Empirical Essays in International Macroeconomics

by

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Declaration

I declare that this dissertation has not been submitted as an exercise for a degree at this or any other University and that it is entirely my own work.

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Agustín S. Bénétrix

To Coco, Susana and my wife, Solange.

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Summary

This thesis is composed of three essays. The first one examines cases in which there is a large shift in a country's net foreign asset position due to the re-valuation of its foreign assets and/or foreign liabilities. It highlights the differences in large valuation shocks between countries characterized by large gross stocks of foreign assets and foreign liabilities and countries exhibiting large net external positions. Finally, it analyzes the macroeconomic dynamics in the neighborhood of large valuation episodes. We find that developing countries and emerging markets had negative valuation episodes as a result of their large and negative net foreign asset position. By contrast, gross stocks of foreign assets and liabilities play a crucial role in large valuation episodes occurring in advanced economies.

The second essay studies the dynamic effect of positive shocks in different types of government spending on the real exchange rate of the European Monetary Union (EMU) countries. To this end, we estimate a panel-vector autoregression and find that these shocks appreciate the real exchange rate. The magnitude and persistence of the exchange rate response vary across different types of government spending. A shock in government investment produces the largest and most persistent appreciation while a shock in total consumption produces the largest impact and the least persistent exchange rate response. Within government consumption, government wages play the most important role. Furthermore, we also compare these results to those generated by the set of countries used in the studies of Perotti finding contrasting evidence: shocks in government expenditure and government consumption depreciate the real exchange rate.

Finally, the last essay studies the dynamic response of real wages to positive shocks in five different types of government spending using annual data in a panel formed by EMU countries. In line with the empirical evidence for other countries, we find that shocks in some types of government spending have Neo-Keynesian implications since they increase real wages. Shocks producing this effect are in government investment, government consumption, these two types of government spending taken together and non-wage government consumption. In contrast, shocks in the number of public employees (i.e. wage government consumption deflated with government nominal wages) produce negative real wage responses. We also analyze the effects of spending shocks in a panel formed by the four countries used in the studies of Perotti. Our findings are that shocks in government absorption and consumption increase real GDP-deflated wages but decrease real CPI-deflated wages. In contrast, shocks in government investment do not affect real wages.

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Chapter 1

Introduction

This thesis addresses two important issues in international macroeconomics namely, (i) the impact of the growth in gross international claims on macroeconomic dynamics and (ii) the short-run effects of government spending on wages and competitiveness.

The analysis of changes in the value of a nation's foreign asset and liability positions has become an issue of major concern because of the large increase in gross stocks of foreign assets and liabilities that has been experienced by many countries in the last eighteen years

This increase, documented by Lane and Milesi-Ferretti (2001), has been so great that even tiny changes in the rates of capital gain of foreign assets and liabilities may generate large net financial wealth redistributions. For instance, a positive shock in the stock market of a country can produce large capital gains in other countries with claims in that particular market. This increase in the value of the assets of the latter countries may lead to changes in the economic decisions of the agents that will then affect the country fundamentals or its external variables. For instance, Gourinchas and Rey (2007a) suggest that the persistent current account deficit of the United States may be possible because it is partially financed by positive net capital gains. That is, this country exhibits larger capital gains in its foreign assets relative to the capital gains of other countries in its foreign liabilities.

Abrupt changes in foreign assets and liability positions can be the result of large swings in capital flows or the result of changes in the value of foreign assets and liabilities. The latter is called the valuation channel. However, the existing literature studying these abrupt changes concentrates on large swings in capital flows only, i.e. current account reversals and sudden stops.

Chapter 2 contributes to the existing literature by filling this gap. More precisely, we identify abrupt changes in the value of foreign assets and liabilities and show how the dynamics of these valuations are associated to the related macroeconomic and asset price variables.

To this end, we use a recently developed database by Lane and Milesi-Ferretti (2001, 2007a) to study how the upsurge in gross international financial integration has contributed to abrupt adjustments via the valuation channel. We conduct an event study where a large valuation shock is defined as the year in which the valuation channel goes beyond a threshold. Then, we calculate the relative role of sizeable net external positions and gross stocks in each of these points in time. Finally, we study the dynamics of the valuation channel and main related macroeconomic and asset price variables in the neighbourhood of two different types of large valuation episodes.

We find that developing countries and emerging markets had negative valuation episodes as a result of their large and negative net foreign asset position. By contrast, gross stocks of foreign assets and liabilities play a crucial role in large valuation episodes occurring in advanced economies.

The second important issue addressed in this thesis is the effect of government fiscal policy in the countries of the European Monetary Union (EMU).

Until early 1980s, fiscal policy was thought to be a useful tool to stabilize the business cycle. At that time, governments relied on active monetary and fiscal policy in response to oil shocks. However, active fiscal policies generated important increases in fiscal deficits and public debt. Moreover, they did not prevent unemployment from rising. This made economists to become sceptical about the usefulness of the fiscal policy to stabilize the business cycle. In contrast to the case of the monetary policy, there is no substantial consensus on the effects of fiscal policies. This lack of agreement does not regard magnitude of some variable responses alone. It also involves the direction in which these variables respond to fiscal shocks.

The second part of this thesis, formed by Chapter 3 and 4, studies the effect of government spending shocks on the real exchange rate and on the real wage of the EMU countries, respectively.

Chapter 3 is further motivated by the importance of understanding how decentralized fiscal policy affects the relative growth and competitiveness between the countries of the EMU. This is an important issue, especially if we believe that decentralized fiscal policies can generate price differentials that may affect the stability of the monetary union.

In this spirit, this chapter contributes to the existing literature by studying the short-run effects of government spending deviations between the EMU countries on their real exchange rate.

A further contribution of this chapter is that it analyses these effects by estimating a panel-vector autoregression. With it, we assess how different types of government spending and different types of shocks affect the real exchange rate in the short run. This is not a simple task, in particular if we take into account that the effects produced by government spending shocks in consumption, real wages and real exchange rate differ between theoretical paradigms and empirical approaches.

Theoretically, neoclassical models predict that government spending shocks produce no change or depreciation of the real exchange rate while Neo-Keynesian models predict that the real exchange rate appreciates. Empirically, we find that the effects of these shocks depend on the analyzed country sample. For instance, papers studying Australia, Canada, United Kingdom and United States find that positive shocks in government consumption depreciate the real exchange rate while studies using countries of the European Union or European Monetary Union find the opposite. For the latter group, this chapter finds that the real appreciation is maximized when the shock occurs in government investment. Moreover, the largest impact real exchange rate response is produced by shocks in government consumption.

Chapter 4 presents a similar assessment but focusing on a labour market variable. We study the dynamic short-run effects of government spending shocks on the whole-economy real wage of the EMU countries. This is an important research question because it helps to understand whether these policies can have demand or supply side effects through the variable that determines the real labour income and the labour supply.

The ambiguous results of different theoretical approaches suggest that an empirical basis is needed. On the one hand, government spending shocks reduce private consumption and real wages in Neoclassical models. This is because they generate negative wealth effects that induce agents to increase labour supply and reduce current consumption. On the other hand, these shocks have demand side effects that offset the negative wealth effects in Neo-Keynesian models with counter cyclical mark ups. In this case, spending shocks increase real wages and private consumption.

Empirically, the results from the structural identification approach using vector autoregression models are typically in line with the implications of Neo-Keynesian models. That is, they increase real wages.

In this chapter, we contribute to the existing literature by estimating different panel-vector autoregressions and studying the short-run effects of different types of government spending on real wages. To the best of our knowledge, these effects were not show before for these countries using this estimation strategy. Furthermore, we examine these giving especial attention to the price deflators of government spending and wages.

We find that many types of government spending shocks increase real wages in the EMU. In particular, positive shocks in government investment plus consumption, and these two taken individually, increase two types of real wages: the real wage perceived by the economic agents and the real wage paid by firms. Moreover, the largest increase in real wages is produced by shocks in government investment.

Finally, Chapter 5 presents the main findings and conclusions of this thesis.

Chapter 2

The anatomy of large valuation episodes

The rapid increase in gross stocks of foreign assets and liabilities shown in Figure 2.1 has revived interest in the dynamics of the external account.[1] In particular, there is a growing concern for the impact of capital gains on the value of foreign asset and liability positions, which has been named the valuation channel of the external adjustment.

This channel operates through changes in the value of foreign asset and liability positions producing financial wealth redistributions that affect the external accounts as well as macroeconomics variables. For instance, a large positive shock in the stock market of a country will produce capital gains to countries holding claims on that particular market. If these claims are large and capital gains are repatriated, the real exchange rate of a country holding those assets will tend to appreciate and the trade balance would be likely to worsen. By contrast, if these capital gains are not repatriated, the increase in the value of foreign assets may be used as collateral to finance additional consumption or investments.

The growth in gross stocks, documented by Lane and Milesi-Ferretti (2001), together with the evidence on return differentials reported by Lane and Milesi-Ferretti (2001, 2007a), Tille (2008), Hung and Mascaro (2004) and Gourinchas and Rey (2007a), suggests that the valuation channel plays an important role in the external adjustment process. For instance, well-timed capital gains may make it unnecessary for a persistent debtor to run trade balance surpluses. Moreover, cross-border net capital gains can generate large wealth redistributions.

When the external adjustment is abrupt, the literature has focused on the study of current account reversals and sudden stops (Milesi-Ferretti and Razin 1998, 2000, Edwards 2004 and Calvo et al. 2004). However, it is silent on the large movements in the external position that are driven by large valuation gains or losses, rather than by large swings in capital flows.

As a result of the breakthrough made by Lane and Milesi-Ferretti (2001, 2007a), it is possi-

[1]Figure 2.1 is adapted from Lane and Milesi-Ferretti (2007a).

ble to analyze sharp external adjustments from the valuation channel perspective. Since this database measures gross stocks of foreign assets and liabilities, the relative role of the rates of capital gain in both sides of the balance sheet as well as across different portfolio categories can be studied. Moreover, Lane and Milesi-Ferretti (2001, 2007a) provide enough information to evaluate how the increase in gross stocks of foreign assets and liabilities affects these adjustments.

This paper makes a step in this direction. In particular, we evaluate how the upsurge in gross international financial integration has contributed to abrupt adjustments via the valuation channel. The methodology is analogous to the one used in the current account reversal literature. That is, we conduct an event study where a large valuation shock is defined as the year in which the valuation channel goes beyond a threshold.

Taking the same subsample of countries used by Lane and Milessi-Ferreti (2007a) to illustrate the general patterns of their database, we derive the valuation channel from the accounting framework of Lane and Milesi-Ferretti (2007b) and identify 59 large valuation shocks between 1994 and 2004. This set of countries is formed by advanced countries and a selected set of developing and emerging countries with the best quality of data.

This finding raises the following questions: Are large valuations the result of sizeable gross stocks? What is the relative role of the debt, direct investment or portfolio equity? Are large valuations persistent? Does a different pattern emerge for developing and advanced countries?

To answer these questions, we calculate the relative role of sizeable net external positions and gross stocks (gross international financial integration) in these large valuation shocks. We do this for the total international portfolio and for the debt, direct investment and portfolio equity subcomponents. Finally, we study the dynamics of the valuation channel and main related macroeconomic and asset price variables in the neighborhood of two types of large valuation episodes.

We find that the level of international financial integration matters for large valuation episodes in advanced economies, since large gross stocks magnify the impact of return differentials. These countries typically do not have large net positions. Rather, gross stocks of foreign assets and liabilities explain most of the episodes. The main contribution is attributable to the equity subcomponent.

For emerging markets and developing countries, valuation episodes are determined by sizeable net external positions and large rates of capital losses. In particular, the debt subcomponent played the main role. For most of these countries, the cumulated valuation shift was persistent, the real exchange rate largely depreciates and the trade balance improves.

In what remains, the chapter is organized in four sections. In Section 2.1, we present the method to identify large valuation shocks. In Section 2.2, we evaluate the relative importance of gross stocks and net positions, taking either the aggregate portfolio or each of its subcomponents. In Section 2.3, we analyze the dynamics of the valuation channel and a set of related macroeconomic and asset price variables, in the neighborhood of the valuation episodes. In the Section 2.4, we conclude.

2.1 Method

This section constructs the measure of large valuation shocks. To this end, we define the valuation channel following Lane and Milesi-Ferretti (2007b) as

$$VAL_t \equiv NFA_t - NFA_{t-1} - CA_t. \tag{2.1}$$

Equation (2.1) shows that the valuation term is defined by the change in the net foreign asset position (NFA_t) minus the current account balance (CA_t).[2][3]

Alternatively, equation (2.1) can be written as

$$VAL_t = kg_t^A A_{t-1} - kg_t^L L_{t-1}. \tag{2.2}$$

A_{t-1} are outstanding holdings by domestic residents of financial claims on the rest of the world. These are classified into five categories: portfolio investment, foreign direct investment, other investments, financial derivatives and reserve assets. Portfolio investment includes equity securities and debt securities, the latter including bonds plus money market debt instruments. Foreign direct investment is given by greenfield investment plus equity participations giving controlling stake. Other investments include debt instruments such as loans, deposits and trade credits. L_{t-1} are outstanding holdings by rest of the world of financial claims on the domestic residents. These are formed by portfolio investment, foreign direct investment, other investments and financial derivatives. Thus, this database comprises governments, central banks and private sector (banks and private firms) as owner categories.

Equation (2.2) shows that the valuation channel is the net capital gain on the net foreign asset position, where kg_t^A and kg_t^L are the net rates of capital gain in foreign assets and liabilities respectively. These, are defined as

$$kg_t \equiv \frac{Stock_t - Stock_{t-1} - Flow_t}{Stock_{t-1}}. \tag{2.3}$$

To ensure that our measure allows for cross-country comparisons, we scale variables as ratios to GDP. In the analysis, it is also helpful to define the measure of gross international financial integration following Lane and Milesi-Ferretti (2001, 2007a) as

[2] Although we take equation (2.1) as the valuation channel, it is important to mention that part of the difference between the change in the net foreign asset position and the capital flows may be explained by data revisions. See Lane and Milesi-Ferretti (2008).

[3] This decomposition of net foreign assets dynamics between the valuation term and current account is also analogous to equation (21) in Ghironi et al. (2007).

$$IFI_t \equiv \frac{A_t + L_t}{GDP_t}. \tag{2.4}$$

Since we are concerned with large shifts in the net foreign asset positions, our study is closely related to the current account reversals and the sudden stops literature. Milesi-Ferretti and Razin (1998) define a current account reversal if the following two conditions are satisfied. First, an average reduction in the current account deficit of at least three percentage points of GDP in a period of three years with respect to the three years before the event. Second, the maximum deficit after the reversal is no larger than the minimum deficit in the three years preceding the reversal. Milesi-Ferretti and Razin (2000) add a third condition to define a current account reversal: the average current account deficit must be reduced by at least one third.

Edwards (2004) follows a different strategy. He concentrates on the changes from one year to another. He defines a current account reversal as a reduction in the current account deficit of at least four percent in one year and a sudden stop by a capital inflows decline of at least five percent of GDP in one year. By contrast, Calvo et al. (2004) define a sudden stop as a phase that meets three conditions. First, it contains at least one observation in which the year-on-year fall in capital flows lies at least two standard deviations below its sample mean. Second, it ends when the annual change in capital flows exceeds one standard deviation below its sample mean. Third, the start of a sudden stop phase is determined by the first time the annual change in capital flows falls one standard deviation below the mean.

Our study follows a strategy similar to Edwards (2004). Specifically, we analyze the changes from one year to another, setting the threshold equal to 10 percent of GDP. Therefore, a country has experienced a large valuation shock if the following condition is satisfied:

$$val_t = \left| \frac{NFA_t - NFA_{t-1} - CA_t}{GDP_t} \right| > 0.1 \tag{2.5}$$

Since we are interested in the 'home country' perspective, we compute this ratio in local currency. In this way, we will also capture the effect of the exchange rate movements.

Figure 2.2 presents, on the vertical axis, the number of large valuation shocks for the years between 1971 and 2004 as defined by equation (2.5). Large valuation shocks together with their values and signs are reported in Table 2.1 for the period 1994 to 2004. We exclude years preceding 1994 because we want to concentrate on the period where the degree of international financial integration accelerated. Lane and Milessi-Ferreti (2007a) show that the break in its trend is significant from 1994 onwards. Moreover, the period between 1994 and 2004 presents the highest quality of data. This is because many countries started publishing estimates of external assets and liabilities between these years. Furthermore, to minimize possible mismeasurements of capital stocks and flows in local currency, we exclude countries with average inflation exceeding 40 percent in these years and those with inflation greater than 40 percent when the large valuation shock occurs.

Table 2.1 shows that 21 out of the 22 large valuation shocks were negative in the group of emerging markets and developing countries. The only positive large valuation shock in this group took place in Israel in 2001. Here, the cross-country average number of large valuation shocks is 1.3. For the group formed by advanced countries, the valuation channel hits the 10 percent of GDP threshold 37 times, giving an average of 1.8 large valuation shocks by country. Here, the signs of the large valuation shocks are mixed: 15 positive and 22 negative.

2.2 International financial integration and the net external position

2.2.1 Accounting

Taking into account that countries have experienced an increase in gross international financial integration, this section decomposes the valuation channel to show the relative role played by sizable gross stocks and large net positions in large valuation shocks.[4] To this end, we add and subtract $kg_t^L A_{t-1}$ from equation (2.2) and divide by GDP_t to obtain

$$val_t = \left(kg_t^A - kg_t^L\right) a_{t-1} + kg_t^L nfa_{t-1}. \tag{2.6}$$

Variables a_{t-1}, l_{t-1} and nfa_{t-1} are the outstanding levels of foreign assets and liabilities and the net foreign asset position, scaled by GDP_t. The first term on the right side of equation (2.6) shows the role of gross stocks. The larger the outstanding gross stock of foreign assets, the greater will be the valuation generated by a given difference in the rates of capital gain between assets and liabilities. The second term shows the role of the outstanding net foreign asset position for a given rate of capital gain in foreign liabilities.

Although this expression is informative, it is not possible to separate the effect of outstanding gross stocks of foreign assets plus liabilities and the net foreign asset position directly. Adding and subtracting $kg_t^A L_{t-1}$ from equation (2.2), adding this expression to equation (2.6) and rearranging, yields

$$\begin{aligned} val_t &= \overline{kg}_t nfa_{t-1} + kgdev_t(a_{t-1} + l_{t-1}) && (2.7) \\ &= valnet_t + valgross_t && (2.8) \end{aligned}$$

where $\overline{kg}_t = \frac{kg_t^A + kg_t^L}{2}$ and $kgdev_t = \frac{kg_t^A - kg_t^L}{2}$. In contrast to equation (2.6), equation (2.7) breaks down the roles of net positions and gross stocks in the $\overline{kg}_t nfa_{t-1}$ and $kgdev_t(a_{t-1} + l_{t-1})$ terms. We call these terms $valnet_t$ and $valgross_t$, respectively.

Levels of the rates of capital gain matter for the $valnet_t$ term. The valuation attributable

[4]We compare diversification finance versus development finance international investments. See Obstfeld and Taylor (2003).

to it depends on the size of the net foreign asset position as well as the mean rate of capital gain or loss, given by $\overline{kg_t}$. Therefore, even if the size of gross stocks may be small, a large net position combined with high rates of capital gain or loss will give a predominant role to the term $valnet_t$, in equation (2.8).

Conversely, if rates of capital gain are low and the difference between these rates in assets and liabilities is high, the term $valgross_t$ will play the predominant role in propagating a shock to the economy. This means that, when gross stocks of foreign assets and liabilities are large and the net foreign asset position is small, what matters is the spread between the rates of capital gain in assets and liabilities, rather than the level of these rates. This spread is captured by $kgdev_t$ in equation (2.7).

Figure 2.3 shows these two roles by plotting $valnet_t$ and $valgross_t$ for each large valuation shock, with $valnet_t$ along the horizontal axis and $valgross_t$ along the vertical axis. An inspection of this figure shows that $valgross_t$ played an important role. For instance, in most of the advanced countries, the valuation generated by the $valgross_t$ term was larger than the valuation generated by the $valnet_t$ term. By contrast, the role of the $valgross_t$ term in emerging markets and developing countries was not predominant. The contribution of net foreign asset positions, measured by the $valnet_t$ term was also important in these countries.

Taking this evidence into account, we propose a taxonomy of large valuation shocks based on the relative roles of $valnet_t$ and $valgross_t$. To this end, we define:

Definition 1 *A large valuation shock is type N if* $|valnet_t| > |valgross_t|$.

Definition 2 *A large valuation shock is type G if* $|valnet_t| < |valgross_t|$.

Table 2.2 presents the decomposition of the large valuation shocks into all the components of equation (2.7) as well as the type of the shock according to definitions 1 and 2. From the 50 cases were this decomposition is performed, 16 percent were N-type and 84 percent were G-type. In the advanced countries group, 5.4 percent of the shocks were N-type while 94.6 percent were G-type. In contrast, the group formed by developing markets and emerging countries presents 53.8 and 46.2 percent of N-type and G-type large valuation shocks, respectively. In terms of the shares of these groups in the shocks types, advanced countries represent 83.3 percent of all the G-type shocks and 25 percent of all the N-type shocks.

2.2.2 Selected country experiences

Four country studies

To illustrate the relative roles of the $valnet_t$ and $valgross_t$ terms, we examine four large valuation shocks. The first one is the G-type large valuation shock equivalent to 10.3 percent of GDP taking place in the United Kingdom and triggered by the significant increase in the global stock markets of 1999. In that year, this country was characterized by a large degree of gross international financial integration. Outstanding gross stocks of foreign assets plus liabilities represented 485.6 percent of the GDP. As shown in Table 2.2, the mean rate of capital gain (0.4 percent) as well as the spread between its rates of capital gain in foreign assets and liabilities (4.2 percent) were not high.

This large valuation shock illustrates an important message of this paper. When gross international financial integration is large, even a low spread between the rates of return in foreign assets and liabilities may generate big wealth redistributions. Table 2.3 reports the percentage change of other asset price and macroeconomic variables and suggest that this large valuation shock was triggered by a global positive shock in the stock markets.

The second large valuation shock is the -12.1 percent of GDP capital loss of Japan in 1999. This is a shock in a country with a low level of gross international financial integration. Outstanding gross stocks of foreign assets plus liabilities were 109.3 percent of GDP. However, this shock was also a G-type. Table 2.2 shows that the mean rate of capital loss was low (1.2 percent) but the spread between the rates of capital gain in foreign assets and liabilities was high (-22.2 percent). This high spread produced big capital gains to foreign investors in Japan relative to the gains of Japanese investors overseas. Table 2.3 shows that this valuation loss was the result of the bubble in the local equity market which was associated with an increase in bond returns and a real exchange rate appreciation. The large valuation shock of Japan in 1999 illustrates how high spreads between the rates of capital gain in foreign assets and liabilities can produce large valuation gains or losses when gross international financial integration is not particularly large.

The third large valuation shock is the Philippines in 1997. This is an N-type shock producing a -20.5 percent of GDP capital loss and the result of the financial crisis taking place in East Asia. In contrast to the previous cases, this country net foreign asset position was large (-44.3 percent of the GDP). The spread between the rates of capital gain was close to the average spread of our country sample (14 percent), and, its mean rate of capital loss was high (41.4 percent). Table 2.3 shows that this capital loss was associated with a sizeable real exchange rate depreciation and a collapse of the local bond and equity markets, produced by the financial crisis taking place in that year. However, as we show next, the main subcomponent generating this capital loss was debt.

Finally, we examine the large valuation shock of Argentina in 2002, which generated a -44.8 percent of GDP capital loss. The trigger for this large valuation shock was the abandonment of the currency board exchange rate regime that produced a -61.2 percent real depreciation. This is an example of a country showing a high spread in its capital gains (68 percent), but having an N-type large valuation shock. The reason for this lies in its large and negative net foreign asset position, combined with a high mean rate of capital loss (169.6 percent). At the time of the shock, the outstanding gross stock of foreign assets plus liabilities and net foreign asset position were 118.9 and -42.9 percent of GDP, respectively. As we show next, the main subcomponent was debt, which had liabilities mostly denominated in foreign currency.

Subcomponents

Since Lane and Milesi-Ferretti (2001, 2007a) break the international portfolio into debt, portfolio equity and direct investment, it is possible to apply our taxonomy of large valuation shocks to these subcomponents. Next, we make use of this classification to analyze the type of each shock at this level of disaggregation, as well as in the aggregate portfolio. In this way, we show their role in determining the type of the aggregate large valuation shock as being G-type or N-type.

Tables 2.4 - 2.6 present the decomposition of the valuation channel in equation (2.7), as well as the type of shock in the aggregate portfolio and in each subcomponent, according to definitions 1 and 2. From here onwards, we refer to the type of shock in each subcomponent using the DEBT-, PEQ- and FDI- mnemonics for debt, portfolio equity and foreign direct investment, respectively.

G-type large valuation shocks: subcomponents.

Here, we study the shock type in each subcomponent, conditional on the aggregate large valuation shock being G-type. When we take the debt subcomponent, in Table 2.4, we observe that 52.4 percent of all the G-type shocks were DEBT-G. From these 22 cases, 18 correspond to advanced countries. However, the United Kingdom and Japan show no role for gross stocks of debt. In the former, the spread between the rates of capital gain in debt assets and liabilities was 0.08 percent, while in the latter it was -2.4 percent. Accordingly, these shocks were DEBT-N.

For portfolio equity, Table 2.5 reports that 69 percent of all the G-type shocks were PEQ-G, most of them in advanced countries. United Kingdom shows that, although the mean rate of capital loss was high in portfolio equity (19.6 percent), the shock was PEQ-G. This was the result of a high spread between rates of capital gain in portfolio equity equivalent to 24.4 percent. In the same way, Japan exhibits a PEQ-G valuation shock characterized by a very high spread in rates of capital gain (-103.2 percent).

Foreign direct investment follows a similar pattern, 71.4 percent of the G-type large valuation shocks were also FDI-G. From these, 80 percent were in advanced countries. As regards our country studies both had a FDI-G valuation shock. The spread in the rates of capital gain was -36.6 and 10 percent in Japan and United Kingdom, respectively.

N-type large valuation shocks: subcomponents.

Next, we condition our analysis on the large valuation shock being N-type in the aggregate portfolio. Table 2.4 shows that 75 percent of these cases were DEBT-N and that all of them took place in emerging markets and developing countries. As mentioned previously for the selected country experiences, the Philippines faced an N-type large valuation shock in 1997. For the debt subcomponent this shock was DEBT-N. At that time, the debt net position was -24.1 percent of the GDP and the mean rate of capital loss was 51.6 percent. In contrast to the aggregate portfolio, the rate of capital gain differential between assets and liabilities did not differ considerably. For Argentina, the role of debt in 2002 is in line with the aggregate portfolio. This country had a very high mean rate of capital loss in this subcomponent (207.7 percent). However, in contrast to the aggregate portfolio, the rate of capital gain differential was small. Table 2.4 shows that debt played the predominant role in these two shocks, since it represents the most important part of the international portfolio of these countries.

When we turn to the portfolio equity subcomponent, in Table 2.5, we find that 37.5 percent of all the N-type shocks were PEQ-N. As regards our two selected cases, gross stocks in portfolio equity were more important than the net position. Both countries exhibited high rates of capital gain differentials in this subcomponent. For the case of the Philippines this was 114.2 percent while for Argentina, 116.4 percent.

Table 2.6 shows that, in foreign direct investments, 62.5 percent of all the N-type shocks were FDI-N. In the two case studies, the types were different in foreign direct investment. For the Philippines, it was a FDI-N shock while for Argentina, FDI-G. The former is characterized by a large negative net position, compared to gross stocks, in foreign direct investment combined with a high mean rate of capital loss. The latter shows also an important negative net position in direct investment but a very high spread between the rates of capital gain on assets and liabilities.

2.2.3 Summary

The study of the aggregate international investment portfolio shows that N-type large valuation shocks are mainly present in emerging markets and developing countries, while G-type in advanced countries. The reason lies in the high mean rates of capital loss combined with large net foreign asset positions in the former group, and, high spreads between the rates of capital gains combined with large gross stocks in the latter group. In terms of the subcomponents, N-type shocks were typically driven by net valuation movements in the debt categories. For the G-type large valuation shocks, gross stocks in the equity subcomponent combined with high spreads played the predominant role in most advanced countries.

2.3 Large valuation episodes and macroeconomic dynamics

2.3.1 Method

As mentioned, this paper is closely related to the current account reversal and sudden stop literature. In this field, Milesi-Ferretti and Razin (1998, 2000) show what triggers current account reversals and which factors determine how costly these reversals are. To this end, they examine low- and middle-income countries and find that domestic variables such as current account balances, the degree of trade openness and levels of reserves contribute to the likelihood of current account reversals. External variables, such as unfavorable terms of trade and high interest rates in advanced economies, also contribute to the probability of these reversals.

Using a panel of 157 countries, Edwards (2004) shows that current account reversals and sudden stops are associated: 46.1 percent of the countries subject to sudden stops faced a current account reversal and 22.9 percent of those subject to current account reversals faced a sudden stop in the same year.

Following the event study methodology of Eichengreen et al. (1995) that distinguishes between periods of 'turbulence' from periods of 'tranquility', Milesi-Ferretti and Razin (2000) show that the current account reversals are highly associated with major changes in external positions.

The literature has also studied the role of the valuation channel in the context of gradual external adjustments. For instance, Lane and Milesi-Ferretti (2006) show that the valuation channel tends to stabilize the external position in advanced countries. This is due to assets and liabilities being mostly denominated in foreign and domestic currency respectively. With this balance sheet structure, a currency depreciation improves the net foreign asset position.

Evidence on the valuation channel stabilizing the external position of the United States, can be found in the International Monetary Fund's World Economic Outlook (2005), Lane and Milesi-Ferretti (2006) and Gourinchas and Rey (2007b). Studies assessing empirically the contribution of the valuation channel to the external adjustment process (De Gregorio 2005; Obstfeld and Rogoff 2005 and Lane and Milesi-Ferretti 2007b), conclude that the valuation channel accounts for 14-30 percent of the total adjustment. In addition, Gourinchas and Rey (2007b) investigate the relative importance of exchange rate movements to adjustment of external imbalances via the valuation or trade channel, finding that stabilizing valuation effects contribute as much as 27 percent to the external adjustment for the United States.

In what follows, we assess the dynamics of the valuation channel and trade balance together with other related macroeconomic and asset price variables, following the strategy of Milesi-Ferretti and Razin (1998, 2000). We analyze their behavior in the three-year neighborhood of a valuation episode and evaluate: whether large valuation shocks were counterbalanced in the following years; whether the valuation channel and trade balance moved in the same direction and how real exchange rate, rate of return differentials, equity prices and bond returns behaved in the neighborhood of these episodes. Furthermore, we report the evolution of the inflation rate and the rate of growth of the real GDP.

Equation (2.5) defined a large valuation shock by the absolute value for the ratio VAL_t/GDP_t being greater than 0.1. Next, we define a large valuation episode as an interval $(t, t+N)$ during which at least one large valuation shock occurs and $N \geq 0$. Moreover, it is surrounded by periods of tranquility, with no large valuation shocks taking place during the intervals $(t-3, t-1)$ and $(t+N+1, t+N+3)$. We further distinguish between two types of large valuation episodes. A large valuation episode is Type-A if all the large valuation shocks during the episode have the same sign. It is Type-B if the episode includes large valuation shocks with opposing signs. Table 2.1 reports these episodes by country.

Next, we assign countries to three groups. The first group contains developing countries and emerging markets with negative Type-A episodes. The second group contains advanced countries with negative Type-A episodes.[5] In the last group, we place advanced countries with Type-B episodes.

Figure 2.4 presents cross-country means of the valuation channel, real rate of return in debt, real rate of return in equity, real exchange rate, domestic bond return index, domestic equity price index, trade balance, rate of growth of real GDP and inflation for the first group of countries. The valuation channel and trade balance are scaled by the year-of-episode GDP. When the episode lasts more than one year, the scaling factor is the mean GDP of that period. The countries in this group are: Argentina 2002, Brazil 1999-2002, Colombia 1997, Malaysia 1994-1999, Mexico 1994-1995, Philippines 1997-2002, South Africa 1999 and Thailand 1997. The valuation channel, real exchange rate and trade balance are also reported in Tables 2.7 and 2.8 for each country separately. In these Tables, columns $t-3$ and $t+3$ show the cumulated valuation change scaled by GDP, the mean trade balance scaled by GDP and the mean percentage change in the real exchange rate in the three-year neighborhood. Column t reports the values in the year of the episode or the period-average of the variable if the episode last more than one year.

The dynamics of the related macroeconomic and asset price variables ex-ante and ex-post the large valuation episode will depend on the nature and sign of the large valuation shocks forming these episodes. The remainder of this section takes the nature and source of the large valuation shocks as given and presents how the dynamics of some related variables are associated to those of the valuation channel. Therefore, drawing conclusions relying on the causality between the valuation channel and these variables remain beyond the scope of our event study.

If a Type-A large valuation episode is formed by negative large valuation shocks triggered by real exchange rate depreciations, we would expect a change in the external position also through the trade channel, i.e. improvement in the trade balance. The movement of the rates of capital gain will depend on the currency composition of the international portfolio. The larger the proportion of foreign assets and liabilities denominated in foreign currency, the greater will be the change in these rates of capital gain relative to the years preceding the episode.

If the large valuation shocks forming these episodes are triggered by shocks in stock markets and are of Type-G, we would expect an increase in the gap between the rates of capital gain of foreign assets and foreign liabilities in the episode. The real exchange rate, trade bal-

[5] We analyze only advanced countries with negative Type-A large valuation episodes because we are interested in drawing general cross-country regularities and the only advanced country with a positive Type-A episode is the United Kingdom in 1999.

ance, growth and inflation would not show important changes in the short run. However, local bond returns and equity prices would change depending on the sign of the large valuation shock and the degree of financial integration of the country in question. When the Type-A large valuation episode is negative, it is reasonable to expect and ex-post increase in local bond returns and equity prices.

For the case of Type-B episodes, it is more difficult to form expectations on the related dynamics since these are formed by large valuation shocks with opposing signs and its duration can last many years.

An inspection of Figure 2.4 and Table 2.7 reveals that negative episodes of Type-A were not counterbalanced afterwards: the capital loss was persistent. The mean cumulative valuation loss remained close to 25 percent of GDP. Moreover, as shown in Table 2.7, most of these countries continued accumulating capital losses in the subsequent years. A second chart in Figure 2.4 shows that the real exchange rate largely depreciates in the year of the episode. The mean annual change was -17.8 percent.[6] In the year of the episode, the trade balance improves significantly. In this set of countries, the real exchange rate depreciation caused the valuation channel and trade balance to move in opposite directions. This was not the result of large negative net positions alone, it was also the result of countries having liabilities largely denominated in foreign currency.

Additionally, Figure 2.4 provides information to evaluate whether the large valuation shock was Type-N or Type-G. The upsurge in the rate of return for debt strengthens the explanation of large valuations shocks being Type-N. Moreover, its negative differential significantly increased the burden of the net position in the debt subcomponent and contributed heavily to the negative sign of the whole valuation. Although the mean return differential in equity was positive, the relatively small gross international financial integration prevented this subcomponent from offsetting the capital loss coming from the debt subcomponent.

Figure 2.5 presents cross-country means of advanced countries experiencing negative valuation episodes of Type-A. These are: France in 1999, Greece in 2004, Iceland in 2000/2001, Japan in 1999 and Norway in 2000. In contrast to the previous group, the capital loss in the year of the episode was partially counterbalanced in most of these countries. The real exchange rate displays no significant change in the year of the episode. The charts for the return differential show that these large valuation shocks were mostly Type-G. Large gross stocks in equity or debt, combined with negative return differentials, either in debt or equity, support this hypothesis. The bond return index shows a reduction in its growth rate in the year of the episode while the equity price index does so for the year of the episode and the following year.

Type-B large valuation episodes are presented in Figure 2.6. The advanced countries and the periods of turbulence are: Ireland 1994-2000, Finland 1998-2000, Netherlands 1994-2002,

[6] In this group, South Africa is the only country experiencing real appreciation (2.9 percent). If we exclude this country to compute the mean depreciation, the mean fall would have been -20.7 percent.

New Zealand 1995-2000, Sweden 1997-2003 and Switzerland 1996-2004. In this figure, $t = 0$ represents the mean of the variable during the Type-B valuation episode, rather than its value the year of the valuation episode. These values are also reported in Table 2.8 at a country level. For this set of countries, capital losses were not subsequently reversed. Moreover, the negative trend of the accumulated valuation loss remains negative for the subsequent years, driven mainly by Ireland and the Netherlands. The return differential for debt is small and positive in the episode and large and negative before and after it. By contrast, the size of the return differential for equity declines in the following years.

The real exchange rate, as well as bond and equity indices do not display large changes in behavior. The trade balance, however, experiences a substantial improvement in almost all countries in the group. The exceptions are New Zealand and Switzerland with a three-year average trade deficit equal to -1.7 and -2.6 percent of GDP, respectively.

2.3.2 Summary

Type-A negative valuation episodes in emerging markets and developing countries produce capital losses which are rarely counterbalanced. For these countries, the real exchange rate largely depreciates, the bond returns, equity prices and real GDP growth fall importantly and increase afterwards. The trade balance improves substantially.

