicator, we observe that its coefficients during Berlusconi's administration are found not statistically significant. By contrast, the announcements made by members of Monti's cabinet seem to have had a significant effect on the Italian spread in the expected direction in all the model specifications. Lastly, the coefficients of the fiscal policy indicator under Letta's period is negative and significant, except in the third specification. Therefore, our results indicate that announcements by members of Monti's cabinet have been much more effective in influencing the Italian spread in the expected direction, whereas announcements made under the other two governments are found to be ineffective or even moving the spread in an unexpected direction like under Letta's administration. These findings highlight a remarkable credibility gap between Berlusconi's and Letta's governments with respect to Monti's administration.

[2]The estimates are not reported here, but are available upon request.

Table 3.1: Parameter estimates - Italian spread

	Berlusconi's cabinet				Monti's cabinet				Letta's cabinet			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Constant	−0.049	−0.044	0.023	0.015	−0.002	0.012	0.316	0.319	−0.288	−0.288	−0.230	−0.308
ΔS_{t-1}	0.232***	0.215***	0.209***	0.214***	0.153***	0.158***	0.170***	0.172***	0.111	0.114	0.107	0.122
$\Delta EuroVIX_t$	1.167***	1.066***	0.665***	0.672***	4.668***	4.651***	0.668	0.692	2.769***	2.769***	2.089***	2.002***
$\Delta CDSGreece_t$	–	0.016***	0.014***	0.014***	–	0.000	0.000	0.000	–	0.000	0.000	−0.000***
$\Delta EUDS_t$	–	–	−0.043***	−0.043***	–	–	−0.468***	−0.469***	–	–	−0.070	−0.054
ΔTED_t	–	–	–	−0.070	–	–	–	−0.214	–	–	–	0.840**
$DomGov_t$	−0.026	0.043	−0.132	−0.159	4.753**	4.769**	3.378**	3.269**	−1.901**	−1.815**	−1.640	−1.581*
Log-Likelihood	−2237.31	−2221.15	−2212.66	−2211.48	−1429.00	−1428.63	−1378.91	−1378.60	−524.76	−524.70	−523.13	−520.39
$Q(5)$	0.178	0.052	0.067	0.070	0.070	0.074	0.095	0.094	0.097	0.098	0.089	0.094
$Q(10)$	0.583	0.327	0.371	0.386	0.301	0.313	0.429	0.434	0.422	0.419	0.397	0.431
$Q^2(5)$	0.746	0.660	0.614	0.560	0.919	0.912	0.571	0.547	0.566	0.568	0.550	0.542
$Q^2(10)$	0.362	0.383	0.404	0.364	0.734	0.707	0.381	0.363	0.425	0.427	0.413	0.356
Observations	747	747	747	747	381	381	381	381	177	177	177	177

Note: GARCH(1,1) regressions of daily basis point changes in the spread. *** (**, *) indicates statistical significance at the 1 (5, 10) percent level. Robust standard errors are used. $Q(5)$ and $Q(10)$ is the statistical significance of the Ljung-Box Q test for the autocorrelations of the standardized residuals up to the 5th and 10th order, respectively. $Q^2(5)$ and $Q^2(10)$ is the statistical significance of the Ljung-Box Q test for the autocorrelations of the squared standardized residuals up to the 4th and 12th order, respectively. Berlusconi's cabinet: 1 January 2009 - 12 November 2011. Monti's Cabinet: 13 November 2011 - 27 April 2013. Letta's cabinet: 28 April 2013 - 31 December 2013.

3.4 Robustness checks

To check the robustness of the results, we first estimate the model using the CDS of Italy (CDS_t) as dependent variable instead of the spread. The results, reported in Table 2, confirm what we have previously found about Berlusconi's and Monti's governments. However, in this case announcements made by members of Letta's cabinet are no longer significant at conventional levels.

Lastly, we run the same regressions using the Italian 10-year government bond yield (Y_t). Four lags of the new dependent variable are added to remove autocorrelation of the residuals[3]. The results are displayed in table 3. The same conclusions can be drawn here. The coefficients relative to Berlusconi's and Letta's governments are found not statistically significant, whereas announcements made by members of Monti's cabinet have been able to substantially influence the sovereign risk of Italy in the expected direction.

