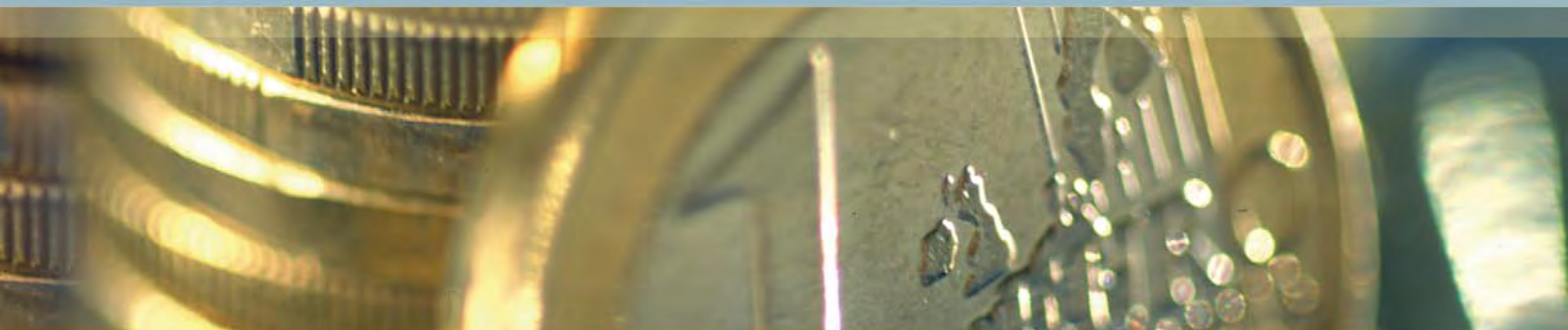


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External Imbalances and Public Finances in the EU

Edited by Salvador Barrios, Servaas Deroose, Sven Langedijk and Lucio Pench
Directorate-General for Economic and Financial Affairs

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Directorate-General for Economic and Financial Affairs

External Imbalances and Public Finances in the EU

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Edited by

Salvador Barrios, Servaas Deroose, Sven Langedijk and Lucio Pench

(Directorate-General Economic and Financial Affairs)

July 2010

Abstract

The global financial crisis induced a sharp deterioration in EU countries' public finances with government deficits and debt reaching levels unprecedented in recent times. Importantly, this crisis has also brought attention to the fact that the countries that have experienced the sharpest deterioration in their public finances were also those where current account deteriorated most during the decade preceding the crisis. The issues remain wide open regarding the nature and consequences of the linkages between external imbalances and public finances in the EU. As evidenced by this crisis, in absence of nominal exchange rate adjustment, business cycle evolutions may be amplified in countries with structural competitiveness problems and buoyant domestic demand. Three years after the start of the global financial crisis a number of EU countries face the dual challenge of restoring competitiveness and to reduce their public deficits. Both objectives may weigh on the incipient economic recovery, however. Policy choices will need to be made calling for further analysis. This Occasional paper brings together recent contributions by leading academics analysing the link between external imbalances and public finances in the EU. These contributions show in particular that the build-up of external imbalances in the EU and the euro area during the decade preceding the financial crisis may have signalled contingent budgetary risks through a number of macroeconomic and microeconomic channels. In addition, this Occasional Paper provides recent research carried out by the Directorate General for Economic and Financial Affairs regarding the challenges posed by external imbalances for the success of fiscal consolidations plans to be implemented in the coming years, drawing on past experiences for EU countries and a sample of OECD countries.

Key words: Public finances, current account, competitiveness, exchange rate, debt, fiscal consolidation, financial crisis, tax revenue, public spending

JEL classification: E62, E63, E65, F31, F32, F41, H3, H6

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All papers are written on a personal basis. The views expressed represent those of the authors and not necessarily those of the organisations they work for.

The Editors,

Salvador Barrios

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Brussels, 22 July 2010

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Introduction

by Salvador Barrios, Servaas Deroose, Sven Langedijk and Lucio Pench ¹

Background

The global financial crisis induced a sharp deterioration in EU countries' public finances with government deficits and debt reaching levels unprecedented in recent times. As a matter of fact, to some extent the situation faced today by European economies is unusual. This crisis has revealed in particular that the increase in EU trade and financial integration might lead to the building up of large external imbalances heightening the costs associated with the risk of sudden increase in debt-financing cost. Dynamic internal demand favoured by the credit expansion and property prices appreciation has led some euro area countries (such as Ireland or Spain) to experience growing current account deficits, appreciating real exchange rates and significant increase in net foreign liabilities prior the outbreak of the current financial crisis. Other countries (such as Germany or the Netherlands) have, on the contrary, benefited from dynamic export-led growth but appeared also exposed to the sudden halt in world trade with disruptive consequence for public finances and economic growth. Outside the euro area many recently acceded Member States experienced significant real exchange rate appreciation and fast deteriorating current account balances increasing their exposure to the financial crisis and the sharp cyclical downturn that followed. Existing evidence shows that, in the past, countries facing such sudden increases in debt-servicing costs often relied on exchange rate adjustment to restore competitiveness and promote export-led recoveries following the advent of major economic downturns. Such mechanisms, however, no longer exist for euro area countries, providing further prominence to fiscal policy as macroeconomic adjustment device for preventing the building up of external imbalances and smoothing the adverse effects of post-crisis adjustment process on prices and economic growth.

As illustrated by the Public Finances in EMU – 2010 report, over the last ten years, significant divergences in the external economic performance of the EU Member States have set in and this has carried contingent economic and budgetary costs. This has brought into focus the consequences of external imbalances and the interrelation between the two key challenges of winding them down and reversing the increases in government debt ratios. The coming years will thus see EU governments undertake consolidations at a time when external imbalances will have to be corrected. The effects of such fiscal contractions on output - through large multipliers affecting domestic demand and revenues - may be sizeable, however, owing to credit and liquidity constraints. At the same time, competitiveness adjustment starting from overvalued real exchange rates and highly leveraged economies, will likely lead to low real growth and high real interest rates as relative prices adjust thus making the need to achieve successful fiscal consolidations through lower debt level even more pressing.

The existing literature on the link between external imbalances and public finances remains inconclusive however and provide too little guidance about the best strategies to be adopted in the EU and euro context regarding the prevention of macroeconomic imbalances and their incidence on the success of fiscal consolidations. Most studies consider the effects of budget deficits and government debt on aggregate demand. According to the Keynesian approach, where fiscal deficits are assumed to result in higher domestic, the accompanying increase in

¹ The introduction has benefitted from contributions by Joaquim Ayuso-i-Casals, Roland Eisenberg, Raffaele Fargnoli, Christine Frayne and Geir Johansen.

imports leads to the so-called twin deficits. The literature finds some, albeit limited, support for this effect. In contrast according to the Ricardian approach, as the private sector adjusts its future expectations of income in the light of rising public debt and the related debt burden and increases its savings accordingly, both output and the current account balance are unaffected by fiscal policy. There is some evidence in favour of the Ricardian approach too, in the literature, qualified by the prevalence of liquidity constraints faced by private agents. However, alongside the overall inconclusive evidence of these macro studies, the run-up to the current crisis has evidenced the possible effect of macro and micro transmissions channels whereby fiscal policy can affect investment and savings decisions despite the fiscal stance being neutral. A thorough analysis of non-conventional macro and microeconomic transmission channels is thus badly needed to expose the full effect of the public finances on external imbalances.

The questions faced by European policy makers are therefore difficult and to a large extent still unresolved. The Directorate General for Economic and Financial Affairs (DG Ecfm) has set out to investigate these questions by organising a workshop in November 2009 which is summarised below. This workshop encouraged further discussions and work in DG Ecfm on the implication of external imbalances for the conduct and surveillance of economic and fiscal policies in Europe. These analyses contributed to recent policy initiatives as illustrated by the Commission's Communication on enhancing economic policy coordination for growth and jobs published on the 30 June 2010 in which questions regarding the need to avert the build up of imbalances in future fiscal surveillance were directly taken on board. External imbalances are likely to weigh on Europe economic recovery in the coming years as well. Countries with competitiveness problem will need to address external imbalances decisively in order to achieve successful fiscal consolidations and invigorate growth recovery. The best strategies to adopt in such context are still open to discussion, however. For this very reason, this report also includes an additional chapter based on recent work by DG Ecfm on the link between external imbalances and fiscal consolidation strategies.

The workshop organised on the 29 November 2009 on "External imbalances and public finances in the EU" and discussions

The workshop was organised in three sessions, focusing on respectively "global imbalances and fiscal policy", "Country experience" and "The Ricardian hypothesis and the role of tax policy". The papers presented mirrored the existing literature in that they covered a wide spectrum of approaches without providing conclusive evidence on the relationship between internal and external imbalances. In particular there was no consensus on either the short or long-run relationship between fiscal policy and current account imbalances, although a wide range of models and possible effects were presented leading a rich debate. The panel discussion that followed the presentations focussed on the role that fiscal policy can play in addressing and correcting existing and emerging external imbalances in the light of the research presented within the context that the European economies currently find themselves in.

The role of fiscal frameworks was considered and the possibility of including the avoidance of imbalances within the remit of fiscal policy was discussed. In particular, the possibility of looking at how microeconomic policy leads to the build-up of both internal and external imbalances was highlighted, with a case being made for using micro-policy to bring balance where divergences were noted. A serious consideration in this issue, however, is that it can be difficult to judge when an imbalance exists, or at least when it is sufficiently large to merit a fiscal intervention. Overall, a comprehensive approach to economic policy was seen as important to ensuring macroeconomic stability. The interdependence of the fiscal and

structural policies together with macrofinancial surveillance was flagged as key to both the significant questions that remain about the relationship between fiscal and external imbalances as well as to the need to address emerging issues together. In the European context the possibility of incorporating external imbalances in the preventive and, where appropriate, the corrective arms of the Stability and Growth Pact would provide a means for increasing the importance given to such imbalances and helping to avoid the problems that they can cause. However, making the avoidance of such imbalances a requirement on a par with the avoidance of deficits and debt was seen as a task difficult to achieve and possibly requiring further analysis integrating microeconomic channels of fiscal policy related to, for instance, taxation, public wages and employment. In terms of internal imbalances, the need to improve the measurement of liabilities – whether explicit or implicit – was stressed as was a better understanding of the implications of micro policies on the wider economy.

Of course, in doing so it would be necessary to make a judgement about how significant the risk posed by emerging imbalances is. In the current crisis, it appears that countries with the largest external imbalances seem to be the hardest hit – focussing on the worst case scenario implied by the macroeconomic fundamentals at any point in time would be one way of addressing difficulties before they materialise but this should be weighed against a concern that credibility should not be compromised. A delicate balance needs to be struck. The discussion of the role of the internal budget imbalances in the current crisis considered the possibility of using rainy day funds to mitigate against pro-cyclical fiscal policy and avoid the damaging deficits that have emerged in a large number of countries in the current juncture. While these have potential benefits they also present difficulties. While they may be desirable on an individual country level, they can lead to global (or regional – if implemented regionally) imbalances and also pose the question of whether using fiscal means to address problems that in the current instance are financial would be a wise approach.

The paper "The Role of Fiscal Policy in Reducing External Imbalances" presented by Ph. Gerson (IMF), S. Abbas (IMF), J. Bougha-Hagbe (IMF), P. Mauro (IMF) and R. Velloso (IMF) and A. J. Fatas (INSEAD) assessed the role of fiscal policy in reducing external imbalance using econometric analysis. The main innovation of their analysis is to be found in the breadth of the dataset and countries covered. Ph. Gerson started by briefly recalling the main findings of the existing literature on the issue. Typically, fiscal expansion is regarded as leading to a higher current account deficit through the channel of lower domestic savings, driving an imbalance between domestic savings and domestic investment. Nevertheless other channels are also likely to play a key role. For instance, current account deterioration can be due to higher government demand for non-tradable goods, triggering a real exchange rate appreciation, which in turn leads to lower exports. On the other hand, to the extent that a high share of Ricardian agents in the economy would imply higher savings to offset future tax increases and therefore a neutral or even positive (through lower consumption) effect on the current account. Another possible transmission channel relates to risk premium considerations. A fiscal expansion may lead to an increased risk premium and capital flight, inducing currency depreciation and a current account surplus.

Panel Regression analysis shows that on average a fiscal expansion of 1% of GDP worsens the current account by almost 0.3 %. In emerging and developing countries the relationship is stronger, probably due to higher government demand for non-tradable goods and/or a higher share of liquidity-constraint agents. A capacity constraint argument may explain why the relationship appears stronger when output is above potential. The VAR estimation method provides similar results. Nevertheless by looking at episodes of sizeable changes in the current account, fiscal policy has been found to play a limited role, except in some case for emerging and developing countries.

A. Turrini (DG ECFIN), discussed the paper by Gerson emphasising the role of the business cycle on current account adjustment. He showed that the impact of output gap changes on the current account balance may be higher than budget balance changes. In order to assess the impact of the cycle on the current account he suggested focusing on import sensitivity to output. Furthermore he highlighted another possible channel of transmission linked to the budget balance and public debt. According to this approach, budget balance deterioration could affect the current account by increasing public debt, leading in turn to higher interest payments to foreign investors. He also provided an alternative interpretation for the evidence that the fiscal effect on the current account appears to be higher for emerging and developing countries and for economies with output above potential. With respect to the first issue, he argued that the less developed financial markets in emerging and developing countries may imply higher multipliers. With respect to the second issue he stressed the role of a pro-cyclical trade elasticity for tradable consumption goods, which would imply higher demand for such goods in good times. Furthermore Turrini suggested other possible checks to assess the impact of government spending versus tax cuts, in particular to control for the impact of cross-countries interactions on current account balance.

The paper "Fiscal Deficits and Current Account Deficits" by M.Kumhof's (IMF) and D. Laxton (IMF) investigated whether permanently higher fiscal deficits could contribute significantly to current account deterioration and whether permanent fiscal consolidation in deficit countries would thus help resolve global current account imbalances. As an illustration Kumhof used U.S. fiscal data. Kumhof presented an open economy business cycle model that is suitable for the joint analysis of fiscal and monetary policy. The model combines the foundations of recent analytical frameworks developed for short-run monetary policy analysis with a finite-horizon model that can be used to study both the short-run and the longer-run effects of fiscal policy. According to the model, a permanent increase in the fiscal deficit equal to 1% of GDP, leads to a current account deterioration of about 0.5 % in the short run. In the long run the deterioration is between 0.75% for a country the size of the USA and 1% for a small open economy. Kumhof stressed that this result was in striking contrast to the conventional infinite-horizon model, where the short-run increase in current account deficit was much smaller. In the infinite-horizon model the long run effect on the current account deficit is – by assumption – equal to zero. Kumhof concluded the presentation by stating that fiscal consolidation can play an important role in reducing global current account imbalances while interest rates remain stable in the long-run.

W. Röger (DG ECFIN), the discussant, observed that the main results depended heavily on the planning horizon of households and the related value of the marginal propensity of consumption (MPC) of wealth. He showed that this parameter was much higher in the model than suggested in other studies. This implied that the large effect of deficits on private consumption and the resulting increases in the real interest rate and the current account deficit in the model are based on assumptions about the MPC which appear to be unrealistic. To underline this, he used Italy as an example. In Italy the debt ratio rose in the early 1980s and fell in the early 1990s. This had hardly any effect on the ratio of consumption to GDP or on the current account in the country. Kumhof responded to this by pointing out that the paper focuses on long run effects, not short run effects. Röger also showed results from the ECFIN Quest-model suggesting that a permanent increase in the deficit has different effects on the current account, depending on whether the deficit is a result of increased government consumption or reduced income from taxes. He concluded that there is no easy story on the connection between the government deficit and the current account.

Ph. R. Lane (Trinity College Dublin and CEPR) presented a paper entitled “**Fiscal Policy and External Stabilisation inside the Euro Area**”. **Ph. Lane (Trinity College Dublin and CEPR)** provided a broad overview on the link between fiscal policy and the current account, using as an illustrative example the Irish case. Fiscal policy on its own can lead to current account deficits but with exchange rate adjustment this can be corrected. However in a currency union this is no longer possible. In addition, the role played by exchange rate adjustment is different for countries within the euro area, as there is no foreign currency risk (and foreign currency reserve issue). The alternative to an exchange rate adjustment is an internal price adjustment which includes wages. Fiscal policy can play a role through public wages as has been the case in Ireland in the current crisis. In an integrated labour market where private and public wages interact this will have an incidence on the general level of wages. Also, recent evidence tends to show a positive correlation between government consumption and the real exchange rate. In the absence of a nominal exchange rate, governments can mimic the effects of currency depreciation through taxes on labour. Another possible tool governments can use is rainy days funds, by using, for instance, a tax on the banking sector. These funds can serve as foreign currency reserve. However, the actual link between the current account and fiscal policy is not clear and is possibly non-linear. Still, in EMU, the temptation is high for countries benefiting from revenue windfalls to spend them. This is why independent fiscal councils can also help.

M. McCarthy (DG ECFIN), the discussant, agreed with most of the points raised by Philip Lane, but was less optimistic regarding the use of fiscal policy in the context of the euro area. While there are some cases of twin deficits, in general the literature shows that these are exceptions (e.g. the paper by Kim and Roubini, 2004). There is a risk of over-burdening fiscal policy. In the SGP framework fiscal policy is an internal stabilisation tool. However, this does not mean we should add external imbalances as an objective as it is difficult to identify emerging sub-optimal imbalances and to know the structural level of deficits. Meanwhile, the symmetry between current account deficits and budget surpluses is not clear and the timing of potential intervention (for instance, should have intervened in the case of Spain before 2004?) is very uncertain making fine tuning not an easy task (e.g. should Germany have run a deficit after 2003?). Overall it is very difficult to derive precise estimates. Maybe the way forward is to look at REER dynamics and determinants related structural factors and focus less on fiscal policy. The other discussant, **B.Kromen (DG ECFIN)**, argued that current account evolutions were driven by private investment decisions, not by fiscal policy. Fiscal policy could prevent current account deterioration, however, by leaning against the wind, for instance by reducing the bias which makes the tax system favourable to home ownership and by ensuring that windfall resources trigger more savings. Macro-prudential policies are also much needed to stem banks' net foreign liabilities. However, the Irish case shows that it is very difficult to identify when fiscal policy should be used to counter current account developments as before 2007-2008 there was a current account surplus and also a positive budgetary balance. There is also a question of whether fiscal policy can help real exchange rate adjustment as public wage cuts suffer from lagged effects.

A. Gavilan (Banco de España) presented a paper “**Fiscal Policy and External Imbalances: A Quantitative Evaluation for Spain**” co-authored with **P. Hernandez de Cos, J.F. Jimeno and J.A. Rojas (Banco de España)**. A.Gavilan (Banco de España) presented a small open economy model for Spain. The aim was to analyse the process of the building-up of external imbalances and the role played by fiscal policy and market rigidities in this respect, by combining the features of an overlapping generations model (i.e. with forward-looking agents) with structural distortions through monopoly power. The model characterises the behaviour of the Spanish economy in the run-up to the 2008-2009 crisis: a large economic expansion and deteriorating current account, together with a substantial

improvement in public accounts and a boom in the construction sector in a context of loosening credit conditions, rigid labour and product markets and large immigration flows. The latter are the main drivers behind domestic demand patterns. The analysis suggests that demographic changes explain the largest changes in investment and in the debt to GDP ratio while demographic changes and interest rates are jointly responsible for the deterioration of external imbalances in the run-up to the crisis. Counterfactual analyses show that the tightening of fiscal policy improves the economy's internal imbalance and reduces external imbalances if the tightening is transitory but amplifies external imbalances if it is permanent, as forward-looking consumers anticipate the future fall in taxes associated with the permanent fall in government consumption which increases private borrowing to smooth consumption. In such a context, structural reforms (represented by reduction in mark-up in the intermediate product and the labour markets) alleviates the accumulation of external debt and allows for a further reduction in the ratio of public debt to GDP, by improving competitiveness and expanding economic activity. Overall Gavilán concluded that fiscal policy could only play a limited role in reducing the accumulation of external imbalances, while structural reforms could play a more important role in improving both the external and internal imbalances.

The discussant **Carlos Martínez-Mongay (DG ECFIN)** agreed with the overall analysis and conclusions of the paper: an interest-rate/immigration-driven expansion leading to a construction boom created largely unsustainable imbalances as these were rooted in low competitiveness. Fiscal consolidation was, in such a context, not enough to prevent the rise in imbalances. However, the paper suggested that with the crisis, a re-balancing was taking place and this might send a wrong message. The base year chosen for the analysis (i.e. 1998) could be disputed as the decline in interest rates started earlier on in the 1990s. Also the paper does not consider the role played by increased female participation in increasing labour supply (alongside immigration) which has also influenced labour market outcomes in Spain. The paper also did not specify whether the adjustment was endogenous as, considering real data, credit and employment growth already started to decline in 2006 and 2007 respectively. Moreover, the paper only contemplated the distinction between final and intermediate goods while, in the context of external competitiveness, a distinction between tradable and non-tradable goods would have probably been appropriate. The model also did not include a financial sector which, in the current crisis, has played a key role. Furthermore, the paper assumes that the interest rate is exogenous while in practice what matters is the real interest rate which is endogenously influenced by prices. The paper also considers a small open economy while Spain, in the euro area context, is a relatively large economy (thus potentially having implication on euro area wide determination of interest rate and inflation). The model could be refined in order to address these other elements.

R. Domenech (BBVA and University of Valencia) presented a paper entitled: "On Ricardian Equivalence and Twin Divergence: The Spanish Experience in the 2009 Crisis" co-authored with M.Cardoso (BBVA). Rafael Domenech's presentation focused on the sharp economic adjustment that the Spanish economy has been experiencing since 2008. Specifically, the paper stressed the rapid increase in the private households' saving ratio coupled with the swift shift of government balances from surplus to large deficits. In turn, the current account deficit recorded in the recent past is falling dramatically. These facts seem to contradict the twin deficits hypothesis. At the same time, the simultaneous rise in private savings and the widening of fiscal deficits are in line with the Ricardian equivalence theory, for which there is generally little empirical support. The objective of this presentation was to analyse and to understand the effects of government shocks on households' behaviour and the current account in a small open economy in a currency area, which corresponds to the case of Spain. To do so, this research resorts to a DGE model for the Spanish economy incorporating the latest developments in this field.

The results of this research suggest that expansionary fiscal policy has only small effects on the current account, in line with the conclusions obtained for the USA in other papers. This result holds despite assuming a large share of non Ricardian consumers. The large increase in the households' saving ratio, which occurs in parallel with the sharp rise in the government deficit, seems to be mainly explained by precautionary saving in response to the desire to reduce indebtedness, the high unemployment rate and the great uncertainty relating to economic prospects. Overall, only a fraction of the increase in the savings ratio is explained by the large concomitant government deficit and, therefore, the Ricardian equivalence theory only holds partially. According to these results, current developments in the Spanish economy may be satisfactorily explained by the presence of a large negative output shock that has been partly counteracted by a significant fiscal stimulus. As a conclusion, the main reason to pursue budgetary consolidation should be more related to sustainability concerns than to external imbalances.

The discussant, **L. Boone (Barclays Capital)**, welcomed the presentation and stressed the use of the most recent developments relating to DGE models in the paper. The traditional explanations for "twin divergence" between government and external deficits, namely a large public debt to GDP ratio and high interest rates, were briefly reviewed. Next, the discussant briefly listed and analysed a number of new elements that could help explain the small effects of fiscal policy on the external balance. Specifically, the current high leverage of consumers and a projected large public debt ratio over the coming years were highlighted also on the basis of country experiences. The paper was considered a good example of how to take these factors into account showing the inherent difficulty of disentangling the actual role of each factor in shaping macroeconomic developments. Finally, the discussant underlined the need for more research on this subject to better identify the causality effects.

Ch. Nickel and I. Vansteenkiste (European Central Bank) presented a paper entitled "**The interaction between fiscal policy and the current account: the role of the Ricardian equivalence**". The topic of the presentation was to assess the impact of high debt ratios on private sector expectations and saving/consumption behaviour. Ch. Nickel and I. Vansteenkiste (ECB) presented a dynamic threshold panel model covering 22 industrialised countries over the period 1981-2007. They looked at the relationship between fiscal policy and the current account, and analysed how this relationship changes with different government debt to GDP ratios. Their regression results suggest that in countries with debt levels below 45% of GDP, an increase in the budget deficit leads to a higher current account deficit (i.e. there is a positive relationship between budget deficit and current account deficit). In countries with debt ratios between 45% and 86% of GDP the relationship is still positive but much less so. In very high debt countries (debt ratios above 86% of GDP), a rise in the budget deficit does not result in a rise in the current account deficit. According to Nickel and Vansteenkiste, this result implicitly suggests that private consumers in very high debt countries have become Ricardian; i.e. they have offset the increase in the budget deficit by a fall in private consumption.

Zsolt Darvas (Bruegel), the discussant, had several comments on the econometrics used in the model. In particular he pointed out that Nickel and Vansteenkiste were unable to reject the null hypothesis of a unit root in the current account balance, but still allowed for the current account to be stationary in the model. Further, he questioned whether the threshold variable (i.e. debt) could be exogenous. He also noticed that on average only 16.2% of the observations – about four countries – fall into the high debt regime. This is almost a boundary solution (according to Darvas, at least 15% of observations should fall into a regime). Moreover, Darvas found it questionable that a sample of four countries was sufficient for making general statements about all high debt countries. As an example he pointed out that Germany's debt ratio will exceed 86% as of 2010, and asked whether Germany then would really be in a situation comparable to that of e.g. Greece and Italy.

Darvas also mentioned that it is not obvious what would be an ideal threshold variable to use in the econometric models. For example Japan had a gross government debt at 187% in 2007, while net government debt was 80%. Finally, Darvas said that both Spain and Germany have been in what Nickel and Vansteenkiste define the middle debt regime for several years. Clearly, the two countries have seen a different evolution of the relationship between government debt and the current account. Darvas concluded his discussion by stating that Nickel and Vansteenkiste have produced a nice paper and the key ideas in the paper are intuitive, but also that the empirical evidence needs to be strengthened.

Peter Claeys (Universitat de Barcelona) presented a paper entitled "Variable tax policy and current account volatility in EMU" and co-authored with Alessandro Maravalle (University of Basque Country). Peter Claeys (Universitat de Barcelona) argued that procyclical fiscal policies have contributed to the build up of underlying imbalances in both external and fiscal balances in several EU countries over recent years. Despite an economic boom, spending has continued to grow. Tax policies have been relaxed for a variety of reasons. Most of these tax cuts had little effect on total revenue and the deficit, thanks to the economic boom. Such policies have allowed EU economies to maintain fast economic growth. But the excessively strong boost to internal and external demand has generated persistent imbalances.

To analyse the effect of fiscal policy on the volatility of consumption, investment and the current account balance, Claeys presented a simple RBC-model of a small open economy. The model was calibrated on data for Spain, and simulates the effect of different spending policies in response to supply shocks. According to the model, temporary spending boosts in booms distort intertemporal allocation decisions, and generate volatile cycles in investment and the current account. Countercyclical spending instead dampens investment boom – also reducing the need for external finance – and thus smoothen the cycle. The authors also introduce a parameter for level of flexibility in the labour market. The model shows that with more flexible labour markets, counter cyclical fiscal policy can be more effective at stabilising the current account.

The discussant, **A. Afonso (ECB)**, started by summarising the results from the paper presented, and added that related evidence shows that volatility of government revenue and spending in OECD is detrimental to growth. Turning to the model, Afonso noted that both strong pro-cyclical and strong counter-cyclical fiscal rules are expected to reduce the variance of consumption, output, hours worked and investments. In other words, the model does not truly favour counter-cyclical as a way to reduce volatility. Moreover, there is an absence of government debt in the model. This absence excludes the link between fiscal imbalances and interest rates, which are also relevant in determining the investment decisions of private agents. Finally, Afonso turned to empirical evidence on the link between fiscal volatility and current account volatility. He quoted one of his earlier papers, where he found a statistically significant negative effect of budget balances on current account balances in the period 1970–2007 for Finland, Italy, Luxembourg, Spain, Slovakia, Slovenia, Sweden and the UK.

Policy panel discussion: "Should the EU's fiscal framework give greater emphasis to current account imbalances?"

The workshop was concluded by a panel discussion, moderated by Servaas Deroose (DG ECFIN). Participants in the panel were Lorenzo Codogno (Ministry of Economy and Finance, Italy), Rafael Domenech (BBVA), Philip Lane (Trinity College Dublin and CEPR), Lucio Pench (DG ECFIN) and Ludger Schuknecht (ECB).

Servaas Deroose introduced the panel discussion recalling that policy experiences over the past years had shown that there was a need for a new theorem on the relation between fiscal policy and current account imbalances. On the short-term impact of fiscal policy on the current account the debate was inconclusive. The panel discussion should focus more on persistent deviations in a medium- to long-term perspective. He called on panellists to go beyond the role of deficits and debt that the presentations had tended to focus on, but also look at micro-channels of fiscal policy through e.g. public wages and employment, contributing to feeding credit booms (mortgages and house prices) and inflation, and their effect on windfall revenues. While many presentations had been on Spain, he called on participants to consider also the counterparts and in particular the role of fiscal policy in Germany. Also in new Member States, which in many cases display substantial imbalances, there may have been a role for fiscal policy in stemming the boom-bust dynamics before and after entry. What preventive policies can help avoid or reduce the build-up of imbalances? He flagged the role of domestic fiscal frameworks; broadening surveillance; and of fiscal policy leaning against the wind, in particular through cautious expenditure growth paths considering that all euro area countries with large external imbalances had had particularly high nominal expenditure growth rates fed by tax windfalls keeping balances unaffected. He also wondered what corrective policies – including micro- channels – could be considered to soften the pain, going beyond sweating it out. How is it possible to deal with the sharp increases in debt in a low inflation and low growth environment associated with competitiveness adjustment? He raised the question whether the SGP framework would need to be adjusted – possibly via the addition of another objective – as it had not addressed the build-up of imbalances.

Lorenzo Codogno considered that the fiscal framework should give more attention to current account imbalances. While no strong relationship could be found between the current account and fiscal balances, many fiscal policies are budget neutral and affect savings and investment behaviour. Budgetary policies could thus affect the current account even though they were neutral on the deficit and debt. He believed that competitiveness challenges could be addressed by economic – and fiscal – policies. The crisis had highlighted that fiscal issues should not be seen in isolation as the economy is inter-dependent. A comprehensive approach should be pursued encompassing the SGP, Lisbon and macrofinancial surveillance. As regards preventive policies, he considered that peer pressure should be rendered more effective. He questioned what could be done about excessive expenditure growth in the context of revenue windfalls. Looking ahead, he was concerned that the macro-economic imbalances had not been addressed and current account balances might diverge further in the recovery causing more problems. When considering how the imbalances should be addressed, the surplus countries should also be considered.

Ludger Schuknecht argued that while the objective of the EU fiscal framework was to maintain sound public finances and the current account imbalances were no perfect indicator of fiscal problems ahead, significant imbalances were at least an important imperfect indicator of fiscal and macroeconomic perspectives. No clear causal link between fiscal policy and current account imbalances can be established as several factors contribute to hiding underlying fiscal imbalances. Further work should be done to expose the full set of transmission channels. In a boom, public consumption and public wage and employment

growth feeds further private wage growth and stokes the real estate boom. Social security systems establish a wage floor giving incentives to take on debt. Together, these elements contribute to construction booms and competitiveness losses. Also tax regimes and wage indexation schemes contribute to transmission of fiscal policy to the current account. Schuknecht considered the preventive arm of the pact (Council Opinions) an excellent means to incorporate competitiveness challenges and its link to fiscal policy in the surveillance framework through stronger recommendations. On the use of the corrective arm, he was sceptical, as it concerned the hard rules of the framework that should not be diluted to ensure that the risk to EMU is minimised. But even in the corrective arm, the intertwinedness of current account balances, competitiveness and fiscal policy should feature in the analysis of the corrections made by countries in EDP. He saw scope for further research through country case studies, taking account of the complexities. Deroose agreed with Schuknecht on the scope for incorporating external imbalances more in the preventive arm, widening its comprehensiveness. He did not share the scepticism as regards the corrective arm, considering that most MS would be in EDP for several years; excluding Member States in EDP would imply that for the next say 5 years no progress would be made on this important issue.

Rafael Domenech saw little role for fiscal policy in containing external imbalances, although he noted that in the present moment it was a moot point because there was a need for consolidation anyway given debt dynamics. He was concerned about the risk of sharp interest rate increases due to rising debt levels, crowding out private investment. Fiscal consolidation should start before the ECB would need to raise interest rates. Other instruments should be used to avoid external imbalances. Deroose agreed that debt levels were increasing rapidly but was not sure how it would affect interest rates. He questioned what global fiscal consolidation would do to world growth. The question was not only whether governments would be quick enough to be the first to act, but also whether the ECB would be patient enough to be second.

Philip Lane put some of the blame of extent of the build-up of imbalances with forecasters, who always predict that all will be fine. He argued that forecasters should focus more on the downside risks and present worse case scenarios. The policy regime should be more focussed on preventing the realisation of these worst case scenarios. Countries that had the largest current account imbalances had been the hardest hit in the crisis, especially concerning fiscal balances. The running down of debt or the building up of larger reserves (rainy day funds) could have helped. In Ireland, for example, the government considered fiscal policy to be particularly prudent as long as the budget was at least balanced. But much larger surpluses were needed. He considered Chile to be a good example, as they built up surpluses of 10 % of GDP per year before the crisis, enabling the country to expand during the crisis. At national level, schemes should be set up allowing for very large surpluses, he argued, similar to the build up of foreign currency reserves before monetary union. In addition, tax flexibility should be used to mimic the exchange rate movement within the monetary union. A temporary tax cut represents a real devaluation, it may thus help economic activity and fiscal balances through its effect on the real interest rate. They can only be implemented in case the fiscal position allows and should not be used to fine tune small cyclical variations, but only in the case of large shocks. Triggers should be judgement based and require careful consideration. The key question remains how to ensure that Member States behave very prudently in good times. Deroose took note that Commission should be stronger on worse case scenarios, but warned of the 'cry-wolf problem'. Credibility could be damaged. He also agreed that current account deficits had been a good predictor of future crises, noting that policy makers had been wrong-footed by academics arguing that much larger current account deficits could be sustained due to structural changes. He

suggested that Lane's ideas on fiscal policy in good times and time-varying tax rates should be explored further.

Lucio Pench noted that there was no consensus on the long-term effect of permanent deficits, and yet this is what matters for levels of investment and growth. In terms of the fiscal framework, he argued that the SGP is about budget balances and had doubts about how to incorporate current accounts in the framework – not least because it would essentially require the rewriting of the Treaty. While he acknowledged that large current account deficits were a signal of problems to come, he considered it a symptom of the underlying challenges. He preferred focusing efforts on a correct assessment of the structural balance, eliminating temporary factors such as those related to the asset booms. Reacting to Lane's suggestions of accumulating very large surpluses (rainy day funds), he wondered whether it would make sense for large countries as well that could not take the rest of the world as given. Would it be an optimal policy response to attenuating imbalances or should the solution be sought more in the direction of macro-prudential policies for the financial sector insofar as we are considering the worst case scenario of a financial crisis. He questioned the wisdom of dealing with financial problems through fiscal means. He drew parallels to the consensual advice to accumulate large foreign currency reserves after the Asian crisis. That also looked good for individual countries, but fed global imbalances as all Asian countries implemented the strategy on a large scale. In terms of the corrective arm of the Pact, he saw a place for current account balances (or net or gross foreign assets) to determine the pace of adjustment. In particular, large imbalances call for more prudence on long-term growth assumptions. He saw a particular role for structural policies, addressing the micro-dimensions. He considered the Pact not to be the right instrument for these policies, but argued that the recommendations of the SGP should be better integrated with other surveillance instruments.