Advanced countries with Type-A negative valuation episodes face capital losses which are partially counterbalanced in most of the cases. Real exchange rate, bond returns and equity prices show no important changes in their trend. GDP growth trend turns to positive the year of the episode. Type-B valuation episodes in advanced countries produce no changes in the real exchange rate, bond returns and equity prices. However, accumulated capital losses are persistent and the trade balance substantially improves.

2.4 Conclusions

This paper studies the anatomy of large valuation episodes, giving special attention to the role of the increase in gross international financial integration experienced by most countries at the beginning of the 1990s. We study sharp alignments of the external imbalances, tackled by the current account reversals and sudden stop literature, from a new angle: the valuation channel.

Our approach shows how re-valuations of foreign assets or liabilities contribute to the external adjustment process. Using an event-study methodology, we identify different types of large valuation shocks and measure the role of the outstanding gross stocks of foreign assets and liabilities.

We also define two types of valuation episodes based on the sign of large valuation shocks. Furthermore, we present how the dynamics of the related macroeconomic and asset price variables are associated with those of the valuation channel in tranquil times surrounding these episodes.

We find that developing countries and emerging markets had negative and Type-A valuation episodes as a result of their large net position. The cumulated valuation effect is rarely counterbalanced in the medium run. In this group, almost all valuation episodes were associated with large real exchange rate depreciations followed by improvements in the trade balance. In contrast, for advanced countries, we find that gross stocks of foreign assets and liabilities play a crucial role. In Type-A valuation episodes, the cumulated valuation effect is then partially counterbalanced. However, the cumulated negative valuation effect does not change its negative trend after Type-B valuation episodes. The trade balance does not show significant changes after Type-A while it improves substantially after Type-B valuation episodes in the advanced economies.

2.5 Appendix: Data sources and definitions

The main database used in this chapter is Lane and Milesi-Ferretti (2001, 2007a). The 2001 version of it represented the first improvement of the International Monetary Fund (IMF) measures of the international investment position. It provided estimates for countries where stock data were not available, thereby expanding the IMF country and time coverage to 67 and 1970-1998, respectively. This chapter is based on the 2007 version of this database that provides annual data on gross stocks of foreign assets and liabilities for 140 countries for the period 1970-2004.

The improvement of the 2001 version relies on a larger set of countries publishing estimates of foreign assets and liabilities as well as on several international and national data sources. These are: the IMF's Balance of Payments Statistics and International Financial Statistics; the World Bank's World Debt Tables and Global Development Finance; the OECD statistics on external indebtedness; the Bank of International Settlements' data on banks' assets and liabilities by creditor and debtor; and national sources for the direct estimates of stocks and cumulative flows with valuation adjustments for indirect estimates.

To construct large valuation shocks we take gross stocks of foreign assets and liabilities from the latter database. Foreign assets and liabilities are the sum of portfolio equity, foreign direct investment and debt. Debt includes bonds, money market debt instruments, financial derivatives, other investments and, for the case of assets, foreign exchange reserves minus gold. Other investments are composed of debt instruments such as loans, deposits and trade credits.

To evaluate the dynamics of the related variables in the neighbourhood of the large valuation episodes we use annual data for the following variables (the source of these data is in parenthesis): trade balance in local currency (Direction of Trade Statistics, IMF); constant GDP in local currency (World Development Indicators); current account balance in local currency and real effective exchange rate index, defined as CPI based real effective exchange rate vis-à-vis trading partners (International Financial Statistics, IMF); equity price index in US dollars (Morgan Stanley Capital International Inc.); total return bond index in US dollars (Global Financial Data); world market price index in US dollars (Morgan Stanley Capital International Inc).

Table 2.1: Large valuation shocks.

Emerging markets and developing countries

Country	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Episode Type-
Argentina									-44.8			*A*
Brazil						-11.4			-13.7			*A*
Colombia				-11.7								*A*
Indonesia	-13.3			-45.2	-53.7		-11.5				-11.9	*A*
Israel						-23.3		12.2				*B*
Malaysia	-15.1			-12.9		-22.2						*A*
Mexico	-16.7	-22.6										*A*
Philippines				-20.5		-13.0	-22.9		-10.2			*A*
South Africa						-18.5						*A*
Thailand				-38.4								*A*

Advanced countries

Country	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Episode Type-
Finland					-40.3	-88.1		46.5	32.7			*B*
France						-11.5						*A*
Greece											-12.6	*A*
Iceland							-11.5	-13.9				*A*
Ireland	12.1			34.2	11.3	20.7	-46.4					*B*
Japan						-12.1						*A*
Netherlands	-31.0		-12.2	-14.1	-18.8	27.2			-12.8			*B*
New Zealand		-12.3			18.3		19.2					*B*
Norway							-14.2					*A*
Sweden				11.0	15.3	12.4	-12.1	21.0	-30.1	-14.2		*B*
Switzerland			21.7	-10.8			-30.7			-13.6	-14.3	*B*
United Kingdom						10.3						*A*

Notes: Large valuation shocks in domestic currency.

Table 2.2: Valuation decomposition: total.

Year	**Country**	$\overline{kg}_t$	nfa_{t-1}	$kgdev_t$	$(a_{t-1}+l_{t-1})$	Type
1994	Ireland	0.9	-39.7	3.2	292.4	G
1994	Netherlands	-15.2	15.2	-9.6	281.6	G
1996	Netherlands	8.9	-11.5	-2.1	259.2	G
1996	Switzerland	9.1	89.6	2.2	431.6	G
1997	Colombia	10.3	-20.0	-10.5	53.2	G
1997	Ireland	34.7	-21.5	9.2	396.4	G
1997	Netherlands	6.7	-17.5	-3.0	294.5	G
1997	Sweden	14.5	-37.7	7.3	240.6	G
1997	Switzerland	11.2	115.9	-4.7	531.5	G
1998	Finland	4.7	-38.5	-22.7	147.2	G
1998	Ireland	15.9	13.0	2.1	562.6	G
1998	Netherlands	-1.1	-23.5	-5.3	348.7	G
1998	New Zealand	2.1	-118.3	11.7	188.9	G
1998	Sweden	8.2	-22.8	7.2	283.2	G
1999	Finland	21.9	-79.0	-31.9	213.9	G
1999	France	-8.6	7.4	-4.1	275.0	G
1999	Ireland	-5.4	24.8	2.3	869.9	G
1999	Israel	4.7	1.9	-13.7	156.3	G
1999	Japan	1.2	26.1	-11.1	109.3	G
1999	Netherlands	-3.7	-41.0	6.2	453.4	G
1999	Philippines	0.0	-61.4	0.5	127.0	G
1999	South Africa	33.0	-6.9	-16.3	93.8	G
1999	Sweden	17.7	-5.4	4.4	327.1	G
1999	United Kingdom	0.4	-14.7	2.1	485.6	G
2000	Iceland	-1.8	-46.1	-7.7	117.6	G
2000	Ireland	-8.2	39.6	-4.0	948.8	G
2000	New Zealand	8.3	-91.6	14.7	193.4	G
2000	Norway	0.0	15.3	-5.5	166.9	G
2000	Sweden	-2.3	8.8	-2.6	413.9	G
2000	Switzerland	-0.8	120.0	-3.5	825.9	G
2001	Iceland	5.4	-59.6	-5.9	141.6	G
2001	Israel	-0.2	-24.1	5.7	179.4	G
2001	Sweden	-12.1	-0.6	6.1	449.8	G
2002	Finland	-17.6	-73.7	7.3	307.3	G
2002	Netherlands	-10.7	-13.4	-1.9	554.6	G
2002	Philippines	0.8	-61.3	-1.3	135.7	G
2002	Sweden	-22.6	22.6	-5.9	419.3	G
2003	Sweden	1.8	-2.1	-4.3	329.1	G
2003	Switzerland	1.4	114.2	-1.3	832.6	G
2004	Greece	2.4	-56.8	-6.8	162.2	G
2004	Indonesia	4.9	-43.8	-5.5	90.4	G
2004	Switzerland	-1.5	111.5	-1.7	851.6	G
1995	New Zealand	11.4	-86.4	2.1	142.5	N
1997	Philippines	41.4	-44.3	7.0	94.2	N
1997	Thailand	61.7	-50.3	-2.4	103.0	N
1999	Brazil	49.5	-29.5	7.0	64.6	N
2000	Philippines	16.4	-58.5	1.7	135.0	N
2001	Finland	-18.4	-129.9	7.0	340.3	N
2002	Argentina	169.6	-42.9	34.0	118.9	N
2002	Brazil	32.7	-45.6	5.6	91.3	N

Notes: Decomposition from equation (2.7). 'Type' stands for the kind of large valuation shock according to definitions 1 and 2. Variables nfa_{t-1}, a_{t-1} and l_{t-1} are the previous year net position, gross stocks of assets and gross stock of liabilities respectively scaled by GDP_t. The decomposition for the following countries is not reported because the data on equity flows and debt flows are not available: Indonesia 1994, 1997, 1998, 2000; Malaysia 1994, 1997, 1999 and Mexico 1994, 1995.

Table 2.3: Selected asset price and macroeconomic variables.

Year	Country	GDP	RER	CPI	EPI	BRI	WMPI	nfa_t	nfa_{t-1}	ca_t	Type
1994	Ireland	5.8	2.4	2.4	11.9	0.7	3.2	-24.7	-39.7	2.9	G
1994	Netherlands	2.9	2.3	2.8	8.9	8.7	3.2	-10.8	15.2	5.0	G
1996	Netherlands	3.0	-3.4	2.0	24.5	-0.5	10.7	-18.5	-11.5	5.2	G
1996	Switzerland	0.5	-10.1	0.8	1.2	-18.1	10.7	117.9	89.6	6.6	G
1997	Colombia	3.4	-5.1	18.5	37.8		11.1	-37.0	-20.0	-5.4	G
1997	Ireland	10.8	-6.0	1.4	13.3	-0.7	11.1	15.0	-21.5	2.3	G
1997	Netherlands	3.8	-3.1	2.2	21.6	-7.8	11.1	-24.9	-17.5	6.6	G
1997	Sweden	2.4	-2.7	0.7	11.6	-6.1	11.1	-23.8	-37.7	3.0	G
1997	Switzerland	1.9	1.6	0.5	43.2	1.5	11.1	114.8	115.9	9.6	G
1998	Finland	5.0	2.3	1.4	119.1	25.8	17.9	-73.2	-38.5	5.6	G
1998	Ireland	8.9	-0.6	2.4	33.0	22.7	17.9	25.4	13.0	1.2	G
1998	Netherlands	4.3	2.6	2.0	21.1	17.8	17.9	-39.0	-23.5	3.3	G
1998	New Zealand	0.5	-14.8	1.3	-25.2	8.4	17.9	-103.9	-118.3	-4.0	G
1998	Sweden	3.6	-9.7	-0.3	12.6	10.7	17.9	-5.7	-22.8	1.9	G
1999	Finland	3.4	-6.7	1.2	150.7	-19.0	27.7	-160.8	-79.0	6.2	G
1999	France	3.3	-5.8	0.5	28.0	-20.3	27.7	-1.2	7.4	2.8	G
1999	Ireland	11.1	-7.0	1.6	-14.0	-19.9	27.7	45.7	24.8	0.3	G
1999	Israel	2.3	6.0	5.2	56.3	14.0	27.7	-23.0	1.9	-1.6	G
1999	Japan	-0.1	16.3	-0.3	60.6	16.0	27.7	16.6	26.1	2.6	G
1999	Netherlands	4.0	-4.7	2.2	5.2	-14.7	27.7	-9.9	-41.0	3.9	G
1999	Philippines	3.4	0.5	5.9	2.3	32.1	27.7	-65.0	-61.4	9.5	G
1999	South Africa	2.4	2.9	5.2	53.4	26.2	27.7	-25.8	-6.9	-0.5	G
1999	Sweden	4.6	2.9	0.5	77.8	-6.9	27.7	9.3	-5.4	2.4	G
1999	United Kingdom	2.9	5.5	1.6	9.7	-2.0	27.7	-7.1	-14.7	-2.7	G
2000	Iceland	5.7	-6.1	5.2	-30.9	-18.5	-14.0	-67.4	-46.1	-9.8	G
2000	Ireland	9.9	0.7	5.6	-14.3	2.6	-14.0	-7.3	39.6	-0.5	G
2000	New Zealand	2.3	-6.9	2.6	-36.3	-1.3	-14.0	-77.2	-91.6	-4.8	G
2000	Norway	2.8	-1.6	3.1	-2.4	-4.8	-14.0	16.5	15.3	15.5	G
2000	Sweden	4.3	-4.6	0.9	-21.9	-0.7	-14.0	-0.6	8.8	2.7	G
2000	Switzerland	3.6	2.8	1.5	4.9	11.0	-14.0	102.9	120.0	13.5	G
2001	Iceland	2.6	-10.0	6.4	-27.0	-1.0	-16.7	-77.7	-59.6	-4.2	G
2001	Israel	-0.3	-2.2	1.1	-32.3	0.9	-16.7	-13.4	-24.1	-1.4	G
2001	Sweden	1.0	-6.0	2.4	-28.1	-8.0	-16.7	23.5	-0.6	3.0	G
2002	Finland	2.2	1.9	1.6	-31.2	32.0	-20.0	-33.4	-73.7	7.6	G
2002	Netherlands	0.6	3.5	3.3	-22.5	29.0	-20.0	-23.6	-13.4	2.5	G
2002	Philippines	4.4	-6.4	3.0	-30.5	39.1	-20.0	-65.7	-61.3	5.7	G
2002	Sweden	2.0	6.1	2.2	-31.5	31.3	-20.0	-2.2	22.6	5.2	G
2003	Sweden	1.5	5.7	1.9	61.0	26.6	33.0	-8.8	-2.1	7.5	G
2003	Switzerland	-0.4	-2.7	0.6	32.4	1.6	33.0	114.5	114.2	13.8	G
2004	Greece	4.2	2.2	2.9	41.2	18.0	14.5	-75.9	-56.8	-6.5	G
2004	Indonesia	5.1	-11.7	6.2	44.5		14.5	-54.2	-43.8	1.4	G
2004	Switzerland	2.1	1.8	0.8	13.8	7.0	14.5	114.1	111.5	16.8	G
1995	New Zealand	4.1	0.4	3.7	17.3	22.5	15.6	-103.7	-86.4	-5.0	N
1997	Philippines	5.2	-17.2	5.6	-63.0	-44.8	11.1	-70.0	-44.3	-5.2	N
1997	Thailand	-1.4	-33.0	5.6	-74.3	-52.9	11.1	-90.7	-50.3	-2.0	N
1999	Brazil	0.8	-27.2	4.9	61.6		27.7	-45.7	-29.5	-4.8	N
2000	Philippines	6.0	-9.5	4.0	-45.3	-18.6	-14.0	-73.0	-58.5	8.4	N
2001	Finland	1.1	3.4	2.6	-39.1	-1.3	-16.7	-76.2	-129.9	7.1	N
2002	Argentina	-10.9	-61.2	25.9	-51.0	-80.8	-20.0	-78.3	-42.9	9.3	N
2002	Brazil	1.9	-31.0	8.5	-33.8		-20.0	-61.0	-45.6	-1.7	N

Notes: The following variables represent the % change respect to the previous year: GDP (constant gross domestic product in domestic currency), RER (real exchange rate), CPI (consumer price index), EPI (equity market price index), BRI (bond return index), WMPI (world market price index). The variables nfa_t and ca_t are net foreign assets and current account scaled by GDP_t.

Table 2.4: Valuation decomposition: debt.

Year	**Country**	$\overline{kg}_t$	nfa_{t-1}	$kgdev_t$	$(a_{t-1}+l_{t-1})$	DEBT-	Type
1994	Ireland	1.0	-5.2	5.8	185.7	G	G
1994	Netherlands	-21.2	11.3	-11.8	175.6	G	G
1996	Netherlands	3.3	-15.8	2.2	141.3	G	G
1997	Colombia	3.4	-10.7	-6.9	41.2	G	G
1997	Ireland	23.0	24.3	15.8	269.7	G	G
1997	Netherlands	-2.0	-16.4	1.2	150.6	G	G
1997	Sweden	-12.5	-37.6	-6.4	126.4	G	G
1998	Finland	0.4	-26.3	-1.9	98.0	G	G
1998	Netherlands	-7.6	-17.2	-2.8	176.0	G	G
1998	Sweden	-1.0	-42.8	1.4	117.5	G	G
1999	Ireland	-5.5	120.6	-2.0	603.2	G	G
1999	Israel	-8.4	10.8	-2.4	123.0	G	G
1999	Netherlands	-7.4	-22.9	12.1	231.0	G	G
1999	Philippines	-0.8	-41.1	1.4	99.5	G	G
2000	Iceland	-2.8	-62.0	-11.5	86.9	G	G
2000	Norway	3.3	-0.3	-5.1	103.9	G	G
2000	Sweden	4.0	-37.0	-2.4	131.1	G	G
2001	Sweden	-1.3	-39.1	-1.2	156.5	G	G
2002	Netherlands	-7.6	-12.4	-2.0	284.6	G	G
2002	Philippines	2.3	-41.5	-2.2	110.3	G	G
2002	Sweden	-4.7	-51.6	-2.3	163.2	G	G
2004	Greece	0.6	-46.4	-6.4	136.8	G	G
1996	Switzerland	9.5	86.4	1.9	273.2	N	G
1997	Switzerland	2.4	103.6	-0.3	345.4	N	G
1998	Ireland	25.3	71.7	1.1	387.0	N	G
1998	New Zealand	4.3	-54.3	2.3	85.0	N	G
1999	Finland	-17.9	-30.5	-0.7	110.7	N	G
1999	France	-17.1	4.9	0.4	142.8	N	G
1999	Japan	-8.1	22.7	-1.2	90.6	N	G
1999	South Africa	-6.2	-17.6	0.6	34.5	N	G
1999	Sweden	-1.9	-44.2	0.5	129.7	N	G
1999	United Kingdom	-2.8	-13.3	0.04	350.7	N	G
2000	Ireland	-11.5	117.0	0.0	622.4	N	G
2000	New Zealand	14.7	-47.7	3.4	89.6	N	G
2000	Switzerland	-4.9	100.9	0.9	495.4	N	G
2001	Iceland	16.5	-83.8	5.7	104.3	N	G
2001	Israel	7.5	8.0	0.1	118.4	N	G
2002	Finland	-4.0	-16.0	-0.3	141.3	N	G
2003	Sweden	-3.4	-46.3	-1.0	153.3	N	G
2003	Switzerland	-3.2	98.8	-0.4	524.6	N	G
2004	Indonesia	5.8	-34.5	-0.2	78.8	N	G
2004	Switzerland	-4.2	99.0	-0.7	513.9	N	G
1995	New Zealand	-1.3	-43.9	-3.1	66.2	G	N
2001	Finland	-2.4	-19.1	-1.5	122.4	G	N
1997	Philippines	51.6	-24.1	-3.0	69.7	N	N
1997	Thailand	74.3	-31.7	-15.3	80.9	N	N
1999	Brazil	45.2	-20.2	-4.9	41.1	N	N
2000	Philippines	23.1	-36.3	-2.8	105.4	N	N
2002	Argentina	207.7	-21.8	1.6	81.0	N	N
2002	Brazil	39.3	-26.9	-8.2	52.8	N	N

Notes: Decomposition from equation (2.7). 'Type' stands for the kind of large valuation shock according to definitions 1 and 2. 'DEBT-' stands for the type of shock in the debt subcomponent. Variables nfa_{t-1}, a_{t-1} and l_{t-1} are the previous year net position, gross stocks of assets and gross stock of liabilities respectively scaled by GDP_t. The decomposition for the following countries is not reported because the data on equity flows and debt flows are not available: Indonesia 1994, 1997, 1998, 2000; Malaysia 1994, 1997, 1999 and Mexico 1994, 1995.

Table 2.5: Valuation decomposition: portfolio equity.

Year	**Country**	$\overline{kg}_t$	nfa_{t-1}	$kgdev_t$	$(a_{t-1} + l_{t-1})$	PEQ-	Type
1994	Netherlands	-6.0	-10.0	-6.4	46.5	G	G
1996	Netherlands	33.9	-8.8	-11.6	51.2	G	G
1996	Switzerland	14.2	-18.1	6.8	92.1	G	G
1997	Netherlands	30.3	-17.0	-11.8	68.0	G	G
1997	Switzerland	33.6	-13.3	-12.5	111.6	G	G
1998	Finland	59.3	-19.9	-71.8	24.9	G	G
1998	Ireland	-18.5	-26.4	-6.8	116.1	G	G
1998	Netherlands	19.0	-26.0	-6.0	90.0	G	G
1998	New Zealand	7.7	-7.1	26.2	24.0	G	G
1999	France	23.2	-11.0	-11.9	30.9	G	G
1999	Ireland	7.5	-51.6	17.1	179.8	G	G
1999	Israel	85.1	-4.3	-68.0	14.8	G	G
1999	Japan	57.3	-2.2	-51.6	11.7	G	G
1999	Netherlands	1.8	-34.4	2.3	122.4	G	G
1999	South Africa	13.8	2.5	13.9	28.1	G	G
1999	Sweden	38.2	-8.8	-18.6	63.5	G	G
1999	United Kingdom	19.6	-10.9	12.2	78.1	G	G
2000	Iceland	-11.1	16.2	9.4	20.4	G	G
2000	Ireland	-13.5	-36.2	-2.2	241.6	G	G
2000	New Zealand	-14.2	0.9	12.0	27.8	G	G
2000	Norway	-3.3	8.8	-8.1	24.4	G	G
2000	Sweden	-6.3	-10.1	6.5	94.2	G	G
2000	Switzerland	7.6	-20.9	-12.3	220.8	G	G
2001	Sweden	-19.6	-10.8	11.9	92.7	G	G
2002	Sweden	-37.2	12.9	9.5	81.5	G	G
2003	Sweden	24.3	14.6	-8.3	53.3	G	G
2004	Greece	17.7	-5.8	-15.7	9.7	G	G
2004	Indonesia	-114.8	-6.8	-170.6	6.9	G	G
2004	Switzerland	2.4	-30.2	-1.3	192.9	G	G
1997	Sweden	25.2	-11.9	-3.5	39.9	N	G
1998	Sweden	24.8	-11.2	3.0	51.8	N	G
1999	Finland	93.8	-58.6	-52.9	66.9	N	G
1999	Philippines	19.2	-5.7	3.2	8.7	N	G
2001	Iceland	-11.5	22.3	4.0	24.6	N	G
2001	Israel	-21.9	-21.8	10.5	33.3	N	G
2002	Finland	-39.3	-78.4	5.8	107.8	N	G
2002	Netherlands	-27.3	-10.8	-1.7	114.1	N	G
2002	Philippines	-24.4	-2.8	4.4	5.6	N	G
2003	Switzerland	16.6	-30.8	1.8	170.0	N	G
1997	Philippines	33.4	-9.1	57.1	10.4	G	N
2000	Philippines	-16.5	-6.7	19.3	10.3	G	N
2002	Argentina	78.2	3.3	58.2	4.8	G	N
2002	Brazil	2.4	-6.0	9.9	8.3	G	N
1995	New Zealand	32.4	-6.7	3.7	13.7	N	N
1999	Brazil	111.3	-3.5	-28.7	4.4	N	N
2001	Finland	-32.7	-131.2	6.0	160.1	N	N

Notes: Decomposition from equation (2.7). 'Type' stands for the kind of large valuation shock according to definitions 1 and 2. 'PEQ-' stands for the type of shock in the portfolio equity subcomponent. Variables nfa_{t-1}, a_{t-1} and l_{t-1} are the previous year net position, gross stocks of assets and gross stock of liabilities respectively scaled by GDP_t. The decomposition for the following countries is not reported because the data on equity flows and/or debt flows are not available: Colombia 1997; Indonesia 1994, 1997, 1998, 2000; Ireland 1994, 1997; Malaysia 1994, 1997, 1999; Mexico 1994, 1995 and Thailand 1997.

Table 2.6: Valuation decomposition: foreign direct investment.

Year	**Country**	$\overline{kg}_t$	nfa_{t-1}	$kgdev_t$	$(a_{t-1} + l_{t-1})$	FDI-	Type
1994	Netherlands	-4.9	14.0	-5.2	59.5	G	G
1996	Netherlands	1.1	13.1	-0.4	66.7	G	G
1997	Netherlands	1.0	16.0	1.2	75.9	G	G
1997	Sweden	50.3	12.3	21.3	62.0	G	G
1997	Switzerland	8.2	25.7	4.0	74.5	G	G
1998	Netherlands	-9.3	19.7	-3.0	82.8	G	G
1998	New Zealand	-5.5	-56.9	14.0	79.9	G	G
1998	Sweden	6.0	31.1	16.0	100.9	G	G
1999	France	-10.9	13.8	-5.1	90.3	G	G
1999	Israel	6.5	-4.5	-18.5	18.5	G	G
1999	Japan	-8.1	5.5	-18.3	6.7	G	G
1999	Philippines	-7.7	-14.7	-7.5	18.9	G	G
1999	South Africa	124.7	8.2	-107.0	31.1	G	G
1999	Sweden	23.7	47.7	12.6	121.7	G	G
1999	United Kingdom	-5.3	9.5	5.0	56.8	G	G
2000	Iceland	-22.4	-0.3	-1.5	10.0	G	G
2000	Ireland	16.4	-41.1	-24.5	84.8	G	G
2000	New Zealand	-17.8	-44.8	15.2	76.0	G	G
2000	Norway	-6.5	6.7	-3.1	38.7	G	G
2000	Sweden	-6.2	55.5	-6.0	177.5	G	G
2001	Iceland	7.5	1.9	-17.3	12.7	G	G
2001	Israel	-2.5	-10.4	3.9	27.7	G	G
2001	Sweden	-20.5	47.9	14.3	184.8	G	G
2002	Netherlands	-10.7	10.8	-2.1	135.2	G	G
2002	Philippines	1.5	-16.9	2.1	19.8	G	G
2003	Sweden	3.6	29.9	-14.1	104.6	G	G
2003	Switzerland	0.2	46.3	-1.6	138.0	G	G
2004	Greece	5.5	-4.9	-4.2	15.7	G	G
2004	Indonesia	-68.3	-2.5	-53.3	4.8	G	G
2004	Switzerland	3.3	42.7	-4.6	144.8	G	G
1994	Ireland	-8.4	-28.7	-0.1	49.3	N	G
1996	Switzerland	3.1	21.3	0.2	66.3	N	G
1997	Colombia	31.9	-8.8	-11.9	10.6	N	G
1997	Ireland	33.8	-26.1	0.1	47.5	N	G
1998	Finland	-59.8	8.4	3.7	23.1	N	G
1998	Ireland	17.5	-32.4	0.4	59.5	N	G
1999	Finland	-19.2	10.2	4.4	36.1	N	G
1999	Ireland	-16.5	-44.3	3.3	86.9	N	G
1999	Netherlands	-17.7	16.4	-1.4	100.0	N	G
2000	Switzerland	-7.1	40.0	2.5	109.6	N	G
2002	Finland	-16.0	20.5	1.9	55.5	N	G
2002	Sweden	-39.0	60.7	-4.3	161.2	N	G
1999	Brazil	36.8	-5.8	43.3	19.1	G	N
2002	Argentina	120.0	-24.4	107.6	33.1	G	N
2002	Brazil	26.2	-12.7	25.8	30.2	G	N
1995	New Zealand	18.2	-35.9	4.3	62.5	N	N
1997	Philippines	14.8	-11.1	10.9	14.1	N	N
1997	Thailand	37.5	-10.0	26.1	13.4	N	N
2000	Philippines	-7.1	-15.6	-0.7	19.3	N	N
2001	Finland	-15.5	19.8	0.1	54.4	N	N

Notes: Decomposition from equation (2.7). 'Type' stands for the kind of large valuation shock according to definitions 1 and 2. 'FDI-' stands for the type of shock in the foreign direct investment subcomponent. Variables nfa_{t-1}, a_{t-1} and l_{t-1} are the previous year net position, gross stocks of assets and gross stock of liabilities respectively scaled by GDP_t. The decomposition for the following countries is not reported because the data on equity flows and debt flows are not available: Indonesia 1994, 1997, 1998, 2000; Malaysia 1994, 1997, 1999 and Mexico 1994, 1995.

Table 2.7: Dynamics in the neighborhood of Type-A episodes.

Type	**Country**	**t=0**	**Variable**	$t-3$	t	$t+3$
A	Argentina	2002	REER	2.8	-61.2	1.3
			TB	1.7	18.0	14.2
			Valuation	0.3	-44.8	-8.1*
A	Colombia	1997	REER	9.2	-5.1	-5.5
			TB	-3.4	-3.6	-0.3
			Valuation	-3.5	-11.7	1.5
A	France	1999	REER	-1.5	-5.8	0.2
			TB	1.0	0.7	-0.3
			Valuation	4.8	-11.5	4.8
A	Greece	2004	REER	3.7	2.2	1.1
			TB	-11.4	-17.9	-21.2
			Valuation	-7.1	-12.6	-10.0
A	Iceland	2000/1	REER	2.9	-8.1	8.6
			TB	-4.8	-5.7	-5.3
			Valuation	1.4	-12.8	2.4
A	Indonesia	2004	REER	8.5	-11.7	
			TB	11.8	11.1	9.4
			Valuation	0.0	-11.9	-1.2
A	Japan	1999	REER	-2.0	16.3	-7.3
			TB	1.9	2.4	1.7
			Valuation	2.9	-12.1	10.2
A	Mexico	1994/5	REER	8.9	-22.0	11.2
			TB	-5.1	-3.8	-3.1
			Valuation	-2.6	-20.0	-23.6
A	Norway	2000	REER	-1.0	-1.6	1.6
			TB	5.5	15.5	16.0
			Valuation	2.2	-14.2	0.9
A	South Africa	1999	REER	-6.0	2.9	-2.1
			TB	-1.9	-1.4	1.1
			Valuation	8.8	-18.5	20.7
A	Thailand	1997	REER	2.0	-33.0	4.5
			TB	-10.1	-3.3	5.9
			Valuation	7.3	-38.4	3.9
A	United Kingdom	1999	REER	8.5	5.5	0.0
			TB	-2.1	-3.5	-3.8
			Valuation	-10.4	10.3	8.6
A	Brazil	1999-2002	REER	-0.8	-15.9	12.2*
			TB	-2.4	-0.1	5.5
			Valuation	-6.1	-31.2	-6.7
A	Indonesia	1994-2000	REER	2.6	-4.8	8.5
			TB	3.6	8.8	15.4
			Valuation	-4.9	-133.1	-0.1
A	Malaysia	1994-1999	REER	3.8	-3.2	2.0
			TB	0.0	5.6	17.3
			Valuation	-8.3	-40.4	-26.2
A	Philippines	1997-2002	REER	6.3	-4.9	-1.3
			TB	-14.0	-1.5	-5.3
			Valuation	0.6	-74.9	-9.9

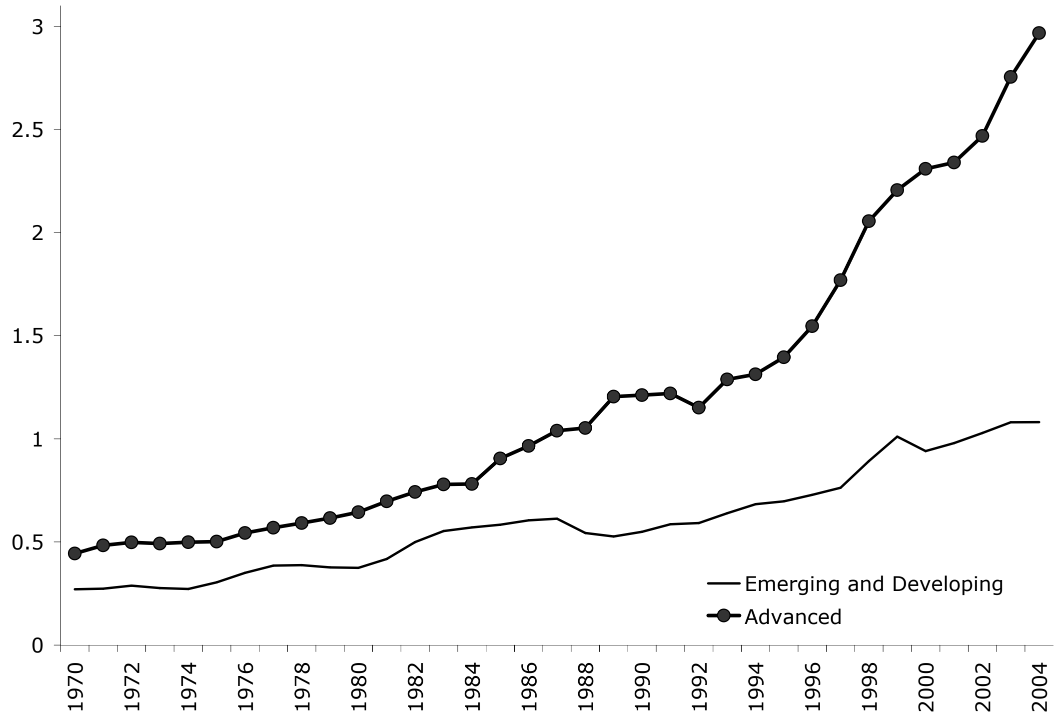
Notes: In the column t, value of the variable in the year of the Type-A valuation episode. Valuation: cumulated valuation scaled by $GDP_{t=0}$. TB: mean trade balance scaled by $GDP_{t=0}$. REER: average % change in the real effective exchange rate index. * means that the value has been calculated using the available remaining years.

Table 2.8: Dynamics in the neighborhood of Type-B episodes.

Type	**Country**	**t=0**	**Variable**	$t-3$	t	$t+3$
B	Finland	1998-2002	REER	-1.4	-0.2	0.1
			TB	7.9	8.6	7.2
			Valuation	-11.8	-43.3	-1.2
B	Ireland	1994-2000	REER	-2.8	-0.8	5.6
			TB	7.0	20.9	44.9
			Valuation	-8.8	20.7	-19.0
B	Israel	1999-2001	REER	0.3	4.2	-8.8
			TB	-6.0	-4.3	-2.7
			Valuation	19.7	-13.5	2.8
B	Netherlands	1994-2002	REER	0.3	0.3	1.4
			TB	2.6	4.2	9.4
			Valuation	-5.6	-80.4	-17.9
B	New Zealand	1995-2000	REER	4.9	-3.2	9.1
			TB	0.6	-1.5	-1.7
			Valuation	-16.7	19.8	-1.3
B	Sweden	1997-2003	REER	3.5	-1.2	-1.2
			TB	5.5	6.8	8.2
			Valuation	-7.3	3.3	-6.3
B	Switzerland	1996-2004	REER	4.1	-0.8	-2.4
			TB	0.7	0.5	-2.6
			Valuation	-16.7	-53.5	-3.4

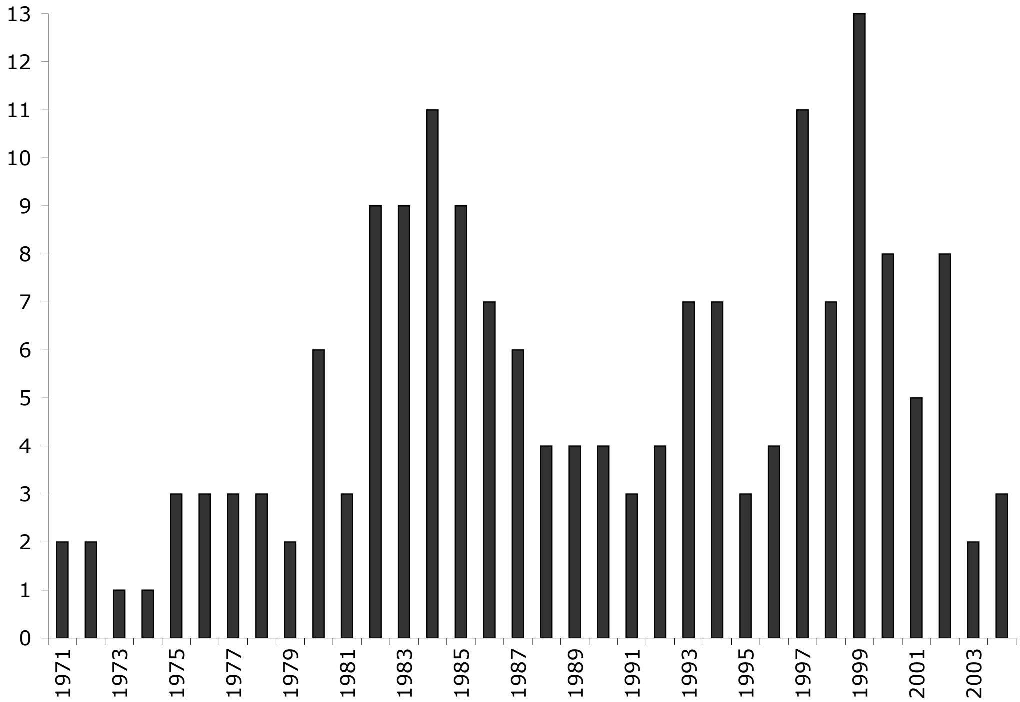
Notes: In the column t, average value of the variable in the Type-B valuation episode. Valuation: cumulated valuation scaled by $GDP_{t=0}$. TB: mean trade balance scaled by $GDP_{t=0}$. REER: average % change in the real effective exchange rate index.