3.5 Conclusions

The study carried out in this article highlights the importance of political communication in influencing sovereign bond spreads. Specifically, we focus on Italian policy-makers' public pronouncements on fiscal policy and public finance, relying on news media releases from the following agencies: Bloomberg, Reuters, Dow Jones Newswires and Market News International. We perform an econometric comparative analysis between the three Italian cabinets that followed one another during the period 2009-2013, assigning a negative (positive) values to announcements that are perceived to reduce (increase) the spread, whereas a zero is assigned to announcements that are perceived as neutral. The results suggests that during Berlusconi's administration fiscal announcements are found to be not statistically significant. By contrast, the announcements made by members of Monti's cabinet seem to have had a significant effect on the Italian spread in the expected direction. Lastly, the coefficients of the fiscal policy indicator under Letta's period is either negative or not significant. Therefore, our results indicate that announcements by members of Monti's cabinet have been much more effective in influencing the Italian spread in the expected direction. These findings highlight a remarkable credibility gap between Berlusconi's and Letta's governments with respect to Monti's administration.

[3]For the sake of brevity, only the coefficient of the first lag is reported.

Table 3.2: Parameter estimates - Italian CDS

	Berlusconi's cabinet				Monti's cabinet				Letta's cabinet			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Constant	−0.110	−0.131	−0.052	−0.045	0.014	0.021	−0.004	0.006	−0.176	−0.176	−0.133	−0.139
ΔCDS_{t-1}	0.179***	0.119**	0.130**	0.130**	0.278***	0.279***	0.275***	0.276***	0.132*	0.140*	0.140*	0.128
$\Delta EuroVIX_t$	1.237***	0.939***	0.216	0.221	3.554***	3.547***	0.430	0.414	2.619***	2.626***	2.021***	1.969***
$\Delta CDSGreece_t$	–	0.055*	0.046*	0.046	–	0.000	0.000	0.000	–	−0.002**	−0.002**	−0.003**
$\Delta EUDS_t$	–	–	−0.079***	−0.079	–	–	−0.358***	−0.360***	–	–	−0.062*	−0.061**
ΔTED_t	–	–	–	0.050	–	–	–	0.163	–	–	–	0.564
$DomGov_t$	−0.435	−0.201	−0.459	−0.429	4.961**	4.977**	2.906*	2.949*	−0.168	−0.070	−0.058	−0.047
Log-Likelihood	−2446.37	−2394.08	−2372.95	−2372.47	−1440.46	−1440.43	−1412.35	−1412.24	−510.95	−510.67	−509.15	−507.84
$Q(5)$	0.144	0.040	0.060	0.070	0.140	0.142	0.027	0.054	0.020	0.018	0.024	0.027
$Q(10)$	0.371	0.135	0.207	0.233	0.317	0.320	0.138	0.217	0.092	0.091	0.103	0.109
$Q^2(5)$	0.713	0.871	0.812	0.818	0.961	0.959	0.612	0.611	0.479	0.458	0.460	0.487
$Q^2(10)$	0.509	0.455	0.560	0.542	0.976	0.976	0.832	0.837	0.729	0.731	0.734	0.770
Observations	747	747	747	747	381	381	381	381	177	177	177	177

Note: GARCH(1,1) regressions of daily basis point changes in the CDS. *** (**, *) indicates statistical significance at the 1 (5, 10) percent level. Robust standard errors are used. $Q(5)$ and $Q(10)$ is the statistical significance of the Ljung-Box Q test for the autocorrelations of the standardized residuals up to the 5th and 10th order, respectively. $Q^2(5)$ and $Q^2(10)$ is the statistical significance of the Ljung-Box Q test for the autocorrelations of the squared standardized residuals up to the 4th and 12th order, respectively. Berlusconi's cabinet: 1 January 2009 - 12 November 2011. Monti's Cabinet: 13 November 2011 - 27 April 2013. Letta's cabinet: 28 April 2013 - 31 December 2013.