Gabriele Giudice (DG Ecfm) noted there was broad consensus on including these issues in the surveillance framework. Particularly for the non euro-area countries, the current account could be looked at alongside convergence. He argued that article 99 of the Treaty (pre-Lisbon) allowed broader interpretation of economic developments of the country concerned, going beyond the scope of the preventive arm of the Pact (art 1466/97). Pench replied that we discovered more and more room for interpretation in the fiscal framework, but, he warned, we should not overburden the Pact and keep it for other processes. Dabrowski questioned whether the main indicators of fiscal surveillance (debt and deficit to GDP ratios) should take account of contingent liabilities in the light of recent experiences. Pench replied that better assessing sustainability considerations was high on the policy agenda. Until now, implicit liabilities relating to ageing populations had been developed in the framework, now other risks – including contingent liabilities were looked at as well, but difficult to measure. And the response to mounting risks was not necessarily fiscal in nature. Citizens should not be paying taxes ex-ante because banks take increasing risks. Istvan Szekely raised the issue of costs for society of rainy day funds and asked what market failure would be addressed by creation of rainy day funds for countries that had government debt (liquidity risk for the government?). Philip Lane agreed with Pench and Szekely that it is better to address distortions directly at the source, but he argued that 2nd best policies were necessary as problems were unavoidable. Rainy day funds in Ireland (pension reserve fund) had been very useful in Ireland for recapitalising banks, which would have been very expensive otherwise. Liquidity has a worth, he considered. Countries outside the euro area hold a lot of liquid assets in the form of reserves. In the euro area you could have something similar in the form of rainy day funds or collective fiscal measures and credit lines, but that may not be high on the politically feasible agenda. Codogno said that a comprehensive approach would not weaken the SGP, which now suffered from surveillance holes leading to fiscal deficits. Schuknecht argued that tight expenditure control was not only important in boom times, but

also in the forthcoming consolidation phase. He argued for a simple, very tight expenditure benchmark. As to the EDPs, he noted that the recent recommendations already included fiscal framework and adjustment needs, but still measuring effective action was very difficult. In 104(9) recommendations, we should be more explicit, especially if there are risks for the euro area. We could then call for e.g. an expenditure freeze and be explicit on specific measures, as for example public sector wage cuts. He called on the Commission to think about how to strengthen peer pressure.

External Imbalances and Fiscal Policy

by Philip Lane (1)

Abstract:

We analyse the role of fiscal policy both in the emergence and the unwinding of external imbalances. Furthermore, we probe whether there is a role for fiscal policy in the prevention of excessive external imbalances. Finally, we ask whether fiscal policy could in practice successfully fulfill such a role.

Keywords: Ireland, current account, government budget deficit.

JEL Classification: F32, H3, E62, F41

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1 Introduction

The goal of this paper is to consider the role of fiscal policy in the determination and resolution of external imbalances. Our primary focus is on individual member countries of the euro area, since these countries no longer have an independent monetary policy or an independent nominal exchange rate that may be deployed in order to target the external balance. In particular, we draw on the recent Irish experience in order to illustrate some of the arguments made in this paper.

We consider the inter-connections between fiscal policy and the external position from a number of angles. First, fiscal policy may be a contributory factor to the emergence of external imbalances. Second, regardless of the source of an external imbalance, fiscal policy may have a role to play in the external adjustment process. Third, fiscal policy may have a preventive role in guarding against the emergence of sub-optimal external imbalances that may be the result of underlying distortions in the economy. However, even if a *prima facie* case for such a preventive mechanism can be established, it is an open question as to whether fiscal policy could be effective in performing such a role.

In the rest of this paper, we consider each of these dimensions in turn. In Section 2, we review the role of fiscal policy as a source of external imbalances. We turn to the contribution of fiscal policy to external adjustment in Section 3. In Section 4, we consider whether fiscal policy should be deployed in order to prevent the emergence of excessive external imbalances. Next, in Section 5, we address whether it is feasible for fiscal policy to successfully take on such a role. Finally, some concluding remarks are offered in Section 6.

2 Fiscal Policy as a Source of External Imbalances

Fiscal policy may be a source of external imbalances through a number of channels. In the standard intertemporal model of the current account, a temporary increase in government spending generates a current account deficit, since households prefer to smooth private consumption rather than to make room for the surge in government absorption via a decline in private absorption (Sachs 1982, Obstfeld and Rogoff 1995). Such transitory shifts in public expenditure may be the result of a temporary surge in government consumption or government investment. A similar pattern holds in the baseline “new open economy macroeconomic” model (Obstfeld and Rogoff 1996). A temporary increase in government consumption boosts domestic demand, generating a current account deficit and real appreciation.

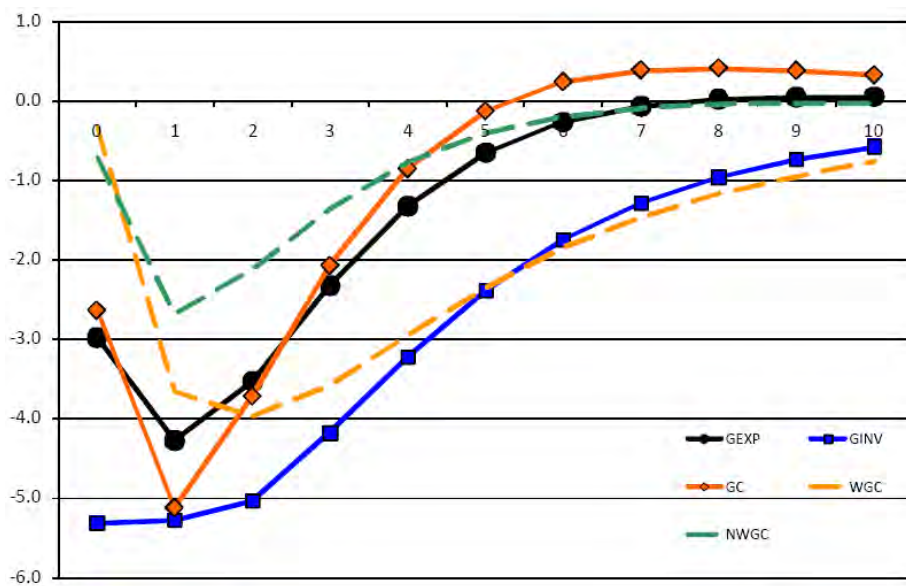
In contrast, a permanent increase in government consumption has no impact on the current account in the standard intertemporal model. Moreover, it generates a current account surplus in the baseline “new open economy macroeconomic” model, since the longterm budget constraint means that households downwardly adjust private consumption. However, the impact of permanent shifts in government spending more closely resemble the results for temporary shocks once frictions are introduced into the dynamics of private consumption, due to the role of habits in preferences or some related mechanism. Corsetti and Muller (2006) consider the impact of persistent shocks to government spending in a multi-sector, multi-country model. Since government spending is mainly directed at domestically-produced goods, a positive fiscal shock drives up domestic prices and improves the terms of trade. For a persistent shock, the expected return on domestic capital improves since domestic output prices increase relative to the price of capital goods, due to the terms of trade improvement. Accordingly, the positive investment response means that a larger current account deficit occurs in a more open economy, due to the terms of trade channel.

Turning to the dynamics of public debt, there is no direct co-movement between the fiscal balance and the external balance under Ricardian Equivalence. However, if the conditions

required for Ricardian Equivalence do not hold, an increase in public debt may be associated with an increase in external debt. For instance, Ganelli (2005) and Kumhof and Laxton (2009) provide models in which households have finite horizons, such that a debt-financed tax cut increases the wealth of currently-alive cohorts, boosting consumption and generating a current account deficit. Furthermore, Corsetti and Muller (2006) show that the addition of an investment channel reinforces the pass through from a fiscal deficit to an external deficit in the case of persistent deficits, especially for more open economies.

Kumhof and Laxton (2009) also show qualitatively-similar results apply in relation to a temporary increase in the fiscal deficit even in an infinite-horizon framework if some proportion of households are credit constrained. Under these conditions, a debt-financed tax cut boosts the current consumption of credit-constrained or hand-to-mouth consumers, leading to a current account deficit.² Consistent with this pattern, the VAR evidence for an eleven-member panel of EMU countries provided by Benetrix and Lane (2009a) is that an increase in government spending is associated with an expansion in the relative size of the nontraded sector and a deterioration in the trade balance. These results are summarised in Figure 1, which also highlights that the impact varies across the different types of government spending. Similar results for the trade balance are also reported by Lane and Perotti (1998) and Beetsma et al (2008). Corsetti and Muller (2006) provide evidence on fiscal expenditure shocks for a four-country sample (US, UK, Australia and Canada). These authors find that an increase in public spending leads to an external deficit for the UK and Canada but the results are not significant for the US and Canada. As is discussed by Benetrix and Lane (2009a), the latter finding can be explained by the data pattern by which fiscal expansions in these countries tend to occur during periods of currency weakness (these four countries all have floating exchange rate regimes.)

Figure 1: Government Spending and the Trade Balance.



Note: Response of trade balance to a 1 percent of GDP shock to different types of government spending. GEXP: total government absorption; GINV: public investment; GC: government consumption; WGC: wage government consumption; NWGC: non-wage government consumption. Source: Adapted from Benetrix and Lane (2009c).

² These authors also show that the impact of a permanent increase in public debt differs across the two approaches. In the finite-horizon model, the long-run stock of net external liabilities increases. In contrast, the savings of non-constrained households fully offsets reduced government savings in the long-run in the infinite-horizon model.

In relation to the connection between public debt and the net foreign asset position is provided by Lane and Milesi-Ferretti (2002). These authors model the long-run evolution of the net foreign asset position as a function of relative output per capita, relative demographic profiles and relative levels of public debt. For a panel of advanced economies, there is a significant association between public debt and the net external debt but the pass through is limited at around 0.11. In contrast, the pass through is much stronger for a panel of developing countries with a coefficient of about 0.66. The more powerful effect in the latter group is in line with theories that emphasise the role of credit constraints in explaining deviations from the Ricardian Equivalence benchmark, in view of the more limited level of financial development in the less-advanced economies. Corsetti and Muller (2006) provide evidence on shocks to the fiscal deficit for a four-country sample (US, UK, Australia and Canada). Consistent with the results for the impact of expenditure shocks, there is evidence of pass through from the fiscal deficit to the external deficit for the UK and Canada but no significant pattern for the US and Canada. As indicated above, it is difficult to properly capture the impact of fiscal policy on the external account for these countries, due to the regularity that these countries experience currency depreciation during the same periods that fiscal policy is in expansionary mode.

Further evidence concerning the impact of fiscal policy on the current account is provided by Feyrer and Shambaugh (2009). These authors identify fiscal shocks in the United States by reference to the narrative approach developed by Romer and Romer (2008). Their estimate is that 50 percent of an unexpected tax cut is passed through to an increase in the US current account deficit.

3 Fiscal Policy and External Adjustment

Regardless of the source of the external imbalance, fiscal policy may have a role to play in facilitating external adjustment. In this section, we first address the role of fiscal policy in contributing to shifts in the real exchange rate and the trade balance. Next, we turn to the role of the fiscal authority in restructuring the international balance sheet in the event of crisis conditions.

3.1 Fiscal Policy, the Real Exchange Rate and the Trade Balance

In order to combine external adjustment with the maintenance of full employment, an economy must re-allocate labour from the nontraded sector to the traded sector. In related fashion, the expansion of the traded sector is facilitated by depreciation of the real exchange rate, which improves the competitiveness of export-orientated and import-competing firms and improves the relative profitability of the traded sector relative to the nontraded sector. For a member of a monetary union, real depreciation cannot be achieved via the traditional route of engineering a nominal devaluation. In the absence of this mechanism, the main macroeconomic policy instrument available is fiscal policy. To the extent that government spending is concentrated on nontraded goods, a contraction in public expenditure may be associated with a decline in the relative price of nontradables and a real depreciation. As an example, government wage consumption is a major component in public spending: the government is a major employer and a decline in its demand for labour relieves pressure on the domestic labour market. In turn, this increases the supply of labour to the traded sector and puts downward pressure on wage levels. A similar mechanism applies to government purchases of consumption and investment goods from the domestic private sector.

In this regard, it is noteworthy that the empirical evidence indicates a robust relation between government spending and the real exchange rate. At medium- and long-term horizons, the cointegration analysis of Ricci et al (2008) and Galstyan and Lane (2009a, 2009b) shows that a sustained decline in government consumption (relative to trading partners) is associated with real

depreciation.³ A similar result is obtained in annual data by Lane and Perotti (2003). Furthermore, the evidence for Europe from VAR analyses is that a discretionary negative shock to government spending is associated with real depreciation (Beetsma et al 2008, Benetrix and Lane 2009a, 2009b).^{4,5} Finally, Benetrix and Lane (2009b, 2009c) shows that the impact of government spending on the real exchange rate varies across different expenditure categories, such that the composition of spending matters in assessing the sensitivity of the real exchange rate to a fiscal shock. Figure 2 summarises the Benetrix-Lane results for the EMU11 sample in terms of the dynamic response of the real exchange rate to a 1 percent of GDP shock to government spending. As is clear from Figure 1, the sensitivity of the real exchange rate varies across different types of government spending.

Taken together, these studies are suggestive that shifts in the level of government spending can contribute to the external adjustment process by influencing the path for the real exchange rate. Consistent with this pattern, the VAR evidence for Europe provided by Benetrix and Lane (2009c) is that a relative decline in government spending is associated with a relative contraction in the size of the nontraded sector and an improvement in the trade balance. Figure 2 provides a summary of the results from Benetrix and Lane (2009c) in terms of the dynamic response of the trade balance to a 1 percent of GDP shock to government spending. As with Figure 1, the impact varies across the different spending categories. Similar results for the trade balance are also reported by Lane and Perotti (1998) and Beetsma et al (2008).

Turning to the financing of the fiscal position, the evidence in the previous section was that, all else being equal, an improvement in the fiscal balance should be associated with a partial improvement in the external balance. Accordingly, a government may also facilitate external adjustment via an improvement in the fiscal balance. However, the conditions under which an improvement in net exports is required are also often associated with a slump in domestic demand. Under such circumstances, policymakers face a conflict between the pursuit of external competitiveness and the maintenance of domestic demand through fiscal expansion. In addition to the macroeconomic dimensions of fiscal policy, there may also be a role for specific microeconomic interventions in aiding external adjustment. For instance, a reduction in employment taxes contributes to real depreciation by lowering the cost of domestic labour (Calmfors 2003). A further type of microeconomic intervention is to alter the timing of consumption decisions through subsidies to saving schemes, which mimics the impact of a shift in the interest rate.⁶ While such interventions may be hard to implement in relation to minor imbalances, these may be worth pursuing in tackling larger-scale deficits.

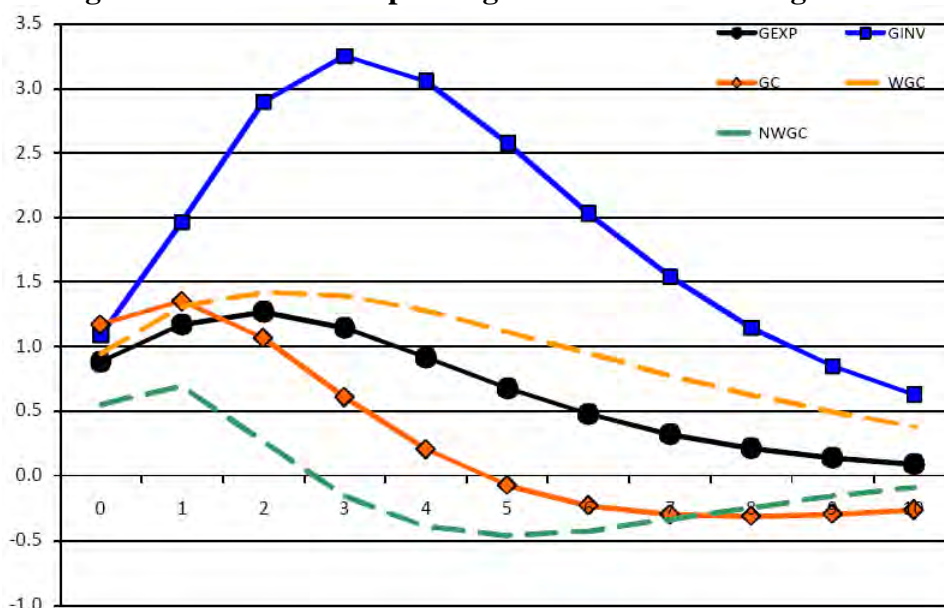
³ Galstyan and Lane (2009a, 2009b) also consider the long-run relation between public investment and the real exchange rate. Since a higher stock of public capital may affect productivity in the traded and nontraded sectors, its impact on the real exchange rate is ambiguous. In the data, there is little robust evidence of a strong link between public investment and the real exchange rate.

⁴ Beetsma et al (2008) consider an EU14 sample, whereas Benetrix and Lane (2009a) provide evidence for an EMU11 group (the founding members of EMU, with the exception of Luxembourg) and Benetrix and Lane (2009b) report results from a country study for Ireland.

⁵ It is striking that some studies (Monacelli and Perotti 2009, Ravn et al 2009) find the opposite pattern (a decline in government spending being associated with real appreciation) for a sample consisting of the United States, United Kingdom, Canada and Australia. However, Benetrix and Lane (2009b) argue that likely reflects a data pattern for this group of floating-currency countries by which the same type of economic news that induces a government to engage in fiscal expansion also leads to a sell off in the currency market.

⁶ While Ireland introduced the Special Savings Incentive Account (SSIA) scheme in 2001 to cool down the booming economy, the design of these scheme was not targeted at cyclical stabilisation. Most important, its fixed five-year horizon meant that the withdrawal of the subsidy in 2006/2007 was independent of the cyclical state of the economy. In contrast, a cyclically-focused scheme would have specified a subsidy schedule that was conditioned on cyclical indicators.

Figure 2: Government Spending and the Real Exchange Rate.



Note: Response of real exchange rate to a 1 percent of GDP shock to different types of government spending. GEXP: total government absorption; GINV: public investment; GC: government consumption; WGC: wage government consumption; NWGC: non-wage government consumption. Source: Adapted from Benetrix and Lane (2009a).

3.2 The Public Balance Sheet and the International Balance Sheet

In the event of an external adjustment problem that is coupled with a financial crisis, the public balance sheet may be transformed by rescue operations that act to transfer assets and liabilities from the private sector to the government or to increase the contingent liabilities of the government through the provision of guarantees and insurance to private entities. This may be the result of a publicly-financed restructuring of the balance sheets of the banking system, the corporate sector and/or the household sector. In some cases, the costs of such bailouts may feed directly into the fiscal balance; in others, the main costs may remain “off balance sheet.” Under either scenario, the impact on the public balance sheet may affect funding costs for the government and affect choices over public spending and taxation.

In relation to the external position, the assumption of foreign liabilities by the government typically reduces the expected losses to foreign creditors on distressed debt.⁷ The long-term horizon of the government means that it may be better able to withstand short-term declines in the market value of assets, although at the cost of increased direct risk to the taxpayer if the ultimate return on these assets fail to meet expectations. If external liabilities are mainly denominated in foreign currency, the government takes on substantial currency risk if it acquires foreign liabilities from the private sector. In particular, the existence of substantial foreign-currency debt complicates the external adjustment process. On the one side, currency depreciation may be helpful in improving the trade balance; on the other side, currency depreciation has an adverse balance sheet effect due to increased domestic-currency value of foreign-currency liabilities (see, amongst others, Lane and Milesi-Ferretti 2005 and Lane and Shambaugh 2010). This trade off has plagued exchange rate policies during emerging market crises in recent decades and is now high on the policy agenda for highly-indebted countries in Central and Eastern Europe.

However, this currency risk is largely absent for members of the euro area. In particular, much of the foreign debt issued in recent years is denominated in euro and held by residents in other member countries of the euro area. Accordingly, crisis dynamics are fundamentally different between

⁷ In some cases, the government may also acquire foreign assets. Examples include the nationalisation of a bank with international operations and the establishment of an asset management agency that acquires non-performing (domestic and foreign) loans from the domestic banking system.

member countries and those outside the euro area, especially in relation to crises that are centred in the banking system. In particular, a member of the euro area is less exposed to the risk of a liquidity run. In the case of a country with substantial foreign-currency liabilities and only limited foreign-currency reserves, its banking system is vulnerable to the withdrawal of foreign-currency financing by private sector investors. In contrast, banks (with sufficient eligible collateral) in the euro area that encounter such problems are able to turn to the ESCB under the rules of its liquidity operations. As a result, the role of the national fiscal authority is to concentrate on ensuring the solvency of domestic banks [through direct and indirect recapitalisation programmes], which in turn enables the banks to obtain liquidity from the ESCB.

4 Preventive Fiscal Policy

In this section, we first outline the factors that may justify a preventive role for fiscal policy in correcting the distortions associated with excessive external imbalances. We then consider a broader array of policy interventions that may also be employed to this end. In particular, we examine the stabilisation of the external account from the perspective macro-prudential risk management, plus the potential role of social partnership in mitigating the wage and price rigidities that are an important source of the risks associated with excessive external imbalances.

4.1 The Case for a Preventive Role for Fiscal Policy

Summers (1988) interpreted the small average size of current account balances as evidence in favour of a “maintained external balance” hypothesis by which national governments proactively seek to avoid large external imbalances. In relation to surplus positions, Summers argued that private-sector agents failed to internalise the full social return on additions to the domestic capital stock and the adverse terms of trade impact of an excessive level of net exports. On the deficit side, large net capital inflows squeeze the domestic traded sector and capacity losses in exporting are difficult to reverse. In similar vein, Blanchard (2007a) argues that a variety of distortions may justify policy interventions in response to the incipient emergence of current account imbalances. First, rigidities in nominal wages and prices may mean that there is excessive volatility in employment in response to swings in the level of domestic demand. Second, financial constraints mean that a contraction in tradables output during a period of high domestic expenditure may not be easily reversed once the economy needs to make the transition towards greater net exports. Third, high net inflows may increase the risk of a sudden stop and the attendant risk of financial distress.

In this study, Blanchard shows how the timing of government spending on nontradables and tradables may be optimally manipulated to limit the distortions induced by current account imbalances. However, an important message from his analysis is that the fiscal intervention may not necessarily alter the scale of the current account position - rather, the policy focus should be on mitigating the associated distortions. For instance, if there is a temporary surge in domestic consumption, rigidities in prices and wages may lead to an excessive increase in employment in the nontraded sector: this can be offset by a reduction in government spending on nontradables, even if this intervention has no impact on the current account deficit. Indeed, Blanchard shows that in some cases the optimal fiscal response may actually result in a larger current account deficit. Under conditions in which financial constraints mean that it is damaging to tolerate a contraction in traded-sector output, the optimal policy to a temporary increase in domestic consumption is to reduce government purchases of nontradables and increase government purchases of tradables. This stems the contraction of the tradables sector but does lead to an enlarged current account deficit.

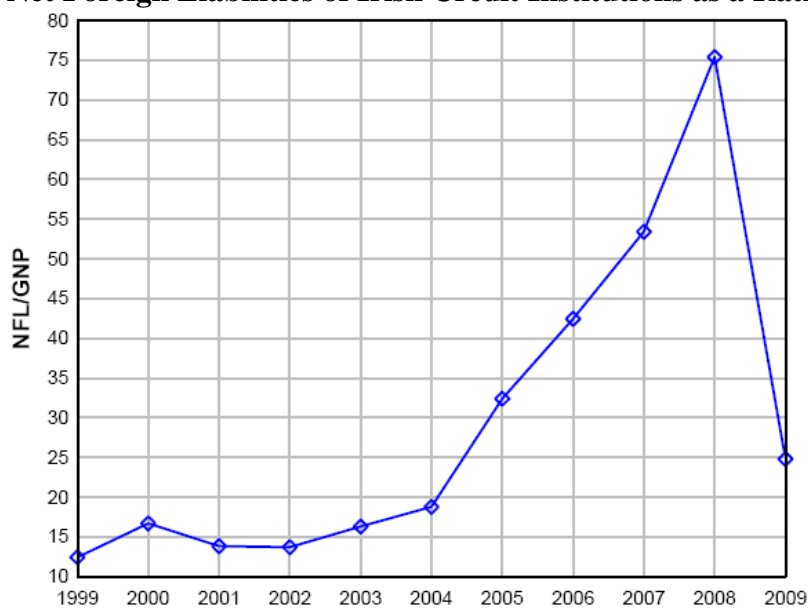
However, if the main distortionary impact of a current account deficit relates to the enhanced risk of a sudden stop, the optimal fiscal policy indeed involves a reduction in the current account deficit. In contrast, the more direct policy targets in the other cases relate to employment

stabilisation and balanced sectoral growth rates. In terms of fiscal strategy, the discussion in Sections 2 and 3 indicates that the government can target the current account balance via a number of instruments. First, a government that wishes to narrow a current account deficit could run a more positive fiscal balance. Second, even at an unchanged fiscal balance, a reduction in government absorption can improve the external balance. Third, even at an unchanged budget balance, tilting the schedule for particular types of taxes can mimic a real depreciation and improve the external position.

4.2 Macro-Prudential Risk Management and the External Account.

In addition, taking a wider policy perspective, a primary instrument for tackling some of the risks associated with excessive capital inflows is the macro-prudential regulation of the financial sector. Since the banking system is in many cases the main intermediary of foreign capital flows, a regulatory regime that successfully manages macro-prudential risk should address concerns about the vulnerabilities embedded in the international balance sheet. A basic risk is that an external deficit may fuel a domestic credit boom and thereby raise the probability of a banking crisis. To illustrate this point, Figure 3 (adapted from Honohan 2009a) shows the net foreign liability position of Irish credit institutions over 1999-2009. While this risk can be mitigated by suitable regulatory interventions by the domestic monetary authority to guard against excessive credit growth, the enhanced risk of a banking crisis may justify running a offsetting fiscal surplus. In many ways, such a precautionary fiscal surplus is analogous to the accumulation of foreign-exchange reserves for a country with its own currency as a guard against financial and currency instability.

Figure 3: Net Foreign Liabilities of Irish Credit Institutions as a Ratio to GNP.



Note: Credit Institutions are . Source: Adapted from Honohan (2009), based on data in Table C3 of Quarterly Bulletin from Central Bank of Ireland.

One option is to simply run a larger fiscal surplus and pay down the level of gross government debt in the event of large capital inflows. However, there is a risk that the occurrence of a financial crisis may also compromise a government's ability to borrow. Accordingly, an alternative approach is to divert the extra net revenues into a dedicated fund that would be invested in liquid assets. In turn, such liquidity may prove useful in dealing with the fallout from a banking crisis and/or reduce the risk of a crisis by providing assurance to investors. Along these lines, Lane (1998a) advocated the establishment of a rainy-day fund upon Ireland's entry into EMU in order to provide some pre-funding in the event of a subsequent banking crisis. Recent proposals to tax bank profits in order to accumulate an insurance fund are similar in

terms of objectives. In the Irish case, no such rainy-day fund was established. However, the National Pensions Reserve Fund (NPRF) was established in 2001 in order to accumulate assets with the goal of pre-funding the long-term increase in ageing-related public spending after 2025.⁸ Although its mandate was to invest commercially on a global basis, a substantial proportion of its net value was recently re-directed towards the re-capitalisation of the two main Irish banks. In this way, the NPRF was re-deployed as a rainy-day fund, despite its stated long-term mission.

However, financial regulation on its own is not sufficient, since corporations, the government and households may also accrue external liabilities through other channels. Indeed, over-regulation of the domestic financial sector increases the incentives to directly tap sources of foreign capital, via overseas banks, the international bond market and the issue of equity-type liabilities to foreign investors. In relation to the feasibility of targeting the external account, the persistent nature of current account positions (at least in recent years) means that timing lags do not provide a prohibitive objection. A basic problem is in identifying the episodes in which policy intervention may be warranted, since it is unlikely that a simple rules-based approach can properly differentiate between “desirable” and “undesirable” levels of net capital inflows. To this end, the current generation of models of equilibrium current account balances and equilibrium real exchange rates provide only a very broad and imprecise guide to the sustainability of a given external balance.⁹ However, the main risks are associated with large external deficits and it may be possible to establish threshold indicators, such that fiscal policy responds in a non-linear fashion to the emergence of deficits that enter a “danger zone.”

4.3 Fiscal Policy and Social Partnership

Finally, another policy task is to improve the adaptability of the domestic economy in coping with shifts in net capital flows. In particular, structural policies that can mitigate nominal and real rigidities can enable external adjustment to occur in a smoother fashion. Such policies are especially important for member countries of the euro area, since real devaluation may typically require periods of nominal declines in wages and prices. Improving the capacity for downward wage and price flexibility is especially challenging in view of the substantial real rigidities that underly resistance to nominal reductions. One specific real rigidity relates to the non-coordination of wage setting in a decentralised economy. With staggered and non-coordinated wage setting, it is difficult to implement in a clean way the type of discrete real devaluation that can be accomplished by a nominal depreciation outside a monetary union. Accordingly, institutions that promote a coordinated approach to wage determination may be especially useful for members of a monetary union, since coordination allows the economy-wide level of wages to adjust to macroeconomic shocks (see, amongst many others, Blanchard 2007a).

Ireland has such a coordination mechanism, through its system of social partnership. Under social partnership, national agreements are negotiated between the government, unions and employer federations. During the post-1987 fiscal adjustment and economic recovery, this mechanism facilitated wage moderation that was in part delivered in exchange for a more favourable tax treatment of labour income. During the Celtic Tiger boom years, it may even be argued that wage moderation was excessive for the reasons outlined by Blanchard (2007a). In particular, it may have been better to stem the very strong employment expansion that ran until 2007, although the expansion during the latter years was in part attributable to other policy failures such as inadequate credit regulation and a pro-cyclical fiscal position. In relation to the current adjustment process in Ireland, the evidence is mixed concerning the role of social partnership. The scale of the macroeconomic shock has led to a pragmatic approach by unions in accepting nominal wage reductions in firms that are struggling for survival. Moreover, there

⁸ In addition to initial funding from the proceeds of the privatisation of the national telecoms operator, the government allocates one percent of GNP each year to the NPRF.

⁹ The state of the art is represented by Ricci et al (2008).

was little substantial opposition to the cancellation of scheduled wage increases under the national agreement and substantial pay reductions in the public sector, via the introduction of a pension levy that averages 7.5 percent across state employees and the nominal pay reductions that were implemented in January 2010.

However, at the time of writing, it seems that the level of union opposition to further nominal pay reductions has grown stronger. A primary concern is that the union movement do not appear to share in the common analysis that a real devaluation needs to be engineered in order to allow Ireland to move onto a sustainable growth path that is not overly-dependent on domestic sources of demand. Rather, the stated fears centre on the risk of a “deflationary spiral” that will only serve to deepen the current recession. A further complicating factor is that the high level of household nominal debt means that nominal pay reductions may trigger adverse financial accelerator effects in the household sector. If such resistance takes hold, there is a substantial risk that Ireland may suffer economic stagnation if real wage adjustment is delayed. In this regard, as is analysed by Blanchard (2007b), the experience of Portugal over the last decade offers a cautionary tale.

5 Effectiveness of Fiscal Policy

In order for fiscal policy to be helpful in external adjustment or as a preventive measure to forestall unsustainable imbalances, it must be the case that fiscal policy can be effectively deployed. In this regard, there are several concerns.

First, if fiscal policy is to be effective as a stabilisation instrument, the long-term fiscal position must be clearly sustainable. Otherwise, interventions that raise the fiscal deficit may lead to concerns among investors and taxpayers, with an attendant increase in funding risk and the size of the risk premium. However, in some cases, the correct fiscal policy from a stabilisation perspective may also improve fiscal sustainability. In particular, as was argued in Section 3, the adjustment process may be facilitated in a country that is running an external deficit by a reduction in government consumption, which should also improve the underlying fiscal position.

Second, an important potential limitation is whether fiscal interventions can be timed correctly. While the scale and duration of the current crisis has provided conditions under which discretionary fiscal interventions have been viable in many countries, there is a longstanding concern that the cumbersome and time-consuming nature of the fiscal process means that it is difficult to effectively deploy fiscal policy for stabilisation purposes.

Third, various political distortions may act against a stabilising role for fiscal policy. There is considerable evidence that the discretionary component of fiscal policy is pro-cyclical in many countries (see, amongst others, Lane 1998a, 2003 and Alesina et al 2008). If fiscal policy is not stabilising vis-a-vis the domestic business cycle, it may be similarly difficult to implement fiscal measures that seek to “lean against the wind” vis-a-vis the external account. Moreover, Benetrix and Lane (2009d) show that membership of EMU has not improved the cyclical profile of fiscal policy: the member countries of the euro area have not improved the cyclical conduct of fiscal policy in recognition of the increased importance of fiscal policy as a stabilisation tool inside a monetary union. This pattern raises doubts about whether fiscal policy could indeed be employed to “lean against the wind” in relation to the direction of net capital flows. Furthermore, there is a non-trivial risk of a de-stabilising fiscal response, since inward capital flows may generate a windfall in tax revenues due to upward pressure on domestic asset prices and an increased level of transactions in domestic asset markets. If the political system fails to save these windfall revenues, an increase in government spending or a reduction in taxes may further amplify the shock to the domestic economy. The importance of asset prices and wealth shocks for tax revenues has been documented for a panel of countries by Eschenbach and Schuknecht (2004). In the Irish case, Addison-Smyth and McQuinn (2009) calculate a

substantial tax windfall from the 2002-2007 housing boom in Ireland that was fuelled by capital inflows.

Fourth, stabilisation of the external account may not receive a large weight in the objective function of policymakers. There are many competing pressures on the allocation of fiscal resources and the determination of overall spending and taxation levels, such that it may be difficult to push fiscal policy in the direction required for external stabilisation.

Taken together, these considerations reinforce the importance of a well-designed institutional framework for the conduct of fiscal policy. In addition to the importance of long-term fiscal sustainability, the assessment of the appropriate fiscal stance from a macroeconomic perspective may usefully involve input from independent experts, while still recognising the primacy of political accountability in making ultimate fiscal decisions. For instance, Calmfors (2003) recommends the establishment of an independent fiscal council that can play this role. While the literature on independent fiscal councils has largely focused on cyclical stabilisation, such a council could also assess the appropriate fiscal stance in guarding against risks that may be embedded in the external position.

6 Conclusions

This paper has covered four main dimensions of the relation between fiscal policy and the external position. First, we have reviewed the ways in which fiscal shocks and fiscal imbalances may be a contributory source to the emergence and persistence of external imbalances. Second, regardless of the original source of the imbalance, we have argued that fiscal policy may be deployed as an instrument that can support the external adjustment process. Third, we have assessed whether there may be a potential role for fiscal policy in the prevention of excessive external imbalances. Finally, we have considered whether fiscal policy can effectively fulfill its potential as a stabilising force for the external account.

The analysis in this paper indicates that fiscal policy is indeed an important potential source of external imbalances. Moreover, fiscal policy interventions can be helpful in facilitating the external adjustment process. This is especially important for member countries of a monetary union, since fiscal policy can help to engineer the type of shifts in the real exchange rate that can be accomplished via nominal currency movements for countries outside a monetary union.

Finally, in view of the havoc associated with disruptive types of adjustment episodes, there is a substantial prima facie case in favour of deploying fiscal policy to mitigate the distortions associated with excessive external imbalances. While this poses an array of logistical and institutional difficulties, the risk of a disruptive adjustment scenario means that intervention at least in response to large and persistent imbalances may be justified. Accordingly, it is highly desirable that further research be conducted on the optimal design of an implementable fiscal policy (plus related ancillary policies) that can reduce the costs from excessive external imbalances.

