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# Empirical Essays in Fiscal Policy

*by*

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A thesis submitted for the degree of  
Doctor of Philosophy

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2013





Thesis 9906

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## Summary

The core of this thesis consists of three chapters. In the first chapter we introduce fiscal policy of trading partners in the study of the effect of fiscal policy on the domestic growth rate. The effects of economic conditions and fiscal policy in trading partners on the domestic economy, in conjunction with fiscal policy in the home country, are the main object of this study. In a panel of OECD economies, we find that the cyclically-adjusted external primary deficit plays a role in determining the growth rate of the home country. Small changes in the fiscal stance of trading partners affect the domestic economy more than large changes. This might be attributed to the transitory nature of large changes and the reaction of the exchange rate and interest rate. Fiscal policy coordination is then more important during normal times.

The second chapter investigates the relation between bailouts and regulation. Regulation, by limiting the room for government intervention in the market, can affect the likelihood of a bailout and its amount. We define bailouts as a set of ad-hoc measures taken by the government, aimed at financially helping firms in turmoil. To capture them, we use data on stock-flow adjustments and their components, and State aid. We find that a higher level of product market regulation, as captured by the OECD indicators, is associated with a lower likelihood of a bailout as measured by stock-flow adjustments and net acquisition of financial assets, but more regulated countries grant a higher level of State aid than average.

The third chapter explores the behaviour of fiscal policy during credit booms that peaked in Europe from 1990 on. We address the question of whether fiscal policy during credit booms is different from fiscal policy during normal times in private credit and whether this difference is due to a different behaviour of the cyclical component or it can be traced back to changes in the structural component as well. Controlling for total revenues and total expenditure, and their components, we find that the behaviour of fiscal variables during credit booms does differ from non-boom periods. This difference can be traced back to both the cyclical and the structural component, suggesting that during times of boom in private credit, the structural component of government revenues and expenditure should be closely monitored, regardless whether its dynamic is due to actual structural changes or to a failure of the cyclical-adjustment to capture the dynamics characterising a credit boom.

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# Chapter 1

## Introduction

This thesis focuses on the role of fiscal policy in the economy. In our analysis fiscal policy is studied as an independent variable in Chapter 2, where we control for the effect of fiscal policy in the home country and in trading partners on the domestic growth rate, and as a dependent variable in Chapter 3 and Chapter 4. In Chapter 3, we investigate the role of regulation in determining the probability and the cost of bailouts, while in Chapter 4 we examine the behaviour of fiscal policy during credit booms.

In Chapter 2 we address the question of whether fiscal policy in trading partners has an effect on the domestic growth rate, while controlling for the effects of domestic fiscal policy as well. This question is particularly important, considering the high degree of economic integration shown by OECD countries. Moreover, in the years following the 2007 crisis, fiscal policy coordination has often been at the centre of the policy debate. To introduce fiscal policy in trading partners in the analysis we create a trade-weighted variable, capturing changes in the cyclically-adjusted primary deficit in trading partners. We find that the external cyclically-adjusted primary deficit affects the domestic economy. An increase in the deficit of trading partners is, in fact, associated with a lower growth rate in the home country, especially in the medium-run and if the changes in the deficit of trading partners are small.

In Chapter 3, our focus is on establishing if and how bailouts are related to the level of regulation in the country. Bailouts consist, in fact, of a set of ad-hoc measures taken by the government, aimed at financially helping firms in turmoil; the government could face then different constraints depending on the level of regulation in the market. To capture bailouts, we use the stock-flow adjustment of government debt and its components, and



State aid. Depending on the measure adopted we capture different types of government expenditure, taking the form of off-budget expenditure, delayed and foregone revenues, and in-budget expenditure tailored on the needs of single firms in distress.

From our analysis emerges that the relation between bailouts and regulation depends on how we measure a bailout. The more regulated the economy is, the lower the chances that the government will intervene in the market to bail out firms, through an asset acquisition or granting a special loan. State aid, on the other hand, tends to be higher in more regulated economies, where the government appears to be more likely to use instruments such as guarantees, tax deferrals and special loans. This evidence suggests a substitution between bailouts and the granting of State aid. More regulated economies provide liquidity and credit to firms in distress through loans and tax deferrals, rather than stepping in and acquiring the firm. We explain this result with the more traumatic nature of bailouts, since they are usually associated with changes in the management, in contrast to State aid.

Chapter 4 explores the behaviour of fiscal policy during credit booms that peaked in Europe from 1990 on. While the literature on credit booms does not find any evidence of an increase in cyclical government consumption during these episodes, there is evidence of a heavier debt burden found in our sample. We proceed controlling the behaviour of both expenditure and revenues around the peak in private credit. In doing so, we include, when possible, a study of the trend of fiscal variables as a share of potential GDP.

Once again, given the increase in financial integration and the simultaneity of credit boom often found in the literature, our study suggests that when considering fiscal integration, particular attention should be given to the behaviour of the structural component as well as the cyclical and periods of credit boom should be considered exceptional times not only for private credit and private consumption, but in terms of the behaviour of fiscal variables as well.

Chapter 5 presents the conclusions.

## Chapter 2

# Fiscal Policy and Trading Partners

### 2.1 Introduction

The aim of this chapter is to investigate fiscal policy and growth in trading partners in the analysis of the effects that changes in domestic fiscal policy have on the growth rate of a country. The increasing degree of international integration makes the inclusion of the trade link in this framework necessary. In fact, while so far monetary policy in trading partners has always been taken into account while evaluating the effects of changes in the interest rate of the home country, the same has not been done for fiscal policy. We hence address the question of whether a change in fiscal policy in a trading partner has an impact on the home country. We also control for the difference between large changes in large partners and business-as-usual fiscal policy.

The effects of sizeable changes in domestic fiscal policy on the domestic growth rate have been the object of a large number of papers. This literature can be divided across different lines. Some studies focus on just one country, while in other cases they adopt a panel approach. There are also differences in the method adopted (a fixed-effect regressions or a panel VAR), or on the way they select the episodes of interests (“quantitative” versus “narrative” approaches).<sup>1</sup>

The chosen sample and method affect the kind of analysis carried on. A case study approach gives a better insight into the mechanisms leading to the outcome, allows for a better identification of the episodes of interest, and it offers more instruments to identify

---

<sup>1</sup>Among others, see Alesina and Ardagna (2010) for panels, Perotti (2011) as an example of case studies. Schaltegger and Weder (2010) run fixed-effects regressions, while Favero et al. (2011) adopted a VAR. For an example of quantitative approach see (Giavazzi et al., 1999) while the narrative approach has been used by Romer and Romer (2010); Devries et al. (2011)

causation. Papers that focused on just one country in fact often include the international links of the home economy in the analysis, differentiating between exchange rate and export-driven expansionary fiscal adjustments. The country panel approach, on the other hand, while allowing to exploit the information that a larger sample can offer, has often omitted the international link. In this setting the identification of the episodes has been more controversial, since it generally relies on a quantitative approach (with the exception of Devries et al., 2011). This study falls among the group adopting a panel approach, while augmenting it for growth and fiscal policy of trading partners.

Non-Keynesian effects of extreme fiscal retrenchments are a key finding in panel studies. The recurring emergence of this evidence, although criticized because of the way episodes have been identified (Leigh, 2010), has not been fully explained yet, as stressed by Perotti (2011). The inclusion of the international link is meant to examine if these results are due to the omission of trading partners' growth and fiscal policy and how they might contribute to the final outcome.

The measure used in this paper to identify the shocks draws from Alesina and Ardagna (2010): they define large changes in fiscal policy as an absolute change in the cyclically-adjusted primary deficit bigger than 1.5% of GDP, compared to the previous year value. This allows to identify both adjustments and stimuli at home and in trading partners and to have a panel as large as the OECD data on fiscal policy variables allows.

The cyclically-adjusted external primary deficit enables the analysis of fiscal policy of trading partners. It is a measure of the trade-weighted fiscal stance abroad, in order to study its impact on the growth rate of the home country in the short and in the medium run. We also control for the country-specific external growth rate, using the trade-weighted GDP growth in trading partners.

We carry on the analysis both in the whole sample and during episodes of large changes in the primary deficit at home and in trading partners. The non-Keynesian effects of large domestic changes found in the literature depend in part on the composition of the sample and in part on the omission of the trade link. The external variables appear to be more important in the medium run than in the short run and fiscal policy in trading partners has a non-Keynesian effect on the domestic growth rate.

From our analysis small changes in the fiscal stance of trading partners appear to be the most important source of spillovers for the domestic economy. We attribute this evidence



to the more persistent nature of small changes compared to large ones and to the reaction of the relative interest rate. When the home country is undergoing a sizeable change in its deficit, the external variables seem not to influence the domestic economy. Some non-Keynesian effects of fiscal adjustments are anyway confirmed even when a measure for the cyclically-adjusted external primary deficit is introduced in the model.

The rest of the chapter is structured as follows: Section 2.2 reviews the literature and discusses the current debate; Section 2.3 describes the data used in the analysis and the method adopted to identify the episodes of interest, for both internal and external changes in fiscal policy. Results can be found in Section 2.5. Section 2.6 concludes.

## **2.2 The Debate over Non-Keynesian Outcomes**

The effects of large changes in fiscal policy on the growth rate of the country and on other macroeconomic variables is once again at the centre of the debate, because of the need for fiscal stimuli in stagnating economies and the necessity of deficit-reducing policies that rose as a counterpart of these events. The non-Keynesian effects of large contractions are among the most debated points.

These effects of sizeable fiscal contractions have often been explained through the expectations channel, operating especially when deficit corrections are mainly composed by spending cuts. Other explanations attribute the result either to the behaviour of the interest rate and the exchange rate during the episodes of interest, or to the actual motivation behind the consolidation, when not discussing the overall existence of the correction itself.

While the two explanations share the view that the composition of the shift in government spending is an important determinant of the impact the change in fiscal policy will have on the growth rate, with pending cuts being more effective when based on cuts in wage expenditure rather than on investment, the mechanisms at the basis are very different. The expectation channel, in fact, is based on a closed-economy explanation operating through the private sector belief that taxes will be lower in the future, while the relative interest rates and the exchange rate mechanism brings the determinants outside national borders.

According to the expectations view, a cut in government expenditure will lead to a

higher GDP growth rate, through an increase in consumption, due to a lower expected tax burden, as Blanchard (1990a) shows. Findings consistent with the expectations view have contributed to reinforce it. According to the results found by Giavazzi et al. (2005), in fact, the dimension and the duration of the adjustment matters in determining whether there will be a non-Keynesian effect or not. An empirical analysis of this channel has been tested by Bertola and Drazen (1993), in a model of government spending where once a “trigger point” has been hit, the behaviour of consumers changes because of a non-linear relation with government spending.

In a more recent paper, Alesina and Ardagna (2010) follow an approach similar to Giavazzi et al. (2005), adopting a cross-sectional analysis of episodes of large changes in fiscal policy, selected for 21 OECD countries, using a quantitative approach. The evidence is once again in favour of non-Keynesian effects of large changes in fiscal policy, where a decrease in government expenditure is correlated with a higher growth rate. The composition of both fiscal stimuli and fiscal adjustments matters in determining the growth rate of the country, with more effective stimuli being positively correlated with a decrease in taxation.

The results have been criticised and attributed to the choice of the sample and specifically to the method chosen to identify the episodes. The use of a panel approach has also been criticised, because it imposes a common reaction to changes in fiscal policy to different countries. (Favero et al., 2011).

In contrast to the expectations view, Perotti (2011) uses a case-study approach to underline how the impact of the exchange rate played a bigger role than it had previously been acknowledged for in determining the non-Keynesian effects found in some notable cases. So far studies based on a panel have not taken into account changes in the fiscal position of other countries.

These two explanations have contrasting implications: if there were a simultaneous adjustment in two trading partners, according to the expectations view, both economies would achieve a non-Keynesian outcome and benefit from the contraction in government expenditure, without being influenced by what happens in the other country. If the exchange rate channel was predominantly responsible for the result, the final outcome of the consolidation would depend on the behaviour of the exchange rate between the two countries and on the exchange rate regime in place.

In this context Lane and Perotti (2003) offer a contribution about the different effects of fiscal policy on growth and employment, depending on its composition and on the exchange rate regime in place: economies with a floating exchange rate will benefit from a cut in government wages more than those with a pegged currency.

The interest rate behaviour during episodes of large changes in fiscal policy has been identified as another possible mechanism. While the papers mentioned so far relied on a quantitative identification of the episodes of interest, when dealing with a set of countries, Devries et al. (2011) built a dataset based on a narrative approach using a method similar to the one adopted by Romer and Romer (2010). It covers a 31-year long period, for 17 OECD economies and draws from both IMF reports and country-specific sources, in order to identify fiscal consolidation episodes that are not driven by a response to the current state of the economy, but by the desire to reduce the deficit.

Although the sample of episodes selected is quite different from the quantitative-based one used in Alesina and Ardagna (2010), Leigh (2010) still finds evidence of a more contractionary effect of tax cuts compared to spending cuts, partially confirming one of the key results emerging from the previous literature.

The authors attribute the less contractionary effects of spending cuts, when compared to tax-based consolidations, to the different behaviour of monetary policy in the two cases. Short-term interest rates in fact decrease faster in response to spending-based deficit reductions. This result is attributed to the more inflationary nature of tax hikes compared to expenditure cuts, such that would require higher interest rates and to a more favourable view, from the central banker, of spending cuts.

In a previous paper by Lambertini and Tavares (2005), on the other hand, monetary policy seems not to influence the persistence of a stabilization, while an exchange rate depreciation before the adjustment significantly increases the likelihood of its success.

These explanations are anyway closely linked to each other. If the persistence of the shift in government expenditure affects the relative interest rate and the exchange rate, cuts in wage expenditure might be perceived as more persistent than cuts in investment or tax increases. More importantly mechanism is not necessarily limited to large changes, since the size in the shift in government expenditure is neither sufficient or necessary to guarantee the persistence of the change.

When dealing with open economies, the business cycle of trading partners might also



play a role in determining the outcome of a large change in the public finances of the home country.

Whether non-Keynesian effects of fiscal policy will take place could depend on both the external growth rate and the level of expenditure abroad. A booming trading partner could substitute an otherwise depressed domestic demand. A contribution about the importance of trading partners in determining the growth rate in the home country comes from Arora and Vamvakidis (2005): in their analysis a 1% increase in GDP growth in trading partners is reflected in a 0.8% increase in GDP growth in the home country.

Movements in the business cycle of other countries have been included by adding a set of time-dummy variables in Giavazzi and Pagano (1995), or by including the aggregate output level for the OECD countries, without actually controlling for country-specific variables that capture not just the world trend, but the economic climate in the most important trading partners.

Corsetti et al. (2010) use a two-country business cycle model to analyse the effects of simultaneous changes in fiscal policy; in this case the authors focus on the effects of a stimulus taking place simultaneously in the two countries.

A study linking fiscal policy to exports has been carried on by Beetsma et al. (2006). In their paper the authors focus on fiscal policy in normal times, avoiding to focus on episodes of large changes and carry on their analysis in a EU framework. The results point towards a positive spillover originating from fiscal policy in a country and resulting, through an increase in the imports of the home country, in a higher growth rate in a trading partner. Spillovers are calculated with a two-step approach, using a panel VAR for the fiscal policy shock and a gravity equation to estimate the effects on imports; their magnitude depends on which country is undergoing a change in its fiscal policy: the impact on the growth rate of its trading partner reaches its maximum of 15 basis points after a 1% change in German public spending.

Along the same lines is the analysis contained in Leigh (2010) where the effect of a consolidation on net exports is investigated: the impact appears to be positive, but tax and spending cuts affect imports and exports differently, with the latter increasing after a decrease in spending and the former decreasing because of a tax hike. The authors also simulate an episode of simultaneous adjustment using the IMF Global Integrated Monetary and Fiscal Model. A fiscal consolidation of 1% of GDP in Canada has a more

severe impact on Canadian GDP if it happens when every country is reducing its deficit by the same amount, rather than if the consolidation only takes place in Canada.

Corsetti and Müller (2011) simulate the impact of an increase of government expenditure in the US on the Euro Area and the UK. The effects of such a change on the output of trading partners depends on the type of process government expenditure follows. If there is reversal in spending, in fact, the output response of the trading partners is positive, while their output declines as a consequence of the increase in spending in the US if this change is modelled as an AR(1) process. The different results are once again due to the different behaviour of the interest rate in the home country. The contractionary effect on output they find during the simulation is conflicting with the VAR results, where they find evidence of an increase in output in trading partners after an expansion in spending at home.

The aim of this work, on the other hand, is not to simulate the effects of a simultaneous change in fiscal policy, but to actually investigate the role that the fiscal position of trading partners has in determining the outcome of a consolidation.

## 2.3 The Data

The data collected for the analysis come mainly from the OECD Economic Outlook, n.84 and from other OECD publications. In order to be consistent with the previous literature and since this paper uses Alesina and Ardagna (2010) as its main reference, all the fiscal policy variables have been cyclically adjusted using the Blanchard (1990b) method. Some innovations have been made, such as utilizing the IMF series on government debt; this series offers a longer sample, with fewer missing values than the OECD one.

Data from the NBER-UN database on bilateral trade flows have been used to create a country-specific trade-weighted GDP growth rate; the series has been augmented with IMF-DOTS data when available.

## 2.4 The External Variables

We introduce two external variables in our analysis of fiscal policy. One is the external growth rate, and the other is the cyclically adjusted external primary deficit. These variables take into account the relative importance of a trading partner for the home

country.

In order to do so, the variables have been constructed using trade weights, calculated as the geometric average of the exports of *home* to *foreign*, as a share of *home* GDP, over a 5-year-long period.

$$w_{h,f,t} = \sum_{t \in N=1}^5 \frac{EXP_{h,f,t}}{GDP_{h,t}} \quad (2.1)$$

These weights offer an efficient and comparable measure of the importance of each trading partner for the domestic economy. Measuring exports to a trading partner as a share of domestic GDP simultaneously accounts for the importance of foreign demand and for the openness of the domestic economy. In a relatively closed economy, in fact, the external demand will amount to a lower share of GDP than in a more open one. Taking the average over a 5-year period reduces the noise introduced by short-run exchange rate fluctuations. Results, however, do not change when using yearly values.

On average, trade between these countries accounts for approximatively 74% of their overall export-to-GDP ratio, with a maximum of 91% for Canada and a minimum of 54% for Japan (see Table 2.1).

We use these weights to construct the external growth rate: a trade-weighted average of the growth rate of each trading partner, and the cyclically-adjusted external primary deficit, described in further details in the following section.

#### 2.4.1 Cyclically-Adjusted External Primary Deficit

The weights have been used to create the variable capturing the cyclically-adjusted external primary deficit, expressed as the weighted average of the cyclically-adjusted primary deficit in trading partners. Due to the lack of data, this variable is calculated for a smaller number of countries than the external growth rate<sup>2</sup>, and it is defined as:

$$\Delta Ext.PrDef_{h,t} = \sum_{f=1}^n w_{h,f,t} \Delta PrDef_{f,t} \quad (2.2)$$

Our basic specification of the cyclically-adjusted external primary deficit, then consists of the weighted average of the cyclically adjusted deficit of each trading partner included

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<sup>2</sup>The countries included in the aggregate fiscal shock variable are: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom and USA.



in our sample. The weights we used have been described above.

The average value of the change in the cyclically-adjusted external primary deficit is considerably lower than the one for the internal one, because the weights do not sum up to one and their magnitude depends on how open the domestic economy is. Offsetting changes in the primary deficit of trading partners are also a factor, since they cancel each other out (see Figures 2.1 and 2.2).

As the debate over the reliance of the results on the sample shows, identifying episodes of large changes in fiscal policy is a controversial exercise. The problems that normally arise are magnified when controlling for the effects on the domestic economy of the fiscal position of a trading partner; it is in fact necessary to identify whether a significant change in fiscal policy is taking place abroad and not just in the home country.

Including external fiscal policy in the analysis requires not only to determine when a change in the fiscal stance is big enough to be taken into account, but it also creates the necessity for a rule that selects when a trading partner has to be included in the analysis. For this reason, we used more than one approach to study the effects of different definitions of the external fiscal shock on the domestic growth rate.

The methods adopted differ depending on whether they select episodes on a country-by-country approach, or if the main focus is on the value of the aggregate external fiscal shock, without distinguishing between its components.

As a first step, it is necessary to adopt a criterion that will determine, in a country-by-country basis, when a sizeable change in the domestic cyclically-adjusted primary deficit takes place. To be consistent with the literature (Alesina and Ardagna, 2010), we will require that a country  $h$  is experiencing a sizeable change in its fiscal stance such that:

$$Adj_t^h = \begin{cases} 1 & \text{if } \Delta PrDef_{h,t} < -1.5\% \\ 0 & \text{Otherwise} \end{cases} \quad (2.3)$$

where  $\Delta PrDef_{h,t}$  is the change in the domestic cyclically-adjusted primary deficit as a percentage of GDP compared to the previous year.

Using this rule we can create a measure of the cyclically-adjusted external primary deficit that distinguishes between extreme and non-extreme episodes happening abroad, accounting for the relative importance of the countries where they are taking place, ac-



cording to:

$$\begin{aligned}
\Delta Ext.PrDef_{h,t} = & \sum_f w_{h,f,t} \Delta PrDef_f |_{Stim_t^f=1} + \\
& + \sum_f w_{h,f,t} \Delta PrDef_f |_{(Stim_t^f \& Adj_t^f)=0} + \\
& + \sum_f w_{h,f,t} \Delta PrDef_f |_{Adj_t^f=1}
\end{aligned} \tag{2.4}$$

where  $w_{h,f,t}$  is the weight described in Equation 2.1.

This decomposition allows us to isolate the effect of large changes in trading partners, namely stimuli and adjustments, from the effects of small changes deriving from “business-as-usual” fiscal policy. It is particularly important to distinguish between large and small changes in the primary deficit of trading partners since, as we have already mentioned before, large changes are regarded by the literature as special episodes in fiscal policy, and they might non have the same effect on the interest rate and the exchange rate as small changes. In fact, large changes might be perceived as temporary, while small changes are more persistent.

When looking at the aggregate cyclically-adjusted external primary deficit (Figure 2.3), for a total of 704 observations in the dataset, we register 312 episodes when the external deficit was increasing, and in 392 cases there was a reduction in the aggregate external deficit. During an increase in the total deficit of trading partners we count 66 fiscal stimuli in the home , 27 fiscal adjustments and in 219 cases of non-extreme fiscal stance. When there was a reduction in the aggregated deficits of trading partners, only 26 stimuli took place against 82 episodes of tight fiscal policy; in 284 cases no extraordinary measures had been taken.

Since not every trading partner has the same importance for the domestic economy, we selected those episodes where *foreign* is also experiencing a sizeable change in its fiscal stance, as defined in Equation 2.3, under the condition that its imports from *home* amount to at least 1% of GDP of *home*:

$$ExtADJ_t^{h,f} = \begin{cases} 1 & \text{if } (Adj_t^h \& Adj_t^f)=1 \text{ and } \frac{EXP_{hf}}{GDP_h} > 1\% \\ 0 & \text{Otherwise} \end{cases} \tag{2.5}$$

A simultaneous fiscal adjustment for country  $i$  is then an episode where, in year  $t$ , a foreign country importing more than 1% of the GDP of country  $i$ , decreased its cyclically-adjusted primary deficit more than by 1.5% of its GDP, while country  $i$  was undergoing

a fiscal contraction as well. This of course also holds for fiscal stimuli, with the opposite sign for the cyclically-adjusted primary deficit. We chose a level of 1% for the export-to-GDP ratio because it allows us to select trading partners important enough to affect the domestic economy without restricting the sample too much and having at least one important trading partner for each country in the sample.

The episodes of simultaneous fiscal stimuli and adjustments selected using this approach are reported in Tables 2.2 and 2.3.

At a closer look, the correlation between a country experiencing a fiscal adjustment in the same year of a major trading partner is not significantly different from zero at any conventional level.<sup>3</sup> This suggests we have captured episodes of discretionary changes in fiscal policy rather than movements of the automatic stabilizers. In fact, if we were capturing the response to a symmetric shock that hit our economies, we would register a large non-discretionary change in fiscal policy in both trading partners. This result holds for stimuli too. Even if this approach selects a small number of episodes, it is worth including it in the analysis because there might be non-linearities associated with a stimulus in a major partner.

## 2.5 Empirical Analysis

As it has been mentioned before, the literature on the effects of sizeable changes in fiscal policy has focused mainly on how the composition of these changes influences the domestic economy. In the following sections the focus will be on the impact that fiscal policy and GDP growth in trading partners have on the domestic economy, both in normal times and during these episodes.

### 2.5.1 Fiscal Policy in the Full Sample

In a model similar to Alesina and Ardagna (2010) we introduce the cyclically-adjusted external primary deficit and we control for output dynamic abroad using a country-specific trade-weighted external GDP growth rate.

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<sup>3</sup>The correlation between an adjustment at home and an adjustment in at least one trading partner is 6% and it is not significantly different from zero. The correlation between a stimulus in the home country and a stimulus abroad is 12% and is significant at 5%

Our baseline equation is:

$$g_{i,t} = \alpha_i + \beta_1 \Delta PrDef_{i,t} + \beta_2 g_{i,t-1}^{RoW} + \beta_3 \Delta ExtPrDef_{i,t} + \beta_4 debt_{i,t-1} + \sum_1^n \gamma_n g_{i,t-n} + \epsilon_{i,t} \quad (2.6)$$

where  $g_{i,t}$  is the GDP growth rate in country  $i$  at time  $t$ , regressed over its lagged values and the stock of gross government debt in the previous period ( $debt_{t-1}$ ), to control for the influence of output dynamics and the debt burden in the home country.  $\Delta PrDef_{i,t}$  is the change in the cyclically-adjusted primary deficit in terms of GDP in the home country. We control for the effects of output dynamics in trading partners on the domestic economy using the trade-weighted external GDP growth rate ( $g_{i,t-1}^{RoW}$ ); we use the first lag of this variable to rule out any contemporaneous effects of foreign fiscal policy.<sup>4</sup>  $\Delta ExtPrDef_{i,t}$ , describes the change in the trade-weighted cyclically-adjusted external primary deficit for country  $i$ , capturing the magnitude of changes in fiscal policy in its trading partners.

Both fiscal variables are substituted with their disaggregate values (as illustrated in Section 2.3) in order to differentiate between large changes and “business-as-usual” fiscal policy. To capture medium-run effects on the domestic growth rate, we run the analysis using the three-year average growth rate in the home country as our dependent variable. The results of the analysis are reported in Table 2.4 for the contemporaneous GDP growth rate and in Table 2.5 for the medium-run effects on the average growth rate.

When looking at the simultaneous effects (Table 2.4), the change in the domestic primary deficit shows a non-Keynesian effect on the growth rate in every specification. These results are in line with Alesina and Ardagna (2010).

As for the external variables, the trade-weighted external growth rate always contributes positively to the domestic growth rate, even if it is statistically significant in only one specification. An increase in the aggregate primary deficit of trading partners, meanwhile, is associated with a lower domestic growth rate. However this result is only significant as long as year fixed effects are not included. In fact, when we add year fixed effects the explanatory power of the model almost doubles, indicating that we could be capturing through them the movements in the interest rates guiding the results, since the

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<sup>4</sup>In fact, if we included the contemporaneous value of this variable in our specification we would capture the external fiscal policy a second time, thought its simultaneous effect on the domestic economy.



within-year variation due to global demand is already included in the external growth rate.

When we disaggregate the domestic and external deficit variables, small changes in the deficit of trading partners are the most significant component of foreign fiscal policy across specifications. Their coefficient is the only one significant both in the short and in the medium run. This result is consistent with Corsetti and Müller (2011), where in absence of a spending reversal, an increase in government spending in the US is associated with a decrease in output of the Euro Area.

The authors attribute the result to a reaction of the interest rate to the increase in government spending in the home country. If agents in the home country expect a spending reversal, the increase in the long-term interest rate at home is limited. In our analysis small changes in the external primary deficit do have a negative impact on the growth rate of a trading partner, and they are less subject to reversals than large changes.

Large reductions and increases in the deficit are in fact special and rare episodes, subject to reversals, contrary to smaller movements in the deficit. Small changes in the primary deficit are, on the other hand, quite persistent; they also show a higher cross-country correlation than large changes (see Figure 2.4). Although investigating the transmission mechanisms of external fiscal policy is beyond the scope of this paper, a simple analysis of the probability of registering an adjustment, given an adjustment the year before, does not yield a significant coefficient. The probability of a non-exceptional fiscal policy, given the same happening the year before is positive and significant. The same is true for a stimulus. As for reversals, the probability of an adjustment, given a stimulus the year before, is not significantly different from zero; on the other hand, the probability of an adjustment being followed by a stimulus is positive and different from zero at a 10% level.

Looking at the effects on the domestic 3-year average growth rate (Table 2.5), the non-Keynesian effect of a change in the domestic primary deficit are confirmed, but the coefficient is now smaller. The impact of a change in fiscal policy at home has been reduced by at least 30%. Large reductions in government expenditure at home are now contractionary, but their coefficient is not significantly different from zero, as in every other specification of the model.