Table 3.3: Parameter estimates - Italian 10-year government bond yield

	Berlusconi's cabinet				Monti's cabinet				Letta's cabinet			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Constant	0.060	0.006	0.012	0.017	0.057	0.058	0.137	0.135	0.130	0.133	0.382	0.374
ΔY_{t-1}	0.115**	0.106**	0.106**	0.105**	0.132***	0.140**	0.162**	0.162***	0.084	0.084	0.110*	0.104
$\Delta EuroVIX_t$	0.123	−0.053	−0.079	−0.038	3.366***	3.350***	0.602	0.640	2.838***	2.844***	0.994	0.962
$\Delta CDSGreece_t$	–	0.014***	0.014***	0.014***	–	0.000	0.000	0.000	–	0.000	0.000	−0.001
$\Delta EUDS_t$	–	–	−0.003	0.000	–	–	−0.327***	−0.325***	–	–	−0.170***	−0.170***
ΔTED_t	–	–	–	0.108	–	–	–	−0.131	–	–	–	0.483
$DomGov_t$	0.074	0.007	0.002	−0.020	4.470**	4.557**	3.713**	3.640**	−1.297	−1.229	−1.158	−1.166
Log-Likelihood	−2228.24	−2216.16	−2216.13	−2214.02	−1371.56	−1371.66	−1341.37	−1341.22	−533.64	−533.59	−525.37	−524.28
$Q(5)$	0.647	0.703	0.710	0.716	0.722	0.849	0.774	0.772	0.266	0.264	0.369	0.337
$Q(10)$	0.705	0.728	0.731	0.745	0.786	0.861	0.683	0.685	0.288	0.289	0.481	0.403
$Q^2(5)$	0.401	0.407	0.409	0.416	0.389	0.387	0.285	0.280	0.232	0.231	0.291	0.288
$Q^2(10)$	0.601	0.476	0.479	0.549	0.549	0.544	0.379	0.370	0.332	0.332	0.429	0.426
Observations	744	744	744	744	381	381	381	381	177	177	177	177

Note: GARCH(1,1) regressions of daily basis point changes in the 10-year government bond yield. *** (**, *) indicates statistical significance at the 1 (5, 10) percent level. Robust standard errors are used. $Q(5)$ and $Q(10)$ is the statistical significance of the Ljung-Box Q test for the autocorrelations of the standardized residuals up to the 5th and 10th order, respectively. $Q^2(5)$ and $Q^2(10)$ is the statistical significance of the Ljung-Box Q test for the autocorrelations of the squared standardized residuals up to the 4th and 12th order, respectively. Berlusconi's cabinet: 1 January 2009 - 12 November 2011. Monti's Cabinet: 13 November 2011 - 27 April 2013. Letta's cabinet: 28 April 2013 - 31 December 2013.

Appendix: The Data

Data on fiscal policy communications are obtained through the ECB Real Time Information System, which includes news media releases from the following agencies:

- Bloomberg
- Reuters
- Dow Jones Newswires
- Market News International

Financial daily data are obtained from the Thomson Reuters-Datastream database:

- Long-term bond yield for Italy: Italy Benchmark Bond 10 YR - Redemption Yield (Datastream mnemonic: ITBRYLD)
- Long-term bond yield for Germany: Germany Benchmark Bond 10 YR - Redemption Yield (Datastream mnemonic: BDBRYLD)
- EuroVIX: VSTOXX volatility index (Datastream mnemonic: VSTOXXI)
- Total stock market index for the EU: EU-DS Market (Datastream mnemonic: TOTMKEU)
- TED spread: TED spread rate - middle rate (Datastream mnemonic: TRTEDSP)
- CDS Greece: Greece Senior 10 Year Credit Default Swap (Datastream mnemonic: GRGVTSX)

Data on ECB non-standard monetary policy events are collected using the dataset in Falagiarda and Reitz (2013), which has been extended to include measures announced in 2013.

Bibliography

Acconcia, A., G. Corsetti, and S. Simonelli (2011). Mafia and public spending: Evidence on the fiscal multiplier from a quasi-experiment. CEPR, Discussion Paper 8305.

Afonso, A. and R. Strauch (2007). Fiscal policy events and interest rate swap spreads: Evidence from the eu. *Journal of International Financial Markets, Institutions and Money 17*(3), 261–276.

Alesina, A., F. R. Campante, and G. Tabellini (2008). Why is fiscal policy often procyclical? *Journal of the European Economic Association 6*(5), 1006–1036.

Alesina, A. and A. Drazen (1991). Why are stabilizations delayed? *The American Economic Review*, 1170–1188.

Alesina, A. and R. Perotti (1994). The political economy of budget deficits. National Bureau of Economic Research, Working Paper 4637.

Ambrosanio, M. F. and M. Bordignon (2007). Internal stability pacts: The european experience. *European Economic Governance Monitor, Papers*.

Amisano, G. and C. Giannini (1997). Topics in structural var econometrics. Berlin/Heidelberg.