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On Ricardian Equivalence and Twin Divergence: The Spanish Experience in the 2009 Crisis

by Miguel Cardoso(1) Rafael Doménech (2), (3)

Abstract

During the current economic crisis in the Spanish economy, households are increasing very quickly their saving rate, the government budget has changed from surplus to a huge deficit and the current account deficit is adjusting rapidly. In this paper we explore a possible explanations of this evidence. Using a DGE model for the Spanish economy, we find that expansionary fiscal policies have only small negative effects on the current account, even assuming a large proportion of non-Ricardian consumers. Therefore, the current negative correlation between the government balance budget and the current account, or twin divergence, cannot be explained by the large fiscal stimulus implemented during the crisis. Alternative explanations for the strong change in consumption and saving patterns within the economy (output loss, deleveraging and uncertainty), seem to be better candidates to explain the twin divergence evidence.

Keywords: Ricardian equivalence, current account, government budget deficit.

JEL Classification: F32, F31, E62, F41, C32.

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1 Introduction

In 2007 the Spanish economy exhibited a large current account deficit (10% of GDP), a public budget surplus (2.2% of GDP), and a relatively low households saving rate (6.5% of GDP), at least compared with their investment rate (almost 10% of GDP). However, with the current economic crisis, the situation has changed dramatically, as Figures 1, 2 and 3 show. The public budget surplus has turned into a huge deficit, that the government currently estimates at 11.4% of GDP, the households saving rate has increased enormously, above 11% of GDP, and the current account deficit, expecting at 5,0% of GDP in 2009, is correcting very quickly.

This empirical evidence is very interesting, since it seems to contradict well-known economic theory, as for example, the existence of twin deficits. At the same time, the rise in private savings and the accumulation of fiscal deficits during the current crisis is observational equivalent to the Ricardian equivalence hypothesis, for which it is difficult to find robust empirical support (see Seater, 1993). In fact, the recent experience of the Spanish economy seems to corroborate the empirical findings by Kim and Roubini (2008) about what they call 'twin divergence', that is, the usual empirical fact in the United States such that when the public budget worsens the current account improves and vice versa (see also Corsetti and Müller, 2007, and Cavallo, 2005 and 2007, on this issue). Thus, the negative correlation between the public budget surplus and the current account is not a specific characteristic of the current crisis, since it has also been the rule in previous expansions and recessions, as Figure 4 shows. The correlation between both variables is -0.74 and falls slightly to -0.67 after controlling for the output gap. In a related paper, Erceg, Guerrieri and Gust (2005), using an open economy DGE model (SIGMA) for the USA, find that fiscal deficits have relatively small effects on the trade balance, irrespective of whether its source is a spending increase or a tax cut, even introducing non-Ricardian consumers, which help to increase the effects of fiscal policy on private consumption (see Galí, López-Salido and Vallés, 2007, and Andrés, Doménech and Fatás, 2008).

The objective of this paper is to understand to what extent the quick adjustment of the current account may be explained by the large fiscal stimulus implemented by the Spanish government during the current crisis. For this purpose we use REMS, a Rational Expectations Model of the Spanish economy designed by Boscá et al (2007), to analyse the effects of expansionary fiscal policies. REMS builds on recent advances in DGE models, sharing many features of SIGMA, such as nominal and real rigidities or the presence of constrained households, but departs from SIGMA in two important aspects.¹ First, REMS models a small open economy (Spain) in a monetary union (EMU). Second, it includes a richer and deeper characterization of the labour market, distinguishing between the intensive and extensive margin in a search and matching model.

¹ Nominal and real rigidities not only affects the response of output to fiscal policy, but also the volatility of output to supply shocks in economies where distortionary taxes are important, as in all advanced economies. For example, Andrés and Doménech (2006) show that, contrary to what has been found in RBC models, distortionary taxes tend to reduce output volatility relative to lump-sum taxes when significant rigidities are present

Figure 1: Households saving and investment rates (in percentage of GDP), Spain, 1987-2009.

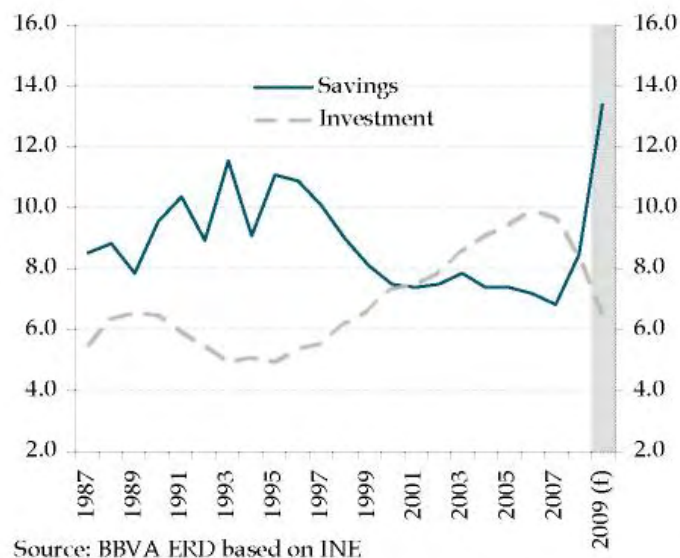


Figure 2: General Government Balance (in percentage of GDP), Spain, 1995-2009.

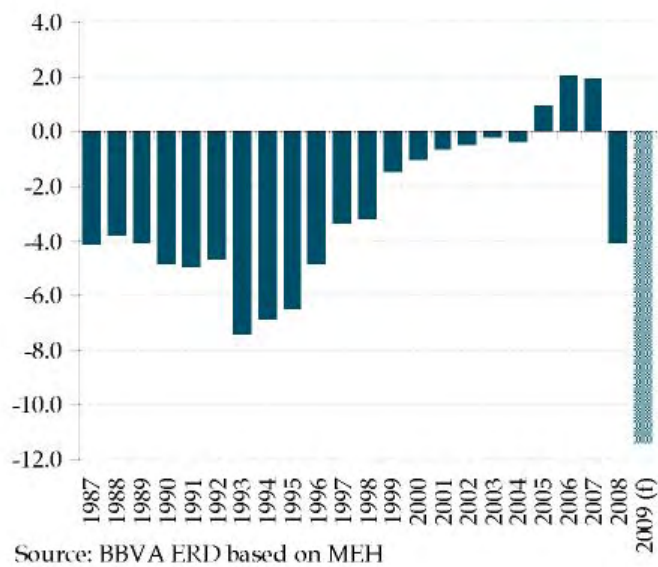


Figure 3: Current Account (in percentage of GDP), Spain, 1987-2009.

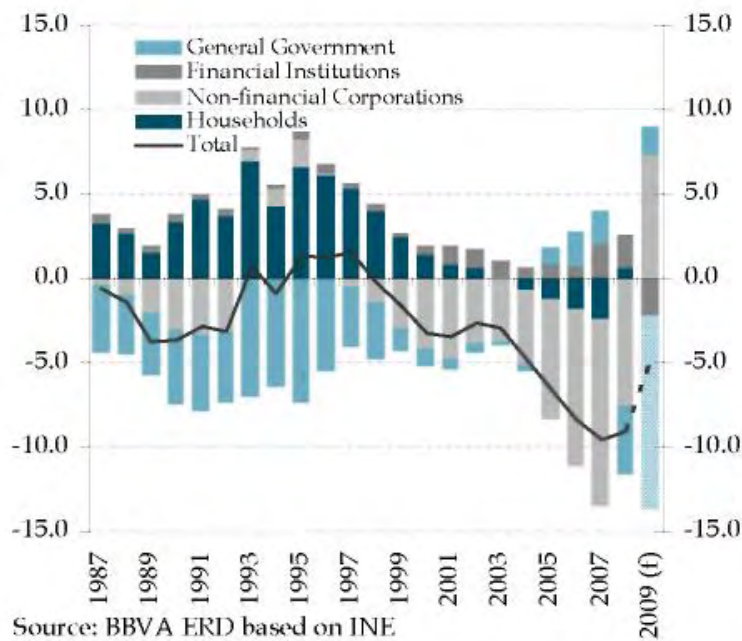
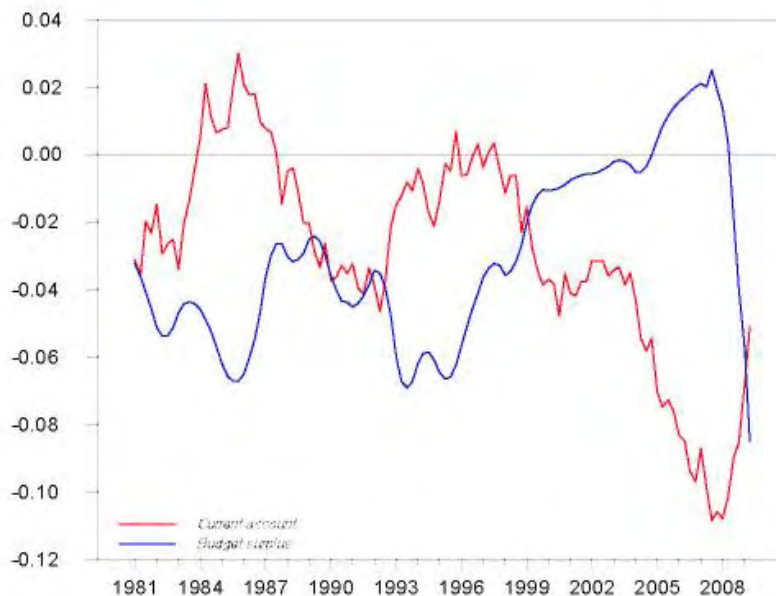


Figure 4: Current account and the budget surplus (% of GDP), quarterly frequency.



Despite the presence of a large share of non-Ricardian consumers (liquidity constrained households), the expansionary fiscal policy has only small negative effects on the current account, as Erceg, Guerrieri and Gust (2005) have also found for the United States. Additionally, the current evidence about the large increase in the households saving rate, at the same time that the government has incurred in a large deficit, seems to be mainly motivated by precautionary saving, in response to the greater uncertainty and the high unemployment rate (18% in 2009), and the desire of reducing their levels of debt, after the dramatic fall in their wealth and the expectations of future higher real interest rates, as a consequence of the international finance turmoil. Given these explanations, although this

evidence is observational equivalent to Ricardian equivalence, it seems that only a fraction of the increase in households saving rate is explained by the large current deficit in government's budget. In fact, our results show that private agents only compensate partially the effects of fiscal policies on the saving rate. Therefore, at the current moment, the emphasis on future fiscal consolidation should be based more on the sustainability of government debt than on the effects on external imbalances. According to these results, the current facts of the Spanish economy could be appropriately explained by the presence of a large negative output shock as suggested by Kim and Roubini (2008) for the US, that has been tried to be counteracted with a large positive fiscal stimulus implemented by the Spanish Government.

The structure of this paper is the following. In Section 2 we present the general equilibrium model for the Spanish economy that we use for economic policy evaluation. In Section 3 we analyse the effects of three different temporary fiscal policies: an increase of public consumption, an increase in public investment and a reduction of the labour income tax rate. In this section we discuss also the sensitivity of our results to changes in some crucial parameters. Finally, Section 4 presents the main conclusions.

2. Theoretical framework

In this paper we use REMS, a Rational Expectations Model of the Spanish economy designed by Boscá et al (2007), to analyse the effects of expansionary fiscal policies². REMS is a decentralized, small open economy model, where households, firms, policymakers and the external sector actively interact each period by trading one final good, two financial assets (public and external debt) and three production factors. To produce gross output, firms employ physical capital (public and private), labour and an intermediate input (energy). While private physical capital and energy are exchanged in a context of perfect competition, the labour market is not Walrasian.

Following Galí et al. (2007), REMS incorporates liquidity-constrained consumers into the standard Keynesian model. There are two types of representative households. One representative household enjoys unlimited access to capital markets, so its members substitute consumption intertemporally in response to changes in interest rates. We will refer to these households as "Ricardian or optimizing consumers". Another representative household does not have access to capital markets, so its members can only consume out of current labour income. We will refer to these liquidity-constrained consumers as "rule-of-thumb (RoT) consumers". For the sake of simplicity, we assume that only optimizing consumers hold money balances, as well as foreign and domestic bonds. However, taxes are levied on both Ricardian and the liquidity-constrained consumers.

It is assumed that workers and firms bargain over these monopoly rents in Nash fashion determining the wage level and the number of hours of the representative workers. Each household is made up of working-age agents who may be active or inactive. In turn, active workers participating in the labour market may either be employed or unemployed. If unemployed, agents are actively searching for a job. Firms' investment in vacant posts is endogenously determined and so are job inflows. Finally, job destruction is taken as exogenous.

Each period the government faces a budget constraint where expenditure items are financed by means of public debt and various distortionary taxes. Intertemporal sustainability of

² In this section we will present a brief description of the main characteristics of the model. For a complete account of the model, see Boscá et. al (2007)

fiscal balance is ensured by a conventional policy reaction function, whereby a lump-sum tax transfer responds to the deviation of the debt to GDP ratio from its long-term target level.

Monetary policy is geared by the European Central Bank (ECB) by means of interest rates movements, which target EMU inflation in which the weight of the Spanish economy is slightly higher to 10 per cent.

2.1 Households

Both types of households maximize intertemporal utility by selecting consumption and leisure. Household members may be either employed or unemployed, but are able to fully insure each other against fluctuations in employment, as in Andolfatto (1996) or Merz (1995).

Optimizing households

Ricardian households face the following maximization programme:

$$\max_{\substack{c_t, m_t, j_t, k_t, \\ b_t^o, b_t^{emu}, m_t^o}} E_t \sum_{t=0}^{\infty} \beta^t \left[\ln(c_t^o - h c_{t-1}^o) + n_{t-1}^o \phi_1 \frac{(T - l_{1t})^{1-\eta}}{1-\eta} + (1 - n_{t-1}^o) \phi_2 \frac{(T - l_{2t})^{1-\eta}}{1-\eta} + \chi_m \ln(m_t^o) \right] \quad (1)$$

subject to:

$$\begin{aligned} & \left(r_t (1 - \tau_t^k) + \tau_t^k \delta \right) k_{t-1}^o + w_t \left(1 - \tau_t^l \right) \left(n_{t-1}^o l_{1t} + r r_t s (1 - n_{t-1}^o) l_{2t} \right) + \left((1 - \tau_t^l) g_{st} - tr h_t \right) + \\ & \frac{m_{t-1}^o}{1 + \pi_t^o} + (1 + r_{t-1}^n) \frac{b_{t-1}^o}{1 + \pi_t^o} + (1 + r_{t-1}^{emu}) \frac{b_{t-1}^{emu}}{1 + \pi_t^o} \\ & - (1 + \tau_t^c) c_t^o \frac{P_t^c}{P_t} - \frac{P_t^j}{P_t} j_t^o \left(1 + \frac{\Phi}{2} \left(\frac{j_t^o}{k_{t-1}^o} \right) \right) - \gamma_A \gamma_N \left(m_t^o + b_t^o + \frac{b_t^{emu}}{\Phi_{bt}} \right) = 0 \end{aligned} \quad (2)$$

$$\gamma_A \gamma_N k_t^o = j_t^o + (1 - \delta) k_{t-1}^o \quad (3)$$

$$\gamma_N n_t^o = (1 - \sigma) n_{t-1}^o + \rho_t^w s (1 - n_{t-1}^o) \quad (4)$$

All variables in the maximisation problem above are expressed in efficiency units per persons of a working age. In our notation, variables indexed by r and o respectively denote *RoT* and optimizing households. Non-indexed variables apply indistinctly to both types of households. Thus, c_t^o , n_{t-1}^o and $s(1 - n_{t-1}^o)$ represent, consumption, the employment rate and the unemployment rate of Ricardian households. s is the share of the non-employed searching for a job, which is assumed to be exogenous. We assume that the leisure utility of the unemployed searching for a job is the same as for the non-active. T , l_{1t} and l_{2t} are the time endowment, hours worked per employee, and hours devoted to job searching by the unemployed. Note that, while the household decides over l_{1t} , the same cannot be said of l_{2t} : time devoted to job searching is assumed to be a function of overall economic activity, so that individual households take it as given³ For simplicity, we adopt the money-in-the-utility function approach to incorporate money into the model.

³ For empirical reasons we assume that the search effort undertaken by unemployed workers varies along the cycle depending positively on the GDP growth rate

Maximization of (1) is constrained by several restrictions. First, the budget constraint (2) describes the various sources and uses of income. The term $w_t(1-\tau^l)n_{t-1}^0l_{1t}$ captures net labour income earned by the fraction of employed workers, where w_t stands for hourly real wages. The product $rr_t w_t(1-\tau^l)s(1-n_{t-1}^0)$ measures unemployment benefits accruing to the unemployed, where rr_t denotes the (exogenous) replacement rate of the unemployment subsidy to the market wage. There are four assets in the economy, namely private physical capital (k_t^o), domestic and Euro-zone bonds (b_t^o and b_t^{ow}) and money balances (m_t^o). The net return on capital is given by $r_t k_{t-1}^o(1-\tau^k) + \tau^k \delta k_{t-1}^o$, where r_t represents the gross return on physical capital and depreciation is tax-deductible as reflected in $\tau^k \delta k_{t-1}^o$.

Interest payments on domestic and foreign debt are respectively given by $r_{t-1}^n \frac{b_{t-1}^o}{1+\pi_t^c}$

and $r_{t-1}^{emu} \frac{b_{t-1}^{ow}}{1+\pi_t^c}$, where r^n and r^{emu} represent the nominal interest rates on domestic and EMU

bonds, which may differ because of a risk premium. The other two expenditure categories are lump-sum transfers, trh_t , and other government transfers, g_{st} . Total revenues can either be invested in private capital or spent on consumption. The household's consumption and

investment are respectively given by $(1+\tau^c) \frac{P_t^c}{P_t} c_t^o$ and $\frac{P_t^c}{P_t} j_t^o \left(1 + \frac{\phi}{2} \left(\frac{j_t}{k_{t-1}}\right)\right)$,

where τ^c is the consumption income tax. Note that total investment outlays are affected by the increasing marginal costs of installation $j_t^o \left(1 + \frac{\phi}{2} \left(\frac{j_t}{k_{t-1}}\right)\right)$. Also, the presence in the

model of the relative prices P_t^c/P_t and P_t^i/P_t implies that a distinction is made between the three deflators of consumption, investment and aggregate output.

The remaining constraints faced by Ricardian households concern the laws of motion for capital and employment. Each period the private capital stock k_t^o depreciates at the exogenous rate δ and is accumulated through investment, j_t^o . Thus, it evolves according to (3). Employment obeys the law of motion (4), where n_{t-1}^0 and $s(1-n_{t-1}^0)$ respectively denote the fraction of employed and unemployed optimizing workers in the economy at the end of period $t-1$. Each period jobs are lost at the exogenous rate σ . Likewise new employment opportunities come at the rate ρ_t^w , which represents the probability that one unemployed worker will find a job. Although the job-finding rate ρ_t^w is taken as exogenous by individual workers, at aggregate level it is endogenously determined according to the following Cobb-Douglas matching function:

$$\rho_t^w(1-n_{t-1}) = \vartheta_t(v_t, n_{t-1}) = \chi_1 v_t^{\chi_2} [s(1-n_{t-1})l_{2t}]^{1-\chi_2}. \quad (5)$$

Rule-of-thumb households

RoT households do not benefit from access to capital markets and also do not hold money, so they face the following maximization programme⁴:

$$\max_{c_t^r, m_t^r} E_t \sum_{t=0}^{\infty} \beta^t \left[\ln(c_t^r - hc_{t-1}^r) + n_{t-1}^r \phi_1 \frac{(T-l_{1t})^{1-\eta}}{1-\eta} + (1-n_{t-1}^r) \phi_2 \frac{(T-l_{2t})^{1-\eta}}{1-\eta} \right] \quad (6)$$

⁴ Alternatively, Coenen, McAdam and Straub (2008) allow these households to smooth consumption by changing money holdings

subject to the law of motion of employment (4) and the specific liquidity constraint whereby each period's consumption expenditure must be equal to current labour income and government transfers, as reflected in:

$$w_t (1 - \tau_t^l) (n_{t-1}^r l_{1t} + r r_t s (1 - n_{t-1}^r) l_{2t}) + g_{st} (1 - \tau_t^l) - tr h_t - (1 + \tau_t^c) c_t^r \frac{P_t^c}{P_t} = 0 \quad (7)$$

$$\gamma_N n_t^r = (1 - \sigma) n_{t-1}^r + \rho_t^w s (1 - n_{t-1}^r) \quad (8)$$

Note that *RoT* consumers do not save and, as a result, they do not hold any assets.

Aggregation

Aggregate consumption and employment can be defined as a weighted average of the corresponding variables for each household type⁵:

$$c_t = (1 - \lambda^r) c_t^o + \lambda^r c_t^r \quad (9)$$

$$n_t = (1 - \lambda^r) n_t^o + \lambda^r n_t^r \quad (10)$$

whereas that for the variables that exclusively concern Ricardian households, aggregation is merely performed as:

$$k_t = (1 - \lambda^r) k_t^o \quad (11)$$

$$j_t = (1 - \lambda^r) j_t^o \quad (12)$$

$$b_t = (1 - \lambda^r) b_t^o \quad (13)$$

$$b_t^{emu} = (1 - \lambda^r) b_t^{oemu} \quad (14)$$

$$m_t = (1 - \lambda^r) m_t^o \quad (15)$$

⁵ $1 - \lambda^2$ and λ^2 denote the constant fractions in the working-age population of Ricardian and *RoT* consumers.

2.2 Factor demands

Production in the economy takes place at two different levels. At the lower level, an infinite number of monopolistically competing firms produce differentiated intermediate goods (y_i), which imperfectly substitute each other in the production of the final good.

These differentiated goods are then aggregated by competitive retailers into a final domestic good (y) using a CES aggregator.

Intermediate producers solve a two-stage problem. In the first stage, each firm faces a cost minimization problem which results in optimal demands for production factors. When choosing the optimal levels of capital, energy, employment and vacancies, intermediate producers set prices by varying the mark-up according to demand conditions. Variety producer $i \in (0, 1)$ uses three inputs: a composite input of private capital and energy, labour and public capital, so that technological possibilities are given by:

$$y_{it} = z_{it} \left\{ \left[a k_{it-1}^{-\rho} + (1-a) e_{it}^{-\rho} \right]^{-\frac{1}{\rho}} \right\}^{1-\alpha} (n_{it-1} l_{it})^\alpha \left(k_{it-1}^p \right)^\zeta \quad (16)$$

where all variables are scaled by the trend component of total factor productivity and z_t represents a transitory technology shock. Each variety producer rents physical capital, k_{t-1} , and labour services, $n_{t-1} l_{1t}$, from households, and uses public capital services, k_{t-1}^p , provided by the government. Intermediate energy inputs e_t can be either imported from abroad or produced at home. The elasticity of substitution

between private capital and energy is given by $\frac{1}{1+\rho} \alpha \in (0,1)$ is a distribution

parameter: it determines relative factor shares in the steady state.

Factor demands are obtained by solving the cost minimization problem faced by each variety producer (we drop the industry index i when no confusion arises)

$$\min_{k_t, n_t, v_t, e_t} E_t \sum_{t=0}^{\infty} \beta^t \frac{\lambda_{1t+1}^o}{\lambda_{1t}^o} \left(r_t k_{t-1} + w_t (1 + \tau^{sc}) n_{t-1} l_{1t} + \kappa_v v_t + \frac{P_t^e}{P_t} e_t (1 + \tau^e) \right) \quad (17)$$

subject to

$$y_t = z_{it} \left(\left[a k_{t-1}^{-\rho} + (1-a) e_t^{-\rho} \right]^{-\frac{1}{\rho}} \right)^{1-\alpha} (n_{t-1} l_{1t})^\alpha \left(k_{t-1}^p \right)^\zeta - \kappa_f \quad (18)$$

$$\gamma_N n_t = (1 - \sigma) n_{t-1} + \rho_t^f v_t \quad (19)$$

where, in accordance with the ownership structure of the economy, future profits are discounted at the household relevant rate β . κ_v captures recruiting costs per vacancy, κ_f is an entry cost which ensures that extraordinary profits vanish in imperfectly-competitive equilibrium, τ^{sc} is the social security tax rate levied on gross wages⁶, and ρ_t^f is the probability that a vacancy will be filled in any given period t . It is worth noting that the probability of filling a vacant post ρ_t^f is exogenous from the firm's perspective. However, from the perspective of the overall economy, this probability is endogenously determined according to the following Cobb-Douglas matching function:

$$\rho_t^w (1 - n_{t-1}) = \rho_t^f v_t = \chi_1 v_t^{\chi_2} [s (1 - n_{t-1}) l_{2t}]^{1-\chi_2} \quad (20)$$

⁶ Note that, in our specification, firms bear the statutory incidence of social security contributions.

2.3 Pricing behavior of intermediate firms: the New Phillips curve

Intermediate firms have market power and set their prices. Each intermediate firm produces a variety y_i and faces a downward-sloping demand curve that takes the form below:

$$y_{it} = y_t \left(\frac{P_{it}}{P_t} \right)^{-\varepsilon} \quad (21)$$

where $\left(\frac{P_{it}}{P_t} \right)$ is the relative price of variety y_i , ε can be expressed in terms of the elasticity of substitution between intermediate goods, $\varsigma > 0$, as $\varepsilon = (1 + \varsigma) / \varsigma$, and y_t represents the production of the final product as defined by

$$y_t = \left(\int_0^1 y_{it}^{1/\varepsilon} di \right)^{\varepsilon} \quad \text{and} \quad P_t = \left(\int_0^1 P_{it}^{-\frac{\varepsilon-1}{\varepsilon}} di \right)^{-\frac{\varepsilon}{\varepsilon-1}} \quad (22)$$

Variety producers act as monopolists and choose prices when allowed. We use the well-known Calvo hypothesis (Calvo, 1983), thereby assuming some overlapping adjustment in prices. Those firms that do not reset their prices optimally at a given date adjust them according to a simple indexation rule to catch up with lagged inflation. Thus, each period a proportion θ of firms simply set $P_{it} = (1 + \pi_{t-1})^\chi P_{i,t-1}$ (with χ representing the degree of indexation), while only a measure $1-\theta$ of firms set their prices, \tilde{P}_{it} , to maximize the present value of expected profits. Consequently, $1-\theta$ represents the probability of adjusting prices each period, whereas θ can be interpreted as a measure of price rigidity. As is standard in the literature⁷, the optimal price solution can be used to obtain an expression for aggregate inflation (the New Phillips curve) in the form:

$$\pi_t = \frac{\beta}{1 + \alpha\beta} E_t \pi_{t+1} + \frac{(1 - \beta\theta)(1 - \theta)}{\theta(1 + \alpha\beta)} \widehat{mc}_t + \frac{\alpha}{1 + \alpha\beta} \pi_{t-1} \quad (23)$$

where \widehat{mc}_t measures the deviation of the firm's marginal cost from the steady state, i.e.,

$$mc_t = \frac{\varepsilon - 1}{\varepsilon} (1 + \widehat{mc}_t)$$

2.4 Trade in the labour market: the labour contract

The key departure of REMS from other DGE models is that trading in the labour market is subject to transaction costs. Each period, the unemployed engage in a search process to find a vacant job. Costly search in the labour market implies that there are simultaneous inflows into and outflows out of employment, so that changes in the stock of unemployment results from the job destruction and job creation. Stable unemployment occurs whenever inflows and outflows cancel out one another, i.e.,

$$\rho_t^f v_t = \rho_t^w (1 - n_{t-1}) = \chi_1 v_t^{\chi_2} [(1 - n_{t-1}) l_{2t}]^{1-\chi_2} = (1 - \sigma) n_{t-1} \quad (24)$$

Because it takes time for households and real resources for firms to make profitable contacts, some pure economic rent emerges with each new job, which is equal to the sum of the expected transaction or search costs.

Several wage and hours determination schemes can be applied to a bilateral monopoly framework. In particular, we will assume that firms and workers negotiate by means of a Nash bargain, so the outcome of the bargaining process maximizes the product

⁷ See, for example, Galí, Gertler and López-Salido (2001).

$$\max_{w_t, l_{1t}} \left((1 - \lambda^r) \frac{\lambda_{ht}^o}{\lambda_{1t}^o} + \lambda^r \frac{\lambda_{ht}^r}{\lambda_{1t}^r} \right)^{\lambda^w} (\lambda_t^{nd})^{(1-\lambda^w)} \quad (25)$$

where $\lambda^w \in (0,1)$ is the worker's bargaining power. The first term in brackets represents the representative worker surplus while the second is the firm surplus. More specifically, $\lambda_{ht}^o / \lambda_{1t}^o$ and $\lambda_{ht}^r / \lambda_{1t}^r$ respectively denote the earning premium (in terms of consumption) of employment over unemployment for a Ricardian and a *RoT* worker. Similarly, λ_t^{nd} represents the profit premium of a filled over an unfilled vacancy for the representative firm. Note that this bargaining scheme features the same wage for all workers, irrespective of whether they are Ricardian or rule-of-thumb.

2.5 Government

The government decides the size and composition of public expenditure and the mix of taxes and new debt levels required to finance total expenses. Government determines exogenously the levels of goods and services (g_t^c) and public investment (g_t^i). Conversely, interest payments on government bonds $(1+r_t)b_{t-1}$, unemployment benefits $g_{ut}(1-n_{t-1})$, and government social transfers g_{st} are assumed to be endogenous. The two latter expenditure categories are given by

$$g_{ut} = rr_t w_t \quad (26)$$

$$g_{st} = tr_t g d p_t \quad (27)$$

whereby g_{ut} and g_{st} are made proportional to the level of real wages, w_t , and activity, $g d p_t$, through rr_t and tr_t .

Government investment augments public capital, which in turn depreciates at the rate δ^p and thus follows the law of motion:

$$\gamma_A \gamma_N k_t^p = g_t^i + (1 - \delta^p) k_{t-1}^p \quad (28)$$

Government expenditure is financed by direct taxation, levied on either labour income (personal labour income tax, τ_t^l , and social security contributions, τ_t^{sc}) and capital income (τ_t^k), as well as indirect taxation, represented by consumption (τ_t^c) and energy taxes (τ_t^e). Government revenues are therefore given by

$$t_t = (\tau_t^l + \tau_t^{sc}) w_t (n_{t-1} l_{1t}) + \tau_t^k (r_t - \delta) k_{t-1} + \tau_t^c \frac{P_t^c}{P_t} c_t + \tau_t^e \frac{P_t^e}{P_t} e_t + tr_t h_t + \tau_t^l \bar{r} w_t (1 - n_{t-1}) l_{2t} + \tau_t^j g_{st} \quad (29)$$

where $tr_t h_t$ stands for lump-sum transfers as defined below.

Each period total receipts and outlays are made consistent by means of the government's budget constraint

$$\gamma_A \gamma_N b_t = g_t^c + g_t^i + g_{ut}(1 - n_{t-1}) + g_{st} - t_t + \frac{(1 + r_t^b)}{1 + \pi_t} b_{t-1} \quad (30)$$

Equation (30) reflects that the gap between total receipts and outlays is financed by variations in lump-sum transfers to households, $tr_t h_t$ (which enter the fiscal budget rule through the term t_t), and/or the issue of domestic bonds (b_t b_{t-1}). Note that government income from seniorage is nil.

The sustainability of public debt requires the introduction of a debt rule that makes at least one fiscal category as instrument for debt stabilization. In particular REMS assumes that

$$trh_t = trh_{t-1} + \psi_1 \left[\frac{b_t}{gdp_t} - \overline{\left(\frac{b}{gdp} \right)} \right] + \psi_2 \left[\frac{b_t}{gdp_t} - \frac{b_{t-1}}{gdp_{t-1}} \right] \quad (31)$$

where $\overline{\left(\frac{b}{gdp} \right)}$ is the long-run target for the debt-to-GDP ratio and $\varphi_1 > 0$ captures the speed of adjustment from the current ratio towards the desired target. The value of $\varphi_1 > 0$ will be chosen to ensure a smooth adjustment of actual debt towards its steady-state level. Although a fiscal policy reaction function in terms of lump-sum transfers is not very realistic it is the most transparent way of analyzing the effects of fiscal stimulus through expenditures and taxes policies since the lump-sum transfers we consider in equation (31) do not affect the behavior of private agents.

2.6 Monetary policy

Monetary policy is implemented by the European Central Bank (ECB), which targets EMU inflation by means of movements in interest rates. Short-term interest rates are governed by the following policy reaction function

$$\ln \frac{1 + r_t^{emu}}{1 + r^{emu}} = \rho^r \ln \frac{1 + r_{t-1}^{emu}}{1 + r^{emu}} + \rho^\pi (1 - \rho^r) \ln(\pi_t^{emu} - \overline{\pi^{emu}}) + \rho^y (1 - \rho^r) \ln \Delta \ln y_t^{emu} \quad (32)$$

where all the variables indexed by emu refer to EMU aggregates. Thus, r_t^{emu} and π_t^{emu} are the Euro-zone nominal short-term interest rate and consumption price deflator (to which the Spanish economy contributes according to its relative size), and $\Delta \ln y_t^{emu}$ measures the deviation of GDP growth from its trend. As explained in Woodford (2003), (32) is the optimal outcome of a rational central bank facing and objective function under relatively general equilibrium conditions.

Finally, the existence of the monetary union means that the intra-euro-area real exchange rate is simply given by the ratio of relative prices between the domestic economy and the remaining EMU members, so real appreciations or depreciations are driven by the inflation differential vis-à-vis the euro area:

$$\frac{rer_{t+1}}{rer_t} = \frac{1 + \pi_{t+1}^{emu}}{1 + \pi_t^{emu}} \quad (33)$$

2.7 The External Sector

Given the small open economy hypothesis assumed in REMS, world prices and world demand are taken as given and the effects of changes in the activity of the Spanish economy on EMU and the rest of the world are ignored. Another simplifying assumption is that final and intermediate goods produced at home are all considered to be tradable.

Aggregate consumption (investment) consists in a composite basket of home and foreign produced goods. There is a representative consumption (investment) distributor whose role is to determine the share of aggregate consumption (investment) to be satisfied with home produced goods $c_h (i_h)$ and foreign imported goods $c_f (i_f)$. This is carried out on the basis of CES technology:

$$c_t = \left((1 - \omega_{ct})^{\frac{1}{\sigma_c}} c_{ht}^{\frac{\sigma_c-1}{\sigma_c}} + \omega_{ct}^{\frac{1}{\sigma_c}} (c_{ft})^{\frac{\sigma_c-1}{\sigma_c}} \right)^{\frac{\sigma_c}{\sigma_c-1}} \quad (34)$$

$$i_t = \left((1 - \omega_{it})^{\frac{1}{\sigma_i}} i_{ht}^{\frac{\sigma_i-1}{\sigma_i}} + \omega_{it}^{\frac{1}{\sigma_i}} (i_{ft})^{\frac{\sigma_i-1}{\sigma_i}} \right)^{\frac{\sigma_i}{\sigma_i-1}} \quad (35)$$

where σ_c (σ_i) is the consumption (investment) elasticity of substitution between domestic and foreign goods.

Each period, the representative consumption distributor chooses c_{ht} and c_{ft} to minimize production costs subject to the technological constraint given by (34). The solution of this problem provides the optimal allocation of aggregate consumption between domestic and foreign goods, c_{ht} and c_{ft} :

$$c_{ht} = (1 - \omega_c) \left(\frac{P_t}{P_t^c} \right)^{-\sigma_c} c_t \quad (36)$$

$$c_{ft} = \omega_c \left(\frac{P_t^m}{P_t^c} \right)^{-\sigma_c} c_t \quad (37)$$

where P_t and P_t^m are respectively the prices of home and foreign produced goods. P_t^c represents both the price of the consumption good borne by households and the shadow cost of production borne by the aggregator.