Figure 2.1: Evolution of international financial integration.



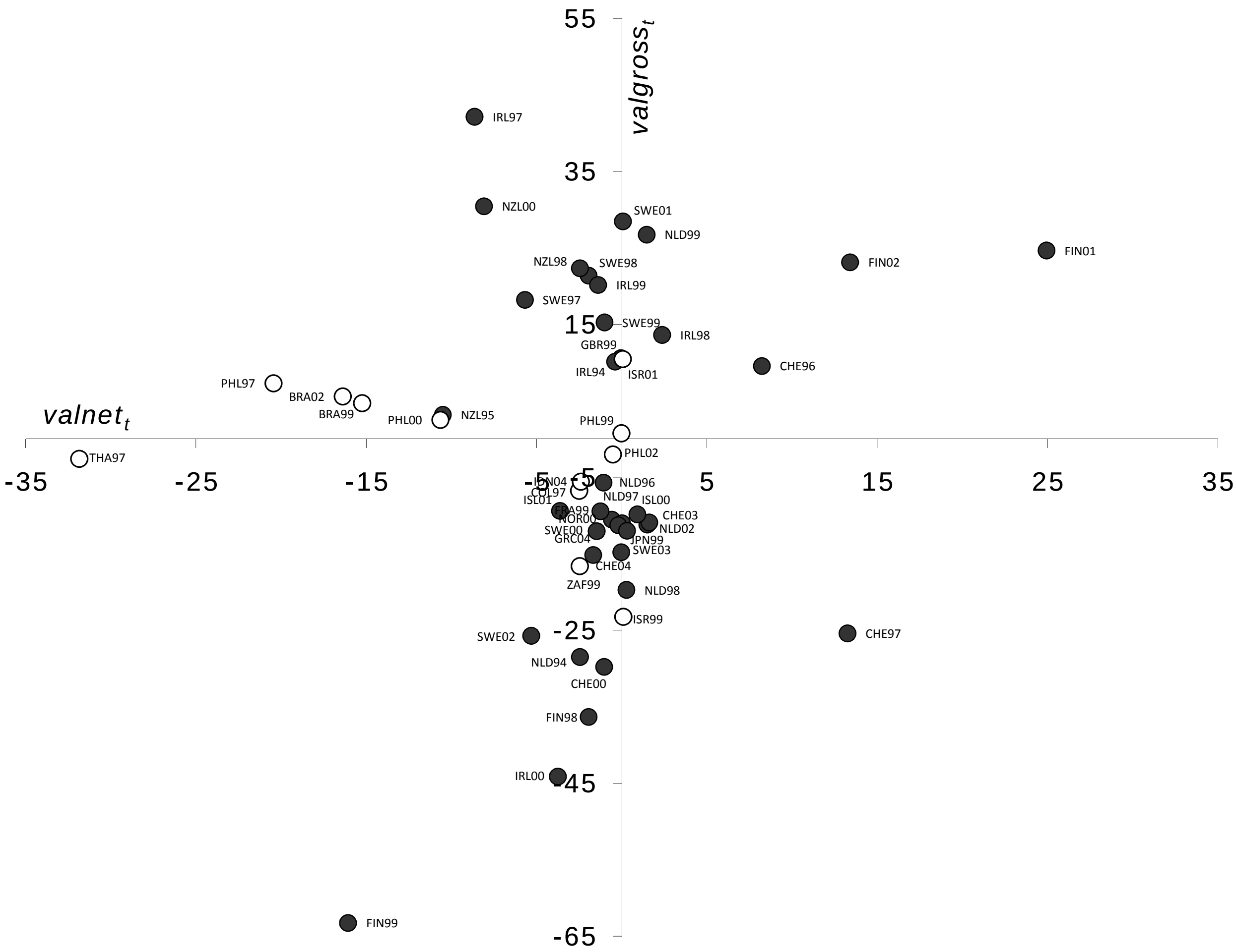
Notes: Based on gross stocks of foreign assets and liabilities data from Lane and Milesi-Ferretti (2007a). Emerging and Developing countries are: Argentina, Brazil, Chile, China, Colombia, India, Indonesia, Israel, Korea, Malaysia, Mexico, Pakistan, Philippines, South Africa, Thailand, Turkey and Venezuela. Advanced countries are: Australia, Austria, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom and United States.

Figure 2.2: Large valuation shocks in time.



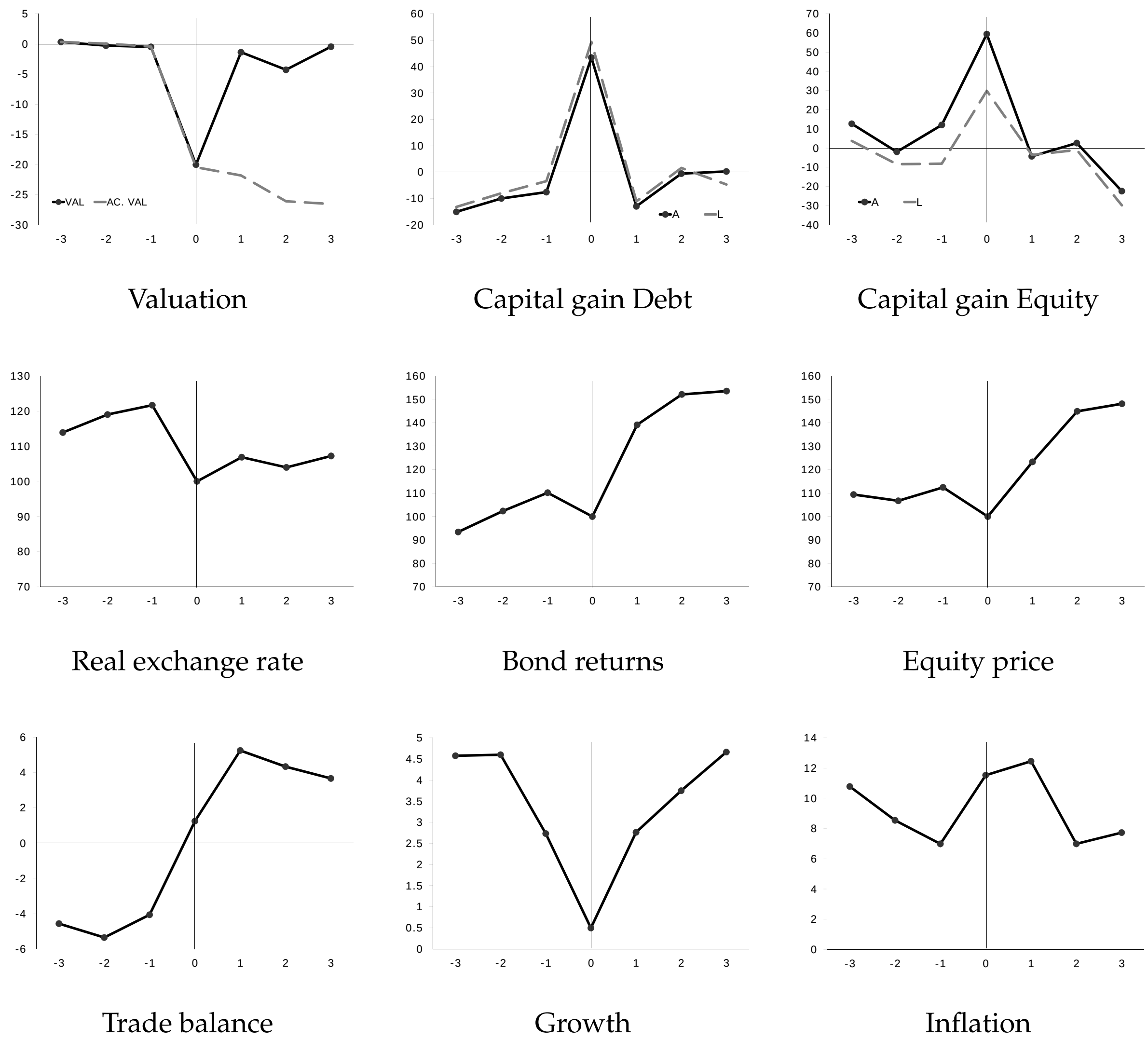
Notes: Vertical axis shows the number of large valuation shocks.

Figure 2.3: Decomposition of large valuations shocks.



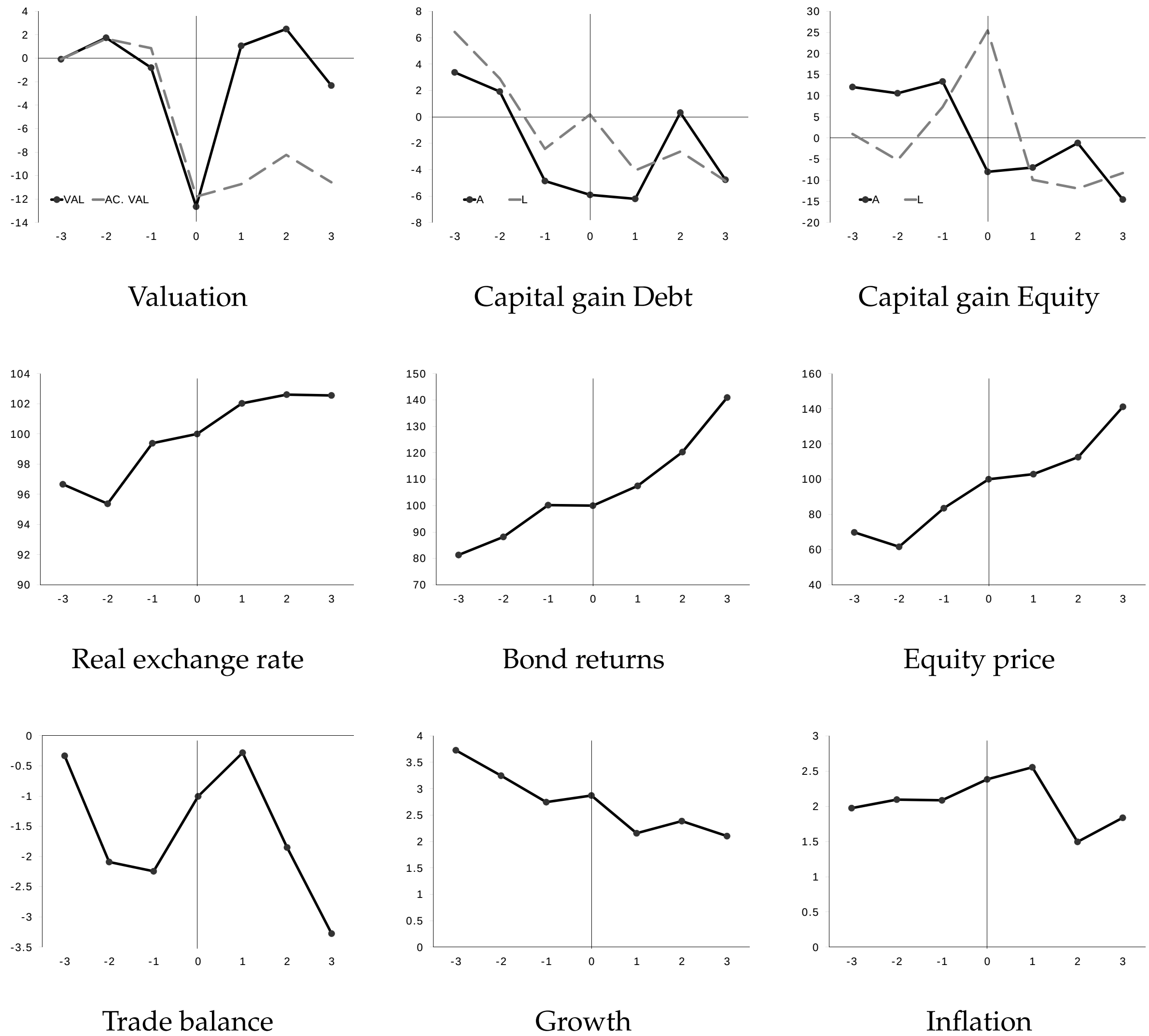
Notes: This figure presents the first and the second term of equation (2.7). Filled circles are advanced countries. The following large valuation shocks are not reported because the data on equity flows and debt flows are not available: Indonesia 1994, 1997, 1998, 2000; Malaysia 1994, 1997, 1999 and Mexico 1994, 1995. As an outlier, the shock of Argentina in 2002 is also excluded (its values of $VALNET_t$ and $VALGROSS_t$ are -77.1 and 42.9, respectively).

Figure 2.4: Dynamics around Type-A negative valuation episodes: emerging markets and developing countries.



Notes: All charts represent cross-country means. The set of countries in this figure is formed by Argentina 2002, Brazil 1999-2002, Colombia 1997, Malaysia 1994-1999, Mexico 1994/1995, Philippines 1997-2002, South Africa 1999 and Thailand 1997. Year $t = 0$ is the year of the valuation episode. When the valuation episode lasts more than one year, we report in $t = 0$ the mean of the variable in that period. The analyzed neighborhood is three years before and after the valuation episode. **Valuation**: mean and cumulated valuation scaled by $GDP_{t=0}$. **Capital gain Debt**: real rate of capital gain in domestic currency for foreign debt assets and liabilities. Debt assets is portfolio debt + bank debt + foreign exchange reserves minus gold. Debt liabilities is portfolio debt + bank debt. Thailand and Malaysia were not taken into account in this chart. For both countries, previous three years flow data on debt assets was not available. **Capital gain Equity**: real rate of capital gain in domestic currency for portfolio equity + foreign direct investment assets and liabilities. Mexico, Colombia, Malaysia and Thailand were not considered in this chart since data on portfolio equity flows was not available. **Real exchange rate**: real exchange rate index, $RER_{t=0} = 100$. **Bond returns**: total return local bond index, $BR_{t=0} = 100$. **Equity price**: local equity price index, $EP_{t=0} = 100$. **Trade balance**: trade balance scaled by $GDP_{t=0}$. **Growth**: % change in the real GDP in local currency. **Inflation**: % change in CPI.

Figure 2.5: Dynamics around Type-A negative valuation episodes: advanced countries.



Notes: All charts represent cross-country means. The set of countries in this figure is formed by France 1999, Greece 2004, Iceland 2000/2001, Japan 1999 and Norway 2000. Year $t = 0$ is the year of the valuation episode. The analyzed neighborhood is three years before and after the valuation episode. **Valuation**: mean and cumulated valuation scaled by $GDP_{t=0}$. **Capital gain Debt**: real rate of capital gain in domestic currency for foreign debt assets and liabilities. Debt assets is portfolio debt + bank debt + foreign exchange reserves minus gold. Debt liabilities is portfolio debt + bank debt. **Capital gain Equity**: real rate of capital gain in domestic currency for portfolio equity + foreign direct investment assets and liabilities. **Real exchange rate**: real exchange rate index, $RER_{t=0} = 100$. **Bond returns**: total return local bond index, $BR_{t=0} = 100$. **Equity price**: local equity price index, $EP_{t=0} = 100$. **Trade balance**: trade balance scaled by $GDP_{t=0}$. **Growth**: % change in the real GDP in local currency. **Inflation**: % change in CPI.

Figure 2.6: Dynamics around Type-B valuation episodes: advanced countries.

Notes: All charts represent cross-country means. The Type-B valuation episodes in this figure are: Ireland 1994-2000, Finland 1998-2002, Netherlands 1994-2002, New Zealand 1995-2000, Sweden 1997-2003 and Switzerland 1996-2004. In $t = 0$ we plot the average value of the variable in the Type-B valuation episode. The analyzed neighborhood is three years before and after the valuation episode. **Valuation**: mean and cumulated valuation scaled by $GDP_{t=0}$. **Capital gain Debt**: real rate of capital gain in domestic currency for foreign debt assets and liabilities. Debt assets is portfolio debt + bank debt + foreign exchange reserves minus gold. Debt liabilities is portfolio debt + bank debt. **Capital gain Equity**: real rate of capital gain in domestic currency for portfolio equity + foreign direct investment assets and liabilities. **Real exchange Rate**: real exchange rate index, $RER_{t=0} = 100$. **Bond returns**: total return local bond index, $BR_{t=0} = 100$. **Equity price**: local equity price index, $EP_{t=0} = 100$. **Trade balance**: trade balance scaled by $GDP_{t=0}$. **Growth**: % change in the real GDP in local currency. **Inflation**: % change in CPI.

Chapter 3

Government spending and the real exchange rate

The aim of this chapter is to study the effects of positive government spending shocks on the real exchange rate in EMU countries. Although this question seems simple, the literature finds difficult to reconcile these effects in theoretical and empirical grounds.

From the theoretical point of view, contrasting implications of a positive shock in government spending are found. On the one hand, neoclassical models predict an increase in output and a negative wealth effect. The latter is produced because agents foresee that they will be taxed in order to finance the increase in government spending. This generates an increase in the current labour supply, decrease in real wages and decrease in private consumption. That is, the negative wealth effect produces an increase in labour supply and a reduction in private demand that causes prices to fall. When this reduction in domestic prices is large and nominal exchange rate does not change, the real exchange rate depreciates.

On the other hand, the implications of Neo-Keynesian models with nominal rigidities are different. Government spending shocks increase labour demand, real wages, private consumption and output. That is, these shocks produce demand side effects that lead to an increase in domestic prices. Then, if nominal exchange rate does not change, this increase in domestic prices leads to appreciation of the real exchange rate.

Efforts to reconcile neoclassical models with the empirical evidence of positive co-movements between government spending and private consumption have focused on the functional form of preferences and the type of consumers. Some of the studies taking this road are Monacelli and Perotti (2006), assuming non-separable utility function; Galí et al. (2007) including rule-of-thumb consumers and; Ravn et al. (2007), using deep habit formation.

Empirically, this question is addressed by studying the impulse-response functions produced by vector autoregressions. Again, contrasting results are found depending on the way in which government spending shocks are identified. Studies using the 'narrative' approach of Ramey and Shapiro (1998) show that positive shocks in government spending do not increase private consumption or wages. In contrast, those using the identification approach of Blanchard and Perotti (2002) and Perotti (2004), find that consumption and wages do increase. This difference is generally attributed to fact that fiscal shocks in the latter may not be fully unanticipated by the private sector. Ramey (2008), shows that if the estimated government spending shocks are in reality anticipated by the private sector by one period, then we would capture the increasing part of the consumption path, missing the negative impact produced by the negative wealth effect. However, Perotti (2007) shows that after removing the two implicit restrictions of the 'narrative' approach, private consumption and real wages increase in response to government spending shocks.[1]

Constrained by the availability of fiscal data, the literature studying the effects of government spending shocks is divided in two branches. The first branch uses Australia, Canada, United Kingdom and United States as case of study, because these countries have long series of reliable non-interpolated quarterly fiscal data. The second branch uses annual frequency and countries of the European Union.

When the variable of interest is the real exchange rate, the dynamic effects of government spending shocks are in sharp contrast between these two branches. On the one hand, papers like Monacelli and Perotti (2006) and Ravn et al. (2007) find that a shock in government consumption produces real depreciation. On the other hand, when the set of countries is changed to the European Union, the dynamic response of the real exchange rate is the opposite. Beetsma et al. (2008) show that a shock in government consumption plus fixed investment appreciates the real exchange rate in EU countries.

This chapter analyzes the relation between government spending and real exchange rate for eleven EMU countries estimating a panel VAR. Some representative articles using this strategy, but with different research questions, are Broda (2004) and Hoffman (2006). The closest study to ours is Beetsma et al. (2008). In that paper, they estimate a six-variable panel VAR using fourteen EU countries and annual data.

Our strategy is similar to theirs in the sense that we estimate a panel VAR for a similar set of countries. The differences are that we estimate a three-variable panel VAR for eleven EMU countries defining GDP and government spending as deviations from the rest-of-EMU members.[2] Moreover, government expenditure is not only taken as the sum of total government consumption and fixed investment, it is broken down into these two components. Furthermore, total government consumption component is broken down into wage and non-wage government consumption.

[1]These two implicit restrictions are that all Ramey-Shapiro episodes have the same dynamics up to a scale factor and, in a version of this approach, that fiscal policy explains all the deviation from 'normal' of all endogenous variables for several quarters after the start of the episode.

[2]However, since they include time-fixed effects and this corresponds to subtracting from each variable its annual mean value across countries, our specification is not too dissimilar to theirs in this respect.

Our findings are consistent with those of that paper. Precisely, a shock in real government expenditure (total government consumption plus fixed investment) appreciates the real exchange rate. However, the study of different types of government spending shows that these responses differ. This is because wage, non-wage government consumption and government investment that includes expenditure in construction, have different proportions of nontradable goods. Our results are that a shock in government investment produces the largest and most persistent real exchange rate appreciation while a shock in total consumption produces the largest impact and the least persistent response. Within total government consumption, government wages play the most important role producing the largest exchange rate response.

Another finding of the chapter is that a shock in government expenditure and total government consumption generates the opposite exchange rate response in a panel formed by Australia, Canada, United Kingdom and United States. Shocks in government expenditure and total government consumption depreciate the real exchange rate while shocks in government investment do not have effects on the real exchange rate.

The reminder of the chapter is organized as follows: In Section 3.1 we make an extensive description of the dataset and the method to construct variables as deviations from the other EMU members. Section 3.2 presents the strategy to identify exogenous spending shocks. In Section 3.3, we present the baseline estimations and study the responses to shocks in different types of government spending. Section 3.4 presents different robustness checks of the baseline results. In Section 3.5, we study the responses of alternative real exchange rates and the relative price of nontradables. Section 3.6, compares our results to those produced by a different set of countries. Finally, in Section 3.7, we conclude.

3.1 Data

The time span of our data is 1970 to 2006 and the frequency is annual. Since we are interested in the effect of government spending shocks on the real exchange rate of advanced countries with a common exchange rate regime, we study eleven EMU countries. We exclude Luxembourg for two reasons: limited availability of fiscal variables and no data for real effective exchange rate vis-à-vis the rest of the EMU. The European Commission publishes, however, this variable for Belgium and Luxembourg together. We take this combined measure as a proxy for the real effective exchange rate of Belgium.

The literature studying the effects of fiscal shocks uses different definitions of government spending. For instance, Blanchard and Perotti (2002) take total government consumption to study its effects on GDP. Monacelli and Perotti (2006) study the effect of government consumption on the trade balance, real exchange rate, GDP and private consumption. In contrast, Monacelli and Perotti (2008) use non-wage government consumption to assess the effect of fiscal shocks on the terms of trade and relative price of nontradables.[3]

Another measure of government spending is government wages. Cavallo (2005, 2007) distinguish between government spending on goods and wages to study the effects of fiscal shocks on consumption and the current account in the United States. Similarly, Giordano et al. (2007) analyze the effects of shocks in these variables on Italian GDP. Government investment shocks are studied implicitly or explicitly in Pappa (2005), Perotti (2007b) and in Beetsma et al. (2006, 2008). In the latter, the analyzed government spending variable is the sum of government investment and government consumption or these taken individually.

Papers examining the effects of these shocks typically take one or two definitions of spending. Here, we study the dynamic effect of five definitions of government spending using annual data for the period 1970 to 2006. These five definitions of government spending are: the sum of government fixed investment (GINV) and total government consumption (GC), that we call government expenditure (GEXP); these two variables taken individually; the wage (WGC) and non-wage (NWGC) government consumption components. Total government consumption excludes transfers. All variables are in log levels.

The source for almost all of these variables is the OECD Economic Outlook No 82. The only exception is government fixed investment for Greece, where we use national sources.[4] Since we are interested in the effect of real government spending, we use government deflators instead of GDP deflators.[5] All variables, but government consumption excluding wages, are deflated with their own deflators, which are also available at the OECD Economic Outlook No 82. For government consumption excluding wages, we use the deflator of total government consumption.

Although data coverage is good, we do not include government wage consumption for Belgium between 1970 and 1975, Germany in 1970 and Portugal between 1970 and 1977. This last country also lacks data for total government consumption and government fixed investment for the same period. Germany also lacks total government consumption for 1970.[6]

The second variable used in our baseline model is gross domestic product in constant local currency units. The source of this variable is also the OECD Economic Outlook. The last variable in our baseline estimations is the CPI-based real effective exchange rate vis-à-vis the rest of the EMU, published by the European Commission. Alternative real effective exchange rate measures from the same source (GDP- and NULC-based real effective exchange rates), are used in Section 3.5. We take these to assess how different real exchange rates, which are based on price deflators with dissimilar shares of domestic prices, respond to government spending shocks.

[3]Subtracting government wages in the United States, they can assume that government spending is as intensive in goods and services as household consumption.

[4]The author would like to thank George Tavlas for providing these data.

[5]It is worth mentioning that fiscal variables deflated with GDP deflator can generate positive effects on output and employment (Monacelli and Perotti 2006).

[6]Data from West Germany and Germany is combined by splicing growth rates in 1991.

3.1.1 Database in relative terms

Since we are interested in evaluating how fiscal policy deviations affect real exchange rates among the EMU countries, we construct a set of indices which measure the deviations of our variables of interest from the rest-of-EMU countries. To this end, we define I as an index that measures the deviations of the variable of interest from the rest-of-EMU countries. This index evolves as follows:

$$I_{i,t} = I_{i,t-1} * \frac{Z_{i,t}}{Z_{i,t-1}}, \tag{3.1}$$

where

$$\frac{Z_{i,t}}{Z_{i,t-1}} = \frac{X_{i,t}}{X_{i,t-1}} - \frac{X_{i,t}^{EMU}}{X_{i,t-1}^{EMU}}. \tag{3.2}$$

The subindex i stands for home country and subindex j for EMU countries different than i. $X_{i,t}$ is the real value of the considered spending variable or real GDP of country i at time t and $X_{i,t}^{EMU}$ is the same variable for the other EMU countries. The last term of (3.2) is defined as

$$\frac{X_{i,t}^{EMU}}{X_{i,t-1}^{EMU}} \equiv \prod_{j \neq i} \left(\frac{X_{j,t}}{X_{j,t-1}} \right)^{\omega_{ij}}. \tag{3.3}$$

From here onwards, we will refer to the expression in (3.3) as the *benchmark*. ω_{ij} is the time invariant trade weight of country j in country i and it is given by

$$\omega_{ij} = \frac{\Sigma_{t=t_0}^{T}(EXP_{ij,t} + IMP_{ij,t})}{\Sigma_{t=t_0}^{T}(EXP_{i,t} + IMP_{i,t})}.^{7} \tag{3.4}$$

$EXP_{ij,t}$ are nominal exports from country i to country j in period t and $IMP_{ij,t}$ are nominal imports of country i from country j in period t.[8] Both are measured in current U.S. dollars. $EXP_{i,t}$ represents total exports of country i to the EMU in period t while $IMP_{i,t}$ stands for total imports of country i from the EMU in period t. We set t_0=1971 and T=2006. For years where X_t is not available, like for example fiscal variables in Portugal between 1970 and 1977, we set ω_{ij} to zero and re-normalize.

The reason for using trade weights instead of GDP weights lies in the fact that trade spillovers from discretionary fiscal policy are found to be important in EU countries.[9] Moreover, trade weights are more consistent with the third variable of our model; the real effective exchange

[7] Since these trade weights are very stable in the 1970 to 2006 period, there is no significant change in the results by considering either $\omega_{ij,t}$ or ω_{ij}.

[8] The source of these data is the Direction of Trade Statistics (DOTS) of the International Monetary Fund.

[9] See Beetsma et al. (2006).

rate.[10] Trade weights together with the alternative GDP weights are reported in Table 3.1.

3.2 Shock identification

As highlighted in Beetsma (2008), the literature has followed two strategies to identify exogenous and unexpected fiscal shocks. The first one is to take events for which it is reasonable to assume that they are exogenous and unexpected. This is the 'narrative' or 'Dummy Variable' approach (Ramey and Shapiro 1998; Edelberg et al. 1999; Burnside et al. 2004 and Romer and Romer 2007).

The second strategy is to identify shocks imposing structural restrictions. Identification strategies within this set vary with the frequency of the data. Most studies using non-interpolated quarterly data identify fiscal shocks using the procedure developed by Blanchard and Perotti (2002) and Perotti (2004). This method decouples the cyclical and the discretionary component of fiscal policy assuming that systematic discretionary responses of fiscal variables are absent in quarterly data. To do this, they make use of country-by-country elasticities available from the OECD (2005) of the various components of net taxes with respect to output.

When quarterly data are not available, we are constrained to use annual frequency and a different identification strategy. However, the use of annual data has some advantages, as highlighted by Beetsma et al. (2008). First, shocks are closer to what a real fiscal shock is, since fiscal policy is not substantially revised within a year. Second, the use of annual data reduces the role of anticipation effects.

Blanchard and Perotti (2002) test the existence of anticipated fiscal policy with future values of estimated fiscal shocks using quarterly frequency. To this end, they include future values of a dummy variable that measures fiscal shocks in their empirical model. They show that anticipation effects are not important in the United States.

Studies suggesting the existence of anticipation effects find that fiscal policy may be anticipated one or two quarters in advance. Using a new variable based on narrative evidence that improves the Ramey-Shapiro military dates, Ramey (2008) shows the existence of anticipation effects that produce qualitative changes in the responses of consumption and real wages. To show this, she performs different Granger causality tests between the war dates and the VAR shocks. The latter were defined as the residual of a dynamic empirical model in which up to four lags of the dependent variable are included.

In our dataset, the presence of anticipation effects could be tested by checking whether output differentials or the real exchange rate Granger causes future values of the government spending VAR shocks. Another strategy would be the implementation of tests similar to those used by Ramey (2008). However, this is not possible in our dataset because series of govern-

[10]Trade weights used in the real effective exchange rate published by the European Commission are not exactly the same as those used in the benchmark variable. This is because the former includes Slovenia as an EMU country.

ment spending shocks identified with the narrative approach are only available for the United States.

Since we use annual frequency any anticipation of policy changes that are further than two quarters into the future becomes less likely. Finally, the use of annual data makes seasonal effects to be less important than in quarterly data. The reason for this is that seasonal changes in fiscal variables are less likely to have cycles that last more than one year.

In terms of identification strategies with annual data, the available options (besides the structural approach based on short- or long-run restrictions or a combination of these two) are: sign restrictions or Choleski decomposition. In the first case, the identification is pursued by constraining the cross-correlation function in response to shocks to assign structural interpretation to orthogonal innovations. This method, as in Canova and Denicoló (2002) and Uhlig (2005), is used by Mountford and Uhlig (2005) and Canova and Pappa (2007) to identify fiscal shocks.

As in Beetsma et al. (2006, 2008), we use the Choleski decomposition. The reason for this choice is the fact that using sign constraints in the context of our model would imply to impose a sign for a certain number of periods to the correlation between government spending deviations and the real growth differential, leaving the response of the real effective exchange rate unconstrained. Here, rather than relying on this data-driven approach to identify spending shocks, we assume that some variables are not allowed to react contemporaneously to shocks in others.

Although we identify shocks in a similar fashion, our baseline specification differentiates from Beetsma et al. (2008) in three main aspects. First, all variables are defined as deviations from the rest-of-EMU countries. Second, we specify a narrower VAR consisting of a measure of government spending, gross domestic product and real exchange rate. Third, we study the effect on the exchange rate of government expenditure (total government consumption plus investment), these two components separately, wage government consumption and non-wage government consumption.

Our three-variables structural model in companion form can be written as follows

$$A_0 Z_{i,t} = A(L) Z_{i,t-1} + C X_{i,t} + \varepsilon_{i,t}. \tag{3.5}$$

$Z_{i,t}$ is a vector of endogenous variables containing: the government spending differential from the rest-of-EMU countries ($\mathrm{g}_{i,t}$), the real GDP differential ($\mathrm{y}_{i,t}$) and the real effective exchange rate ($\mathrm{e}_{i,t}$). All these variables are in log levels. $X_{i,t}$ is a vector with the country-specific intercepts (c_i), country-specific linear trends ($\mathrm{t}_{i,t}$) and year dummies (d_t). Subscripts i and t denote the country and the year. Matrix A_0 captures the contemporaneous relations between the endogenous variables. Matrix $A(L)$, is the matrix polynomial in the lag operator L that captures the relation between the endogenous variables and their lags. Matrix C contains the coefficients of the country fixed effects, the country-specific linear trends and the time fixed effects. The vector $\varepsilon_{i,t}$, contains the orthogonal structural shocks to each equation of the VAR and var$(\varepsilon_{i,t}) = \Omega$. Thus,

$$Z_{i,t} = \begin{bmatrix} \mathrm{g}_{i,t} \\ \mathrm{y}_{i,t} \\ \mathrm{e}_{i,t} \end{bmatrix} \quad A_0 = \begin{pmatrix} 1 & -\alpha_{\mathrm{yg}} & -\alpha_{\mathrm{eg}} \\ -\alpha_{\mathrm{gy}} & 1 & -\alpha_{\mathrm{ey}} \\ -\alpha_{\mathrm{ge}} & -\alpha_{\mathrm{ye}} & 1 \end{pmatrix} \quad X_{i,t} = \begin{bmatrix} \mathrm{c}_i \\ \mathrm{t}_{i,t} \\ \mathrm{d}_t \end{bmatrix} \quad \varepsilon_{i,t} = \begin{bmatrix} \varepsilon^{\mathrm{g}}_{i,t} \\ \varepsilon^{\mathrm{y}}_{i,t} \\ \varepsilon^{\mathrm{e}}_{i,t} \end{bmatrix}.$$

Premultiplying (3.5) by A_0^{-1} we obtain our model in reduced-form,

$$Z_{i,t} = B(L)Z_{i,t-1} + DX_{i,t} + u_{i,t}; \tag{3.6}$$

where $B(L) = A_0^{-1}A(L)$, $D = A_0^{-1}C$, $u_{i,t} = A_0^{-1}\varepsilon_{i,t}$, $u_{i,t} = \begin{bmatrix} u^{\mathrm{g}}_{i,t} & u^{\mathrm{y}}_{i,t} & u^{\mathrm{e}}_{i,t} \end{bmatrix}'$ and var$(u_{i,t}) = \Sigma$.

In order to recover $\varepsilon_{i,t}$ and Ω from the reduced-form, we impose $\alpha_{\mathrm{yg}} = \alpha_{\mathrm{eg}} = \alpha_{\mathrm{ey}} = 0$ to matrix A_0. Therefore, the structural shocks are given by

$$\begin{bmatrix} \varepsilon^{\mathrm{g}}_{i,t} \\ \varepsilon^{\mathrm{y}}_{i,t} \\ \varepsilon^{\mathrm{e}}_{i,t} \end{bmatrix} = \begin{pmatrix} 1 & 0 & 0 \\ \alpha_{\mathrm{gy}} & 1 & 0 \\ \alpha_{\mathrm{ge}} + \alpha_{\mathrm{ye}}\alpha_{\mathrm{gy}} & \alpha_{\mathrm{ye}} & 1 \end{pmatrix} \begin{bmatrix} u^{\mathrm{g}}_{i,t} \\ u^{\mathrm{y}}_{i,t} \\ u^{\mathrm{e}}_{i,t} \end{bmatrix}.$$

Imposing these restrictions is equivalent to assume that fiscal spending deviation from the rest of the EMU countries does not react contemporaneously to shocks in the real GDP differentials or the real exchange rate and; that the real GDP differential does not react contemporaneously to shocks in real exchange rate. Therefore, the Choleski ordering to identify shocks is: government spending deviations, GDP differential and real effective exchange rate.

These identification assumptions are in line with papers dealing with the effects of discretionary fiscal shocks in the sense that we order g before y. This ordering is motivated by the fact that government spending is planned before the period starts. Moreover, Beetsma et al. (2006) estimate a panel VAR in public spending (g) and output (y) for seven EU countries with non-interpolated quarterly fiscal data assuming that g does not react to y within a quarter. From these results they construct an estimate of the response of public spending to output at annual frequency finding that it is not significantly different from zero.

3.3 Baseline empirical model

3.3.1 Estimation approach

We estimate the three equations of our system independently using least squares in RATS. To deal with country-specific heterogeneity we include country fixed effects (c_i) and country-specific linear trends ($t_{i,t}$). The latter is used because many variables, even if they are defined as deviations from the other EMU members, are not stationary at individual country level. Although all variables are defined as deviations from the rest of the EMU, the use of fixed trade weights may produce common fluctuations across countries. To control for this and to eliminate cross-country contemporaneous residual correlation, we include time fixed effects (d_t).

Nickell (1981) and Arellano (2003) show that the introduction of lagged regressors in panels with fixed effects induce serial correlation between the residuals and future values of the regressors. When the time dimension of the panel is fixed and the cross-section dimension tends to infinity, this correlation produces a bias in the coefficient of the lagged dependent variable. Our panel has eleven EMU countries and annual data for the period 1970 to 2006. This means that if present, biases in the coefficients may be small. We set the lag length of each model to two according to the Akaike Information Criterion, Schwarz Bayesian Information Criterion and the absence of first-order autocorrelation, tested with the Durbin-Watson statistic. However, it is important to mention that the latter statistic may not be the appropriate test for first order serial autocorrelation in panels with fixed effects. This is because these country-specific intercepts induce serial correlation between the residuals and the future values of the regressors.[11]

As previously mentioned, we estimate panel VARs for five types of government spending. Following Beetsma et al. (2001, 2008), we define GEXP (government expenditure) as the sum of total government consumption excluding transfers (GC) and government fixed investment (GINV). Perotti (2007b) shows that government investment and government consumption have dissimilar effects on GDP. Taking this into account and since the distribution of the GDP increase determines the response of the real exchange rate, we also study the dynamic effects of positive shocks in these two variables. Furthermore, in the same way of Cavallo (2005, 2007) and Giordano et al. (2007), we break down total government consumption into wage (WGC) and non-wage (NWGC) consumption.