The trade-weighted external growth rate is almost always significant and it positively contributes to the growth rate in the home country.



As in the case for the contemporaneous growth rate, an increase in the cyclically-adjusted external primary deficit is associated with a lower growth rate at home. Although its coefficients also show a reduction, this is smaller than for the domestic primary deficit. Estimates are now robust to the inclusion of year fixed effects in the analysis.

Results from the short and medium-run regressions suggest that small changes in fiscal policy of trading partners are particularly important, while the most important feature of domestic fiscal policy is the negative impact that large expansions have on the growth rate. In the short run results are sensitive to the inclusion of time dummies, since they capture the within group variation. Overall, spillovers from external fiscal policy seem to matter the most when the change is not perceived as temporary, and when the mechanisms that lead to the results, through changes in the exchange rate and in the interest rate, have time to adjust.

## 2.5.2 Sample Refinements

The analysis has so far relied upon the whole sample, without isolating the episodes characterized by large changes in fiscal policy. Our previous results suggest that large changes are less important than small changes, so to further investigate this finding we control for fiscal policy during large changes in the deficit.

### 2.5.2.1 Large Domestic Changes

Results for the baseline specification (Equation 2.6), conditioned on whether the home country is undergoing a sizeable change in its fiscal stance, are reported in Table 2.6. In this case the results can easily be compared to those in Alesina and Ardagna (2010), since we test an augmented version of their model.

During the year of a stimulus (Columns (1) and (2)), and in the three years after it (Columns (3) and (4)), an increase in the domestic primary deficit is associated with a lower growth rate in the home country; the coefficient is significant only in the short run.

Our external variables seem not to affect the domestic growth rate. An increase in spending by trading partners has a contractionary effect on the home economy on impact, while it has a Keynesian effect in the medium run. Even if the coefficient is not statistically significant at any standard level, when the domestic economy is increasing its deficit by more than 1.5% of GDP, a simultaneous increase in the deficit of trading partners is

associated with higher growth rate in the home country.

Results for fiscal adjustments (Columns (5) to (8) of Table 2.6), are more interesting. When the home country is undergoing a sharp reduction in its deficit, we find a Keynesian effect of the domestic deficit on the growth rate. Even if these coefficients are not significantly different from zero, it is worth noticing how a sharp decrease in the deficit is now associated with a lower growth rate, since in the previous literature (Alesina and Ardagna, 2010), where international variables were excluded, the effect of an adjustments on the growth rate went in the opposite direction. As for the external primary deficit, it always lowers the domestic growth rate and its coefficient is significantly different from zero in the medium run.

The results for large changes seem to confirm the results obtained in the full sample. The international variables are not significant across specifications and the same is true for the domestic primary deficit. Adjustments and stimuli are special cases and we can not trace any regularities among them.

While the external growth rate has a positive impact on the economy of a country undergoing an adjustment, suggesting that the external demand plays an important role, once we add the external primary deficit to the regression its coefficient is not significant anymore. This result points in the direction of excluding the trade link as the transmission mechanism while considering interest rates or the exchange rate as the most important determinants: in fact, because of the transitory nature of large changes, they tend not to affect the interest rates as much as small constant changes.

The results are robust to different specifications of the model, including decomposing the external growth rate into in-sample and out-of-sample components, and getting rid of the debt burden variable or the second lag of the domestic GDP growth rate, when not significantly different from zero.<sup>5</sup>

#### **2.5.2.2 Simultaneous Large Changes**

The literature (Perotti, 2011; Beetsma et al., 2006), explains some successful episodes of fiscal adjustments through a devaluation of the currency of the home country against its major trading partners; this is for instance the case for three out of the four cases considered by Perotti (namely Ireland, Finland and Sweden).

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<sup>5</sup>Results are available upon request.

When the large change in government expenditure occurs simultaneously in trading partners, this mechanism is subject to two different forces. In case of a simultaneous and concordant movement in the deficit, e.g. an adjustment in two trading partners, the effects of a depreciation on exports will depend on the relative behaviour of the exchange rate, and on trade elasticities; hence, the reduction in the deficit might not be beneficial for any of the countries involved.

The results described in the previous section refer to the GDP growth of countries going through a sizeable change in their fiscal position, without imposing any restriction on what is happening in its trading partners.

We then tested our model when the home country is undergoing a sizeable change at the same time as an important partner, as described by Equation 2.5. In this context we introduced a new variable for the external cyclically adjusted primary deficit, that specifically captures sizeable changes in fiscal policy of big trading partners. The sample size has been considerably reduced because of the stricter requirements imposed by the definition of simultaneous episodes, but it is still big enough to justify its inclusion in the analysis. Results are reported in Table 2.7.

During simultaneous stimuli (Columns (1) and (2)), an increase in the domestic primary deficit is associated with a lower growth rate, as it was when we did not condition on fiscal policy in trading partners.

The growth rate of trading partners is associated with a higher domestic growth rate on impact. The external fiscal policy variables always have a Keynesian effect on the domestic growth rate. The variable capturing stimuli in large partners is never significant, while the external primary deficit for all the trading partners included in the sample shows a significant coefficient in the medium run.

During simultaneous adjustments, domestic and external fiscal variables are never significantly different from zero. Once again, episodes of large changes in fiscal policy do not seem to share any common feature.

### 2.5.3 Normal and Exceptional Times

The analysis we carried on confirms only in part the non-Keynesian effects of fiscal policy found in the literature. In the full sample, changes in domestic fiscal policy are always associated with a lower growth rate. The result is driven by large increases in the deficit,



while adjustments and small changes seem not to matter. This is in contrast with the non-Keynesian effect of large reductions in the deficit that has been found in the literature. Moreover, the non-Keynesian effect of large increases in the deficit is found when we restrict the sample to large changes only. This result can be explained by the more persistent nature of stimuli, when compared to adjustments: increasing the deficit by at least 1.5% of GDP for two years in a row, in fact, appears to be more likely than reducing it by the same amount for more than one year. Less dramatic changes in the deficit, on the other side, have a lower probability of being reversed.

Spillovers from fiscal policy in trading partners, when present, have a non-Keynesian effect on the domestic growth rate and matter the most if the changes in deficit are small. This can be explained with the more persistent nature of small changes relatively to the large ones. If changes are perceived to be temporary they will not affect the exchange rate, nor the relative interest rate. For the same reason, there is no evidence of spillovers from external fiscal policy when conditioning on a large change at home or on simultaneous, concordant large changes. This effect is more robust in the medium run than in the short run. In the medium run, in fact, small changes in the deficit of trading partners affect the growth rate also when we include yearly fixed effects in the model.

In light of these results fiscal policy coordination between trading partners is most desirable during normal times, when it generates spillovers. Moreover, if the results we obtained are driven by either the exchange rate or the relative interest rates, this would imply that the effort of coordinating fiscal spending should not focus on fiscal variables only but include the effects of fiscal policy on the exchange rate and the relative interest rate, since they could be the main transmission channel of fiscal policy in open economies.

## 2.6 Conclusions

In this paper we introduced the effect of growth and fiscal policy in trading partners to the analysis of the impact of fiscal policy on the domestic growth rate. In order to do this we have constructed a country-specific external growth rate, and we introduced fiscal policy of trading partners through the cyclically-adjusted external primary deficit. There variables are weighted by the share of exports from the home country to a trading partner, expressed as a share of domestic GDP.



In our analysis, an increase in the external primary deficit is associated with a lower growth rate in the home country.

Moreover, the cyclically-adjusted external primary deficit shows a very different effect on the growth rate of the home country depending on whether we treat large changes in fiscal policy in isolation as special episodes.

When we focus on the whole sample, in fact, a fiscal expansion abroad is associated with a lower growth rate in the home country. Spillovers from fiscal policy in trading partners are hence non-Keynesian. Once we condition on episodes of large changes, our domestic and external fiscal variables are rarely significant. If we condition on the home country undergoing a large change in its deficit, then fiscal policy in trading partners does not affect the domestic growth rate; the same is true for the external growth rate.

The importance of small changes in the cyclically-adjusted external primary deficit that emerges from our analysis is consistent with the findings in Corsetti and Müller (2011) where, if the fiscal shock is described by an exogenous AR(1) process, the output of the home country decreases as a consequence of an increase in spending by its trading partners.

In light of these results, we exclude a direct effect of trade as the main source of spillovers from fiscal policy and growth in trading partners, in favour of the behaviour of the interest rate and the exchange rate. In fact we can not find evidence of the external demand compensating for a reduced internal demand during adjustments, as the non-Keynesian effects of large changes in fiscal policy often found in the literature do not emerge in our analysis and the external growth rate is not always significant.

If spillovers in fiscal policy are caused by changes in interest rates that occur because of small, persistent changes in the fiscal balance, coordination of fiscal policy in normal times is more important than when countries are undergoing exceptional changes in their deficit. This also means that coordinating fiscal policy could not be enough to achieve a higher growth rate if the behaviour of the exchange rate and the relative interest rate is not included in the analysis.

2.7 Tables

Table 2.1: Sample Description

| Country        | Export/GDP (%) |       | Ratio% |
|----------------|----------------|-------|--------|
|                | Within Sample  | Total |        |
| Australia      | 5.7            | 9.2   | 64.6   |
| Austria        | 12.9           | 15.9  | 76.9   |
| Belgium        | 33.3           | 38.5  | 85.4   |
| Canada         | 17.8           | 19.4  | 91.3   |
| Denmark        | 18.1           | 21.3  | 84.0   |
| Finland        | 16.0           | 20.1  | 81.6   |
| France         | 10.2           | 13.6  | 70.5   |
| Germany        | 22.0           | 27.8  | 78.3   |
| Greece         | 2.5            | 3.7   | 67.9   |
| Ireland        | 36.9           | 41.4  | 89.3   |
| Italy          | 7.7            | 10.4  | 72.4   |
| Japan          | 4.9            | 8.9   | 55.1   |
| Netherlands    | 26.1           | 33.0  | 75.1   |
| New Zealand    | 9.8            | 13.9  | 72.6   |
| Norway         | 21.9           | 24.3  | 88.0   |
| Portugal       | 8.5            | 9.6   | 84.4   |
| Spain          | 6.3            | 7.8   | 76.1   |
| Sweden         | 19.5           | 23.9  | 81.4   |
| Switzerland    | 20.6           | 27.9  | 72.7   |
| United Kingdom | 9.2            | 12.2  | 72.8   |
| United States  | 3.0            | 5.0   | 61.3   |
| Total          | 14.7           | 18.2  | 76.2   |

Table 2.2: Simultaneous Fiscal Expansions - Change in the Partner's Primary Deficit

| Home Country | Year | Belgium | Denmark | Finland | France | Germany | Ireland | Italy | Japan | Netherlands | Norway | Spain | Sweden | UK    | USA   |
|--------------|------|---------|---------|---------|--------|---------|---------|-------|-------|-------------|--------|-------|--------|-------|-------|
| Belgium      | 1975 |         |         |         | 1.96%  |         |         | 3.56% |       | 3.02%       |        |       |        |       |       |
|              | 1981 |         |         |         | 1.87%  |         |         | 3.82% |       |             |        |       |        |       |       |
|              | 1980 |         |         |         |        |         |         |       |       |             |        |       |        |       |       |
| Denmark      | 1978 |         |         |         |        |         |         |       |       |             |        |       | 2.30%  |       |       |
|              | 1990 |         |         |         |        |         |         |       |       |             |        |       | 1.78%  |       |       |
|              | 1991 |         |         |         |        |         |         |       |       |             |        |       | 2.32%  | 1.84% |       |
| Finland      | 1992 |         |         |         |        |         |         |       |       |             |        |       | 7.31%  | 1.64% |       |
|              | 2001 |         |         |         | 1.58%  |         |         | 1.72% |       | 3.24%       |        |       | 2.82%  | 2.98% |       |
|              | 2003 |         |         |         |        | 4.33%   |         |       |       |             |        |       |        | 3.40% | 1.65% |
| France       | 1981 |         |         |         |        |         |         | 3.82% |       |             |        |       |        | 2.98% |       |
|              | 1992 |         |         |         |        |         |         |       |       |             |        | 3.47% |        | 2.74% | 2.66% |
|              | 1993 |         |         |         |        |         |         |       |       |             |        |       |        | 3.40% |       |
| Germany      | 1995 |         |         |         |        |         |         | 1.72% |       | 5.43%       |        |       |        |       |       |
|              | 2001 |         |         |         |        |         |         |       |       | 3.24%       |        |       |        |       |       |
|              | 1995 |         |         |         |        | 6.82%   |         |       |       |             |        |       |        |       |       |
| Greece       | 2001 |         |         |         |        | 4.33%   |         | 1.72% |       | 3.24%       |        |       | 2.82%  | 3.40% |       |
|              | 2007 |         |         |         |        |         |         |       | 1.54% |             |        |       |        |       |       |
| Ireland      | 1981 |         |         |         | 1.87%  |         |         |       |       |             |        |       |        |       |       |
|              | 2001 |         |         |         |        | 4.33%   |         |       |       |             |        |       |        | 3.40% |       |
|              | 1975 |         |         |         | 1.96%  |         |         |       |       |             |        |       |        |       |       |
| Netherlands  | 1995 |         |         |         |        | 6.82%   |         |       |       |             |        |       |        |       |       |
|              | 2001 |         |         |         |        | 4.33%   |         | 1.72% |       |             |        |       | 2.82%  | 3.40% |       |
|              | 2002 | 2.53%   |         |         | 1.63%  |         |         |       |       |             |        |       | 2.67%  | 2.74% | 2.66% |
| Norway       | 1977 |         |         |         |        |         |         |       |       |             |        |       |        |       |       |
|              | 1991 |         |         |         | 1.63%  |         |         |       |       |             |        |       | 4.56%  | 1.64% |       |
|              | 2002 |         |         |         | 1.69%  |         |         |       |       | 1.55%       |        |       | 2.32%  | 2.74% | 2.66% |
| Portugal     | 1993 |         |         |         | 1.69%  |         |         |       |       |             |        |       |        |       |       |
|              | 1993 |         |         |         |        |         |         |       |       |             |        | 3.47% |        |       |       |
|              | 1977 |         |         |         |        |         |         |       |       |             |        |       |        |       |       |
| Spain        | 1980 |         |         |         |        |         |         |       |       |             |        |       |        |       |       |
|              | 1991 |         | 1.72%   |         |        |         |         |       |       |             |        |       |        |       |       |
|              | 1980 |         |         | 4.73%   |        |         |         |       |       |             |        |       |        |       |       |
| Sweden       | 1991 |         |         | 1.75%   | 1.58%  |         |         |       |       |             |        |       |        | 1.64% |       |
|              | 1992 |         |         | 2.63%   |        |         |         |       |       |             |        |       |        | 2.98% |       |
|              | 2001 |         |         |         | 1.63%  |         |         | 1.72% |       | 3.24%       |        |       |        | 3.40% |       |
| UK           | 2002 |         |         |         | 1.58%  |         |         |       |       | 1.55%       |        |       |        | 2.74% | 2.66% |
|              | 1992 |         |         |         | 1.58%  |         |         |       |       |             |        |       |        |       |       |
|              | 2001 |         |         |         |        | 4.33%   | 4.39%   |       |       | 3.24%       |        |       |        |       |       |
|              | 2002 |         |         |         | 1.63%  |         |         |       |       | 1.55%       |        |       |        |       | 2.66% |

Table 2.3: Simultaneous Fiscal Adjustments - Change in the Partner's Primary Deficit

| Home        | Year | Partner Country |         |        |         |         |        |         |         |        |             |        |        |        |        |
|-------------|------|-----------------|---------|--------|---------|---------|--------|---------|---------|--------|-------------|--------|--------|--------|--------|
|             |      | Austria         | Belgium | Canada | Denmark | Finland | France | Germany | Ireland | Italy  | Netherlands | Norway | Spain  | Sweden | UK     |
| Austria     | 1996 |                 |         |        |         |         | -1.66% | -6.79%  |         | -2.16% |             |        |        |        |        |
|             | 1997 |                 |         |        |         |         |        |         |         | -2.11% |             |        |        |        | -2.03% |
|             | 1982 |                 |         |        |         |         |        |         |         |        |             |        |        | -1.51% |        |
|             | 1983 |                 |         |        |         |         |        |         |         |        |             |        |        | -2.30% |        |
| Belgium     | 1984 |                 |         |        |         |         |        |         |         |        |             |        |        | -2.37% |        |
|             | 1986 |                 |         |        |         |         |        |         |         |        |             |        |        |        |        |
|             | 2005 |                 |         |        |         |         |        |         |         |        |             | -3.48% |        |        |        |
| Finland     | 1981 |                 |         |        |         |         |        |         |         |        |             |        |        | -2.07% |        |
|             | 1984 |                 |         |        |         |         |        |         |         |        |             |        |        | -2.30% | -1.66% |
|             | 1988 |                 |         |        |         |         |        |         |         |        |             |        |        | -3.61% |        |
|             | 1994 |                 |         |        |         |         |        |         |         |        |             |        |        | -4.82% | -1.56% |
| France      | 1996 |                 |         |        |         |         | -1.66% | -6.79%  |         | -7.03% |             | -1.54% |        |        | -2.51% |
|             | 1998 |                 |         |        |         |         |        | -2.42%  |         |        |             |        |        |        | -1.56% |
|             | 1998 |                 |         |        |         |         |        |         |         |        |             |        |        |        | -2.51% |
|             | 2000 |                 |         |        |         |         |        |         |         |        |             |        |        |        | -1.56% |
| Germany     | 1996 | -2.29%          |         |        |         |         | -1.66% | -6.79%  |         | -7.03% |             | -1.66% |        |        | -1.56% |
|             | 2000 |                 |         |        |         |         |        |         |         |        |             |        |        |        | -2.51% |
| Greece      | 1996 |                 |         |        |         |         |        | -6.79%  |         |        |             |        |        |        |        |
|             | 1987 |                 | -1.61%  |        |         |         |        |         |         |        |             |        |        |        |        |
| Ireland     | 1988 |                 |         |        |         |         |        |         |         |        |             |        |        |        | -1.66% |
|             | 2000 |                 |         |        |         |         |        | -2.42%  |         | -1.73% |             |        |        | -2.51% | -1.99% |
| Italy       | 1997 |                 |         |        |         |         |        |         |         |        |             |        |        |        | -1.66% |
|             | 1988 |                 |         |        |         |         |        |         |         |        |             |        |        |        |        |
|             | 1991 |                 |         |        |         |         |        |         |         |        |             |        |        |        |        |
| Netherlands | 1996 |                 |         |        |         |         | -1.66% | -6.79%  |         | -1.64% |             |        |        |        |        |
|             | 2000 |                 |         |        |         |         |        |         |         |        |             | -1.66% | -4.82% | -1.56% | -2.51% |
| New Zealand | 1983 |                 |         |        |         |         |        |         |         |        |             |        |        | -1.51% |        |
|             | 1996 |                 |         |        |         |         |        | -6.79%  |         | -2.24% |             |        |        | -4.82% | -1.56% |
|             | 2000 |                 |         |        |         |         |        | -2.42%  |         | -7.03% |             |        |        |        | -2.51% |
|             | 2004 |                 |         |        |         |         |        |         |         |        |             |        |        |        |        |
| Norway      | 2005 |                 |         |        |         |         |        |         |         |        |             |        | -1.92% |        |        |
|             | 2005 |                 |         |        |         |         |        |         |         |        |             |        |        |        |        |
| Portugal    | 1988 |                 |         |        |         |         | -2.46% |         |         |        |             |        |        |        |        |
|             | 1996 |                 |         |        |         |         | -1.66% | -6.79%  |         |        |             |        |        |        | -1.66% |
| Spain       | 1983 |                 |         |        |         |         |        |         |         |        |             |        |        |        | -1.56% |
|             | 1984 |                 |         |        |         |         |        |         |         |        |             |        |        |        |        |
| Sweden      | 1986 |                 |         |        |         |         |        |         |         |        |             |        |        |        |        |
|             | 1994 |                 |         |        |         |         |        |         |         |        |             |        |        |        |        |
|             | 1996 |                 |         |        |         |         |        |         |         |        |             |        |        |        |        |
|             | 1997 |                 |         |        |         |         |        |         |         |        |             |        |        |        |        |
| UK          | 2004 |                 |         |        |         |         |        |         |         |        |             |        |        |        |        |
|             | 1996 |                 |         |        |         |         |        |         |         |        |             |        |        |        |        |
|             | 1996 |                 |         |        |         |         |        |         |         |        |             |        |        |        |        |
|             | 2000 |                 |         |        |         |         |        |         |         |        |             |        |        |        |        |



Table 2.4: Short-Run GDP Growth and Fiscal Policy Abroad

|                    | <i>GDPGrowth</i>    |                     |                     |                     |                     |                     |                     |                     |
|--------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
|                    | (1)                 | (2)                 | (3)                 | (4)                 | (5)                 | (6)                 | (7)                 | (8)                 |
| GDP growth(-1)     | 0.35***<br>(8.99)   | 0.35***<br>(9.07)   | 0.34***<br>(8.68)   | 0.34***<br>(8.83)   | 0.31***<br>(7.65)   | 0.31***<br>(7.61)   | 0.30***<br>(7.54)   | 0.30***<br>(7.47)   |
| GDP growth(-2)     | -0.06<br>(-1.63)    | -0.06*<br>(-1.72)   | -0.06<br>(-1.59)    | -0.05<br>(-1.28)    | -0.02<br>(-0.60)    | -0.02<br>(-0.59)    | -0.03<br>(-0.70)    | -0.03<br>(-0.64)    |
| Debt(-1)           | -0.00<br>(-0.59)    | -0.00<br>(-0.65)    | -0.00<br>(-0.53)    | -0.00<br>(-0.53)    | -0.00<br>(-0.76)    | -0.00<br>(-0.80)    | -0.00<br>(-0.75)    | -0.00<br>(-0.79)    |
| Ext.GDPGrowth(-1)  | 0.33<br>(1.63)      | 0.26<br>(1.29)      | 0.35*<br>(1.74)     | 0.23<br>(1.00)      | 0.44<br>(1.49)      | 0.41<br>(1.39)      | 0.46<br>(1.57)      | 0.32<br>(0.97)      |
| $\Delta Ext.PrDef$ |                     | -1.16***<br>(-3.57) |                     |                     |                     | -0.55<br>(-1.27)    |                     |                     |
| Ext.STIM           |                     |                     |                     | -1.25**<br>(-2.02)  |                     |                     |                     | -0.16<br>(-0.21)    |
| Ext.ADJ            |                     |                     |                     | -0.20<br>(-0.32)    |                     |                     |                     | -0.72<br>(-0.86)    |
| Ext.SMALL          |                     |                     |                     | -3.53***<br>(-3.60) |                     |                     |                     | -1.61<br>(-1.28)    |
| $\Delta PrDef$     | -0.26***<br>(-6.00) | -0.22***<br>(-4.75) |                     |                     | -0.13***<br>(-3.04) | -0.13***<br>(-3.02) |                     |                     |
| STIM               |                     |                     | -0.47***<br>(-6.36) | -0.41***<br>(-5.62) |                     |                     | -0.28***<br>(-4.12) | -0.28***<br>(-4.00) |
| ADJ                |                     |                     | -0.06<br>(-0.90)    | -0.02<br>(-0.29)    |                     |                     | -0.00<br>(-0.01)    | -0.00<br>(-0.02)    |
| SMALL              |                     |                     | -0.18<br>(-1.54)    | -0.17<br>(-1.47)    |                     |                     | -0.04<br>(-0.34)    | -0.06<br>(-0.57)    |
| Constant           | 0.02***<br>(7.29)   | 0.02***<br>(7.51)   | 0.02***<br>(7.83)   | 0.02***<br>(7.99)   | 0.01**<br>(2.56)    | 0.01***<br>(2.66)   | 0.02***<br>(3.04)   | 0.02***<br>(3.10)   |
| Observations       | 649                 | 649                 | 649                 | 649                 | 649                 | 649                 | 649                 | 649                 |
| $R^2_{Overall}$    | 0.23                | 0.24                | 0.24                | 0.26                | 0.42                | 0.42                | 0.43                | 0.43                |
| $R^2_{Between}$    | 0.82                | 0.83                | 0.73                | 0.75                | 0.71                | 0.70                | 0.72                | 0.70                |
| $R^2_{Within}$     | 0.19                | 0.20                | 0.20                | 0.23                | 0.41                | 0.41                | 0.42                | 0.42                |
| Year FE            | N                   | N                   | N                   | N                   | Y                   | Y                   | Y                   | Y                   |

*t* statistics in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Note:** Results are based on the whole sample. The dependent variable is GDP growth in year  $t$  in the home country.  $\Delta Ext.PrDef$  is the change in fiscal position among trading partner, weighted by the exports to the trading partner, as a share of domestic GDP. This measure has been decomposed differentiating between stimuli (STIM), adjustments (ADJ) and small changes (SMALL), in fiscal policy of each trading partner, according to Equation 2.4.  $Ext.GDPGrowth$  is a country-specific external growth rate, weighted by exports to each trading partners as a share of domestic GDP.  $\Delta PrDef$  is the change in the cyclically-adjusted primary deficit over GDP in the home country. This variable has been decomposed too, according to Equation 2.3.  $Debt$  is the domestic debt to GDP ratio. All the fiscal variables have been cyclically adjusted using the Blanchard (1990b) method. Country fixed-effects are always included.

Table 2.5: Medium-Run GDP Growth and Fiscal Policy Abroad

|                    | <i>Average GDP Growth</i> |                     |                     |                     |                     |                     |                     |                     |
|--------------------|---------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
|                    | (1)                       | (2)                 | (3)                 | (4)                 | (5)                 | (6)                 | (7)                 | (8)                 |
| GDP growth(-1)     | 0.14***<br>(4.54)         | 0.13***<br>(4.48)   | 0.13***<br>(4.25)   | 0.13***<br>(4.26)   | 0.15***<br>(5.04)   | 0.15***<br>(4.97)   | 0.15***<br>(4.94)   | 0.14***<br>(4.85)   |
| GDP growth(-2)     | -0.07**<br>(-2.40)        | -0.07**<br>(-2.55)  | -0.07**<br>(-2.30)  | -0.06**<br>(-2.02)  | -0.02<br>(-0.81)    | -0.02<br>(-0.83)    | -0.03<br>(-0.92)    | -0.03<br>(-0.88)    |
| Debt(-1)           | -0.00<br>(-0.20)          | -0.00<br>(-0.47)    | -0.00<br>(-0.18)    | -0.00<br>(-0.54)    | -0.00<br>(-0.96)    | -0.00<br>(-1.11)    | -0.00<br>(-1.07)    | -0.00<br>(-1.21)    |
| Ext.GDPGrowth(-1)  | 0.47**<br>(2.50)          | 0.47**<br>(2.54)    | 0.49***<br>(2.60)   | 0.27<br>(1.19)      | 0.65**<br>(2.58)    | 0.65***<br>(2.60)   | 0.67***<br>(2.65)   | 0.49*<br>(1.67)     |
| $\Delta Ext.PrDef$ |                           | -1.07***<br>(-4.28) |                     |                     |                     | -0.74**<br>(-2.26)  |                     |                     |
| Ext.STIM           |                           |                     |                     | -0.49<br>(-0.98)    |                     |                     |                     | -0.26<br>(-0.45)    |
| Ext.ADJ            |                           |                     |                     | -1.02**<br>(-2.04)  |                     |                     |                     | -1.13*<br>(-1.78)   |
| Ext.SMALL          |                           |                     |                     | -3.53***<br>(-4.32) |                     |                     |                     | -1.79*<br>(-1.74)   |
| $\Delta PrDef$     | -0.17***<br>(-5.13)       | -0.13***<br>(-3.72) |                     |                     | -0.09***<br>(-2.70) | -0.08***<br>(-2.66) |                     |                     |
| STIM               |                           |                     | -0.27***<br>(-4.89) | -0.23***<br>(-4.21) |                     |                     | -0.20***<br>(-3.87) | -0.20***<br>(-3.79) |
| ADJ                |                           |                     | -0.05<br>(-0.83)    | 0.00<br>(0.04)      |                     |                     | 0.02<br>(0.35)      | 0.02<br>(0.34)      |
| SMALL              |                           |                     | -0.17*<br>(-1.87)   | -0.16*<br>(-1.81)   |                     |                     | -0.02<br>(-0.31)    | -0.06<br>(-0.72)    |
| Constant           | 0.02***<br>(11.79)        | 0.02***<br>(12.23)  | 0.02***<br>(11.99)  | 0.02***<br>(12.58)  | 0.01<br>(1.45)      | 0.01<br>(1.54)      | 0.01*<br>(1.74)     | 0.01*<br>(1.88)     |
| Observations       | 607                       | 607                 | 607                 | 607                 | 607                 | 607                 | 607                 | 607                 |
| $R^2_{Overall}$    | 0.12                      | 0.14                | 0.13                | 0.16                | 0.34                | 0.34                | 0.35                | 0.35                |
| $R^2_{Between}$    | 0.15                      | 0.10                | 0.13                | 0.13                | 0.18                | 0.15                | 0.19                | 0.17                |
| $R^2_{Within}$     | 0.11                      | 0.14                | 0.11                | 0.16                | 0.37                | 0.37                | 0.38                | 0.39                |
| Year FE            | N                         | N                   | N                   | N                   | Y                   | Y                   | Y                   | Y                   |

$t$  statistics in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Note:** The dependent variable is the average growth rate for the domestic GDP in year  $t$  and the following two. For the independent variables, see note in Table 2.4.