Angrist, J. D. and J.-S. Pischke (2008). *Mostly harmless econometrics: An empiricist's companion*. Princeton University Press.

Arellano, M. and S. Bond (1991). Some tests of specification for panel data: Monte carlo evidence and an application to employment equations. *The Review of Economic Studies 58*(2), 277–297.

Arghyrou, M. G. and A. Kontonikas (2012). The emu sovereign-debt crisis: Fundamentals, expectations and contagion. *Journal of International Financial Markets, Institutions and Money 22*(4), 658–677.

Attinasi, M. G., C. Checherita, and C. Nickel (2009). What explains the surge in euro area sovereign spreads during the financial crisis of 2007-09?

Auerbach, A. and Y. Gorodnichenko (2012). Fiscal multipliers in recession and expansion. Fiscal Policy after the Financial Crisis, University of Chicago Press.

Auerbach, A. J. and Y. Gorodnichenko (2011). Measuring the output responses to fiscal policy. forthcoming in American Economic Journal: Economic Policy.

Balassone, F. and D. Franco (2000). Public investment, the stability pact and the âĂŸgolden ruleâĂŹ. *Fiscal studies 21*(2), 207–229.

Balduzzi, P. and V. Grembi (2010). Compliance vs. effectiveness: Assessing the role of fiscal rules.

Barro, R. J. (1989). The ricardian approach to budget deficits. *The Journal of Economic Perspectives 3*(2), 37–54.

Bartolini, D. and R. Santolini (2009). Fiscal rules and the opportunistic behaviour of the incumbent politician: Evidence from italian municipalities. CESifo Group Munich.

Bastos, P., L. Castro, J. Cristia, and C. Scartascini (2011). Does energy consumption respond to price shocks? evidence from a regression-discontinuity design. *Inter-American Development Bank Working Paper Series No. IDB-WP-234*.

Batini, N., G. Callegari, and G. Melina (2012). Successful austerity in the united states, europe and japan. IMF Working Paper 12/190.

Baum, A. and G. B. Koester (2011). The impact of fiscal policy on economic activity over the business cycle-evidence from a threshold var analysis. Discussion Paper Series 1, Economic Studies.

Beetsma, R., M. Giuliodori, F. de Jong, and D. Widijanto (2013). Spread the news: The impact of news on the european sovereign bond markets during the crisis. *Journal of International Money and Finance 34*, 83–101.

Bernoth, K., J. Von Hagen, and L. Schuknecht (2004). Sovereign risk premia in the european government bond market.

Blanchard, O. and R. Perotti (2002). An empirical characterization of the dynamic effects of changes in government spending and taxes on output. *the Quarterly Journal of economics 117*(4), 1329–1368.

Blanchard, O. J. and D. Leigh (2013). Growth forecast errors and fiscal multipliers. NBER Working Paper 18779.

Blinder, A. S. (2004). The case against the case against discretionary fiscal policy. Center for Economic Policy Studies, Princeton University.

Bollerslev, T. (1986). Generalized autoregressive conditional heteroskedasticity. *Journal of econometrics 31*(3), 307–327.

Brugnano, C. and C. Rapallini (2010). Il patto di stabilità interno per i comuni: una valutazione con i certificati dei conti consuntivi. *Economia pubblica*.

Brutti, F. and P. Sauré (2012). Transmission of sovereign risk in the euro crisis. *Available at SSRN 2041257*.

Burnside, C., M. Eichenbaum, and J. D. Fisher (2004). Fiscal shocks and their consequences. *Journal of Economic theory 115*(1), 89–117.

Caldara, D. and C. Kamps (2008). What are the effects of fiscal shocks? a var-based comparative analysis. ECB Working Paper 877.

Carmassi, J. and S. Micossi (2010). The role of politicians in inciting financial markets to attack the eurozone. *EuropEos, CEPS, Brussels* (4).

Dafflon, B. (2002). Local public finance in europe: Balancing the budget and controlling debt. Edward Elgar Publishing.

De Bruyckere, V., M. Gerhardt, G. Schepens, and R. Vander Vennet (2012, October). Bank/sovereign risk spillovers in the European debt crisis. Working Paper Research 232, National Bank of Belgium.

De Grauwe, P. and Y. Ji (2012). Mispricing of sovereign risk and multiple equilibria in the eurozone.

De Santis, R. A. (2012). The Euro area sovereign debt crisis: Safe haven, credit rating agencies and the spread of the fever from Greece, Ireland and Portugal. Working Paper Series 1419, European Central Bank.