Proceeding in the same manner as with the investment distributor problem, similar expressions can be obtained regarding the optimal allocation of aggregate investment between domestic and foreign goods, i_{ht} and i_{ft}

$$i_{ht} = (1 - \omega_i) \left(\frac{P_t}{P_t^i} \right)^{-\sigma_i} i_t \quad (38)$$

$$i_{ft} = \omega_i \left(\frac{P_t^m}{P_t^i} \right)^{-\sigma_i} i_t \quad (39)$$

By assumption, the price of domestically produced consumption and investment goods is equal to the GDP deflator, P_t . In order to obtain the consumption price deflator, one needs to further incorporate the demand schedules provided by (36) and (37) for home and foreign consumption goods into the cost of producing one unit of aggregate consumption goods ($P_t c_{ht} + P_t^m c_{ft}$). Bearing in mind that the production cost per unit equates to the price of production, it is straightforward to express the consumption (investment) price deflator as a function of the GDP and import deflators

$$P_t^c = \left((1 - \omega_{ct}) P_t^{1-\sigma_c} + \omega_{ct} P_t^{m1-\sigma_c} \right)^{\frac{1}{1-\sigma_c}} \quad (40)$$

$$P_t^i = \left((1 - \omega_{it}) P_t^{1-\sigma_i} + \omega_{it} P_t^{m1-\sigma_i} \right)^{\frac{1}{1-\sigma_i}} \quad (41)$$

The exogenous world price is a weighted average calculated on the basis of final good and intermediate good prices, \overline{PFM} and \overline{P}^e , both expressed in terms of the domestic currency. Given the small open economy assumption, the relevant foreign price is defined as:

$$P_t^m = (\tilde{\alpha}_e P_t^e + (1 - \tilde{\alpha}_e) \overline{PFM}_t) \quad (42)$$

where $\tilde{\alpha}_e$ stands for the ratio of energy imports to overall imports. Export prices charged by Spanish firms may deviate from prices charged by competitors in foreign markets because the possibility of pricing-to-market. The pricing-to-market hypothesis is consistent with a model of monopolistic competition among firms where each firm regards its influence on other firms as negligible. Under these circumstances, we may define the Spanish export price deflator as

$$P_t^x = P_t^{(1-ptm)} (\overline{PFM}_t)^{ptm} \quad (43)$$

where P_t^x is the export price deflator, \overline{PFM}_t is a competitors price index expressed in euros and the parameter ptm determines the extent to which there is pricing-to-market.

Aggregate imports include two final goods, foreign consumption and investment, and one intermediate commodity, energy:

$$im_t = c_{ft} + i_{ft} + \alpha_e e_t \quad (44)$$

where α_e represents the ratio of energy imports over total energy consumption.

Exports demand can be defined in terms of aggregate consumption and investment from abroad, \overline{y}_t^w , and the ratio of the export price deflator to the competitors price index

expressed in euros, $P_t^x \overline{PFM}_t$:

$$ex_t = s_t^x \left(\frac{P_t^x}{\overline{PFM}_t} \right)^{-\sigma_x} \overline{y}_t^w \quad (45)$$

Plugging (43) into (45) yields the exports demand under the small open economy assumption and the pricing-to-market hypothesis:

$$ex_t = s_t^x \left(\frac{\overline{PFM}_t}{P_t} \right)^{(1-ptm)\sigma_x} \overline{y}_t^w \quad (46)$$

The current account balance is defined as the trade balance plus interest rate receipts/payments from net foreign assets:

$$ca_t = \frac{P_t^x}{P_t} ex_t - \frac{P_t^m}{P_t} im_t + (r_t^{emu} - \pi_t) b_{t-1}^{oemu} \quad (47)$$

Following standard practice in the literature (see, for example, Obstfeld and Rogoff, 1995, 1996), net foreign assets are regarded as a stock variable resulting from the accumulation of current account flows. This is illustrated by the following dynamic equation:

$$\frac{\gamma_A \gamma_N b_t^{oemu}}{\phi_{bt}} = \frac{(1 + r_t^{emu})}{1 + \pi_t^c} b_{t-1}^{oemu} + \frac{P_t^x}{P_t} ex_t - \frac{P_t^m}{P_t} im_t \quad (48)$$

(48) is obtained by combining the Ricardian households' budget constraint (assuming a zero net supply for domestic bonds and money), the government's budget constraint and the economy's aggregate resource constraint.

2.8 Accounting identities in the economy

Gross output can be defined as the sum of (final) demand components and the (intermediate) consumption of energy:

$$y_t = c_{ht} + i_{ht} + g_t + \frac{P_t^x}{P_t} ex_t + \kappa_v v_t + \frac{P_t^e}{P_t} (1 - \alpha_e) e_t + \kappa_f \quad (49)$$

whereas GDP is given by:

$$gdp_t = y_t - \frac{P_t^e}{P_t} e_t - \kappa_f - \kappa_v v_t \quad (50)$$

Note that, in accordance with previous definitions, c_{ht} and i_{ht} are equal to overall domestic consumption and investment minus consumption and investment goods imported from abroad. Thus, c_{ht} and i_{ht} are consistent with the definitions above for gross output and value added.

2.9 Calibration

Model parameters have been fixed using a hybrid approach of calibration and estimation, at a quarterly frequency (see Boscá et al, 2007 for further details). Some parameter values are taken from related DGE models. Several other parameters have been computed from the sample average counterpart of the long-run conditions. The remaining parameters have been estimated on the basis of selected model's equations.

Table 1: Parameter Values

\bar{g}	0.0905	\bar{l}_2	0.2183	β^b	0.5035	$\overline{\pi^{emu}}$	0.0000
τ^c	0.1069	Φ_1	2.9483	$\left(\frac{b}{gdp}\right)$	2.4000	T	1.3690
τ^l	0.1107	η	2.0000	\overline{rr}	0.3832	λ^w	0.4274
τ^k	0.2080	σ_c	1.2063	τ_t^e	0.2000	ω_i	0.1381
\overline{tr}	0.1381	Φ_b	0.0060	Φ_1	0.0100	σ_i	0.9305
τ^{sc}	0.2215	Φ_2	2.2389	φ_2	0.2000	λ^r	0.5000
P^e	0.8620	ρ	0.9571	σ_x	1.3000	h	0.6000
β	0.9908	a	0.9985	$\overline{r^{emu}}$	0.0158	α_e	0.4980
α	0.5938	χ_m	0.1987	ζ	0.0600	$\tilde{\alpha}_e$	0.1049
δ	0.0141	\overline{mc}	0.7961	γ_A	1.0018	ω_c	0.0930
Φ	5.5000	γ	1.7500	γ_N	1.0047	K_f	0.2730
k_v	1.4966	s	0.2600	δ^p	0.0105	s^x	0.0142
σ	0.0180	ρ^r	0.7500	ptm	0.5767	ρ^w	0.7600
χ_1	0.6115	λ	0.2006	ω_c	0.0930	Φ_e	25.000
χ_2	0.5725	β^f	0.4965	\bar{y}^w	7.7855	$\rho_{\underline{e}}$	0.8500

Altogether, these parameters produce a baseline solution that accurately resembles the behaviour of the Spanish economy over the last 25 years. The data used in the calibration come from the REMSDB database. At the beginning of the sample, the third quarter of 1985 displays adequate cyclical properties for most of the endogenous variables (see Puch and Licandro, 1997). Several variables included in the model have no direct statistical counterpart from official sources. Such variables include consumption and employment of RoT and optimizing consumers, Lagrange multipliers, Tobin's q, composite capital stock, marginal cost and total factor productivity. In order to sidestep the lack of data availability affecting these variables, we use the model's related behavioural equations to compute them.

Table 1 lists the values of parameters and exogenous variables. The implied steady state values of the endogenous variables are given in Table 2 where, when appropriate, variables have been defined in relative terms of GDP, all prices are relative to the deflator price index, P_t , and the real exchange rate is defined as $rer_t = \frac{\overline{PFM}_t}{P_t}$. Roughly speaking, the calibration

strategy follows a sequence in which one starts by setting the value of a number of parameters which are subsequently used to obtain a measure of the level of total factor productivity. This makes it possible to express all variables in the model in terms of efficiency units. The remaining parameters are then fixed on the basis of the model's equations with variables measured in efficiency units.

Table 2: Steady State

b	2.400	i_h	0.133	π_t	0.000
b^o	2.400	im	0.262	gdp_t	1.000
c	0.615	j	0.238	π_t^c	0.000
c_f	0.108	j^o	0.476	$\frac{p_t^i}{p_t}$	0.911
c_h	0.510	k	11.43	$\frac{p_t^m}{p_t}$	0.803
c^o	0.726	ke	9.647	$\frac{p_t^x}{p_t}$	0.888
c^r	0.504	k^p	1.871	q_t	1.016
e	0.068	l_1	0.436	r_t	0.033
rer	0.815	l_2	0.218	r_t^n	0.014
ex	0.236	\widehat{mc}	0.0000	g_{st}	0.138
b^w	0.000	m_t^0	11.11	trh_t	0.055
b^{ow}	0.000	n_t	0.449	t_t	0.356
g^c	0.152	n_t^0	0.449	gut	0.019
i	0.252	n_t^r	0.449	g_t^i	0.029
i_f	0.120	$\frac{p_t^c}{p_t}$	0.969	w_t	1.515

3. Fiscal policy and the current account

3.1 A temporary increase of public consumption

We first analyse the effects of a temporary but persistent increase of public consumption upon the main macroeconomic variables in our model. The initial shock in public consumption is equivalent to 1 per cent of GDP (more than 5 per cent in terms of public consumption), similar to the size of the expansionary policies implemented through public expenditure in 2008 and 2009 by the Spanish government.⁸ Figure 5 presents the impulse-response functions of the main endogenous variables. The response of output is clearly positive on impact and the short term multiplier is equal to 1.0, in line with the recent results of Corsetti, Meier and Muller (2010) and Woodford (2010), and slightly higher than in Cwik and Wieland (2009). As expected, the response of private consumption is also positive, due to the presence of rule-of-thumb consumer, since the consumption of optimizing households

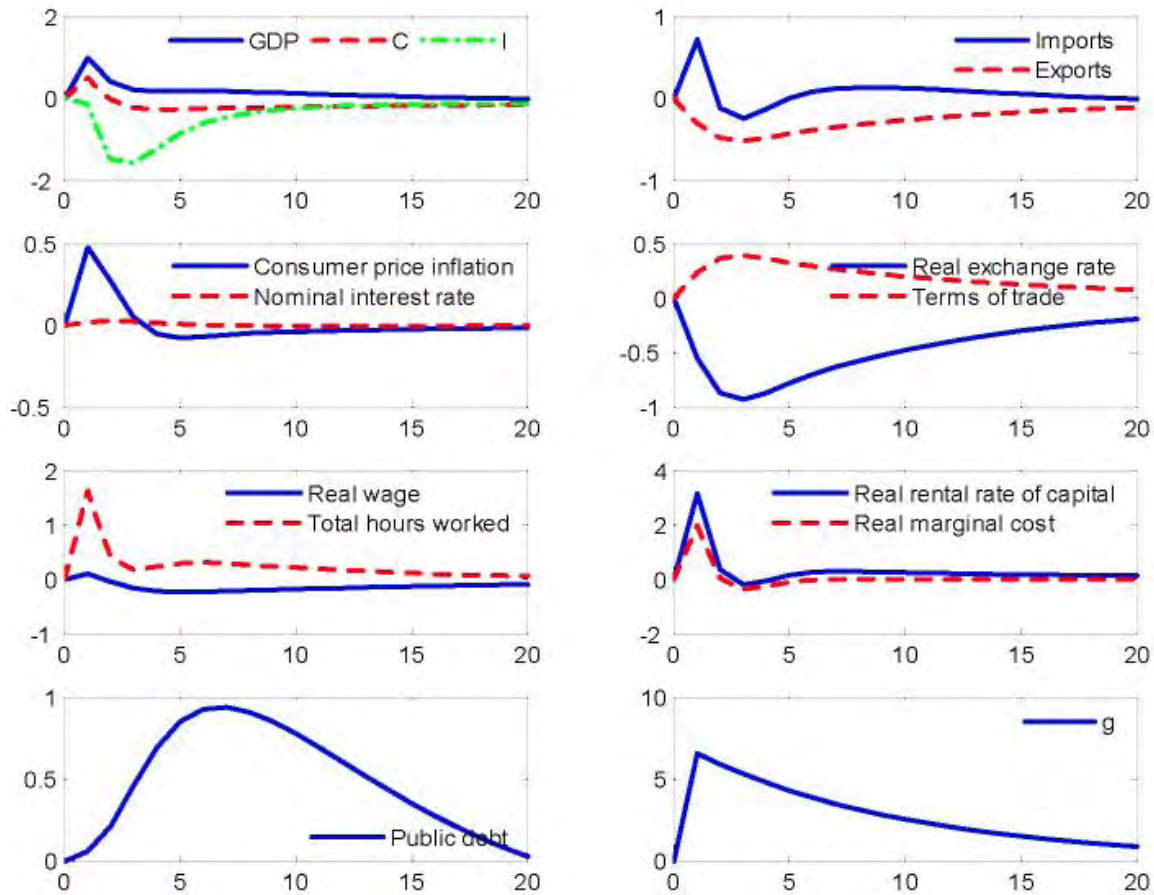
⁸ In particular, the law of movement of public consumption is given by:

$$\overline{g_t^c} = 0.9\overline{g_{t-1}^c} + 0.1\overline{g_t^c} + \mathcal{E}_t^g$$

where $\overline{g_t^c}$ is the steady-state level of public consumption and \mathcal{E}_t^g is the shock.

falls, given the negative wealth effects of higher government spending. The higher level of output is obtained with a higher level of total hours worked (labor supply also rises with the negative wealth effect of optimizing households), which is accompanied with slightly greater real wages, in spite of their rigidities. On the contrary, private investment decreases, reaching the lowest levels after three quarters. The fall of investment is driven by the fall in Tobin's q .

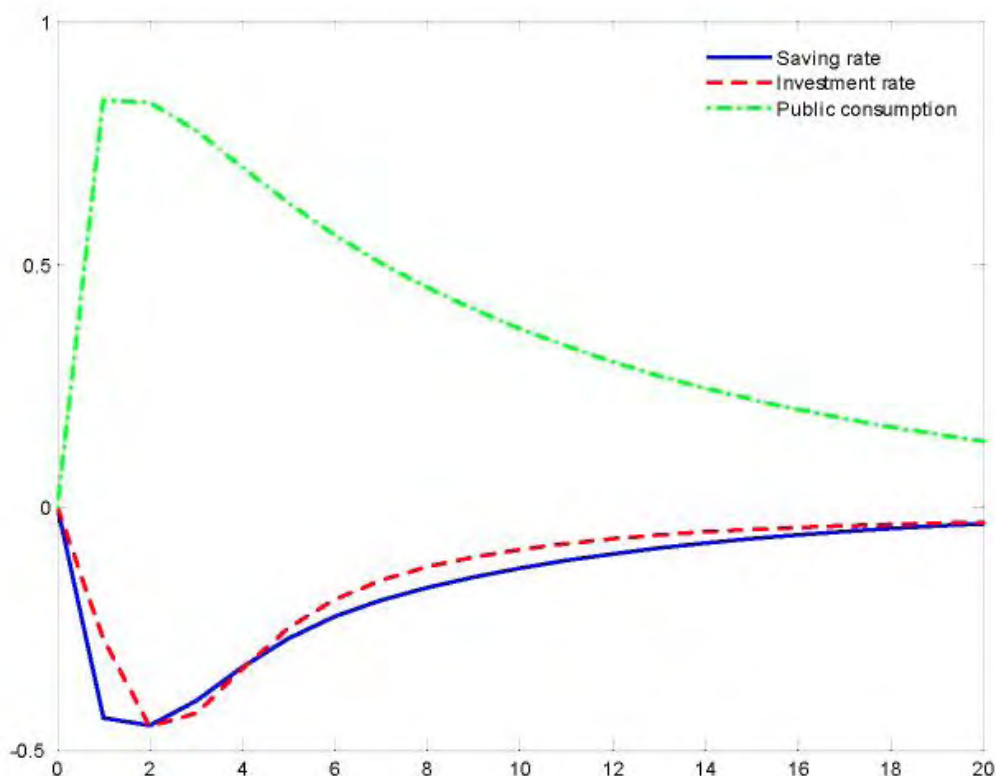
Figure 5: Impulse-response functions after a temporary shock in public consumption.



The increase in marginal costs also pushes the inflation rate up. Higher domestic prices as well as higher levels of output and private consumption cause an increase in imports on impact. However, this increase of imports has a short life since imports are more sensitive to private investment, which falls from $t + 1$ to $t + 3$. The increase in domestic prices also affects negatively foreign competitiveness, therefore inducing a reduction of exports. As shown in Figure 5 the real exchange rate appreciates and the terms of trade (P^x/P^m) increase. In spite of the higher inflation rate, nominal interest rate increases very slightly, given the small weight of the Spanish economy in EMU inflation (around 10 per cent). Finally, as expected, public debt increases, reaching its highest level seven quarters after the shock, and then falls steadily as a result of the fiscal rule.

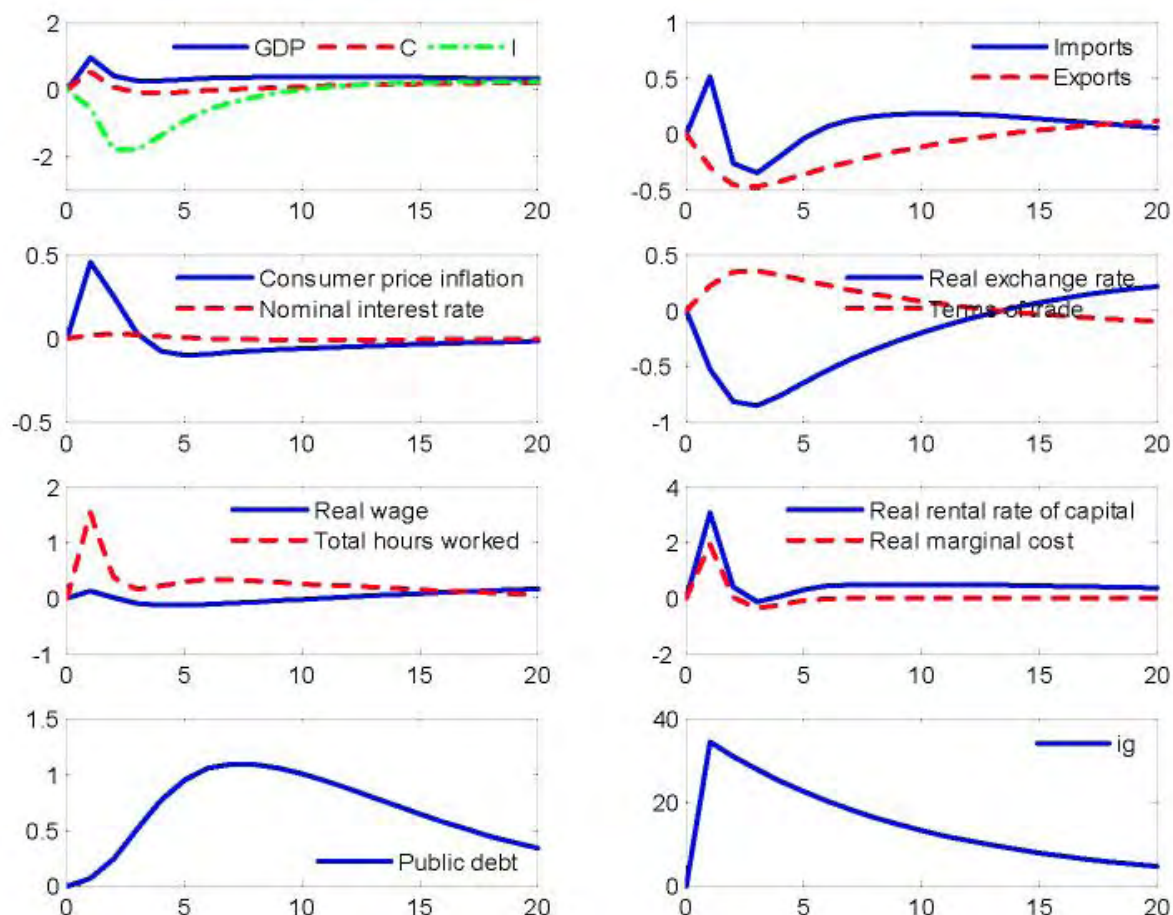
A very interesting way of analysing the effects of the positive shock in public consumption upon the external imbalances is given by Figure 6. In this figure we have represented the absolute deviations of the savings, investment and public consumption, all in relative terms with respect to GDP, from their steady-state levels (that is, $x_t - \bar{x}$). As we can observe, the public consumption rate increases above 0.8 percentage points, and the saving rate almost falls 0.6pp. In fact, private savings only compensate a 46.6 per cent of the increase of public consumption, on average over the first 20 quarters. Therefore, there is only partial Ricardian equivalence in our economy.

Figure 6: The response of saving, investment and public consumption rates after a temporary shock in public consumption. Absolute deviations from their steady-state values.



However, the fall in the investment rate compensates partially the fall of the saving rate and, therefore, the increase in the current account deficit is very small: on impact is equal to 0.2pp of GDP, smaller than 1/4 of the increase in the public consumption rate. In other words, although there is some evidence of twin deficits, only a small fraction of the government budget deficit translates into a current account deficit. Surprisingly, despite the large differences between SIGMA and REMS, our results are very similar to those obtained by Erceg, Guerrieri and Gust (2005), who find that a fiscal deficit has a relatively small effect on the U.S. trade balance, irrespective of whether the source is a spending increase or tax cut. In their benchmark calibration, where as in REMS non-ricardian consumers represent 50 per cent total households, they find that a rise in the fiscal deficit of one percentage point of GDP induces the current account to deteriorate by less than 0.2 percentage point of GDP.

Figure 7: Impulse-response functions after a temporary shock in public investment.



3.2 A temporary increase of public investment

As a second exercise of expansionary fiscal policy we analyse the effects of a temporary increase in public investment. As in the case of public consumption, the initial shock in public investment is equivalent to 1 per cent of GDP (slightly more than 20 per cent in terms of public investment) and similar in its magnitude to the Fund for Local Investment implemented by the Spanish government in 2009.⁹

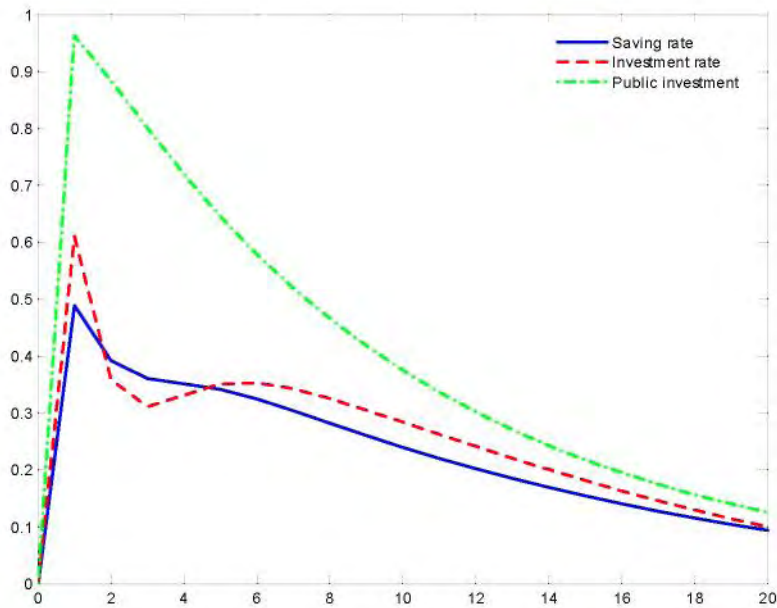
As it can be seen in Figure 7, the response of output is again clearly positive on impact, although the short-term multiplier is slightly smaller (0.97), and the response of private consumption is also positive (the consumption of optimizing households falls). Notice that the transitory nature of the shock and the accumulation of public capital may explain the slightly fiscal multiplier than in the case of the public consumption shock. As in the previous case, the positive shock in public investment induces a higher level of total hours worked and slightly greater real wages, and a fall in private investment. The rest of variables shows similar responses to those observed previously after a public consumption shock. The main difference is in the persistence of the shock, since public investment accumulates into public capital, which depreciates slightly.

⁹ As for public consumption, the law of movement of public investment is given by:

$$\overline{i_t^g} = 0.9\overline{i_{t-1}^g} + 0.1\overline{i_t^g} + \varepsilon_t^i$$

where $\overline{i^g}$ is the steady-state level of public consumption and ε^i is the shock.

Figure 8: The response of saving, investment and public investment rates (in percentage point of GDP) after a temporary shock in public investment. Absolute deviations from their steady-state values.



The effects of the positive shock in public investment upon the external imbalances are analyzed in Figure 8. In this case, the public investment rate increases above 0.9 percentage points, whereas the total investment rate only increases 0.6pp on impact, since private investment falls. The saving rate also increases in this case, because public savings are higher as a consequence of greater public revenues, and the economy exhibits a very small current account deficit (0,12 per cent of GDP) confirming again the previous results. Although the current account deficit is very persistent, its size in terms of GDP is small, given place to a weak relationship between the deficits in the government budget and in the current account.

3.3 A temporary reduction of labor income taxes

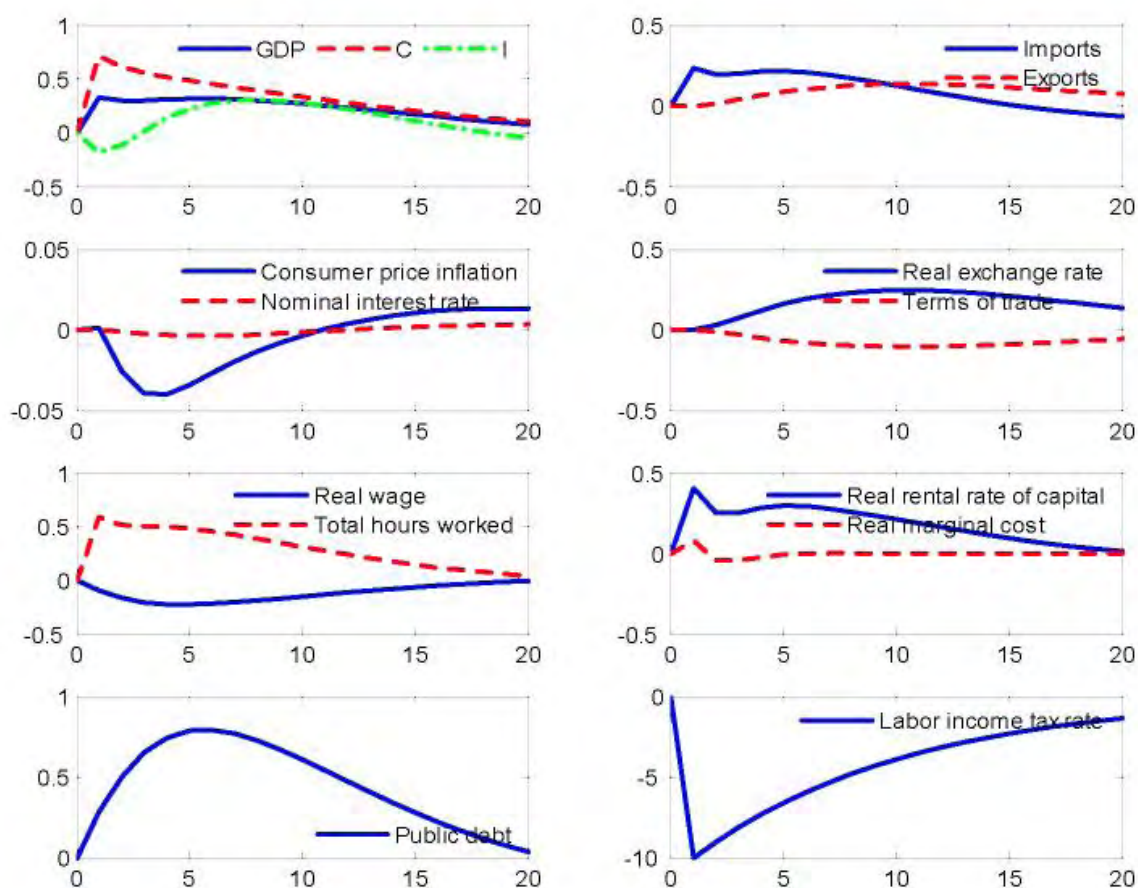
The next exercise we consider is a temporary reduction of 10 per cent in the labour income tax rate. The ex-ante effects of this reduction in the tax rate are equivalent to 0.5 per cent of GDP, very close in its magnitude to the tax rebate implemented by the Spanish government in 2008 and 2009.¹⁰ Figure 9 shows the impulse-response functions after the shock. Output increases on impact (the tax multiplier is equal to -0.61, smaller than for public consumption and investment), and remains above its steady-state level during many quarters.

¹⁰ The law of movement of the labor income tax rate is given by

$$\tau_t^l = 0.9\tau_{t-1}^l + 0.1\bar{\tau}^l + \varepsilon_t^\tau$$

where $\bar{\tau}^l$ is the steady-state level of the labor income tax rate and ε_t^τ is the shock.

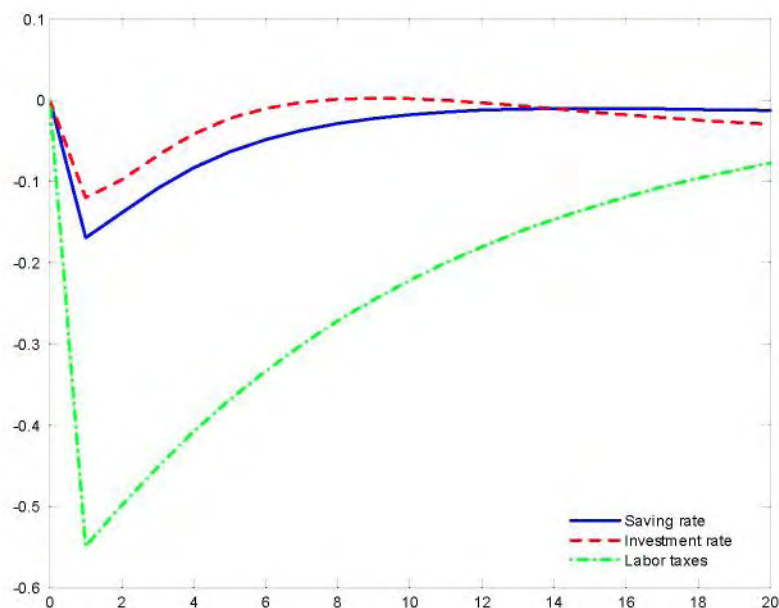
Figure 9: Impulse-response functions after a temporary reduction in the labor income tax rate.



The increase in private consumption is even higher than for GDP, and it is explained by the increase in the consumption of non-ricardian households, since optimizing households do not change their consumption levels. The crowding out effects upon private investment are now smaller, as well as the increase in the marginal cost and the rental rate of capital. The fall in the labor income tax rate induce a reduction in the real wage (before taxes) and, as expected, an increase in total hours worked, which take advantage of lower taxes. The fall in the labor income tax rate translates into a small depreciation of the real exchange rate and into a small fall of the terms of trade, which gives place to higher exports through the improvement in relative prices. However, imports increase more than exports, particularly on impact, first through higher private consumption and later through higher private investment from $t + 3$ onwards.

The effects of the temporary reduction in the labour income tax rate upon the external imbalances are analyzed in Figure 10. In this case, revenues from labor income taxes fall more than 0.5 percentage points of GDP, the investment rate only decreases 0.12pp on impact and the saving rate also falls 0.17pp. Given the small responses of the investment and saving rate, the economy exhibits a very small current account deficit (0,05 per cent of GDP), only slightly smaller than the decline in the case of the public consumption and investment shocks.

Figure 10: The response of saving and investment rates, and revenues from labor income taxes over GDP after a temporary reduction of the labor income tax rate. Absolute deviations from their steady-state values.



3.4 Sensitivity analysis

In order to check the robustness of our results, we have analyzed again the effects of a shock in public consumption (equivalent to 1 per cent of GDP) under different specifications of our model. The results of these exercises are shown in Table 3. For each exercise we show the fiscal multiplier, the investment rate, the saving rate and the current account balance in terms of GDP. All this variables refer to the same quarter in which the fiscal stimulus is implemented. To facilitate comparisons, the first row just shows the results of our baseline.

Table 3: Sensitivity Analysis

	Multiplier	I/GDP	S/GDP	CA/GDP
(1) Baseline	1.01	23.55	23.38	-0.17
(2) $\lambda^r = 0.8$	1.19	23.44	23.20	-0.23
(3) $\lambda^r = 0.0$	0.82	23.64	23.54	-0.09
(4) $\lambda^w = 0.9$	1.08	26.92	26.67	-0.25
(5) $ptm = 0.0$	0.96	23.33	23.16	-0.16
(6) $\sigma_s, \sigma_c, \sigma_i \times 2$	0.81	22.66	22.46	-0.20
(7) $s^x, \omega_s, \omega_i \times 0.5$	1.01	21.68	21.61	-0.08
(8) $h = 0.0$	0.94	23.64	23.49	-0.15
(9) $\rho^w = 0.9$	1.05	23.45	23.29	-0.16
(10) $\varphi_b = 0.06$	0.96	23.48	23.35	-0.13
(11) $\lambda^r = \lambda^w = 0.9, \Phi_b = 6 > 10^{-6}$	1.53	26.67	26.21	-0.46
(12) Spending reversal fiscal rule	1.06	23.77	23.56	-0.22
(13) Independent central bank	0.60	23.73	23.73	-0.01

Notes: The variables in the columns refer to the impact fiscal multiplier, the investment and saving ratios, and the current account surplus in terms of GDP, in the same period in which public consumption increases by 1% of GDP.

In the second row we show the results for $\lambda^r = 0.8$, that is, when we increase the share of rule-of-thumb consumers in the economy. As expected, the fiscal multiplier increases, almost a 20 per cent with respect baseline. Additionally, as the share of Ricardian consumers is smaller, the effect of the fiscal deficit upon the current account deficit is also greater, increasing to -0.23 per cent of GDP, almost a quarter of the initial fiscal stimulus. Conversely, when we

reduce the share of rule-of-thumb consumers, as in row (3), both the fiscal multiplier and the current account deficit are smaller, since Ricardian equivalence is greater. These results are similar to the ones also obtained by Erceg, Guerrieri and Gust (2005).

In the fourth row we increase the bargaining power of workers ($\lambda^w = 0.9$). A higher value of λ^w increases the sensitivity of wages to marginal labour productivity, since workers have the power to set wages up to the highest feasible level. In this case, both the fiscal multiplier and the effects upon the current account balance are higher than in the baseline.

In row (5) we set the pricing-to-market parameter to zero, that is, exports prices are exactly equal to domestic prices. Therefore, as the fiscal stimulus increases domestic prices, exports prices also increase by the same amount and relative prices remain constant. As expected, the loss in competitiveness induces a smaller fiscal multiplier and a slightly smaller current account deficit with respect to the baseline.

In the sixth row we multiply by 2 the elasticity of imports and exports to relative prices. In this case the fiscal multiplier is a 20 per cent smaller than in the baseline but the current account balance only increases slightly to -0.20. In row (7), instead of increasing the sensitivity of exports and imports to relative prices, we reduce the openness of the economy, dividing the scale factors in exports and imports equations (s^x, ω_c and ω_i) by 2. Although the fiscal multiplier is not affected by this change in the specification of the model, as expected the effects upon the current account balance are now smaller than in the baseline, approximately a half of its current account deficit, in line with the results of Corsetti and Muller (2006).