Table 2.6: Short and Medium Run GDP Growth during Large Changes in Fiscal Policy at Home

|                           | Stimuli                |                        |                         |                         | Adjustments            |                        |                         |                         |
|---------------------------|------------------------|------------------------|-------------------------|-------------------------|------------------------|------------------------|-------------------------|-------------------------|
|                           | <i>ShortRun</i><br>(1) | <i>ShortRun</i><br>(2) | <i>MediumRun</i><br>(3) | <i>MediumRun</i><br>(4) | <i>ShortRun</i><br>(5) | <i>ShortRun</i><br>(6) | <i>MediumRun</i><br>(7) | <i>MediumRun</i><br>(8) |
| GDP growth(-1)            | 0.57***<br>(4.94)      | 0.56***<br>(4.89)      | 0.20**<br>(2.16)        | 0.21**<br>(2.19)        | 0.34***<br>(3.85)      | 0.34***<br>(3.86)      | 0.22***<br>(2.75)       | 0.23***<br>(2.92)       |
| GDP growth(-2)            | -0.25**<br>(-2.24)     | -0.24**<br>(-2.04)     | 0.01<br>(0.10)          | -0.00<br>(-0.03)        | -0.06<br>(-0.84)       | -0.07<br>(-0.89)       | -0.15**<br>(-2.21)      | -0.16**<br>(-2.41)      |
| <i>Debt</i> (-1)          | -0.00<br>(-0.42)       | -0.00<br>(-0.45)       | -0.00<br>(-0.07)        | -0.00<br>(-0.00)        | -0.01*<br>(-1.73)      | -0.01<br>(-1.53)       | -0.01<br>(-1.09)        | -0.00<br>(-0.66)        |
| <i>Ext.GDPGrowth</i> (-1) | 0.66<br>(1.44)         | 0.77<br>(1.54)         | 0.05<br>(0.11)          | -0.10<br>(-0.19)        | 0.78*<br>(1.78)        | 0.61<br>(1.11)         | 1.21***<br>(2.80)       | 0.69<br>(1.33)          |
| $\Delta Ext.PrDef$        |                        | -0.66<br>(-0.55)       |                         | 0.57<br>(0.54)          |                        | -0.52<br>(-0.52)       |                         | -1.51*<br>(-1.75)       |
| $\Delta PrDef$            | -0.36*<br>(-1.99)      | -0.36*<br>(-1.96)      | -0.20<br>(-1.32)        | -0.20<br>(-1.30)        | 0.16<br>(1.12)         | 0.18<br>(1.22)         | 0.07<br>(0.55)          | 0.13<br>(1.03)          |
| Constant                  | 0.02**<br>(2.42)       | 0.02**<br>(2.36)       | 0.02***<br>(3.41)       | 0.02***<br>(3.42)       | 0.03***<br>(4.96)      | 0.03***<br>(4.97)      | 0.03***<br>(4.62)       | 0.03***<br>(4.82)       |
| Observations              | 85                     | 85                     | 82                      | 82                      | 102                    | 102                    | 97                      | 97                      |
| $R^2$                     | 0.32                   | 0.32                   | 0.10                    | 0.10                    | 0.27                   | 0.27                   | 0.24                    | 0.27                    |
| Adjusted $R^2$            | 0.28                   | 0.27                   | 0.04                    | 0.03                    | 0.23                   | 0.23                   | 0.20                    | 0.22                    |

*t* statistics in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Note:** Results are reported for the baseline specification only. Regressions are based on a sample of large changes in the cyclically-adjusted primary deficit taking place in the home country, selected following a quantitative approach. An adjustment is a reduction in the primary deficit by at least 1.5% of GDP of the country. Stimuli consist in an increase from year to year bigger than 1.5% of GDP. For a description of the variables, see note in Table 2.4

Table 2.7: Short and Medium Run GDP Growth during Simultaneous Large Changes in Fiscal Policy

|                           | Simultaneous Stimuli   |                        |                         |                         | Simultaneous Adjustments |                        |                         |                         |
|---------------------------|------------------------|------------------------|-------------------------|-------------------------|--------------------------|------------------------|-------------------------|-------------------------|
|                           | <i>ShortRun</i><br>(1) | <i>ShortRun</i><br>(2) | <i>MediumRun</i><br>(3) | <i>MediumRun</i><br>(4) | <i>ShortRun</i><br>(5)   | <i>ShortRun</i><br>(6) | <i>MediumRun</i><br>(7) | <i>MediumRun</i><br>(8) |
| GDP growth(-1)            | 0.56***<br>(3.62)      | 0.56***<br>(3.60)      | 0.32*<br>(1.77)         | 0.31*<br>(1.71)         | 0.45***<br>(2.99)        | 0.45***<br>(3.01)      | 0.38***<br>(3.14)       | 0.38***<br>(3.13)       |
| GDP growth(-2)            | -0.46**<br>(-2.59)     | -0.45**<br>(-2.58)     | -0.38*<br>(-1.88)       | -0.36*<br>(-1.81)       | -0.07<br>(-0.48)         | -0.07<br>(-0.49)       | -0.20*<br>(-1.77)       | -0.20*<br>(-1.74)       |
| <i>Debt</i> (-1)          | -0.00<br>(-0.07)       | -0.00<br>(-0.04)       | -0.01<br>(-0.41)        | -0.01<br>(-0.37)        | -0.01<br>(-0.77)         | -0.01<br>(-0.76)       | 0.00<br>(0.49)          | 0.00<br>(0.49)          |
| <i>Ext.GDPGrowth</i> (-1) | 1.61**<br>(2.49)       | 1.64**<br>(2.54)       | -0.65<br>(-0.53)        | -0.53<br>(-0.44)        | 0.74<br>(0.82)           | 0.72<br>(0.78)         | 0.38<br>(0.52)          | 0.32<br>(0.43)          |
| $\Delta Ext.PrDef$        | 0.45<br>(0.27)         |                        | 4.63*<br>(1.73)         |                         | 0.71<br>(0.60)           |                        | -0.83<br>(-0.88)        |                         |
| $\Delta TPExtPrDef$       |                        | 0.34<br>(0.20)         |                         | 4.47<br>(1.65)          |                          | 0.67<br>(0.52)         |                         | -0.96<br>(-0.93)        |
| $\Delta PrDef$            | -0.33*<br>(-1.70)      | -0.34*<br>(-1.70)      | -0.13<br>(-0.58)        | -0.14<br>(-0.67)        | 0.16<br>(0.96)           | 0.16<br>(0.96)         | 0.22<br>(1.60)          | 0.22<br>(1.61)          |
| Constant                  | 0.01<br>(0.84)         | 0.01<br>(0.83)         | 0.02*<br>(1.85)         | 0.02*<br>(1.87)         | 0.03***<br>(2.88)        | 0.03***<br>(2.85)      | 0.03***<br>(3.15)       | 0.03***<br>(3.20)       |
| Observations              | 37                     | 37                     | 36                      | 36                      | 39                       | 39                     | 39                      | 39                      |
| $R^2$                     | 0.61                   | 0.61                   | 0.26                    | 0.26                    | 0.43                     | 0.43                   | 0.41                    | 0.42                    |
| Adjusted $R^2$            | 0.53                   | 0.53                   | 0.11                    | 0.10                    | 0.33                     | 0.33                   | 0.30                    | 0.31                    |

*t* statistics in parentheses

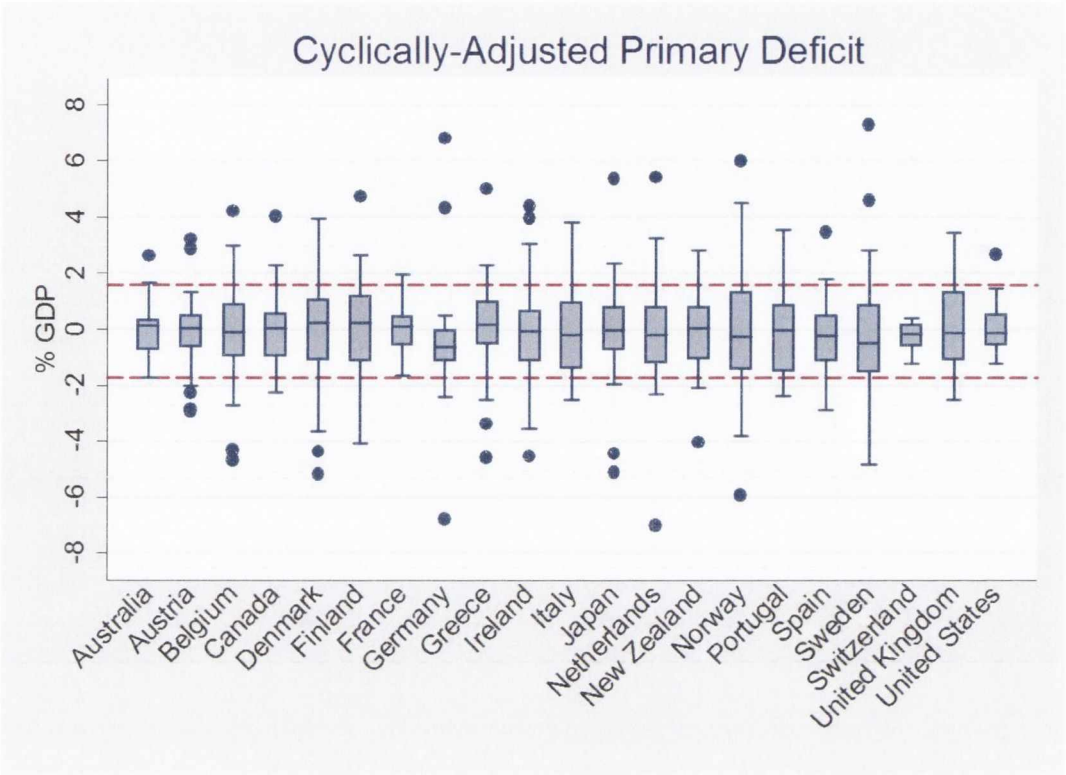
\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Note:** Results are reported for the baseline specification only. Regressions are based on a sample of simultaneous, concordant large changes in the cyclically-adjusted primary deficit taking place in the home country and in trading partners whose imports from the home country amount to at least 1% of home's GDP.  $\Delta TPExt.PrDef$  is the change in fiscal position in important trading partner, as defined before. For a description of the other variables, see note in Table 2.4



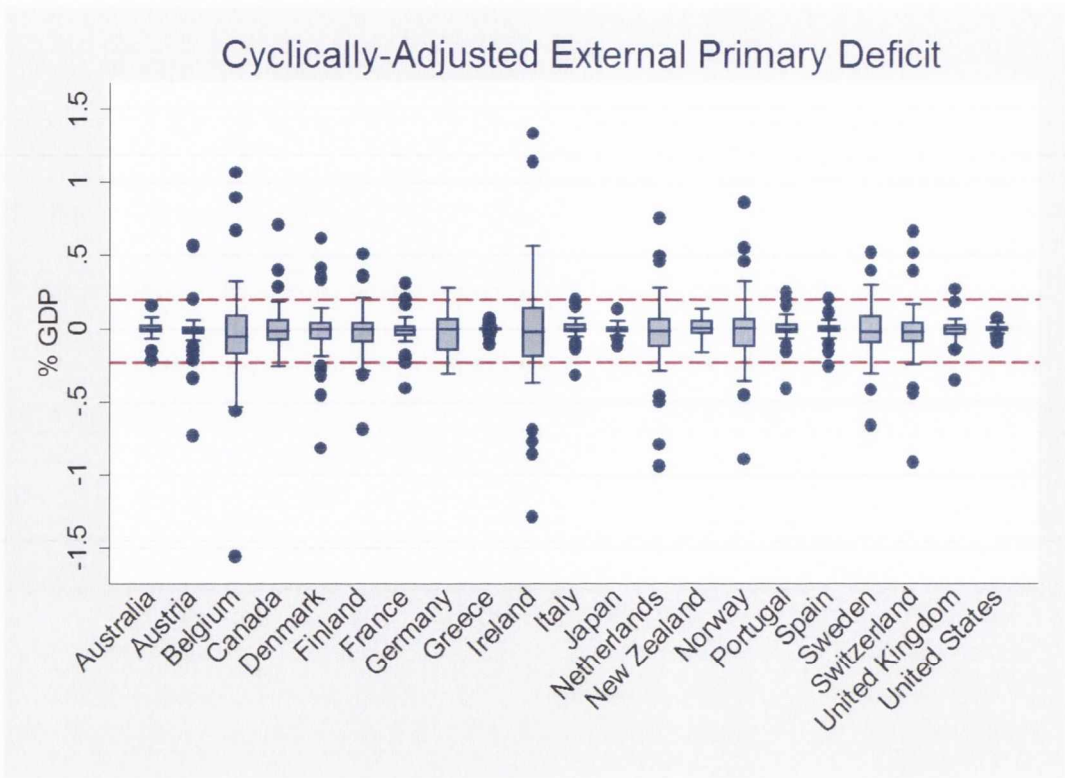
2.8 Figures

Figure 2.1: Cyclically-Adjusted Domestic Primary Deficit



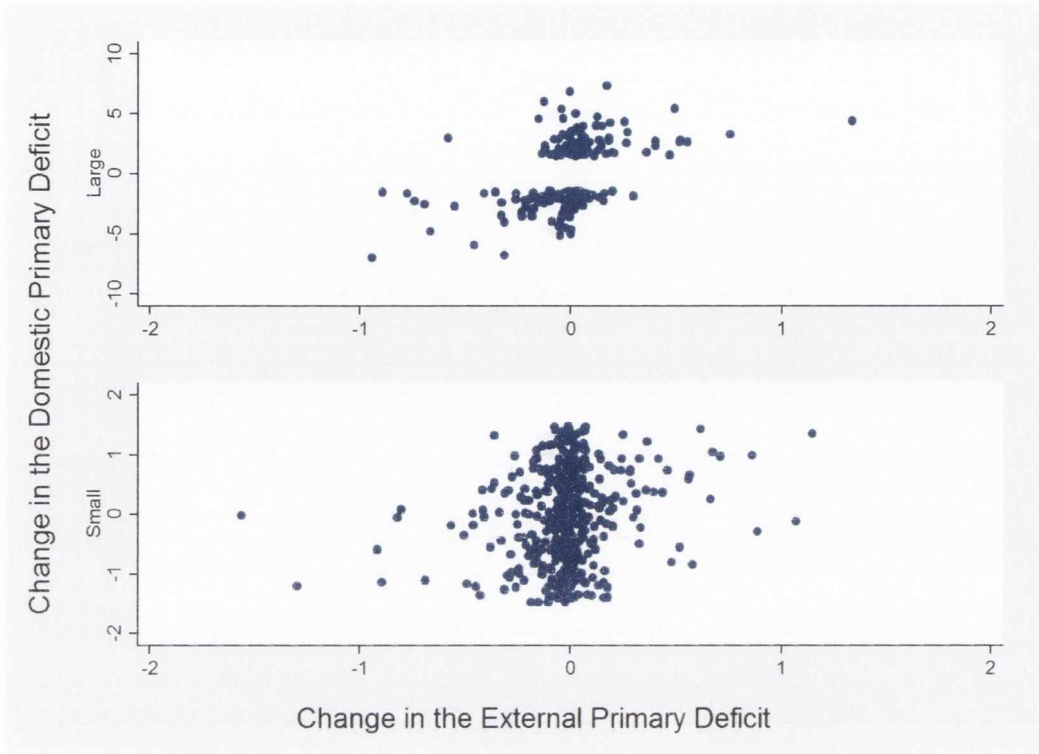
**Note:** Bands are set at one standard deviation.

Figure 2.2: Cyclically-Adjusted External Primary Deficit



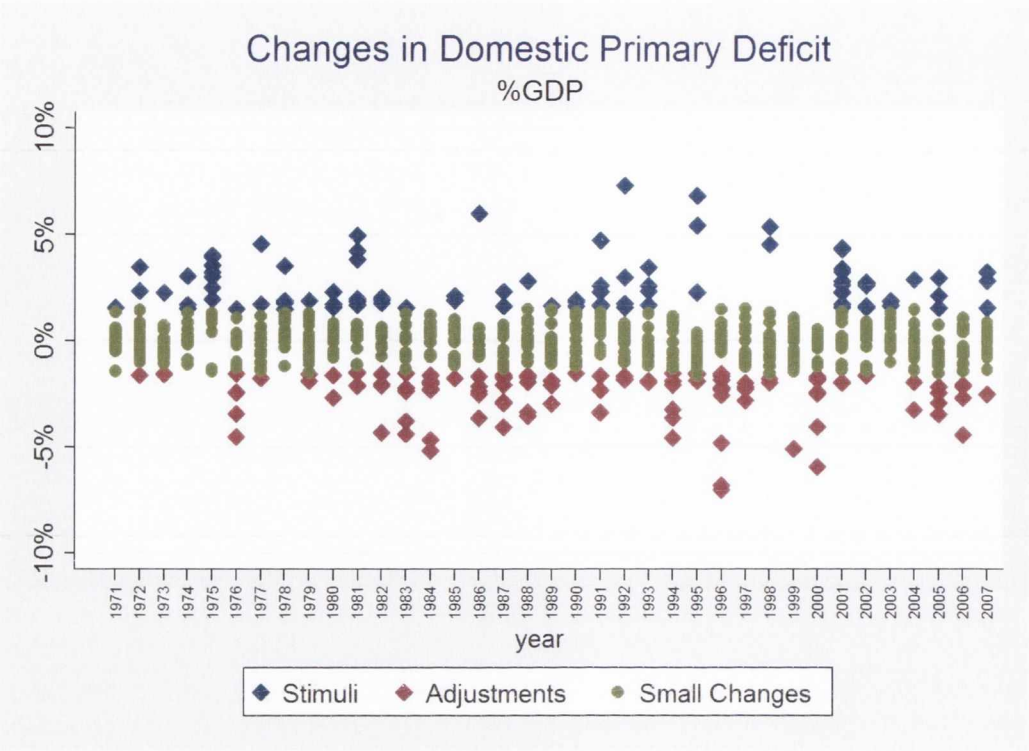
**Note:** Bands are set at one standard deviation.

Figure 2.3: Changes in the Domestic and External Cyclically-Adjusted Primary Deficit - %GDP



**Note:** All the variables are cyclically-adjusted. Large changes in the domestic primary deficit are defined according to Equation 2.3

Figure 2.4: Changes in the Domestic Cyclically-Adjusted Primary Deficit



**Note:** The figure shows the change in the cyclically-adjusted primary deficit for each country included in the sample, in each year.



Table 2.8: Fiscal Stimuli\* - (Alesina and Ardagna, 2010)

|      |   |           |           |           |           |    |           |           |    |           |
|------|---|-----------|-----------|-----------|-----------|----|-----------|-----------|----|-----------|
| 1971 | 1 | UK        |           |           |           |    |           |           |    |           |
| 1973 | 1 | UK        |           |           |           |    |           |           |    |           |
| 1976 | 1 | NO        |           |           |           |    |           |           |    |           |
| 1979 | 1 | SE        |           |           |           |    |           |           |    |           |
| 1983 | 1 | FI        |           |           |           |    |           |           |    |           |
| 1986 | 1 | NO        |           |           |           |    |           |           |    |           |
| 1988 | 1 | NZ        |           |           |           |    |           |           |    |           |
| 1989 | 1 | GR        |           |           |           |    |           |           |    |           |
| 2004 | 1 | AT        |           |           |           |    |           |           |    |           |
| 1972 | 2 | <b>IT</b> | UK        |           |           |    |           |           |    |           |
| 1977 | 2 | SE        | NO        |           |           |    |           |           |    |           |
| 1985 | 2 | GR        | <b>PT</b> |           |           |    |           |           |    |           |
| 1987 | 2 | <b>FI</b> | NO        |           |           |    |           |           |    |           |
| 1998 | 2 | JP        | NO        |           |           |    |           |           |    |           |
| 2003 | 2 | <b>UK</b> | FI        |           |           |    |           |           |    |           |
| 1978 | 3 | <b>FI</b> | <b>IE</b> | <b>PT</b> |           |    |           |           |    |           |
| 1980 | 3 | NL        | DK        | SE        |           |    |           |           |    |           |
| 1990 | 3 | AU        | UK        | FI        |           |    |           |           |    |           |
| 1995 | 3 | DE        | <b>NL</b> | GR        |           |    |           |           |    |           |
| 2005 | 3 | BE        | JP        | PT        |           |    |           |           |    |           |
| 2007 | 3 | <b>IE</b> | JP        | <b>NO</b> |           |    |           |           |    |           |
| 1974 | 4 | DK        | <b>IE</b> | <b>NO</b> | SE        |    |           |           |    |           |
| 1982 | 4 | CA        | FI        | ES        | DK        |    |           |           |    |           |
| 1992 | 4 | FR        | SE        | FI        | UK        |    |           |           |    |           |
| 1993 | 4 | JP        | PT        | FR        | ES        |    |           |           |    |           |
| 1981 | 6 | GR        | BE        | IT        | DK        | ES | FR        |           |    |           |
| 1991 | 6 | AU        | CA        | SE        | FI        | UK | <b>NO</b> |           |    |           |
| 2002 | 6 | US        | FR        | NO        | FR        | NL | <b>UK</b> |           |    |           |
| 1975 | 9 | AT        | DK        | BE        | CA        | FR | <b>JP</b> | <b>IE</b> | NL | IT        |
| 2001 | 9 | <b>IE</b> | DE        | <b>CA</b> | <b>GR</b> | SE | FI        | IT        | NL | <b>UK</b> |
|      |   | 1         | 2         | 3         | 4         | 5  | 6         | 7         | 8  | 9         |

\*Expansionary Fiscal Stimuli Highlighted

Table 2.9: Fiscal Adjustments\* - (Alesina and Ardagna, 2010)

|      |    |           |           |           |           |           |           |           |    |    |           |           |
|------|----|-----------|-----------|-----------|-----------|-----------|-----------|-----------|----|----|-----------|-----------|
| 1972 | 1  | <u>NL</u> |           |           |           |           |           |           |    |    |           |           |
| 1977 | 1  | <u>UK</u> |           |           |           |           |           |           |    |    |           |           |
| 1985 | 1  | DK        |           |           |           |           |           |           |    |    |           |           |
| 1990 | 1  | IT        |           |           |           |           |           |           |    |    |           |           |
| 1999 | 1  | JP        |           |           |           |           |           |           |    |    |           |           |
| 2001 | 1  | JP        |           |           |           |           |           |           |    |    |           |           |
| 2002 | 1  | PT        |           |           |           |           |           |           |    |    |           |           |
| 2007 | 1  | IT        |           |           |           |           |           |           |    |    |           |           |
| 1973 | 2  | <b>FI</b> | <u>NL</u> |           |           |           |           |           |    |    |           |           |
| 1979 | 2  | FR        | <u>NO</u> |           |           |           |           |           |    |    |           |           |
| 1980 | 2  | IT        | <u>NO</u> |           |           |           |           |           |    |    |           |           |
| 1992 | 2  | PT        | IT        |           |           |           |           |           |    |    |           |           |
| 1993 | 2  | <u>NZ</u> | <u>NL</u> |           |           |           |           |           |    |    |           |           |
| 1995 | 2  | CA        | <b>PT</b> |           |           |           |           |           |    |    |           |           |
| 1998 | 2  | UK        | <u>FI</u> |           |           |           |           |           |    |    |           |           |
| 2004 | 2  | NO        | <u>SE</u> |           |           |           |           |           |    |    |           |           |
| 1981 | 3  | CA        | FI        | SE        |           |           |           |           |    |    |           |           |
| 1989 | 3  | NZ        | <u>NO</u> | <b>IE</b> |           |           |           |           |    |    |           |           |
| 1991 | 3  | GR        | IT        | NL        |           |           |           |           |    |    |           |           |
| 1976 | 4  | <b>GR</b> | FI        | IT        | <b>IE</b> |           |           |           |    |    |           |           |
| 1982 | 4  | BE        | UK        | <u>IT</u> | PT        |           |           |           |    |    |           |           |
| 2005 | 4  | <u>AT</u> | <u>DK</u> | <b>GR</b> | NO        |           |           |           |    |    |           |           |
| 2006 | 4  | BE        | <b>GR</b> | PT        | JP        |           |           |           |    |    |           |           |
| 1983 | 5  | DK        | PT        | NL        | <b>NO</b> | SE        |           |           |    |    |           |           |
| 1994 | 5  | ES        | GR        | FI        | SE        | <u>NZ</u> |           |           |    |    |           |           |
| 1997 | 5  | AT        | UK        | CA        | IT        | SE        |           |           |    |    |           |           |
| 1986 | 6  | <b>ES</b> | CA        | <b>PT</b> | DK        | GR        | <u>SE</u> |           |    |    |           |           |
| 1988 | 6  | AU        | <u>UK</u> | <b>PT</b> | FI        | NL        | <b>IE</b> |           |    |    |           |           |
| 2000 | 6  | DE        | <u>NZ</u> | <u>IE</u> | <u>UK</u> | <b>FI</b> | NO        |           |    |    |           |           |
| 1984 | 7  | AT        | BE        | SE        | FI        | JP        | DK        | IE        |    |    |           |           |
| 1987 | 7  | AU        | <b>ES</b> | BE        | <u>SE</u> | NZ        | CA        | <b>IE</b> |    |    |           |           |
| 1996 | 11 | DE        | AT        | ES        | CA        | <b>FI</b> | FR        | UK        | SE | GR | <u>NO</u> | <u>NL</u> |
|      |    | 1         | 2         | 3         | 4         | 5         | 6         | 7         | 8  | 9  | 10        | 11        |

\*Expansionary fiscal adjustments highlighted, successful adjustments underlined



## Chapter 3

# Bailouts and Regulation

### 3.1 Introduction

The aim of this chapter is to study the impact of the level of regulation in the economy on the likelihood of a bailout. The effects of product market regulation on the economy have so far been studied with reference to its impact on variables such as income growth, or the overall level of investment in the economy (Alesina et al., 2005).

Two alternative hypothesis are at the basis of this investigation. If a country has a low level of product market regulation, the ability of the government to intervene directly in the economy could be lower than in a highly regulated one. According to this hypothesis, highly regulated economies will experience a higher rate of discretionary government intervention, both through direct acquisition and financing of firms, and through a higher level of State aid granted, compared to less regulated and more competitive countries.

On the other hand, a higher level of regulation could shield firms from competition, resulting in a lower need for government intervention. In this case, a low the level of regulation would put some pressure on the mark-ups of the incumbents (Blanchard and Giavazzi, 2003), and result in higher government expenditure.

To address this question we adopt multiple measures of bailouts, defined as a set of ad-hoc measures taken by the government, aimed at financially helping firms in turmoil, using both stock-flow adjustment and its components. Stock-flow adjustments are defined as the difference between the change in the stock of debt in a period and the government deficit for that same time window. Since stock-flow adjustments are not included in the deficit, they have been made the object of several studies on creative accounting and



fiscal transparency (von Hagen and Wolff, 2006; Weber, 2012), but their role has not been investigated outside this particular field. To develop a more complete picture, we also run our analysis using State aid granted to firms as a dependent variable, since it captures a different type of government intervention, including in addition to off-budget measures, also foregone revenues and in-budget expenditure, meant to target a particular firm.

To capture the level of regulation in the economy we use the product market regulation indicators, produced by the OECD.

We find that a higher level of regulation is associated with a lower level of bailouts. Countries with a lower level of product market regulation experience higher stock-flow adjustments and a higher level of net acquisition of financial assets. In contrast, the level of State aid granted by countries is higher in more regulated economies. However, these results are not robust to different specifications of the model and are only valid for some indicators.

The rest of the chapter is organized as follows: in Section 3.2 we briefly discuss the literature; data sources are described in Section 3.3, while the methodology and results are reported in Section 3.4; Section 3.5 concludes.

## **3.2 Fiscal Position and Regulation**

The literature on fiscal rules has identified a number of reasons why government debt is often higher than predicted.

Government debt is not only the result of the accumulation of deficits over the years, but it sometimes surges because of the direct intervention of the government in the economy. Governments often intervene in the market financing and sustaining privately-held firms, and through their direct interest in state-owned corporations.

Bailouts and State aid are ad-hoc measures capturing this discretionary spending. The frequency of the adoption of such measures can be influenced by a stricter or wider level of regulation in the economy.

The literature on politically connected firms and lobbying, in fact, found a significant relation between regulation and lobbying. In Bernhagen and Mitchell (2009), for instance, the regulatory exposure, together with the size of the firm, increases the probability of a firm directly undertaking lobbying in the EU. In this context, tighter regulation creates

an incentives for firm to invest in rent-seeking behaviour. Size, but not profitability of the firm, is another determinant, suggesting that large firms have more resources and may benefit from scale economies when investing in direct lobbying. In this context, regulation then would be positively correlated with ad-hoc measures, benefiting large firms. This would include politically connected firm as well, since according to Faccio (2006), they tend to be bigger than the average.