In Table 3.2 and Figure 3.1, we present the real exchange rate and GDP differential responses to a shock in government spending deviation equivalent in magnitude to 1 percent of GDP. To scale the responses we take the cross-country average of the government expenditure to GDP ratio for the period 1970 to 2006. For these EMU countries, this ratio is equal to 22 percent. The shares of government investment, total government consumption, wage and non-wage government consumption in GDP are 3.2, 18.8, 11.2 and 7.6 percent, respectively.

In order to derive the 16th and 84th percentiles of the impulse-response distribution in the figures, we perform Monte Carlo simulations and assume that the parameter distribution is normal. Hence, the mean of the impulse response minus/plus one standard deviation corresponds to the 16th and 84th percentiles of its distribution, respectively. Taking this into account,

[11] For possible alternatives see Baltagi et al. (2007).

we use this information to construct several t-tests and show whether the point estimates of the mean impulse-responses are statistically different from zero in Tables 3.2 and 3.4.

3.3.2 Impulse-response analysis

Government expenditure

A 1 percent of GDP shock in government expenditure produces a 0.95 percent increase in the GDP differential on impact. This effect is statistically significant at 1 percent. The peak is found one year after the shock where the GDP differential reaches 1.36 percent. From year one onwards, this effect starts vanishing and becomes statistically insignificant in year seven. This spending shock appreciates the real effective exchange rate on impact by 1.04 percent and also in the subsequent six years. The peak appreciation is in year two with a value of 1.47 percent. This response is statistically significant up to year six.

These qualitative results are in line with the findings of Beetsma et al. (2008). The main difference is that the real exchange rate does not show an impact appreciation in their empirical model. As in our case, the maximum appreciation is between year one and three. Since we define all variables as deviations from the rest-of-EMU trend and we use eleven EMU countries, instead of fourteen EU, it is not possible to directly compare their quantitative results to ours.

Government investments vs. government consumption

Shocks of 1 percent of GDP in government investment or government consumption increase GDP differentials. For the first case, the response is larger and significant for a longer period. Both appreciate the exchange rate on impact: a shock in government investment produces a real appreciation of 1.23 percent while a shock in government consumption appreciates the exchange rate by 1.48 percent.

Shocks in government investment produce larger and more persistent exchange rate responses than shocks in government consumption. In the latter, the real appreciation vanishes from year five onwards. Government investment generates the largest real appreciation across all definitions of government spending. The peak appreciation produced by this shock is 3.49 percent in year three. Furthermore, the point estimate of the mean response is statistically significant along the whole impulse-response horizon.

Government consumption: wage vs. non-wage elements

When government consumption is broken down into the wage and non-wage components, a shock in the latter increases the GDP differential by 0.5 percent to 0.93 percent while a shock in the former does not have a statistically significant effects on this variable.

The real exchange rate response is positive and statistically significant for both shocks. In the non-wage case, it is significant at 10 percent and equivalent to 0.8 and 1.01 percent appreciation in year zero and year one. A shock in government wages produces a larger and more persistent exchange rate response. The impact is equal to a 1.07 appreciation while the peak, in year two, equals to 1.92 percent.

3.3.3 Variance decomposition

Next, we study the contribution of structural innovations to the h-step ahead forecast error variance. This exercise gives information on the relative power of each shock in explaining the forecast error variance of the equations in the VARs at different forecast horizons. Therefore, it is complementary to the impulse-response analysis presented previously. Since we are interested only in the proportion of forecast error variance attributable to each shock, we do not report the size of these standard errors.

In what follows, we examine the contribution of structural innovations in government spending to the forecast error variance of the exchange rate equation. Accordingly, Figure 3.2 shows that the forecast error variance attributable to a shock in government expenditure ranges between 3.0 and 5.8 percent.[12] Between h=1 and h=6 this proportion grows and from h=7 onwards it stabilizes around 5.8 percent.

Consistently with the impulse-response analysis, government investment explains the largest proportion of the forecast error variance in the real exchange rate equation. For the first two steps, the variance attributable to this shock is less that 5 percent. However, from h=3 onwards, this share grows and stabilizes at 34.7 percent after h=8.

The forecast error variance attributable to government consumption is the second largest. Between h=4 and h=10, it accounts for 14 percent of the total variance. After government investment and consumption, a shock in government wages explains the largest proportion in later years. From h=3 onwards, 13.7 percent of the forecast errors variance in the real exchange rate equation is attributable to this shock. In line with our previous results, non-wage government consumption explains the smallest proportion of forecast error. The shares of forecast error variance attributable to this shock are between 0.8 and 1.06 percent.

For the case of the GDP equation, the largest proportion of forecast error variance is attributable to shock in government investment. This is on average 12 percent of the forecast error variance of this equation. In the second place, we find a government expenditure explaining between 4 and 9 percent of the forecast error variance. On the other extreme, the least proportion is attributable to a shock in wage government consumption. This is close to zero along the whole forecast horizon.

[12] Figure 3.2 shows the proportion of the forecast error variance attributable to a shock in two of the three endogenous variables, for all the equations and VARs. That is, if the equation is GDP, we show the share of variance attributable to a shock in government spending and real exchange rate.

3.3.4 Summary

A 1 percent of GDP shock in each definition of government spending, measured as deviation from the rest-of-EMU trend, appreciates real effective exchange rate. The magnitude and persistence differs from case to case. The largest impact response is produced by a shock in total government consumption, followed by a shock in government investment and then by a shock in government expenditure. An investment shock produces the largest and the most persistent effect on the real exchange rate. When government consumption is broken down into the wage and non-wage component, the former produces real appreciation while the latter does not.

3.4 Robustness checks

In order to check the robustness of our results, we follow five different strategies. First, we estimate each panel VAR excluding one country member at a time and constructing variables relative to a different benchmark, to see if there are single countries driving the results of the whole panel. In this exercise, the rest-of-EMU benchmark is made of the other nine rather than ten EMU countries.

Figure 3.3 shows the mean real exchange rate responses to a 1 percent of GDP shock in each government spending. Thick black lines are the responses of the baseline model while thin gray lines are the responses excluding one country member at a time. This figure shows that baseline exchange rate responses are robust to this change in the dataset. However, the exclusion of some countries in some types of government spending produce quantitative differences.

When the shock is in government expenditure, the exclusion of Ireland produces larger real appreciations for the first years. For a shock in government investment, we find that the exclusion of Belgium leads to larger responses from year four onwards. For a shock in government consumption, the exclusion of Ireland generates again a larger response in the first years and the exclusion of Greece, leads to more persistent real appreciation. Finally, when the shock is in government wages, the exclusion of Portugal or the Netherlands leads to greater real appreciations.

The second robustness check is to estimate a panel VAR including an additional endogenous variable which is defined as the difference between the total government expenditure and one of the other four definitions of government spending analyzed in this chapter. That is, when the variable is government investment, this additional variable is given by total government expenditure minus government investment. For this case, this is equal to government consumption. We name this variable the 'complement government spending'. Following this strategy, we ensure that a shock in, for example government investment, is a shock in this variable and not a shock in the aggregate government expenditure which is contemporaneously correlated with government investment. However, it is important to mention that this short run identification restriction is a strong assumption because the decisions on the different components of government expenditure may not be orthogonal to each other.

Figure 3.4 and Table 3.4 show the responses to shocks in government fixed investment, government consumption, wage and non-wage government consumption. The Choleski ordering to identify these shocks is: government spending, the complement government spending, the GDP and finally the real exchange rate. This change in the specification does not change the responses of GDP and real exchange rate.[13]

Another strategy to check the robustness of our results is to estimate the baseline for a different period. Precisely, we take the pre-EMU years (i.e. from 1970 to 1998). We do this to check if this change in the exchange rate regime has affected the way in which the real exchange rate responds to shocks in government spending. Table 3.3 shows the statistically significant differences in the responses of the exchange rate and GDP for these two periods and Table 3.4 shows the exchange rate responses for the whole impulse-response horizon. We check whether the differences between the responses in these two periods are significant with t-tests that are based on the 1000 different responses generated by the Monte Carlo simulations for each year of the impulse-response horizon.

For all cases where impact GDP responses are statistically significant, the pre-EMU sample delivers larger responses. This difference changes sign from year two onwards. The exchange rate impact response for the pre-EMU period is also larger for all government spending. This negative difference last at least four periods in government expenditure, five in investment and the whole impulse-response horizon in government wages. Although the responses are qualitatively similar, there is evidence that government spending shocks produced larger real appreciation in the period preceding the creation of the European Monetary Union; at least in government expenditure, investment and wage consumption.

Since Perotti (2004) and Romer and Romer (2007) provide evidence showing that variance of fiscal policy shocks and their effects on GDP and consumption have declined after 1980, we also estimate each panel VAR for the period 1980 to 2006. Figure 3.6 shows the impulse-response functions of each endogenous variable to shocks in each definition of government spending. The point estimates of the mean exchange rate response, together with their significance, are also reported in Table 3.4.

This robustness check shows that the baseline responses are qualitatively robust to this change in the sample period, although real exchange rate responses become less persistent. Table 3.4 shows that the impact and peak response of the exchange rate to shocks in government expenditure, government consumption, wage and non-wage government consumption are grater than in the baseline. Government investment produces a larger impact but smaller

[13]For a shock in government fixed investment, government total consumption and non-wage government consumption, the response of the complement government spending is positively correlated with the shock. In contrast, a shock in government wages is negatively correlated with this additional variable. This strong negative correlation explains why output does not increase as a result of a shock in wage government consumption.

peak and less persistent response. In line with the evidence of the decline in the variance of fiscal shocks, point estimates of the mean response in this period are less significant.

Finally, we check if our baseline results are robust to the inclusion of the general consolidated gross debt as a ratio of GDP. Following Beetsma et al. (2008) we include the logarithm of the first two lags of this variable.[14] Figure 3.7 shows that our baseline responses are robust to this specification. As highlighted by Beetsma el al. (2008), this may be the result of the country-specific trends picking up the effects of movements in the debt-GDP ratios.

Although exchange rate responses are qualitatively similar, Table 3.4 shows that the inclusion of the debt feedback leads to a larger delayed appreciations to government expenditure and government wages shocks. The real exchange response to a shock in government consumption is larger for the whole impulse-response horizon, when the debt feedback is included. For the case of a government investment shock, exchange rate impact and year one to four responses are smaller than in the baseline model.

3.5 Alternative relative price indices

3.5.1 Real exchange rates based on different price deflators

This section studies how exchange rate responses are affected by the use of deflators with different shares of domestic prices. To this end, we replace the CPI-based real effective exchange rate in each panel VAR by the GDP- and the NULC-based (nominal unit labor cost) real effective exchange rates, taken from the European Commission.

The use of these alternative exchange rate measures complements the study previously presented for the CPI-based real exchange rate. This is because the GDP-based real exchange rate measures the relative competitiveness between countries as a whole, since it depends on output prices. By contrast, the exchange rate based on nominal unit labour cost gives information on the relative competitiveness only in the labour markets. Moreover, by studying these we can show the role of price indices with different proportions of domestic prices in the exchange rate responses. The exchange rate based on the CPI deflator is the one with the least proportion of domestic prices, since it includes import prices. On the contrary, the nominal unit labor cost deflator has the largest share of domestic prices.

Figure 3.8 shows the responses of these exchange rates to a shock in each type of government spending of a magnitude equivalent to 1 percent of GDP. For a shock in government expenditure, the exchange rates based on CPI or GDP deflators respond similarly. However, the NULC-based exchange rate response is different since it has the largest impact and it is the most persistent. As shown in Table 3.4, all responses to a shock in government expenditure are statistically significant at least for the first five years. This result suggest that, in EMU countries,

[14]The source for general government consolidated gross debt is AMECO.

this shock appreciates more the exchange rate based on the largest share of domestic prices.

A shock in government investment produces close impact responses in the CPI- and GDP-based exchange rates. However, the latter gives the smallest real appreciation from year two onwards. After year one, the NULC- and CPI-based exchange rates appreciate similarly. When this exercise is done for government consumption, we find that the largest and the most persistent appreciation is in the NULC-based exchange rate. This result, together with the one of government investment, suggest that the largest and most persistent response in the NULC-based exchange rate as a result of a shock in government expenditure, is produced by the government consumption subcomponent. In order of magnitude and persistence, the second largest response to a shock in government consumption is in the GDP-based exchange rate.

Finally, a shock in government wages produces the largest impact appreciation in the UNLC-based exchange rate. This is because this shock is associated with a labor demand shock. However, this response becomes the smallest after two years. Table 3.4, shows that these responses are significant for the first periods only, implying that the observed differences of the point estimates in latter years are not meaningful. Although presented for completeness in Figure 3.8, we omit the assessment of the shock in non-wage government consumption because these responses are not statistically significant.

3.5.2 Relative price of nontradables

We have shown that exchange rates based on deflators with different shares of domestic prices respond differently to shocks in government expenditure, government investment and government consumption. In this line, since the relative price of nontradables plays an important role in the real exchange rate fluctuations, we study the response of the relative price of nontradables to these shocks. To this end, we replace the real effective exchange rate with the ratio of nontradable to tradable price indices, expressed in relative terms vis-à-vis trading partners.

As in the baseline model, the relative price of nontradables evolves following equation (3.1). That is, it moves according to the difference between the rates of change in relative price of nontradables in the considered countries and the rate of change in the benchmark. The latter is formed by the trade weighted average of the relative price of nontradables in the other EMU members. However, $\frac{Z_{i,t}}{Z_{i,t-1}}$ is now

$$\frac{Z_{i,t}}{Z_{i,t-1}} = \frac{\frac{P_{i,t}^{NT}}{P_{i,t-1}^{NT}}}{\frac{P_{i,t}^{T}}{P_{i,t-1}^{T}}} - \prod_{j \neq i} \left(\frac{\frac{P_{j,t}^{NT}}{P_{j,t-1}^{NT}}}{\frac{P_{j,t}^{T}}{P_{j,t-1}^{T}}} \right)^{\omega_{ij}} . \tag{3.7}$$

Similarly to equation (3.2), i stands for home country, j for the other EMU countries and ω_{ij} is a time invariant trade weight given by equation (3.4). P^{NT} and P^{T} are prices of nontradable and tradable goods, respectively. Following Lane and Milesi-Ferretti (2002), we construct proxies for P^{NT} and P^{T} using price indices of different sectors. We take these indices from the

EU KLEMS dataset.

For P^{NT}, we take a value added weighted average of three different price indices: 'construction', 'hotels and restaurants' and 'community social and personal services'; while for P^{T}, we take the 'manufacturing' price index.

Figure 3.9 shows the responses to a spending shock equivalent to 1 percent of GDP for all government spending. As in the case where the real exchange rate is used, the relative price of nontradables increases after a spending shock in government expenditure, government fixed investment and total government consumption. Shocks in non-wage and wage consumption do not produce statistically significant responses.

Although the impact effect is not significant, a shock in government investment produces the largest and the most persistent response in the relative price of nontradables. The peak is in year five with a value equivalent to 3.8 percent. In the second place, the largest response is produced by a shock in total government consumption with insignificant impact effects and a peak in year one equal to 1.24 percent. As shown in Figure 3.10, responses of the relative price of nontradables are robust to the introduction of the 'complement government spending', as additional endogenous variable. However, for a shock in total government consumption, the response of the relative price of nontradables is of smaller magnitude.

Taking the United States as a case study and defining government consumption as government consumption of intermediate goods and services plus compensation of government employees and defense spending on equipment and software, Monacelli and Perotti (2008) find similar results. A 1 percent of GDP shock in this variable produces an increase in relative price of nontradables with a maximum close to 1 percent in year one.

For the EMU, the sum of government fixed investment and total consumption (government expenditure) produces also an increase in the relative price of nontradables. Although the impact effect is not significant, the peak response is in year three and equal to 1.05 percent. This result is in line with the findings of Monacelli and Perotti (2008). In contrast, shocks in wage and non-wage government consumption do not generate statistically significant responses.

Responses of the relative price of nontradables are qualitatively similar to those of the real exchange rate as a result of a shock in government investment and consumption. A positive deviation from the rest-of-EMU trend in government expenditure, government investment or total government consumption produces an increase in the relative price of nontradables as well as a real exchange rate appreciation.

3.6 The Perotti sample

In contrast to our results, several papers find that shocks in government expenditure or government consumption produce real depreciation.[15] These studies, use countries for which non-

[15]See for example Monacelli and Perotti (2006) and Ravn et al. (2007).

interpolated quarterly fiscal data are available and identify shocks with the approach of Blanchard and Perotti (2002).

Here, we take this set of countries, formed by Australia, Canada, United Kingdom and United States, and estimate different panel VARs using variables in relative terms at annual frequency. To construct relative measures we follow the procedure outlined in Section 3.1 but using instead the G7 countries as the benchmark. The chosen real effective exchange rate index is taken from the European Commission, based on the CPI deflator and computed vis-à-vis twenty four trading partners. To identify fiscal shocks we use the same Choleski ordering of Section 3.2.

Figure 3.11 shows the responses to a spending shock equivalent to 1 percent of GDP in government expenditure, government fixed investment and total government consumption.[16] As in the literature dealing with these countries, we find that a shock in government expenditure produces a real depreciation. The peak is found in year two, where it is equivalent to 2.54 percent. From this year onwards, the real exchange rate appreciates but does not reach the original levels; at least before ten years after the shock. For this fiscal variable as well as total government consumption, the results are the opposite to those of the EMU countries. Government consumption produces a statistically insignificant impact response but produces a real depreciation equivalent to 3.85 percent in year four. In line with Perotti (2007) findings, government investment is not more effective than government consumption shocks in boosting the GDP. Moreover, shocks in the former do not affect the real exchange rate.

This section shows that using the same estimation approach and methodology to identify fiscal shocks, the real exchange rate responses differ between the EMU and the Perotti sample. A potential explanation for this lies in the exchange rate regime. On the one hand, the Perotti sample is formed by countries adopting flexible exchange rate regimes after the collapse of the Bretton Woods system. While on the other, we have the EMU countries with different exchange rate arrangements going from flexible exchange rate regimes with bands to currency union.

It is well known that the monetary policy can not target the exchange rate and the business cycle at the same time if capital flows are free. Therefore, if the country has a flexible exchange rate regime, the monetary policy can accommodate a fiscal expansion. Then, if the depreciation of the local currency produced by the monetary expansion is large enough, the increase in prices produced by the fiscal shock may be counterbalanced by the nominal exchange rate effect leading to a real exchange rate depreciation. In contrast, an expansionary fiscal shock is more likely to generate real exchange rate appreciation if the exchange rate regime is fixed.

To test this conjecture, a potential strategy would be to follow Beetsma et al. (2008). That is, to include monetary instrument such as the short run interest rate in the baseline estimation and place it after the government spending variable in the Choleski ordering. Doing this, it will

[16]Since wage and non-wage government consumption for Australia are not available at the OECD Economic Outlook, shocks in these variables are not studied.

be possible to account for changes in monetary policy and confront the results between these two sets of countries.

The discrepancy between the exchange rate responses may be related to the structural differences between the 'Anglo-Saxon' countries of the Perotti sample and the countries of the EMU used in our baseline model. This is somehow suggested by the first robustness test showing that the exclusion of Ireland produces important quantitative differences in the exchange rate responses. These differences affecting the exchange rate responses may be in the structure of the labour markets or in the governmental institutions. To test the former a strategy would be the inclusion of the rate of unemployment in the baseline specification, since this would capture the difference in the flexibility of the labour markets. To test the latter, a potential approach would be to account for the tradable and nontradable goods composition of the government expenditure. Furthermore, these two differences could also be tested by excluding group of countries with structural similarities in these dimensions and compare the exchange rate responses as in the first robustness check.

3.7 Conclusions

This chapter makes a contribution to the literature of fiscal shocks in open economies by estimating the effects of different government spending shocks on the real effective exchange rate of eleven EMU countries. To this end, we use a dataset with different types of government spending and GDP constructed as deviations from the other EMU members to then estimate a three-variables panel VAR.

When we use the most aggregate measure of government spending, our results are in line with papers using similar set of countries and annual data. That is, an unexpected government expenditure shock appreciates the real exchange rate. The study of the different government spending subcomponents shows that the largest appreciation is produced by shocks in government fixed investment and that this appreciation is maximized between three or four years after the realization of the shock. To the best of our knowledge, this result has not been shown before. Most papers studying the response of the real exchange rate to spending shocks use either total government consumption or the sum of this and government fixed investment.

Moreover, government consumption produces the largest impact and the least persistent real exchange rate response. Within this category, government wages are the part of spending generating the exchange rate appreciation since non-wage government consumption does not affect the exchange rate. Furthermore, statistically significant exchange rate responses are found to be of larger magnitude for the period preceding the EMU.

We also analyze the effects of these shocks on the relative price of nontradables finding that they respond similarly to the real exchange rate. Relative price of nontradables increase as a result shocks in government expenditure, government investment and government consumption. As in the case of the exchange rate, the response of the relative price of nontradables is maximized when the shock is in government investment.

The result of real appreciation produced by a spending shock is in sharp contrast to the findings of papers using the Perotti sample. Using the same method as for the EMU, we also find that government spending shocks depreciate the real exchange rate of these countries. A possible explanation for this may be the role of different exchange rate regimes in both country samples.

Table 3.1: Trade weights (ω_{ij}) and GDP weights.

Country	Partner	Trade	GDP	Country	Partner	Trade	GDP
Austria	Belgium	3.3	3.9	Ireland	Austria	1.3	3.1
	Finland	1.2	2.1		Belgium	13.5	3.9
	France	6.8	23.0		Finland	2.4	2.0
	Germany	64.5	31.6		France	20.3	22.6
	Greece	0.8	2.1		Germany	30.2	31.0
	Ireland	0.5	1.3		Greece	0.8	2.1
	Italy	14.9	18.6		Italy	9.7	18.2
	Netherlands	5.1	6.2		Netherlands	15.4	6.1
	Portugal	0.7	1.6		Portugal	1.2	1.6
	Spain	2.2	9.6		Spain	5.2	9.4
Belgium	Austria	1.2	3.2	Italy	Austria	4.7	3.8
	Finland	0.8	2.1		Belgium	7.2	4.6
	France	26.7	23.2		Finland	1.0	2.4
	Germany	32.4	31.8		France	28.3	27.2
	Greece	0.6	2.1		Germany	37.8	37.3
	Ireland	1.7	1.3		Greece	2.5	2.5
	Italy	7.3	18.7		Ireland	1.1	1.5
	Netherlands	25.6	6.3		Netherlands	9.0	7.4
	Portugal	0.8	1.7		Portugal	1.4	1.9
	Spain	2.9	9.7		Spain	7.0	11.3
Finland	Austria	3.7	3.1	Netherlands	Austria	1.7	3.3
	Belgium	7.1	3.9		Belgium	22.5	4.0
	France	13.5	22.8		Finland	1.4	2.1
	Germany	43.6	31.2		France	15.1	23.7
	Greece	1.4	2.1		Germany	44.8	32.6
	Ireland	1.8	1.3		Greece	0.9	2.2
	Italy	9.5	18.4		Ireland	1.4	1.4
	Netherlands	12.9	6.2		Italy	7.9	19.1
	Portugal	1.8	1.6		Portugal	0.9	1.7
	Spain	4.7	9.5		Spain	3.4	9.9
France	Austria	1.6	4.0	Portugal	Austria	1.9	3.1
	Belgium	16.9	4.9		Belgium	6.0	3.9
	Finland	1.0	2.6		Finland	1.6	2.0
	Germany	35.2	39.4		France	19.9	22.7
	Greece	1.1	2.6		Germany	27.3	31.1
	Ireland	1.4	1.6		Greece	0.5	2.1
	Italy	20.0	23.1		Ireland	0.8	1.3
	Netherlands	10.8	7.8		Italy	11.0	18.3
	Portugal	1.9	2.0		Netherlands	8.3	6.1
	Spain	10.1	12.0		Spain	22.7	9.5
Germany	Austria	9.8	4.4	Spain	Austria	1.5	3.4
	Belgium	14.1	5.5		Belgium	5.9	4.2
	Finland	2.2	2.9		Finland	1.2	2.2
	France	25.2	32.1		France	31.0	24.6
	Greece	1.7	2.9		Germany	27.6	33.7
	Ireland	1.6	1.8		Greece	1.1	2.2
	Italy	17.5	25.9		Ireland	1.3	1.4
	Netherlands	20.5	8.7		Italy	15.8	19.8
	Portugal	1.6	2.3		Netherlands	8.3	6.7
	Spain	5.9	13.4		Portugal	6.5	1.8
Greece	Austria	2.4	3.1				
	Belgium	5.7	3.9				
	Finland	1.6	2.0				
	France	14.2	22.8				
	Germany	35.6	31.2				
	Ireland	0.9	1.3				
	Italy	24.3	18.4				
	Netherlands	10.2	6.2				
	Portugal	0.6	1.6				
	Spain	4.5	9.5				

Table 3.2: Responses to a fiscal spending shock equivalent to 1% of GDP.

REER responses

shock in →	GEXP		GINV		GC		WGC		NWGC	
0	1.04	***	1.23	**	1.48	***	1.07	*	0.80	*
1	1.41	***	2.22	***	1.69	***	1.84	**	1.01	*
2	1.47	***	3.14	***	1.37	**	1.92	**	0.43	
3	1.31	***	3.49	***	0.84	*	1.69	**	-0.16	
4	1.04	**	3.29	***	0.37		1.36	**	-0.49	
5	0.78	**	2.81	***	0.03		1.04	*	-0.57	
6	0.55	*	2.25	***	-0.16		0.76		-0.51	
7	0.39		1.74	***	-0.25		0.54		-0.39	
8	0.27		1.33	**	-0.27		0.36		-0.25	
9	0.19		1.01	**	-0.26		0.23		-0.13	
10	0.14		0.77	*	-0.23		0.12		-0.04	

GDP responses

shock in →	GEXP		GINV		GC		WGC		NWGC	
0	0.95	***	1.70	***	0.81	***	-0.1		0.50	**
1	1.36	***	2.32	***	1.24	***	-0.4		0.88	**
2	1.35	***	2.40	***	1.11	***	-0.6		0.93	**
3	1.17	***	2.24	***	0.83	**	-0.7		0.85	**
4	0.94	***	1.99	***	0.55		-0.8		0.76	*
5	0.73	**	1.71	**	0.33		-0.9		0.69	
6	0.55	*	1.44	**	0.17		-1.0		0.63	
7	0.41		1.20	*	0.06		-1.0		0.59	
8	0.31		1.01	*	-0.01		-1.0	*	0.56	
9	0.23		0.85		-0.06		-1.0	*	0.52	
10	0.18		0.72		-0.08		-1.0	*	0.48	

Note: *, ** and ***, denote statistical significance at 10, 5 and 1 percent, respectively.

Table 3.3: Difference between Baseline and pre-EMU responses to a spending shock equivalent to 1% of GDP.

REER responses

shock in →	GEXP		GINV		GC		WGC		NWGC	
0	-0.25	***	-0.45	***	-0.09	***	-0.19	***	-0.02	*
1	-0.22	***	-0.55	***	0.08	**	-0.13	***	0.00	*
2	-0.16	***	-0.59	***	0.19	***	-0.45	***	0.08	**
3	-0.07	***	-0.56	***	0.19	***	-0.63	***	0.06	*
4	0.04	**	-0.39	***	0.17	***	-0.63	***		
5	0.15	***			0.15	***	-0.51	***		
6	0.23	***	0.23	***	0.13	***	-0.35	***		
7	0.28	***	0.50	***	0.10	***	-0.22	***		
8	0.28	***	0.69	***	0.06	***	-0.13	***		
9	0.26	***	0.77	***			-0.08	***		
10	0.23	***	0.77	***	-0.02	***	-0.07	***	0.04	*

GDP responses

shock in →	GEXP		GINV		GC		WGC		NWGC	
0	-0.12	***	-0.18	***	-0.16	***			-0.17	***
1			-0.09	*	-0.09	**	-0.24	***	-0.10	***
2	0.15	***	0.15	***	0.05	***	-0.18	***	0.01	**
3	0.33	***	0.44	***	0.15	***			0.14	***
4	0.46	***	0.72	***	0.19	***	0.02	***	0.23	***
5	0.52	***	0.95	***	0.19	***	0.08	***	0.29	***
6	0.52	***	1.10	***	0.14	***	0.10	***	0.31	***
7	0.48	***	1.15	***	0.08	***	0.07	***	0.31	***
8	0.41	***	1.12	***			0.02	***	0.31	***
9	0.33	***	1.04	***	-0.04	**			0.30	***
10	0.25	***	0.92	***	-0.09	***			0.29	***

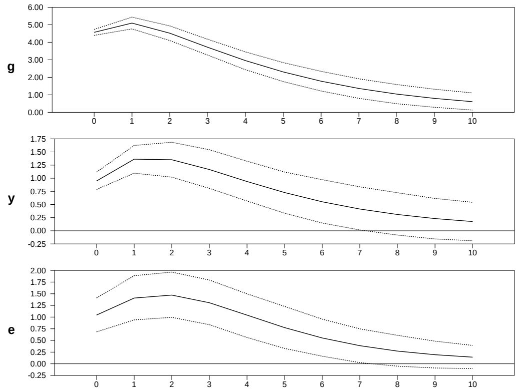
Note: Only statistically significant differences reported. *, ** and ***, denote statistical significance at 10, 5 and 1 percent, respectively.

Table 3.4: Real effective exchange rate responses to fiscal spending shock equivalent to 1 % of GDP.

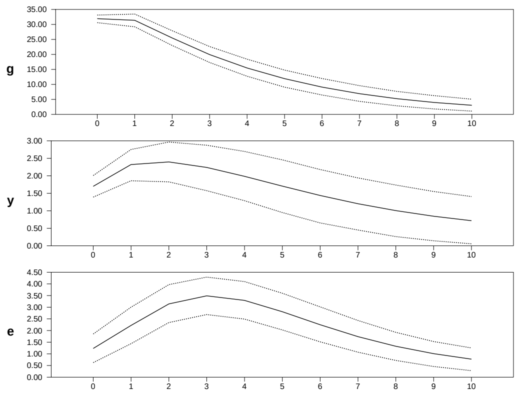
shock	t	Baseline		4-vbles VAR		pre-EMU		post-1980		incl. DEBT		GDP-defl		NULC-defl	
	0	1.04	***			1.29	***	1.21	***	1.01	***	1.00	***	1.18	***
	1	1.41	***			1.63	***	1.61	***	1.29	***	1.39	***	1.29	**
	2	1.47	***			1.63	***	1.32	***	1.43	***	1.51	***	1.45	**
	3	1.31	***			1.38	***	0.87	**	1.40	***	1.37	***	1.51	**
	4	1.04	**			1.00	**	0.49		1.25	***	1.08	**	1.40	**
GEXP	5	0.78	**			0.63		0.24		1.06	***	0.77	*	1.19	**
	6	0.55	*			0.32		0.10		0.85	**	0.52		0.95	*
	7	0.39				0.11		0.02		0.67	**	0.34		0.71	*
	8	0.27				-0.01		-0.02		0.52	*	0.22		0.51	
	9	0.19				-0.07		-0.03		0.39	*	0.14		0.36	
	10	0.14				-0.08		-0.04		0.29		0.10		0.26	
	0	1.23	**	1.12	**	1.69	**	1.42	**	0.96	*	1.14	**	0.89	
	1	2.22	***	2.08	***	2.77	***	2.27	***	1.65	**	2.24	***	2.07	**
	2	3.14	***	3.08	***	3.73	***	2.63	***	2.68	***	2.97	***	3.08	***
	3	3.49	***	3.51	***	4.05	***	2.46	***	3.21	***	3.09	***	3.48	***
	4	3.29	***	3.34	***	3.68	***	1.96	***	3.17	***	2.79	***	3.33	***
GINV	5	2.81	***	2.84	***	2.90	***	1.37	**	2.80	***	2.31	***	2.86	***
	6	2.25	***	2.25	***	2.02	**	0.86	*	2.31	***	1.81	**	2.28	***
	7	1.74	***	1.69	***	1.24	*	0.48		1.84	***	1.39	**	1.73	**
	8	1.33	**	1.22	**	0.64		0.23		1.43	**	1.06	*	1.29	**
	9	1.01	**	0.86	*	0.24		0.07		1.10	**	0.82	*	0.95	*
	10	0.77	*	0.60		0.00		-0.02		0.85	**	0.65	*	0.72	
	0	1.48	***	1.47	***	1.57	***	1.56	***	1.54	***	1.49	***	2.01	***
	1	1.69	***	1.60	***	1.60	**	1.79	***	1.78	***	1.90	***	1.96	**
	2	1.37	**	1.22	**	1.18	*	0.96	*	1.61	***	1.75	**	1.90	**
	3	0.84	*	0.74		0.65		0.26		1.25	**	1.23	**	1.61	**
	4	0.37		0.33		0.20		-0.09		0.88	*	0.64		1.20	*
GC	5	0.03		0.04		-0.11		-0.18		0.57		0.18		0.79	
	6	-0.16		-0.14		-0.28		-0.14		0.33		-0.11		0.46	
	7	-0.25		-0.24		-0.35		-0.05		0.15		-0.26		0.22	
	8	-0.27		-0.28		-0.33		0.02		0.03		-0.31		0.07	
	9	-0.26		-0.29		-0.28		0.08		-0.06		-0.30		-0.01	
	10	-0.23		-0.27		-0.21		0.11		-0.11		-0.26		-0.05	
	0	1.07	*	1.20	*	1.26	*	1.64	**	1.03	*	1.34	*	1.49	*
	1	1.84	**	1.86	**	1.97	*	2.71	***	1.84	**	1.86	**	1.93	*
	2	1.92	**	1.82	**	2.36	**	2.25	***	2.03	**	1.95	**	1.77	*
	3	1.69	**	1.48	*	2.32	**	1.31	*	1.92	***	1.81	**	1.44	
	4	1.36	**	1.18	*	1.99	**	0.53		1.67	**	1.57	*	1.08	
WGC	5	1.04	*	0.98		1.54	*	0.07		1.37	**	1.28	*	0.77	
	6	0.76		0.81		1.11		-0.11		1.07	*	1.01		0.52	
	7	0.54		0.64		0.76		-0.13		0.80		0.76		0.33	
	8	0.36		0.47	***	0.49		-0.08		0.57		0.56		0.19	
	9	0.23		0.29	***	0.31		-0.03		0.37		0.40		0.09	
	10	0.12		0.13		0.20		0.01		0.21		0.27		0.02	
	0	0.80	*	0.87	*	0.82		0.74	*	0.82	**	0.49		0.26	
	1	1.01	*	1.10	*	1.02		1.59	***	1.02	*	1.06	*	0.54	
	2	0.43		0.51		0.35		0.82	*	0.48		0.45		0.31	
	3	-0.16		-0.03		-0.22		-0.02		-0.02		-0.34		-0.08	
	4	-0.49		-0.33		-0.49		-0.39		-0.30		-0.83		-0.37	
NWGC	5	-0.57		-0.43		-0.55		-0.37		-0.39		-0.98	*	-0.50	
	6	-0.51		-0.42		-0.49		-0.18		-0.37		-0.89	*	-0.49	
	7	-0.39		-0.35		-0.38		0.03		-0.30		-0.70	*	-0.40	
	8	-0.25		-0.27		-0.25		0.19		-0.21		-0.48		-0.28	
	9	-0.13		-0.18		-0.15		0.27		-0.12		-0.28		-0.16	
	10	-0.04		-0.11		-0.07		0.30		-0.05		-0.12		-0.07	

Note: Point estimates of the Impulse-Response mean. *, ** and ***, denote statistical significance at 10, 5 and 1 percent, respectively.

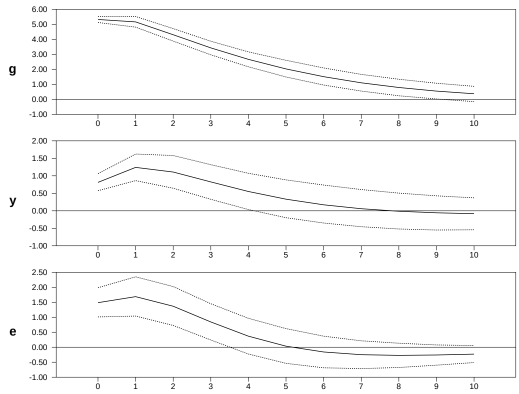
Figure 3.1: Baseline. Responses to a spending shock equivalent to 1% of GDP.