In rows (8) and (9), we show that the baseline results are also robust to changes in the habit parameter ($h = 0$) and in the coefficient of real wage inertia ($\rho^w = 0.9$). In both cases the fiscal multiplier and the effects upon the current account balance do not change very much. In row (10) we increase the sensitivity of the risk premium to the external debt. As expected, this change reduces both the fiscal multiplier and the current account balance.

Combining those changes with greater effects in the external position, in row (11) we have increased the share of rule-of-thumb consumer up to the (improbable) value of 90%, the bargaining power of workers ($\lambda^w = 0.9$) and we have reduced significantly the coefficient Φ_b which measures the sensitivity of the risk premium to external debt, that now converges to the steady state very slowly. Even in this unrealistic situation in which the fiscal multiplier increases a 50 per cent with respect the baseline, the current account deficit goes to 0.46 of GDP, less than half the initial fiscal stimulus.

In row (12) we have changed the specification of the fiscal rule. Contrary to the baseline, in which fiscal consolidation is achieved with lump-sum transfers, in this case public spending also reacts to the deviations of the debt to GDP ratio from its steady-state level:

$$g_t^c = 0.9g_{t-1}^c + 0.1\bar{g}^c - 0.002 \left[\frac{b_{t-1}}{gdp_t} - \overline{\left(\frac{b}{gdp} \right)} \right] - \varepsilon_t^g \quad (51)$$

The effects of this type of rule over the fiscal multiplier have also been analysed by Corsetti, Meier, and Müller (2009). According to these authors, the effects of fiscal stimulus depends not only on short-term tax and spending policies, but also on the expectations by agents about the offsetting measures in the future. They find that accounting for such fiscal rules that make explicit spending reversals brings new Keynesian models in line with the crowding-in of private consumption. As we can see in row (12), these results are confirmed although the effects are relatively small: both the fiscal multiplier and the current account

deficit increase with a fiscal rule for public expenditure which is sensitive to the deviations of the public debt to GDP ratio from its steady-state level.

Finally in row (13) we have evaluated the implications of being in a currency area with no independent monetary policy. In principle, for a relatively small country as Spain, both the fiscal multiplier and the effects of the fiscal stimulus upon the current account balance should be greater since monetary policy reacts only slightly increasing interest rates. Davig and Leeper (2009) have found that government spending generates positive consumption multipliers and a higher fiscal multiplier for GDP when monetary policy is passive, that is, in a regime in which the monetary authority does not increase real interest rates in response to expansive fiscal policies. In the limiting case in which the zero bound on nominal interest rates is binding, Christiano, Eichenbaum and Rebelo (2009) and Woodford (2010) have found a similar results. In row (13) we have change the specification of the model assuming that the exchange rate is flexible (therefore, the uncovered interest parity holds) and that the short-term interest rates are governed by a standard Taylor rule:

$$\ln \frac{1+r_t}{1+\bar{r}} = 0.75 \ln \frac{1+r_{t-1}}{1+\bar{r}} + 1.75(1-\rho^r) \ln(\pi_t - \bar{\pi})$$

As expected, the fiscal multiplier is now much smaller and the effects upon the current account balance are almost negligible.

In summary, this sensitivity analysis confirms the main results obtained in our baseline. The effects of fiscal policy upon the current account balance are relatively small. In order to obtain greater effects on the current account in line with the twin deficit hypothesis we have to impose values of some parameters as, for example, the share of rule-of-thumb consumers that seems to be very improbable.

4. Conclusions

In this paper we have explored the effects of different expansionary fiscal policies upon the trade deficit in Spain, a small open economy in a currency union and, therefore, with no independent central bank. Using a DGE model for the Spanish economy, we find that expansionary fiscal policies have only small negative effects on the current account, even assuming a large proportion of non-Ricardian consumers. Although Ricardian equivalence holds only partially, the crowding-out effects upon private investment implied by fiscal policies compensate the behaviour of national savings, thus avoiding large effects upon the trade deficit.

An additional interpretation of these results is that the current negative correlation between the large deficit in the government balance budget and the quick correction of the current account during 2009 cannot be explained by the twin divergence hypothesis in the Spanish economy, and it may be explained by a large output shock that more than compensates the effects of fiscal policy.¹¹ Additionally, the large increase in the households saving rate in 2009 seems to be motivated by precautionary saving and the desire of reducing their levels of debt, as response to the international financial turmoil and the huge increase of unemployment, rather than by the large fiscal stimulus, as proposed by the Ricardian equivalence hypothesis.

From a policy perspective, our results suggest that the emphasis on the future fiscal consolidation should be based more on the sustainability of government debt than on the negative effects on external imbalances.

¹¹ Notice that given a parameterization of our model, it may be possible to perform stochastic simulations to generate artificial data and compute the implied distributions of the correlation between the government budget deficit and the current account for different types of shocks.

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The interaction between fiscal policy and the current account: the role of the Ricardian equivalence*

by Christiane Nickel^a Isabel Vansteenkiste^b

Abstract

This paper shows that high government debt to GDP ratios influence private sector expectations and behaviour and thus also affect the current account and its explanators. First, we estimate a dynamic panel threshold model for 21 industrialised countries in which the relationship between the current account and the government balance is allowed to alter according to the government debt to GDP ratio. For countries with debt to GDP ratios up to 85% an increase in the fiscal deficit leads to a higher current account deficit. For very high debt countries this relationship however turns negative but insignificant, suggesting that a rise in the fiscal deficit does not result in a rise in the current account deficit. Implicitly this result suggests that households in very high debt countries tend to become Ricardian (i.e. they have offset the increase in the fiscal deficit by a fall in private consumption). Secondly, we analyse whether the relationship between the current account and other explanatory variables depends on the government debt to GDP ratio. Our calculations seem to indicate that as the debt ratio approaches or goes beyond the high debt threshold less consumption smoothing takes place.

Keywords: Fiscal policy, current account, panel threshold model.

JEL Classification: F32, E62, F41

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1 Introduction

The ongoing financial and economic crisis is pushing up government debt to GDP ratios to very high levels not only in the euro area but also in other parts of the world. In principle, high debt to GDP ratios are not a new phenomenon and they are quite common for countries that previously experienced a financial and economic crisis. This time, however, the rise in the debt to GDP ratios is happening on a global scale affecting many industrialised countries because the unfavourable economic environment is not restricted to one particular area or country. In addition, in many instances the starting positions at the beginning of the crisis were relatively weak complicating the adjustment to a new economic steady state now. This not only holds for debt ratios, which at least for some EU countries were already close to or beyond 100% of GDP at the onset of the crisis, but also structural fiscal positions. In addition, other macroeconomic imbalances, including external ones, were mushrooming before the crisis.

This raises the question of what does the rise in debt ratios mean for the economy as whole? Will it mean a mere level shift, i.e. that debt ratios are at a higher level but fundamental economic relationships remain the same? Or will these high debt ratios imply also a change in the expectations and thus the behaviour of economic agents?

To shed light on these questions, our paper takes an indirect approach. We don't look directly at government debt ratios and the behaviour of economic agents per se. Instead, we put our analysis in a wider context and also consider the intertwining of public finances and external imbalances.

On the one hand, we look at the relationship between fiscal policy and the current account and consider how this relationship changes with different government debt to GDP ratios. The analyses of Blanchard (1990), Sutherland (1997), Perotti (1999) and Berben and Brosens (2007) identify the government debt to GDP ratio as the key variable affecting private sector expectations. Whenever the debt ratio is either near a critical value or growing at a rapid pace, a fiscal consolidation programme does not lead to a rise in national saving: the private sector reacts to improved long-term prospects by dissaving more than the government saves. In this Ricardian case, a high public debt level should therefore be associated with a stable or even negative relationship between the fiscal deficit and the current account deficit. If the public debt ratio is however low and consumers react in a Keynesian manner (i.e. use the fiscal stimulus to consume more) the relationship between the fiscal deficit and the current account deficit should be positive.

On the other hand, we go a step further and also analyse whether the relationship between the current account balance and some other explanatory variables depends on the government debt to GDP ratio. It could be argued that if indeed the debt ratio has an influence on the private sector expectations than other economic relations should also be dependent on the level of government debt.

The contribution of this paper is threefold. First, this paper links insights from the literature on the expansionary effects of fiscal consolidations with the behaviour of the current account. The literature on the expansionary effects of fiscal consolidation shows that the government debt to GDP ratio can indeed explain observed differences in private consumer reactions to fiscal policy but did not draw conclusions on the implications that this would have on the behaviour of the current account. Therefore this paper looks directly at the effect of fiscal policy on the current account and does not concentrate solely on fiscal policy and private consumption. The second contribution lies in the determination of a concrete debt ratio that could be considered as either "high" or "low" or as a critical value. The existing literature so far does not answer the question what constitutes a high or a low debt ratio in certain circumstances (see Giammarioli et al., 2006). The use of a threshold model allows us to find concrete values. Finally and in addition to our earlier work (see Nickel and Vansteenkiste,

2008), we also analyse whether the relationship between the current account and some other explanatory variables (such as the real effective exchange rate or the investment to GDP ratio) depends on the government debt to GDP ratio.

This paper uses a panel threshold model to shed light on the impact of high debt to GDP ratios on the relationship between the fiscal balance and the current account of the balance of payments and to investigate the role of Ricardian equivalence for 21 industrial countries during the period 1981-2008. In this model, the relationship between the current account and its underlying explanatory variables (including the fiscal balance) is allowed to alter according to the government debt ratio. Our calculations find two thresholds for the government debt to GDP ratio: In low debt countries (up to a debt level of 43% of GDP) the relationship is positive, i.e. an increase in the fiscal deficit leads to a higher current account deficit. In medium debt countries with debt ratios between 43% and 85% of GDP the relationship is still positive but much less so. In high debt countries with debt ratios of above 85% of GDP the relationship is negative and insignificant, suggesting that a rise in the fiscal deficit does not result in a rise in the current account deficit. Implicitly this result suggests that private consumers have become Ricardian (i.e. they have offset the increase in the fiscal deficit by a fall in private consumption). The results are similar when estimating the same model for the 11 euro area countries included in the larger panel. Here, the following two thresholds for the government debt to GDP ratio are found: at 48% and 92%. In this case, the relationship the current account and the government balance is positive when the government debt to GDP ratio remains below 92%. Thereafter the relationship is negative and insignificant.

The paper is structured as follows: In section 2 we review the related literature. Based on the findings, we describe the used data and the estimation methodology in section 3. In section 4 we present the regression results. Section 5 concludes.

2 Literature review

Our paper builds on two strands of literature: the literature on the expansionary effects of fiscal consolidations and the literature on the determinants of the current account. Unfortunately, with few exceptions (e.g. Kim and Roubini, 2004) both strands do not meet very often.¹

The literature on the expansionary effects of fiscal consolidations goes back to 1974, the year when Robert Barro published its seminal article on Ricardian equivalence. The topic gained renewed interest in the mid-1980's when both Denmark (1983-86) and Ireland (1987-89) introduced drastic fiscal consolidation programmes yielding higher — not lower, as Keynesian theory would have suggested — economic growth. In the aftermath, a large body of literature developed to explain these “non-Keynesian” effects of fiscal consolidations.

One part of the literature on expansionary fiscal consolidations, to which this paper is strongly linked, investigates the relationship between national saving and fiscal policy. Based on Giavazzi and Pagano (1990, 1996) and Alesina and Perotti (1995, 1997), Giavazzi et al. (2000) conclude that the relationship between fiscal policy and national saving may be non-linear. Broadly speaking, these non-linearities arise from the influence of fiscal policy on private sector expectations. In a situation where private agents feel that the current fiscal situation is unsustainable and will sooner or later lead to economic disruptions, the implementation of a drastic fiscal consolidation programme signalling a regime shift can change the private sector's assessment of future economic developments. Building on earlier work by Blanchard (1990) and Sutherland (1997), Perotti (1999) shows that the debt to GDP ratio is a good predictor for a non-linear response of the private sector to a fiscal consolidation. Whenever the debt ratio is either high or growing at a rapid pace, a fiscal consolidation programme

¹ Funke and Nickel (2006) study the impact of fiscal variables on the trade account

does not lead to a rise in national saving: the private sector reacts to improved long-term prospects by dissaving more than the government saves. The importance of government debt as a key variable affecting private sector expectations was confirmed by other more recent studies (e.g. Berben and Brosens, 2007).

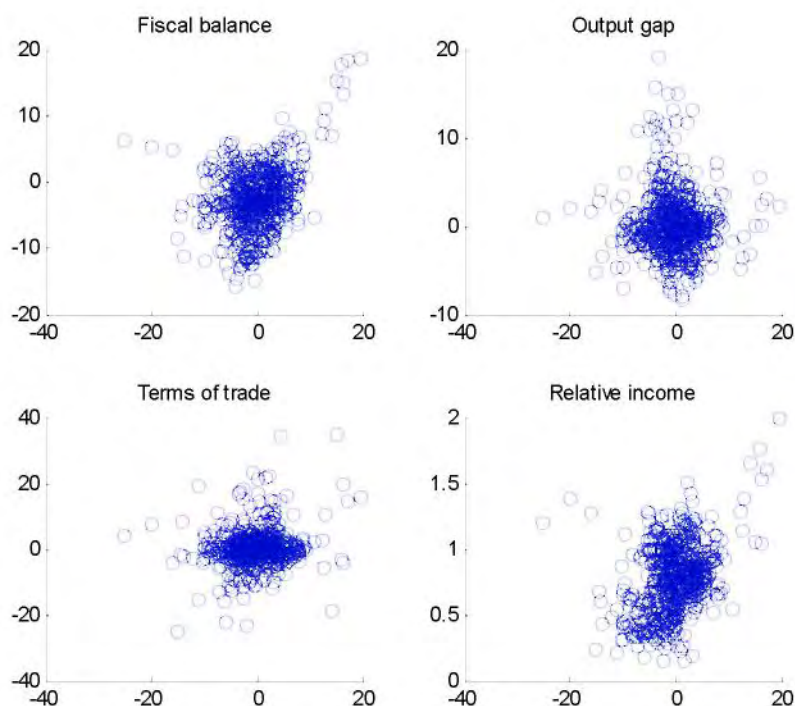
The modern literature on current account determination rests on the intertemporal approach as first proposed by Buiter (1981) and Sachs (1981) and extended by Obstfeld and Rogoff (1995). In these models, the current account of a country is treated mainly as a reflection of consumption and investment decisions (Gandolfo, 2001). The current account acts as a shock absorber to temporary changes in national cash flow or net output (i.e. output less investment and government spending) in order to smooth consumption and maximize welfare (Obstfeld and Rogoff, 1995). In response to a temporary adverse terms of trade or productivity shock, an open economy would prefer to run a current account deficit and borrow from abroad rather than allow consumption to fall. Glick and Rogoff (1995) but also Bussière et al (2005) find that productivity shocks, in particular country-specific ones, act as main drivers of the current account.

Longer-term variations in current account balances can also be explained by the intertemporal model. A small open economy, which is initially capital (and income) poor, provided it has access to international capital markets, will run current account deficits for a sustained period of time in order to build its capital stock while maintaining its long-run rate of consumption. This argument underlines that the stage of development may play a significant role in explaining current account developments and the works of Ghosh and Ostry (1995); Debelle and Faruquee (1996) and later Chinn and Prasad (2003) — to name just a few — showed this empirically.

Extending the basic intertemporal approach beyond the representative agent model to an overlapping generations framework, one could introduce life-cycle considerations into the analysis. With some heterogeneity across age groups, demographic trends through their life-cycle implications become a relevant source of long-run variation in the current account. According to the life-cycle model, consumption and saving behaviour are directly tied to the stage in the life cycle. Hence, systematic changes in the age structure of population will affect national saving behaviour. To the extent that capital-labour ratios are also affected, changes in demographics may affect investment as well. Using cross-country panel data sets, Chinn and Prasad (2003) and Luhrman (2003) show that demographic trends indeed are a significant factor in the determination of the current account. In a VAR model, Kim and Lee (2007) show that the increase in the dependency rate significantly lowers the savings rate and subsequently worsens current account balances.

Similarly, the life-cycle framework could also be used to examine the real effects of fiscal policy on the current account through its intergenerational consequences. As stated above, in the absence of Ricardian equivalence, tax policies will have implications (through net wealth effects) for national saving. In particular, changes in public saving and debt will not be fully offset by changes in private saving, leading to changes in the current account balance. Government spending or tax measures will have a further impact on the current account, even in the permanent income model, through its direct effect on absorption given income. Consequently, without Ricardian equivalence, fiscal policy has important long-run implications for net foreign assets and the current account, as for example shown in Debelle and Faruquee (1996) as well as Bussière et al. (2004).

Figure 1: The relationship between the current account and its explainers



3 Data and estimation methodology

The discussion above suggests a number of factors which might be important in determining the current account: fiscal policy, demographics, the stage of development, the real exchange rate, the terms of trade, productivity shocks, amongst others.

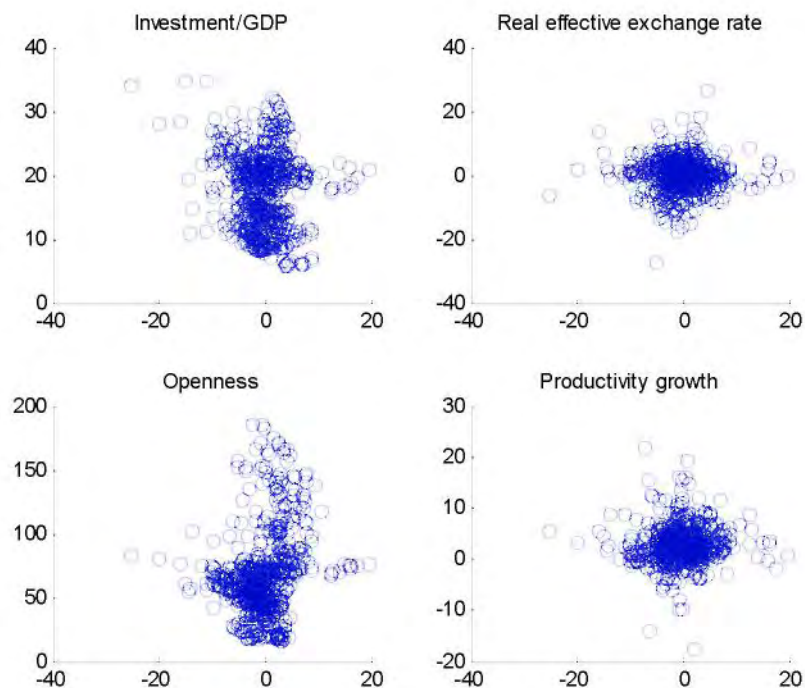
This section outlines the methodology adopted in estimating the determinants of the current account and discusses the data used.

3.1 Data

The sample we use to examine the determinants of the current account covers the period 1981-2008 for 21 industrial countries, namely: Australia, Austria, Belgium, Germany, Canada, Denmark, Spain, Finland, France, UK, Greece, Ireland, Italy, Iceland, Japan, the Netherlands, Norway, New Zealand, Portugal, Sweden and the United States. The data and sample selection is to some extent driven by the availability of required series. Most of the data is drawn from the IMF's annual World Economic Outlook September 2009 database. However, the real effective exchange rate is derived from the BIS while the dependency ratio series used originate from the UN World Development Indicators. For Germany the data refers to West Germany before 1990. In an extension to the estimations we also present the results only using the 11 euro area countries.

Scatter plots of the current account and the explanatory variables are shown in Chart 1-2 for the sample of industrial countries. The graphs are only suggestive of the relationship between the current account and its various explanatory variables that we will focus on in the next section, as they reflect only partial correlations.

Figure 2: The relationship between the current account and its explainers



The dependent variable in our regression analysis is the ratio of the current account of the balance of payments to GDP. Fiscal policy is captured by the general government budget surplus (including interest payments on government debt) as a ratio to GDP.

Stage-of-development effects were measured by the income per capita (in terms of purchasing power parity) calculated relative to the United States. Demographic effects were measured by the dependency ratio (i.e. the ratio of the non-working age population to the working age population). We also split the dependency ratio into its two components: the ratio of the old (over 65) to the working age population, and the ratio of the young (under 19) to the working age population.

The annual change in the terms of trade was used to capture the effects of export and import price movements on the current account.

To capture the stage of the business cycle, we include a measure of the output gap in the analysis. To derive the output gap, we make use of the HP filter technique in case the IMF output gap estimate is not available.

We further include the change in productivity in our regressions. Indeed, through its impact both on saving and investment, it has been shown that productivity can affect the current account (see for instance Valderrama, 1996 with a focus on the United States but also Bussière et al, 2005 and Rogoff and Glick, 1995). In general, we would expect an improvement in productivity to worsen the current account.

We also include the real effective exchange rate in our regressions. A priori, the impact of the real effective exchange rate on the current account is ambiguous. The real effective exchange rate generally tends to rise while the economic catching-up process is taking place. This is due to the Balassa-Samuelson effect as well as demand-side influences such as the use of capital inflow. By contrast, unforeseen, but permanent, appreciations affect the saving ratio in the opposite direction: as a result of the appreciation, the purchasing power of current and future income increases, as does that of monetary and property assets already

accumulated. This positive wealth effect has a negative influence on the propensity to save.² Finally, a temporary real appreciation should result in an improvement of the current account according to the consumption smoothing hypothesis (see Obstfeld and Rogoff, 1995). In this paper, we focus on the short-term effects and hence would expect a priori the real effective exchange rate appreciation to result in an improvement of the current account. As, however, productivity increases could be correlated with a real effective exchange rate appreciation we also ran regressions excluding each variable in turn to avoid potential multicollinearity problems.

3.2 Estimation methodology

As mentioned above, in this paper, we want to pin down the impact of high debt ratios on private sector expectations and behaviour. We approach this question indirectly and consider the intertwining of public finances with external imbalances. In doing so we also investigate the role of Ricardian equivalence. We do this by allowing the relationship between the government balance and the current account balance to alter according to the government debt level. At the same time, we wish to control in this analysis for other factors. In Nickel and Vansteenkiste (2008), a dynamic panel threshold model was set up whereby the control variables were assumed to be exogenous. However, it could be argued that all economic relations depend on the level of government debt.

For this reason, in this paper, we set up a threshold model whereby we allow for all variables to be endogenous. Such model was developed by Caner and Hansen (2004). It holds the restriction though that the threshold variable must be exogenous.

A model with endogenous regressors can be described as follows. Let $\{y_t, z_t, x_t\}_{t=1}^n$ be the information set, where y_t is unidimensional, z_t is an m -dimension vector (regressors), and x_t is a k -dimensional vector (instruments), with $k \geq m$. The threshold variable $q_t = q(x_t)$ can be an element or a function of the vector x_t . In a general way, the equation can then be written as follows

$$\ln y_{i,t} = \pi_i + \theta_1 \ln z_{i,t} + \varepsilon_{it} \quad q_{i,t} \leq \gamma \quad (1)$$

$$\ln y_{i,t} = \pi_i + \theta_2 \ln z_{i,t} + \varepsilon_{it} \quad q_{i,t} > \gamma \quad (2)$$

In this model, the observed data are from a balanced panel where the subscript i indexes the individual and the subscript t indexes time. The dependent variable, in our case the ratio of the current account balance to GDP, $y_{i,t}$ is scalar, the threshold variable (i.e. the government debt to GDP ratio) $q_{i,t}$ is scalar, and the regressor $z_{i,t}$ is a set of explanatory variables, which are threshold dependent. The observations can be divided into several regimes. In equations 1-2, for illustrative purposes, we have divided the observations into two regimes depending on whether the threshold variable $q_{i,t}$ is smaller or larger than the threshold γ . The regimes are distinguished by differing regression slopes, θ_1 and θ_2 . The error ε_{it} is assumed to be independent and identically distributed (iid) with mean zero and finite variance σ^2 .

The method proposed by Caner and Hansen (2004) is based on the estimation of a reduced form equation for the explanatory variables as a function of instrumental variables. The estimated values are plugged into the above mentioned equations and the threshold value is estimated by minimizing the sum of the squared residuals. The parameters of the structural

² See Davey (2001), Maki and Palumbo (2001) and Strauss (2000). However, if the real appreciation leads to an improvement in the terms of trade (the elasticity of the supply of imported and exported goods is high), an unexpected rise in the real exchange rate can have a positive effect on the current account. A positive valuation effect emerges alongside the negative wealth effect, resulting in a fall in the import value when trading volumes are unchanged. The overall effect is dependent on supply and demand elasticities as well as the time preference of economic agents. See Harberger (1950), Laursen and Metzler (1950), Svensson and Razin (1983), Backus, Kehoe and Kydland (1994) or Kent (1997).

equation are estimated in a third step, when the sample is divided according to the estimated threshold. The estimation is conducted using the two-stage least square method (2SLS).

The first stage (conditional expectations model of $z_{i,t}$) is given by

$$z_{i,t} = f(x_{i,t}, \beta) + u_{it} \quad (3)$$

$$E(u_{i,t} \mid x_{i,t}) = 0 \quad (4)$$

where β is a vector with parameters, $u_{i,t}$ is the error term and $f(\cdot, \cdot)$ is a function. In particular, this function can also be conditioned on the threshold value (which can be equal or different from the set of equations above):

$$f(x_{i,t}, \beta) = (\beta_1' x_{i,t}) [1 - I(q_{i,t} \leq \gamma)] + (\beta_2' x_{i,t}) [1 - I(q_{i,t} > \gamma)] \quad (5)$$

The parameters β in equation 3 can be obtained by OLS, for each γ , as

$$\hat{\beta}_1(\gamma) = \left(\sum_{t=1}^n x_{i,t} x_{i,t}' [I(q_{i,t} \leq \gamma)] \right)^{-1} \sum_{t=1}^n x_{i,t} z_{i,t}' [I(q_{i,t} \leq \gamma)] \quad (6)$$

$$\hat{\beta}_2(\gamma) = \left(\sum_{t=1}^n x_{i,t} x_{i,t}' [I(q_{i,t} > \gamma)] \right)^{-1} \sum_{t=1}^n x_{i,t} z_{i,t}' [I(q_{i,t} > \gamma)] \quad (7)$$

Using parameters $\hat{\beta}$, we can obtain the values of $\hat{z}_{i,t}$ that will replace $z_{i,t}$ in the equations 1-2. Doing it recursively for every γ , the threshold value in the equation can be chosen by the minimization of the sum of the squared residuals, using a grid search. For every γ , let Y , Z_L and Z_H denote the vector y_t and the matrices $z_{i,t} [I(q_{i,t} \leq \gamma)]$ and $z_{i,t} [I(q_{i,t} > \gamma)]$ respectively. Thus the threshold estimator is obtained from:

$$\hat{\gamma} = \arg \min S_n(\gamma) \quad (8)$$

where $S_n(\gamma)$ is the sum of the squared residuals in the regression of Y on Z_L and Z_H . The set of threshold values in 8 should be such that each regime has sufficient observations to generate reliable parameter estimations. According to Franses and van Dijk (1999), a safe choice is at least 15% of the sample.

Given the estimated threshold value $\hat{\gamma}$, the sample is divided into subsamples and the parameters of equation 8 can be estimated by two stage least squares as:

$$\hat{\theta}_1 = \left[\hat{Z}_L' \hat{X}_L (\hat{X}_L' \hat{X}_L)^{-1} \hat{X}_L' \hat{Z}_L \right]^{-1} \left[\hat{Z}_L' \hat{X}_L (\hat{X}_L' \hat{X}_L)^{-1} \hat{X}_L' Y \right]$$

$$\hat{\theta}_2 = \left[\hat{Z}_H' \hat{X}_H (\hat{X}_H' \hat{X}_H)^{-1} \hat{X}_H' \hat{Z}_H \right]^{-1} \left[\hat{Z}_H' \hat{X}_H (\hat{X}_H' \hat{X}_H)^{-1} \hat{X}_H' Y \right]$$

where \hat{Z}_L , \hat{Z}_H , \hat{X}_L and \hat{X}_H stand for the matrices with observations $z_{i,t} [I(q_{i,t} \leq \gamma)]$, $z_{i,t} [I(q_{i,t} > \gamma)]$, $x_{i,t} [I(q_{i,t} \leq \gamma)]$ and $x_{i,t} [I(q_{i,t} > \gamma)]$ respectively. Caner and Hansen (2004) show that those estimators are consistent, although not necessarily efficient.

In the context of our set-up, the instruments chosen for the estimation are lags of the explanatory variables.

Another element to consider in our estimations is whether the regression should be estimated with the variables in levels or first differences. This depends on the assumption about the

stationarity of the current account to GDP ratio and the explanatory variables. Conceptually, this implies that whether the current account (as a share of GDP) is stationary (mean-reverting) depends on the long-run impact of shocks on the equilibrium net foreign asset position. If changes to the underlying determinants of saving and investment have only level effects on the stock of NFA, but not on the ratio of NFA to GDP, the effects of shocks on the current account to GDP ratio will tend to die out over time. If, however, certain shocks alter the entire path for NFA, the ratio of NFA and the current account to GDP would be permanently affected (absence of mean reversion).

Dickey Fuller tests country-by-country are generally unable to reject the null of difference stationarity for the current account to GDP ratio. For this reason, we estimate dynamic specifications that allow for the current account to be stationary.

4 Regression results

In this section, we present the regression results derived from estimating the above-described equations 1-2 as a dynamic panel model. The model includes as a threshold variable the government debt to GDP ratio. The explanatory variables include the fiscal deficit as a ratio of GDP, the change in the terms of trade, income relative to the United States, the output gap, the investment to GDP ratio, openness, the changes in the real effective exchange rate, the change in productivity and the dependency ratio.³

Before proceeding to the results from the model estimation, we need first to determine the number of thresholds. In our estimation, we allow for (sequentially) zero, one, two and three thresholds. The likelihood ratio test used to determine the number of thresholds suffers however from the traditional Davies problem (see Davies, 1977, 1987).⁴ The issue has been inter alia investigated by Andrews and Ploberger (1994) and Hansen (1996). Our equations 1-2 fall in the class of models considered by Hansen (1996) who suggested a bootstrap to simulate the asymptotic distribution of the likelihood ratio test.

The resultant likelihood ratio test statistics F1, F2 and F3, along with their bootstrap p-values⁵, are shown in Table 1. We find that the tests for a single and a double threshold are strongly significant. On the basis of these results, we conclude that there is strong evidence that there are two thresholds in the regression relationship. For the remainder of the analysis we work for this reason with this double threshold model.

Table 1: Tests for threshold effects

Test for single threshold	
P-value	0.0001
Test for double threshold	
P-value	0.004
Test for triple threshold	
P-value	0.065

Table 2: Threshold estimates

	Estimate	95% confidence interval
γ_1	43.1	[40.2,46.0]
γ_1	84.8	[79.8,89.98]

In the next step, we then proceed with determining the point estimates of the two thresholds for the government debt to GDP ratio and their asymptotic 95% confidence intervals. The

³ It is possible that some of the variables are correlated and hence that the regression will exhibit a multicollinearity problem. To overcome this we also ran the regression excluding some of the explanatory variables.

⁴ The Davies problem implies that testing is nonstandard since the threshold parameter is not identified under the null hypothesis. The inference problem when a nuisance parameter is not identified under the null hypothesis was first studied by Davies.

⁵ 300 bootstrap replications were used for each of the three bootstrap tests as in Hansen (1999).

results are reported in Table 2. The threshold estimates are 43% and 85%. The asymptotic confidence intervals for the threshold are tight, indicating little uncertainty about the nature of this division.

Table 3 reports the percentage of countries which fall into the three regimes. We see that on average over all the years, the percentage of countries that fall in the very low debt category is about 27%. The largest share of countries fall within the >43%,<85% category whereas on average around 17% of countries have a high debt ratio (of above 85%). Considering the evolution over time, we can see that the share of medium debt and high debt countries has risen over time, whereas those of the low debt countries has fallen.

In the regression slope estimates, the coefficients of our primary interest are those on the fiscal balance to GDP ratio.⁶ These results are presented in Table 4. As can be seen, the coefficient estimates and their accompanying standard errors vary importantly across regimes. Indeed, in the low debt regime, the impact of the fiscal balance is high and significant, suggesting that an increased fiscal deficit results in a rise in the current account deficit. This is still true for countries with a medium debt to GDP ratio however here the impact is less strong (indeed the estimated coefficient is only a quarter of that in the low debt regime). Moreover, in general, the impact of the fiscal position on the current account is less than one-for-one.

Table 3: Number of countries in each regime each year

	low debt	medium debt	high debt
	<=43	>43,<=85	>85
1981	10	10	1
1982	10	10	1
1983	8	11	2
1984	8	11	2
1985	7	12	2
1986	5	14	2
1987	6	12	3
1988	8	10	3
1989	8	10	3
1990	9	9	3
1991	7	11	3
1992	5	12	4
1993	2	14	5
1994	1	15	5
1995	1	15	5
1996	2	14	5
1997	3	13	5
1998	3	13	5
1999	3	13	5
2000	5	12	4
2001	5	12	4
2002	6	11	4
2003	5	12	4
2004	5	12	4
2005	7	10	4
2006	7	10	3
2007	8	10	3
2008	6	11	4
Average	5.7	11.8	3.5
Average (in %)	27.3	56.0	16.7

Note: Debt is defined as general government debt as a % of GDP

⁶ The exercise was also run with the ratio of the fiscal primary balance to GDP. This left the conclusions broadly unchanged. The regression results can be obtained from the authors upon request.

Table 4: Fiscal Balance/GDP Coefficient Estimates Full Sample Model

Coefficient	Standard error	T-statistic	Threshold (Debt/GDP)
0.54**	0.13	4.07	<43%
0.11*	0.03	3.19	43%-85%
-0.35	0.69	-0.51	>85%

Coefficients in this table show the estimates of γ as derived from 1-2. A ** indicates a significance at the 5% level, a * shows significance at the 10% level.

Finally, in the high debt regime, where the debt to GDP ratio exceeds 85%, the coefficient turns negative and insignificant, suggesting that a rise in the fiscal deficit does not result in a rise in the current account deficit. Implicitly this result suggests that private consumers have become Ricardian (i.e. they have offset the increase in fiscal deficit by a fall in private consumption expenditure, hence keeping the national savings unchanged). The results are consistent with a growing body of research on the composition and effects of fiscal consolidation, as described in the literature survey.

Beyond the fiscal balance, which is regime dependent, we also include a number of control variables in our panel model which are also regime dependent. The regression results for those can be seen in Tables 5. All variables enter the model with one lag. In addition we included the lagged current account to GDP ratio.

The coefficient estimates for the latter variable turns out to be high and strongly significant under all government debt regimes, showing the importance of the partial adjustment effect. Further, the regression results indicate that in the low to medium debt regime increases in the terms of trade have a positive effect on the current account. This is in line with the Harberger-Laursen-Metzler (HLM) effect which predicts a positive relationship between temporary exogenous changes in the terms of trade and national savings, through consumption-smoothing behaviour. For example, a deterioration in the terms of trade results in a decrease in a country's current real income that is larger than the fall in its permanent income. Given that the marginal propensity to consume is less than unity, national consumption is also predicted to fall.⁷ However, in the high debt regime the coefficient turns negative and insignificant. This may suggest that opposing forces are at work. Indeed, in this context, several studies have indicated the importance of permanent changes in the terms of trade on the optimal capital stock and hence through this channel the impact of investment (capital accumulation) on the current account balance. This effect works in the opposite direction to the consumption-smoothing effect (see for instance Murphy, 1992, Servén, 1999 and Kent and Cashin, 2003). In particular in high debt countries, for instance Pozzi et al. (2003) have documented that consumption smoothing is less prevalent. Theoretically, the authors have suggested a number of channels through which government debt levels can affect consumption smoothing. In more detail, high or rising government debt ratios imply an increase in households' future liabilities. Banks or other lenders may then reduce the amounts they lend, thereby raising the incidence of liquidity constraints and excess sensitivity of private consumption. Alternatively, highly indebted governments may rig the financial system so as to generate an artificially large demand for government bonds. This also will make it less interesting or more difficult for banks to extend credit to individuals.