An interesting contribution on bailouts and politically-connected firms comes from the findings of Faccio et al. (2006): in their paper in fact, such firms are more likely be bailed out, *ceteris paribus*, than the non-connected ones and they are in a worse financial position at time of bailout. Also, previously privatized firms have a higher probability of being bailed out. Since the paper is based on anecdotal evidence and it uses a lax definition of bailout, results can not be easily extended outside the sample. Even so, the findings offer an interesting point of view on how governments deal with firms in distress. A further caveat has to be made when reading their results in the light of the analysis in this chapter: the authors in fact derive their information about corporate bailouts from a key-word research in news article. The keywords they use include the word “aid”. and “rescue”; due to this inclusion, the authors capture not only government acquisitions of financial assets, but they also capture State aid and other extraordinary measures that do not necessarily imply an acquisition.

Stock-flow adjustments, although capturing bailouts, have mainly been used in the fiscal rule literature with reference to creative accounting. Creative accounting in fact, can result in stock-flow adjustments, as has been shown in the literature, since it makes use of the same off-budget instruments that capture the magnitude of bailouts and special lending to firms.

In Milesi-Ferretti (2004), for instance, numerical fiscal rules can lead to perverse and undesirable outcomes, like pushing part of the expenditure off-balance sheet. Empirical studies have investigated this effect on the level of debt, following the imposition of the stability and growth pact, as in von Hagen and Wolff (2006), where stock-flow adjustments are the Trojan horse used to avoid the limits imposed by the fiscal rule; the authors do find evidence of creative accounting. Weber (2012) links the magnitude of stock-flow adjustments to the level of fiscal transparency of a country. Easterly (1999), on the other hand, makes reference to what he calls “illusionary fiscal adjustments”, where reductions

in the debt burden are merely caused by creative accounting operations that push some expenditure items off-budget.

A useful source of information on stock-flow adjustments is the annual report published by Eurostat in its effort to monitor this variable. It describes some relevant facts and illustrates the trends guiding the stock-flow adjustments figures. For a few years Eurostat, together with the main stock-flow adjustments subcomponent, gave some details about the firms receiving capital injections, including their names. The episodes mentioned in these reports have been included in Table 3.1.

The information disclosed in the reports confirms that stock-flow adjustments do capture bailouts. Banks, airlines and real estate companies are the ones mentioned most often (see Table 3.1). This does not come as a surprise, since these sectors are often considered to be strategical by governments.

To reconcile this evidence with effective monitoring by Eurostat, we need to break up stock-flow adjustments into their components. Since stock-flow adjustments register the revenues from privatizations - and the corresponding expenditure in the case of a bailout - results in the von Hagen and Wolff (2006) analysis could be capturing the intervention of the government in the economy, rather than creative accounting. In this case the imposition of the 3% threshold for the deficit decreased the cost of off-deficit policies, relatively to the ones included in the deficit. For instance, it is now less costly to bailout a firm or granting a State aid, rather than incurring the increase in expenditure in automatic stabilizers caused by a restructuring.

In light of this result, a fiscal rule that only focuses on the flow component of government expenditure and leaves out the stock, can cause the perverse effect of increasing the debt level. In one of the cases mentioned in Table 3.1, Eurostat reclassified as capital transfers an operation undertaken by the Portuguese to refinance two hospitals and initially reported as an equity injection. In that year Portugal was reporting a deficit above 3%, so there was an incentive in under-reporting the amount of the violation.

As for the literature on bailouts, it has focused mainly on episodes related to the banking sector, rather than on the overall economy. According to Lyons (2009), the special attention granted to bank bailouts is due to the particular nature of this industry. In fact, a bank failure would increase the risk of contagion within the banking system. Moreover, it would also expose other industries to a higher risk or turmoil, in case the access to credit



and refinancing were affected. State aid, on the other hand, is often used to help firms in other sectors, since the risks described before do not exist or are significantly smaller and losses and failures are accepted as a normal outcome in a competitive market.

To stress the peculiarity of the banking sector, regulation in this case can increase the risk of a systemic crisis according to Beck et al. (2006), although concentration appears to be a stabilizing force. The ambiguous effects of regulation in the banking sector are described, among others, in Caprio and Honohan (1999). As we can see in Table 3.1, banks do appear quite often among the beneficiaries of equity injections, although the cases mentioned in the reports are not limited to the banking sector but include firms in utilities and transport.

However, among the extensive literature on liberalizations, just a few studies have focused on the macroeconomic effects of changes in product market regulation, as reported in Schiantarelli (2005). Some interesting results come from Alesina et al. (2005), where the overall level of investment in liberalized sectors is related to the level of regulation. More often, studies on the effects of economic liberalizations have been carried on in the context of political liberalizations (see, for instance, Giavazzi and Tabellini, 2005). Currently, there are no studies that try to investigate the link between liberalizations and the fiscal position of a country, an exception being Duval (2008). In his paper, however, causation goes in the other direction, with the macroeconomic policy of the country causing structural reforms, including reduced product market regulation.

In the context of this study, we will investigate the effects of the degree of product market regulation on bailout expenditure of different countries, in order to address the question of whether a highly regulated economy will create the conditions necessary for more frequent and bigger bailouts, and greater requirement for State aid, or it will reduce the usage of such instruments because the high level of regulation protects the profitability of the incumbents.

The main hypothesis we test in our analysis is then that regulation affects the likelihood of a bailout. While protecting the incumbents, high levels of regulation could lower the need for a direct intervention of the government in rescue of the firm, as captured by the net acquisition of financial assets. On the other hand, big and politically connected firms would have the incentive and the capacity of lobbying for State aid, as in Faccio et al. (2006).



In addition to this, large and politically connected firms might be less likely to be bailed out, if the bailout also implies a change in the management. State aid, from this point of view, is more compatible with the status quo than a direct takeover. State aid in fact, is meant to be an instrument to relief a firm facing special circumstances, while a bailout would imply a discontinuity with the previous management.

### **3.3 The Data**

In order to describe the extent of bailouts we used three different aggregates as a dependent variable: Stock-flow Adjustments, Net Acquisition of Financial Assets (net asset acquisitions, from now on) and State Aid. To capture the degree of regulation in the economy, we use the OECD Product Market Regulation indicators (PMR) as our independent variable.

#### **3.3.1 Data on Regulation**

The data on regulation come from the OECD Product Market Regulation (PMR), indicators.

These indicators have been calculated for OECD countries for the first time in 1998 and new values are released every five years. They provide an objective measure of the degree of regulation in the economy as a whole, ranging from 0 to 6 and increasing with the degree of regulation in the economy.

The indicators are structured into three different levels (see Figure 3.1 and Table 3.16). The high-level indicator offers the widest definition of regulation while the three medium-level indicators distinguish between State Controls, Barriers to Trade and Investment, and Barriers to Entrepreneurship. Every medium-level indicator is divided into sub-domains. Sub-domains are then built as a weighted average of the corresponding low-level indicators.

Because of their stratified nature, the PMR indicators give us the possibility to distinguish between the effects of the overall level of regulation, as expressed by the higher level indicators, and between specific policies, summarized in the 18 low-level indicators. As we can see in Table 3.3, while the level of the indicators decreased on average over time, the between-country variance is still quite high and it does not seem to matter less over time. The Product Market Regulation indicators then offer a good description of the changes

in the level of regulation taking place within each country and they also provide a good summary of the cross-country heterogeneity in the level of regulation as well (Schiantarelli, 2005).

### 3.3.2 Fiscal Data

The choice of a stricter or wider definition of bailout is reflected in the dependent variable we use.

If we adopt a more comprehensive definition of a bailout, looking at cases where the government buys a firm or grants a special loan, then stock-flow adjustments are the dependent variable we will use.

Against this, focusing on net asset acquisitions makes the definition of bailouts narrower, since we exclude a number of measures (such as other changes in government debt), that are included in stock-flow adjustments but not in net asset acquisitions.<sup>6</sup>

The adoption of State aid as the dependent variable constitutes the broadest definition of bailouts, since some of its components are grants and tax exemptions which affect the fiscal accounts. This type of intervention does not constitute hidden expenditure but it affects the deficit through foregone revenues. The non-explicit nature of lower revenues shares some of the opacity that characterizes stock-flow adjustment.

Stock-flow adjustments are defined as the difference between the change in government debt and the accumulated deficit over a period. They can be decomposed into four main components (Table 3.15): Net Acquisition of Financial Assets, which includes the proceeds from liberalizations and the money spent in bailouts, while it also registers government loans to banks granted as actions undertaken in the context of the present crisis; Incurrences in Liabilities not in Government Debt, consisting of pending payments and receipt; Valuation Effects and Other Changes in Government Debt; finally a residual term, capturing statistical discrepancies is added.

Although several organizations provide data on government finance, not every source includes figures for stock-flow adjustments.

We chose the Annual Macro-economic Database (AMECO), provided by the European Commission, as our main source on stock-flow adjustments in accordance with the previ-

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<sup>6</sup> An example of this comes from the Eurostat report on stock-flow adjustment of 2009, where a measure implemented by the British government in 2008 in response to the crisis is mentioned without giving any other additional detail about it in the report of 2010.

ous literature (von Hagen and Wolff, 2006). The data start quite early, with observations dating back to 1971. By 1991 the AMECO database includes data on stock-flow adjustments for 15 countries. As a drawback, this dataset only includes data on the aggregate stock-flow adjustment and it does not offer any information about its components.

For the individual components of stock-flow adjustments, and for net asset acquisitions in particular, we will use the data provided by Eurostat within the Government Financial Statistics figures. The data from this source date back to 1995, but with several gaps in the oldest part of the sample.

Of course Eurostat and the European Commission provide data for European countries only; this would leave several OECD countries out of the analysis, for which the indicators are available, if we relied on these two sources only.

To avoid this problem, we turn to the IMF Government Finance Statistics (GFSM2001). This database is wider than those previously mentioned, but it suffers from several gaps in the data. This source has hence been used only to augment the data from Eurostat. Further details can be found in Appendix 3.7.

As mentioned before, in our analysis we define bailouts not only as the money granted by the government to firms through loans or equity injections, but we extend the definition to include State aid. The rationale for this extension is due to the fact that State aid allows the government to select a specific firm or sector and help it.

Data on State aid, expressed as a percentage of GDP, comes from the European Commission Scoreboard on State aid, so it is only available for EU Member States. State aid can be divided into six components: grants, tax exemptions, equity participations, soft loans, tax deferrals, and guarantees. The first two categories alone constitute 95% of total aid to industry and services granted in the last three years. State aid conceded in response to the crisis is excluded from the data.

Not all of these components fall outside the definition of government debt. Some components as tax exemptions and tax deferrals, in fact, although not included in the deficit do contribute to it since they are forgone revenues; grants enter the deficit,<sup>7</sup> while equity participations and soft loans are part of the off-budget measures included in the stock-flow adjustment. As for guarantees, as long as they are not called, they are off-

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<sup>7</sup>The ESA95 manual leaves some discretionality on this point. For instance an investment grant in kind to a public corporation, although falling into the D.92 category as investment grants, would leave the deficit unchanged.



balance sheet since they are classified as contingent liabilities; if it is the government that will eventually pay the debt, the liability will be recorded among the government liabilities, budget included.

The sign of the correlation between State aid and bailouts, defined in their stricter sense as the net acquisition of financial assets by the government, depends on the country. Austria, Belgium, Czech Republic, Germany, Spain, Finland, the Netherlands, Portugal, Slovakia and the United Kingdom register an inverse relationship between the two measures, while the rest of the sample shows a positive correlation (see Table 3.4).

The net acquisition of assets adds up to a higher share of GDP than State aid: specifically, State aid amounts to an average of 0.54% of GDP over the period, while the average net acquisition of financial assets is 1.5% of GDP. If we restrict the sample to the periods and countries for which we have observations for both variables, the average State aid amounts to 0.57% of GDP, while net asset acquisitions amount to 1% of GDP. While these numbers could seem negligible when expressed as a percentage of GDP, it is worth remembering that the threshold for the deficit in the Growth and Stability Pact is set at 3% of GDP, so the average level of State aid amounts to 16.7% of the threshold.

State aid could be thought of as complementary to stock-flow adjustments - and to the acquisition of financial assets - since during times of economic distress the government will be allowed to grant State aid under the European scheme and it will also have to take over firms. On the other hand, the two measures could be seen as substitutes, since governments could either choose to grant State aid or bailout the firm. This hypothesis can not be tested, since net asset acquisitions and State aid can not be summed together to give a broader measure of bailouts. In fact, they have some components in common: for equity participations and soft loans, there is a perfect overlap. These common expenditure voices can not be removed, since we do not have data disaggregated at the necessary level.

## **3.4 Empirical Analysis**

### **3.4.1 Estimating the Probability of a Bailout**

We started the analysis addressing the question of how much the degree of regulation in the economy affects the probability of having a change in debt bigger than the deficit, i.e. of having a positive stock-flow adjustment.



Even if this exercise can not give us any information about causality, it has the advantage of being consistent with the previous literature regarding the impact of macroeconomic policies on the level of regulation (Duval, 2008).

To proceed with the analysis, we have created a dummy variable that is equal to one if the total stock-flow adjustment during the time frame between two indicators is positive and zero otherwise, as illustrated below:

$$sfa_n = \begin{cases} 1 & \text{if } \sum_{t=0}^n \text{Stock-Flow Adj.} > 0 \\ 0 & \text{if } \sum_{t=0}^n \text{Stock-Flow Adj.} < 0 \end{cases} \quad (3.1)$$

We focus on the sign of the sum of stock-flow adjustments during the period, rather than on their dimension, because the price paid by governments when bailing out a company is rarely, if ever, the market price of the firm, and is usually higher. Moreover, as Huang and Levich (1999) and Pagano and Volpin (2001) show, governments do not always sell at market prices either, but they tend to offer shares at a significantly higher discount than any other IPO. This implies that the values registered in stock-flow adjustments could be distorted. The net acquisition of financial assets by the government captures these episodes and it constitutes the biggest component of stock-flow adjustments. In addition to this, the second biggest component, valuation effects, is also subject to controversies in its measurement. Hence we proceeded by estimating the following model:

$$P_{k,t}(sfa_n = 1) = \frac{1}{1 + e^{-(\beta_0 + \beta_1 PMR_{k,t} + \beta_2 PMR_{k,t}^2 + \gamma Z_{k,t})}} \quad (3.2)$$

We tested the model with and without the squared value of the indicator,  $PMR^2$ , and a set of control variables,  $Z$ . We added a squared term in the analysis because the need for bailouts could be non-linear in the degree of protection that incumbents are granted. In fact, when incumbents are shielded from competition, they do not need to be taken over by the government through a bailout, since the firm could be earning profits (Blanchard and Giavazzi, 2003).

As a further robustness check we have included among the independent variables in  $Z$  the unemployment rate and the level of debt, since a bad economic outlook could make governments more keen to bailout firms. Results are quite sensitive to the different specifications. The coefficients are often insignificant and in several cases it is not possible

to include more independent variables in the regression because of the limited dimension of the sample. For these reasons, the tables with the results have been omitted.

As the level of regulation decreases, incumbents might suffer from the higher level of competition in the industry and require government intervention in the form of a bailout or other special measures. This will result in a non-linear relation between the level of regulation and the net acquisition of financial assets from the government.

Results from this naive regression are reported in Tables 3.5 and 3.6. For the sake of brevity we only report the coefficients when significant. The number of observations included in the sample is quite low because the indicators have been calculated a maximum of three times for each country.

When significant, the coefficients are always negative: a higher level of regulation in the economy is associated with a lower probability of registering a positive stock-flow adjustment.

The results of the analysis show that higher level indicators tend to be more significant than their components. The overall level of regulation in the economy seems to influence the probability of a bailout more than the single policies. Moreover, the sub-domain indicators are not necessarily significant when their components are significant. We can see from Table 3.6 that the scope of the public enterprise sector seems to negatively influence the probability of a bailout, and the same is true for the direct control over business enterprise. The medium-level indicator for public ownership, which includes the two indicators combined with government involvement in the infrastructure sector, shows a coefficient not significantly different from zero.

### **3.4.2 Linear Regressions**

Although the logit analysis yields some interesting results and gets rid of the bias in prices, it does not fully exploit the information available in the dataset. Also, since State aid can not assume a negative value and it is always different from zero, it does not make sense to apply the logit analysis to it so for sake of comparability we run linear regressions for all three of our definitions of bailouts.

## Stock-flow Adjustments and Net Assets

As has been mentioned before, in order to exploit all the information contained in the data on stock-flow adjustments and net asset acquisitions, we choose to abandon the logit framework in favour of a GLS approach. The following model has then been estimated:

$$\sum_{t=s}^T \frac{BailoutSpending_{i,t}}{T-s} = \alpha + \beta_1 PMR_{i,T} + \beta_2 PMR_{i,T}^2 + \gamma Z_{i,T} + v_i + \epsilon_{i,T} \quad (3.3)$$

where *Bailout Spending* is the average value over the period of stock-flow adjustments or net asset acquisitions, depending on the definition of bailout we adopt. PMR identifies the OECD indicator and *Z* is a vector of control variables, including, as before, the level of government debt and the unemployment rate.

We use the average value for the period as a dependent variable, because it smooths the cyclical behaviour of the dependent variable and it also lessens the impact of measurement errors. Once again, we also run our analysis excluding the squared term.

Results are reported in Tables 3.7 to 3.12. As before, we decided to only include statistically significant coefficients. We also restricted the coefficients reported in the tables to those significant for both stock-flow adjustments and net asset acquisitions. This choice only excludes a few significant coefficients.

The high and medium-level indicators (Table 3.7) are once again significantly different from zero and negatively correlated to a bailout under both of our definitions. The overall  $R^2$  is always quite low and product market regulation indicators are more powerful when explaining stock-flow adjustments than net asset acquisitions. This result suggests that net asset acquisitions are too narrow a measure and governments do intervene in the economy using other instruments in addition to the ones included in net asset acquisitions.

In contrast to what happened in the logit model, the coefficients for the sub-domains are always significantly different from zero. For this reason, we presented the results for the low-level indicator with the sub-domain to which they belong (see Tables 3.8 to 3.12).

When we add the squared value of the indicator to the analysis, the coefficients are rarely significant: the cost of bailouts seems then to be linear in the degree of regulation, with relatively more competitive economies facing the same cost of liberalization, in terms of higher expenditure in bailouts, as the most regulated ones.



## State Aid

To investigate the role of State aid in bailouts, we estimate the same model we ran for stock-flow adjustments and net asset acquisitions, as described in Equation 3.3. Once again, the dependent variable is the average level of State aid granted during the period.

Tables 3.13 and 3.14 include the significant coefficients for the regressions. The sign of the coefficients, in contrast with the previous results, is always positive. When the level of regulation is high, firms are supported and granted a higher level of aid. When we add the square value of the indicator to our specification, only the coefficients for explicit barriers to trade and investment, and its component capturing the level of tariffs are significantly different from zero.

Other specifications of the model, including the level of government debt, have been tested, but the results have been omitted since only in a few cases could the sample support the number of independent variables and the results were not robust to the different specifications.

To solve the causality problems affecting the regressions, we have estimated the model using an instrument for the product market regulation indicators. The high-level product market regulation indicator has been instrumented with the OECD indicators on employment protection legislation (EPL). The literature, in fact, has identified a link between the two forms of regulation (Boeri et al., 2000). EPL indicators, measuring qualitative characteristics of the labour market, offer a good instrument for the level of product market regulation, since they capture the level of rigidity faced by firms in dealing with their labour force, but they do not regulate the relation between the government and the firm. The level of EPL, moreover, varies across countries independently on the degree of unionisation, as shown in Freeman (2008), in part excluding the possibility of EPL being correlated to bailouts because of lobbying by the unions. This analysis does not yield significant results, so the tables have been omitted. As a further control we have used the share of general government employment over total employment as an instrument for the overall level of regulation. General government employment in fact does not include employment in State-owned firms, but it offers information about how relevant the role of the government in the economy is. This analysis as well does not yield any significant coefficient and is hence omitted from the tables.

Comparing the results for stock-flow adjustments and net asset acquisitions to the



results we obtained for State aid, State aid seems to be the instrument used in combination with higher level of regulation to help struggling firms, while direct bailouts that result in a stock-flow adjustment are more frequent when the level of regulation is lower. A higher level of regulation, while protecting mark-ups, can also induce in a higher stream of aid from the government to the firms. When regulation is low, on the other hand, firms are not granted yearly aid, but the government resorts to those instruments included in stock-flow adjustments, such as equity injections and granting special loans. From this perspective, it would be interesting, once more data become available, to investigate the behaviour of the common measures included in both State aid and stock-flow adjustments. In fact, once stripped of the common components, we could be able to see a sharper difference in the behaviour of these variables and to determine which components drive the results.

### 3.5 Conclusions

This chapter has investigated, for a panel of 23 OECD economies over a 15-year period, the effect of the level of product market regulation on the likelihood of a bailout. We used broader and stricter definitions of bailouts, ranging from the whole stock-flow adjustment, to the net acquisition of financial assets, or the granting of State aid.

The results, although not robust to different specifications, show that stricter regulation in the product market is associated with a lower probability of registering a bailout, as captured by off-budget government expenditure. When restricting the definition of bailout to the net acquisition of financial assets by the government, we still find that higher product market regulation is associated with lower expenditure by the government. The opposite result holds for State aid: in fact, it increases with the level of regulation. More competitive economies are then more likely to rescue firms directly than granting them State aid.

We explain our results with two alternative hypotheses. While regulation can shield firms from competition and grant them higher mark-ups, it also creates an incentive for the firms affected by this regulation to lobby with the government for State aid. The high cost imposed by regulation, in fact, makes it rational for the firm to invest in direct lobbying with the government. In this scenario higher regulation would result in both a lower need for bailout and a higher level of State aid granted to firms.

Alternatively, we can see a bailout as a more drastic measure undertaken by the government to rescue a firm than State aid. In this case a bailout would require a change in the status quo, and maybe in the management, that big and politically connected firms will not see with favour, while they will prefer to be financed with State aid. Further research should hence point in the direction of investigating the causal link and check if the two types of bailouts we adopted are complementary to each other.

## 3.6 Tables

### 3.6.1 Data Description

Table 3.1: Episodes Mentioned in the Eurostat Reports on Stock-flow Adjustments

| Country                       | Year      | Additional Information                                    |
|-------------------------------|-----------|-----------------------------------------------------------|
| <i>Privatization proceeds</i> |           |                                                           |
| Czech Republic                | 2002      | <sup>1</sup> p.7                                          |
| Czech Republic                | 2005      | <sup>1</sup> c.s.                                         |
| Slovakia                      | 2002      | <sup>1</sup> c.s.                                         |
| Slovakia                      | 1999      | <sup>2</sup> p.3                                          |
| Slovakia                      | 2001      | <sup>2</sup> c.s.                                         |
| Bulgaria                      | n/a       | <sup>2</sup> c.s.                                         |
| Lithuania                     | n/a       | <sup>2</sup> c.s.                                         |
| <i>Equity Injections</i>      |           |                                                           |
| Austria                       | 2004      | Austrian Railways <sup>1</sup>                            |
| Austria                       | all years | quasi-corporation <sup>2,3</sup>                          |
| Belgium                       | 2007      | BAM (Antwerp infrastructure project) <sup>3</sup> p.8     |
| Belgium                       | all years | quasi-corporations <sup>3</sup> p.8                       |
| Cyprus                        | 2006      | Cyprus Airways <sup>2</sup>                               |
| Czech Republic                | 2003      | Osinek <sup>2</sup> p.10                                  |
| Czech Republic                | 2002      | CEPS a.s. <sup>3</sup> p.8                                |
| Denmark                       | all years | quasi-corporations <sup>2</sup> p.10                      |
| Estonia                       | 2002      | RE Company <sup>1</sup>                                   |
| Estonia                       | 2003      | RE Company (Riigi Kinnisvara) <sup>2</sup>                |
| Estonia                       | 2003      | Oil company (Eesti Vedelkütusevaru Agentuur) <sup>2</sup> |
| Estonia                       | 2006      | EVA <sup>3</sup>                                          |
| Estonia                       | 2007      | EVA <sup>3</sup>                                          |
| Finland                       | 2007      | Finnair Plc <sup>3</sup>                                  |
| Finland                       | 2007      | Sponda Plc <sup>3</sup>                                   |
| France                        | 2003      | France Telecom <sup>1</sup>                               |
| Greece                        | 2005      | ATE Bank <sup>1,2</sup>                                   |
| Germany                       | all years | quasi-corporations <sup>2</sup>                           |
| Germany                       | 2007      | GfW Bank <sup>3</sup>                                     |
| Italy                         | 2004      | SACE export insurance <sup>2</sup>                        |
| Latvia                        | 2005      | Mortgage Bank <sup>2</sup> (Hipoteku)                     |
| Luxembourg                    | 2006      | Soc.Gen. de Credit et d'Investissement <sup>2</sup>       |
| Malta                         | 2006      | Air Malta <sup>1</sup>                                    |
| Portugal                      | 2002      | Hospitals <sup>1</sup>                                    |
| Portugal                      | 2004      | CGD Bank <sup>2</sup>                                     |
| Portugal                      | 2005      | Hospitals <sup>2</sup>                                    |
| Portugal                      | 2007      | Cahora Bassa <sup>3</sup>                                 |
| Poland                        | 2006      | GAZ-System <sup>2</sup>                                   |
| Romania                       | 2006      | CEC Bank <sup>2</sup>                                     |
| Spain                         | 2007      | ICO export insurance <sup>3</sup>                         |
| UK                            | 2005      | NGDF nuclear fund <sup>3</sup>                            |

Eurostat Report on Stock-flow Adjustments: <sup>1</sup>2006, <sup>2</sup>2007, <sup>3</sup>2008.