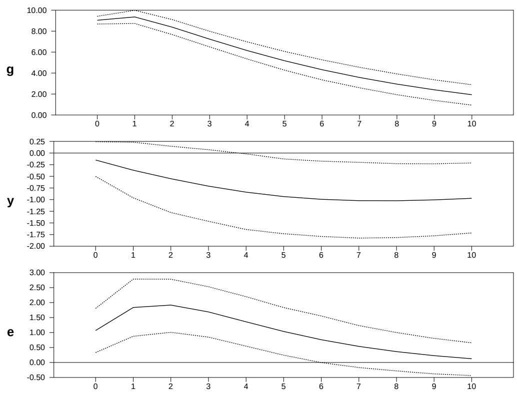
shock in GEXP



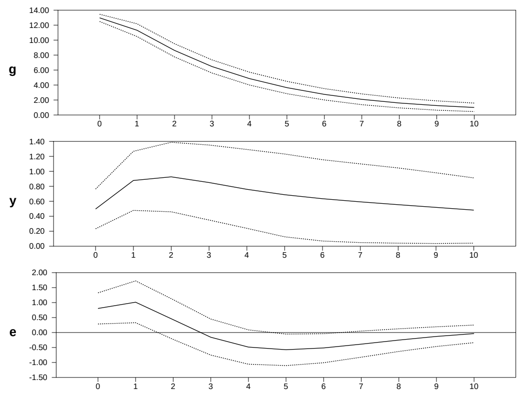
shock in GINV



shock in GC



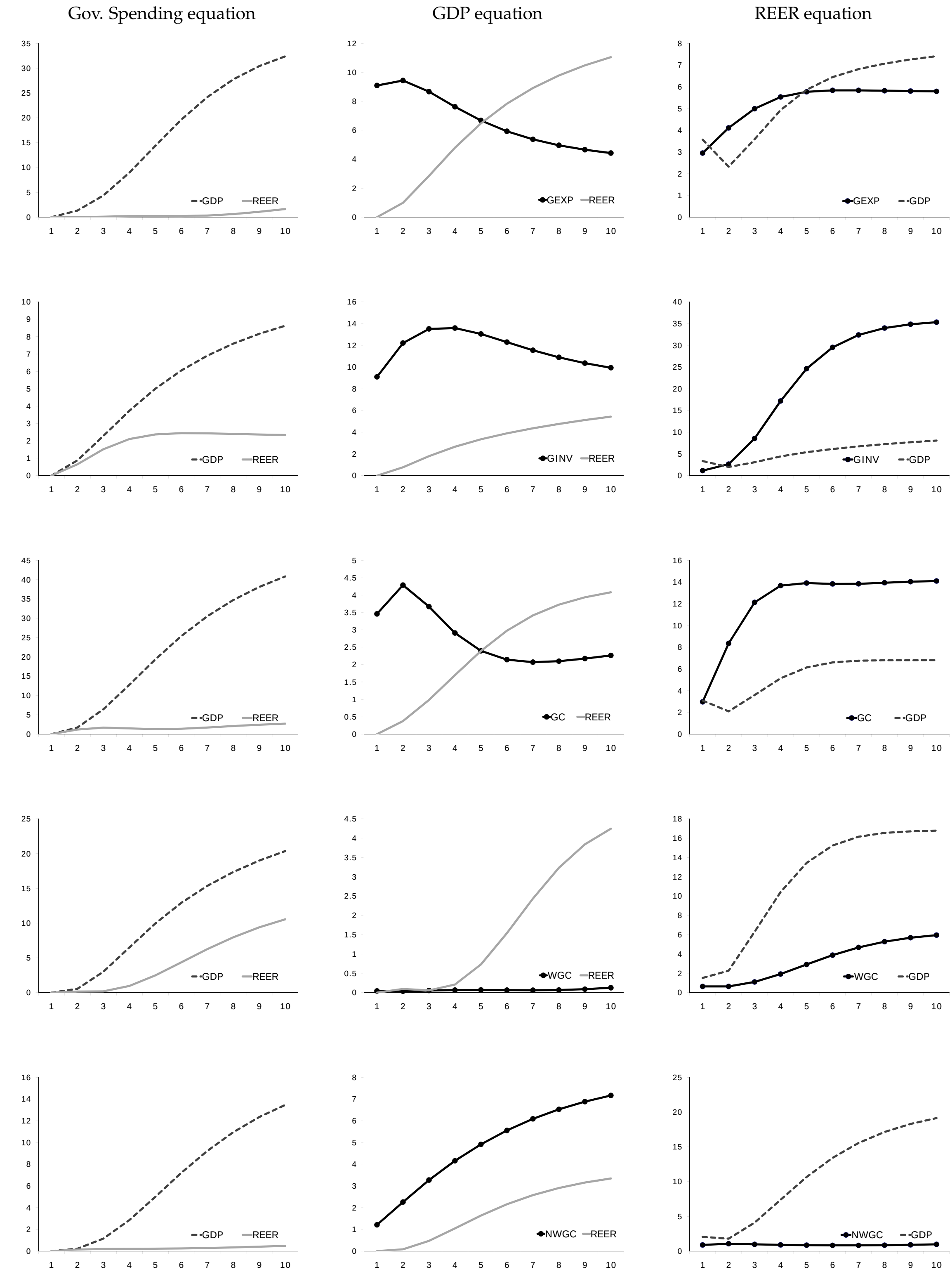
shock in WGC



shock in NWGC

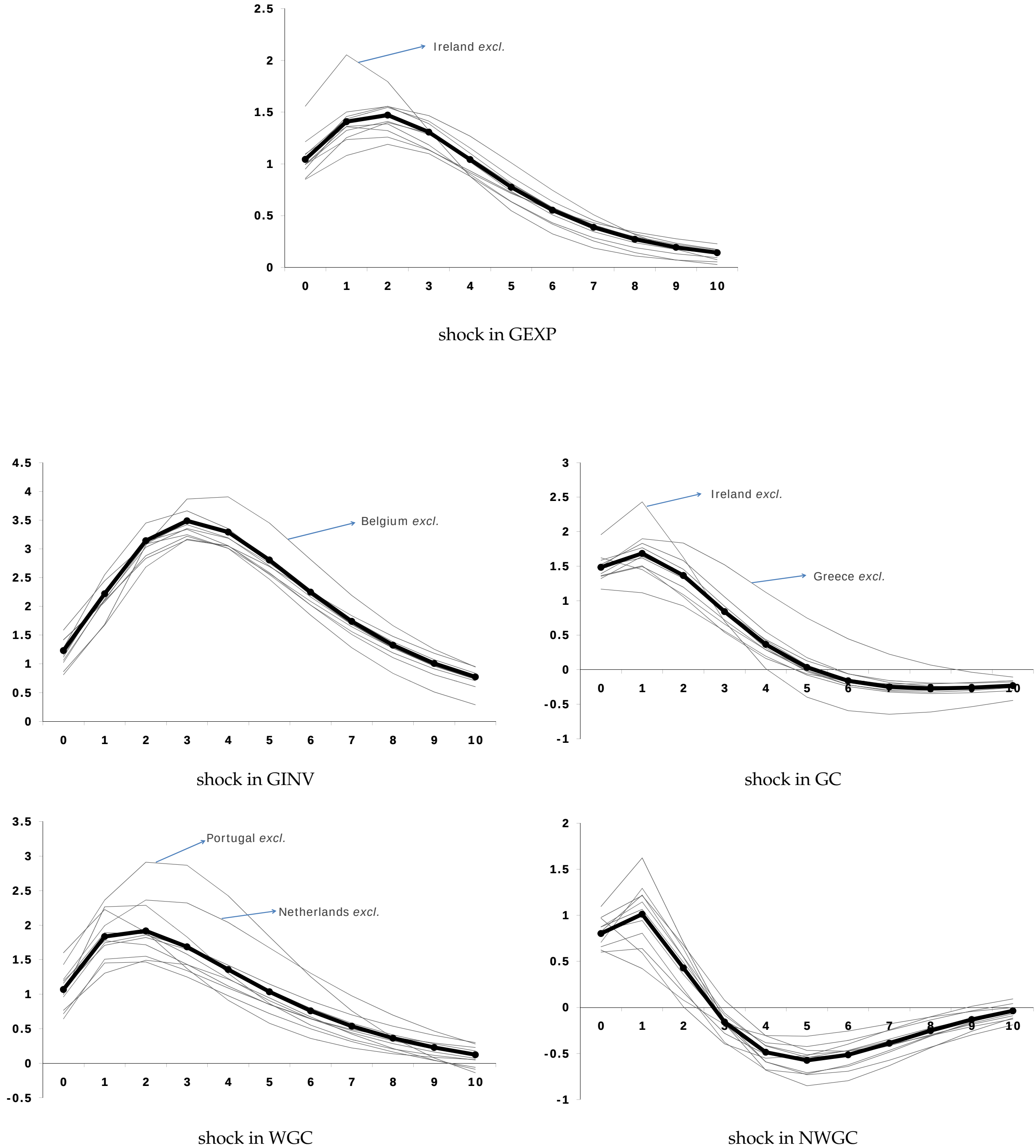
Note: Solid lines are the point estimates of the Impulse-Response mean. Dotted lines are the 16th and 84th percentiles from Monte Carlo simulations based on 1000 replications. Vertical axis indicates the percentage deviation from the rest-of-EMU for government spending (g), GDP differentials (y) and the percentage appreciation of the real effective exchange rate (e).

Figure 3.2: Variance decomposition.



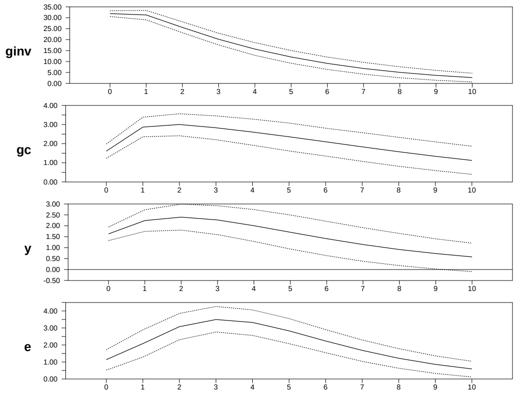
Note: Each row represents a VAR model for each definition of government spending. Vertical axis measures the percentage of forecast error variance attributable to a shock in the plotted endogenous variable.

Figure 3.3: Robustness check. Real exchange rate responses for different spending shocks: one country member excluded.

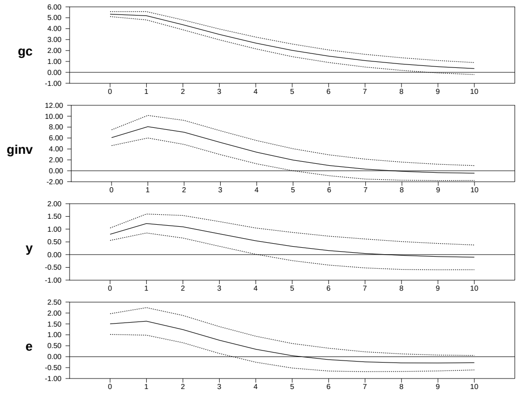


Note: Thick line denotes the response of the baseline EMU model. Thin lines, denote the responses for PVAR estimated excluding one country member at a time.

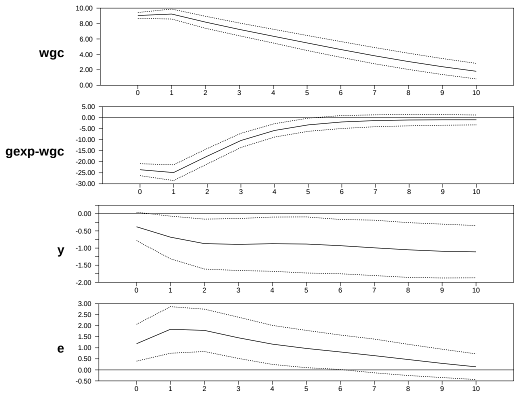
Figure 3.4: Robustness check. VAR including the 'complement government spending'.



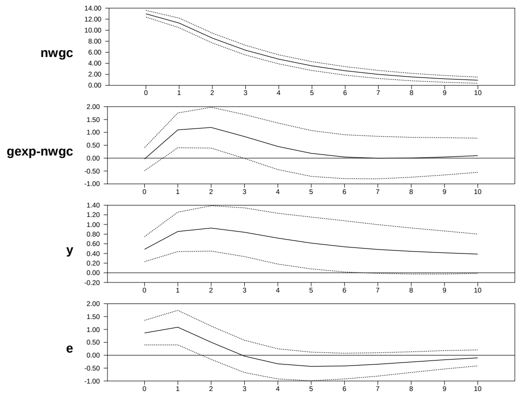
shock in GINV



shock in GC



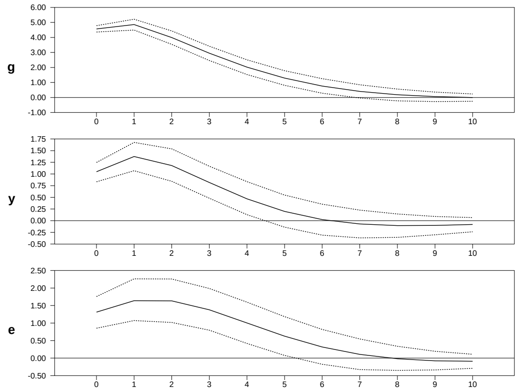
shock in WGC



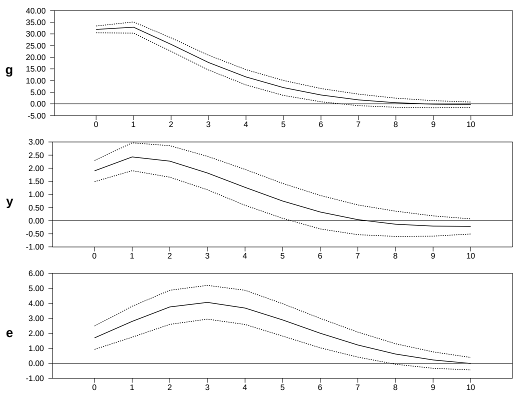
shock NWGC

Note: Solid lines are the point estimates of the Impulse-Response mean. Dotted lines are the 16th and 84th percentiles from Monte Carlo simulations based on 1000 replications. Vertical axis indicates the percentage deviation from the rest-of-EMU for government spending and GDP differentials (y), and the percentage appreciation of the real effective exchange rate (e).

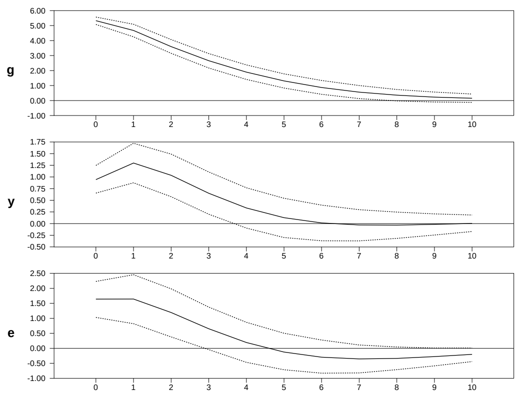
Figure 3.5: Robustness check. Baseline model estimated for the period 1970-1998. Responses to spending shock equivalent to 1% of GDP.



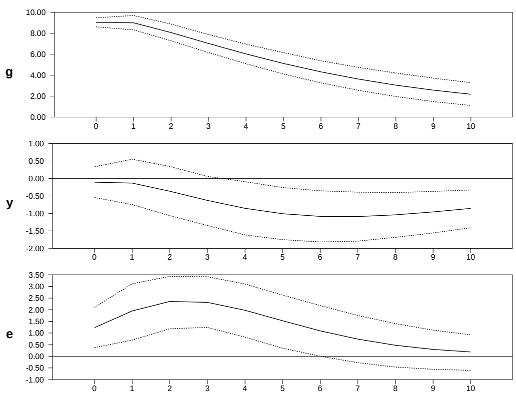
shock in GEXP



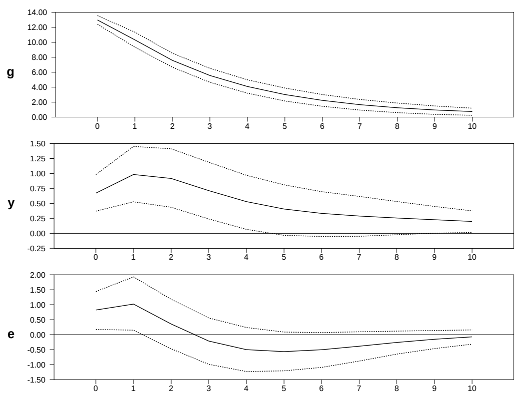
shock in GINV



shock in GC



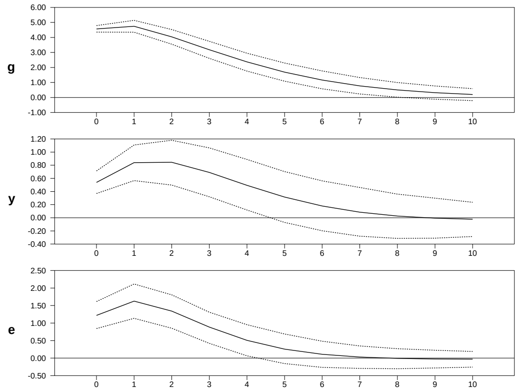
shock in WGC



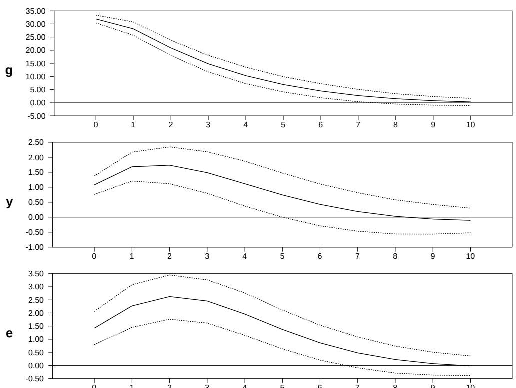
shock in NWGC

Note: Solid lines are the point estimates of the Impulse-Response mean. Dotted lines are the 16th and 84th percentiles from Monte Carlo simulations based on 1000 replications. Vertical axis indicates the percentage deviation from the rest-of-EMU for government spending (g), GDP differentials (y) and the percentage appreciation of the real effective exchange rate (e).

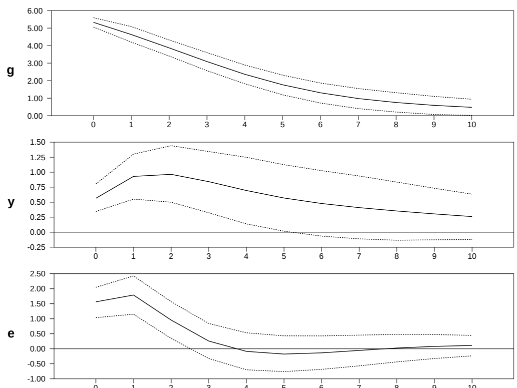
Figure 3.6: Robustness check. Baseline model estimated for the period 1980-2006. Responses to spending shock equivalent to 1% of GDP.



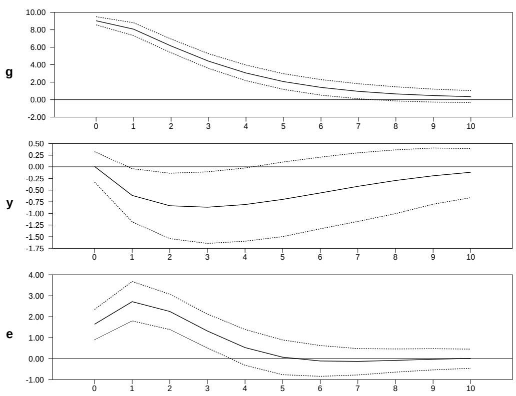
shock in GEXP



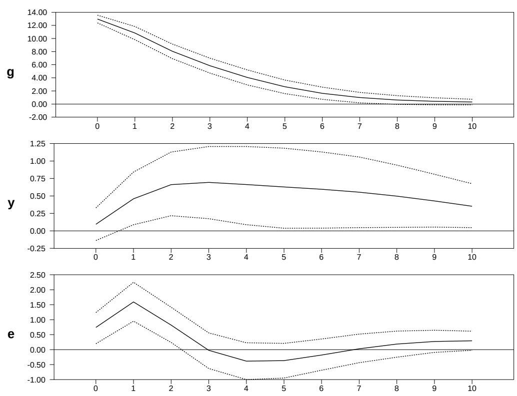
shock in GINV



shock in GC



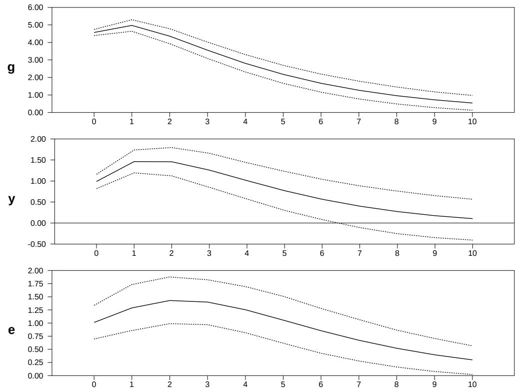
shock in WGC



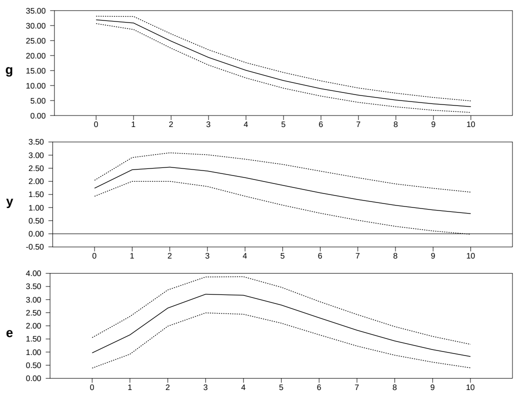
shock in NWGC

Note: Solid lines are the point estimates of the Impulse-Response mean. Dotted lines are the 16th and 84th percentiles from Monte Carlo simulations based on 1000 replications. Vertical axis indicates the percentage deviation from the rest-of-EMU for government spending (g), GDP differentials (y) and the percentage appreciation of the real effective exchange rate (e).

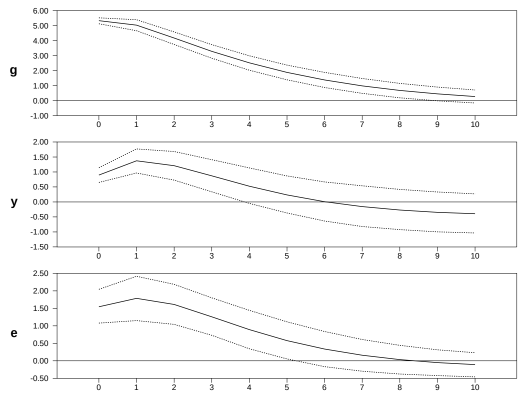
Figure 3.7: Robustness check. Baseline model including two lags of public debt over GDP. Responses to spending shock equivalent to 1% of GDP.



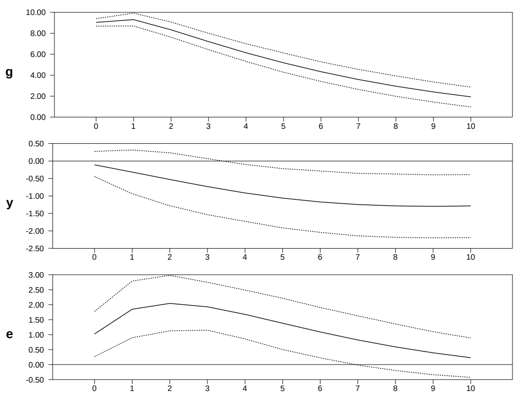
shock in GEXP



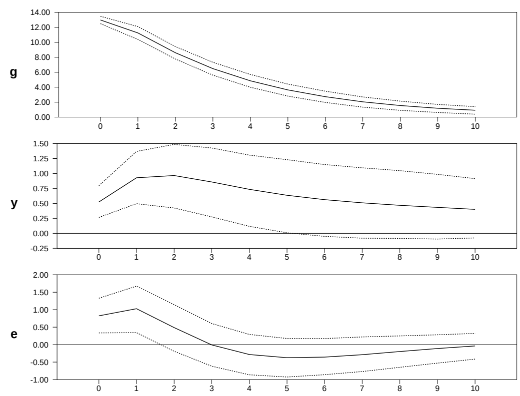
shock in GINV



shock in GC



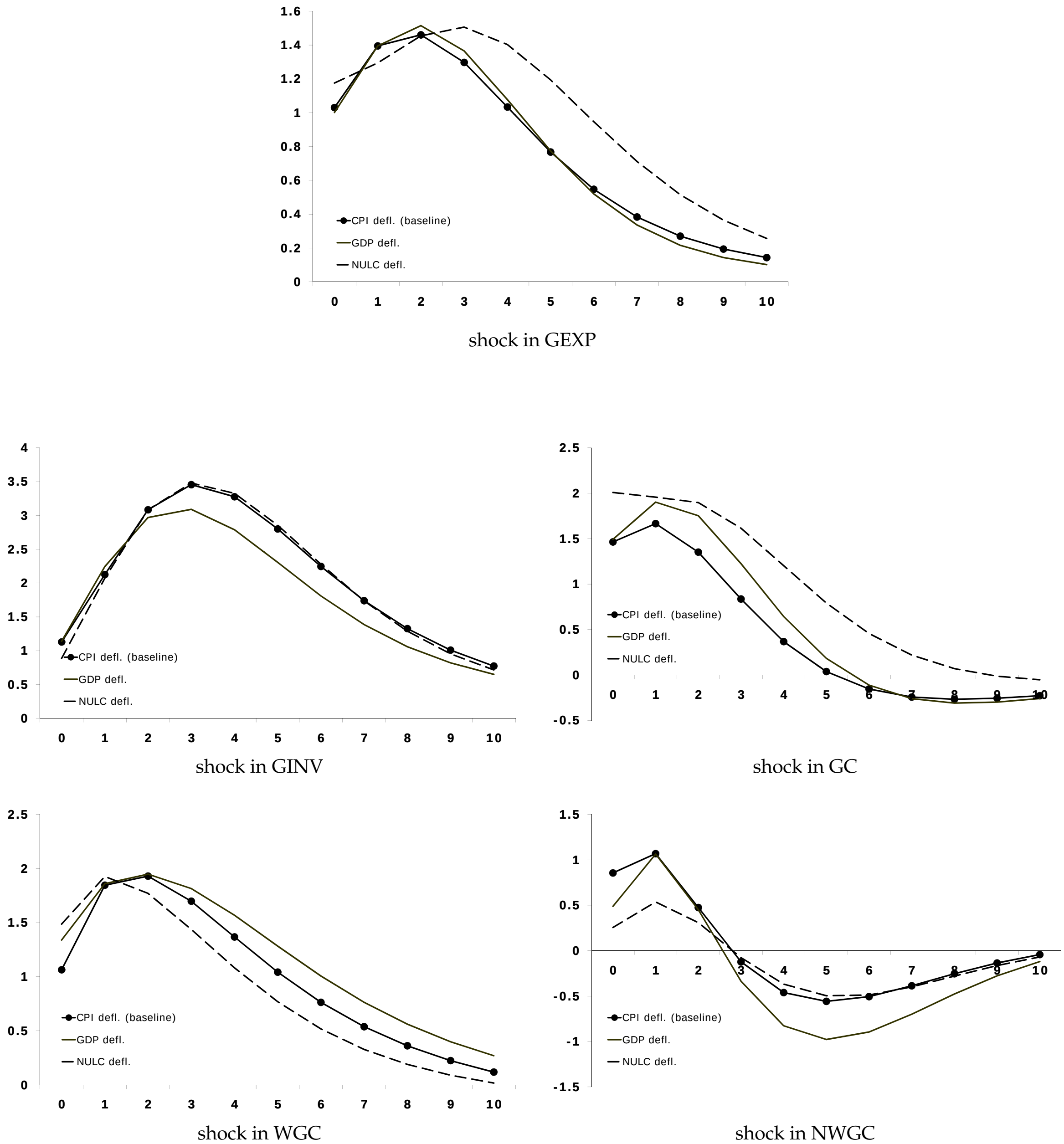
shock in WGC



shock in NWGC

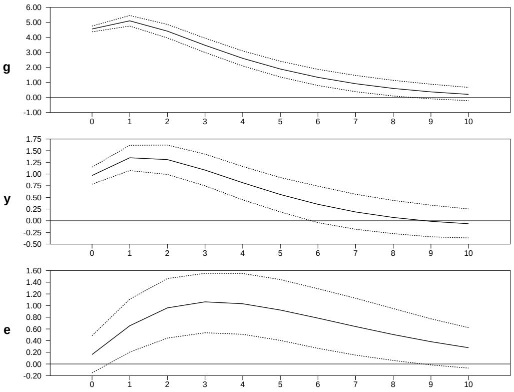
Note: Solid lines are the point estimates of the Impulse-Response mean. Dotted lines are the 16th and 84th percentiles from Monte Carlo simulations based on 1000 replications. Vertical axis indicates the percentage deviation from the rest-of-EMU for government spending (g), GDP differentials (y) and the percentage appreciation of the real effective exchange rate (e).

Figure 3.8: Responses of real effective exchange rates using different deflators to a spending shock equivalent to 1% of GDP.

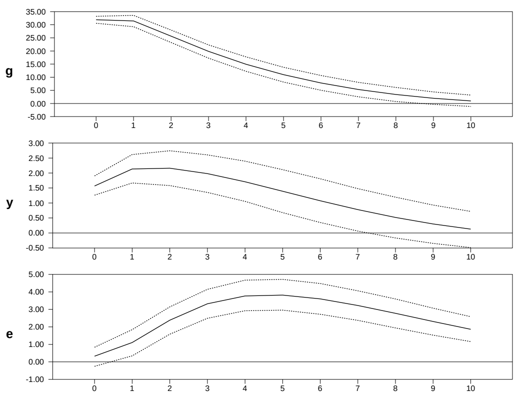


Note: Point estimates of the Impulse-Response mean. CPI defl. (baseline) is the real effective exchange rate deflated with CPI and used in the baseline estimations. GDP defl. is the exchange rate deflated with the GDP deflator and NULC defl. is the exchange rate deflated using nominal unit labour cost for total economy.

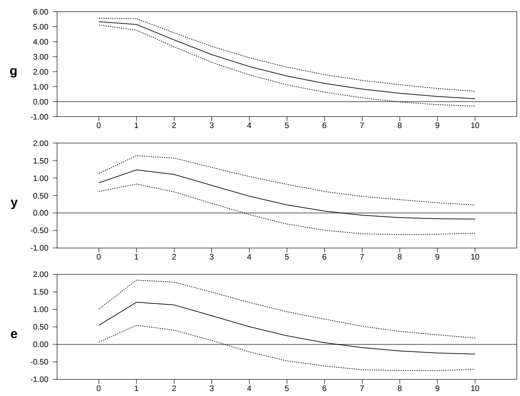
Figure 3.9: Responses to a spending shock equivalent to 1% of GDP. Relative price of nontradables (e).



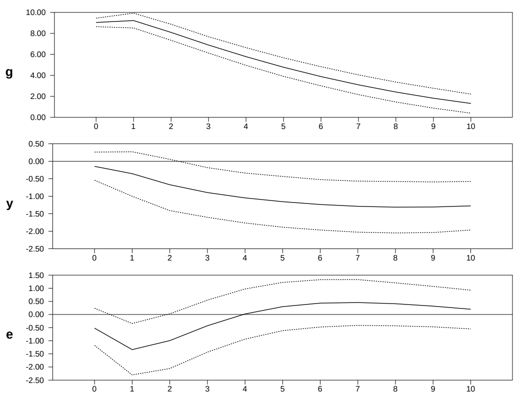
shock in GEXP



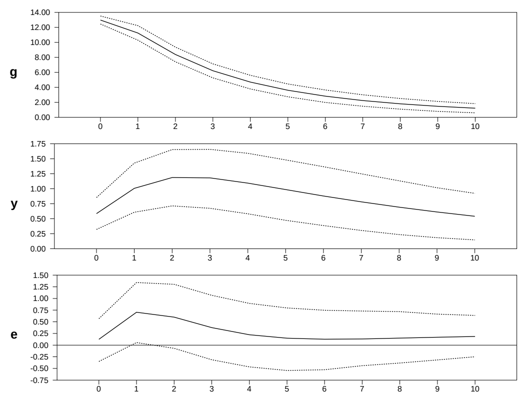
shock in GINV



shock in GC



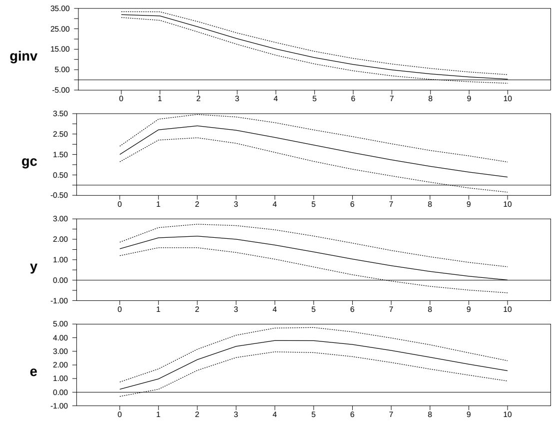
shock in WGC



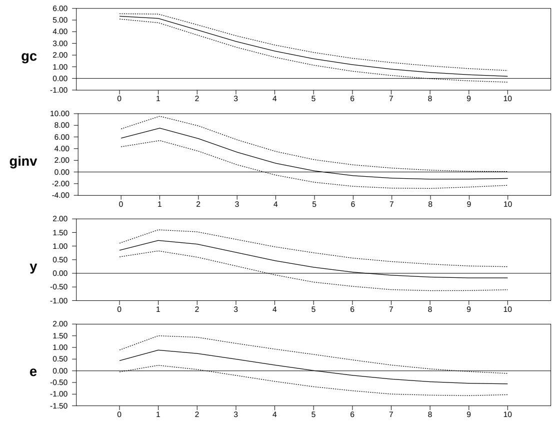
shock in NWGC

Note: Solid lines are the point estimates of the Impulse-Response mean. Dotted lines are the 16th and 84th percentiles from Monte Carlo simulations based on 1000 replications. Vertical axis indicates the percentage deviation from the rest-of-EMU for government spending (g), GDP differentials (y) and the percentage change on the relative price of nontradables (e).

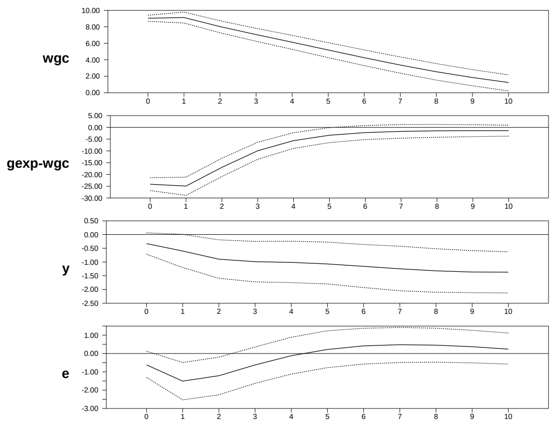
Figure 3.10: Robustness Check. Responses to a spending shock equivalent to 1% of GDP. Relative price of nontradables (e). VAR including the 'complement government spending'.



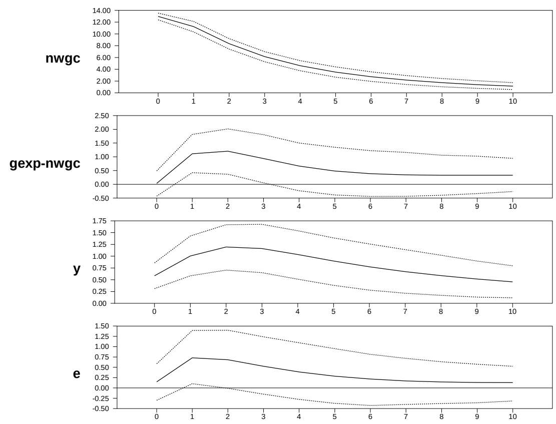
shock in GINV



shock in GC



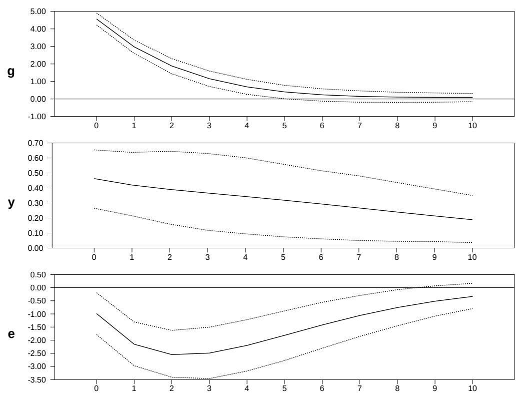
shock in WGC



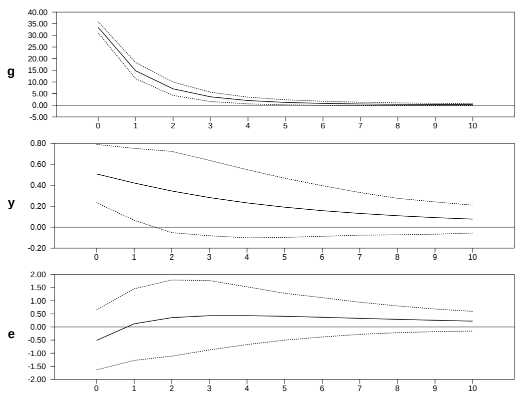
shock NWGC

Note: Solid lines are the point estimates of the Impulse-Response mean. Dotted lines are the 16th and 84th percentiles from Monte Carlo simulations based on 1000 replications. Vertical axis indicates the percentage deviation from the rest-of-EMU for government spending and GDP differentials (y), and the percentage change on the relative price of nontradables (e).