The coefficient on the output gap has a negative sign, reflecting the dominance of the accelerator effect of the output gap on investment over the positive effect of the output gap on savings suggested by the permanent income model. The coefficient is however larger in high debt regimes. This may confirm again that consumption smoothing is less prevalent in high debt regimes.

⁷ This can for instance easily be demonstrated in a single-good New Keynesian model.

The results also show that the dependency ratio has the expected negative sign, in all regimes. This suggests that demographics matter for a country's current account balance. When we inserted the ratio of the old population (over 65) to the working age population and the ratio of the young (under 20) to the working age population separately we found broadly similar results hence we only report here the results for the overall dependency ratio.

Table 5: Regression Estimates - Full sample Sample

debt/GDP ratio:	<43%	<85%, >43%	>85%
Current account/GDP(-1)	0.81**	0.80**	0.63**
Change in terms of trade(-1)	0.54**	0.10*	-0.26
Relative income(-1)	0.15	0.12	0.18*
Output gap(-1)	-0.21**	-0.23**	-0.58*
Investment/GDP ratio(-1)	-0.30**	-0.25	-0.05
Openness(-1)	0.03**	0.05**	0.02**
Change in real exchange rate(-1)	-0.05*	-0.15*	-0.33**
Productivity change(-1)	-0.15	-0.33	-0.88**
Dependency ratio(-1)	-17.35**	-14.56**	-16.79**

Coefficients in this table show the estimates of θ and δ as derived from 1-2. A** indicates a significance at the 5% level, a * shows significance at the 10% level.

The relative income variable enters the equation with a positive sign and is even marginally significant in the high debt regime. The positive coefficient on relative income indicates that a per capita income below the average, will be associated with a current account deficit. The rationale is that poorer countries are assumed to grow faster than the average and are thus borrowing against future income. However the coefficient enters the regression in two of the three cases not significantly, most likely as in fact most countries in our sample are rather close in terms of stage of development (i.e. our sample does not contain developing countries).

Both the productivity variable and the investment to GDP ratio enter all regressions with a negative sign. However, the productivity variable is only significant in the high debt regime whereas the investment to GDP ratio is only significant in the medium and low debt regimes. However, when dropping either variable from the regression, the other variable enters significantly. This would indicate the presence of multicollinearity, whereby both variables are proxying the same channel. Overall, the finding of a negative relationship between productivity and the current account is in line with Bussière et al. (2005) and Glick and Rogoff (1995) who find that their country specific productivity measure enters the current account panel equation they estimate systematically significant at the 1% level.

As mentioned in section 2, the impact of the real effective exchange rate on the current account is ex ante not clear. In our regression, the coefficient turns out to be negative and also statistically significant in all regimes, suggesting that an exchange rate appreciation tends to result in a current account deficit.

Finally, openness appears to have a significant impact on the current account across the countries we investigated. Indeed, as the import+export to GDP ratio increases, the current account balance tends to increase. This impact of this variable on the current account seems to be unaffected by the government debt to GDP ratio.

When we repeat the above mentioned analysis, only including the 11 euro area countries from the sample into the regression, we find broadly similar results. For the euro area panel, we also find evidence that there are two thresholds in the regression relationship, in this case at 48% and 92% (see Table 6 for estimation results). As is the case for the more extended model we find in the low debt regime that the impact of the fiscal balance is high and significant,

suggesting that an increased fiscal deficit results in a rise in the current account deficit. This is still the case for medium debt levels although the impact of the fiscal deficit on the current account diminishes. However, when the debt to GDP ratio exceeds 92% the coefficient becomes negative and insignificant, suggesting that a rise in the fiscal deficit does not result in a rise in the current account deficit.

Table 6: Fiscal Balance/GDP Coefficient Estimates for the euro area sample Model

Coefficient	Standard error	T-statistic	Threshold (Debt/GDP ratio)
0.42**	0.18	3.17	<48%
0.25*	0.09	1.78	48%-92%
-0.25	0.47	-0.19	>92%

A ** indicates a significance at the 5% level, a * shows significance at the 10% level.

As regards the other estimated coefficients, the results broadly concord with those shown for the extended sample (see Table 7).

Table 7: Regression Estimates - euro area sample Sample

debt/GDP ratio:	<48%	<92%, >48%	>92%
Current account/GDP(-1)	0.82**	0.70**	0.75**
Change in terms of trade(-1)	0.25**	0.18**	-0.01
Relative income(-1)	0.21	0.17	0.19
Output gap(-1)	-0.15**	-0.20**	-0.30**
Investment/GDP ratio(-1)	-0.62**	-0.35**	-0.45*
Openness(-1)	0.04*	0.03*	0.09**
Change in real exchange rate(-1)	-0.12*	-0.15*	-0.35**
Productivity change(-1)	-0.19	-0.11	-0.16
Dependency ratio(-1)	-23.09**	-19.19**	-12.45**

Coefficients in this table show the estimates of θ and δ as derived from 1-2. A** indicates a significance at the 5% level, a * shows significance at the 10% level.

5 Conclusion

This paper asked the question whether high government debt to GDP ratios have an impact on the expectations and thus the behaviour of the private sector. To this end, we took an indirect approach and looked at the impact of the debt to GDP ratio on the relationship between the current account and its explanatory variables (including the fiscal balance).

In a first step, we looked at the relationship between fiscal policy and the current account and consider how this relationship changes with different government debt to GDP ratios. Indeed our regression results suggest that in low debt and medium debt countries (up to a debt level of 43% of GDP) the relationship is positive, i.e. an increase in the fiscal deficit leads to a higher current account deficit. In medium-to-high debt countries with debt ratios between 43% and 85% of GDP the relationship is still positive but much less so. In the very high debt countries with debt ratios of above 85% of GDP the relationship is negative, suggesting that a rise in the fiscal deficit does not result in a rise in the current account deficit. Implicitly this result suggests that private consumers have become Ricardian (i.e. they have offset the increase in the fiscal deficit by a fall in private consumption). Given that this extreme case of debt ratios above 85% of GDP is relatively rare (on average only 17% of the countries fall in this category for every single year), one can draw the conclusion that a more Keynesian reaction of the consumer and therefore a positive relationship between the fiscal and the current account deficit is more likely in most of the time. Repeating the estimation only for the 11

largest euro area countries, we find broadly similar results, although in this case the relationship between fiscal deficits and the current account becomes insignificant when the government debt to GDP ratio exceeds 92%.

In a second step, we also analyse whether the relationship between the current account balance and some other explanatory variables depends on the government debt to GDP ratio. It could be argued that if indeed the debt ratio has an influence on the private sector expectations than other economic relations should also be dependent on the level of government debt. Our calculations seem to indicate that as the debt ratio approaches or goes beyond the high debt threshold less consumption smoothing takes place. The rationale for this finding is that high or rising government debt ratios imply an increase in households' future liabilities. Banks or other lenders may then reduce the amounts they lend, thereby raising the incidence of liquidity constraints and excess sensitivity of private consumption. Alternatively, highly indebted governments may rig the financial system so as to generate an artificially large demand for government bonds. This also will make it less interesting or more difficult for banks to extend credit to individuals. Looking forward, the results of our paper could indeed be interpreted as an indication that the current rise in debt ratios might trigger a change in the expectations and the behaviour of economic agents.

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Variable fiscal policy and current account volatility in a small open Economy

by Alessandro Maravalle^a and Peter Claeys^b

Abstract

The speed of the recent economic downturn has exposed growing underlying imbalances in both external and fiscal balances. We argue that procyclical fiscal policies have contributed to the build-up of these imbalances. We use a simple RBC model of a small open economy to analyse the effect of fiscal policy on the volatility of consumption, investment and the current account balance. We calibrate the model on data for Spain, and simulate the effect of different spending policies in response to supply shocks. Procyclical fiscal policy is harmful for economic stability. Temporary spending boosts in booms distort intertemporal allocation decisions, and generate very volatile cycles in investment and the current account. Countercyclical spending instead dampens the investment boom - also reducing the need for external finance - and so smoothens the cycle. Our model is able to replicate the relation between the degree of cyclicity of fiscal policy, and the volatility of consumption, investment and the current account in OECD countries.

Keywords: RBC, current account, fiscal rule, spending, automatic stabiliser.
JEL classification: E32, E62, F41, H62.

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1 Introduction

The very rapid deterioration of economic conditions during the recent economic crisis has come to many as a surprise. Large current account imbalances that persisted over the last decade quickly unwound. At the same time, the fall in fiscal positions has been dramatic, questioning even sustainability of public debt in some OECD countries. A large part of this adjustment is likely an equilibrium phenomenon in the wake of the crisis. The speed of the downturn suggests that the economic crisis has exposed growing underlying imbalances in the economy both in external and fiscal balances. In this paper, we argue that these imbalances have been exacerbated by procyclical fiscal policies followed in several EU countries over recent years. In some, despite an economic boom, public spending has often continued to grow as it was fuelled by buoyant tax receipts. In others, tax policies have been relaxed for a variety of reasons. Most of these tax cuts had little effect on total revenues and the deficit, thanks to the economic boom. Such policies have allowed these economies to maintain the pace of economic growth. But the excessively strong boost to internal and external demand has generated persistent imbalances. The downfall in the crisis is much harder as a consequence. The reverse mechanism – due to efforts to keep deficits in check – causes a strong fall in output. A shrinking tax base makes tax revenues dwindle, and forces cuts in spending at the time the economy perhaps needs some support.

We develop a simple RBC model of a small open economy to analyse the effect of these procyclical fiscal policies on output and the current account (Mendoza, 1991). The government decides on some level of spending, and finances this with a lump sum tax. It then let spending vary with the economic cycle: we model this with a simple reaction function in which total spending responds to deviations of output from steady state. We calibrate the model on data for a small open economy, like Spain. We show that, in an economic boom, procyclical policy inflates investment and – through the increased need for financing – also deepens current account deficits. Countercyclical policy instead stabilises the economy, as it guarantees a steady stream of revenues of investment in capital. The cyclical variation in spending need not be large to produce this effect. Due to this distortion, procyclical policies moreover result in lower steady state levels of output.

Our model is able to replicate the relation between the degree of cyclicity of fiscal policy, and the volatility of consumption, investment and the current account observed in OECD countries. The more persistent are supply shocks, the stronger are the consequences of the distortions in fiscal policy on economic volatility. The economic transmission mechanism is also stronger – and the cost of procyclical fiscal policy is higher – when labour markets are more flexible, capital adjustment costs are low, or the economy is more integrated in international financial markets.

The paper is organised as follows. In section two, we show that procyclical spending policies are still common in EU countries. We show that procyclical policies are associated with more volatile consumption and investment, but not with large changes in the current account. In section three, we set up a small RBC model of a small open economy, and introduce a fiscal policy rule to mimic the spending decisions of the government over the cycle. We calibrate this model, and discuss the effect of different policies on economic volatility in section four. We also examine the long-term distortionary effects of procyclical fiscal policy. We calculate the effect of some alternative fiscal strategies to implement countercyclical policy in section five. Finally, we summarise our findings, discuss the limitations of the model, and give some suggestions for fiscal reform in section six.

2. Procyclical policies in EU economies

As part of the efforts to coordinate macroeconomic policies in the euro area, after the start of EMU in 1999, the European Commission was to issue regular Broad Economic Policy Guidelines to align country specific policies with EMU wide objectives. In 2001, the European Commission issued an unusual recommendation to Ireland. The Broad Economic Policy Guidelines report warned that the tax cuts implemented by the government were a hazard for the economy. The Irish economy was growing at about 5% a year at that moment. One of the poorest EU Member States had managed to convert itself into the *Celtic Tiger* – thanks in part to generous European funding – with growth figures only seen in East Asia, and was about to overtake most other EU countries in terms of GDP per capita. Fiscal problems typical to the Irish economy in the eighties had waned. Initially, the reaction in Ireland was quite nuanced, as only the government and some newspapers criticised the report as excessive and alarmist, or even as an unjust punishment (Meyer, 2004). Opposition parties and other newspapers were concerned about the negative fall out of this warning for the position of Ireland. Eventually, most criticism turned negative. The warning came under heavy fire as Ireland was certainly not trespassing the rules of the Stability and Growth Pact. Unlike other euro area countries, the budget showed a surplus and debt was falling rapidly. The recommendation was considered as an infringement in the sovereign decision of a Member State to set taxes.

The EC recommendation did not doubt the application of the rules of the Stability and Growth Pact. The tax cuts envisaged by the Irish government would not put the budget at risk in the short term: tax revenues would probably stay stable, thanks to the further boost to economic growth. But the European Commission considered tax policies as inconsistent with the Broad Economic Policy Guidelines in the long term. The tax cuts risked inflating the economic boom further, and exposed the Irish budget to important shortfalls in an economic crisis. The bottom-line of the EC argument in 2001 was that procyclical policy risked overheating the economy. Ireland may be an extreme case of course, and with the benefit of hindsight it is easy to point to the dramatic depression into which the Irish economy fell in 2008, with a record deficit of 12% and a foreseen rise in debt to 75% in 2010. Unfortunately, Ireland is not alone among EU countries to implement procyclical policies. Many other governments have responded to economic booms with spending hikes or tax cuts, and with contractionary policies in bad times.

Given the structure of spending and taxes, one would expect that as output rises above its long-term level, unemployment benefits and transfer payments are reduced or tax receipts rise. We can measure the strength of the automatic stabilisers by the cyclical elasticity of the budget. Typically, this elasticity is around 0.50 for the surplus OECD countries. On the spending side, automatic stabilisers include mainly unemployment schemes that support income for some time, and act as an insurance scheme, thus preserving income stability and providing consumption smoothing for credit-constrained consumers. The size of these elasticities is not very large, and typically varies between -0.23 and -0.02. Table 1 reports the elasticity of spending and the primary surplus for a sample of OECD countries (Girouard and André, 2005). In addition to these automatic stabilisers, the budget responds to economic conditions because of systematic discretionary interventions of the government to steer the economy. The government may wish to lean against an economic crisis by cutting taxes or raising expenses. However, in practice, governments overturn the working of automatic stabilisers, and give an additional boost to the economic cycle. Taxes are insufficiently raised in booms to finance higher spending, as there seemingly are no problems for the budget balance. Taxation is increased – or spending cut – in the next crisis only as mounting imbalances urge a fiscal adjustment. Lane (2003) estimates for a sample of OECD countries the response of government spending (or the primary surplus) to economic growth. Table 1 reports the ‘realised’ budget elasticities of estimating this fiscal rule. Government

consumption, the most important component of total spending, is procyclical in many countries, while we would expect a slightly negative effect thanks to the change in employment benefits. The effect of procyclical spending on the budget deficit is offset by tax revenues. Hence, the primary surplus falls short of the expected elasticity of the automatic stabilisers – about 0.50 – in all but a few countries.

Table 1: Cyclicity coefficients: broad categories.

Country	spending elasticity OECD	primary surplus OECD	government consumption Lane, 2003	country	spending elasticity OECD	primary surplus OECD	government consumption Lane, 2003
Australia	-0.16	0.30	0.10	Italy	-0.04	0.09	-0.14
Austria	-0.08	0.18	0.14	Japan	-0.05	0.10	0.08
Belgium	-0.14	0.14	-0.18	Netherlands	-0.23	0.23	0.40
Canada	-0.12	0.59	-0.34	Norway	-0.12	0.73	0.60
Denmark	-0.21	0.04	0.37	New Zealand	-0.15	0.31	-0.12
Finland	-0.18	0.44	-0.03	Portugal	-0.18	0.16	0.61
France	-0.11	0.33	-0.16	Spain	-0.11	0.14	0.68
Germany	-0.18	0.40	-0.08	Sweden	-0.15	0.85	0.13
Greece	-0.04	-0.07	0.45	Switzerland	-0.19	-	0.35
Iceland	-0.02	0.17	0.91	UK	-0.05	0.37	-0.54
Ireland	-0.11	-0.03	0.57	US	-0.09	0.37	0.03

Notes: data from Lane (2003), and Girouard and André (2005).

We would expect that procyclical policies stabilise the deficit over the cycle, at the cost of economic stability. However, larger deficits in a crisis are not offset by large surpluses in economic booms. There is ample evidence of a fiscal relaxation in good times that is not offset by a tightening in downturn.¹ Governments loosen the fiscal stance by the size of the additional tax revenues in good times, but let the balance deteriorate as soon as economic conditions start to worsen again (Manasse, 2006, Giuliadori and Beetsma, 2008). Hence, procyclical policy is largely a boom phenomenon. The consequence of this asymmetric response over the cycle is a debt bias.² Further evidence for OECD and EU countries shows that procyclical fiscal policies are mostly driven by government expenditure. Spending goes up during booms, but it does not come down in recessions again (Hercowitz and Strawczynski, 2004; Turrini, 2008).

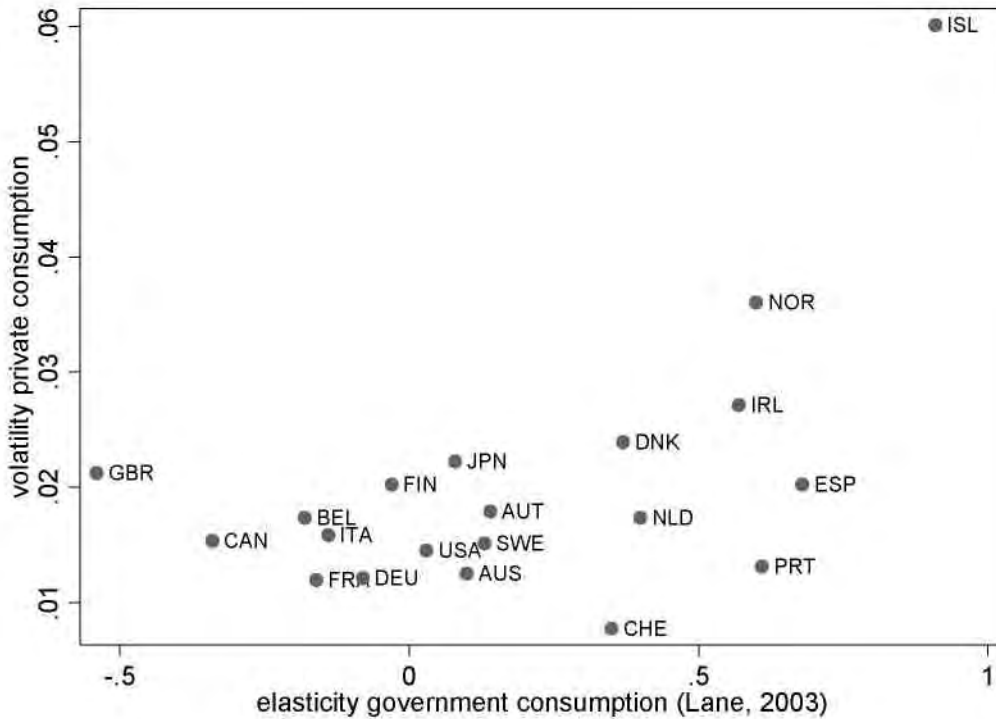
Procyclical policies come at the cost of economic stability. According to the ‘tax smoothing’ hypothesis, tax rates should be held constant over the business cycle and the budget deficit should move in a countercyclical fashion, for a given path of government spending. Procyclical policies exacerbate economic instability as the distortionary effect of taxation becomes larger, and consequently stifle growth. Keynesian models would also suggest adjusting taxes and spending in a countercyclical fashion to stabilise income. We can see this negative effect of procyclical policy on economic stability in Figure 1. We plot the coefficients of Table 1 of the Lane-regressions against the volatility of private consumption and private investment. More procyclical budgets are associated with higher volatility in private consumption and investment. We do not find a similar relationship between the spending elasticity and the volatility of the current account. We observe that Ireland can be

¹ See the studies by Buti and Sapir (1998), Buti *et al.* (1998), EC (2001), Von Hagen *et al.* (2002), and Balassone *et al.* (2008).

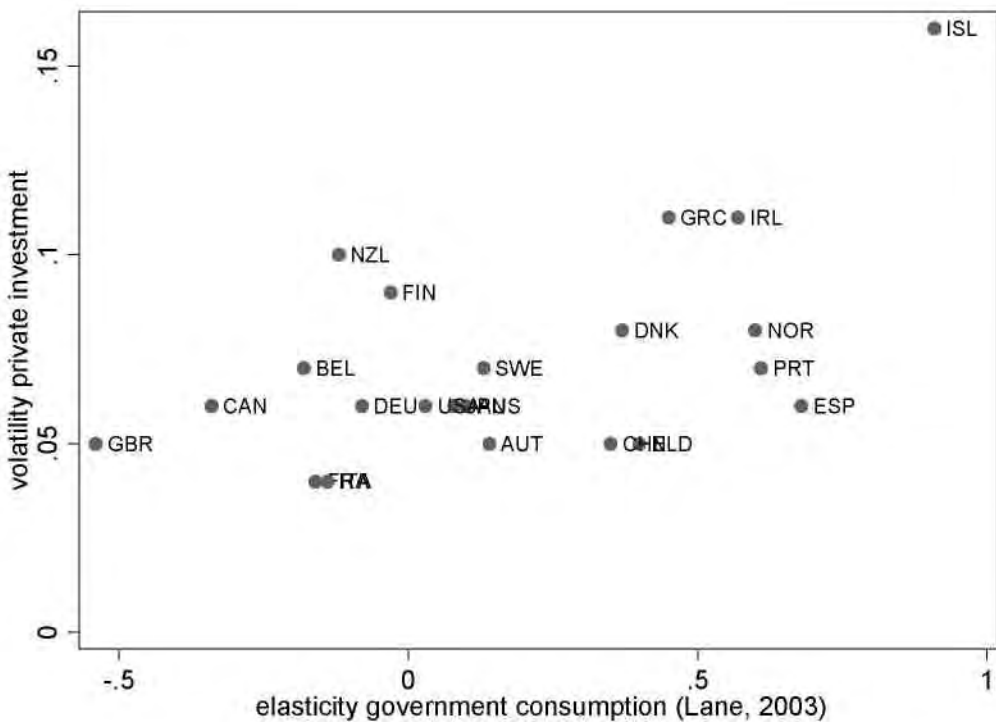
² There is somewhat less evidence of asymmetry and procyclical policy if you look at real-time data. Giuliadori and Beetsma (2008) find that EU countries react in a procyclical way to unexpected changes in the output gap, while the responses of the other OECD countries are acyclical. However, fiscal policy is acyclical for EU countries *ex ante* (and counter cyclical for OECD countries). According to Golinelli and Momigliano (2006), this is due to information problems on the cyclical stance in real time

grouped together with some other small open economies that have experienced dramatic falls in the budget balance over the last crisis. Spain, Greece and also Iceland has run very procyclical policies, and experimented quite high volatility in consumption or investment. This is not a coincidental finding. A plot of other measures of changes in fiscal policy (such as the volatility of government consumption) against the same variables, results in a similar pattern.

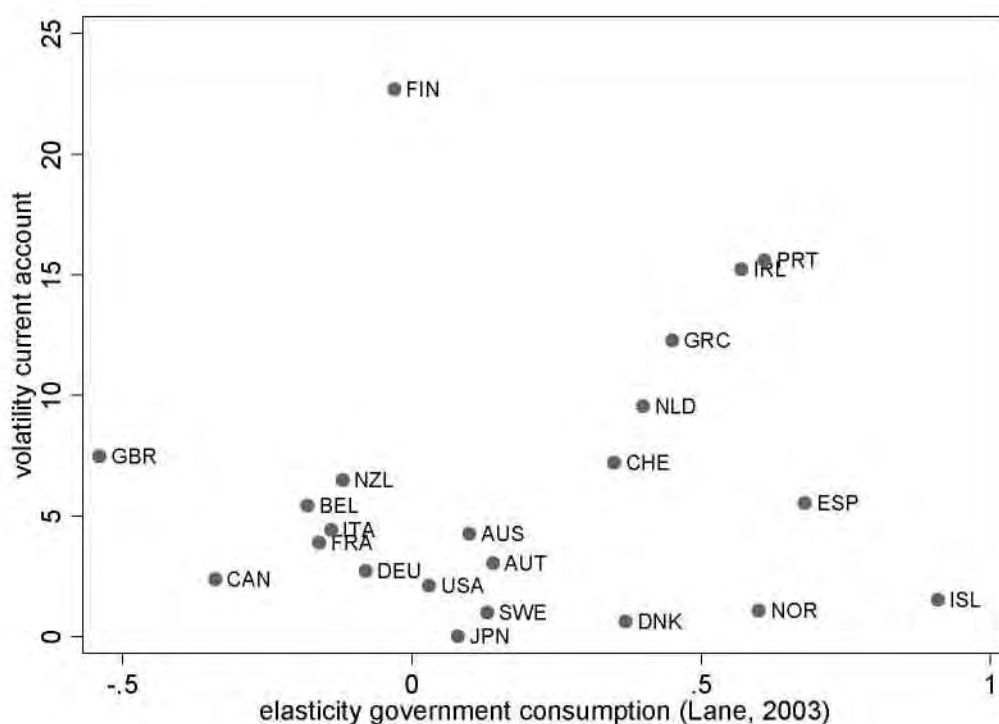
Figure 1: Spending elasticity, and volatility of consumption, investment and current account



(a) spending elasticity v volatility private consumption



(b) spending elasticity v volatility private investment



(c) spending elasticity v volatility current account Notes: coefficients of Table 1 (Lane, 2003), OECD Economic Outlook June 2009.

3. An open economy model

We are able to replicate this pattern in a simple RBC model of a small open economy that includes a behavioural reaction function for government spending. The basic mechanism is that procyclical boosts to spending in an economic boom inflate investment perspectives, and as a consequence, also consumption. This distorts the choice between savings and investment. Only if this distortion implies an increased need for financing does it create a current account deficit. Countercyclical policies instead foster stable conditions for investment, and spur the accumulation of capital.

3.1. The building blocks

The model we build is a standard small open economy RBC model and closely follows Mendoza (1991). The economy is inhabited by an infinitely lived population of unit density. Households share the same preferences and have to allocate consumption C and labour supply h intertemporally to maximise the expected value of the stream of instantaneous utility:³

$$E_t \sum_{t=0}^{\infty} \beta^t \left[\frac{(c_t - \omega^{-1} h_t^\omega)^{1-\gamma} - 1}{1-\gamma} \right] \tag{1}$$

where $\beta \in (0, 1)$ is the subjective discount rate, $\gamma > 1$ is the intertemporal elasticity of substitution in consumption and $\omega > 1$ in labour supply. Households own the perfectly competitive firms and choose every period how much to invest (k_t) and how much to invest (it). In this choice, they are subject to the law of motion of capital

³ The CES utility function makes labour supply depend only on the real wage, not on consumption and wealth. This is a desirable property of the utility function as it allows us to get steady state conditions that are independent on any initial level of wealth or net foreign asset position of the economy.

$$k_{t+1} = k_t(1 - \delta) + i_t, \quad (2)$$

where i_t is investment in period t , and $\delta > 0$ is the depreciation rate of capital K_t . We assume firms incur some adjustment costs when they invest. The quadratic function $\Phi(k_{t+1} - k_t)$ captures the increasingly costly changes in capital as follows:

$$\Phi(k_{t+1} - k_t) = \frac{\phi(k_{t+1} - k_t)^2}{2}, \Phi(0) = 0, \Phi'(0) = 0. \quad (3)$$

Technology is represented by a constant returns to scale production function

$$y_t = A_t F(k_t, h_t), \quad (4)$$

where $A_t > 0$ is total factor productivity. Shocks to technology follow an AR(1) stochastic process. The degree of persistence of this technology (or supply) shock is indicated by ρ .

Households can borrow from abroad the quantity d_t at the real interest rate r_t . The payment on this foreign borrowing depends on the world real interest rate r^* , but is augmented by a premium that depends on the quantity borrowed. Higher borrowing makes it more costly to borrow even more. The function $p(\cdot)$ determines this premium on r^* with $p'(\cdot) > 0$, so that interest rates are higher ($r_t > r^*$) if the net foreign asset position is higher than in steady state ($d_t > \bar{d}$). The parameter $\psi > 0$ reflects the costs in adjusting the portfolio.⁴ We can summarise this as follows

$$r_t = r^* + p(d_t), \quad p(d_t) = \psi(e^{d_t - \bar{d}} - 1) \quad (5)$$

Government spending G_t consists entirely of domestic production, and does not provide any utility to the economic agent. The budget is perfectly balanced by taxes in every period. We moreover assume that T_t is a lump sum tax. Hence,

$$G_t = T_t \quad (6)$$

As the budget constraint is satisfied in each period, government finances higher spending with taxes. The government does not issue debt domestically, nor does it borrow from abroad. The only debt in this model is international, and it amounts to private agents borrowing internationally to finance their consumption and investment choices.

To sum up, households maximize (1) subject to (2), (4), and (5) and the following intertemporal budget constraint.

$$d_t = d_{t-1}(1 + r_{t-1}) - y_t + c_t + i_t + \Phi(k_{t+1} - k_t) + T_t \quad (7)$$

Finally, the no-Ponzi game constraint holds

$$\lim_{j \rightarrow \infty} \frac{d_{t+j}}{\prod_{s=1}^j (1 + r_s)} \leq 0 \quad (8)$$

that is always satisfied if the stock of debt is bounded, as is the case for approximations around the non-stochastic steady state.

⁴ The introduction of the elasticity of debt to the interest rate is necessary to obtain stationary wealth within the framework of small-open economy models (Schmitt-Grohé and Uribe, 2004).

Given that there is only one good in this economy, and goods and the financial asset are interchangeable, we can aggregate the budget constraint over the entire population. We thus obtain the link between the trade balance (TB) and the current account (CA):

$$TB_t = y_t - c_t - i_t - \Phi(k_{t+1} - k_t) + T_t$$

$$CA_t = -(d_t - d_{t-1}) = -\Delta NFA_t = TB_t - r_{t-1}d_{t-1}. \quad (9)$$

At time t , a country has a net debt (credit) foreign asset position if $d_t > 0$ ($d_t < 0$), and lends (borrows) abroad if $CA_t > 0$ ($CA_t < 0$).

3.2. Solving the model

This dynamic stochastic general equilibrium model does not have a closed form solution. We log-linearise the equilibrium conditions around the non-stochastic steady state and solve the corresponding discrete time rational expectations model by applying the method of Schmitt-Grohé and Uribe (2004). Preferences, technology and the stochastic errors depend on parameters that must be set to some specific values to solve the model. The selection of values for these parameters depends on: (a) the restrictions imposed by the model on the steady state solution, (b) external estimates from the relevant empirical literature, and (c) the steady state values of the data series.

We use data for Spain. The main reason is that Spain has run procyclical fiscal policies (Lane, 2003; De Roose *et al.*, 2008).⁵⁶ Moreover, it has run large current account deficits and fiscal surpluses for many years. However, the fiscal surplus has turned to a double digit deficit in 2009, and debt is foreseen to rise to 70% of GDP. The current account has shrunk strongly too. The data we use for calibrating the model are based on annual observations over the period 1970-2008 and are taken from the OECD. We extend the results for Spain to other countries with a robustness check on the main parameters.

A first group of parameters ($\alpha, \beta, \gamma, \delta, R, D$) is set to values that make the steady state of the model roughly consistent with some stylised facts of the Spanish economy. These stylised facts are the ratio of labour over total income, the ratio of aggregate consumption over output (C/Y), the ratio of aggregate Investment over output (I/Y), the ratio of government expenditure over output (G/Y), and the ratio of the net foreign asset position over output (D/Y). The values in sample are in Table 2. We so choose the value of α (capital share of output) as 1 minus the average of labour compensation over total income. The real interest rate R is set to the average of the nominal interest rate of the ten year bond minus the inflation rate. The value of δ (the capital depreciation rate) is set to match the average ratio of investment to output. The steady state value of government spending \bar{G} and the net foreign asset position \bar{D} , are set to match the average ratio of both series over output (G/Y and D/Y). The parameter β (the subjective discount rate) is determined by the steady state condition of the model and set equal to $\frac{1}{(1+R)}$. The parameter γ (the intertemporal elasticity of substitution) is set equal to 2 but results are consistent with different values as the exact value in the economy is hard to estimate and widely debated (though always larger than 1).

A second group of parameters ($\rho, \sigma, \psi, \varphi, \omega$) is set to match the observed standard deviation of investment, hours worked and output. The statistical moments for the relevant variables

⁵ We test similar fiscal rules as Lane (2003) for the response of government consumption, total revenues and the primary surplus to the output gap. The primary surplus falls in economic booms, and this is mostly due to rises in spending (while taxes do not react to the cycle).

are obtained after transforming the relevant data into logarithms and detrending them with an HP filter with parameter $\lambda = 6,25$ and $\lambda = 8,25$ (Ravn and Uhlig, 2001). Table 2 provides the range of the possible values for these statistics gives, and gives an idea of the sensitivity of these decompositions to the choice of λ .

Table 2: Steady state values.

ratio	data	model
C/Y	59.10%	60.3%
I/Y	20.00%	20.2%
G/Y	16.70%	18.6%
B/Y	16.90%	18.6%
σ_Y	1.03 – 1.14	1.04
ρ_Y	0.50 – 0.56	0.54
σ_I	3.53 – 3.88	3.77
σ_h	0.31 – 0.37	0.31
$\sigma_{CA/Y}$	2.40	0.49

The value of ρ (persistence of the technology shock) is set to match the first order serial correlation of output. The values of σ (the standard error of the technology shock), ψ (portfolio adjustment cost), Φ (capital adjustment costs) are set to determine the standard deviation of investment and output. The value of ω (the inverse of the intertemporal elasticity of substitution in labour supply) is set to match the relative variance of output and hours worked found in the data. The value of θ matches the elasticity of government spending to economic growth as computed by Lane (2003) as reported in Table 1. We assume all macroeconomic variables have been modified by the slightly procyclical fiscal policy in Spain ($\theta = 0.68$). We summarise in Table 3 all parameters we use to calibrate the model.

Table 3: Parameter values.