Table 3.2: Fiscal Variables Summary Statistics

| Variable                |        | Mean   | Std. Dev. | N   | $\rho(i, SFA)$ |
|-------------------------|--------|--------|-----------|-----|----------------|
| <i>Deficit</i>          | (%GDP) | -1.23  | 4.5       | 287 | 59%***         |
| $\Delta Debt$           | (%GDP) | 2.38   | 3.84      | 266 | 49%***         |
| <i>SFA</i>              | (%GDP) | 0.94   | 4.32      | 262 | —              |
| <i>NetAssets</i>        | (%GDP) | 1.51   | 4.74      | 175 | 95%***         |
| <i>Liabilities</i>      | (%GDP) | -0.22  | 0.76      | 161 | -4%            |
| <i>Valuations</i>       | (%GDP) | 0.16   | 1.15      | 163 | 25%***         |
| <i>Stat.Discrepancy</i> | (%GDP) | -0.06  | 0.76      | 156 | 3%             |
| <i>NetAssets</i>        | (%SFA) | 83.78  | 920.11    | 175 |                |
| <i>Liabilities</i>      | (%SFA) | -20.60 | 795.18    | 161 |                |
| <i>Valuations</i>       | (%SFA) | 45.16  | 816.67    | 163 |                |
| <i>Discrepancy</i>      | (%SFA) | -3.01  | 198.76    | 156 |                |



Table 3.3: PMR Indicators - Summary statistics

| Indicator                                             | 1998           |                | 2003           |                | 2008           |                |
|-------------------------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|
|                                                       | <i>Average</i> | <i>St.Dev.</i> | <i>Average</i> | <i>St.Dev.</i> | <i>Average</i> | <i>St.Dev.</i> |
| Product market regulation                             | 2.2            | 0.6            | 1.6            | 0.4            | 1.3            | 0.3            |
| Administrative regulation                             | 2.2            | 0.7            | 1.6            | 0.6            | 1.2            | 0.5            |
| Domestic economic regulation                          | 3              | 0.7            | 2.3            | 0.5            | 1.9            | 0.4            |
| State control                                         | 3.2            | 0.8            | 2.4            | 0.8            | 2.1            | 0.7            |
| Public ownership                                      | 3.7            | 1              | 3.2            | 0.9            | 3              | 0.9            |
| Involvement in business operation                     | 2.7            | 1              | 1.5            | 0.9            | 1.1            | 0.7            |
| Barriers to entrepreneurship                          | 2.3            | 0.5            | 1.7            | 0.4            | 1.3            | 0.4            |
| Barriers to competition                               | 2.4            | 0.5            | 1.9            | 0.4            | 1.6            | 0.4            |
| Administrative burdens on startups                    | 2.3            | 1.1            | 1.8            | 1              | 1.5            | 0.8            |
| Regulatory and administrative opacity                 | 2.2            | 1.1            | 1.4            | 0.8            | 1              | 0.7            |
| Barriers to trade and investment                      | 1              | 0.9            | 0.7            | 0.4            | 0.5            | 0.3            |
| Explicit barriers to trade and investment             | 1.4            | 0.9            | 1.1            | 0.6            | 0.9            | 0.5            |
| Other barriers                                        | 0.7            | 1.1            | 0.3            | 0.5            | 0.2            | 0.3            |
| Scope of public enterprise sector                     | 3.6            | 1.3            | 3.2            | 1.1            | 3.2            | 1              |
| Gov. involv. in infrastructure sector                 | 4.1            | 1.2            | 3.5            | 1.1            | 2.8            | 0.9            |
| Direct control over business enterprise               | 3.5            | 1.3            | 3              | 1.3            | 2.9            | 1.4            |
| Price controls                                        | 2.2            | 1.3            | 0.9            | 0.8            | 0.7            | 0.4            |
| Use of command and control regulation                 | 3.1            | 1.2            | 2.2            | 1.3            | 1.6            | 1              |
| Licence and permits system                            | 3.1            | 2              | 2.2            | 1.8            | 1.7            | 1.3            |
| Communication and simplif.<br>of rules and procedures | 1              | 0.6            | 0.6            | 0.6            | 0.2            | 0.3            |
| Admin. burdens for corporation                        | 2.3            | 1.3            | 1.9            | 0.9            | 1.6            | 0.8            |
| Admin. burdens for sole proprietor firms              | 2.2            | 1.2            | 1.8            | 1.1            | 1.6            | 1              |
| Sector specific admin. burdens                        | 2              | 1.3            | 1.5            | 1.1            | 1.3            | 0.8            |
| Legal barriers                                        | 1.9            | 0.7            | 1.4            | 0.6            | 1.1            | 0.6            |
| Antitrust exemptions                                  | 0.6            | 0.8            | 0.3            | 0.7            | 0.3            | 0.9            |
| Barrier to entry in network sectors                   | 3.9            | 1.2            | 2.4            | 0.9            | 1.6            | 0.9            |
| Barrier to entry in services                          | 3.3            | 1.4            | 3.3            | 1.1            | 3.3            | 0.8            |
| Barriers to FDI                                       | 2              | 0.9            | 1.6            | 0.7            | 1.3            | 0.8            |
| Tariffs                                               | 1.2            | 1              | 1.2            | 1              | 0.9            | 0.3            |
| Discriminatory procedures                             | 1              | 1.2            | 0.6            | 0.7            | 0.6            | 0.8            |

Table 3.4: Correlations between State Aid and Net Acquisition of Financial Assets

| Country               | <i>AssetsAcq.</i> | Total | Country               | <i>AssetsAcq.</i> | Total |
|-----------------------|-------------------|-------|-----------------------|-------------------|-------|
| <i>Austria</i>        |                   |       | <i>Ireland</i>        |                   |       |
| Total                 | -0.40             |       | Total                 | 0.94              |       |
| Industry and Services | -0.43             | -0.34 | Industry and Services | 0.92              | 0.73  |
| <i>Belgium</i>        |                   |       | <i>Italy</i>          |                   |       |
| Total                 | -0.20             |       | Total                 | 0.68              |       |
| Industry and Services | -0.22             | 0.92  | Industry and Services | 0.83              | 0.99  |
| <i>Czech Republic</i> |                   |       | <i>Luxembourg</i>     |                   |       |
| Total                 | -0.76             |       | Total                 | 0.02              |       |
| Industry and Services | -0.76             | 0.99  | Industry and Services | 0.44              | 0.97  |
| <i>Germany</i>        |                   |       | <i>Netherlands</i>    |                   |       |
| Total                 | -0.54             |       | Total                 | -0.39             |       |
| Industry and Services | -0.56             | 0.99  | Industry and Services | 0.40              | -0.55 |
| <i>Denmark</i>        |                   |       | <i>Poland</i>         |                   |       |
| Total                 | 0.33              |       | Total                 | -0.25             |       |
| Industry and Services | 0.46              | 0.88  | Industry and Services | -0.35             | 0.98  |
| <i>Spain</i>          |                   |       | <i>Portugal</i>       |                   |       |
| Total                 | -0.35             |       | Total                 | -0.73             |       |
| Industry and Services | -0.40             | 0.98  | Industry and Services | -0.58             | 0.81  |
| <i>Finland</i>        |                   |       | <i>Sweden</i>         |                   |       |
| Total                 | -0.89             |       | Total                 | 0.58              |       |
| Industry and Services | 0.79              | 0.60  | Industry and Services | 0.89              | 0.10  |
| <i>France</i>         |                   |       | <i>Slovakia</i>       |                   |       |
| Total                 | 0.09              |       | Total                 | -0.86             |       |
| Industry and Services | 0.23              | 0.99  | Industry and Services | -0.87             | 0.89  |
| <i>Greece</i>         |                   |       | <i>United Kingdom</i> |                   |       |
| Total                 | 0.59              |       | extrails              | -0.49             |       |
| Industry and Services | 0.65              | 0.96  | Industry and Services | -0.26             | 0.85  |
| <i>Hungary</i>        |                   |       |                       |                   |       |
| Total                 | 0.25              |       |                       |                   |       |
| Industry and Services | 0.59              | 0.47  |                       |                   |       |

**Note:** The table contains the correlations between Total State aid excluding railways (*Total*), State aid to industry and service (*Industry and Service*), and Government Net Acquisition of Financial Assets (*Assets Acq.*).

### 3.6.2 Regressions

In Tables 3.5- 3.14 we use the OECD identifiers as variable names. For the structure of Product Market Indicators, see Table 3.16

### Non-linear Regressions

Table 3.5: Probability of a Positive Stock-flow Adjustment  
High and Medium-Level Indicators

|                  | (1)               | (2)               | (3)                | (4)               | (5)               | (6)                | (7)               |
|------------------|-------------------|-------------------|--------------------|-------------------|-------------------|--------------------|-------------------|
| PMR              | -4.3**<br>(-2.10) |                   |                    |                   |                   |                    |                   |
| BTE              |                   | -5.4**<br>(-2.48) |                    |                   |                   |                    |                   |
| BTI              |                   |                   | -2.7***<br>(-2.60) | -3.4**<br>(-2.02) |                   |                    |                   |
| BTI <sup>2</sup> |                   |                   |                    | 0.5<br>(0.67)     |                   |                    |                   |
| ABS              |                   |                   |                    |                   | -0.9**<br>(-2.03) |                    |                   |
| XBR              |                   |                   |                    |                   |                   | -2.2***<br>(-3.03) | -3.3**<br>(-2.07) |
| XBR <sup>2</sup> |                   |                   |                    |                   |                   |                    | 0.6<br>(0.92)     |
| Constant         | 7.7**<br>(2.19)   | 10.3**<br>(2.55)  | 1.9***<br>(3.13)   | 2.1***<br>(2.87)  | 2.3**<br>(2.32)   | 2.2***<br>(3.41)   | 2.6***<br>(2.97)  |
| Observations     | 54                | 54                | 54                 | 54                | 54                | 54                 | 54                |

*t* statistics in parentheses  
 \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Note:** The dependent variable is a binary variable that assumes value 1 if the sum of stock-flow adjustments during the previous period was positive and zero otherwise. The independent variables correspond to PMR: Product market regulation, BTE: Barriers to entrepreneurship, BTI: Barriers to trade and investment, ABS: Administrative burdens on startups, XBR: Explicit barriers.

Table 3.6: Probability of a Positive Stock-flow Adjustment  
Low-Level Indicators

|                  | (1)               | (2)              | (3)                | (4)               | (5)                | (6)                | (7)               | (8)               | (9)               | (10)               | (11)              |
|------------------|-------------------|------------------|--------------------|-------------------|--------------------|--------------------|-------------------|-------------------|-------------------|--------------------|-------------------|
| SCP              | -0.7**<br>(-2.18) | 1.7<br>(1.37)    |                    |                   |                    |                    |                   |                   |                   |                    |                   |
| SCP <sup>2</sup> |                   | -0.3*<br>(-1.81) |                    |                   |                    |                    |                   |                   |                   |                    |                   |
| DCB              |                   |                  | -0.7***<br>(-2.63) |                   |                    |                    |                   |                   |                   |                    |                   |
| PCT              |                   |                  |                    | -1.2**<br>(-2.24) |                    |                    |                   |                   |                   |                    |                   |
| CSR              |                   |                  |                    |                   | -2.3***<br>(-2.61) | -7.2***<br>(-2.58) |                   |                   |                   |                    |                   |
| CSR <sup>2</sup> |                   |                  |                    |                   |                    | 2.2**<br>(2.22)    |                   |                   |                   |                    |                   |
| ABC              |                   |                  |                    |                   |                    |                    | -1.2**<br>(-2.38) |                   |                   |                    |                   |
| SSA              |                   |                  |                    |                   |                    |                    |                   | -0.9**<br>(-2.12) |                   |                    |                   |
| LBR              |                   |                  |                    |                   |                    |                    |                   |                   | -1.4**<br>(-1.96) |                    |                   |
| FDI              |                   |                  |                    |                   |                    |                    |                   |                   |                   | -1.3***<br>(-2.93) |                   |
| DSC              |                   |                  |                    |                   |                    |                    |                   |                   |                   |                    | -1.2**<br>(-2.52) |
| Constant         | 2.8**<br>(2.48)   | -0.8<br>(-0.40)  | 2.9***<br>(2.86)   | 2.0**<br>(2.34)   | 1.9***<br>(2.71)   | 3.6***<br>(2.70)   | 3.1***<br>(2.66)  | 2.0**<br>(2.43)   | 2.6**<br>(2.17)   | 2.4***<br>(3.25)   | 1.3***<br>(3.13)  |
| Observations     | 54                | 54               | 54                 | 54                | 54                 | 54                 | 54                | 54                | 54                | 54                 | 54                |

*t* statistics in parentheses

\* *p* < 0.10, \*\* *p* < 0.05, \*\*\* *p* < 0.01

**Note:** The dependent variable is a binary variable that assumes value 1 if the sum of stock-flow adjustments during the previous period was positive and zero otherwise. The independent variables correspond to SCP: Scope of public enterprise sector, DCB: Direct control over business enterprise, PCT: Price controls, CCR: Use of command & control regulation, ABC: Administrative burdens for corporation, SSA: Sector specific administrative burdens, LBR: Legal barriers, FDI: Barriers to FDI, DSC: Discriminatory procedures.



Linear Regressions

Table 3.7: Summary and Medium-Level Indicators

|                 | Stock-flow Adjustments |                    |                    |                   | Net Assets         |                    |                    |                    |
|-----------------|------------------------|--------------------|--------------------|-------------------|--------------------|--------------------|--------------------|--------------------|
|                 | (1)                    | (2)                | (3)                | (4)               | (5)                | (6)                | (7)                | (8)                |
| PMR             | -2.1***<br>(-4.32)     |                    |                    |                   | -2.2***<br>(-4.37) |                    |                    |                    |
| STC             |                        | -1.5***<br>(-4.10) |                    |                   |                    | -1.4***<br>(-4.04) |                    |                    |
| BTE             |                        |                    | -1.9***<br>(-4.32) |                   |                    |                    | -1.6***<br>(-3.27) |                    |
| BTI             |                        |                    |                    | -1.1**<br>(-2.20) |                    |                    |                    | -2.0***<br>(-3.18) |
| Constant        | 4.8***<br>(3.63)       | 5.2***<br>(3.68)   | 4.7***<br>(3.55)   | 2.0*<br>(1.75)    | 5.4***<br>(4.69)   | 5.3***<br>(4.49)   | 4.6***<br>(3.93)   | 3.0***<br>(3.30)   |
| Observations    | 54                     | 54                 | 54                 | 54                | 59                 | 59                 | 59                 | 59                 |
| $R^2_{Overall}$ | 0.15                   | 0.16               | 0.11               | 0.07              | 0.11               | 0.10               | 0.08               | 0.04               |
| $R^2_{Within}$  | 0.33                   | 0.30               | 0.34               | 0.11              | 0.33               | 0.29               | 0.21               | 0.21               |
| $R^2_{Between}$ | 0.19                   | 0.17               | 0.16               | 0.08              | 0.08               | 0.07               | 0.09               | 0.02               |

*t* statistics in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Note:** The dependent variables are the average value of stock-flow adjustment and net assets over the period. The independent variables correspond to PMR: Product market regulation, STC: State control, BTE: Barriers to entrepreneurship, BTI: Barriers to trade and investment.

Table 3.8: Public Ownership Sub-Domain and its Components

|                 | Stock-flow Adjustments |                    |                   |                    | Net Assets         |                    |
|-----------------|------------------------|--------------------|-------------------|--------------------|--------------------|--------------------|
|                 | (1)                    | (2)                | (3)               | (4)                | (5)                | (6)                |
| POW             | -1.5***<br>(-3.61)     |                    |                   | -1.5***<br>(-3.61) |                    |                    |
| GIN             |                        | -1.7***<br>(-5.37) |                   |                    | -1.6***<br>(-5.03) |                    |
| DCB             |                        |                    | -0.7**<br>(-2.32) |                    |                    | -0.8***<br>(-2.77) |
| Constant        | 6.5***<br>(3.57)       | 7.3***<br>(4.60)   | 3.5**<br>(2.45)   | 6.7***<br>(4.22)   | 7.4***<br>(5.27)   | 4.3***<br>(3.59)   |
| Observations    | 54                     | 54                 | 54                | 59                 | 59                 | 59                 |
| $R^2_{Overall}$ | 0.06                   | 0.05               | 0.11              | 0.04               | 0.02               | 0.11               |
| $R^2_{Within}$  | 0.27                   | 0.47               | 0.10              | 0.27               | 0.46               | 0.13               |
| $R^2_{Between}$ | 0.04                   | 0.04               | 0.13              | 0.02               | 0.01               | 0.10               |

*t* statistics in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Note:** The dependent variables are the average value of stock-flow adjustment and net assets over the period. The independent variables correspond to POW: Public ownership, GIN: Government involvement in infrastructure sector. DCB: Direct control over business enterprise.

Table 3.9: Involvement in Business Operations Sub-Domain and its Components

|               | Stock-flow Adjustments |                    |                    |                    | Net Assets         |                    |
|---------------|------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
|               | (1)                    | (2)                | (3)                | (4)                | (5)                | (6)                |
| IBO           | -1.1***<br>(-3.75)     |                    |                    | -1.0***<br>(-3.62) |                    |                    |
| PCT           |                        | -0.8***<br>(-3.36) |                    |                    | -0.7***<br>(-2.77) |                    |
| CCR           |                        |                    | -0.8***<br>(-2.87) |                    |                    | -0.8***<br>(-3.41) |
| Constant      | 3.3***<br>(2.83)       | 2.3**<br>(2.08)    | 3.2***<br>(2.59)   | 3.5***<br>(3.75)   | 2.7***<br>(3.02)   | 3.7***<br>(3.77)   |
| Observations  | 54                     | 54                 | 54                 | 59                 | 59                 | 59                 |
| $R^2$ Overall | 0.18                   | 0.12               | 0.14               | 0.11               | 0.06               | 0.11               |
| $R^2$ Within  | 0.25                   | 0.23               | 0.14               | 0.24               | 0.16               | 0.22               |
| $R^2$ Between | 0.22                   | 0.16               | 0.18               | 0.07               | 0.03               | 0.07               |

*t* statistics in parentheses  
\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Note:** The dependent variables are the average value of stock-flow adjustment and net assets over the period. The independent variables correspond to IBO: Involvement in business operation, PCT: Price controls, CCR: Use of command & control regulation.

Table 3.10: Regulatory and Administrative Opacity Sub-Domain and its Components

|               | Stock-flow Adjustments |                    |                    |                    | Net Assets         |                    |
|---------------|------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
|               | (1)                    | (2)                | (3)                | (4)                | (5)                | (6)                |
| RAO           | -1.4***<br>(-5.47)     |                    |                    | -1.1***<br>(-3.54) |                    |                    |
| LPS           |                        | -0.9***<br>(-4.82) |                    |                    | -0.6***<br>(-2.97) |                    |
| CSR           |                        |                    | -1.4***<br>(-3.59) |                    |                    | -1.3***<br>(-2.92) |
| Constant      | 3.5***<br>(2.88)       | 3.5***<br>(2.76)   | 2.2**<br>(2.02)    | 3.4***<br>(3.61)   | 3.3***<br>(3.35)   | 2.6***<br>(2.99)   |
| Observations  | 54                     | 54                 | 54                 | 59                 | 59                 | 59                 |
| $R^2$ Overall | 0.04                   | 0.02               | 0.09               | 0.03               | 0.01               | 0.06               |
| $R^2$ Within  | 0.48                   | 0.43               | 0.26               | 0.26               | 0.21               | 0.17               |
| $R^2$ Between | 0.02                   | 0.00               | 0.16               | 0.02               | 0.00               | 0.07               |

*t* statistics in parentheses  
\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Note:** The dependent variables are the average value of stock-flow adjustment and net assets over the period. The independent variables correspond to RAO: Regulatory and administrative opacity, LPS: Licences and permits system, CSR: Communication and simplification of rules and procedures.

Table 3.11: Barriers to Entrepreneurship Sub-Domains and their Components

|               | Stock-flow Adjustments |         |         |         | Net Assets |         |         |         |
|---------------|------------------------|---------|---------|---------|------------|---------|---------|---------|
|               | (1)                    | (2)     | (3)     | (4)     | (5)        | (6)     | (7)     | (8)     |
| ABS           | -0.8*                  |         |         |         | -0.8**     |         |         |         |
|               | (-1.92)                |         |         |         | (-2.03)    |         |         |         |
| ABC           |                        | -0.8**  |         |         |            | -0.7*   |         |         |
|               |                        | (-2.16) |         |         |            | (-1.83) |         |         |
| BTC           |                        |         | -1.6*** |         |            |         | -1.1*   |         |
|               |                        |         | (-3.20) |         |            |         | (-1.95) |         |
| BEN           |                        |         |         | -0.6*** |            |         |         | -0.6*** |
|               |                        |         |         | (-3.39) |            |         |         | (-3.08) |
| Constant      | 2.9**                  | 3.0**   | 4.3***  | 3.0**   | 3.3***     | 3.2***  | 3.9***  | 3.3***  |
|               | (2.16)                 | (2.28)  | (2.93)  | (2.41)  | (3.06)     | (2.93)  | (2.87)  | (3.42)  |
| Observations  | 54                     | 54      | 54      | 54      | 59         | 59      | 59      | 59      |
| $R^2$ Overall | 0.08                   | 0.10    | 0.02    | 0.04    | 0.08       | 0.09    | 0.00    | 0.01    |
| $R^2$ Within  | 0.05                   | 0.08    | 0.23    | 0.25    | 0.06       | 0.04    | 0.11    | 0.22    |
| $R^2$ Between | 0.17                   | 0.16    | 0.01    | 0.06    | 0.10       | 0.11    | 0.01    | 0.00    |

*t* statistics in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Note:** The dependent variables are the average value of stock-flow adjustment and net assets over the period. The independent variables correspond to ABS: Administrative burdens on startups, ABC: Administrative burdens for corporation, BTC: Barriers to competition, BEN: Barriers to entry in network sectors.

Table 3.12: Barriers to Trade and Investments Sub-Domains and their Components

|               | Stock-flow Adjustments |         |         |         | Net Assets |         |
|---------------|------------------------|---------|---------|---------|------------|---------|
|               | (1)                    | (2)     | (3)     | (4)     | (5)        | (6)     |
| XBR           | -1.5**                 |         |         | -2.0*** |            |         |
|               | (-2.48)                |         |         | (-2.95) |            |         |
| FDI           |                        | -1.3*** |         |         | -1.2***    |         |
|               |                        | (-2.68) |         |         | (-2.93)    |         |
| OBR           |                        |         | -0.7*   |         |            | -1.2**  |
|               |                        |         | (-1.74) |         |            | (-2.43) |
| Constant      | 2.5**                  | 3.2**   | 1.6     | 3.5***  | 3.7***     | 2.3***  |
|               | (2.17)                 | (2.47)  | (1.41)  | (3.51)  | (3.52)     | (2.61)  |
| Observations  | 54                     | 54      | 54      | 59      | 59         | 59      |
| $R^2$ Overall | 0.12                   | 0.07    | 0.02    | 0.06    | 0.03       | 0.01    |
| $R^2$ Within  | 0.11                   | 0.14    | 0.08    | 0.17    | 0.19       | 0.15    |
| $R^2$ Between | 0.18                   | 0.13    | 0.01    | 0.06    | 0.02       | 0.00    |

*t* statistics in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Note:** The dependent variables are the average value of stock-flow adjustment and net assets over the period. The independent variables correspond to XBR: Explicit barriers, FDI: Barriers to FDI, OBR: Other barriers.

# State Aid

Table 3.13: Average State Aid  
High and Medium-Level Indicators

|                 | (1)             | (2)             | (3)              | (4)              | (5)            | (6)              | (7)             | (8)               |
|-----------------|-----------------|-----------------|------------------|------------------|----------------|------------------|-----------------|-------------------|
| PMR             | 0.3**<br>(2.54) |                 |                  |                  |                |                  |                 |                   |
| STC             |                 | 0.1**<br>(1.99) |                  |                  |                |                  |                 |                   |
| BTE             |                 |                 | 0.2***<br>(2.64) |                  |                |                  |                 |                   |
| BTI             |                 |                 |                  | 0.3**<br>(2.00)  |                |                  |                 |                   |
| POW             |                 |                 |                  |                  | 0.1*<br>(1.93) |                  |                 |                   |
| ABS             |                 |                 |                  |                  |                | 0.2***<br>(2.87) |                 |                   |
| XBR             |                 |                 |                  |                  |                |                  | 0.3**<br>(2.42) | -1.0**<br>(-2.01) |
| XBRsq           |                 |                 |                  |                  |                |                  |                 | 0.8***<br>(2.77)  |
| Constant        | 0.1<br>(0.57)   | 0.2<br>(0.97)   | 0.1<br>(0.78)    | 0.4***<br>(3.22) | 0.1<br>(0.40)  | 0.2<br>(1.45)    | 0.3**<br>(2.43) | 0.7***<br>(3.71)  |
| Observations    | 54              | 55              | 54               | 54               | 55             | 54               | 54              | 54                |
| $R^2_{Overall}$ | 0.09            | 0.06            | 0.11             | 0.06             | 0.07           | 0.09             | 0.11            | 0.16              |
| $R^2_{Within}$  | 0.12            | 0.08            | 0.13             | 0.08             | 0.04           | 0.19             | 0.06            | 0.25              |
| $R^2_{Between}$ | 0.10            | 0.05            | 0.12             | 0.07             | 0.12           | 0.09             | 0.18            | 0.23              |

*t* statistics in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Note:** The dependent variables are the average value of State aid granted over the period to service and industry, as a share of GDP. The independent variables correspond to PMR: Product market regulation, STC: State control, BTE: Barriers to entrepreneurship, BTI: Barriers to trade and investment, POW: Public ownership, ABS: Administrative burdens on startups, XBR: Explicit barriers.



Table 3.14: Average State Aid  
Low-Level Indicators

|               | (1)             | (2)            | (3)              | (4)             | (5)             | (6)              | (7)              | (8)                |
|---------------|-----------------|----------------|------------------|-----------------|-----------------|------------------|------------------|--------------------|
| SCP           | 0.1**<br>(2.20) |                |                  |                 |                 |                  |                  |                    |
| GIN           |                 | 0.1*<br>(1.66) |                  |                 |                 |                  |                  |                    |
| ABC           |                 |                | 0.2***<br>(3.06) |                 |                 |                  |                  |                    |
| ABP           |                 |                |                  | 0.1**<br>(2.07) |                 |                  |                  |                    |
| SSA           |                 |                |                  |                 | 0.1**<br>(2.44) |                  |                  |                    |
| BEN           |                 |                |                  |                 |                 | 0.1*<br>(1.96)   |                  |                    |
| TRF           |                 |                |                  |                 |                 |                  | 0.5***<br>(3.73) | 1.8***<br>(4.20)   |
| TRFsq         |                 |                |                  |                 |                 |                  |                  | -0.8***<br>(-3.15) |
| Constant      | 0.1<br>(0.48)   | 0.2<br>(0.87)  | 0.2<br>(1.55)    | 0.3**<br>(2.56) | 0.3**<br>(2.57) | 0.4***<br>(3.00) | 0.5***<br>(7.45) | 0.5***<br>(7.20)   |
| Observations  | 55              | 55             | 55               | 55              | 55              | 55               | 55               | 55                 |
| $R^2$ Overall | 0.12            | 0.03           | 0.12             | 0.06            | 0.09            | 0.01             | 0.24             | 0.31               |
| $R^2$ Within  | 0.01            | 0.08           | 0.17             | 0.08            | 0.11            | 0.15             | 0.15             | 0.34               |
| $R^2$ Between | 0.22            | 0.03           | 0.14             | 0.07            | 0.10            | 0.06             | 0.37             | 0.33               |

*t* statistics in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Note:** The dependent variables are the average value of State aid granted over the period to service and industry, as a share of GDP. The independent variables correspond to SCP: Scope of public enterprise sector, GIN: Government involvement in infrastructure sector, ABC: Administrative burdens for corporation, ABP: Administrative burdens for sole proprietor firms, SSA: Sector specific administrative burdens, BEN: Barriers to entry in network sectors, TRF: Tariffs.

### 3.7 Appendix

IMF Government Financial Statistics Manual (GFSM2001):

Austria, Australia, Belgium, Czech Republic, Germany, Denmark, Spain, Finland, France, Greece, Hungary, Ireland, Iceland, Italy, Japan, Luxemburg, Netherlands, Norway, Poland, Portugal, Sweden, Slovak Republic, United Kingdom

Government Financial Statistics (Eurostat):

Austria, Belgium, Czech Republic, Germany, Denmark, Spain, Finland, France, Greece, Hungary, Ireland, Iceland, Italy, Luxemburg, Netherlands, Norway, Poland, Portugal, Sweden, Slovak Republic, United Kingdom

Countries originally included in the PMR dataset:

Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Korea, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Spain, Sweden, Switzerland, Turkey, United Kingdom and United States

Table 3.15: SFA Components (Eurostat - ESA95)

| Stock-flow adjustment (SFA)                                      |                              |
|------------------------------------------------------------------|------------------------------|
| Net acquisition of financial assets                              |                              |
| of which:                                                        |                              |
|                                                                  | Currency and deposits        |
|                                                                  | Securities other than shares |
|                                                                  | Loans                        |
|                                                                  | Shares and other equities    |
|                                                                  | Other financial assets       |
| Incurrence in liabilities not in the Government debt             |                              |
| Valuation effects and other changes in volume in Government debt |                              |
| Statistical discrepancies                                        |                              |

Figure 3.1: Product Market Regulation Indicators

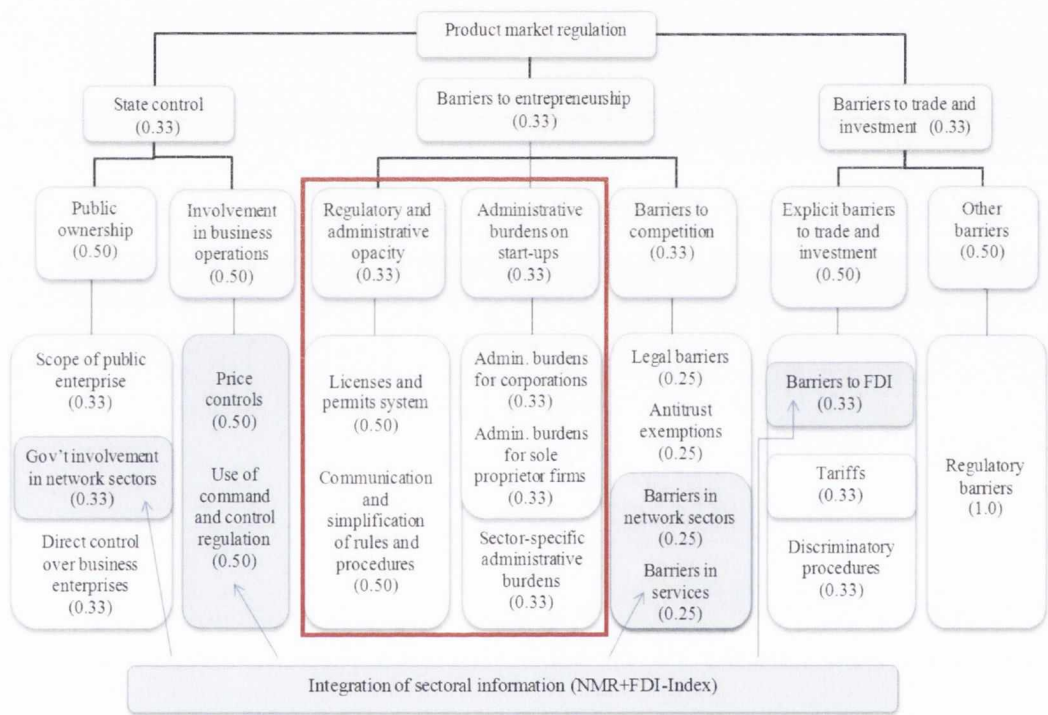


Table 3.16: Product Market Indicators Codes

| High-Level: PMR Product Market Regulation |                                           |                                                                                                                                                  |           |
|-------------------------------------------|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| Medium-Level                              | Medium-Level (Subdomain)                  |                                                                                                                                                  | Low-Level |
| STC State control                         | POW Public ownership                      | SCP Scope of public enterprise sector<br>GIN Government involvement in infrastructure sector<br>DCB Direct control over business enterprise      |           |
|                                           | IBO Involvement in business operation     | PCT Price controls<br>CCR Use of command & control regulation                                                                                    |           |
|                                           | RAO Regulatory and administrative opacity | LPS Licences and permits system<br>CSR Communication and simplification of rules and procedures                                                  |           |
| BTE Barriers to entrepreneurship          | ABS Administrative burdens on startups    | ABC Administrative burdens for corporation<br>ABP Administrative burdens for sole proprietor firms<br>SSA Sector specific administrative burdens |           |
|                                           | BTC Barriers to competition               | LBR Legal barriers<br>ATX Antitrust exemptions<br>BEN Barriers to entry in network sectors<br>BES Barriers to entry in services                  |           |
|                                           |                                           |                                                                                                                                                  |           |
| BTI Barriers to trade and investment      | XBR Explicit barriers                     | FDI Barriers to FDI<br>TRF Tariffs<br>DSC Discriminatory procedures                                                                              |           |
|                                           | OBR Other barriers                        | RBR Regulatory barriers                                                                                                                          |           |
|                                           |                                           |                                                                                                                                                  |           |

Source: OECD (2011), Product Market Regulation Database





## Chapter 4

# Fiscal Policy during Credit Booms in Europe

### 4.1 Introduction

In this chapter we present an event study of the behaviour of fiscal policy in Europe around episodes of credit boom. We find that credit booms differ from standard times in private credit growth, both in terms of government expenditure and revenues, and in terms of their components. This difference is caused by the change in the structural component of the variables and not only by their cyclical behaviour.