Denton, R. E. and G. C. Woodward (1990). *Political communication in America*. Praeger New York.

Edelberg, W., M. Eichenbaum, and J. D. Fisher (1999). Understanding the effects of a shock to government purchases. *Review of Economic Dynamics 2*(1), 166–206.

Eggertsson, G. B. and M. Woodford (2003). The zero bound on interest rates and optimal monetary policy. *Brookings Papers on Economic Activity 2003*(1), 139–211.

Eichenbaum, M. and J. D. Fisher (2005). Fiscal policy in the aftermath of 9/11. *Journal of Money, Credit and Banking*, 1–22.

Eichengreen, B. and J. von Hagen (2004). Fiscal policy and monetary union: Is there a tradeoff between federalism and budgetary restrictions? *Journal of Economic Theory 114*(2), 198–230.

Falagiarda, M. (2012, March). Quantitative Easing: Origins, channels, and recent experiences. Unpublished manuscript.

Falagiarda, M. and S. Reitz (2013). Announcements of ecb unconventional programs: Implications for the sovereign risk of italy. Kiel working paper, Kiel Working Paper.

Fatás, A. and I. Mihov (2001). The effects of fiscal policy on consumption and employment: theory and evidence. CEPR Discussion Paper 2760.

Gade, T., M. Salines, G. Glöckler, and S. Strodthoff (2013). âĂIJloose lips sinking markets?": the impact of political communication on sovereign bond spreads. European central bank occasional paper series n. 150, European Central Bank.

Gagliarducci, S. and T. Nannicini (2013). Do better paid politicians perform better? disentangling incentives from selection. *Journal of the European Economic Association 11*(2), 369–398.

Gali, J., J. D. López-Salido, and J. Vallés (2007). Understanding the effects of government spending on consumption. *Journal of the European Economic Association 5*(1), 227–270.

Galli, E. and V. Grembi (2010). Assessing degrees of fiscal rules. mimeo presented at The 7th Public Economics At the Regional and Local level (PEARL) Conference, Turin, April, 2010.

Ganelli, G. and J. Tervala (2010). Public infrastructures, public consumption, and welfare in a new-open-economy-macro model. *Journal of Macroeconomics 32*(3), 827–837.

Gerlach, S., A. Schulz, and G. B. Wolff (2010, May). Banking and sovereign risk in the Euro area. CEPR Discussion Papers 7833.

Giordano, R., S. Momigliano, S. Neri, and R. Perotti (2007). The effects of fiscal policy in italy: Evidence from a var model. *European Journal of Political Economy 23*(3), 707–733.

Giordano, R., M. Pericoli, and P. Tommasino (2013). Pure or wake-up-call contagion? Another look at the EMU sovereign debt crisis. *International Finance 16*(2), 131–160.

Giuriato, L. and F. Gastaldi (2009). The domestic stability pact in italy: a rule for discipline? University Library of Munich, Germany.

Glick, R. and S. Leduc (2012). Central bank announcements of asset purchases and the impact on global financial and commodity markets. *Journal of International Money and Finance 31*(8), 2078–2101.

Goldbach, R. and C. Fahrholz (2011). The euro area's common default risk: Evidence on the commission's impact on european fiscal affairs. *European Union Politics 12*(4), 507–528.

Grembi, V., T. Nannicini, and U. Troiano (2012). Policy responses to fiscal restraints: A difference-in-discontinuities design. IZA Discussion Paper.

Hamilton, J. D. (1994). Time series analysis. Cambridge Univ Press.

Hamilton, J. D. and J. C. Wu (2012). The effectiveness of alternative monetary policy tools in a zero lower bound environment. *Journal of Money, Credit and Banking 44*, 3–46.

Hsu, A. (2011, September). Does fiscal policy uncertainty matter for bond risk premia? Unpublished manuscript.

Ilzetzki, E. (2012). How big (small?) are fiscal multipliers? *Journal of monetary economics*.

Imbens, G. W. and T. Lemieux (2008). Regression discontinuity designs: A guide to practice. *Journal of Econometrics 142*(2), 615–635.

Kopcke, R., G. Tootell, and R. K. Triest (2006). The macroeconomics of fiscal policy. The MIT Press.

Krueger, A. (2002). Crisis prevention and resolution: lessons from argentina. speech at the National Bureau of Economic Research conference on The Argentina Crisis, NBER, Cambridge MA, July.