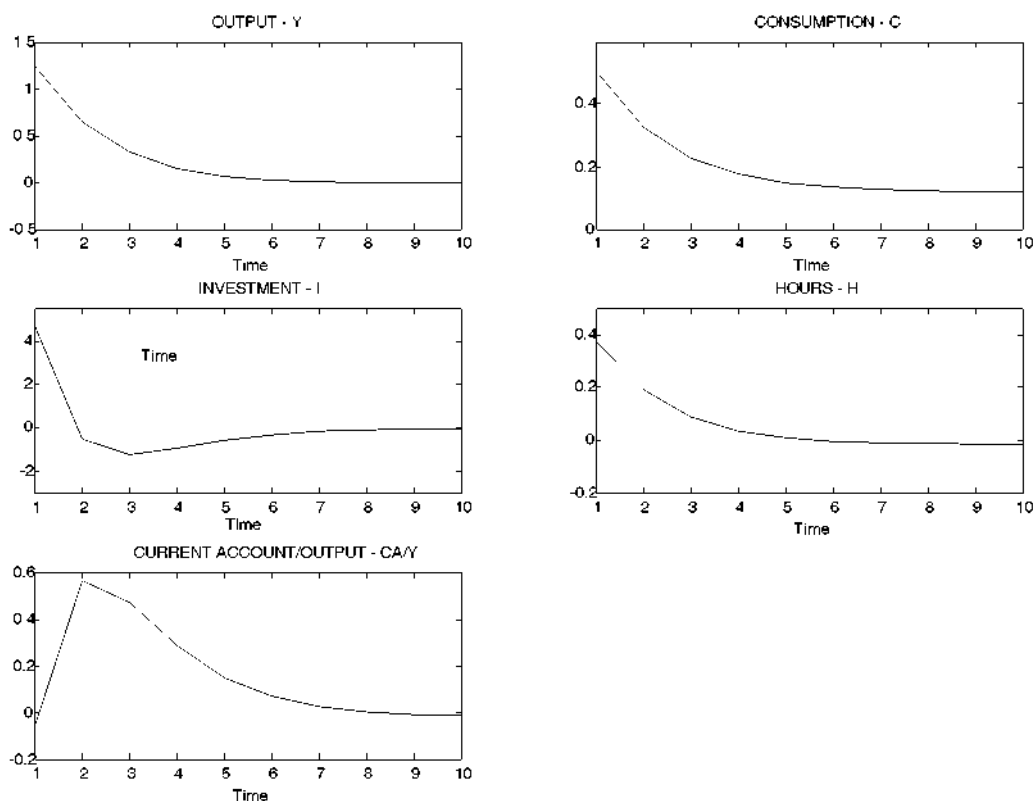
parameter		value
α	capital share of output	0.37
β	subjective discount rate	0.96
γ	intertemporal elasticity of substitution	2.00
δ	depreciation rate	0.07
ψ	portfolio adjustment cost	0.0182
ρ	AR(1) technology shock	0.41
ω	inverse intertemporal elasticity of substitution in labour supply	3.42
φ	capital adjustment costs	0.0016
R	real interest rate	0.04
D	external debt	0.35
G	government spending	0.35
θ	elasticity of government spending to the output gap	0.68

3.3. Basic insights

The basic insights of the responses to a technology or supply shock in this model are similar to Mendoza (1991). We discuss the baseline results, and refer to Mendoza (1991) for a more complete discussion. Overall, the model – albeit simple – is able to match the main moments of the Spanish economy, and the steady state properties of the model are close to the stylised facts (Table 2). A positive supply shock pushes up the marginal productivity of capital and labour. As a consequence, it raises investment in capital

immediately (Figure 2). Hours worked go up as households profit from the positive shock to realise additional income now. As households feel wealthier, they also raise consumption. But this raise is smoothed over time as part of the additional income is saved. On aggregate, total output will raise. In a closed economy, the investment boom would be financed from giving up consumption so pushing up interest rates. In a small open economy, financing can be got on international markets instead. This will create a current account deficit in the first years after the shock if domestic saving is insufficient to finance the boom in investment. For the basic set of parameter values chosen here, savings exceed investment so the country lends to international markets. As a consequence, the country becomes a net creditor after some periods.

Figure 2: Impulse response function: 1% deviation supply shock



If we were to allow for shocks to government spending in this model, the effects would be similar to those of a supply shock. As spending goes up, taxes go up directly and agents feel poorer (negative wealth effect) and will supply more labour. As labour supply goes up, investment in physical capital and output will rise too. These predictions are similar to the RBC model of Baxter and King (1993) for a closed economy. The additional effect is that financing of investment on international markets permits reducing consumption less than would be the case in a closed economy. The rise in investment can be stronger due to the muted response of domestic interest rates. Investment and external adjustment on the current account play a key role in the transmission.

4. The fiscal rule

4.1. The fiscal rule

In the benchmark model, government spending has no utility and just absorbs domestic use of the single good. This spending is financed by a lump-sum tax, so fiscal policy has no

particular role to play. The findings are standard for an RBC model. We now introduce the effects of countercyclical or procyclical fiscal policies on economic performance and stabilisation. We do so by adding a fiscal rule to the baseline model. In particular, we model the decision of the government to spend with a reaction function. The behaviour of the government is very simple. Spending is initially fixed by the government at some level \bar{G} but then decides to change G_t when economic conditions change. In particular, the fiscal rule is:

$$G_t = \left(\frac{Y_t}{Y_{ss}} \right)^\theta \bar{G}. \quad (10)$$

As output rises above its steady state level, the government adjusts G . The parameter θ is the government spending elasticity with respect to output. In case $\theta < 0$ spending is cut during the boom, and we call spending countercyclical. Instead, if $\theta > 0$ spending is procyclical. For example, a 2% fall in output would imply an increase in G by 4% for a countercyclical fiscal policy, when $\theta = -2$. It would mean a decrease in G by 4% for a procyclical fiscal policy ($\theta = 2$). The standard model comes out as a special case when $\theta = 0$, and $G_t = \bar{G}$.

We further define as a weakly cyclical policy when the reaction of government spending to the business cycle - as measured by $\left| \frac{Y_t}{Y_{ss}} \right|$ - is less than proportional. A weakly countercyclical (*procyclical*) fiscal implies ($|\theta| \in [0, 1]$). In case the output gap were 1%, government spending would change by less than 1%. Although the level of government would still rise or fall in absolute terms, the government spending ratio would always fall. Instead, when fiscal policy is strongly cyclical ($|\theta| > 1$) cyclical, the response of government spending is more than proportional to the change in output.

As we consider a balanced budget, we could alternatively have modelled a fiscal rule in which taxes respond to the cycle.⁶ The mechanism described here is similar to the distortionary effect of taxation on the economy, as described by Baxter and King (1993). We focus on spending, as the distortion introduces a wedge that varies over the cycle with government size. In contrast to those papers, we also consider the effect on the current account.

4.2. Effects of cyclical fiscal policy on the economic responses

Under the standard RBC model, the opportunity cost of leisure is equal to the marginal productivity of labour (which in competitive labour markets equals the wage). The introduction of a behavioural rule for the government introduces a wedge between these values. In contrast to the benchmark case, cyclical fiscal policy affects the opportunity cost of leisure, and so the intratemporal condition that rules how the agent chooses to distribute his endowment of time between work and leisure. In particular, the first order condition is modified, and the marginal decision between work and leisure is not only given by the wage MP_h , but is multiplied a factor that depends on the size of the output gap, government size and the elasticity of spending to the cycle. In particular,

$$\frac{-U_{h_t}}{U_{c_t}} = MP_{h_t} \left(1 - \theta \left(\frac{y_t}{y_{ss}} \right)^{\theta-1} \frac{\bar{G}}{y_{ss}} \right). \quad (11)$$

⁶ Empirical work by Forni *et al.* (2009) includes a tax rule in a calibrated DSGE model for the euro area.

Cyclical fiscal policy also affects the intertemporal marginal rate of substitution between consumption at time t and consumption at time $t+1$:

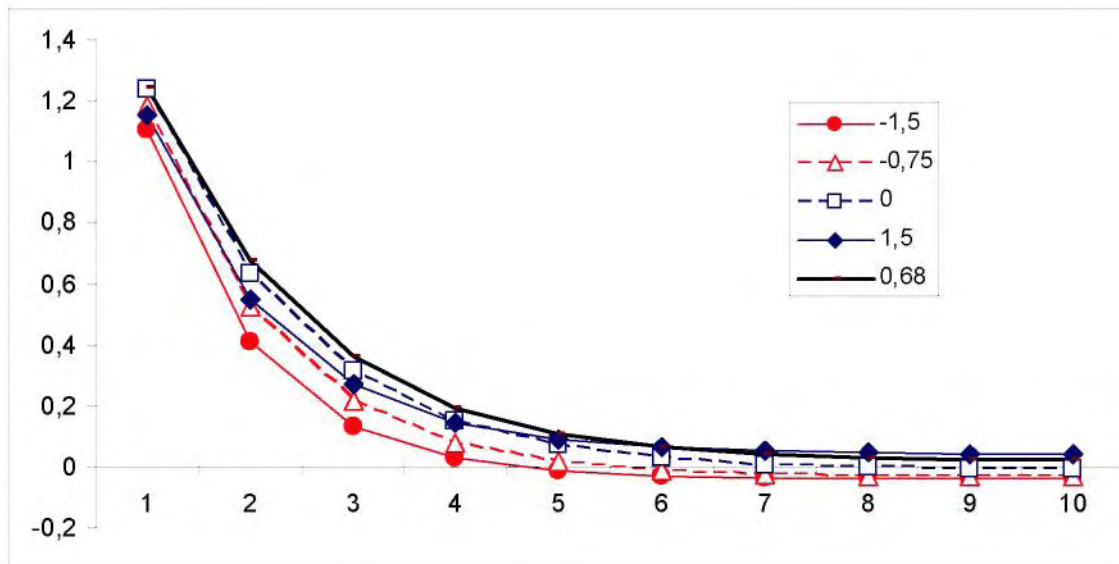
$$U_{c,t} (1 + \Phi_{k,t+1} (k_{t+1} - k_t)) = \beta E U_{c,t+1} \left[MPK_t \left(1 - \theta \left(\frac{y_{t+1}}{y_{ss}} \right)^{\theta-1} \frac{\bar{G}}{y_{ss}} \right) + 1 - \delta + \Phi_{k,t+1} (k_{t+2} - k_{t+1}) \right] \quad (12)$$

When $\theta \neq 0$, fiscal policy also affects the incentive to investment at time t by affecting the expected marginal productivity of capital next period. Cyclical fiscal policy distorts the marginal productivity of inputs by the factor $\theta \left(\frac{y_{t+1}}{y_{ss}} \right)^{\theta-1} \frac{\bar{G}}{y_{ss}}$. This distortion changes the dynamic response of the economy in the wake of a supply shock. First, the distortion depends on the share of spending in steady state output, $\frac{\bar{G}}{y_{ss}}$: the larger is government, the greater is the distortion. A larger government would leave more room for fiscal (de)stabilization. This is a typical result for an RBC model with no nominal rigidities (Domenech *et al.*, 2008). Second, and this has not been considered so far, is that this distortion is not constant but varies over the cycle (by the factor $\frac{y_{t+1}}{y_{ss}}$).

Take a positive technology shock for example, and assume that fiscal policy is countercyclical ($\theta < 0$). Spending goes down during the boom. From the modified first order conditions (11) and (13) this implies that the distortion falls, and so the increase in the marginal product of capital and labour is magnified. In a way, the cut in spending reduces the gain on future investment and supplying more labour. By taking away unproductive public spending and reorientating it to productive activity, it stabilises expectations on future economic activity. Stable economic conditions increase the average marginal productivity of capital. Due to this effect, consumption and investment increase less after a positive technology shock relative to a neutral fiscal policy. Countercyclical fiscal policies thus work as a buffer against a technological shock as it takes out the steam under the boom. Figure 3 plots the impulse responses of total output for various degrees of countercyclicality. The responses for hours worked, consumption and investment are similar, and so we have not repeated these. We see how output goes back to baseline as the boom gradually dies out. We observe that for countercyclical rules, the effect on all macroeconomic variables is indeed dampened. The more countercyclical is spending (lower θ), the more the economy is stabilised. Figure 3 shows that the responses of output under countercyclical policy lie under those of the standard policy, when $\theta=0$.⁷

⁷ Similarly, in a recession, spending increases reduce the distortion. After a negative supply shock, higher spending improves the marginal product of capital and labour.

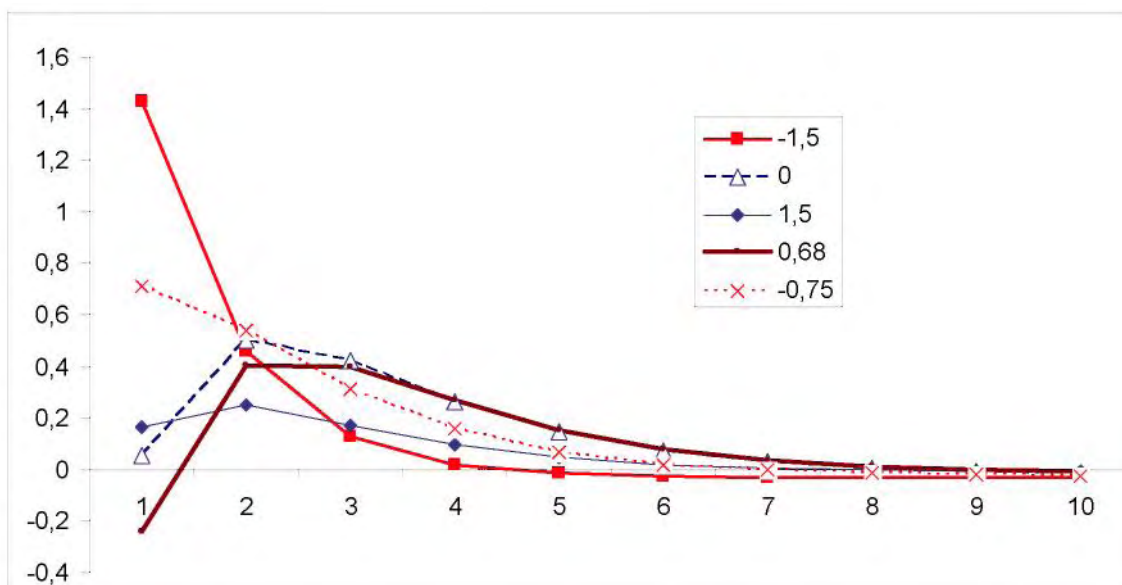
Figure 3: Impulse response function 1% deviation technology shock, response of output



But there is a limit on the degree to which countercyclical policies may foster stable conditions for investment and labour supply. At some degree of countercyclical policy the fiscal rule will revert the effect of the supply shock on marginal productivities, and this produces perverse effects on the economy. I.e., an excessive degree of countercyclical policy cuts marginal productivity too strongly. The distortion does not just fall, but overrides the stabilising effect. This might cause investment to decrease after the economy is hit by a positive technology shock, and explains why the output response to a strongly countercyclical is dampened less (Figure 3).

The dampening effect of countercyclical policy is also visible on the current account. Under the parameterisation of the benchmark case, the increase in investment is nearly completely financed by domestic saving. As a consequence, the effect on the current account is nil. A countercyclical policy smooths out both investment and consumption, hence savings exceed investment and the current account becomes strongly positive (Figure 4). For strongly countercyclical policies, the fall in activity makes external financing less necessary, and hence the boost to saving makes the current account turn positive in the first period already.

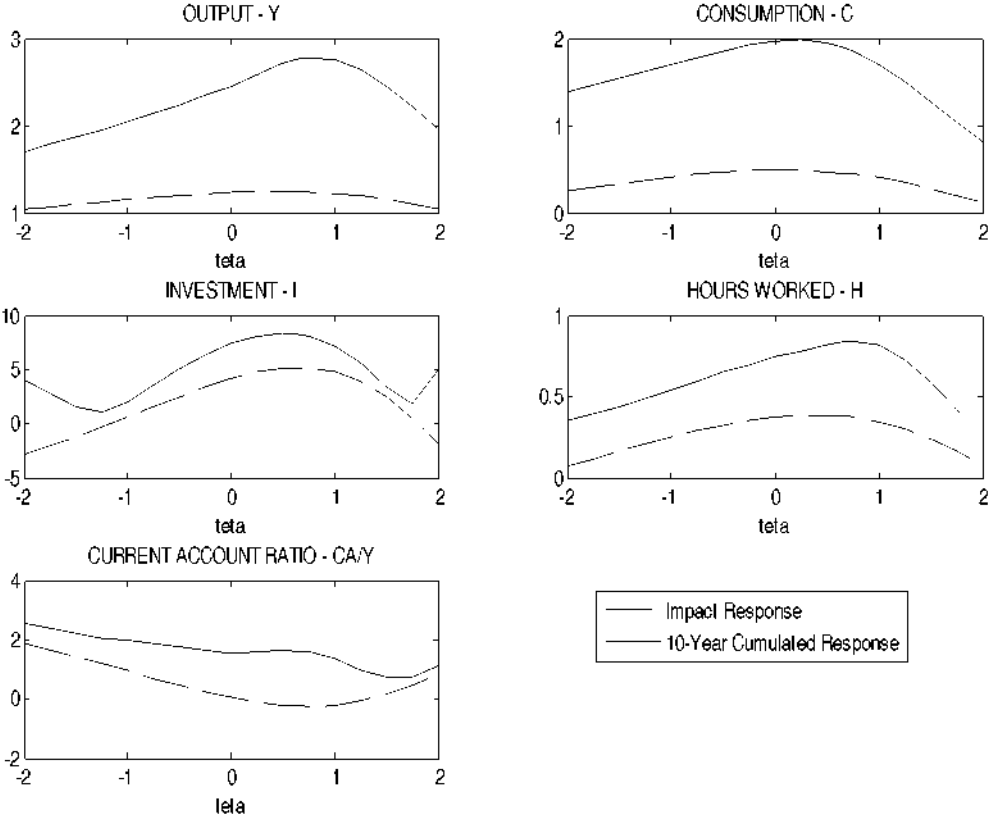
Figure 4: Impulse response function: 1% deviation technology shock, response of current account ratio



Under a procyclical fiscal policy rule, the effects on the first order conditions (11) and (12) are reversed. Higher spending in a boom further fuels the marginal product of labour and capital. As a consequence, investment, consumption and output will increase even more (Figure 3). External financing needs will rise even more, and the current account will become negative. The destabilisation of investment and consumption responses of the economy is magnified in this case. The dynamics of the distortion over the cycle differ when fiscal policy is weakly or strongly procyclical. A weakly procyclical fiscal policy creates an incentive to invest and work that falls in recessions and rises in booms. I.e., fiscal policy tends to amplify the technological shock. We see in Figure 4 that all impulse responses get magnified if $\theta \in [0,1]$ Recall that under the parameterisation of the model, this is precisely the case for Spain ($\theta=0.68$). The current account deficit will be much stronger initially (Figure 4). In contrast, under a strongly procyclical fiscal policy, the disincentive to investment and work gets reduced in recession and increases in booms, and again works as a buffer against shocks. The reason for this non-linearity is that when spending reacts more than proportionally to the cycle, the way marginal conditions are affected by the distortion over the cycle changes. As long as the spending response is not too strong, it just changes marginal optimality conditions. If the response is stronger than the change in output, the entire production is absorbed by the government. This substitution of private for public resources drains investment and labour opportunities in a boom, so dampening economic activity.

Figure 5 summarises these effects of fiscal policy for varying degrees of cyclicity. The vertical line measures the impact response and the 10-year cumulative absolute response of output (Y), consumption (C), investment (I) and the ratio of current account over output (CA) to a 1% positive technology shock. The horizontal line indicates different degrees of cyclicity of the fiscal rule associated to the impulse responses, where $\theta=0$ reports the impulse response at the benchmark policy.

Figure 5: Impact and cumulative impulse response for varying degrees of cyclicity



We can also formally derive the behaviour of the distortion with respect to the cyclical variation. We get the following expression.

$$\frac{d\left[-\theta\left(\frac{y_{t+1}}{y_{ss}}\right)^{\theta-1}\frac{\bar{G}}{y_{ss}}\right]}{d\left(\frac{y_{t+1}}{y_{ss}}\right)} = -\theta(\theta-1)\left(\frac{y_{t+1}}{y_{ss}}\right)^{\theta-2}\frac{\bar{G}}{y_{ss}}, \quad (13)$$

which is negative for countercyclical or strongly procyclical fiscal rules, but is positive for weakly procyclical policy. The intensity of the change in the distortion changes for different fiscal rules. If we derive (14) with respect to θ , we get

$$\frac{\partial[\bullet]}{\partial\theta} \cong -\frac{\bar{G}}{y_{ss}}\left(\frac{y_{t+1}}{y_{ss}}\right)^{\theta-2} [(2\theta-1)] \quad (14)$$

Figure 6. Evolution of the distortion for different fiscal rules.

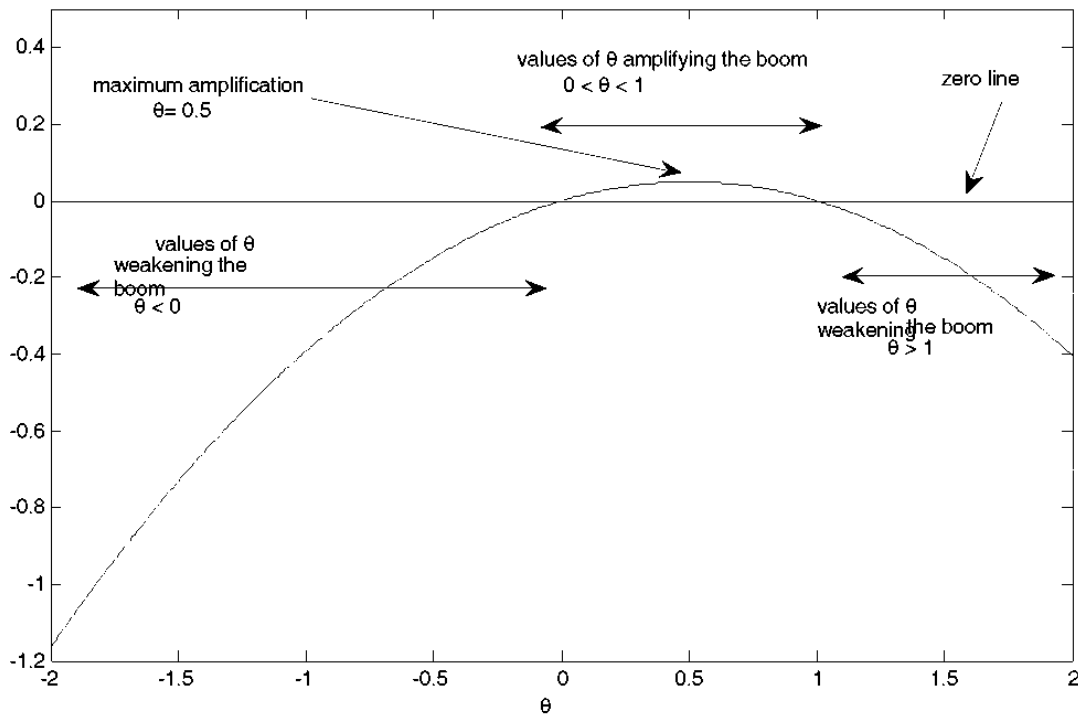


Figure 6 helps to understand how the distortion varies over the cycle depending on the cyclicity of government policy. The x-axis reports the degree of cyclicity of fiscal policy, as measured by θ . Values of θ below 0 refer to countercyclical fiscal rules; between 0 and 1 imply weakly procyclical fiscal rules; and above 1 are strongly procyclical fiscal rules. The y-axis measures the derivative of the distortion over the cycle. When the derivative is positive, the fiscal rule amplifies the boom, when it is negative the fiscal rule reduces the boom. We have plotted Figure 6 for plausible values of the spending share and the output gap.⁸ If we start reading the graphic from the left, we observe that a too high degree of countercyclicality reverses the effect of the supply shock. The distortion falls for values of θ below 0 as its derivative is negative, but the dampening effect on the economy is particularly pronounced. As the degree of countercyclicality falls, the distortion falls quite rapidly. A

⁸ To draw this graph we consider a government size of $G_{ss}/Y_{ss}=0.20$ and considering a boom in the economy corresponding to the output being 1% above the steady state value ($Y_t/Y_{ss}=1.01$).

similar argument applies for strongly procyclical fiscal rules: as $\theta > 1$ distortion turns negative again and dampens economic activity. In contrast, for values of θ between 0 and 1 weakly procyclical policy raises the distortion and reaches a maximum for $\theta = 0.5$.

4.3. Effect on second moments of the economy

To analyse in more detail how the introduction of cyclical spending rules affects the stabilization properties of the economy we focus on the second moments of output, consumption, investment, hours worked and the current account ratio. For a given distribution of the technological shock (i.e. Gaussian white noise with a given standard deviation), we compute the variance covariance matrix of the economy for each possible degree of cyclicity of spending. If we find that for a specific $\theta \neq 0$ the variance of - for example - consumption, is lower than the variance at the benchmark (ratio < 100), then we conclude that for consumption that fiscal policy rule has better stabilization properties than the standard policy. On the contrary, if the ratio of their variances is above 100, we conclude that the fiscal rule has worse stabilization properties than acyclical policy. We have scaled all policies relative to the policy prevailing in Spain (with $\theta = 0.68$).

Unsurprisingly, with countercyclical fiscal policy the variances of consumption (C), output (Y), hours worked (h) and investment (I) are lower than with an acyclical policy (Table 4). The reduction is larger, the more countercyclical is spending. Only the volatility of investment veers back for very countercyclical policies. The reason is that reduced economic activity makes the effect of a technology shock much stronger (Galí, 1994; Domenech *et al.*, 2008). With procyclical fiscal policy rules, instead, we observe higher variability of consumption, investment and output for weakly procyclical fiscal rules. The variances reach their peak value for $\theta = 0.5$, after which it keeps decreasing and fall again below 100% under strongly procyclical fiscal policy. These results are easily explained by the dynamics of the distortion to marginal productivity of capital and labour over the cycle. Countercyclical fiscal rules and strong procyclical fiscal rules work as a shock buffer, and tend to stabilise the system. On the contrary, weakly procyclical fiscal rules tend to amplify the effect of the shocks, and make the economy less stable. Recall that our model has been parameterised on a value of $\theta = 0.68$. Table 4 shows how this policy has raised the variability of output or hours worked by about 3 to 4%, but has barely affected the volatility of consumption. The difference is much more pronounced for investment, with an 18% fall if Spanish budget policy would have been neutral.

Table 4. The effects of θ on second moments.

θ	Var(Y)	Var(C)	Var(I)	Var(h)
-2	76%	75%	52%	51%
-1,75	79%	78%	37%	54%
-1,5	81%	80%	22%	59%
-1,25	84%	83%	9%	65%
-1	87%	87%	16%	72%
-0,75	90%	90%	33%	79%
-0,5	92%	94%	50%	86%
-0,25	95%	97%	67%	92%
0	97%	100%	81%	96%
0,25	99%	102%	93%	100%
0,5	100%	102%	99%	101%
0,68	100%	100%	100%	100%
0,75	100%	99%	99%	99%
1	99%	94%	91%	94%
1,25	96%	85%	74%	83%
1,5	91%	75%	47%	69%
1,75	86%	65%	17%	50%
2	79%	55%	45%	31%

In Figure 3, we saw that the impact of a technology shock on output, consumption and hours worked is affected by fiscal policy. The effects of counter- and procyclical policy do not spillover on the findings for the current account in a linear way. Countercyclical policies favour consumption smoothing (and savings) and investment can be financed easily by domestic sources. In this case, they even borrow from abroad to fund capital accumulation on impact (negative current account). In the following periods, the new more productive capital produces an extra output that is mainly saved by lending abroad for consumption smoothing. This even makes the country a net creditor on international markets. As a consequence, the current account will be much more volatile (Table 5). Slightly procyclical policies give a strong boost to investment, but much less to consumption. This tends to reduce savings relative to investment, so they compress the reaction of the current account. The response of the current account is not too volatile as a result. As strongly procyclical fiscal policy clamps down on economic activity, investment will not raise by much although savings still do. This raises volatility with respect to the benchmark fiscal rule.

Table 5: The effects of θ on second moments.

θ	Var(CA/Y)	Var(C/Y)	Var(I/Y)
-2	273%	113%	103%
-1,75	245%	112%	82%
-1,5	216%	112%	61%
-1,25	188%	111%	41%
-1	161%	111%	30%
-0,75	138%	110%	35%
-0,5	120%	109%	50%
-0,25	109%	108%	68%
0	105%	107%	84%
0,25	105%	105%	95%
0,5	103%	102%	101%
0,68	100%	100%	100%
0,75	98%	99%	98%
1	85%	96%	87%
1,25	66%	94%	65%
1,5	52%	92%	33%
1,75	72%	91%	12%
2	123%	90%	62%

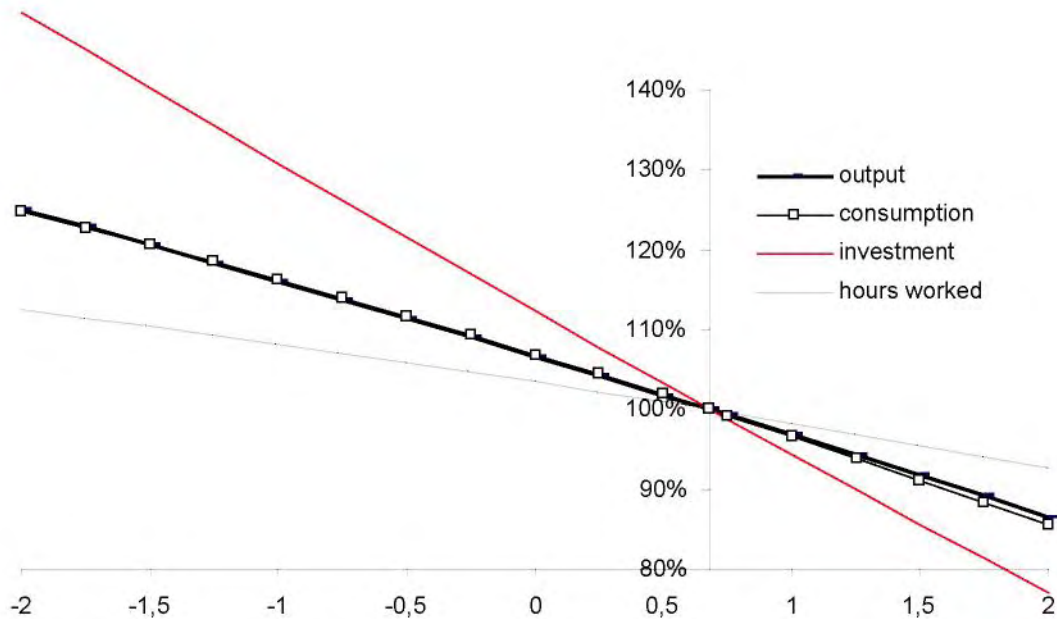
Within our model, there is no clear link between the kind of non-standard fiscal rules and the stability of the current account. Indeed, the key for a non-standard fiscal rule to outperform the benchmark in stabilizing the current account is by reducing the variance of output relatively more than that of the components of domestic absorption (consumption, investment and public spending). Thus, the lack of a clear link between the kind of fiscal rule and the variability in the current account ratio is due to the interaction between the fiscal rule and all parameters that rule the transmission mechanism of supply shocks to the economy.

4.4. The effect on the steady state

Cyclical policies change the intertemporal allocation of consumption and saving. Countercyclical policies foster stable conditions for investment, and spur the accumulation of capital. Procyclical fiscal policy instead magnifies the distortions of fiscal policy, and reduces the steady state values for consumption and investment. The capital stock, and output, will be lower than under other policies. We set in Figure 7 the steady state value for all variables equal to 100 under the standard lump sum fiscal policy. When the figure reports an entry above 100, it means that the fiscal policy rule corresponding to that value of θ

implies a higher steady state value than under the benchmark case. Figure 7 shows how θ affects the steady state values of output, consumption, investment and hours worked.

Figure 7: Effect of cyclical spending policy on steady state.



In spite of the non-linear stabilising effects of cyclical policies, the distortionary effect on steady state values is linear. Figure 7 shows that a more countercyclical fiscal policy is associated with higher steady state values for all variables. The reason is a gradual substitution away from government spending to productive investment, as under a stabilising policy, the capital stock grows relatively more. Consumption therefore rises proportionally less than investment. Results for procyclical policy go in the opposite direction. Steady state values fall below the benchmark. Procyclical policy adds to the negative absorption effect of public spending on the economy. For the fiscal policy we observe in Spain, steady state output (or consumption) is about 3% lower.

4.5. Sensitivity analysis

The interaction between fiscal policy and the economy varies if the transmission mechanism of supply shocks to the economy changes. A fiscal rule may be more or less stabilizing the stronger is the impact of supply shocks to the economy. The impact on consumption or investment is modified for varying degrees of cyclicity of fiscal policy, but mostly goes in the same direction. In contrast, the effect of supply shocks on the current account is not linear. We check for this transmission with some sensitivity analysis on basic parameters of the model, and in this way explain why different EU economies show contrasting responses to economic shocks. The sensitivity analysis leads to two main results. First, the effect of cyclical fiscal rules on the steady state and the volatility of output, consumption, investment and hours worked continue to hold. Second, weakly countercyclical fiscal policy is more likely to stabilize the current account when the impact of a shock on the economy increases. This may happen both because of a stronger transmission mechanism of the shock to the economy, or because the shock itself is sufficiently persistent.

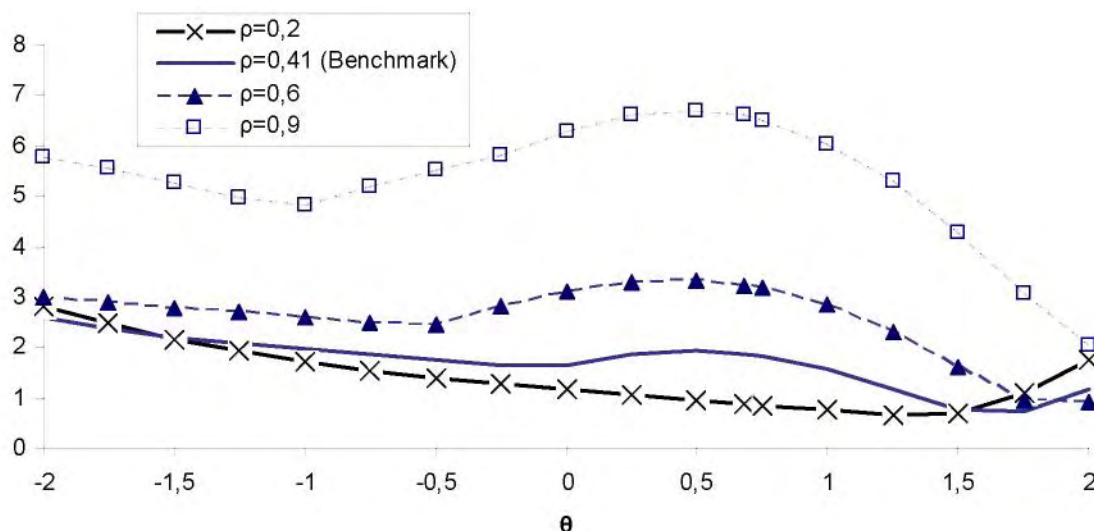
The persistence of the technology shock, ρ is important in understanding the effect of fiscal policy on the current account. For the baseline result in Figure 4, we have used a value of $\rho=0.54$, which falls in the range of values we detect in the data. Table 6 reports how the second moments change as the shocks gets more persistent. These are the ratio of the standard deviation of investment over the standard deviation of output (σ_I/σ_Y), the standard

deviation of the current account ratio ($\sigma_{CA/Y}$), the ratio of the standard deviation of consumption over the standard deviation of output (σ_C/σ_Y), the ratio of the standard deviation of hours worked over the standard deviation of output (σ_h/σ_Y). All these second moments are computed when the benchmark fiscal rule is adopted. A more persistent shock increases the volatility of the current account ratio as it is optimal to invest more and accumulate more capital over a longer period of time. This induces agents to borrow more on international financial markets at the start, and then lend more and for a longer time in the following periods. Figure 8 shows the 10 year cumulative response of the current account to a 1% positive technological shock for varying degrees of ρ (over the range of possible 9). In order to assess the overall impact, we cumulate the absolute values of every period's response as the negative initial effect of the investment boom would otherwise neutralise the later effect of increased savings. Generally, a more persistent shock has a stronger impact. The higher initial investment creates at first a large current account deficit, but as savings rise, this will turn the country eventually in a large net creditor. Procyclical policies magnify the response as they give an additional boost to investment, and this mechanism gets magnified for more persistent shocks. Only for very temporary shocks does investment never rise enough to offset the raise in savings.