The literature has so far focused on political-economy variables to explain the composition and cyclicity of government spending and revenues, with a few exceptions. As for credit booms, defined as periods when private credit grew far above its trend level, they have been associated with sharp increases in real estate and asset prices, but the extent to which they might affect fiscal policy and its components has not been explored yet.

In our sample of sixteen credit booms peaking in Europe from 1990 on, the debt burden, on average, decreased in the years of the build up of the credit boom, to increase afterwards (see Figure 4.2). The reduction in the years leading to the peak is due to an increase in GDP, rather than a decrease in the stock of debt, as illustrated in Figure 4.4. The nominal stock of debt, in fact, decreased in three episodes only. We then look at the dynamics of total expenditure and total revenues, and their components, to find the origin of this increase in debt, controlling for the role of both the structural component, when the data are available.

While the literature finds that an increase in private credit is associated with an improvement in the cyclically-adjusted primary balance (Benetrix and Lane, 2011), it also finds very small movements in government consumption during credit booms (Mendoza and Terrones, 2012), or capital flow bonanzas (Reinhart and Reinhart, 2008) in industrial countries.

The contribution of this chapter is then to provide an event analysis to reconcile these results with the increase in government debt registered in the sample. In order to do this, we control for the behaviour of the different components of government expenditure and we introduce revenues in the picture.

A credit boom can influence the level of debt and the composition of government expenditure through different mechanisms. If the level of government debt is, among other things, determined by credit constraints faced by the government, then the increase in private credit might also affect the government capacity to borrow (Gavin and Perotti, 1997; Lane, 2003). On the other hand, constraints on households could also play a role in explaining not only the overall balance, but also the composition of government budget and the relative weight of different components within it. In fact, Jappelli and Pagano (1994) find that credit constraints shape the portfolio allocation of households.<sup>8</sup> The same mechanisms could then change the demand for government expenditure and its composition, and it would also change the relative composition of revenues, due to the new asset allocation decided by the household. If an increase in private credit is accompanied with a decrease in the saving rate of households, the relative weight of direct taxes on consumptions in terms of total government revenues might increase. On the expenditure side, if households invest in more illiquid assets than before, they could demand a higher level of government expenditure in investment, if it is a complement to the class of assets they are investing.

Looking at developed economies, where the government can more easily have access to the capital market to finance its expenditure (Gavin and Perotti, 1997), studies of credit booms found little cyclicity of government consumption (Elekdag and Wu, 2011; Mendoza and Terrones, 2012). We reconcile these findings with the increased debt burden found in our sample (Figure 4.4), with changes in structural revenues and structural expenditure.

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<sup>8</sup>In their analysis credit constrained households display a higher saving rate. Guiso et al. (1996), find that these same households detain less risky and more liquid assets than average.

The behaviour of the structural component could be caused by changes in demand, or it could reflect some residual cyclicity of these variables being left out of the calculations for the cyclical components because of an anomalous response of automatic stabilizers during credit booms, or because of discretionary cyclical factors. In any case, the dynamic reported in this chapter suggests that relying on the structural component of fiscal policy during credit booms could be misleading since it is itself subject to changes during times of exceptional growth of private credit.

The rest of the chapter is structured as follows: Section 4.2 describes the behaviour of fiscal policy in normal times and during booms found in the literature; Section 4.3 illustrates the data sources we use in this chapter; Section 4.4 describes the behaviour of government debt, revenues and expenditure during credit booms; Section 4.5 concludes.

## **4.2 Booms and Fiscal Variables**

The analysis of the determinants of fiscal policy has so far explored its relation with a set of political-economy variables. Although these variables offer a good explanation of the degree of cyclicity of fiscal policy in developing and industrial countries, they have rarely included direct references to the effects of credit constraints on government finances, and on the demand of the private sector for government expenditure. Studies focused on booms in asset prices or capital flow bonanzas have examined the behaviour of government consumption during such periods. In this section we briefly discuss the literature and lay the motivation for our analysis of fiscal policy during credit booms.

### **4.2.1 Fiscal Policy Determinants in Normal Times**

#### **4.2.1.1 Political Economy Determinants**

As we mentioned before, studies on the level of government spending and revenues have, so far, identified a series of political-economy variables and country characteristics as the drivers of the degree of cyclicity of fiscal policy, in industrial and developing countries. One of the main findings of these studies is the pro-cyclicity of government spending in developing nations and the a-cyclicity the same variable displays in the G7 (Talvi and Vegh, 2005).

Several studies (see Tornell and Lane 1999; Lane 2003; Alesina et al. 2008, for in-



stance), link the degree of cyclicity of fiscal spending to the government fragmentation and the proximity of an election, or to the ability of interest groups to capture part of the budget process. Other studies have attributed the cyclical behaviour of fiscal policy in developing countries to the inability of the government to raise money on the international capital markets during bad times. This inability is in itself explained by political factors. Governments, in fact, are not considered to be credible enough to have access to the capital market when they need external finance; they are hence forced spending during expansions, since they will not be able to finance themselves otherwise.

In Gavin and Perotti (1997), the authors attribute the cyclicity of fiscal policy in Latin American countries to such inability of the government to have access to the capital market. The authors corroborate this hypothesis using evidence on emergency funding required by these countries. Compared to industrial economies, in fact, Latin American countries use this type of funding more often, suggesting that they have a limited access to the market during downturns.

In Talvi and Vegh (2005), on the other hand, the government would face an increasing demand for public spending if running a budget surplus. This increasing demand for spending increases the cost for the government to adopt a counter-cyclical fiscal policy, running surpluses during good times and deficits during bad times. This leads to a pro-cyclical behaviour of fiscal policy. The government, in fact, will lower taxes during expansions in the tax base, to limit the funds available for public spending.

In this case public expenditure is determined by political factors. The increasing demand for public spending does not rise from a higher demand of infrastructure from firms, or to an increase in the demand for public sector services by households; it is a political decision driven by a political distortion. For the same reason, the lower tax revenues are not the outcome of a change in the tax base, caused by a different allocation of funds.

#### **4.2.1.2 Economic Determinants**

To explain the determinant of fiscal policy, Shelton (2007) includes both political and economic variables in his analysis of fiscal policy in developed and developing countries. In his paper he reviews the main theories explaining the size of government. Focusing on the characteristics of a country, he finds a positive relation between government expendi-

ture and trade openness, as firstly investigated in Rodrik (1998). As international trade becomes more important for the economy, the government then expands its size in order to provide insurance against external shocks, in particular against shocks to the terms of trade. Government expenditure is in this case a complement to private demand.

Another area of the literature focuses on the behaviour of fiscal policy during expansions. In fact, the relative weight of different sources of revenues might change along the cycle. If private consumption increases, revenues coming from taxes on production and imports also increase. If during the boom the country experiences an increase in the wealth of households, then revenues could be stemming from capital taxes and taxes on wealth more than during normal times, rather than on taxes on the income of households and business. As a result, if the increase in GDP is driven by an increase in a category subject to a relatively lower tax elasticity than others, this will be reflected in a lower revenues to GDP ratio than before.

A boom in asset prices, for instance, since it is skewed towards an increase in corporate profits rather than on households income, would affect revenues because of its relatively lower elasticity. On this subject Morris and Schuknecht (2007) offer an analysis of the elasticity of government revenues to increases in asset prices for a set of industrial countries. During times of increasing shares and real estate prices, taxes on business and taxes on transactions increase more than taxes on households and indirect taxes. More importantly, this study shows that such increase is not completely reflected in the officially-measured cyclical component of revenues but it also explains part of the structural component.

#### **4.2.2 Fiscal Policy During Booms**

A different branch of the literature has included the analysis of the behaviour of government consumption in the study of periods of sustained expansion in output, asset prices, or during periods of capital flows bonanzas (Morris and Schuknecht, 2007; Kaminsky et al., 2005).

In Mendoza and Terrones (2012), the authors describe, among other variables, the behaviour of government expenditure during credit booms. In this case the analysis only focuses on the deviations of real per-capita government primary expenditure relative to its trend. In doing so, they do not capture changes in the trend. Moreover, they do not include the behaviour of revenues. In Kaminsky et al. (2005), the authors use the inflation tax rate

to capture changes in revenues, since it contributes to increases in revenues. They choose to focus on inflation because of the limited availability of data on tax rates; moreover, their choice is supported by the literature on inflation as an optimal tax. Inflation creates a nominal increase in the tax base, so higher tax rates apply, if taxation is progressive. When using inflation as a measure of revenues, differentiating between different revenues sources is then important since, for instance, taxes on imports are proportional and hence will be less affected by the nominal fiscal drag than direct taxes on households, for instance.

In a study of credit booms similar to Mendoza and Terrones (2008), Elekdag and Wu (2011) identify periods of exceptional growth in private credit and control for regularities characterizing these episodes. They differentiate between episodes of credit depending whether the credit boom ended suddenly or not. From their analysis, fiscal policy appears to be pro-cyclical during episodes of credit boom in general. They also find that the largest deviations of government consumption from its structural level are a characteristic of credit booms that ended abruptly. During booms in private credit that ended smoothly, in fact, the deviation of government expenditure from its structural level is negligible, as it stays close to zero before and after the peak.

In their analysis, the overall fiscal balance as a share of GDP around the peak does not display any cyclicity, but it slightly deteriorates after the peak in private credit.

The authors also compare the dynamics of the deviation from the trends of the overall fiscal balance and real government consumption differentiating between groups of countries rather than by the type of credit boom. In this case they find that the deviations from the trend in the fiscal balance are wider for emerging than for advanced economies and they both display a pro-cyclical behaviour, increasing before the peak in private credit and decreasing after it. Real government consumption on the other hand, while starting below trend for advanced economies, and is always at its trend level or above it for emerging economies.

Since these results can not be easily reconciled with the evidence from Figure 4.2 and Figure 4.4, we introduce revenues in the analysis and we control for changes in trend of both expenditure and revenues, and their components when available.



### 4.3 The Data

To identify credit booms we rely on Mendoza and Terrones (2012). In their paper they identify a period as a credit boom if real private credit per-head in a country grew above its trend, by a certain threshold. This method allows to take into account differences in the level of financial deepening characterizing each country. We restrict our analysis to the episodes of credit boom peaking in Europe since 1990. Our sample then includes 26 countries and 16 credit booms (see Table 4.1). In Figure 4.1, we deviate from the measure of real private credit per capita used by Mendoza and Terrones (2012), because of availability of the data, and we plot private credit as share of GDP, as provided by the World Bank, together with the peak in private credit as identified by Mendoza and Terrones (2012).

Data on government finance come from Eurostat and covers the period 1990-2010. Data on cyclically-adjusted variables and on potential GDP<sup>9</sup> come from the AMECO database. For government debt, we rely on multiple sources and definitions using data from AMECO, the OECD and the IMF.

For the cyclically-adjusted variables, we also rely on the OECD Economic Outlook (May 2012). It provides data about social security contributions, and it distinguishes between direct and indirect taxes. Within the direct taxes category, it differentiates between Taxes on Business and taxes on households. Once again we express these variables in term of potential GDP.

We use the cyclically-adjusted data provided by AMECO and the OECD to capture the structural component of the different variables, instead of applying a filter, since they account for the different elasticities characterising different components of government revenues and expenditure.

Using the official calculations of the structural and cyclical component rather than relying on a trend value after filtering the data has the advantage of isolating the purely mechanical cyclical component from the structural component. Even if the structural component, calculated using the production function of the economy, still captured some discretionary cyclical factors, this feature would only add to the importance of focusing on this component during times of boom in private credit.

To be consistent with the current literature (Elekdag and Wu, 2011; Mendoza and

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<sup>9</sup>Data on potential GDP are not available for Switzerland and Norway



Terrones, 2012), we analyse the behaviour of our variables in an event window going from three years before the peak in private credit, to three years after it. Choosing this time frame rather than a longer one, we might be leaving some information out of our analysis but we also focus on the years displaying the highest growth rate in private credit.

## 4.4 A Heavier Debt Burden

The question we address in our event analysis is whether credit booms are different from other periods in terms of the behaviour of fiscal variables and what happens to these variables during credit booms.

As it has been mentioned in Section 4.2, according to the literature credit booms differ from periods when private credit grows at a standard level because of the behaviour of some macroeconomic variables. Mendoza and Terrones (2012), for instance, find that the cyclical component of private consumption increases in terms of its trends in the years leading to the peak in private credit, to decrease afterwards. Private investment displays the same pattern, and so does the output in the non-tradable sector. These regularities also emerge from other studies (Kaminsky et al., 2005; Elekdag and Wu, 2011).

In contrast to these recurring regularities characterizing private consumption and investment, the literature found little evidence of an effect of credit booms on government consumption, especially in industrial countries. An exception that has already been mentioned is Benetrix and Lane (2011), where credit growth is associated with an improvement in the cyclically-adjusted primary balance, although this study does not include observations after 2007.

To reconcile this with Figure 4.2 and Figure 4.4, we address in Table 4.2 the question whether the level and the accumulation of government debt during credit booms are different from normal times. In Europe, from 1990 on, the debt-to-GDP ratio is on average higher during credit boom periods, even if the difference is not statistically significant. The average change in the debt-to-GDP ratio, on the other hand, is significantly higher during credit booms: it goes, in fact, from 0.2% of GDP in normal times, to 2.4% of GDP. If credit booms were similar to non-boom periods in terms of the behaviour of fiscal variables, the debt-to-GDP ratio should be lower during boom periods.

Since the difference between the average debt burden, depending whether a credit

boom is taking place, is not statistically significant, but the accumulation of debt is faster during credit booms, the dynamic within credit booms must explain the results. As we have already seen in Figure 4.2, the debt-to-GDP tends to decrease in the years leading to the peak, to increase in its aftermath.

In Figure 4.2 then, we look at the behaviour of the debt-to-GDP ratio around the peak in private credit. Countries that experienced a credit boom found themselves, three years after the peak in private credit, with a higher debt-to-GDP ratio than they had three years before the peak. This increase in debt offsets the reduction experienced in the three-year period preceding the peak.

The result is not driven by movements in government financial assets: in fact, government net debt shows a similar behaviour (Figure 4.3).

At a closer look, in ten cases out of fifteen<sup>10</sup>, government debt decreased in the three years leading to the peak, to increase afterwards (these are the episodes in the fourth quadrant in Figure 4.2). Meanwhile, countries that experienced an increase in their gross debt burden in the years leading to the peak, saw an even greater increase after it. When the debt-to-GDP ratio decreased in both periods, the reduction after peak was smaller than the previous one (as illustrated by the episodes in third quadrant, above the 45° line). The Norwegian credit boom of 2007 is the only episode that does not go in the same direction: in fact a post-peak reduction in gross debt is preceded by an increase in the years before.

As we can see in Figure 4.4, the reduction in the debt burden experienced by some countries in the three years leading to the peak in private credit, was mainly due to a faster increase in GDP, rather than to a reduction in the stock of debt. Spain, Sweden and Switzerland were the only countries that experienced a reduction in debt; in eight cases, by the year of the peak in private credit, the stock of debt had increase by more than ten percent of its level three years before.

#### 4.4.1 Total Revenues and Total Expenditure

To better understand the dynamics leading to the accumulation of debt we observe, we analyse the behaviour of total revenues and total expenditure. As we did for debt, we control for a difference in the behaviour of these variables depending on whether the

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<sup>10</sup>Data on Romania are not available.

country is experiencing a credit boom, to then focus on the dynamics during credit booms.

#### 4.4.1.1 Boom versus Non-Boom

While the average values of total expenditure and total revenues in terms of GDP are lower during credit booms than else (see Table 4.2), this difference is not statistically significant. As it was for the debt-to-GDP ratio, the yearly change in revenues and expenditure is significantly different from zero, and it is higher during credit booms than otherwise. Even if revenues increase during credit booms, expenditure grows by half a point of GDP more.

This result is in line with the increase in government debt we find and it underlines the difference between the behaviour of fiscal variables during credit booms, compared to the reaction to increases in private credit during normal times, as found in Benetrix and Lane (2011).

For total revenues and total expenditure, moreover, we can use the cyclically-adjusted values provided by AMECO. We investigate the behaviour of structural revenues and expenditure in our analysis because changes in the structural can be associated with changes in the availability of credit to the private sector and the degree of financial deepening of the economy.

In fact, if households are less credit constrained than they were before, they might demand different services from the government. This hypothesis is consistent with the evidence found in Jappelli and Pagano (1994), where credit constraints affect the composition of households portfolio allocations.

If private credit is booming, an increase in government wage expenditure, meant to provide more services to the booming economy, could be considered desirable according to theories that see a complementarity between government and private expenditure Alesina et al. (1998); Shelton (2007). The same increase could be registered in the cyclical components, if higher automatic stabilizers are required to insure against external shocks as in Rodrik (1998). On the other hand, the increase in the availability of credit could make self-insuring easier compared to expansions in the GDP that are not associated with a credit boom. Individuals would then demand a lower level of insurance from fluctuations in the cycle, since consumption smoothing can now be taken over by the households through the increase of credit available; at this lower demand would correspond a larger decrease in



the cyclical expenditure than during normal times in private credit since it would not be only due to a lower unemployment rate. If this last one were the case, some components of government expenditure would be substitutes for private expenditure. Government investment might be a complement, since a higher availability of credit for households and firms could result in a higher demand for infrastructures and government investment. Changes in the policy mix could also be due to political factors, if the sectors leading the boom were strong enough to capture expenditure or a lower tax rate.

In any of these cases, the structural and the cyclical component of government expenditure would change. More importantly, they could change both in the same direction or in opposite directions.

The role of structural expenditure, that we will identify with the cyclically-adjusted value of the variable, is then central, not only as a yardstick to measure how much the cycle deviates from it, but as a variable per se. We can relate this case to what has been found for developing economies, where according to Aguiar and Gopinath (2007), during credit booms output is driven by changes in structural rather than changes in its cyclical component. Moreover, when we refer to cyclical expenditure, we include both automatic stabilizers and discretionary cyclical factors. While automatic stabilizers are captured by the official calculations of the cyclical adjustment, that use the production function and unemployment rate, together with tax elasticities, to calculate the response of fiscal variables to the cycle, the discretionary factors, as the higher demand for infrastructures mentioned before for instance, would not be included in the cyclical component.

Previous studies (Mendoza and Terrones 2012; Elekdag and Wu 2011 among others), focused their attention on the behaviour of the cyclical component of government consumption as a share of its trend, hence they do not capture a possible structural change in spending, caused by the credit boom.

In Table 4.3, we use the official calculations of the cyclically-adjusted primary expenditure and revenues to control for the behaviour of the structural and cyclical components separately. We identify the cyclical and the structural components as follows:

$$G_t = G_t^{st} + G_t^c$$

where  $G_t$  is the value of expenditure as a share of potential GDP at time  $t$ ;  $G_t^{st}$  is the



structural component and  $G_t^c$  is the cycle. This holds for revenues and for the single components of both revenues and expenditure.

We also use these values to control for the ratio of the structural component of expenditure in terms of revenues, rather than focusing on the deviations of the cyclical component from the structural as it has been done in the previous literature, for the reasons we have already illustrated. We then define the expenditure-to-revenues ratio as:

$$(G/T)_t^{st} = \frac{G_t^{st}}{T_t^{st}} * 100$$

We can see in Table 4.3 that while total revenues seem not to be affected by credit booms, the change in structural expenditure is statistically significant and such ratio is higher during credit booms than otherwise.

The average value of the structural and the cyclical components as a percentage of potential GDP do not differ across times of boom and normal times. Even if the difference in the average weight of the structural component for revenues and expenditure as a share of GDP is not statistically significant, they move in different directions. In fact, when we control if this diverging movement is statistically significant, using the expenditure-to-revenues ratio, we can see that it is higher during credit boom and the difference is statistically significant.

As a further control, we calculate the growth rate of structural revenues and expenditure, to take into account not only the average yearly change, but also the starting level of these variables. Both growth rates are significantly higher during periods of credit boom, with expenditure growing at a faster pace than revenues.

#### 4.4.1.2 Within-Boom Dynamic

In Table 4.4, we report, for each country in our sample, the expenditure-to-revenues ratio for the year of the peak in private credit and three years before and after it, using the data including the cyclical component.

On average, during the three years leading to the peak in private credit, total primary expenditure went from 97.2% of total revenues to 93.8%. In the aftermath of the peak, this ratio grew to 106.1%.

Out of 16 countries in the sample, three years before the peak (Column (1)), the

total primary expenditure was higher than revenues in six cases: by the year of the peak (Column (2)), only three countries had higher expenditure than revenues. During the three years leading to the peak, in fact, the expenditure-to-revenues ratio decreased in eleven cases. Among the exceptions, the largest increase was registered in Belgium and Ireland, where the ratio, by the year of the peak, had grown respectively by 1.5 and 4.2 percentage points, compared to its value three years before. Three years after the peak in private credit (Column (3)), expenditure was higher than revenues in eleven cases and the ratio was consistently higher than it was at the time of the peak, except for Italy.

In Table 4.5 we report the data on the officially cyclically-adjusted variables provided by Eurostat, in order to distinguish between movements in the cycle and in the structural component, as previously mentioned. In this case as well, the average expenditure-to-revenues ratio on the year of the peak was lower than three years before it, while it increased in the aftermath compared to the peak year.

As for the single episodes, in this case the sample is almost split in two: eight countries experienced an increase in the relative weight of expenditure, while six countries displayed a lower expenditure-to-revenues ratio in the year of the peak than they had three years before it. Three years after the peak (Column (3)), the ratio has increased in ten countries and decreased in four, when compared to the year of the peak.

Once we compare Table 4.4 with Table 4.5 we can see that the expenditure-to-revenues ratio including the cyclical component increased by 3.4 percentage points from three years before the peak to the year of the peak in private credit, while the structural value of this ratio increased by 0.6 percentage points. The smaller increase in the ratio in Table 4.5, compared to what we found in Table 4.4, was due to a higher value of the structural ratio both three years before and the year of the peak. Controlling for the single episodes, we can compare the value of the total ratio three years before the peak in each country (Column (1) of Tables 4.4 and 4.5), with its structural value: the structural ratio is consistently higher when the cyclical component is included, with the exception of Finland, France and Germany. When comparing the value of the ratio during the year of the peak (Column (2)), the structural ratio is always higher than when the cyclical component is included, with the exception of Romania. This result is not striking since we expect a revenue windfall during the credit boom and a lower cyclical expenditure due to a lower unemployment rate.

Nonetheless, when comparing the changes in the ratio including the cyclical component with the structural one in the years leading to the peak (Columns (1) and (2)), 15% of the decrease in expenditure-to-revenues ratio was due to changes in the structural components. Changes in the structural component were even more important in the aftermath of the peak (Columns (2) and (3)), when they amounted to 25% of the total change.

To disentangle of the total and the cyclically-adjusted dynamics of aggregate revenues from the ones of expenditure, we plot in Figure 4.5 the behaviour of these variables around the peak of the credit boom. For each variable we distinguish between the 10<sup>th</sup> percentile of the sample in Sub-plot (a), the average in Sub-plot (b), and the 90<sup>th</sup> in Sub-plot (c).

Revenues stay quite stable in the years leading to the peak, showing a small increase on average and in the 90<sup>th</sup> percentile (Sub-plots (b) and (c)), while after the peak they display a very sharp increase. This increase can not be solely attributed to a reaction of the cyclical component, since the difference in the behaviour of the total and the adjusted variable seems to be minimal. As for expenditure, the increase before peak is larger than for revenues, but the structural component is almost always below the total value of the variable. The difference between these two variables widens in the aftermath of the peak, but they still growth at a faster pace in the aftermath than in the years leading to the peak in private credit.

This result could be explained both with a change in the composition of revenues and in government consumption. We will then control for these dynamics in the next section, where we disaggregate total revenues and expenditure into their components.

#### 4.4.2 The Individual Components

Because of their different nature, some components of revenues and expenditure are more responsive to changes in the economic environment (Morris and Schuknecht, 2007). We hence disaggregate total expenditure and total revenues into their second and third level components, in order to have a better understanding of the dynamics within the government balance sheet that lead to the result we have just described.

We focus on five different components of government expenditure, because of their importance in terms of total expenditure (see Tables 4.12 and 4.13) and because of the different elasticity to credit these components might have. Total expenditure is hence divided into: Intermediate Consumption (non-wage consumption from now on); Compen-



sations of Employees (wages); Social Benefits; Gross Capital Formation (investment); and Transfers and Subsidies. These components together account for 93% of total expenditure on average. Transfers and subsidies includes different components and for its description we refer to the variable description in Table 4.14. We also rely on the OECD official calculations of cyclically-adjusted revenues components to investigate the dynamics of the structural component of taxes and social security transfers (see Table 4.7 and Tables 4.8-4.11).

#### **4.4.2.1 Boom versus Non-Boom**

In Table 4.6, we report the average boom and non-boom values for the single components as reported by Eurostat, in terms of GDP and their yearly growth rate.

Looking at the expenditure components, wage expenditure during credit booms does not differ from normal times in private credit, while intermediate consumption as a share of GDP is on average lower during credit booms than otherwise. As for transfers and subsidies, the difference is not statistically significant. Investment, on the other hand, is higher during credit booms than otherwise, and the difference is statistically significant.

As for revenues (Table 4.6), taxes on production and imports amount to a lower share of GDP during credit booms than otherwise. Among them, the result is driven by taxes on products rather than taxes on duties and imports. Revenues then seem to behave, during credit booms, as during booms in asset prices (Morris and Schuknecht, 2007).

Imputed social contributions are higher during credit booms; the difference between boom and non-boom times is statistically significant, in contrast to taxes on income. Taxes on income, in fact, amount to a higher percentage of GDP during credit boom than during normal times.

In Table 4.7 we use the official data on cyclically-adjusted revenues components available from the OECD. For sake of clarity and comparability, we include the non-adjusted values for these variables in the table, since the definitions of Eurostat and the OECD do not overlap completely and the countries included in the sample are not the same.

Indirect taxes display the same behaviour, regardless of the cyclical adjustment. They are in fact significantly lower during credit booms than otherwise. Taxes on Business on the other hand, do not differ from times of standard growth in private credit when cyclically-adjusted, but they are significantly higher during credit booms than otherwise



once the cyclical component is taken into account. This is hardly surprising, given the cyclical nature of corporate profits, but it suggests a stronger response of the cyclical component during credit booms than otherwise. Non-boom periods, in fact, include expansions and in the boom periods we have included the three years following the peak, hence this behaviour can not entirely be attributed to changes in GDP.

Taxes on households and individuals are, on the other hand, lower during credit booms than otherwise, regardless of whether the cyclical component is taken into account or not. Although they show the largest change depending whether the country is undergoing a credit boom, the difference between the cyclically-adjusted value during credit booms and the value including the cyclical component, is relatively smaller than for taxes on business. As for social security contributions, they are slightly higher during credit booms, as opposed to taxes on households, but the difference is not significant at any standard level.

To further investigate this result, we once again analyse the behaviour around the peak of the cyclically-adjusted revenues components. In this case we do not report the expenditure-to-revenues ratio, since we only have data on cyclically-adjusted revenues, but we report the data for the component including the cycle as well.

#### **4.4.2.2 Within-Boom Dynamics**

In Tables 4.8 to 4.11, we report the values of the single components at the peak of the credit boom and three years before and after it. In each table, we report the values including the cyclical component and the structural values as provided by the OECD. Variables are expressed as a share of potential GDP.