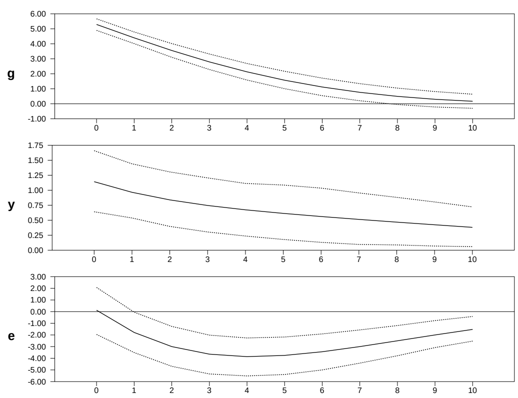
Figure 3.11: Responses to a spending shock equivalent to 1% of GDP using the Perotti sample: Australia, Canada, United Kingdom and United States.



shock in GEXP



shock in GINV



shock in GC

Note: Solid lines are the point estimates of the Impulse-Response mean. Dotted lines are the 16th and 84th percentiles from Monte Carlo simulations based on 1000 replications. Vertical axis indicates the percentage deviation from the G7 countries for government spending (g), GDP differentials (y) and the percentage appreciation of the real effective exchange rate (e).

Chapter 4

Government spending and real wages

This chapter studies the dynamic effects of positive shocks in different types of government spending on real wages. Its contribution is the provision of baseline impulse-response functions for a panel of countries belonging to the European Monetary Union (EMU).

The literature on the field shows that the implications of government spending shocks differ between theoretical paradigms and empirical approaches. Neoclassical models predict that shocks in government spending reduce private consumption and real wages. This is because these shocks generate negative wealth effects that induce agents to increase labour supply, since they foresee a current or future increase in taxes.

Neo-Keynesian models allowing for price rigidities (Linnemann and Schabert 2003; Galí et al. 2007; Monacelli and Perotti 2007) or other reasons for counter cyclical markups (Rotemberg and Woodford 1992; Ravn et al. 2007) show that real wages increase as a result of shocks in government spending. The reason for this is that government spending shocks produce demand-side effects which are stronger than the negative wealth effects.

Pappa (2005) compares the effects of government consumption and investment shocks in these two paradigms. Using a wide range of parameterizations, she finds that shocks in government consumption and investment increase output, deficit, employment and real wages in Neo-Keynesian models. In contrast, the same shocks increase output, deficit and employment, but reduce real wages in neoclassical RBC models.

Accordingly, the response of the real wage is a key differentiating factor between Neoclassical and Neo-Keynesian models.

Empirically, the effects of government expenditure shocks are studied with vector autoregressions. However, the ways in which government spending shocks are identified vary across studies.

For the United States, applications of the 'narrative' approach, developed by Romer and Romer (1989), show that output raises while private consumption and real wages fall, as a result of large exogenous increases on the military spending (Ramey and Shapiro 1998; Edelberg et al. 1999; Burnside et al. 2004). This result is in line with the predictions of neoclassical models. However, Perotti (2007) shows that after removing the two implicit restrictions in this identification method, private consumption and real wages increase in response to government spending shocks.[1]

Results coming from the structural identification approach are typically in line with the implications of Neo-Keynesian models. For instance, Fatás and Mihov (2001), Blanchard and Perotti (2002) and Perotti (2004) show that government spending shocks increase private consumption and real wages.

Taking into account that this structural approach, based on quarterly data, can be subject to the problem of fiscal shock being not fully unanticipated by the private sector, Ramey (2008) estimates a structural VAR with long run data. Using annual data for the United States extended back to 1889, she finds that responses to government spending shocks are consistent with the neoclassical model. However, when the VAR is estimated using official BEA data, as in Perotti (2007), the responses of private consumption and real wages become positive. This is because prior to 1929, several components of government spending were interpolated linearly over long intervals and were not consistently defined.

Structural VAR evidence supports the Neo-Keynesian theoretical predictions. Using different time series methodologies to identify government spending shocks, Perotti (2007) finds little evidence supporting the neoclassical predictions in the United States, Australia, Canada and the United Kingdom.

Papers studying the dynamic response of real wages to shocks in government spending focus on these four countries since they have reliable non-interpolated quarterly data. Here, we contribute to the literature by estimating these effects in EMU countries.

This chapter is closely related to Beetsma et al. (2008) because it estimates a panel VAR using annual fiscal data and assess, as in Chapter 3, the effect of shocks in five types of government spending.

In line with the empirical evidence for other countries, we find that positive shocks in some types of government spending increase real CPI-deflated wages. This is the case of government investment, government consumption, these two types of government spending taken together and non-wage government consumption. In contrast, shocks in the number of public employees (i.e. wage government consumption deflated with government nominal wages) produce negative real wages responses.

We also analyze the effects of spending shocks in the set of countries used in the studies of Perotti. Our findings are that shocks in government absorption and consumption increase real GDP-deflated wages but decrease real CPI-deflated wages, while shocks in government investment have no effect on real wages.

[1]These two implicit restrictions are that all Ramey-Shapiro episodes have the same dynamics up to a scale factor and, in a version of this approach, that fiscal policy explains all the deviation from 'normal' of all endogenous variables for several quarters after the start of the episode.

The reminder of the chapter is organized as follows: Section 4.1 presents the strategy to identify exogenous spending shocks. In Section 4.2, we describe the data and study the responses to shocks in different types of government spending. In Section 4.3, we check the robustness of these results. Section 4.4 studies the effect of shocks in government spending in a panel formed by the four countries used in the studies of Perotti. In Section 4.5, we analyze the role of alternative price deflators for government spending variables, as well as for wages. Finally, in Section 4.6 we conclude.

4.1 Identification Approach

Following Beetsma et al. (2008) and Chapter 3, we identify fiscal shocks using a Choleski ordering. To show how we identify fiscal shocks, it is convenient to present our three-variables structural model in companion form.

$$A_0 Z_{i,t} = A(L)Z_{i,t-1} + CX_{i,t} + \varepsilon_{i,t} \tag{4.1}$$

$Z_{i,t}$ is a vector of endogenous variables containing: the government spending variable ($\mathrm{g}_{i,t}$), the real GDP ($\mathrm{y}_{i,t}$) and real wages ($\mathrm{w}_{i,t}$). $X_{i,t}$ is a vector with the country-specific intercepts (c_i), country-specific linear trends ($\mathrm{t}_{i,t}$) and year dummies (d_t). Subscripts i and t denote the country and the year. Matrix A_0 captures the contemporaneous relations between the endogenous variables. Matrix $A(L)$, is the matrix polynomial in the lag operator L that captures the relation between the endogenous variables and their lags. Matrix C contains the coefficients of the country fixed effects, the country-specific linear trends and the time fixed effects. The vector $\varepsilon_{i,t}$, contains the orthogonal structural shocks to each equation of the VAR and var($\varepsilon_{i,t}$) $= \Omega$. Thus,

$$Z_{i,t} = \begin{bmatrix} \mathrm{g}_{i,t} \\ \mathrm{y}_{i,t} \\ \mathrm{w}_{i,t} \end{bmatrix} \quad A_0 = \begin{pmatrix} 1 & -\alpha_{\mathrm{yg}} & -\alpha_{\mathrm{wg}} \\ -\alpha_{\mathrm{gy}} & 1 & -\alpha_{\mathrm{wy}} \\ -\alpha_{\mathrm{gw}} & -\alpha_{\mathrm{yw}} & 1 \end{pmatrix} \quad X_{i,t} = \begin{bmatrix} \mathrm{c}_i \\ \mathrm{t}_{i,t} \\ \mathrm{d}_t \end{bmatrix} \quad \varepsilon_{i,t} = \begin{bmatrix} \varepsilon^{\mathrm{g}}_{i,t} \\ \varepsilon^{\mathrm{y}}_{i,t} \\ \varepsilon^{\mathrm{w}}_{i,t} \end{bmatrix}.$$

Premultiplying (4.1) by A_0^{-1} we obtain our model in reduced-form,

$$Z_{i,t} = B(L)Z_{i,t-1} + DX_{i,t} + u_{i,t}; \tag{4.2}$$

where $B(L) = A_0^{-1}A(L)$, $D = A_0^{-1}C$, $u_{i,t} = A_0^{-1}\varepsilon_{i,t}$, $u_{i,t} = \begin{bmatrix} u^{\mathrm{g}}_{i,t} & u^{\mathrm{y}}_{i,t} & u^{\mathrm{w}}_{i,t} \end{bmatrix}'$ and var($u_{i,t}$) $=$ Σ.

In order to recover $\varepsilon_{i,t}$ and Ω from the reduced-form, we impose $\alpha_{\mathrm{yg}} = \alpha_{\mathrm{wg}} = \alpha_{\mathrm{wy}} = 0$ to matrix A_0. Therefore, the structural shocks are given by

$$\begin{bmatrix} \varepsilon^{\mathrm{g}}_{i,t} \\ \varepsilon^{\mathrm{y}}_{i,t} \\ \varepsilon^{\mathrm{w}}_{i,t} \end{bmatrix} = \begin{pmatrix} 1 & 0 & 0 \\ \alpha_{\mathrm{gy}} & 1 & 0 \\ \alpha_{\mathrm{gw}} + \alpha_{\mathrm{yw}}\alpha_{\mathrm{gy}} & \alpha_{\mathrm{yw}} & 1 \end{pmatrix} \begin{bmatrix} u^{\mathrm{g}}_{i,t} \\ u^{\mathrm{y}}_{i,t} \\ u^{\mathrm{w}}_{i,t} \end{bmatrix}.$$

Imposing these restrictions is equivalent to assume that fiscal spending does not react contemporaneously to shocks in the real GDP or in real wages and, that the real GDP does not react contemporaneously to shocks in real wages. Therefore, the Choleski ordering to identify shocks is: government spending, GDP and real wages. This ordering is motivated by the fact that government spending is planned before the period starts. Moreover, Beetsma et al. (2006) estimate a panel VAR in public spending (g) and output (y) for seven EU countries with non-interpolated quarterly fiscal data assuming that g does not react to y within a quarter. From these results they construct an estimate of the response of public spending to output at annual frequency finding that it is not significantly different from zero.

4.2 Baseline empirical model for real wages

4.2.1 Data

As in Chapter 3, we study the dynamic effect of five definitions of government spending using annual data for the period 1970 to 2006. These five definitions of government spending are: the sum of government fixed investment (GINV) and total government consumption (GC), that we call government expenditure (GEXP); these two variables taken individually; the wage (WGC) and non-wage (NWGC) government consumption components. Total government consumption excludes transfers. The sources of these data are the same as those used in Chapter 3. All variables are in log levels.

We do not include government wage consumption for Belgium between 1970 and 1975, Germany in 1970 and Portugal between 1970 and 1977. This last country also lacks data for total government consumption and government fixed investment for the same period. Germany also lacks total government consumption for 1970.[2] The second variable is gross domestic product in constant local currency units also from the OECD Economic Outlook.

The goal of this chapter is to study the effect of shocks in different types of government spending on real wages. Following Lane and Perotti (2003), we define real wages as real compensation per employee. Since we analyze the economy as a whole without distinguishing between sectors, we use real consumption wages (i.e. CPI-deflated real wages). We take this variable, instead of the real product wage, because it is relevant for labour supply and the real labour income. The source for real consumption wages is the Annual Macroeconomic Database of the European Commission (AMECO).

[2] Data from West Germany and Germany is combined by splicing growth rates in 1991.

4.2.2 Estimation approach

To assess the effects of government spending shocks on real wages, we estimate a panel VAR for each type of government spending, taking annual data for the period 1970 to 2006 in eleven EMU countries. We exclude Luxembourg because most of the spending data that we use are not available for this country.

In order to deal with country-specific heterogeneity, each panel VAR includes country fixed effects and country-specific linear trends. Furthermore, to deal with common fluctuations, we include time fixed effects. The lag length in each model is set to two according to the Akaike Information Criterion, Schwarz Bayesian Information Criterion and the absence of first-order autocorrelation tested with the Durbin-Watson statistic.

Figure 4.1 presents the impulse-response functions to a 1 percent of GDP shock in each definition of government spending. To scale the responses, we take the cross-country mean shares of each of these five measures of government spending in GDP. In this panel, GEXP, GINV, GC, WCG and NWGC represent 22, 3.2, 18.8, 11.2 and 7.6 percent of GDP in the period between 1970 and 2006, respectively.

4.2.3 Impulse-response analysis

Government expenditure

As in most of the literature studying the dynamic effects of government spending on wages, the effects of a shock in government expenditure are in line with the Neo-Keynesian predictions also in the EMU countries.

A shock of 1 percent of GDP produces positive impact and delayed responses in real wages and GDP. The impact wage response equals to 0.95 percent and it is statistically significant at a level of 1 percent. As shown in the first column of Table 4.1, the point estimate of the mean wage response is statistically significant until year nine. Between year zero and year six, it is significant at a level of 1 percent. The peak wage response is located in year two with a value of 1.18 percent.

A shock in this spending variable is also expansionary. Table 4.2 shows that the impact and peak GDP responses are equivalent to 0.91 and 1.28 percent, respectively. The latter is located in year one. The point estimate of the mean GDP response is statistically significant at 1 percent levels between years zero and three. This estimate is statistically significant at 5 and 10 percent in years four and five, respectively.

Government investment and government consumption

Government investment shocks produce also an increase in wages. A 1 percent of GDP shock in this variable generates the largest response. Its impact equals to 1.37 percent while its peak, located in year two, equals to 1.66 percent. The point estimate of the mean wage response to a shock in government investment is statistically significant along the whole impulse-response horizon. Between years zero and four it is significant at a level of 1 percent.

A shock of the same magnitude in government consumption also increases wages. The impact response equals to 1.04 percent and the maximum, located in year two, is equivalent to 1.4 percent. In relation to the wage response produced by a shock in government expenditure, government consumption produces larger increases in wages on impact and in the following five periods.

In contrast to the evidence reported by Perotti (2007) for the four-country sample, government investment is more effective than government consumption in boosting the GDP of these EMU countries. The response of the latter to a shock in government investment is greater not only for the impact but also for the whole impulse-response horizon. GDP responses are statistically significant up to year seven and three for shocks in investment or consumption, respectively.

Government consumption: wage and non-wage elements

The last two shocks produce different effects on real wages. First, an increase in government wage consumption leads to a reduction in real wages of the whole economy. Although the point estimate of the impact response is insignificant, the location of the 16th and 84th percentiles of the impulse-response distribution suggests that the response of wages is negative in the first six years. The minimum response to a shock in government wages is located in year two and it is equivalent to -1.35 percent. This point estimate is statistically significant at a level of 5 percent. As we discuss next, the reason for this negative response is that wage government consumption is negatively correlated to the sum of the other four government spending variables.

A 1 percent of GDP shock in the non-wage component of government consumption produces an insignificant negative impact response. In contrast to a shock in wage government consumption, real wages present a positive peak in year five and six equivalent to 0.83 percent and significant at a level of 5 percent.

The effects of these shocks in GDP are also different. Government wage consumption delivers insignificant and negative GDP responses, while non-wage government consumption produces positive and significant effects. In the latter, the peak is in year 3 and equivalent to 1.06 percent.

4.2.4 Variance decomposition

To study the contribution of structural innovations to the h-step ahead forecast error variance, we present the variance decomposition of each estimated panel VAR. This is a complementary exercise to the impulse-response analysis because it shows the relative power of each structural shock in explaining the forecast error variance in each equation of the system.

Figure 4.2 presents the proportion of the forecast error variance attributable to a shock in two of the three endogenous variables in each panel VAR. That is, if the equation is for GDP, we show the share of the variance attributable to a shock in government spending and real wages.[3] Since our interest in on the effect of government spending shock in wages, we focus mainly on this equation.

The forecast error variance attributable to a shock in government expenditure is the largest across all types of spending shocks and ranges between 6.2 and 22 percent. This is in line with the fact that wage responses to a shock in this variable are significant for a longer period and for higher levels of confidence. This proportion grows as the forecast horizon becomes larger.

A shock of 1 percent of GDP in government investment explains on average 6.3 percent of the whole forecast error variance of the wage equation. This proportion grows at a lower rate as the forecast horizon becomes larger. The proportion of forecast error variance in the wage equation attributable to shocks in this variable ranges between 4.3 and 7.9 percent.

When the shock is in government consumption, the proportion attributable to it grows as the forecast horizon becomes larger. The minimum is 3.4 while the maximum 20.6 percent. In contrast, wage government consumption shocks explain a smaller proportion. After year five it stabilizes around 4.4 percent.

Finally, non-wage government consumption explains the smallest proportion of forecast error variance in the wage equation. The average proportion attributable to this shock is 1.4 percent.

4.2.5 Summary

Shocks of the same magnitude in government spending produce different results in real wages and GDP depending on its type. This is because, since they have a diverse composition, they can differently affect productivity or aggregate demand. For instance, government investment is more likely to increase labor productivity and hence wages. Our results show that the increase in real wages is the largest when shocks are in this government variable.

Government spending shocks can have demand side effects. For instance, innovations in government consumption may generate excess demand in the short run. This can lead to an increase in the demand of factors producing their price to rise. In our empirical model, shocks to government expenditure and consumption also increase real wages. Moreover, non-wage government consumption does too but with some delay.

[3]We do this because we are interested in the response of the endogenous variables to shocks in other endogenous variables, rather than a shock in itself. However, the proportion of forecast error variance attributable to a shock in the lagged dependent variable is the share which is not explained by shocks in the other two endogenous variables. For instance, if the proportion of forecast error variance in the wage equation attributable to shocks in government consumption and GDP are 15 and 35 percent respectively, the proportion attributable to a shock in wages would be 50 percent.

Most of the shocks analyzed here produce results that are in line with the Neo-Keynesian predictions that government expenditure produce demand side effects. That is, they increase output, consumption and real wages.

In contrast, wage government consumption produce negative wage responses. As we will show next, a shock in this variable produces negative wage responses because this variable is negatively correlated with the sum of the other four types of government spending.

The response of GDP varies also. The larger response is also produced by a shock to government investment. Shocks to government expenditure, consumption and non-wage government consumption are expansionary while a shock to wage government consumption is contractionary.

4.3 Robustness checks

4.3.1 Exclusion of one country member

We conduct different robustness checks on the results of the baseline model. The first one is to estimate eleven panel VARs excluding one country member at a time to see if there are individual countries driving the baseline results. Figure 4.3 shows the mean real wage responses to shocks equivalent to 1 percent of GDP in different types of government spending. Thick black lines are the responses produced by the baseline empirical model, while thin grey lines are the responses in each of the eleven panel VARs.

An inspection of this figure shows that the exclusion of single countries do not generate qualitative changes in the response of wages to shocks in government expenditure. However, large quantitative differences appear in some cases.

The exclusion of Ireland produces a larger wage response in the whole impulse-response horizon which, for some years, is greater than the baseline by a factor of 1.6. This is the result of Ireland's unusually weak real wage response to shocks in government spending. The exclusion of Greece, Portugal or Spain generates opposite quantitative effects. In the former, the wage response is smaller in the whole horizon by an average factor of 0.55. In the last two cases, these exclusions generate smaller responses until year seven or from year two onwards, respectively.

A potential explanation for the small response of real wages in the Irish economy may be related to the flexibility of its labor market. Countries with more flexible labor markets are likely to exhibit larger changes in quantities as part of the adjustment toward a new equilibrium. Then, wages would change less. The lower flexibility of their labor markets may also explain why Greece and Portugal show relatively large real wage responses. Another possible determinant of the larger wage response in the latter countries is related to the degree of informal employment. If the informal labor market is large and the mobility from the informal to formal sector is low, it is reasonable to expect that real wages in the formal sector will increase more.

When the shock is in government investment, the exclusion of Ireland generates, as in the previous case, a larger wage response for the whole horizon. Similarly, a panel without Belgium produces a greater wage response for year two onwards. In contrast, when Greece is excluded, the impact and the year one to three response is smaller than the baseline.

The pattern produced by this robustness check, when the spending variable is government consumption, is similar to the one produced by government expenditure. The exclusion of Ireland produces larger wages responses while the exclusion of Greece, Portugal and Spain produce smaller responses.

For the case of wage government consumption we find that these results are not qualitatively or quantitatively robust to the exclusion of Greece or Portugal. In the first case the wage response becomes positive from year five onwards, while in the second, the response of wages is negative and tends to decrease in time.

Finally, this robustness check for the non-wage government consumption component shows that, again, the exclusion of these two countries produces qualitative and quantitative differences. The exclusion of Portugal generates a negative wage response for the first periods while the exclusion of Greece produces a negative response for the whole impulse-response horizon.

4.3.2 Introduction of the complement government spending variable in the system

The second robustness check is to estimate each panel VAR including and additional expenditure variable defined as the difference between the total government expenditure and the spending variable being considered. For instance, when the analyzed variable is wage government consumption, this fourth variable called 'complement government expenditure' would be equal to government expenditure minus wage government consumption.

The aim of this robustness check is to ensure that each shock in each fiscal variable is a shock in that variable rather than a shock in total government expenditure contemporaneously correlated with the spending variable being studied.

Figure 4.4 and Table 4.1 show the responses of wages to shocks in government investment, consumption, wage government consumption and non-wage government consumption. To identify shocks, we use the following Choleski order: government spending, the complement government spending, GDP and wages. This order ensures that the studied government spending variable is not allowed to react contemporaneously to a shock in the complement spending variable.

Figure 4.4 and Table 4.1 show that the baseline results are qualitatively robust to this change in the specification. Government investment shocks produce slightly larger responses in real wages and the same statistical significance for the point estimates. Shocks in government consumption produce slightly larger wage responses for the impact and for the following seven years with the same significance levels.

When the shock is in wage government consumption, the inclusion of the complement government spending variable generates larger negative wage responses for the impact and for the following four years. This negative response is the result of wage government consumption being negatively correlated with the complement government spending variable. Since the four variables forming the latter are positively correlated with each other and also positive correlated with real wages and output, a positive shock in wage government consumption reduces real wages and output. The negative correlation between wage government consumption and the complement government spending variable may be the result of governments reducing consumption of goods and services in order to increase the number of public employees.

Finally, a shock in non-wage government consumption produces larger wage responses for the impact and following six years with no important changes in the significance of the mean wage response.

As a further robustness check, we take this four-variables system and estimate eleven panel VARs excluding one country member at a time, in the same way as in the previous subsection. Figure 4.5 shows that the qualitative effects produced by the exclusion of some countries are similar to those in the baseline empirical model.

4.3.3 Change in the data span

Another robustness check is based on the evidence of Perotti (2004) and Romer and Romer (2007) that the variance of fiscal policy shocks and GDP has decreased after approximately the year 1980. Taking this into account, we estimate our baseline model using data for the period 1980 to 2006.

Figure 4.6, Table 4.1 and 4.2 show the responses of wage and GDP for each shock in government spending. Baseline responses are qualitatively robust to this change in the data. A 1 percent of GDP shock in government expenditure produces wage responses which are, on average, 50 percent smaller. Moreover, the statistical significance of the point estimate of the mean wage response is smaller when the analyzed period is 1980 to 2006. Table 4.2 shows that the GDP response is also smaller than in the baseline.

In the same way, shocks in government investment produce smaller wage responses. Moreover, the statistical significance of the mean response falls drastically. Only the impact wage response is significant. GDP responses are also smaller and less significant. When the shock is in government consumption, the same results of a shock in government expenditure appear. That is, smaller and less significant wage responses. For GDP, there is also an important reduction in the mean response and in its level of significance.

Shocks in wage government consumption produce less negative and less significant wage responses as well as less persistent GDP contraction. Finally, the responses of wages to non-wage government consumption shocks are greater and more significant from year three onwards. Mean GDP responses, however, become smaller and statistically insignificant.

Another robustness check aims at capturing the effect of the creation of the EMU on these dynamic responses. We do this to check if the change in the exchange rate regime has affected the responses of real wages. Figure 4.7, Table 4.1 and 4.2 show the responses of the endogenous variables for the period preceding the creation of the EMU. That is, we take years from 1970 to 1998.

When the shock is in government expenditure, the impact and year one wage responses are greater but less persistent. The significance of the mean wage response is also reduced when we use pre-EMU data. Similarly, impact and year one GDP responses are greater.

A shock in government investment produces larger impact wage responses and an important reduction in its persistence as well as in the statistical significance in latter years. The GDP response is also greater on impact and year one and less persistent than in the baseline model.

Government consumption produces larger wage responses in the first years and less persistence and significant mean responses. The same pattern is found in the GDP response. Wage government consumption produces less negative wage responses with no change in the significance while non-wage government consumption produces larger wage responses for the impact and subsequent five years. For a shock in the latter, the GDP response is greater in the first years and it is less persistent.

These two experiments give mutually consistent results. For the period preceding the creation of the EMU, wage and GDP responses tend to be stronger and more significant than in the period going from 1980 to 2006. These is consistent with the findings of Perotti (2004) and Romer and Romer (2007). Accordingly, the baseline model produces responses which are, in most of the cases, between these two.

4.3.4 Inclusion of debt feedback

Following Beetsma et al. (2008), we check if our baseline results are robust to the inclusion of the general government consolidated gross debt as a ratio of GDP. We include the logarithm of the first two lags of this variable. The source of these data is the AMECO database.

As shown in Figure 4.8 and Table 4.1, the debt feedback produces no significant changes in the response of real wages to a shock in government expenditure, either in its level or in its significance. For the GDP, however, Table 4.2 shows that responses are slightly greater when the debt to GDP ratio is included.

A shock in government investment produces slightly larger wage and GDP responses. Shocks in government consumption produce larger wage and GDP responses in the first years. Finally shocks in wage government consumption produce less negative wage responses while shocks in non-wage government consumption give slightly smaller wage responses. For the latter, the GDP response is slightly smaller for the latter years and less statistically significant.

4.3.5 Summary results from the robustness checks

Different robustness checks show that the baseline results are robust to most of the changes in the model specification. The important result of this section is that some country exclusions produce large quantitative and qualitative changes in the response of real wages. Importantly, the exclusion of Greece changes the response of real wages to shocks in non-wage government consumption from positive to negative after year one.

4.4 The Perotti sample

Most of the papers assessing the dynamic effects of government spending on real wages take a small set of countries or, as in many cases, focus on the United States economy.

For instance, Pappa (2005) studies the effects of shocks in government consumption, government investment and government employment on the real wages of the United States, at the whole economy and state levels. Using sign constraints which are robust to neoclassical and Neo-Keynesian theoretical predictions to identify fiscal shocks, she finds positive responses of real wages and employment to innovations in these variables. In that paper, the frequency of the data is annual and real wages are defined as the average wage per job deflated with the aggregate price deflator.

Taking Canada, United Kingdom and United States, Perotti (2007) finds that shocks in government expenditure in goods and services, increase real product wage in the whole economy and, more importantly, in the manufacturing sector. In that study, government expenditure includes expenditure in military equipment and excludes fixed capital formation. Data is in quarterly frequency and fiscal shocks are identified with the method of Blanchard and Perotti (2002) and Perotti (2004).

Following Monacelli and Perotti (2006) and Perotti (2007), this chapter takes the set of countries for which reliable non-interpolated quarterly fiscal data are available. These countries are: Australia, Canada, United Kingdom and United States. We call this set 'the Perotti sample'. However, rather than studying different VARs for each country separately, using quarterly data and identifying shocks with the method of Blanchard and Perotti (2002) and Perotti (2004), we estimate a panel VAR with annual data and identify shocks using the Choleski ordering presented in Section 4.1. As in the EMU sample, we take the real consumption wage.

Figure 4.9 shows the real wage responses to shocks in government expenditure, government investment and government consumption. The wage and non-wage component of the latter are not studied because these data are not available for Australia at the OECD Economic Outlook database. Dotted lines represent the 16th and 84th percentiles of the impulse-response distribution, while continuous lines are the point estimates of the mean responses.

This figure shows that all these spending shocks, equivalent in magnitude to 1 percent of GDP, are expansionary. However, the point estimates of the mean real wage response are statistically insignificant. The inspection of the confidence bands shows that wage tends to respond negatively after the year two and four to shocks in government expenditure and government consumption, respectively.

This result is in sharp contrast to the one produced by the EMU sample. Moreover, while a shock in government investment produces the largest real wage response in those countries, the same shock produces no effect in the Perotti sample. These contrasting results are in line with the findings of Chapter 3 that real exchange rate responses are the opposite for the EMU and the Perotti sample. This fall in real consumption wages seems to be in contrast to the findings of Perotti (2007) that real product wage responses to shocks in government consumption are positive. However, as it is shown in the next section, the price deflator plays a crucial role in shaping the wage responses of these countries.

4.5 Alternative price deflators

4.5.1 Government spending deflated with GDP prices

Since we are interested on the effect of shocks in the quantities purchased by the government, we use the specific government price deflator for each spending variable in the baseline model. The exception is non-wage government consumption. For this case, we take the deflator of total government consumption. This approach of deflating government spending with government prices is also implemented by Corsetti and Müller (2006) and Beetsma et al. (2008).

A different strategy is to deflate fiscal variables with GDP prices. For instance, Monacelli and Perotti (2006) take this deflator to compute real government consumption. Among others studies deflating government spending with GDP prices we find Lane and Perotti (2003), Pappa (2005) and Perotti (2004, 2007).

The rationale of taking the GDP deflator is that it permits to account for government shocks in quantities and in relative prices at the same time. In general, the literature finds that the effects produced by shocks in government variables deflated with GDP prices are qualitatively similar to those generated by government variables deflated with own deflators. For instance, Monacelli and Perotti (2006) show that the use of government prices to compute real government consumption does not change the baseline results produced by real government consumption deflated with GDP prices.

This section compares the wage responses to shocks in real government spending deflated with these two price indices. The advantage of this strategy is that it helps to understand the importance of the price and quantity components in government spending shocks. As we show next, this change in the definition of spending shocks produces important changes in the real wage responses.

In what follows, we re-estimate the baseline model using fiscal variables deflated with GDP prices. Furthermore, we check the robustness of these results with the same battery of tests of

Section 4.3. GDP and real wage responses to shocks in the five fiscal variables are presented in Figure 4.10. Tables 4.3 and 4.4 show the estimates of these responses together and the estimates for the robustness checks. Figure 4.11 shows the real wage responses of this model together with those excluding one country member at a time.

In the EMU sample, the responses of real wages are larger than in the baseline but qualitative the same for total expenditure, government consumption and non-wage government consumption. This shows that government shocks that combine shocks in relative government prices and in quantities produce larger real wage responses. In contrast, the effect of shocks in government investment prices and quantities together is smaller and less significant than the effect of shocks in the quantities of government investment alone. This could be the result of real wages being less correlated with government investment deflated with GDP prices.

The main change produced by deflating government spending variables with GDP prices is on the response of real wages to shocks in wage government consumption. Recall that by deflating wage government consumption with GDP prices, we are also allowing for shocks in relative public wages to take place. In contrast, the real wage response in the baseline is exclusively based on shocks in the number of public employees, since we used the government wage deflator.

A 1 percent of GDP shock in the wage government consumption produces now the largest real wage response across all types of government spending. This shock increases real wages by 3.42 percent on impact with a peak of 3.95 percent in year one.

A caveat against the use of the GDP deflator in this case may be the fact that if government nominal wages are endogenous to private-sector nominal wages, shocks in the former would not be completely exogenous. Therefore, the use of the GDP deflator may be problematic.

Figure 4.12 presents the real wage responses for the Perotti sample using GDP- deflated government spending variables. For this group, there are no qualitative differences with the previous case when the shocks are in government expenditure or government consumption. In contrast, government investment produces now negative real wage responses. Quantitatively, GDP-deflated government expenditure and government consumption produce larger positive impact responses that become negative after year two. As in the previous case, the point estimates of the mean real wage responses are statistically insignificant.

4.5.2 CPI- versus GDP-deflated real wages

Here, we compare the dynamic effects of government spending shocks on real consumption and real product wages. The difference between these measures is that the former can be thought as real wages perceived by private agents, since this variable is defined as nominal compensation per employee deflated with private consumption prices. In contrast, the latter is nominal compensation per employee deflated with GDP prices. Hence it is a measure of firm costs (i.e. real wages paid to the employees).

Tables 4.1 and 4.2 and Figure 4.13 show the point estimates of the mean responses of real product wage and GDP to shocks in the government spending variables for the EMU sample. A 1 percent of GDP shock in government expenditure produces responses in real consumption wage which are larger than those of the real product wage for the impact as well as for year one and two. Similarly, shocks in government investment produce larger consumption wage responses in the first years. This difference is greater than the one produced by government expenditure.

Government consumption shocks produce larger increases in the real product wage. In contrast to the previous cases, this difference persists for the whole impulse-response horizon. Similarly, the responses to shocks in wage and non-wage government consumption are smaller in the real consumption wage.

The government consumption results of this section are in line with those of Chapter 3. Shocks in this variable produce larger real exchange rate appreciations in the real exchange rate based on GDP prices, than in the real exchange rate based on consumption prices.

In contrast to the case of the EMU, the response of the real product wage is qualitatively different to the one of the real consumption wage for shocks in government expenditure and government consumption in the Perotti sample. However, the responses to shocks in government investment are qualitatively the same independently of the price index used to deflate nominal wages. Shocks in this variable do not affect real wages.

Since the point estimate of these responses are statistically insignificant, we study the qualitative differences by analyzing their confidence bands. Figure 4.14, shows that shocks in government expenditure produce positive real product wage responses and negative real consumption wage responses from year two onwards. This same pattern is observed in the wage responses to a shock in government consumption.

The reason for this divergence in the real wage responses can be the result of dissimilar responses of the price indices that are used to deflate nominal wages. That is, if consumer prices increase more than output prices as a result of a shock in government spending, the response of the real consumption wage would be less positive than the response of the real output wage.

4.6 Conclusions

Although the literature is not yet conclusive on the theoretical effects of government spending shocks in real wages, the empirical studies assessing the dynamic effects of government spending find evidence supporting the Neo-Keynesian predictions. That is, spending shocks produce GDP expansion, an increase in private consumption and a rise in real wages.

However, this same literature has been concentrated on countries with reliable non-interpolated quarterly fiscal data, leaving unexplored the effects of these policies in other countries. An exception is the work of Lane and Perotti (2003). This article studies a panel formed by OECD countries and finds that wage government spending increase the real product wage in the short-run and that this effect is larger under a flexible exchange rate regime.

Here we study the dynamic effects of positive shocks to different types of government spending on the real wage of eleven EMU members, estimating a panel VAR and using annual data. We find that shocks in total government absorption, defined as the sum of government fixed investment and total government consumption excluding transfers, produce positive responses in real CPI-deflated and GDP-deflated wages. This same result is observed when the shocks are in these two spending variables taken individually. Shocks in government investment produce the largest wage increases across all types of spending. Innovations in non-wage government consumption produce delayed increases in real wages. All these qualitative results are also observed when government spending variables are deflated with GDP prices.

In contrast, shocks in the number of public employees (i.e. wage government consumption deflated with government nominal wages) produce negative responses of real wages, while shocks in wage government consumption deflated with GDP prices produce positive responses. A caveat against the use of the GDP deflator in this case may be the fact that if government nominal wages are endogenous to private-sector nominal wages, shocks in the former would not be completely exogenous implying that the use of the GDP deflator may generate identification problems.

We also analyze the effects of government spending in a panel formed by the four countries generally used in the studies of Perotti. As in Perotti (2007), we find that shocks in government absorption and consumption increase real GDP-deflated wages. In contrast, the response of the real CPI-deflated wages is the opposite.