Linnemann, L. (2006). The effect of government spending on private consumption: a puzzle? *Journal of Money, Credit and Banking*, 1715–1735.

Lucas, R. E. and N. L. Stokey (1983). Optimal fiscal and monetary policy in an economy without capital. *Journal of monetary Economics 12*(1), 55–93.

Lütkepohl, H. (2005). New introduction to multiple time series analysis. Cambridge Univ Press.

Manasse, P. (2007). Deficit limits and fiscal rules for dummies. *IMF Staff Papers 54*(3), 455–473.

McNair, B. (2011). *An introduction to political communication.* Taylor & Francis.

Milesi-Ferretti, G. M. (2004). Good, bad or ugly? on the effects of fiscal rules with creative accounting. *Journal of Public Economics 88*(1), 377–394.

Mohl, P. and D. Sondermann (2013). Has political communication during the crisis impacted sovereign bond spreads in the euro area? *Applied Economics Letters 20*(1), 48–61.

Mountford, A. and H. Uhlig (2009). What are the effects of fiscal policy shocks? *Journal of applied econometrics 24*(6), 960–992.

Owyang, M. T., V. A. Ramey, and S. Zubairy (2013). Are government spending multipliers greater during periods of slack? evidence from 20th century historical data. NBER Working Paper 18769.

Patrizii, V., C. Rapallini, and G. Zito (2006). I patti di stabilita interni. *Rivista di diritto finanziario e scienza delle finanze 65*, 156–189.

Perotti, R. (2004). Estimating the effects of fiscal policy in oecd countries. IGIER Working Paper 276.

Perotti, R. (2007). In search of the transmission mechanism of fiscal policy. NBER Working Paper 13143.

Persson, T. and L. E. Svensson (1989). Why a stubborn conservative would run a deficit: Policy with time-inconsistent preferences. *The Quarterly Journal of Economics 104*(2), 325–345.

Ramey, V. A. (2011). Identifying government spending shocks: It's all in the timing*. *The Quarterly Journal of Economics 126*(1), 1–50.

Ramey, V. A. and M. D. Shapiro (1999). Costly capital reallocation and the effects of government spending. NBER Working Paper 6283.

Ravn, M., S. Schmitt-Grohé, and M. Uribe (2006). Deep habits. *The Review of Economic Studies 73*(1), 195–218.

Rodden, J. (2002). The dilemma of fiscal federalism: grants and fiscal performance around the world. *American Journal of Political Science*, 670–687.

Rodden, J. (2004). Comparative federalism and decentralization: On meaning and measurement. *Comparative Politics*, 481–500.

Romer, C. D. and D. H. Romer (2010). The macroeconomic effects of tax changes: Estimates based on a new measure of fiscal shocks. *American Economic Review 100*, 763–801.

Schuknecht, L., J. Von Hagen, and G. Wolswijk (2009). Government risk premiums in the bond market: Emu and canada. *European Journal of Political Economy 25*(3), 371–384.

Serrato, J. C. and P. Wingender (2010). Estimating local fiscal multipliers. University of California at Berkeley, mimeo.

Sims, C. A. (1980). Macroeconomics and reality. *Econometrica 48*(1), 1–48.

Sims, C. A., J. H. Stock, and M. W. Watson (1990). Inference in linear time series models with some unit roots. *Econometrica: Journal of the Econometric Society*, 113–144.

Sims, C. A. and T. Zha (1999). Error bands for impulse responses. *Econometrica 67*(5), 1113–1155.

Sutherland, D., R. Price, and I. Joumard (2005). Fiscal rules for sub-central governments: Design and impact. OECD Publishing.

Ter-Minassian, T. Fiscal rules for subnational governments: can they promote fiscal discipline? *OECD Journal on Budgeting 6*(3), 111.

Uhlig, H. (2005). What are the effects of monetary policy on output? results from an agnostic identification procedure. *Journal of Monetary Economics 52*(2), 381–419.

Weingast, B. (2006). Second generation fiscal federalism: implications for decentralized democratic governance and economic development. SSRN 1153440.

Wildasin, D. E. (1997). Externalities and bailouts: hard and soft budget constraints in intergovernmental fiscal relations. World Bank Publications 1843.

Zanardi, A. (1997). Federalismo fiscale: si riparte? *La finanza pubblica italiana*, 127–155.