In Tables 4.8 and 4.9 we find the values for Social Security Contributions and Indirect Taxes. On average, both Social Security and Indirect Taxes were higher the year of the peak than three years before it. After the peak in the credit boom, the weight of the variables in terms of potential GDP decreased on average. When looking at the structural component of these variables (Columns (4) to (6)), we still find variation in their average value in the build up and in the aftermath of the peak: the dynamics of Social Security Contributions is inverted, they, in fact, stayed constant during the boom, to increase after the peak, while Indirect Taxes still showed an increase in the build up of the credit boom, and a decrease in the aftermath of the peak.

Looking at the single episodes, the total value of Social Security Contributions (Table 4.8), increased in eleven cases out of fifteen in the years leading to the peak (Columns (1) and (2)). The increase was considerably high in Estonia and Finland. In the aftermath (Columns (2) and (3)), there was an increase in eight cases and the size of the increase was lower, in absolute terms, than the reduction experienced in the other seven cases. Once we focus on the structural component only (Columns (4) to (6)), the difference between the year of the peak and three years before is quite small: in six cases we register an increase, and it remains sizeable for Finland only, at 1.6% of potential GDP. Sweden saw a reduction in the structural component of 1.2% of potential GDP. Three years after the peak, the structural component of Social Security Contributions was higher than it was the year of the peak in ten cases out of fifteen; once again, the only sizeable reduction took place in Sweden, where it decreased by 1.3% of potential GDP.

As for Indirect Taxes (Table 4.9), their total value was higher the year of the peak than three years before it, in twelve cases out of fifteen. In Estonia, Germany and Greece this increase exceeded 1% of potential GDP. Once we focus on the structural component, nine countries still displayed an increase in the structural component of Indirect Taxes. The structural increase exceeded 1% of potential GDP in Estonia, Greece and Italy, accounting for a larger share of the total variation than the cyclical component, in Greece and Italy. Moreover, once the cyclical component has been removed, we can see a reduction in Indirect Taxes in Slovenia by more than 1% of potential GDP, in the built up of the credit boom. In the aftermath of the credit boom, while the total values decreased in twelve countries (Columns (2) and (3)), the structural value increased in nine cases only (Columns (5) and (6)).

Social Security Contributions increased in the years leading to the peak because of changes in the cyclical component. Their structural component, in fact, stayed stable; as for Indirect Taxes, the increase they showed is partially due to changes in the structural component, as well as the cyclical. In the aftermath of the peak, while structural Indirect Taxes decreased on average, even if only by 0.1% of potential GDP, the structural component of Social Security Contributions increased by 0.5% of potential GDP, in contrast to the decreased they showed in their total value.

Direct Taxes (Tables 4.10 and 4.11), on average, are higher the year of the peak than they were three years before; three years after the peak, they are always lower than they

were when private credit per-head was at its highest level. Once the variable have been cyclically adjusted, they still display the same behaviour on average.

The total value of Taxes on Business (Columns (1) to (3) of Table 4.10), increased in the years leading to the peak in private credit in every episode, except for Estonia and Italy. In the aftermath of the peak, Taxes on Business were always lower than in the year of the peak, with the exception of Italy. Once the cyclical component has been removed, in five cases Taxes on Business were lower the year of the peak in private credit, than three years before it. As mentioned before they showed a decrease in the aftermath of the peak, with the exception of Italy and Norway. Once again, the variation in the structural component in the years leading to the peak, is an important share of the total change in many single episodes and on average.

Taxes on Households (Table 4.11), saw their total value always increased in the build up of the credit boom, with the exception of Belgium, France and Norway. Once we focus on the structural component, Estonia, Portugal, Slovenia, Sweden and Switzerland also displayed a lower weight of Taxes on Households as a share of potential GDP on peak compared to three years before. In the aftermath of the credit boom, the total value of Taxes on Households increased in France and Switzerland only, although, when looking solely at the structural component (Columns (5) and (6)), they actually grew since the year of the peak in four more cases.

The structural component of Taxes on Households, showed a less consistent behaviour among the episodes than Taxes on Business. For Taxes on Business, moreover, the movement in the structural component from three years before the peak in private credit to the year of the peak, is higher than the movement in the cyclical component, amounting to 57% of the total average change; the change in Taxes on Households in the build up of the credit boom, on the other hand, is mainly imputed to the cyclical component, since the change in the structural component, although not negligible, amount to 33% of the total. When comparing the average values registered three years after the peak to the peak, the variation in the structural component of Taxes on Business accounts for an even larger share of total variation than in the build up to the peak, reaching almost 78% of it, while it stays approximatively constant for Taxes on Households.

The bulk of the variation in Taxes on Business, then, seems to be concentrated in the structural component, as opposite to Taxes on Households, whose behaviour across



episodes is less homogeneous and seem to be driven by changes in the cyclical component.

As we did for aggregate expenditure and revenues, in Figures 4.6 and 4.7 we report the total and the cyclically-adjusted values of each variable as a share of potential GDP, around the peak in private credit, distinguishing between the top and bottom deciles and the average value.

In this case we register a very different behaviour, depending on the decile. In Figure 4.6, in fact, we can see that while for the lowest decile the structural value of Social Security Contributions and Indirect Taxes is lower than the total value, the opposite is true for the highest decile. This also holds for the lowest decile of Taxes on Business, while it only holds for Taxes on Households when looking at the highest one (Figure 4.7).

On average all the variables display an increase in the years leading to the peak of the credit boom, and a sharp decrease in the aftermath, with the exception of Taxes on Households. They, in fact, increase before and after the peak. This increase can be seen in the highest and lowest decile as well. Taxes on Households are then the only component displaying a behaviour similar to the one displayed by total revenues in Figure 4.5.

#### **4.4.3 The Information in the Structural Component**

Figure 4.2 shows that the credit booms taking place in Europe from 1990 on displayed a common pattern in terms of debt accumulation. With only one exception, countries undergoing a boom in private credit found themselves with a heavier debt burden that they had before.

From our investigation of government revenues and expenditure, we see that credit booms are different from normal times in private credit growth in terms of the behaviour of fiscal variables. Moreover, such anomalous behaviour is not limited to the cyclical component of the variables, but it is reflected in the structural values as well.

The weight of expenditure in terms of revenues increases during credit booms. This increase is not only due to a response to the cycle of the automatic stabilizers, as calculated by the official statistics provided by Eurostat and the OECD, but it is reflected in the structural component as well. The single components of these two variables, moreover, do not display a common behaviour across categories, with the structural component of Taxes on Business being more important than the cyclical component in the years leading to the peak, as well as in the aftermath. More importantly, when data on the cyclically-adjusted



revenues are available, the structural component once again captures a sizeable part of the total variation of fiscal variables in the built up of the credit boom.

## 4.5 Conclusions

This chapter analyses the behaviour of government expenditure and revenues during credit booms taking place in European countries from 1990 on. In doing so we address two main questions: whether the behaviour of the fiscal variables during credit booms is different from normal times, and whether there is a difference, during the credit boom, it is not limited to the behaviour of the cyclical component but the structural is affected as well.

We find that the behaviour of government expenditure and revenues during credit booms differs from normal times in private credit growth. Credit booms are characterised by an increase in the debt burden that can not be reconciled with the normal behaviour of fiscal policy in relation to private credit (Benetrix and Lane, 2011). Moreover, this evidence can neither be reconciled with the increased cyclicalities in expenditure during credit booms (Mendoza and Terrones, 2012; Morris and Schuknecht, 2007).

This accumulation of debt is the result of changes in revenues and expenditure. Within the single components, then, the cyclical and the structural components are both subject to changes and display a different behaviour from normal times.

While determining whether the behaviour shown by the structural component reflects an actual structural change, discretionary cyclical factors, or it is due to some residual cyclicalities in the variables captured by the structural components is beyond the scope of this analysis, but this finding is of particular importance, since it imposes a caveat on the analysis of fiscal policy during credit booms and on the reliability of the cyclical adjustment. In fact, our findings suggest that changes in the structural component of fiscal policy should be taken into account.

## 4.6 Tables

Table 4.1: Boom and Non-boom Periods  
Average Private Credit(%GDP)

| Country            | Peak | Non-boom        | Boom            |
|--------------------|------|-----------------|-----------------|
| <i>Belgium</i>     | 2007 | 75.5<br>(2.3)   | 75.4<br>(22.4)  |
| <i>Estonia</i>     | 2007 | 31.9<br>(16.9)  | 86.8<br>(16.6)  |
| <i>Finland</i>     | 1990 | 68.1<br>(14.5)  | 82.6<br>(7.5)   |
| <i>France</i>      | 1990 | 93.0<br>(11.0)  | 90.3<br>(5.0)   |
| <i>Germany</i>     | 2000 | 103.0<br>(8.8)  | 116.5<br>(2.9)  |
| <i>Greece</i>      | 2007 | 39.3<br>(13.0)  | 91.0<br>(14.5)  |
| <i>Ireland</i>     | 2007 | 76.7<br>(27.9)  | 191.7<br>(36.2) |
| <i>Italy</i>       | 1992 | 83.9<br>(20.2)  | 57.0<br>(2.8)   |
| <i>Norway</i>      | 2007 | 63.6<br>(8.1)   | 76.8<br>(10.0)  |
| <i>Poland</i>      | 2008 | 22.7<br>(4.1)   | 43.2<br>(10.8)  |
| <i>Portugal</i>    | 2000 | 109.9<br>(57.5) | 115.3<br>(23.8) |
| <i>Romania</i>     | 1998 | 28.8<br>(15.0)  | 9.2<br>(1.9)    |
| <i>Slovenia</i>    | 2007 | 30.6<br>(6.7)   | 74.5<br>(18.2)  |
| <i>Spain</i>       | 2007 | 85.9<br>(13.4)  | 178.7<br>(33.9) |
| <i>Sweden</i>      | 2007 | 94.5<br>(17.9)  | 122.2<br>(12.5) |
| <i>Switzerland</i> | 2007 | 159.9<br>(4.4)  | 166.1<br>(6.5)  |

**Note:** Standard Deviations in parenthesis. The table reports the average value of private credit by deposit money banks as a share of GDP. *Source:* World Bank Financial Structure Database (Nov.2010)

Table 4.2: Debt and Total Primary Expenditure and Revenues (% GDP)  
Boom and Non-Boom Periods

|                      | Non-Boom | Boom  | Difference |
|----------------------|----------|-------|------------|
| Debt                 | 53.4%    | 54.1% | 0.7%       |
| $\Delta$ Debt        | 0.2%     | 2.4%  | 2.2%***    |
| Expenditure          | 43.0%    | 42.0% | -1.0%      |
| $\Delta$ Expenditure | -0.0%    | 0.8%  | 0.8%***    |
| Revenue              | 43.7%    | 43.0% | -0.7%      |
| $\Delta$ Revenue     | -0.1%    | 0.2%  | 0.3%*      |

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Note:** With boom periods we identify a seven-year window centred around the peak in private credit, as identified in Mendoza and Terrones (2012). Column (1) contains average value of the variable during credit booms, column (2) during normal times. In column (3) we report the difference between column (2) and column (1) and the significance level of a two tailed t-test. We accounted for the different standard deviation of the two sub-samples, when needed. Source: AMECO Database

Table 4.3: Cyclically-Adjusted Expenditure and Revenues (% Potential GDP)  
Boom and Non-Boom Periods

|                                         | Non-Boom | Boom  | Difference |
|-----------------------------------------|----------|-------|------------|
| Cyclical Expenditure                    | 0.004    | -0.01 | -0.02      |
| Structural Primary Expenditure          | 42.9     | 43.0  | 0.1        |
| $\Delta$ Structural Primary Expenditure | -0.0     | 0.8   | 0.9***     |
| Cyclical Revenue                        | 0.0      | 0.1   | 0.1        |
| Structural Revenue                      | 43.5     | 42.6  | -0.8       |
| $\Delta$ Structural Revenue             | 0.1      | 0.4   | 0.3        |
| Structural Ratio (G/T)%                 | 99.4     | 101.3 | 1.9**      |
| Growth Rate of Structural Expenditure   | 0.5      | 2.1   | 1.6**      |
| Growth Rate of Structural Revenues      | -0.0     | 1.2   | 1.2**      |

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Note:** Boom periods are defined as the year of the peak of the credit boom as identified in Mendoza and Terrones (2012) and the three-year periods before and after the peak. Column (1) contains average value of the variable during credit booms, column (2) during normal times. In column (3) we report the difference between column (1) and column (2) and the significance level of a two tailed t-test. We accounted for the different standard deviation of the two sub-samples, when needed. The cyclical adjustment has been calculated by Eurostat. Source: AMECO Database

Table 4.4: Total Primary Expenditure as a Share of Revenues (%)

| Country     | Year | $G/T\%$        |             |                |
|-------------|------|----------------|-------------|----------------|
|             |      | (1)<br>$t - 3$ | (2)<br>Peak | (3)<br>$t + 3$ |
| Belgium     | 2007 | 91.0           | 92.5        | 101.2          |
| Estonia     | 2007 | 94.9           | 92.9        | 99.0           |
| Finland     | 1990 | 93.4           | 87.3        | 106.9          |
| France      | 1990 | 99.2           | 99.6        | 106.8          |
| Germany     | 2000 | 98.5           | 90.7        | 102.7          |
| Greece      | 2007 | 106.6          | 104.9       | 112.4          |
| Ireland     | 2007 | 92.8           | 97.0        | 119.7          |
| Italy       | 1992 | 105.6          | 95.7        | 90.8           |
| Norway      | 2007 | 77.8           | 67.7        | 77.9           |
| Poland      | 2008 | 103.0          | 103.8       | 106.9          |
| Portugal    | 2000 | 99.2           | 100.0       | 101.0          |
| Romania     | 1998 | 101.2          | 97.8        | 100.3          |
| Slovenia    | 2007 | 101.1          | 97.2        | 109.5          |
| Spain       | 2007 | 95.1           | 91.5        | 120.4          |
| Sweden      | 2007 | 96.0           | 90.3        | 97.9           |
| Switzerland | 2007 | 100.6          | 91.5        | 95.7           |
| Total       |      | 97.2           | 93.8        | 106.1          |

Source: Eurostat

**Note:** The table illustrates the behaviour of total expenditure as a share of total revenues around the peak in private credit for each episode.

Table 4.5: Primary Expenditure as a Share of Revenues (%) - Cyclically-Adjusted

| Country  | Year | $G/T\%$        |             |                |
|----------|------|----------------|-------------|----------------|
|          |      | (1)<br>$t - 3$ | (2)<br>Peak | (3)<br>$t + 3$ |
| Belgium  | 2007 | 91.8           | 95.1        | 99.8           |
| Estonia  | 2007 | 99.4           | 104.0       | 93.5           |
| Finland  | 1990 | 93.2           | 91.5        | 100.7          |
| France   | 1990 | 97.9           | 101.8       | 104.4          |
| Germany  | 2000 | 98.0           | 92.1        | 100.6          |
| Greece   | 2007 | 107.5          | 108.8       | 107.5          |
| Ireland  | 2007 | 93.2           | 101.1       | 113.3          |
| Italy    | 1992 | 108.8          | 96.0        | 91.1           |
| Poland   | 2008 | 103.0          | 106.1       | 106.6          |
| Portugal | 2000 | 99.4           | 103.8       | 99.9           |
| Romania  | 1998 | 107.6          | 93.0        | 95.7           |
| Slovenia | 2007 | 101.9          | 104.7       | 104.9          |
| Spain    | 2007 | 96.1           | 93.4        | 113.3          |
| Sweden   | 2007 | 97.0           | 93.9        | 96.3           |
| Total    |      | 99.6           | 99.0        | 102.0          |

Source: AMECO Database

**Note:** The table reports the value of the official structural component of total expenditure as a share of total revenues the peak in private credit for each episode. The structural components are calculated by Eurostat. Data are not available for Switzerland and Norway.



Table 4.6: Revenue Components  
Boom and Non-Boom Periods

| Variable                                       | Non-Boom | Boom | Difference |
|------------------------------------------------|----------|------|------------|
| Expenditure Components as a Percentage of GDP  |          |      |            |
| Compensation of Employees                      | 11.3     | 11.4 | 0.1        |
| Intermediate Consumption                       | 6.7      | 5.9  | -0.8***    |
| Gross Fixed Capital Formation                  | 3.0      | 3.4  | 0.4***     |
| Subsidies and Transfers                        | 5.8      | 5.5  | -0.3       |
| Revenue Components as a Percentage of GDP      |          |      |            |
| Taxes on production and imports                | 13.3     | 12.5 | -0.8***    |
| Current taxes on income, wealth, etc.          | 12.2     | 12.6 | 0.4        |
| Taxes on income                                | 11.6     | 12.0 | 0.4        |
| Other current taxes                            | 0.6      | 0.6  | 0.0        |
| Taxes on products                              | 11.9     | 11.2 | -0.7***    |
| Value added type taxes (VAT)                   | 7.2      | 6.8  | -0.4***    |
| Taxes and duties on imports excluding VAT      | 0.7      | 0.7  | 0.0        |
| Taxes on products, except VAT and import taxes | 4.1      | 3.7  | -0.4**     |
| Actual social contributions                    | 11.5     | 11.4 | -0.1       |
| Imputed social contributions                   | 0.8      | 1.0  | 0.2***     |
| Employers' actual social contributions         | 7.0      | 7.0  | 0.0        |
| Employees' social contributions                | 3.5      | 3.3  | -0.2       |
| Social contributions by self- and non-employed | 1.1      | 1.1  | 0.0        |

**Note:** Boom periods are defined as the year of the peak of the credit boom as identified in Mendoza and Terrones (2012) and the three-year periods before and after the peak. Column (1) contains average value of the variable during credit booms, column (2) during normal times. In column (3) we report the difference between column (1) and column (2) and the significance level of a two tailed t-test. We accounted for the different standard deviation of the two sub-samples, when needed. Source: Eurostat

Table 4.7: Boom vs Non-Boom Periods, Cyclically-Adjusted Values  
Percentage of Potential GDP

|                                   | Non-boom | Boom | Difference |
|-----------------------------------|----------|------|------------|
| <i>Social Security</i>            | 12.4     | 12.6 | 0.2        |
| <i>Indirect Taxes</i>             | 13.3     | 12.7 | -0.6**     |
| <i>Taxes on Business</i>          | 2.8      | 2.7  | -0.1       |
| <i>Taxes on Households</i>        | 11.5     | 9.1  | -2.3***    |
| Non-cyclically adjusted variables |          |      |            |
| Social Security                   | 12.4     | 12.7 | 0.3        |
| Indirect Taxes                    | 13.4     | 12.8 | -0.5*      |
| Taxes on Business                 | 2.9      | 3.4  | 0.5*       |
| Taxes on Households               | 11.9     | 9.5  | -2.3***    |

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Note:** *Social Security* is social security contribution received by general government; *Indirect Taxes* are taxes on imports and production; while *Taxes on Business* and *Taxes on Households* include direct taxes from these units. Source: OECD Economic Outlook N.91

Table 4.8: Social Security Contributions

| Country     | Peak<br>Year | Total<br>Value |      |         | Structural<br>Component |      |         |
|-------------|--------------|----------------|------|---------|-------------------------|------|---------|
|             |              | (1)            | (2)  | (3)     | (4)                     | (5)  | (6)     |
|             |              | $t - 3$        | Peak | $t + 3$ | $t - 3$                 | Peak | $t + 3$ |
| Belgium     | 2007         | 16.1           | 16.2 | 16.4    | 16.1                    | 15.8 | 16.5    |
| Estonia     | 2007         | 10.5           | 12.0 | 12.2    | 10.4                    | 10.8 | 13.2    |
| Finland     | 1990         | 11.4           | 13.3 | 13.7    | 11.3                    | 12.9 | 14.4    |
| France      | 1990         | 19.8           | 20.4 | 20.1    | 20.1                    | 20.1 | 20.5    |
| Germany     | 2000         | 19.3           | 18.9 | 18.2    | 19.4                    | 18.7 | 18.4    |
| Greece      | 2007         | 13.7           | 13.9 | 12.9    | 13.5                    | 13.1 | 13.1    |
| Ireland     | 2007         | 6.3            | 6.9  | 6.8     | 6.0                     | 6.3  | 7.3     |
| Italy       | 1992         | 13.6           | 14.5 | 14.2    | 13.5                    | 14.6 | 14.2    |
| Norway      | 2007         | 9.2            | 9.4  | 9.5     | 9.4                     | 9.0  | 9.6     |
| Poland      | 2008         | 12.1           | 11.5 | 11.6    | 12.3                    | 11.4 | 11.5    |
| Portugal    | 2000         | 10.3           | 11.1 | 11.6    | 10.2                    | 10.6 | 11.6    |
| Slovenia    | 2007         | 14.4           | 15.0 | 15.3    | 14.4                    | 13.9 | 15.5    |
| Spain       | 2007         | 13.0           | 13.3 | 12.6    | 13.0                    | 13.1 | 13.1    |
| Sweden      | 2007         | 11.2           | 10.3 | 8.5     | 11.2                    | 10.0 | 8.7     |
| Switzerland | 2007         | 6.9            | 6.9  | 7.0     | 7.0                     | 6.8  | 7.0     |
| Total       |              | 12.5           | 12.9 | 12.7    | 12.5                    | 12.5 | 13.0    |

**Note:** *Social Security Contributions* is social security contribution received by general government. Source: OECD Economic Outlook N.91  
Data on Romania are not available since it is not an OECD economy.

Table 4.9: Indirect Taxes

| Country     | Peak<br>Year | Total<br>Value |      |         | Structural<br>Component |      |         |
|-------------|--------------|----------------|------|---------|-------------------------|------|---------|
|             |              | (1)            | (2)  | (3)     | (4)                     | (5)  | (6)     |
|             |              | $t - 3$        | Peak | $t + 3$ | $t - 3$                 | Peak | $t + 3$ |
| Belgium     | 2007         | 12.9           | 13.1 | 12.7    | 12.9                    | 12.7 | 12.8    |
| Estonia     | 2007         | 12.1           | 14.9 | 12.8    | 12.1                    | 13.1 | 13.9    |
| Finland     | 1990         | 14.9           | 15.7 | 13.3    | 14.8                    | 15.0 | 14.5    |
| France      | 1990         | 14.9           | 14.7 | 14.2    | 15.2                    | 14.4 | 14.5    |
| Germany     | 2000         | 9.8            | 10.8 | 10.6    | 9.9                     | 10.6 | 10.8    |
| Greece      | 2007         | 12.0           | 13.6 | 11.8    | 11.8                    | 12.8 | 12.0    |
| Ireland     | 2007         | 13.6           | 14.5 | 10.5    | 12.9                    | 13.3 | 11.4    |
| Italy       | 1992         | 10.0           | 10.8 | 11.7    | 9.9                     | 10.9 | 11.7    |
| Norway      | 2007         | 12.5           | 13.0 | 11.9    | 12.4                    | 12.3 | 12.0    |
| Poland      | 2008         | 13.4           | 14.3 | 13.9    | 13.6                    | 14.2 | 13.8    |
| Portugal    | 2000         | 12.8           | 13.6 | 14.3    | 12.7                    | 13.0 | 14.3    |
| Slovenia    | 2007         | 15.5           | 15.6 | 14.1    | 15.6                    | 14.5 | 14.3    |
| Spain       | 2007         | 12.0           | 11.9 | 9.8     | 11.9                    | 11.6 | 10.3    |
| Sweden      | 2007         | 16.4           | 17.3 | 17.5    | 16.2                    | 16.5 | 17.9    |
| Switzerland | 2007         | 7.1            | 7.1  | 6.9     | 7.2                     | 6.9  | 6.9     |
| Total       |              | 12.7           | 13.4 | 12.4    | 12.6                    | 12.8 | 12.7    |

**Note:** *Indirect Taxes* are taxes on imports and production. Source: OECD Economic Outlook N.91  
Data on Romania are not available since it is not an OECD economy.

Table 4.10: Taxes on Business

| Country     | Peak<br>Year | Total<br>Value |      |         | Structural<br>Component |      |         |
|-------------|--------------|----------------|------|---------|-------------------------|------|---------|
|             |              | (1)            | (2)  | (3)     | (4)                     | (5)  | (6)     |
|             |              | $t - 3$        | Peak | $t + 3$ | $t - 3$                 | Peak | $t + 3$ |
| Belgium     | 2007         | 3.2            | 3.7  | 2.8     | 3.2                     | 3.6  | 2.9     |
| Estonia     | 2007         | 1.6            | 1.5  | 1.1     | 1.6                     | 1.3  | 1.2     |
| Finland     | 1990         | 1.2            | 2.1  | 0.5     | 1.2                     | 2.0  | 0.6     |
| France      | 1990         | 2.3            | 2.4  | 1.6     | 2.3                     | 2.3  | 1.6     |
| Germany     | 2000         | 2.6            | 3.1  | 1.9     | 2.6                     | 3.1  | 1.9     |
| Greece      | 2007         | n/a            | n/a  | n/a     | 3.2                     | 2.9  | 2.3     |
| Ireland     | 2007         | 4.0            | 4.1  | 2.4     | 3.7                     | 3.6  | 2.7     |
| Italy       | 1992         | 3.0            | 2.7  | 3.5     | 3.0                     | 2.7  | 3.5     |
| Norway      | 2007         | 9.7            | 11.6 | 10.0    | 2.3                     | 3.1  | 3.2     |
| Poland      | 2008         | 2.1            | 2.9  | 2.5     | 2.2                     | 2.9  | 2.5     |
| Portugal    | 2000         | 3.3            | 4.0  | 2.9     | 3.2                     | 3.8  | 2.9     |
| Slovenia    | 2007         | 1.8            | 3.4  | 1.8     | 1.8                     | 3.2  | 1.8     |
| Spain       | 2007         | 3.5            | 4.9  | 1.8     | 3.5                     | 4.8  | 1.9     |
| Sweden      | 2007         | 2.9            | 3.9  | 3.3     | 2.8                     | 3.6  | 3.4     |
| Switzerland | 2007         | 3.0            | 4.0  | 3.6     | 3.1                     | 3.9  | 3.7     |
| Total       |              | 3.2            | 3.9  | 2.8     | 2.7                     | 3.1  | 2.4     |

**Note:** *Taxes on Business* are direct taxes on business. Source: OECD Economic Outlook N.91

Data on Romania are not available since it is not an OECD economy; the dataset does not provide the data including the cyclical component for Greece.

Table 4.11: Taxes on Household

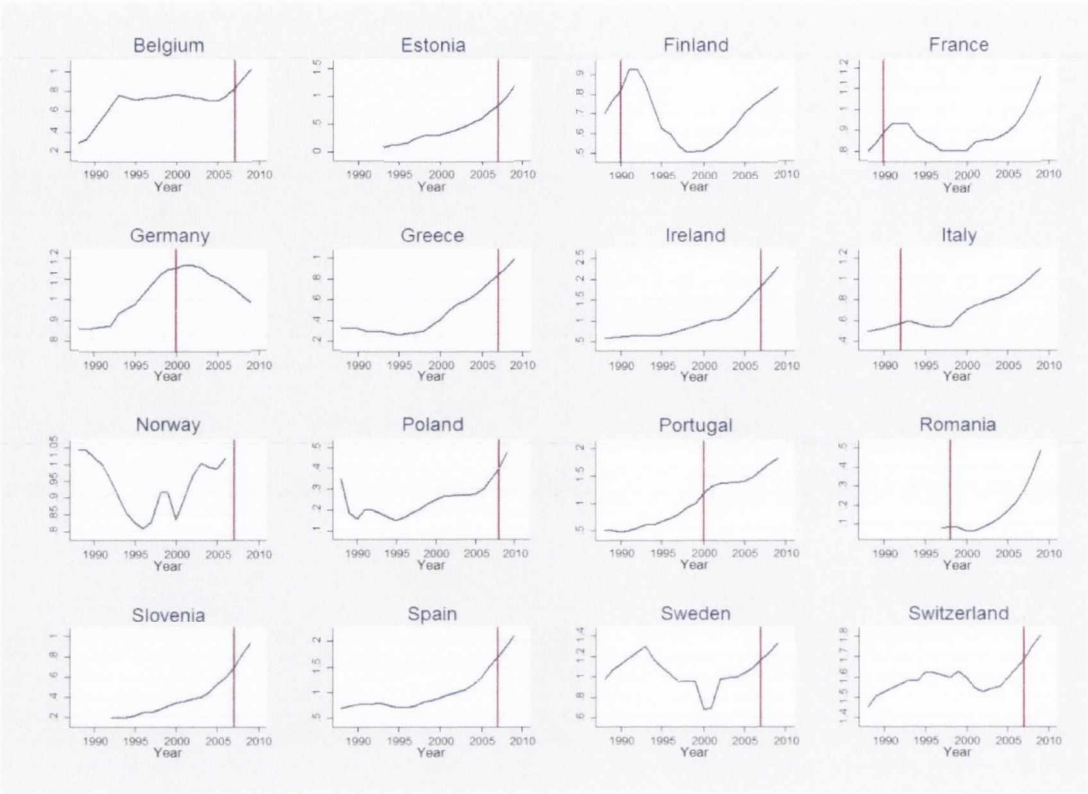
| Country     | Peak<br>Year | Total<br>Value |      |         | Structural<br>Component |      |         |
|-------------|--------------|----------------|------|---------|-------------------------|------|---------|
|             |              | (1)            | (2)  | (3)     | (4)                     | (5)  | (6)     |
|             |              | $t - 3$        | Peak | $t + 3$ | $t - 3$                 | Peak | $t + 3$ |
| Belgium     | 2007         | 13.5           | 13.0 | 12.6    | 13.4                    | 12.6 | 12.8    |
| Estonia     | 2007         | 6.4            | 6.9  | 5.1     | 6.3                     | 6.1  | 5.6     |
| Finland     | 1990         | 14.5           | 16.1 | 13.9    | 14.4                    | 15.4 | 15.0    |
| France      | 1990         | 5.6            | 5.6  | 6.2     | 5.7                     | 5.5  | 6.1     |
| Germany     | 2000         | 8.9            | 9.9  | 8.8     | 9.1                     | 9.7  | 8.9     |
| Greece      | 2007         | n/a            | n/a  | n/a     | 4.8                     | 4.9  | 5.5     |
| Ireland     | 2007         | 8.9            | 9.7  | 7.3     | 8.2                     | 8.7  | 8.1     |
| Italy       | 1992         | 10.5           | 11.4 | 10.9    | 10.5                    | 11.5 | 11.1    |
| Norway      | 2007         | 10.9           | 10.7 | 10.7    | 11.1                    | 10.4 | 10.8    |
| Poland      | 2008         | 4.8            | 5.8  | 4.6     | 4.8                     | 5.7  | 4.6     |
| Portugal    | 2000         | 5.7            | 5.9  | 5.5     | 5.6                     | 5.5  | 5.5     |
| Slovenia    | 2007         | 6.3            | 6.5  | 6.4     | 6.4                     | 6.0  | 6.4     |
| Spain       | 2007         | 6.9            | 8.4  | 7.2     | 6.8                     | 8.1  | 7.8     |
| Sweden      | 2007         | 18.1           | 18.3 | 15.5    | 18.0                    | 17.5 | 15.8    |
| Switzerland | 2007         | 11.2           | 11.5 | 11.7    | 11.4                    | 11.2 | 11.7    |
| Total       |              | 9.4            | 10.0 | 9.0     | 9.1                     | 9.3  | 9.0     |

**Note:** *Taxes on Households* are direct taxes on households. Source: OECD Economic Outlook N.91

Data on Romania are not available since it is not an OECD economy; the dataset does not provide the data including the cyclical component for Greece.