Table 4.1: Real wage responses to fiscal spending shock equivalent to 1% of GDP.

shock		Baseline		4-vbles VAR		post 1980		pre EMU		DEBT		GDP-defl. W	
	0	0.95	***			0.57	***	1.10	***	0.97	***	0.89	***
	1	1.13	***			0.69	**	1.22	***	1.17	***	1.07	***
	2	1.18	***			0.78	**	1.03	***	1.22	***	1.14	***
	3	1.17	***			0.82	**	0.80	**	1.20	***	1.17	***
	4	1.10	***			0.81	**	0.59	*	1.12	***	1.16	***
GEXP	5	0.99	***			0.74	**	0.41		0.99	***	1.10	***
	6	0.85	***			0.64	*	0.26		0.83	***	1.01	***
	7	0.70	**			0.51	*	0.14		0.67	**	0.89	***
	8	0.55	**			0.38		0.05		0.52	*	0.75	***
	9	0.42	*			0.26		-0.01		0.39	*	0.62	**
	10	0.30				0.16		-0.04		0.27		0.50	**
	0	1.37	***	1.42	***	0.78	**	1.44	***	1.42	***	1.04	***
	1	1.60	***	1.65	***	0.74		1.51	***	1.70	***	1.16	***
	2	1.66	***	1.69	***	0.78		0.94	*	1.78	***	1.32	***
	3	1.65	***	1.67	***	0.85		0.37		1.75	***	1.49	***
	4	1.57	***	1.59	***	0.88		0.02		1.65	***	1.58	***
GINV	5	1.44	**	1.47	**	0.85		-0.11		1.49	**	1.58	***
	6	1.27	**	1.32	**	0.75		-0.12		1.31	**	1.50	***
	7	1.09	**	1.16	**	0.62		-0.07		1.12	**	1.37	***
	8	0.92	**	0.99	**	0.48		-0.01		0.94	*	1.21	***
	9	0.76	*	0.83	*	0.34		0.03		0.78	*	1.04	***
	10	0.62	*	0.69	*	0.22		0.05		0.64	*	0.88	**
	0	1.04	***	1.09	***	0.78	***	1.26	***	1.09	***	1.10	***
	1	1.31	***	1.35	***	1.09	**	1.51	***	1.39	***	1.41	***
	2	1.40	***	1.41	***	1.23	**	1.41	***	1.46	***	1.46	***
	3	1.35	***	1.37	***	1.25	**	1.19	***	1.39	***	1.43	***
	4	1.22	***	1.25	***	1.16	**	0.93	**	1.22	***	1.34	***
GC	5	1.05	**	1.07	**	1.01	**	0.68	*	1.01	**	1.21	***
	6	0.85	**	0.87	**	0.83	*	0.45		0.79	*	1.06	***
	7	0.67	*	0.68	*	0.64		0.28		0.58		0.90	**
	8	0.50	*	0.49	*	0.47		0.14		0.39		0.74	**
	9	0.35		0.34		0.32		0.05		0.23		0.59	**
	10	0.23		0.21		0.20		0.00		0.10		0.45	*
	0	-0.50		-0.68	*	-0.13		-0.57		-0.45		-0.44	
	1	-1.22	*	-1.46	**	-0.84		-1.18	*	-1.13	*	-0.83	
	2	-1.35	**	-1.59	**	-1.02		-1.26	**	-1.28	*	-0.89	
	3	-1.21	*	-1.35	**	-0.93		-1.07	*	-1.18	*	-0.82	
	4	-0.99	*	-1.04	*	-0.75		-0.84		-1.00	*	-0.72	
WGC	5	-0.79		-0.78		-0.55		-0.67		-0.83		-0.62	
	6	-0.62		-0.60		-0.37		-0.57		-0.69		-0.54	
	7	-0.51		-0.49		-0.22		-0.52		-0.59		-0.47	
	8	-0.42		-0.42		-0.09		-0.50		-0.51		-0.42	
	9	-0.36		-0.38		0.00		-0.48		-0.46		-0.38	
	10	-0.32		-0.36		0.06		-0.45		-0.43		-0.34	
	0	-0.31		-0.30		-0.80	***	-0.14		-0.33		-0.03	
	1	-0.19		-0.17		-0.53		0.22		-0.21		0.01	
	2	0.19		0.24		0.11		0.69		0.17		0.29	
	3	0.53		0.62		0.67		0.98	**	0.51		0.58	
	4	0.75	*	0.85	**	1.00	**	1.04	**	0.73	*	0.78	**
NWGC	5	0.83	**	0.91	**	1.11	**	0.94	**	0.81	*	0.87	**
	6	0.83	**	0.87	**	1.07	**	0.76	**	0.80	**	0.88	**
	7	0.76	**	0.76	**	0.95	**	0.56	**	0.74	**	0.83	**
	8	0.67	**	0.63	**	0.78	**	0.39	*	0.64	**	0.75	**
	9	0.57	**	0.51	**	0.61	**	0.26		0.54	*	0.66	**
	10	0.48	**	0.40	*	0.46	*	0.17		0.44	*	0.57	**

Note: Point estimates of the Impulse-Response mean. *, ** and ***, denote statistical significance at 10, 5 and 1 percent, respectively.

Table 4.2: Real GDP responses to fiscal spending shock equivalent to 1% of GDP.

shock		Baseline		4-vbles VAR		post 1980		pre EMU		DEBT		GDP-defl. W	
	0	0.91	***			0.47	***	1.11	***	0.97	***	0.90	***
	1	1.28	***			0.76	***	1.42	***	1.42	***	1.25	***
	2	1.23	***			0.81	***	1.19	***	1.36	***	1.19	***
	3	1.01	***			0.71	**	0.81	***	1.11	***	0.97	***
	4	0.75	**			0.55	*	0.47	*	0.82	**	0.70	**
GEXP	5	0.51	*			0.37		0.21		0.55		0.45	
	6	0.30				0.21		0.04		0.32		0.23	
	7	0.13				0.07		-0.06		0.12		0.05	
	8	0.01				-0.04		-0.11		-0.03		-0.09	
	9	-0.09				-0.11		-0.12		-0.15		-0.20	
	10	-0.15				-0.15		-0.11		-0.24		-0.27	
	0	1.73	***	1.72	***	1.21	***	1.94	***	1.79	***	1.71	***
	1	2.27	***	2.27	***	1.83	***	2.43	***	2.43	***	2.21	***
	2	2.24	***	2.29	***	1.86	***	2.02	***	2.40	***	2.17	***
	3	2.00	***	2.07	***	1.61	**	1.42	**	2.13	***	1.94	***
	4	1.71	***	1.77	***	1.25	*	0.94	*	1.81	***	1.65	***
GINV	5	1.43	**	1.46	**	0.89		0.62		1.51	**	1.35	**
	6	1.17	**	1.18	*	0.58		0.43		1.24	*	1.06	*
	7	0.94	*	0.92		0.32		0.33		1.00		0.80	
	8	0.75		0.70		0.13		0.26		0.81		0.57	
	9	0.59		0.52		0.00		0.22		0.65		0.38	
	10	0.46		0.37		-0.09		0.18		0.52		0.22	
	0	0.74	***	0.72	***	0.33	*	1.01	***	0.79	***	0.72	***
	1	1.10	***	1.07	***	0.55	*	1.30	***	1.19	***	1.07	***
	2	0.97	**	0.96	**	0.58		1.04	**	1.02	**	0.93	**
	3	0.70	*	0.69	*	0.51		0.68	*	0.69	*	0.64	*
	4	0.42		0.40		0.38		0.36		0.35		0.35	
GC	5	0.17		0.15		0.23		0.12		0.05		0.09	
	6	-0.02		-0.07		0.09		-0.03		-0.20		-0.12	
	7	-0.18		-0.23		-0.03		-0.12		-0.40		-0.29	
	8	-0.28		-0.34		-0.12		-0.16		-0.55		-0.40	
	9	-0.35		-0.41		-0.18		-0.17		-0.65		-0.48	
	10	-0.39		-0.45		-0.20		-0.16		-0.71		-0.52	
	0	-0.22		-0.47		-0.02		-0.04		-0.16		-0.24	
	1	-0.44		-0.75		-0.59		0.03		-0.35		-0.53	
	2	-0.55		-0.83		-0.74		-0.17		-0.50		-0.68	
	3	-0.56		-0.68		-0.60		-0.33		-0.56		-0.74	
	4	-0.54		-0.50		-0.35		-0.43		-0.58		-0.75	
WGC	5	-0.50		-0.40		-0.10		-0.49		-0.58		-0.74	
	6	-0.48		-0.38		0.09		-0.54		-0.58		-0.72	
	7	-0.46		-0.40		0.23		-0.55		-0.57		-0.70	
	8	-0.44		-0.44		0.30		-0.55		-0.57		-0.66	
	9	-0.43		-0.48		0.32		-0.53		-0.56		-0.63	
	10	-0.41		-0.51		0.32		-0.49		-0.55		-0.59	
	0	0.51	**	0.48	**	-0.08		0.71	**	0.49	**	0.44	**
	1	0.87	**	0.82	**	0.08		1.03	**	0.88	**	0.75	**
	2	1.02	**	1.00	**	0.34		1.06	**	1.02	**	0.91	**
	3	1.06	**	1.01	**	0.56		0.94	**	1.05	**	0.95	**
	4	1.01	**	0.92	**	0.67		0.74	*	1.00	**	0.91	**
NWGC	5	0.92	**	0.79	*	0.67		0.53		0.90	*	0.81	**
	6	0.80	*	0.64	*	0.58		0.33		0.77	*	0.69	*
	7	0.67	*	0.51		0.44		0.18		0.64		0.55	
	8	0.55		0.39		0.29		0.07		0.52		0.42	
	9	0.44		0.30		0.16		0.00		0.41		0.30	
	10	0.35		0.23		0.05		-0.03		0.31		0.20	

Note: Point estimates of the Impulse-Response mean. *, ** and ***, denote statistical significance at 10, 5 and 1 percent, respectively.

Table 4.3: Real wage responses to fiscal spending (GDP-deflated) shock equivalent to 1% of GDP.

shock		GDP-defl. GOV		4-vbles VAR		post 1980		pre EMU		DEBT	
	0	1.17	***			0.95	***	1.32	***	1.23	***
	1	1.34	***			0.94	***	1.38	***	1.41	***
	2	1.31	***			0.90	***	1.11	***	1.37	***
	3	1.22	***			0.89	***	0.82	***	1.26	***
	4	1.10	***			0.86	***	0.58	**	1.12	***
GEXP	5	0.95	***			0.78	***	0.38	*	0.95	***
	6	0.79	***			0.66	**	0.23		0.78	***
	7	0.63	**			0.54	**	0.11		0.62	**
	8	0.49	**			0.41	**	0.03		0.48	**
	9	0.37	**			0.29	*	-0.02		0.36	*
	10	0.27	*			0.20		-0.04		0.27	
	0	1.17	***	1.12	***	0.53		1.28	***	1.23	***
	1	1.24	***	1.11	**	0.22		1.26	**	1.37	***
	2	1.20	**	0.87	*	0.12		0.66		1.35	**
	3	1.15	**	0.76		0.18		0.16		1.29	**
	4	1.08	*	0.77		0.26		-0.07		1.20	**
GINV	5	0.99	*	0.84	*	0.31		-0.08		1.10	*
	6	0.89	*	0.90	*	0.31		0.02		0.99	*
	7	0.79	*	0.93	**	0.28		0.12		0.87	*
	8	0.69	*	0.91	**	0.23		0.19		0.76	
	9	0.59	*	0.86	**	0.17		0.22		0.66	
	10	0.50		0.79	**	0.11		0.21		0.57	
	0	1.55	***	1.68	***	1.30	***	1.75	***	1.61	***
	1	1.85	***	2.03	***	1.40	***	1.86	***	1.92	***
	2	1.87	***	2.04	***	1.50	***	1.59	***	1.93	***
	3	1.74	***	1.86	***	1.54	***	1.23	***	1.77	***
	4	1.51	***	1.57	***	1.47	***	0.85	***	1.52	***
GC	5	1.24	***	1.25	***	1.29	***	0.53	**	1.24	***
	6	0.97	***	0.95	***	1.05	***	0.28		0.96	***
	7	0.73	**	0.69	***	0.81	***	0.11		0.72	**
	8	0.53	**	0.49	**	0.58	**	0.01		0.51	*
	9	0.37	*	0.33	*	0.39	*	-0.04		0.35	
	10	0.25		0.20		0.23		-0.07		0.22	
	0	3.42	***	3.51	***	3.53	***	3.57	***	3.54	***
	1	3.93	***	4.03	***	3.64	***	3.57	***	4.08	***
	2	3.50	***	3.62	***	3.05	***	2.55	***	3.62	***
	3	2.81	***	2.94	***	2.40	***	1.51	***	2.88	***
	4	2.13	***	2.26	***	1.83	***	0.74		2.14	***
WGC	5	1.54	***	1.65	***	1.34	**	0.23		1.49	***
	6	1.07	**	1.15	**	0.93	*	-0.07		0.96	*
	7	0.70		0.76	*	0.60		-0.23		0.55	
	8	0.42		0.47		0.35		-0.29		0.24	
	9	0.21		0.24		0.17		-0.29		0.02	
	10	0.06		0.08		0.04		-0.27		-0.15	
	0	0.50	**	0.50	**	-0.06		0.73	**	0.52	**
	1	0.72	**	0.72	*	0.15		1.01	**	0.75	**
	2	1.01	**	1.03	**	0.76	*	1.24	***	1.03	**
	3	1.21	***	1.29	***	1.29	***	1.29	***	1.22	***
	4	1.26	***	1.37	***	1.53	***	1.17	***	1.26	***
NWGC	5	1.21	***	1.31	***	1.53	***	0.95	***	1.20	***
	6	1.08	***	1.15	***	1.36	***	0.71	**	1.07	***
	7	0.93	***	0.95	***	1.12	***	0.50	*	0.91	**
	8	0.77	**	0.75	**	0.87	***	0.34	*	0.75	**
	9	0.63	**	0.58	**	0.64	**	0.22		0.60	**
	10	0.51	**	0.45	*	0.45	*	0.14		0.48	**

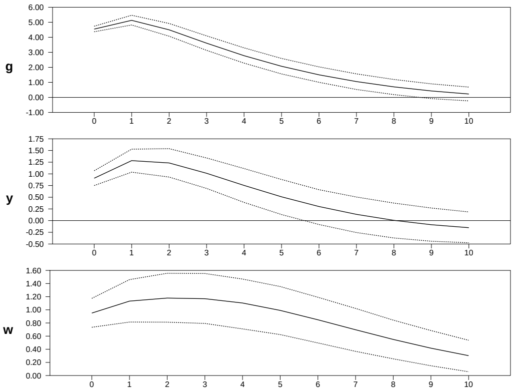
Note: Point estimates of the Impulse-Response mean. *, ** and ***, denote statistical significance at 10, 5 and 1 percent, respectively.

Table 4.4: Real GDP responses to fiscal spending (GDP-deflated) shock equivalent to 1% of GDP.

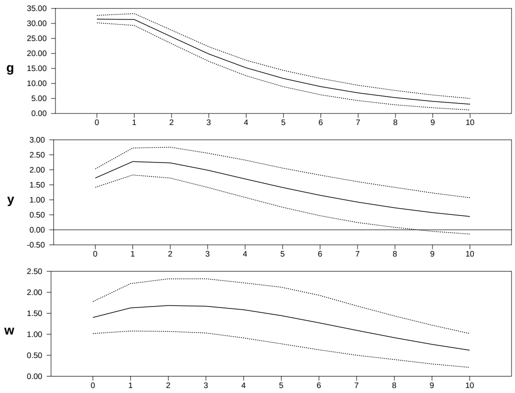
shock		GDP-defl. GOV		4-vbles VAR		post 1980		pre EMU		DEBT	
	0	0.73	***			0.44	***	0.86	***	0.79	***
	1	0.97	***			0.50	**	1.06	***	1.07	***
	2	0.92	***			0.45	*	0.84	***	1.01	***
	3	0.76	***			0.38		0.53	**	0.82	***
	4	0.57	**			0.30		0.26		0.61	**
GEXP	5	0.40				0.21		0.07		0.42	
	6	0.24				0.13		-0.04		0.25	
	7	0.12				0.05		-0.10		0.12	
	8	0.03				-0.01		-0.12		0.02	
	9	-0.04				-0.05		-0.11		-0.06	
	10	-0.08				-0.08		-0.10		-0.12	
	0	1.94	***	1.90	***	1.38	***	2.27	***	2.03	***
	1	2.51	***	2.46	***	1.84	***	2.78	***	2.71	***
	2	2.43	***	2.36	***	1.78	***	2.34	***	2.62	***
	3	2.16	***	2.09	***	1.52	**	1.72	***	2.32	***
	4	1.85	***	1.82	***	1.19	*	1.22	**	1.99	***
GINV	5	1.57	***	1.58	**	0.89		0.88		1.70	**
	6	1.32	**	1.37	**	0.62		0.68		1.44	**
	7	1.11	*	1.18	**	0.41		0.54		1.22	*
	8	0.93	*	1.00	*	0.24		0.44		1.03	
	9	0.77		0.83		0.12		0.36		0.88	
	10	0.64		0.69		0.03		0.28		0.75	
	0	0.56	***	0.54	***	0.28	**	0.68	***	0.60	***
	1	0.78	***	0.77	***	0.22		0.84	***	0.83	***
	2	0.73	***	0.73	**	0.21		0.63	**	0.75	***
	3	0.57	**	0.56	*	0.23		0.33		0.55	*
	4	0.38		0.34		0.22		0.09		0.33	
GC	5	0.20		0.14		0.17		-0.08		0.13	
	6	0.04		-0.03		0.10		-0.16		-0.04	
	7	-0.07		-0.15		0.01		-0.19		-0.17	
	8	-0.15		-0.23		-0.06		-0.19		-0.27	
	9	-0.21		-0.28		-0.12		-0.16		-0.33	
	10	-0.24		-0.30		-0.15		-0.13		-0.37	
	0	0.76	***	0.75	***	0.76	***	0.80	**	0.86	***
	1	0.90	**	0.89	**	0.62	*	0.82	**	0.99	**
	2	0.61		0.59		0.26		0.32		0.65	
	3	0.19		0.16		-0.07		-0.21		0.17	
	4	-0.19		-0.23		-0.31		-0.57		-0.29	
WGC	5	-0.49		-0.53		-0.45		-0.73		-0.65	
	6	-0.69		-0.74		-0.53		-0.75		-0.91	
	7	-0.82		-0.87	*	-0.54		-0.69		-1.07	*
	8	-0.88	*	-0.93	*	-0.52		-0.57		-1.16	*
	9	-0.89	*	-0.94	*	-0.47		-0.45		-1.19	*
	10	-0.87	*	-0.92	*	-0.41		-0.33		-1.18	*
	0	0.54	**	0.54	**	0.00		0.77	**	0.58	***
	1	0.88	***	0.89	***	0.04		1.06	***	0.94	***
	2	1.03	***	1.06	***	0.27		1.01	**	1.07	***
	3	1.04	***	1.06	***	0.52		0.83	**	1.06	***
	4	0.97	**	0.95	**	0.66	*	0.60		0.97	**
NWGC	5	0.84	**	0.79	**	0.66		0.39		0.84	**
	6	0.70	*	0.62	*	0.56		0.21		0.69	*
	7	0.56		0.46		0.41		0.09		0.55	
	8	0.44		0.33		0.25		0.01		0.42	
	9	0.33		0.23		0.10		-0.03		0.31	
	10	0.24		0.15		-0.01		-0.04		0.22	

Note: Point estimates of the Impulse-Response mean. *, ** and ***, denote statistical significance at 10, 5 and 1 percent, respectively.

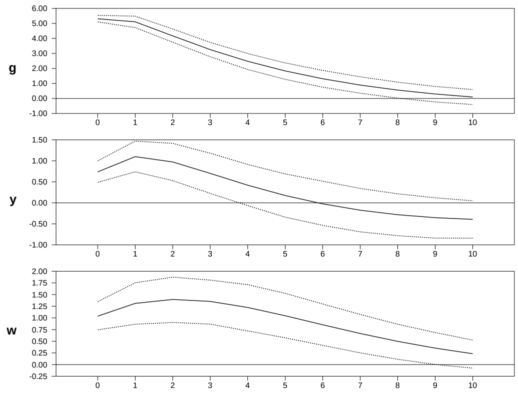
Figure 4.1: Baseline. Responses to a government spending shock (1% of GDP).



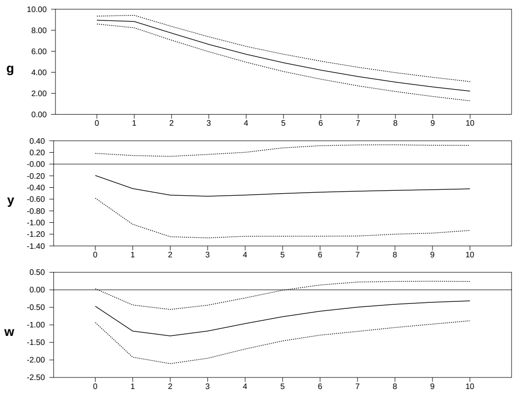
shock in GEXP



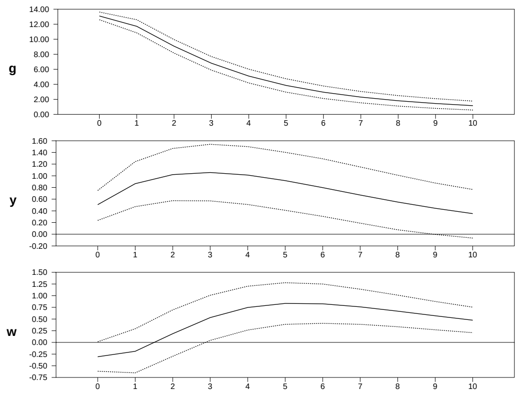
shock in GINV



shock in GC



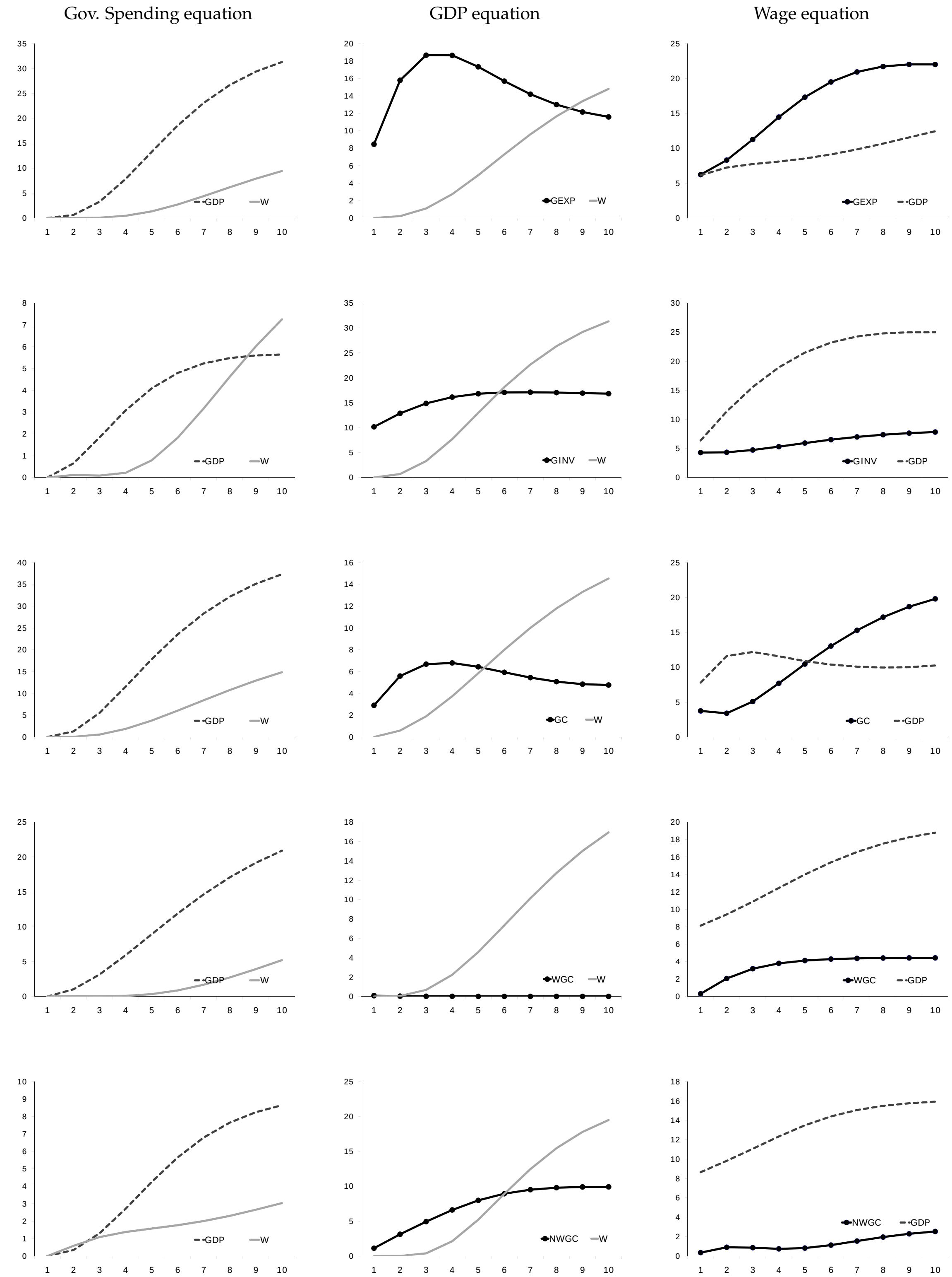
shock in WGC



shock in NWGC

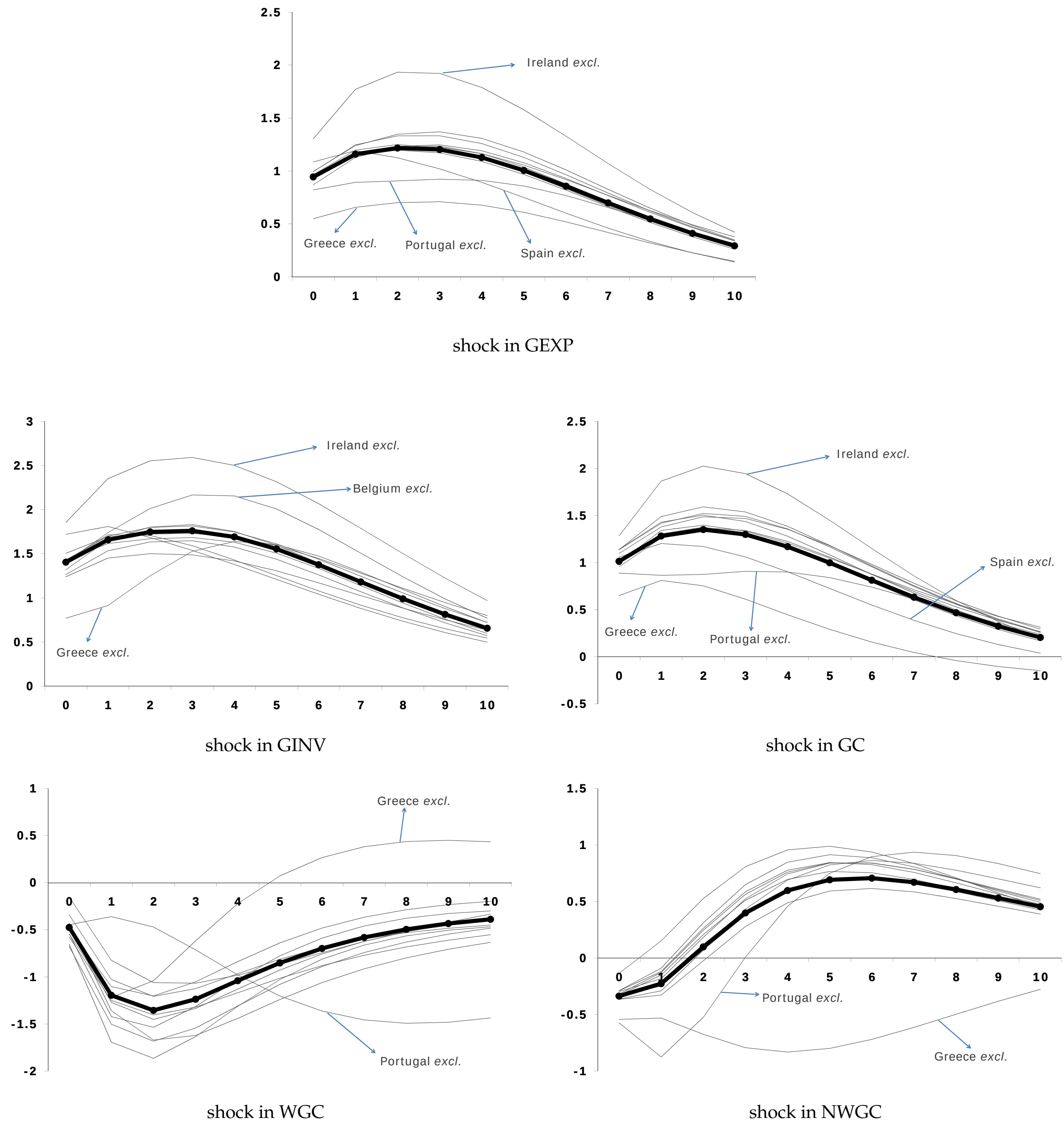
Note: Solid lines are the point estimates of the Impulse-Response mean. Dotted lines are the 16th and 84th percentiles from Monte Carlo simulations based on 1000 replications. Vertical axis indicates the percentage change in government spending (g), GDP (y) and CPI-deflated real wages (w).

Figure 4.2: Variance decomposition.



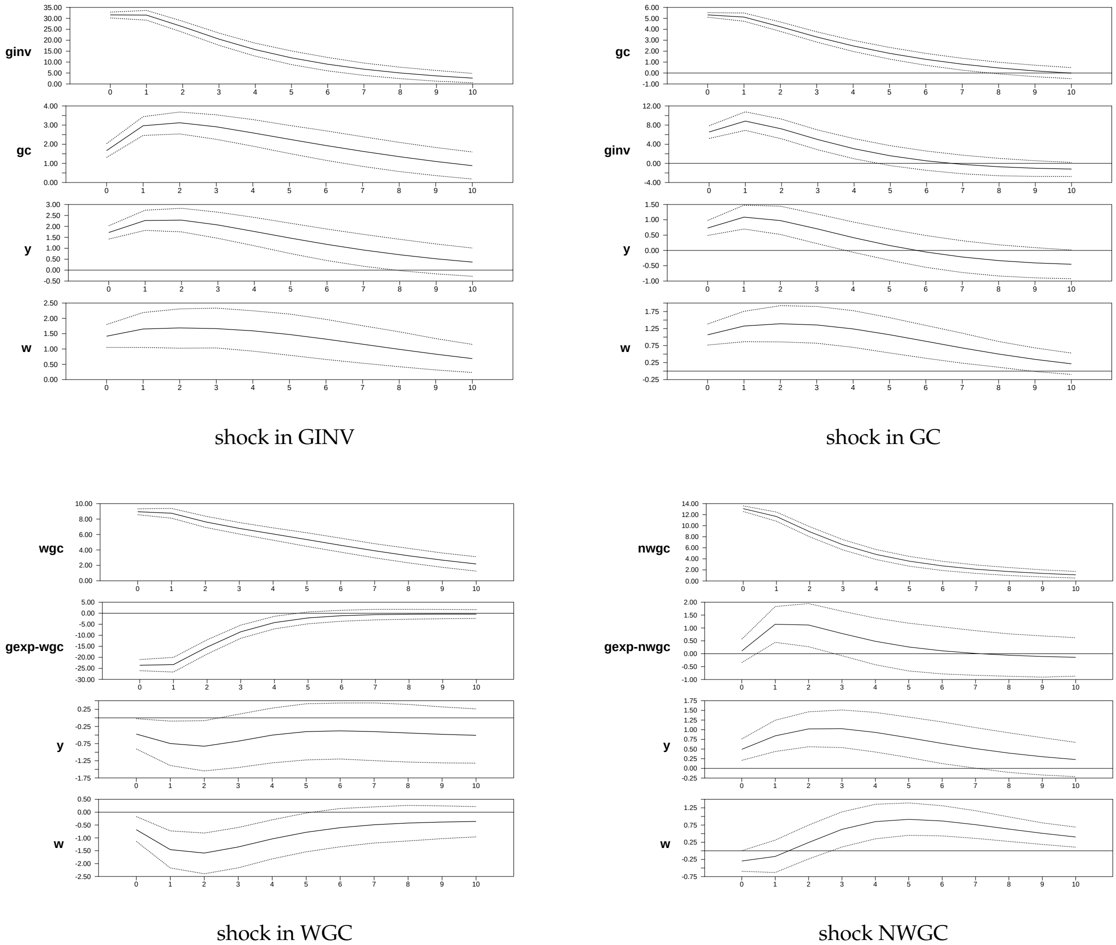
Note: Each row represents a VAR model for each definition of government spending. Vertical axis measures the percentage of forecast error variance attributable to a shock in the plotted endogenous variable.

Figure 4.3: Robustness check. Wage responses for different spending shocks: one country member excluded.



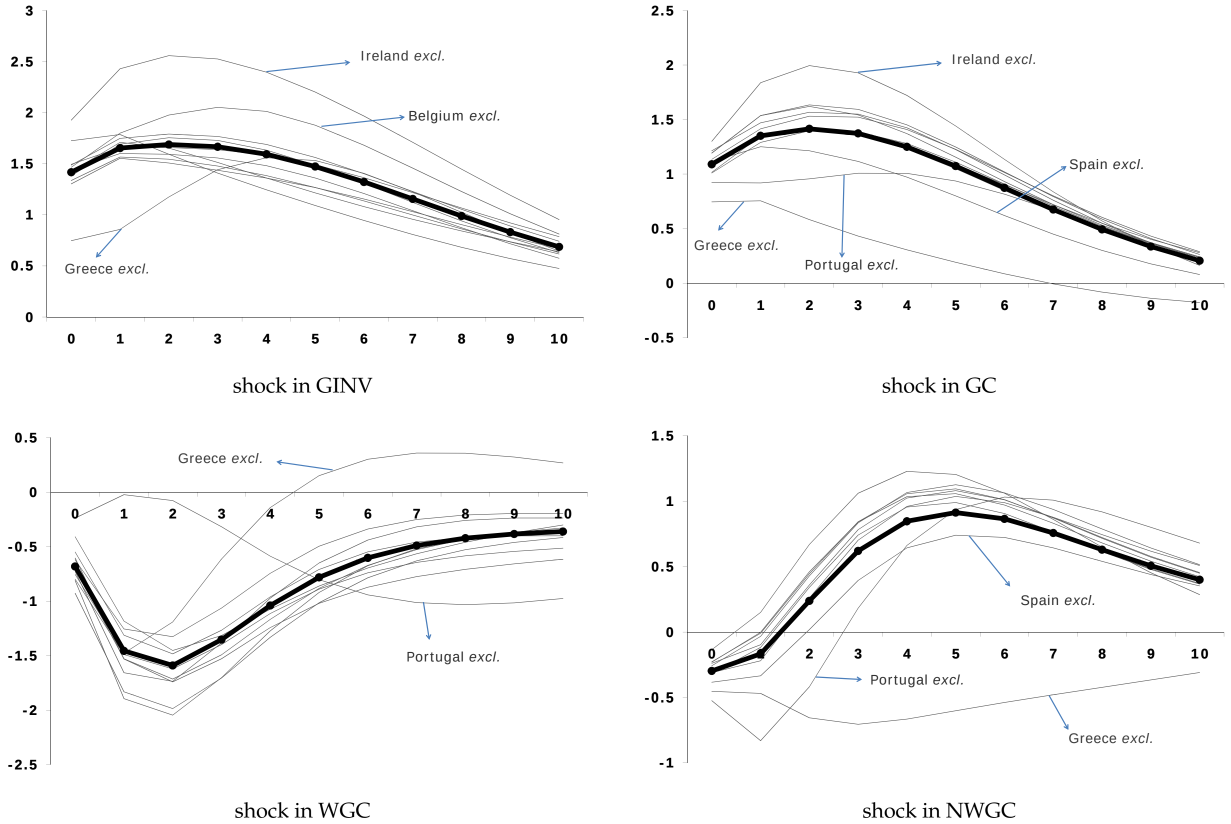
Note: Thick line denotes the response of the baseline EMU model. Thin lines, denote the responses for PVAR estimated excluding one country member at a time.

Figure 4.4: Robustness check. VAR including the 'complement government spending'.



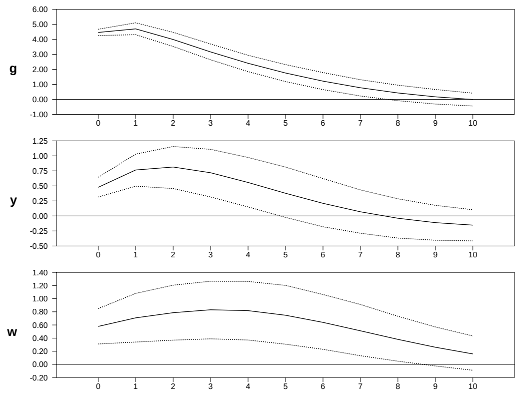
Note: Solid lines are the point estimates of the Impulse-Response mean. Dotted lines are the 16th and 84th percentiles from Monte Carlo simulations based on 1000 replications. Vertical axis indicates the percentage change in government spending (g), GDP (y) and CPI-deflated real wages (w).

Figure 4.5: Robustness check. Wage responses for different spending shocks in VAR including the ‘complement government spending’: one country member excluded.

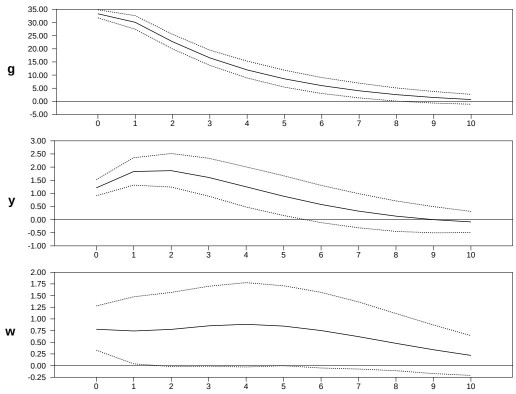


Note: Thick line denotes the real wage response in the 4-variables system. Thin lines, denote the responses for the 4-variables PVAR estimated excluding one country member at a time.