# 4.7 Figures

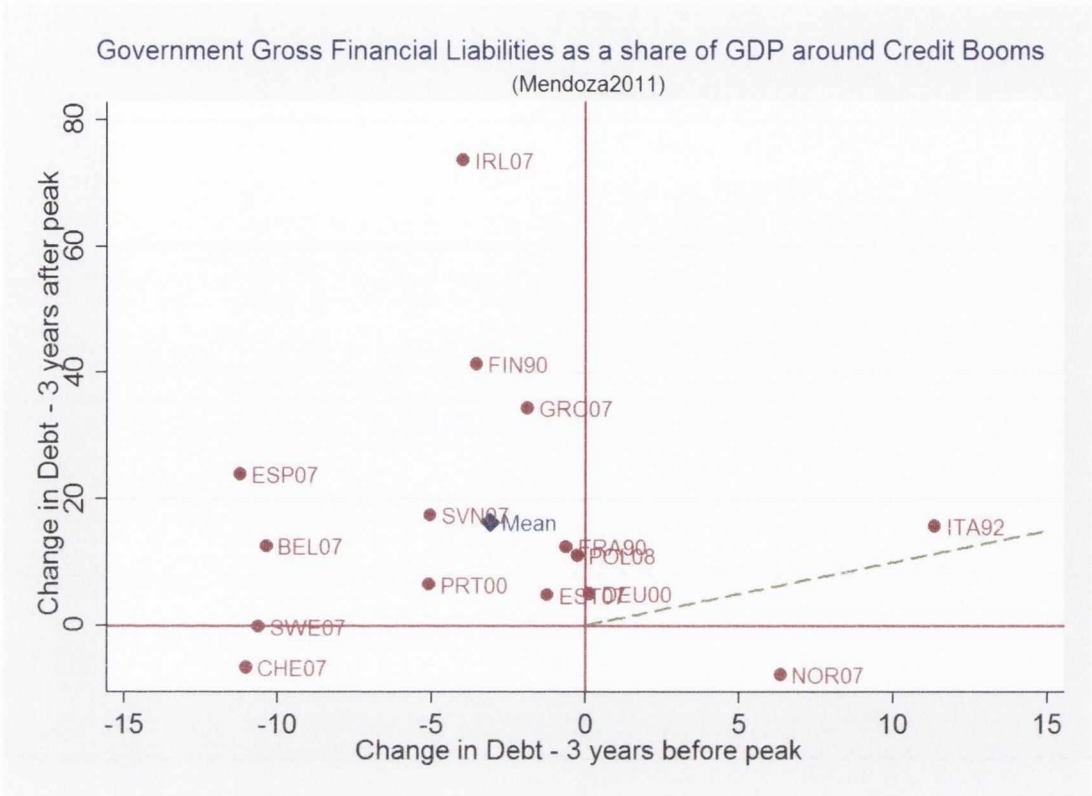
Figure 4.1: Private Credit as a Share of GDP



**Note:** The graph shows the private credit to GDP ratio for the European countries that experienced a credit boom peaking from 1990 on. The year of the peak, as identified by Mendoza and Terrones (2012), is evidenced by the vertical bar. (Source: World Bank Financial Structure dataset - Nov. 2010)

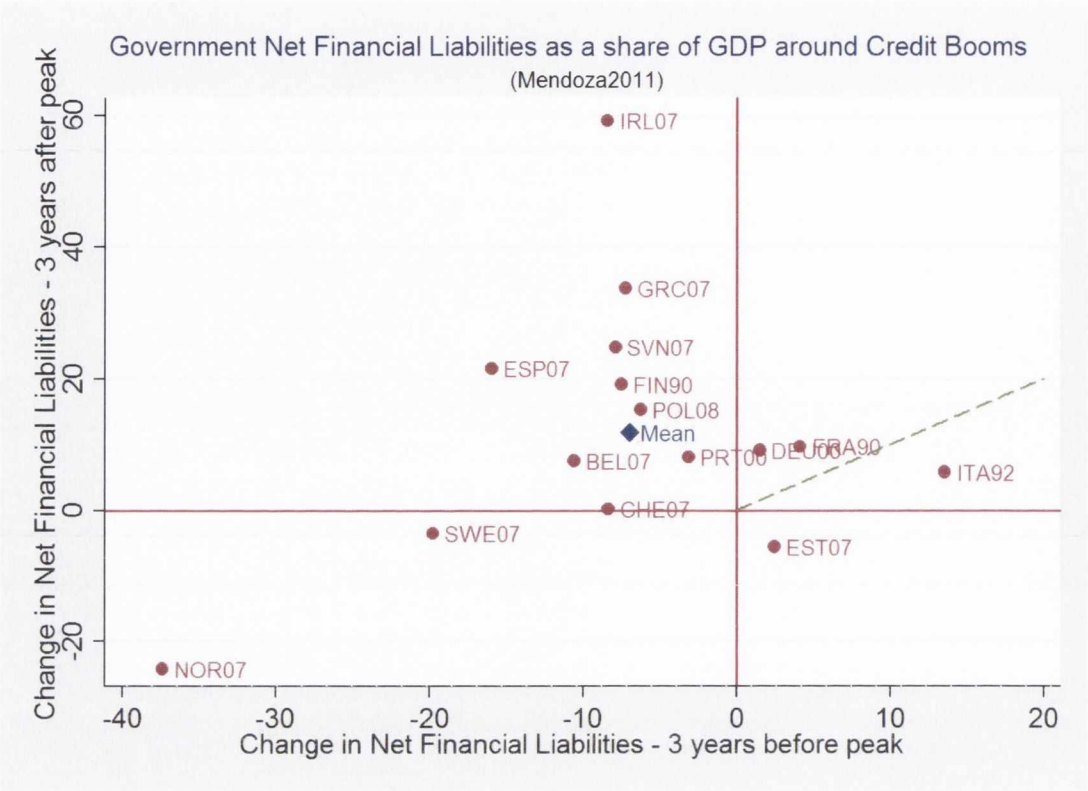


Figure 4.2: Changes in Government Debt around Episodes of Credit Boom



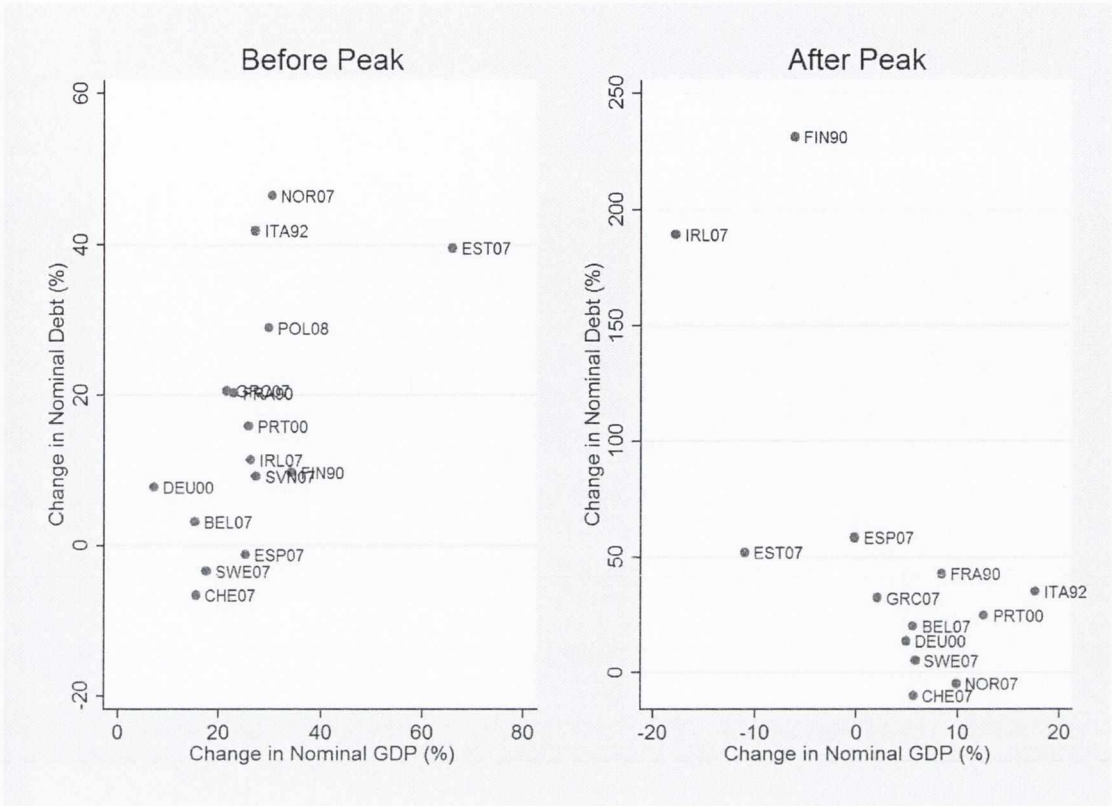
**Note:** The graph shows the evolution of government debt before and after the peak of a credit boom as defined in Mendoza and Terrones (2012). Episodes in the first quadrant describe an increase in the ratio both before and after the peak. The majority of these episodes is above the 45° line, meaning that the increase after the peak has been sharper than before. (Source: OECD Economic Outlook N.91 and IMF Historical Debt Dataset)

Figure 4.3: Changes in Government Net Debt around Episodes of Credit Boom



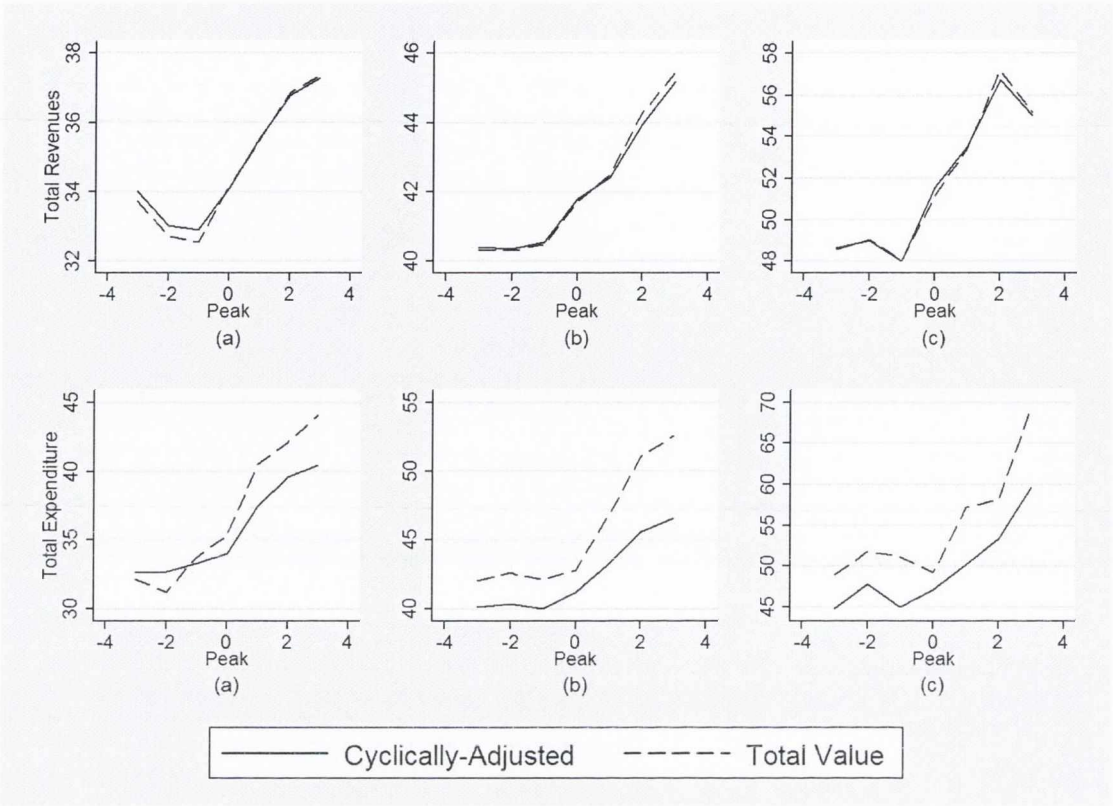
**Note:** The graph shows the evolution of government net financial liabilities (net debt from now on), before and after the peak of a credit boom as defined in Mendoza and Terrones (2012). Net debt is defined as gross debt minus gross financial assets. Episodes in the first quadrant describe an increase in the ratio both before and after the peak. The majority of these episodes is above the 45° line, meaning that the increase after the peak has been sharper than before. (Source: OECD Economic Outlook N.91)

Figure 4.4: Change in Real Debt and Real GDP



**Note:** The graph shows the percentage change in nominal government debt and nominal GDP in the three years of the build up of the credit boom and from the year of the peak to three years after it. (Source: OECD Economic Outlook N.91 and AMECO Database)

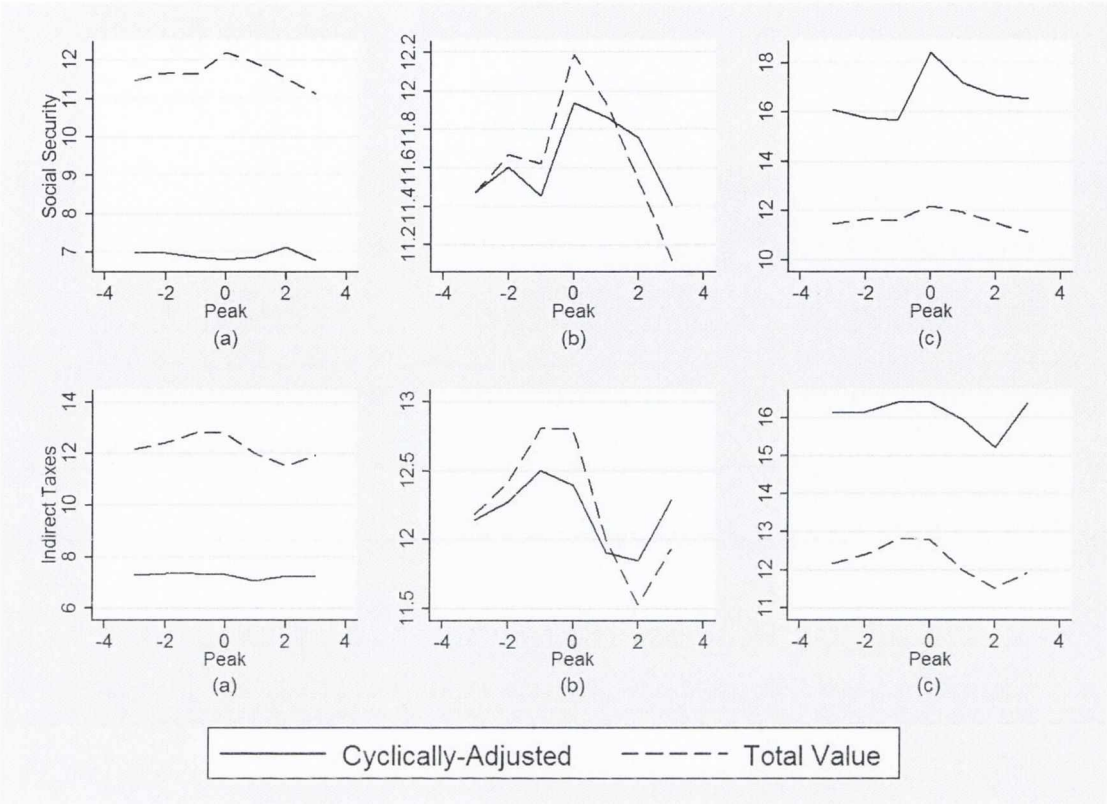
Figure 4.5: Behaviour of Total and Cyclically-Adjusted Total Revenues and Expenditure around Peak



**Note:** The graph compares the evolution of the total and the cyclically-adjusted values of government total revenues and expenditure around the peak in private credit. Sub-plot (a) describes the behaviour of episodes in the 10<sup>th</sup> percentile of the distribution, Sub-plot (b) shows the average, while Sub-plot (c) described the 90<sup>th</sup> percentile. (Source: AMECO Database)

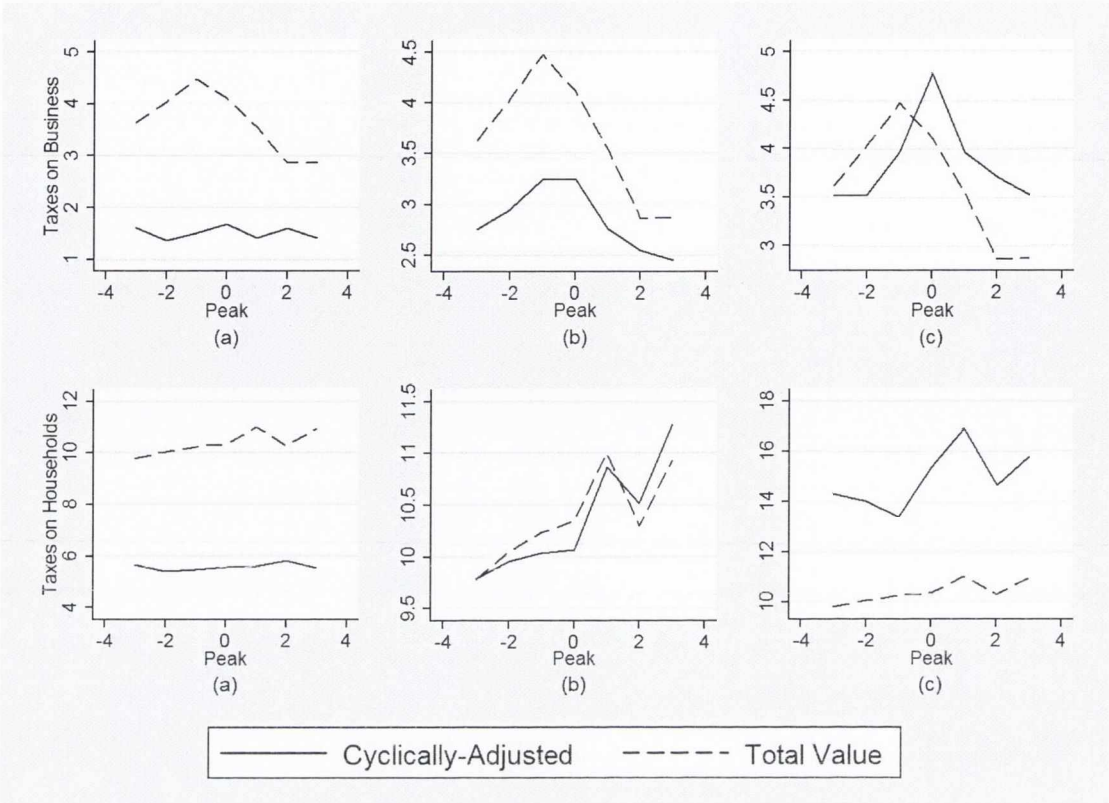


Figure 4.6: Behaviour of Total and Cyclically-Adjusted Revenues Components around Peak



**Note:** The graph compares the evolution of the total and the cyclically-adjusted values of social security contributions and indirect taxes around the peak in private credit. Sub-plot (a) describes the behaviour of episodes in the 10<sup>th</sup> percentile of the distribution, Sub-plot (b) shows the average, while Sub-plot (c) described the 90<sup>th</sup> percentile. (Source: OECD Economic Outlook)

Figure 4.7: Behaviour of Total and Cyclically-Adjusted Direct Taxes around Peak



**Note:** The graph compares the evolution of the total and the cyclically-adjusted values of direct taxes on households and direct taxes on business around the peak in private credit. Sub-plot (a) describes the behaviour of episodes in the 10<sup>th</sup> percentile of the distribution, Sub-plot (b) shows the average, while Sub-plot (c) described the 90<sup>th</sup> percentile. (Source: OECD Economic Outlook)

## 4.8 Appendix

Table 4.12: Government Expenditure and its Components

| Variable                                             | Mean | Std. Dev. | N   |
|------------------------------------------------------|------|-----------|-----|
| Total Expenditure                                    | 46.1 | 7.1       | 420 |
| Social Benefits                                      | 17.2 | 4.4       | 420 |
| Final Consumption Expenditure                        | 20.4 | 3.2       | 411 |
| Intermediate Consumption                             | 6.5  | 1.9       | 420 |
| Compensation of Employees                            | 11.3 | 2.6       | 420 |
| Gross Capital Formation                              | 3    | 1.1       | 420 |
| Gross Fixed Capital Formation                        | 3.1  | 1.1       | 345 |
| Property Income (Consolidated)                       | 3.2  | 2.3       | 420 |
| Subsidies                                            | 1.6  | 0.9       | 420 |
| Capital Transfers (Consolidated)                     | 1.4  | 1.6       | 420 |
| Other Current Transfers (Consolidated)               | 1.8  | 0.7       | 420 |
| Other taxes on production                            | 0.1  | 0.2       | 390 |
| Investment Grants                                    | 0.9  | 1.3       | 290 |
| Net acquisition of non-financial non-produced assets | -0.1 | 0.3       | 406 |

**Note:** Values are expressed as a percentage of GDP. The averages do not distinguish between periods of credit boom and normal times.

Table 4.13: Government Revenues and its Components

| Variable                                               | Mean | Std. Dev. | N   |
|--------------------------------------------------------|------|-----------|-----|
| Total receipts from taxes and social contributions     | 37.7 | 6.6       | 469 |
| Total tax receipts                                     | 25.6 | 6.4       | 469 |
| Taxes on production and imports                        | 13.1 | 2.4       | 469 |
| Taxes on products                                      | 11.7 | 2.1       | 469 |
| Value added type taxes (VAT)                           | 7.1  | 1.4       | 462 |
| Taxes and duties on imports excluding VAT              | 0.7  | 1         | 451 |
| Taxes on products, except VAT and import taxes         | 4    | 1.7       | 469 |
| Other taxes on production                              | 1.4  | 1.2       | 469 |
| Current taxes on income, wealth, etc.                  | 12.3 | 5.3       | 469 |
| Taxes on income                                        | 11.7 | 5         | 469 |
| Other current taxes                                    | 0.6  | 0.6       | 466 |
| Capital taxes                                          | 0.2  | 0.2       | 448 |
| Actual social contributions                            | 11.5 | 3.9       | 469 |
| Employers' actual social contributions                 | 7    | 2.8       | 469 |
| Employees' social contributions                        | 3.4  | 2         | 459 |
| Social contributions by self- and non-employed persons | 1.1  | 0.9       | 450 |
| Imputed social contributions                           | 0.8  | 0.8       | 432 |

**Note:** Values are expressed as a percentage of GDP. The averages do not distinguish between periods of credit boom and normal times.

Table 4.14: Variables

| Variable Name                                    | Source     | Code             |
|--------------------------------------------------|------------|------------------|
| Debt (EDP procedure)                             | AMECO      | UDGG             |
| Net Debt                                         |            |                  |
| Debt                                             | IMF        |                  |
| Total Expenditure                                | Eurostat   | TE               |
| Total Revenues                                   | Eurostat   | TR               |
| Cyclically Adjusted Total Primary Expenditure    | AMECO      | UUTGBP           |
| Cyclical Component of Total Primary Expenditure  | AMECO      | UUCGCP           |
| Cyclically Adjusted Total Revenues               | AMECO      | URTGAP           |
| Cyclical Component of Total Revenues             | AMECO      | UTCGCP           |
| Compensations of Employees                       | Eurostat   | D1               |
| Intermediate Consumption                         | Eurostat   | P2               |
| Gross Capital Formation                          | Eurostat   | P5               |
| Subsidies and Transfers                          | Eurostat   | D3+D7CO+D9CO+D92 |
| Taxes on production and imports                  | Eurostat   | D2               |
| Current taxes on income, wealth, etc.            | Eurostat   | D5               |
| Taxes on income                                  | Eurostat   | D51              |
| Other current taxes                              | Eurostat   | D59              |
| Actual social contributions                      | Eurostat   | D611             |
| Imputed social contributions                     | Eurostat   | D612             |
| Taxes on products                                | Eurostat   | D21              |
| Value added type taxes (VAT)                     | Eurostat   | D211             |
| Taxes and duties on imports excluding VAT        | Eurostat   | D212             |
| Taxes on products, except VAT and import taxes   | Eurostat   | D214             |
| Employers' actual social contributions           | Eurostat   | D6111            |
| Employees' social contributions                  | Eurostat   | D6112            |
| Social contributions by self- and non-employed   | Eurostat   | D6113            |
| Social Security Transfers Received by Government | OECD       | SSRGA            |
| Indirect Taxes                                   | OECD       | TINDA            |
| Taxes on Business                                | OECD       | TYBA             |
| Taxes on Households                              | OECD       | TYHA             |
| Deflator                                         | AMECO      |                  |
| Potential GDP                                    | OECD       | GDPTR            |
| Credit                                           | World Bank | pcrdbfgdp        |





## Chapter 5

# Conclusions

This thesis has analysed different aspects of fiscal policy. In Chapter 2 we introduced the behaviour of fiscal policy in trading partners in the study of the effects of changes in the government cyclically-adjusted primary deficit on the growth rate of the economy. An increase in the deficit of trading partners is associated with a lower domestic growth rate, especially when the change in the deficit is not large. We attribute this result to the persistence of small changes compared to abrupt shifts in the deficit. The degree of persistence, in fact, might affect the relative interest rate and the exchange rate, transmitting the shock to the trading partner. In light of this result, domestic fiscal policy and its determinants are hence important not only for the domestic economy, but for its trading partners as well.

In Chapter 3 we studied the effect of regulation on bailouts. According to our analysis there is not a unique correspondence between regulation and the probability that the government will undertake special, ad-hoc measures to rescue a firm in turmoil. In fact, the relation between bailouts and regulation depends on how bailouts are measured. Bailouts, as captured by stock-flow adjustments and net acquisition of financial assets, are more frequent in less regulated economies, while these same countries tend to grant a lower level of State aid to firms. This result can be attributed to a higher profitability of firms, when shielded from competition or, alternatively, to the more traumatic nature of a bailout, that is often associated with a change in management, making it less attractive for large, politically-connected firms than State aid. Further research should point in the direction of assessing what is the degree of substitution between the different measures of bailout adopted, once more detailed data will be available.

In Chapter 4, we explored the behaviour of fiscal policy during episodes of credit boom

taking place in Europe from 1990 on. We found that during episodes of abnormal expansion in private credit, not only the degree of cyclicity of revenues and expenditure is affected, but their structural component displays a characteristic behaviour that distinguishes it from normal times. Part of the change in total expenditure and revenues, and in their components, is not captured by the official cyclical adjustment but is displayed in the structural component as well. Whether this evidence is caused by a failure of the cyclical adjustment to capture the dynamics that take place during exceptional times in private credit, or it is due to an actual change in the structural component, once again associated with the rapid increase in credit, the results suggest that credit booms are different from normal times and the structural component of fiscal revenues and expenditure should be taken into account, especially while setting policies.





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