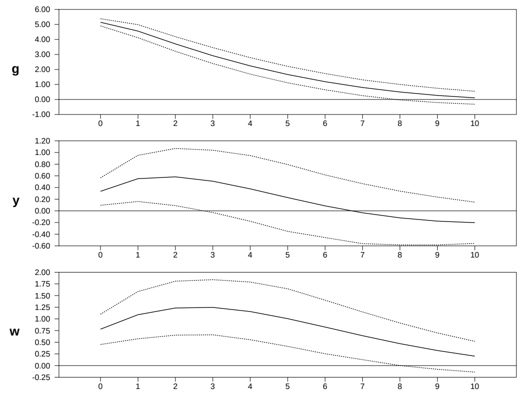
Figure 4.6: Robustness check. Baseline estimated for the period 1980-2006.



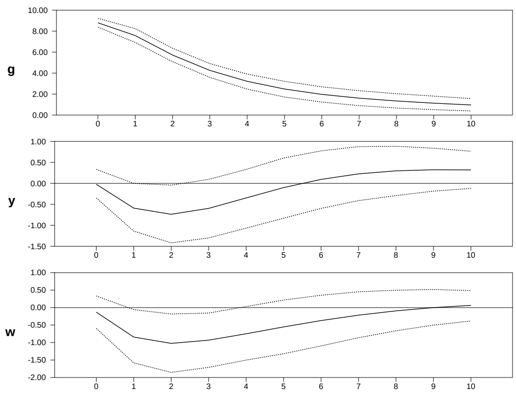
shock in GEXP



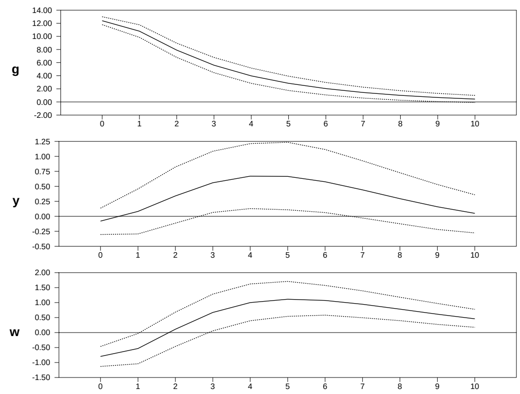
shock in GINV



shock in GC



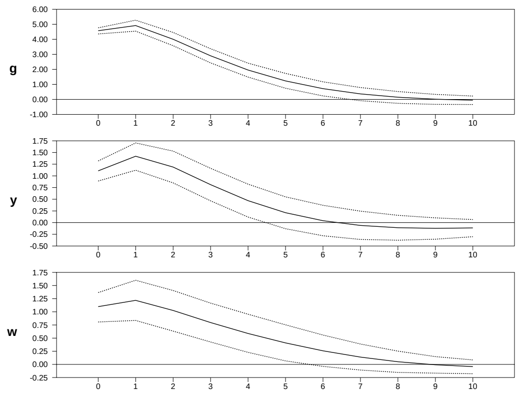
shock in WGC



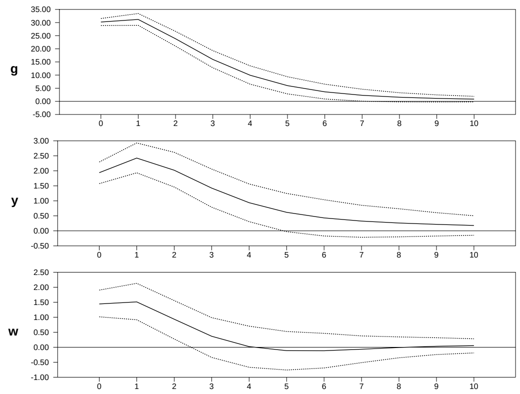
shock in NWGC

Note: Solid lines are the point estimates of the Impulse-Response mean. Dotted lines are the 16th and 84th percentiles from Monte Carlo simulations based on 1000 replications. Vertical axis indicates the percentage change in government spending (g), GDP (y) and CPI-deflated real wages (w).

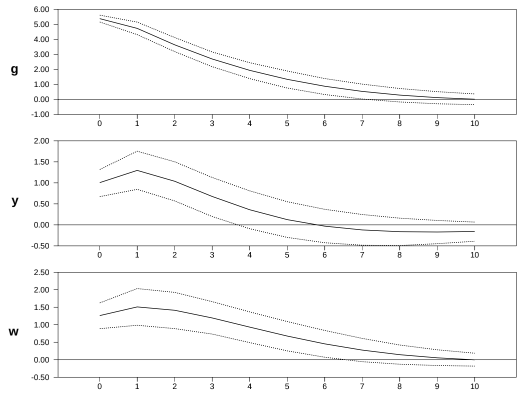
Figure 4.7: Robustness check. Baseline estimated for the pre-EMU period.



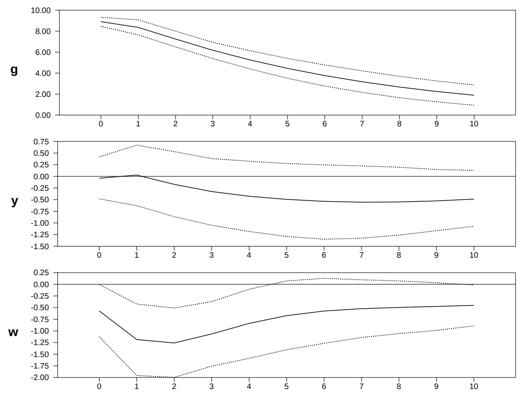
shock in GEXP



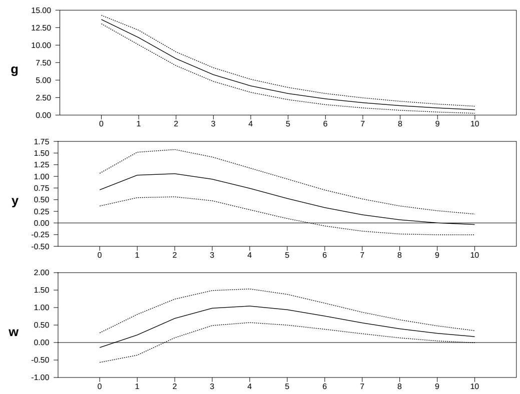
shock in GINV



shock in GC



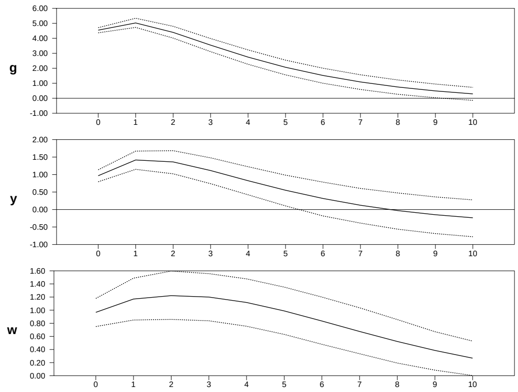
shock in WGC



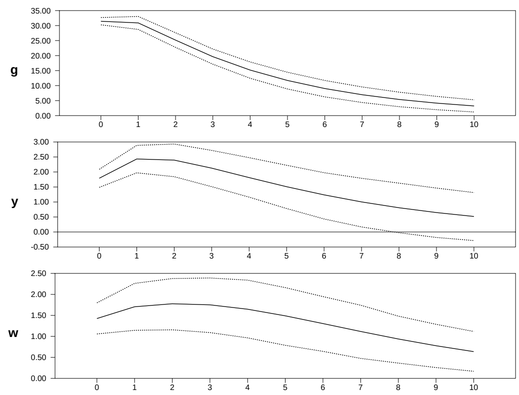
shock in NWGC

Note: Solid lines are the point estimates of the Impulse-Response mean. Dotted lines are the 16th and 84th percentiles from Monte Carlo simulations based on 1000 replications. Vertical axis indicates the percentage change in government spending (g), GDP (y) and CPI-deflated real wages (w).

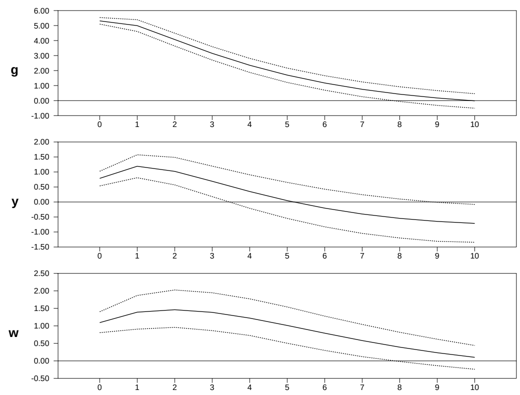
Figure 4.8: Robustness check. Baseline model including two lags of public debt over GDP. Responses to spending shock equivalent to 1% of GDP.



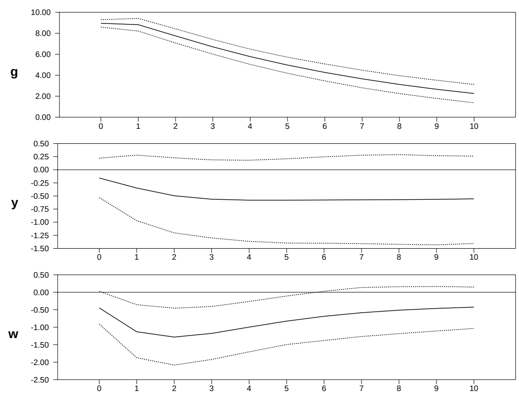
shock in GEXP



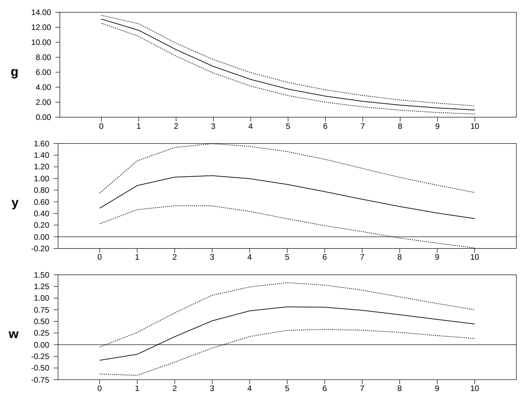
shock in GINV



shock in GC



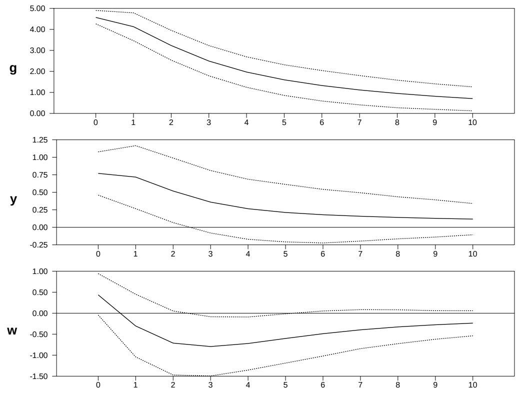
shock in WGC



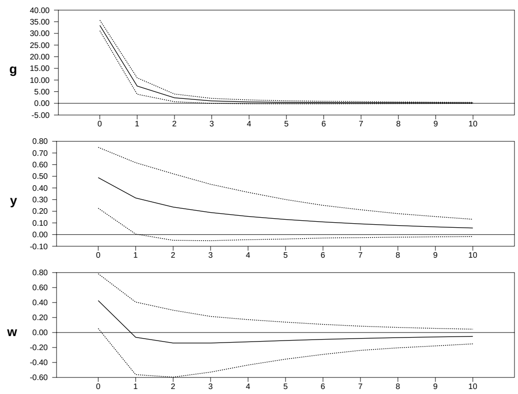
shock in NWGC

Note: Solid lines are the point estimates of the Impulse-Response mean. Dotted lines are the 16th and 84th percentiles from Monte Carlo simulations based on 1000 replications. Vertical axis indicates the percentage change in government spending (g), GDP (y) and CPI-deflated real wages (w).

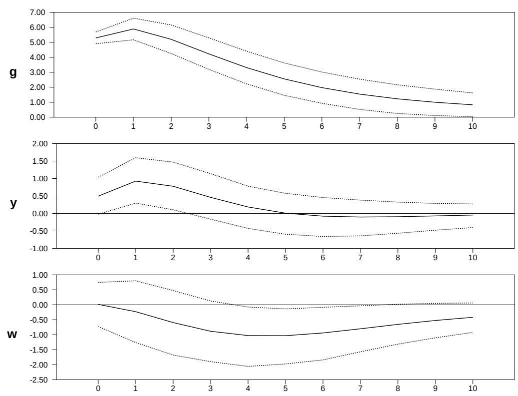
Figure 4.9: Responses to a spending shock equivalent to 1% of GDP using the Perotti sample: Australia, Canada, United Kingdom and United States.



shock in GEXP



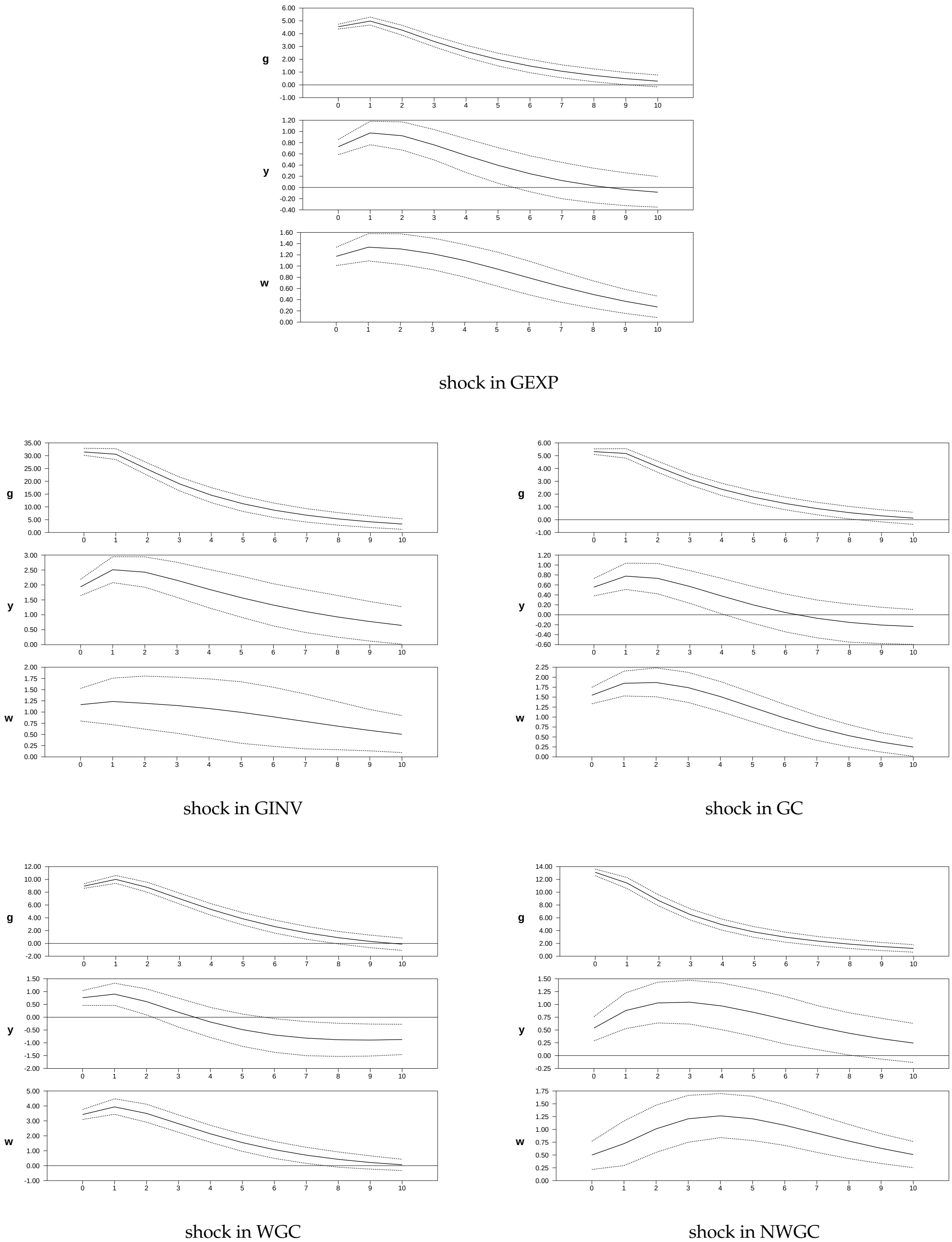
shock in GINV



shock in GC

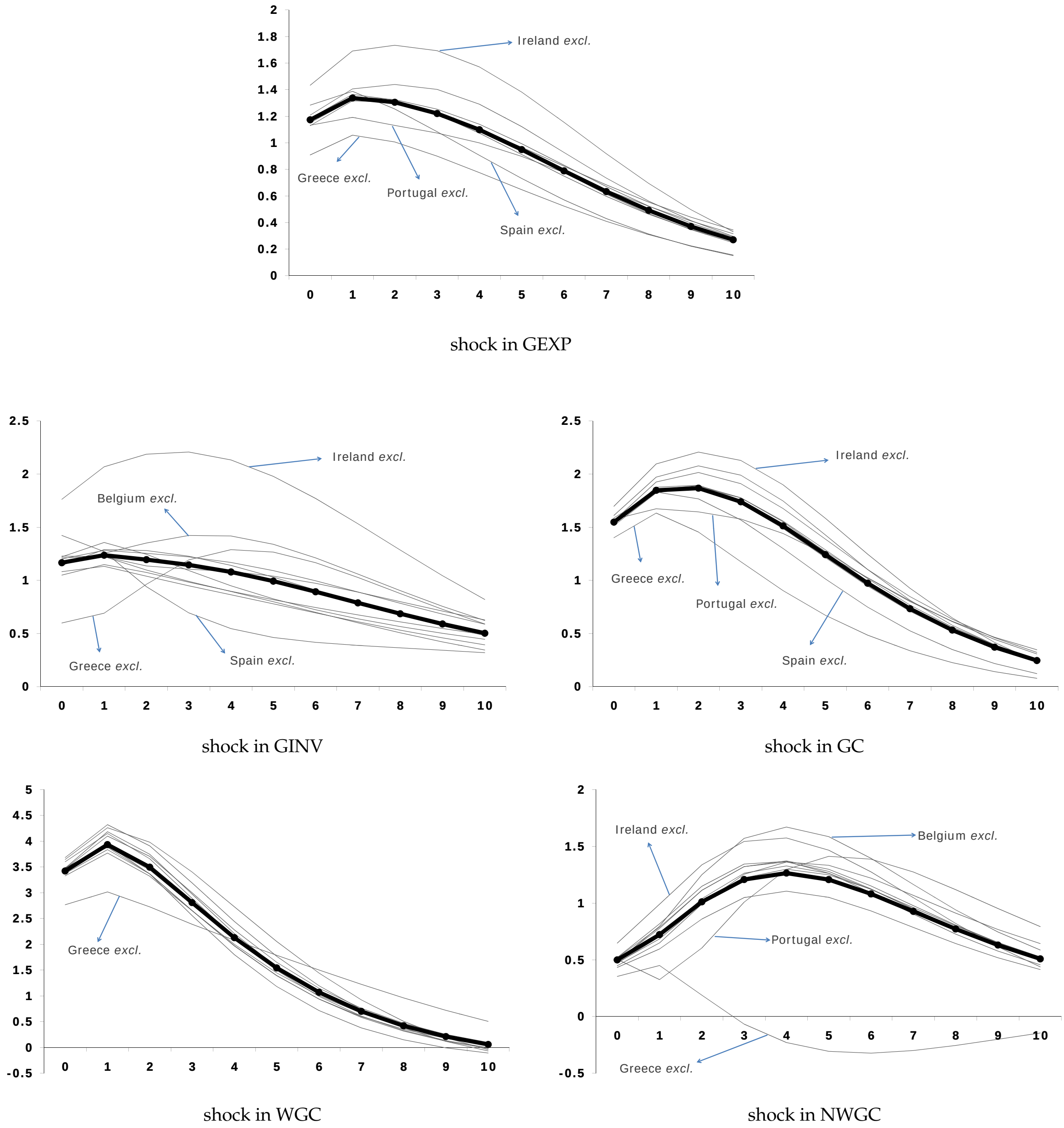
Note: Solid lines are the point estimates of the Impulse-Response mean. Dotted lines are the 16th and 84th percentiles from Monte Carlo simulations based on 1000 replications. Vertical axis indicates the percentage change in government spending (g), GDP (y) and CPI-deflated real wages (w).

Figure 4.10: Baseline using GDP-deflated fiscal variables. Responses to a government spending shock (1% of GDP).



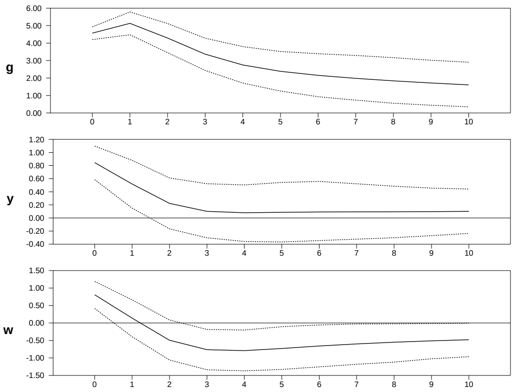
Note: Solid lines are the point estimates of the Impulse-Response mean. Dotted lines are the 16th and 84th percentiles from Monte Carlo simulations based on 1000 replications. Vertical axis indicates the percentage change in government spending (g), GDP (y) and CPI-deflated real wages (w).

Figure 4.11: Robustness check. Wage responses for different spending shocks: One country member excluded. GDP-deflated government spending variables.

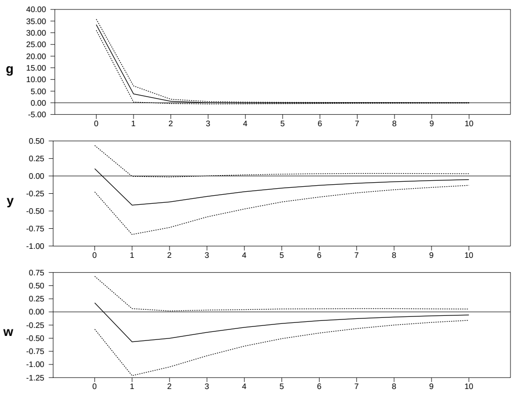


Note: Thick line denotes the response using a panel with the eleven EMU countries and government spending deflated with GDP prices. Thin lines, denote the responses for the model estimated excluding one country member at a time.

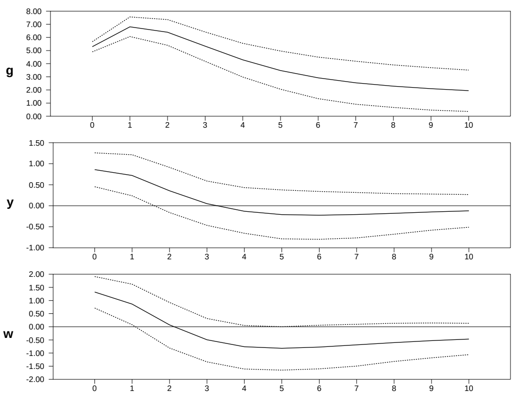
Figure 4.12: Responses to a spending shock equivalent to 1% of GDP using the Perotti sample. GDP-deflated fiscal variables.



shock in GEXP



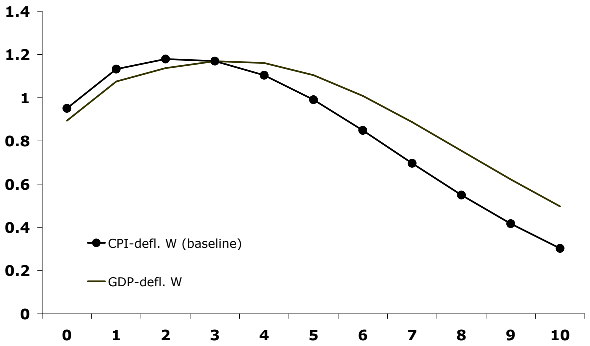
shock in GINV



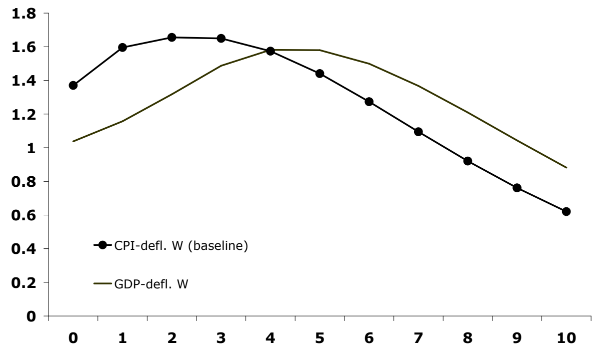
shock in GC

Note: Solid lines are the point estimates of the Impulse-Response mean. Dotted lines are the 16th and 84th percentiles from Monte Carlo simulations based on 1000 replications. Vertical axis indicates the percentage change in government spending (g), GDP (y) and CPI-deflated real wages (w).

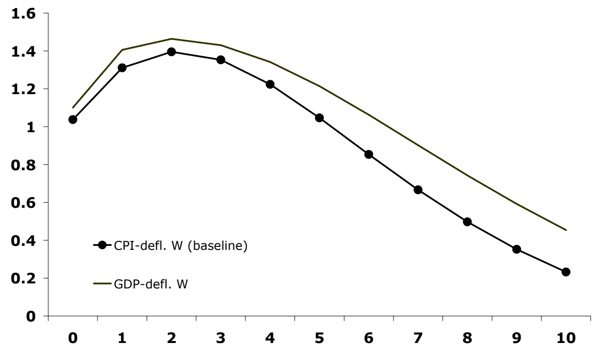
Figure 4.13: Comparison between CPI- and GDP- deflated real wage responses to a spending shock equivalent to 1% of GDP.



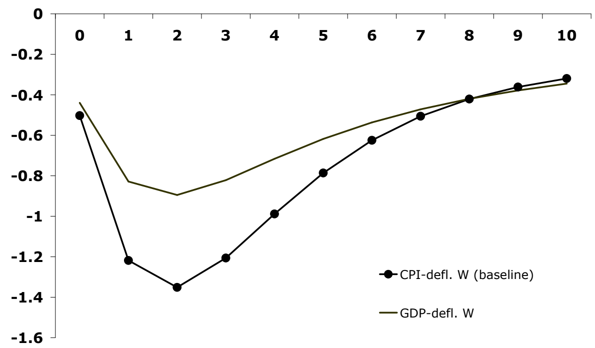
shock in GEXP



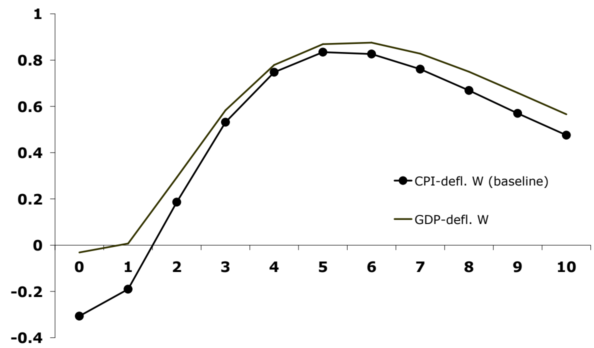
shock in GINV



shock in GC



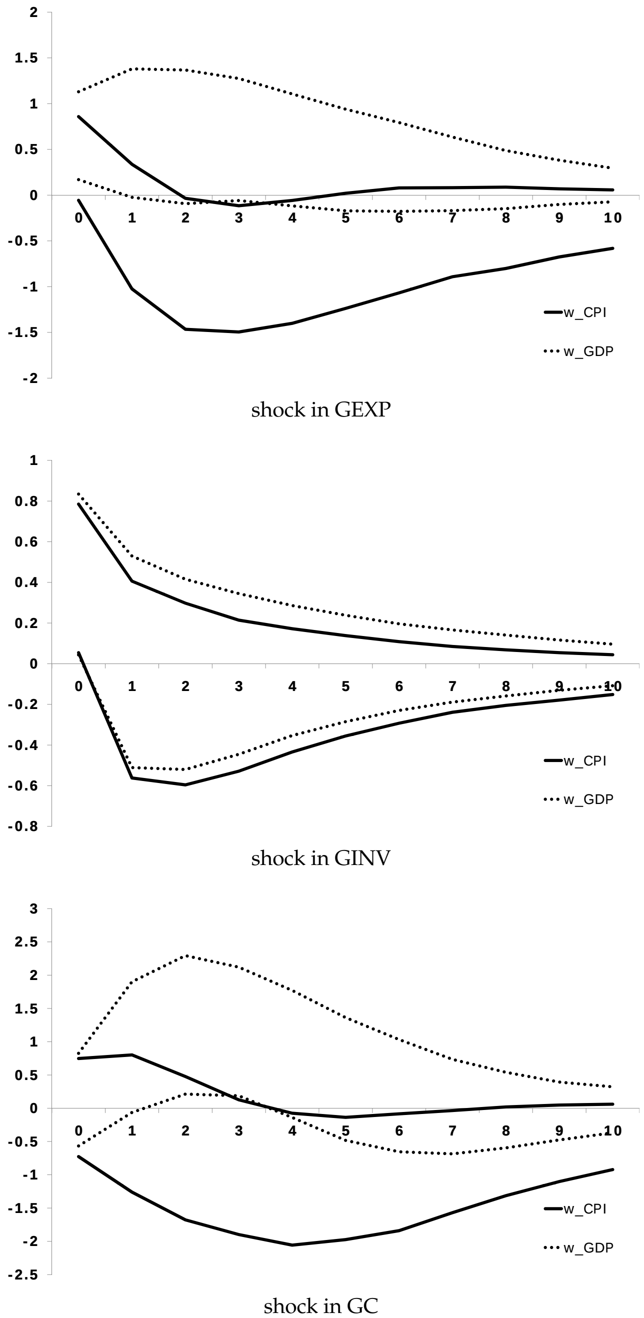
shock in WGC



shock in NWGC

Note: Point estimates of the mean real wage response. Vertical axis indicates the percentage change in CPI-deflated and GDP-deflated real wages.

Figure 4.14: Comparison between CPI- and GDP- deflated wage responses to a spending shock equivalent to 1% of GDP using the Perotti sample.



Note: 16th and 84th percentiles from Monte Carlo simulations based on 1000 replications. Vertical axis indicates the percentage change in CPI-deflated and GDP-deflated real wages.

Chapter 5

Conclusions

This thesis studied two important issues in international macroeconomics. The first one is the analysis of large changes in the value of foreign assets and liabilities that produce large financial wealth redistributions between countries. This is a topic of major concern if take into account that these redistributions can importantly affect the external accounts of a country. Moreover, the study of these valuations has gain importance because gross stocks of foreign assets and liabilities have grown rapidly since the beginning of the 1990s.

Taking this into account, Chapter 2 studies different episodes that are characterized by large changes in the value of foreign assets and liabilities. Our contribution is the study of sharp alignments of the external imbalances through the valuation channel, rather than through large swings in the flows of capital, i.e. the study of current account reversals and sudden stops.

Using an event-study methodology, we identify different types of large valuation shocks and measure the role of outstanding gross stocks of foreign assets and liabilities as well as the role of net foreign asset positions. We also define two types of valuation episodes based on the sign of large valuation shocks. Furthermore, we present how the dynamics of the related macroeconomic and asset price variables are associated with those of the valuation channel in tranquil times surrounding these episodes.

The findings of this chapter are that developing countries and emerging markets had negative valuation episodes as a result of their large and negative net foreign asset position. Their cumulated valuation effect is rarely counterbalanced in the medium run. In this group, almost all valuation episodes were associated with large real exchange rate depreciations that were followed by improvements in the trade balance.

By contrast, we find that gross stocks of foreign assets and liabilities play a crucial role in advanced countries. In episodes where large valuation shocks had the same sign, the cumulated valuation effect is then partially counterbalanced. However, the cumulated negative valuation effect does not change its negative trend after episodes characterized by positive and negative large valuation shocks. The trade balance does not show significant changes after the first type of episodes while it improves substantially after the second in the advanced economies.

This chapter contributes to the literature by identifying abrupt changes in the value of foreign assets and liabilities and showing how the dynamics of the related asset price and macroeconomic variables are associated to these valuation changes. It also provides evidence suggesting that countries should monitor not only their net foreign asset positions but also the size of their gross stocks. This is because the latter can create large redistributions of financial wealth producing changes in the economic decisions of the agents that will then affect the country fundamentals or its external variables.

Since we identify large valuation episodes using an event-study methodology and we do not study the nature of these valuation shocks, establishing causality between the related variables that can give support to policy recommendations remains beyond the scope of this chapter. To do so, further research is needed.

In this line, the natural next step is to further study the structure of the international investment portfolio and how it affects the size and sign of large valuation shocks. An extension to this chapter would be the study of the currency and geographical composition of the international investment portfolio. Doing this, it would be easier to deduce the nature of the shock by measuring the contribution of these two factors to large valuation episodes.

These two extensions require the use and construction of new databases. For the case of the currency breakdown, this can be done with a recently developed database by Lane and Shambaugh (2007). This database provides estimates of the currency composition of the international investment portfolio for 117 countries in the period between 1990 and 2004. By contrast, the study of the geographical composition is more difficult. This is because currently available public databases provide information on the geographical breakdown of some international investment subcomponents for a small number of years.

The second topic of international macroeconomics addressed in this thesis is the study of the short-run dynamic effects of government spending shocks in countries of the European Monetary Union (EMU).

Chapter 3 makes a contribution to the literature by estimating the effects of different types of government spending shocks on the real exchange rate of these countries. This is an important topic if we think that decentralized fiscal policy can generate price differentials that may affect the stability of the monetary union.

The main result of this chapter is that unexpected positive government expenditure shocks appreciate the real exchange rate in these economies. Moreover, the study of different types of government spending shows that the largest real exchange rate appreciation is produced by shocks in government investment. This real appreciation is maximized between three or four years after the realization of the shock.

Other types of government spending produce also real appreciation. Government consumption generates the largest impact and the least persistent real exchange rate response.

Within this category, wages are the part of government spending generating the exchange rate appreciation.

This chapter also shows that these effects differ before and after the creation of the EMU. We find that governments had more power to influence the relative competitiveness in years preceding its creation.

To further study the determinants of the real exchange rate responses, we analyze the effects of these shocks on the relative price of nontradables. Our findings are qualitatively similar to those for the exchange rate. Relative price of nontradables rise in response to shocks in government expenditure, government investment and government consumption.

Another important finding of the chapter is that the real appreciation produced by a spending shock is in sharp contrast to the findings of papers using a different set, formed by Anglo-Saxon countries. This suggests that structural differences between these groups of countries may affect the direction in which the real exchange rate responds to these shocks.

Chapter 4 presents a similar study to the one pursued in Chapter 3 but focusing on a labour market variable. We study the short run effects of government spending shocks on real wages. The study of this topic is important because it helps to understand whether these shocks have supply or demand side effects.

The findings of this chapter are that positive shocks in total government expenditure, defined as the sum of government investment and government consumption, produce positive responses in real CPI-deflated and GDP-deflated wages. The same result is observed when these two variables are taken individually. Shocks in government investment produce the largest wage increase across all types of spending. Innovations in non-wage government consumption produce delayed increases in real wages. All these qualitative results are also observed when government spending variables are deflated with GDP prices.

In contrast, shocks in the number of public employees (i.e. wage government consumption deflated with government nominal wages) produce negative responses of real wages, while shocks in wage government consumption deflated with GDP prices produce positive responses. A caveat against the use of the GDP deflator in this case may be the fact that if government nominal wages are endogenous to private-sector nominal wages, shocks in the former would not be completely exogenous implying that the use of the GDP deflator may generate identification problems.

We also analyze the effects of government spending in a panel formed by the four Anglo-Saxon countries that are generally used in the studies of Perotti. As in Perotti (2007), we find that shocks in government absorption and consumption increase real GDP-deflated wages. In contrast, the response of the real CPI-deflated wages is the opposite.

Chapter 3 and 4 show that governments can affect the short-run relative competitiveness and real wages through sudden changes in their spending. Therefore, this type of fiscal policies can have important macroeconomic effects through the external sector and through the labour market. For the first case, this effect would come through a trade balance deterioration produced by the real appreciation of the exchange rate. For the second case, the macroeconomic effects would come through the labour market since the increase in real wages affect private demand for final goods. These effects will depend not only on the size of the spending shock, but also on the type of spending being increased.

Our thesis suggests that these policies may be useful to stabilize the business cycle. However, in contrast to the monetary policy, the existence of lags between the identification of economic changes and the implementation of a discretionary government spending shock makes active fiscal policy not a feasible instrument for short-run stabilisation.

To identify government spending shocks this thesis relies on the assumption that government spending does not react contemporaneously to shocks in output. Although this identification scheme has been extensively used in studies based on annual data, there is still a debate on whether this is the best identification approach.

Many papers rely on quarterly data to identify fiscal shocks. However, there are few countries with reliable non-interpolated government spending data at this frequency. Taking this into account, potential extensions of these chapters would be to develop and implement alternative identification strategies that are more appropriate for annual frequency.

One possible direction could be identification of particular years in which it is reasonable to assume that an unexpected government spending shock has occurred. That is, to follow a strategy similar to Ramey and Shapiro (1998) or Ramey (2008) for the EMU countries. Alternatively, a different strategy would be to follow a purely data driven approach. For instance, to estimate autoregressive models using different controls to obtain series of government spending shocks. These, could then be used to study the effects of innovations in government spending on the real exchange rate and real wages of these economies.

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