Table 6. Sensitivity analysis: persistence of the supply shock

	$\rho = 0,2$	$\rho = 0,41$	$\rho = 0,6$	$\rho = 0,9$	data
σ_I/σ_Y	2,83	3,64	4,38	4,99	3,42-3,43
$\sigma_{CA/Y}$	0,46	0,51	0,56	0,61	2,40
σ_C/σ_Y	0,53	0,71	0,99	1,60	0,97-0,99
σ_h/σ_Y	0,59	0,44	0,31	0,19	0.30-0.32

Figure 8. Cumulative response of current account ratio.



Automatic stabilisers are an example of the type of countercyclical policy analysed in our model. As the output gap rises, the structure of the budget implies that spending goes down (thanks to lower unemployment benefits) and tax revenues go up (because of larger tax bases). Economic stabilisation with fiscal policy is considered to be easy in the face of a demand shock, as there is no trade-off between income stabilisation and the functioning of fiscal policy stabilisers. With a supply shock, it is often argued that automatic stabilisers fail to work. The reason is that – after a negative supply shock – the expansion in spending, and the fall in tax revenues, do not adjust to the permanently lower level to income. This locks in changes in spending and taxation. In addition to automatic stabilisers, large part of the stabilising impact comes from this lack in adjusting spending to changed economic circumstances (Deroose *et al.*, 2008). In our model, countercyclical policy – even in the

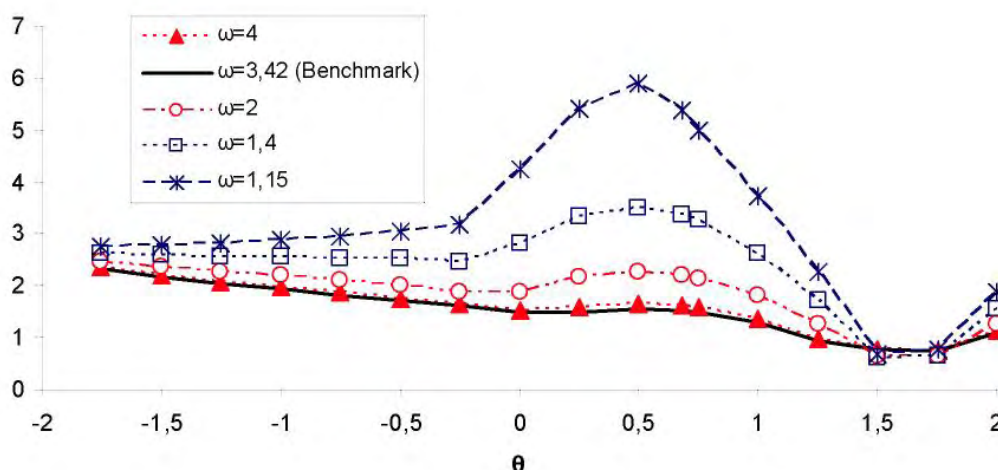
wake of a supply shock – stabilises the economy as shocks are always temporary. As countercyclical policy leads to a substitution from public to productive private spending, however, the steady state spending ratio is lower.

We may next wonder about the role of labour markets. We would expect that economies with more flexible labour markets than Spain can more easily adjust to economic shocks. At the same time, procyclical policy would exacerbate economic volatility in this case. An example may be Ireland. We measure labour market flexibility by ω , the inverse of the intertemporal elasticity of the labour supply. The benchmark value we have used so far ($\omega=3.42$) is the value used to parameterize the Spanish economy. More flexible labour markets are characterised by a lower ω . Table 7 reports some second moments of the model computed for different values of ω , and Figure 9 does so for the (absolute value) of the cumulated response. We observe that flexible labour markets enhance the transmission of supply shocks to the economy. A more elastic labour supply means hours worked increase more after a boom. As a consequence, investment rises more, and so does the current account deficit. What happens to the response of the current account is shown by Figure 9. The response of the current account ratio for weakly countercyclical fiscal rules is stronger relative to the benchmark fiscal rule. The fiscal distortion gives an additional boost to the marginal productivity of capital and raises investment even further. The higher need for investment leads to even more borrowing from abroad in the first periods. As the shock fades away, the country starts to save more – when the extra supply of capital and labour allows the economy to produce extra output – and becomes a net creditor. A reform of the Spanish labour market that removes rigidities would increase the volatility of the current at the existing fiscal policy. Figure 10 tells us that any fiscal policy that is more countercyclical would be effective at stabilising the current account – *ceteris paribus*.

Table 7. Sensitivity analysis: flexible labour markets

	$\omega=4$	$\omega=3,42$	$\omega=2$	$\omega=1,4$	$\omega=1,15$	data
σ_I/σ_Y	3,62	3,64	3,77	4,03	4,27	3,42-3,43
$\sigma_{CA/Y}$	0,50	0,51	0,65	0,94	1,45	2,40
σ_C/σ_Y	0,71	0,71	0,70	0,66	0,77	0,97-0,99
σ_H/σ_Y	0,38	0,44	0,76	1,19	1,24	0.30-0.32

Figure 9. Cumulative response of the current account ratio



Most EU economies have quite efficient financial markets, although there are still marked differences across Europe. As EU countries are all small open economies, they are very well integrated into world capital markets, and can tap easily from international financial markets. The introduction of the euro has likely improved the functioning of financial markets, and

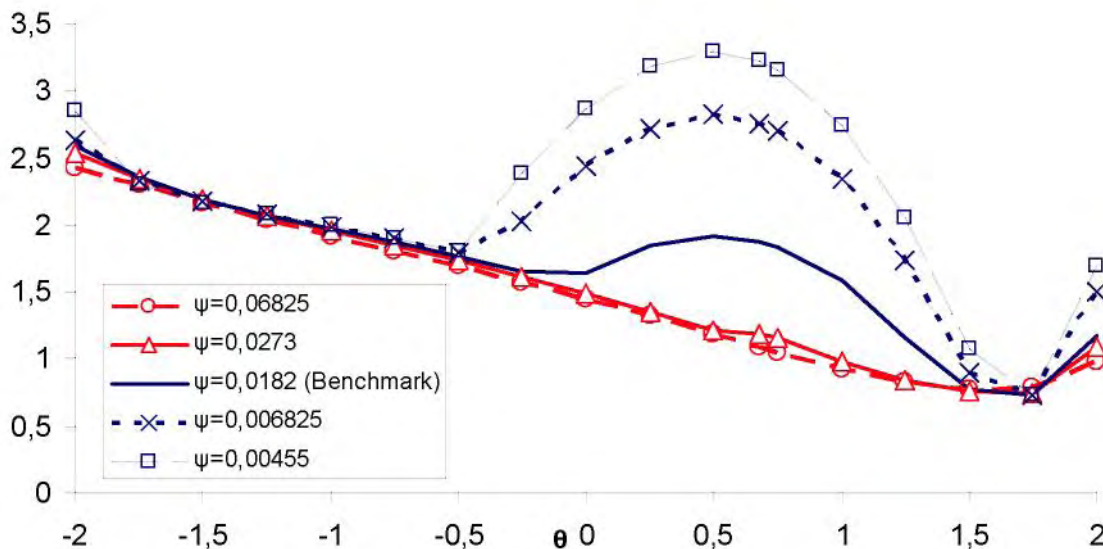
their integration. Spain or Ireland are examples of countries that have become much more linked to European financial markets since their EU and EMU membership. We can mimic the effect of increasing integration with a reduction in the premium on interest rates (lower ϕ), and the effect of more efficient financial markets with a fall in capital adjustment costs (lower ψ). The effects are similar for both parameters. As we would expect, a more favourable environment for investment increases the variability of investment and also of the current account ratio, as can be seen in Table 8. The capital stock can now be adjusted very quickly, hence investment booms become more pronounced and so are the needs for financing on international capital markets.

Table 8. Sensitivity analysis: cost of adjustment of capital

	$\Psi = 0,0685$	$\Psi = 0,0273$	$\Psi = 0,0182$	$\Psi = 0,006825$	$\Psi = 0,00455$	data
σ_I/σ_Y	1,69	2,94	3,64	4,07	6,25	3,42-3,43
σ_{CA}/σ_Y	0,44	0,43	0,51	0,59	1,08	2,40
σ_C/σ_Y	0,73	0,72	0,71	0,71	0,69	0,97-0,99
σ_n/σ_Y	0,43	0,43	0,44	0,44	0,45	0.30-0.32

The change in the response of the current account ratio to a technology boom can be observed in Figure 10. As the adjustment cost of capital decreases, the cumulative response of the current account ratio for the benchmark rule increases with respect to weakly countercyclical fiscal rules. Countries like Spain and Ireland, which have maintained procyclical fiscal policy, have therefore become much more vulnerable after their integration into the EMU.

Figure 10. Cumulative response of current account ratio.



The bottom-line of these robustness checks is that the ability of a weakly countercyclical fiscal rule to dampen the volatility of the current account ratio is higher for economies where the transmission mechanism is stronger. The cost of procyclical policies becomes larger after reforms that make financial or labour markets more efficient. Independently of the characteristics of the economy, a weakly countercyclical fiscal rule is more likely to outperform the benchmark rule in terms of the stability of the current account.

5. Implementation

Procyclical policies contribute to creating larger imbalances. The drying up of external finance, and the jump in public debt, hinder a smooth economic recovery as they limit future

policy options. A better management of fiscal policy could have softened the consequences of the crisis. But is variable spending an effective and feasible alternative? There are several theories giving a rationale as to why policymakers favour using suboptimal procyclical policies. Some argue that procyclical policies are due to imperfect information on cyclical conditions (Golinelli and Momigliano, 2006). In this case, as the countercyclical effect of automatic stabilisers is not very large, governments may attempt to introduce additional countercyclical spending. For EMU countries, countercyclical fiscal policies can act as a substitute for the loss of monetary policy, and is similar to the rise of interest rates in a typical Taylor rule reaction function of the central bank. However, the implementation of discretionary policy changes in spending usually is a lengthy process, which depends on budgetary procedures and parliamentary approval. Prompt adjustments in spending in the wake of new information on the economic cycle are subject to political discussion, and real time revisions of cyclical conditions are easily misinterpreted. An alternative to countercyclical spending are taxes. Taxation is a faster and more targeted policy measure. There are several ways in which tax policy can be made more countercyclical, with for example automatic tax triggers on VAT, corporate taxes, etc.. Countercyclical spending or taxation come at the cost of more volatility in the deficit. This puts at risk the 3% barrier in the Stability and Growth Pact. A less controversial solution is possible in which surpluses are put in a 'rainy day' fund during an economic boom. In the following crisis, additional spending can be financed by this fund. Balassone *et al.* (2008) discuss the application of rainy day funds to the Stability and Growth Pact.

Most theories see procyclical policies as the outcome of a political distortion in the budget process. The basic tenet of these models is that fiscal surpluses generate political pressure for additional public spending or tax cuts (Talvi and Vegh, 2005).^{9,10} Empirical evidence for EU countries shows that governments react in an asymmetric way to the cycle, creating a debt bias. Moreover, there is also evidence of an electoral cycle in this bias (Hallerberg and Strauch, 2003). Fiscal rules, whether numerical or procedural, that eliminate or constrain this procyclical bias would probably pay off more than very sophisticated countercyclical spending measures. A reform of fiscal institutions would probably support countercyclical policies. Manasse (2006) finds that fiscal rules not just curb the deficit bias but also enhance countercyclical policy. Although Galí and Perotti (2003) find evidence of a similar change in EU countries' policies, other papers find little evidence that the Maastricht rules, and consequently the SGP, have altered the cyclical behaviour of the budget (Balassone *et al.*, 2006).

6. Conclusions

The speed of the recent economic downturn has exposed growing underlying imbalances in both external and fiscal balances. We argue that procyclical fiscal policies have contributed to the build-up of these imbalances. We use a simple RBC model of a small open economy

⁹ The leading theory for developing countries is that governments are cut off from credit lines when an economic crisis hits, thus starving public expenditure.

¹⁰ Two different – but not mutually exclusive – political theories explain the distortion at the root of the increased lobbying efforts in booms. On the one hand, Lane and Tornell (1996) and Tornell and Lane (1999) argue that multiple power blocs (ministries, lobby groups, etc.) compete for a bigger share in spending. On the other hand, Alesina *et al.* (2008) assume that voters have imperfect information on the budget process. In order to avoid that corrupt governments distribute tax revenues to particular interest groups, voters anticipate this, and appropriate part of the additional tax revenues in economic booms by voting for increases in their preferred public good, or a tax cut. This forces the government to a procyclical bias in taxation. As fiscal revenues increase in an economic boom, more resources are available, and this increases the level of competition. Spending may even grow more than proportionally relative to the increase in income. The same argument for the excess rise in spending can also lead to a disproportionate fall in taxation.

to analyse the effect of different spending policies on the volatility of consumption, investment and the current account balance. We calibrate the model on data for Spain, and simulate the effect of different spending policies in response to economic shocks.

Procyclical fiscal policy is harmful for economic stability. Temporary spending boosts in booms distort intertemporal allocation decisions, and generate very volatile cycles in investment and the current account. Countercyclical spending instead dampens the investment boom – also reducing the need for external finance – and thus smoothenes the cycle. This mechanism behind large and persistent fiscal and current account imbalances is a robust finding. If the economy is more open, labour and capital markets more flexible, and shocks more persistent, the effects of different spending policies are strengthened.

We find that this simple model mimics quite well the behaviour of consumption, investment, and current account volatility in a small open economy like Spain. For a small degree of procyclicality in fiscal policy, we can match the persistence and the volatility of output and investment, as well as that of the current account. The model can explain the relation between the degree of cyclicity of fiscal policy, and the volatility of consumption, investment and the current account in OECD countries.

Our approach disregards important issues like the interaction between a national fiscal policy and a common monetary policy, the terms of trade, debt finance, and the harmful growth effects of distortionary taxation. Extensions of this simple model to include nominal rigidities are likely strengthening our conclusions. For EU economies, the risks of downward adjustment and the welfare losses of crises are larger due to nominal rigidities. The gains of countercyclical policy must therefore be larger.

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Fiscal consolidations with external imbalances

by Salvador Barrios and Sven Langedijk ⁽¹⁾

Abstract

In this paper we investigate the influence of external imbalances on the success of fiscal consolidations. Our analysis focuses on past experiences with fiscal consolidations in order to derive policy implications which can be useful in the current EU and, more specifically, euro area context. In particular, it has often been argued that in the current crisis fiscal consolidation strategies would be especially costly from a growth perspective in euro area countries with competitiveness problems, especially because these countries could not adjust downward their nominal exchange rate. Moreover, heightened global risk aversion has increased the cost of external borrowing sharply thus resulting in dangerous spiralling effect between low growth and high borrowing cost. Our analysis shows that large current account deficits can significantly impair the ability of countries to achieve successful fiscal consolidations suggesting that competitiveness improvement could contribute positively to reducing deficit and debt levels. Our econometric results show that nominal or real effective exchange rate depreciation do not necessarily lead to significant reduction in debt levels after a fiscal consolidation episode has been started. Therefore the absence of the nominal exchange rate adjustment (which would be needed to reduce the current account deficit) does not necessarily represent a major hurdle to achieve successful fiscal consolidation. This suggests also that the absence of the exchange rate devaluation in the euro area tend to shift the toll of the adjustment more decisively on structural reforms in order to increase growth in the medium to long run and to improve competitiveness. While exchange rate devaluation/depreciation do not seem to influence the success of fiscal consolidations significantly, the exchange rate regime matters however for the choice of consolidation measures. In particular, we show that expenditure-cuts based consolidations and, in particular, the reduction or contention of public wages tends to enhance the success of fiscal consolidation for countries under fixed-exchange rate regimes. This result suggests that fiscal consolidation strategies are therefore more likely to reduce debt level and to correct external imbalances if they can effectively influence the wage and price setting in the private sector.

Keywords: EU, euro area, current account, government budget deficit, exchange rate, competitiveness, fiscal consolidation.

JEL Classification: E62, F32, F31, F41, H3

(1) European Commission, Directorate General for Economic and Financial Affairs. This work is partially based on results published in the Public finances Report in EMU 2010, Directorate General for Economic and Financial Affairs, European Commission. The opinions reflected in this paper are not necessarily those of the European Commission.

1 Introduction

While nearly all EU countries will have to reduce their deficit and debt levels in the coming years, the most appropriate strategies to achieve these goals are far from uniform, however. A key element of differentiation rests on the medium-term growth prospect and the size of macroeconomic imbalances. For instance, Greece, Spain, and Portugal GDPs are expected to grow on average at -1.7%, 0.2%, and 0.6% per annum respectively in 2010 and 2011 while in the rest of the euro area GDP is expected to expand by 1.4% on average.¹ Such a bleak macroeconomic outlook can be directly linked to the necessary post-financial crisis adjustment the aforementioned countries would need to achieve. In particular, the dual challenge of reducing debt levels and restoring external competitiveness is likely to weigh on their future growth performance. Recent turbulences in financial markets illustrate such a concern as evidenced by the fact that countries that entered the crisis with the most deteriorated current account have suffered the sharpest increase in public debt servicing costs, despite them having announced (and in some cases already implemented) ambitious fiscal consolidation plans.² Fiscal consolidation efforts must therefore contribute to reducing macroeconomic imbalances. In turn, this is likely to affect the pace of the economic recovery and thus the ability to contain further rises in public deficit and debt levels. Moreover, low inflation to restore competitiveness implies high real interest rates and low nominal growth, further weighing on dynamics of the debt-to-GDP ratio.

While these issues are not new, the context under which they must be tackled is rather unusual for at least three reasons. First, the financial crisis that initiated in 2007 is not yet over and credit flows to the economy remain subdued in most European countries. Second, euro area countries no longer avail of the exchange rate as macroeconomic adjustment device which shifts the toll of adjustment more decisively on structural reforms to improve competitiveness. Third, the run-up to the 2008/2009 financial crisis was marked in a number of EU countries by expansionary fiscal policies which, in the wake of buoyant tax revenues have followed expansionary fiscal policies by increasing levels of public spending and, this way, fuelled domestic demand. From a macroeconomic perspective, expansionary fiscal policies might have contributed to worsen external positions which, with hindsight, proved particularly distressful in a context of heightened risk aversion in financial markets. Fiscal policy might also have affected microeconomic decisions, in particular policies promoting sustained increase in public employment and wages as well as generous tax breaks which in certain cases might have affected relative prices and real exchange rates dynamics.³

In this paper we investigate these issues by analysing the determinants of successful fiscal consolidations focusing specifically on the role played by current account imbalances and exchange rate adjustments. We consider past experiences with fiscal consolidations considering EU27 countries and a sample of non-EU OECD countries where systemic financial crises had been more prevalent in the past. The success of fiscal consolidations is gauged according to a given level of debt reduction which is likely to reflect the priority of EU policy makers in the current juncture.

¹ Source: European Commission spring 2010 forecast.

² For instance, Barrios et al. (2010) show that countries that experienced the sharpest deterioration in their current account in the 2000s were particularly exposed to sharp increases in government bond yields between 2007 and 2009.

³ Generous tax break for housing acquisition in particular has nurtured windfall tax revenues and promoted credit-led expansionary phases with private indebtedness reaching unprecedented levels in many EU countries, see European Commission (2009).

Our results show that a widening of current account imbalances preceding a fiscal consolidation episode makes it significantly less likely for such consolidation to succeed. However, we do not find evidence suggesting that the exchange rate depreciation (which could be expected to reduce current account deficits) would facilitate a successful fiscal consolidation. A closer look at this result suggests that inflationary pressure may have in many instances cancelled out the potential benefits from devaluation/depreciation. We show indeed that a more important role has been played in the past by price and wage adjustment whereby governments could effectively increase the probability to achieve a successful fiscal consolidation. In particular expenditure-based consolidation focusing on real public wages reduction appear to have played a significant role in order to achieve successful fiscal consolidations in countries with a fixed or quasi-fixed exchange rate regime. More specifically, in the current context, euro area countries with both fiscal and competitiveness challenges could implement fiscal consolidation strategies reducing public expenditure and, by the same token, attempting to facilitate price and wage adjustment in the private sector.

The rest of the paper is organised as follows. In Section 2 we discuss the main questions concerning the link between external imbalances and the success of fiscal consolidation drawing on the recent literature concerning the EU. In Section 3 we review the recent evolution in public finances, current account and exchange rates in the EU in the run-up to the global financial crisis. In Section 4 we draw policy implications for the current context by testing econometrically the link between the success of fiscal consolidations and external imbalances focusing on the role played by exchange rate variations and current account imbalances. Section 5 summarises our findings and discusses policy implications.

2 External imbalances, fiscal consolidation and adjustment: the challenges ahead.

The existing literature is relatively scant on the effects of unwinding of macroeconomic imbalances on budgetary developments. Existing studies tend to suggest that post-boom periods which are usually accompanied by the correction of current account (and competitiveness) imbalances may be particularly costly from a growth and budgetary perspective, see e.g. Corsetti et al. (1999) and Mussa (2005). In addition, existing studies on the influence of external imbalances on the success of fiscal consolidations have primarily focused on the influence of exchange rate depreciation/devaluation, see e.g. Lambertini and Tavares (2005) and Hjelm (2002). In this section we provide an overview of these questions and review recent evidence concerning the euro area in the run-up to the current financial crisis.

2.1 The relation between fiscal policy and external imbalances: evidence for the EU.

Recent empirical studies point to a significant influence of public spending on price and exchange rates dynamics which may have an indirect bearing on current account adjustment.⁴ In particular, recent evidence in the case of Ireland shows that an increase in government wage expenditure may lead to short-run appreciation in real exchange rates (see Bénétrix and Lane, 2009) and can also have long-run effects on external competitiveness (see Galstyan and Lane, 2009). Government wage spending may also have wider consequences on a country's competitiveness through its impact on labour market outcomes. For instance, Pérez and Sánchez (2010), consider the cases of Germany, France, Italy and

⁴ Government public spending may also have an impact on other variables which may also affect a country's competitive position, such as private investment or profit, see in particular Alesina et al. (2002). These other aspects are not considered here, however.

Spain and show that public sector wages tend to exert upward pressure on private wages in these countries either directionally by leading private sector wage dynamics (France and Italy) or through positive feedback process between public and private wages (Germany and Spain). In some cases also generous tax breaks, especially concerning taxation of the most volatile tax components (such as housing or corporate taxes) have further fed booming internal demand and contributed to deteriorate current account balance further, see Barrios and Fagnoli (2010).

Fiscal profligacy might in turn have hampered government ability to run counter-cyclical fiscal policy once the effects of the global financial crisis unfolded with countries whereby countries that had experienced the largest tax revenues windfalls had to implement fiscal contraction policies to tame down fast rising public deficit and debt, see Barrios and Rizza (2010). Part of this fiscal policy U-turn was directly linked to the sudden spike in government bond yields and the difficulties to keep on financing both private and public debt at affordable price, see in particular Barrios et al. (2010). The occurrence of sudden stop in external financing and/or the sharp increase in private and public debt servicing cost evidenced in the current crisis suggest that while current account deficits could in principle be more easily financed in EMU, this could also eventually weaken the resilience of economies to large external shocks and sudden rise in global risk aversion. For instance Langedijk and Roeger (2007) find that the absence of an exchange risk premium in EMU allows an increase in capital mobility resulting in a lower correlation between domestic savings and investment. Accordingly, increased capital mobility seems to have been an important driving force behind the current account dynamics in the EU. Due to the reduction of risk premia, investment – and especially housing investment - responds strongly to exogenous shocks. This leaves countries that have benefited most from reduction in risk premia (such as Spain, Ireland and Greece) vulnerable to adverse risk premium shocks.

2.2 Fiscal consolidation and competitiveness adjustment: risks and challenges for euro area countries

In absence of exchange rate devaluation as in the case of euro area countries, the toll of the adjustment in the short-term falls onto prices and wages while reforms need to be undertaken in order to raise productivity level in the medium to long run. These adjustment may in turn have adverse consequences for public finances: in times of competitiveness adjustment and overvalued real exchange rates, real growth is likely to be low and real interest rates high as relative prices adjust, resulting in a high snowball effect, especially if debt itself is high. These effects on the debt-to-GDP ratio can be disentangled as follows. First, the numerator, nominal debt is affected by the impact of adjustment dynamics on the structural and nominal budget balance (and thus net lending). Second, the denominator, nominal GDP deviates from potential (nominal) GDP and will need to adjust downward, as both real GDP and the price level are above their potential before the bust. The deviation of prices from the equilibrium price level is reflected by the overvaluation of the real exchange rate. The downward adjustment process reduces the denominator and increases the nominator, leading to a higher debt to GDP ratio when imbalances have been unwound. In fact the direct effect of downward real exchange rate adjustment on public finances can be considered similar to the nominal depreciation of a currency in a country with largely foreign denominated debt. Instantaneous adjustment of the imbalances would lead to an increase of the debt-level to that level. In the case of an immediate price adjustment there would not, however, be an effect of adjustment through output losses. In absence of nominal exchange adjustment therefore the fiscal strategy and flanking policies to be adopted might be different than in a case where such devaluation is possible. For instance, Martin et al. (2007) illustrate this by distinguishing between industrialised countries that experienced external adjustment via real effective exchange rate depreciation during busts and those that relied on an internal adjustment process and experienced no exchange rate depreciation but corrected real wage

and tradable/non-tradable sector imbalances via domestic price adjustments. They find that the difference between internal and external adjustment is correlated with the degree of macroeconomic imbalances and balance sheet problems. Internal adjustment seems more prevalent when financial vulnerabilities, excess demand and competitiveness loss remain relatively contained in the boom. In the bust, internal adjusters experience more protracted but softer downturns than external adjusters as imbalances unwind more slowly. More generally, the speed and the economic and budgetary costs of the adjustment will depend both on the degree of price and wage flexibility and on the ease with which resources can be reallocated across sectors of the economy. To the extent that price and wage adjustment is hampered by nominal and real wage rigidities and product prices do not react to demand signals, the adjustment process will be stretched and may eventually be achieved at a permanently lower level of output and higher level of structural unemployment, see Deroose et al. (2004).

2.3 Are fiscal consolidations less successful under fixed exchange rate regimes?

In a fixed exchange rate regime or currency union, fiscal consolidations and debt reductions can be expected to be especially costly as export-led recoveries can not be pursued by devaluations/depreciations. It can only be mimicked by substantial downward price and wage adjustment. However such a downward adjustment would also imply an increase in the debt to GDP ratio in the short-run as discussed above. Considering nominal and real price and wage rigidities, it also entails risk of protracted period of low growth and/or a deflationary spiral.

The absence of nominal exchange rate adjustment may not be as costly as it seems in first instance, however. In fact two conditions must be fulfilled in order for an exchange rate devaluation to enhance the success of fiscal consolidations: (i) it needs a strong and credible policy commitment to lower inflation in the long-run, though a pick-up in inflation in the short run may help reducing the debt ratio (ii) exchange rate pass-through must be contained in order to effectively improve competitiveness. While fiscal consolidation can be helpful to fulfil condition (i), fulfilling condition (ii) hinges on structural policies (that increase productivity) and the export-market structure (and foreign vs. domestic mark-ups) which are more difficult to monitor and influence, see Goldberg and Knetter (1997) and Alesina and Perotti (1996). Only a handful of papers have so far provided evidence on fiscal consolidation and exchange rates suggesting that the effect of exchange rate (including both nominal and real) on the success of fiscal consolidations albeit significant is relatively small, see in particular Lambertini and Tavares (2005) and Hjelm (2002), while other authors have found that that real exchange rate depreciation favours the start and continuation of fiscal consolidation episodes but fail to find evidence that real exchange rate depreciation favour debt reduction significantly, see Ahrend et al. (2006).

As discussed above, public expenditure cuts can have favourable consequences on the supply side of the economy, especially those spending reductions accompanied by reforms increasing labour supply and/or lowering unit labour cost. Cuts in public wages can also spill over to wage formation in the private sector and thus indirectly alleviate governments' budgets by improving external competitiveness through real depreciation, see Lane and Perotti (2003) and Alesina et al. (2002). By contrast, fiscal consolidations increasing tax pressure on wages could have the adverse effect of reducing both take-home pay and employment, depressing domestic demand and slowing down economic growth.⁵ A closer look at past evidence indicates that while exchange rate depreciations are sometimes associated with successful of fiscal consolidations, the relationship is far from close. This is

⁵ The final impact of wage-related taxes would, however, depend on national labour market institutions and wage bargaining processes, see Boltho and Glyn (2006).

illustrated in Graph 1 plotting the evolution of the annual change in the real and nominal effective exchange rate together with indication of whether a fiscal consolidation undertaken in a given year was or not successful.⁶ Fiscal consolidation is defined as an improvement in the cyclically adjusted primary balance (CAPB) of at least 1.5% taking place in one single year or taking place over three years if, in addition, each and every year the CAPB does not deteriorate by more than 0.5% of GDP. A fiscal consolidation is in turn considered as successful if it lowers the public debt level by at least five percentage points of GDP in the three years following a consolidation episode.⁷

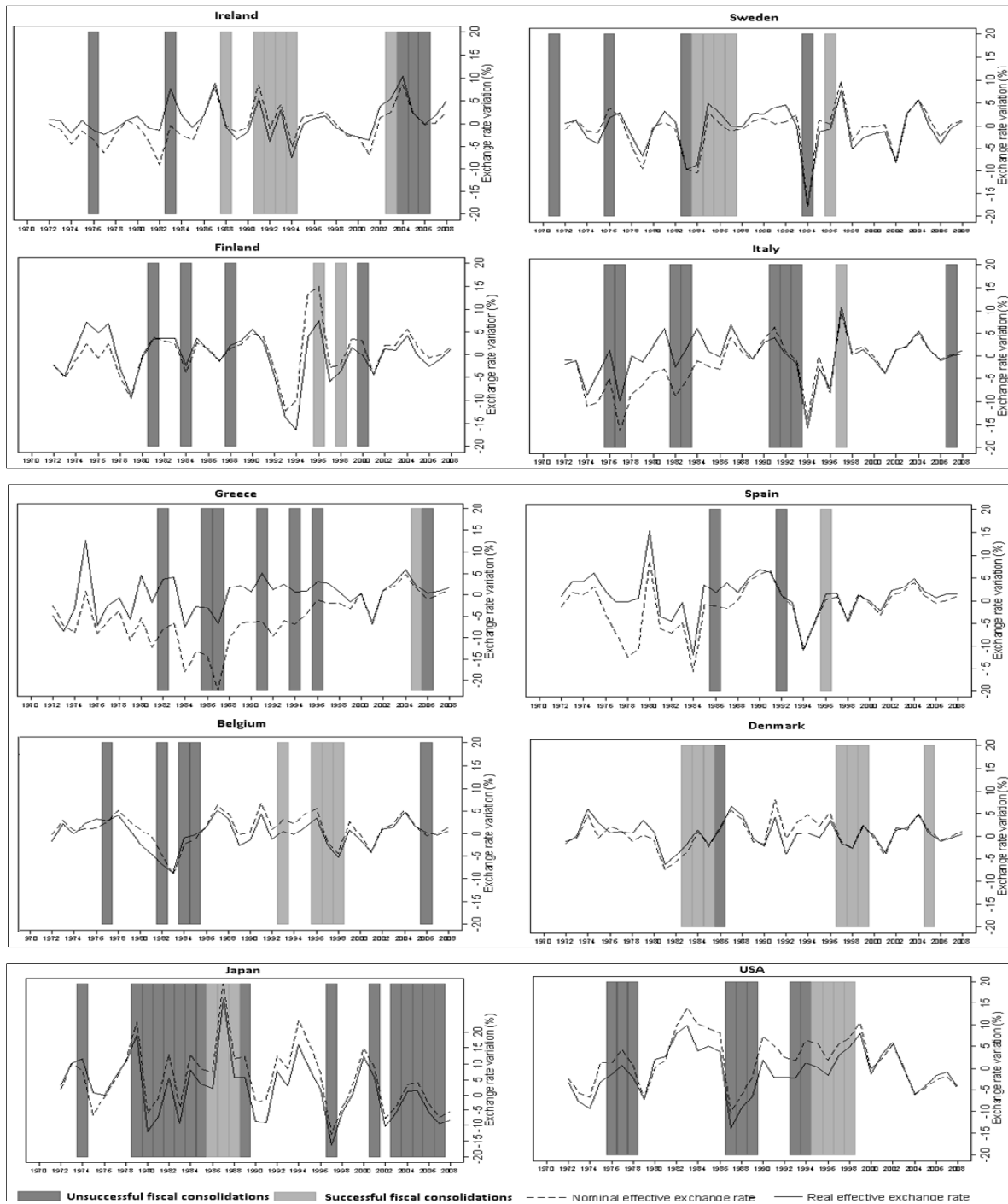
Graph 1 reports episodes of successful and unsuccessful fiscal consolidations together with annual variation in nominal and real effective exchange rates. Graph 1 includes, among others, evidence for Ireland and Denmark. These two countries that are often referred to as having achieved successful fiscal consolidations in the wake of large exchange rate devaluations during the 1980s and early 1990s, see Giavazzi and Pagano (1990). Importantly, in both these countries the real and nominal exchange rates moved closely enough during these periods reflecting the fact that the nominal exchange rate depreciation did not translate into significant inflationary pressures. Two other prominent examples of successful fiscal consolidations accompanied by exchange rate depreciations/devaluations are Finland and Sweden during their respective financial crises in the 1990s, see in particular European Commission (2009). Here again, a close correlation between real and nominal exchange rate suggest that in both cases upward inflationary pressures were relatively contained. The ensuing export-led recoveries helped achieving successful fiscal consolidations in both cases. Last but not least, these countries also achieved high quality of public spending contributing to boost potential growth.⁸

⁶ The exchange rates figures reported in Graph 1 are based weighted average of bilateral exchange rates with main trading partners. Source: OECD

⁷ Alternative definitions of fiscal consolidation and of their success are of course possible. The pros and cons of such definitions are discussed in Barrios et al. (2010). The data for the CAPB and the debt ratio are taken from DG Ecfm Ameco database.

⁸ See in particular Gylfasson et al. (2010) and Barrios and Schaechter (2009).

Graph 1: Successful and unsuccessful consolidations and real and nominal exchange rates in selected sample of countries



Note: The real effective exchange rate is based on cpi differential
 Source: Commission services and OECD.

Other episodes of fiscal consolidations illustrate how the association between exchange rate devaluation/depreciation and the success of fiscal consolidations is by no means automatic. For instance, as shown in Graph 1 the Irish fiscal consolidation episode that took place in the early 1980s did not appear to be successful in reducing public debt levels, while such consolidation was preceded by a depreciation of the nominal exchange rate. The ensuing appreciation in the real exchange rate suggests in this case that inflationary pressures eventually cancelled out the expected positive effect of the exchange rate depreciation. Another case in point is Greece which has sometimes been considered an example of how the absence of the exchange rate adjustment was especially damaging for peripheral EU

countries in the current juncture.⁹ Greece has in the past undertaken several fiscal consolidations, however these were rarely successful. In particular the large depreciation of the Drachma in the early 1980s did not lead to a successful fiscal consolidation in the subsequent years. Here also an explanation for this can be found in the fact that the nominal exchange rate devaluation eventually resulted in real exchange rates appreciation due to inflationary pressures.

The cases of non-EU OECD economies also illustrate that the relationship between exchange rate depreciation/devaluation and the success of fiscal consolidation may occasionally be the opposite of what one would expect. For instance, Graph 1 shows that, in the case of Japan in the second half of the 1980s, successful fiscal consolidations were preceded by or coincided with sharp exchange rate appreciations contrary to the received idea that depreciations are needed to smooth the negative impact of fiscal consolidations. The other non-EU economy considered here is the US: in this country the sharp devaluation of the dollar in the mid-1980s (both nominal and real) was not sufficient to achieve successful fiscal consolidation in the following years. On the contrary, successful fiscal consolidations in the second half of the 1990s were accompanied by real and nominal exchange rate appreciation.

2.2 The success of fiscal consolidations in presence of current account imbalances

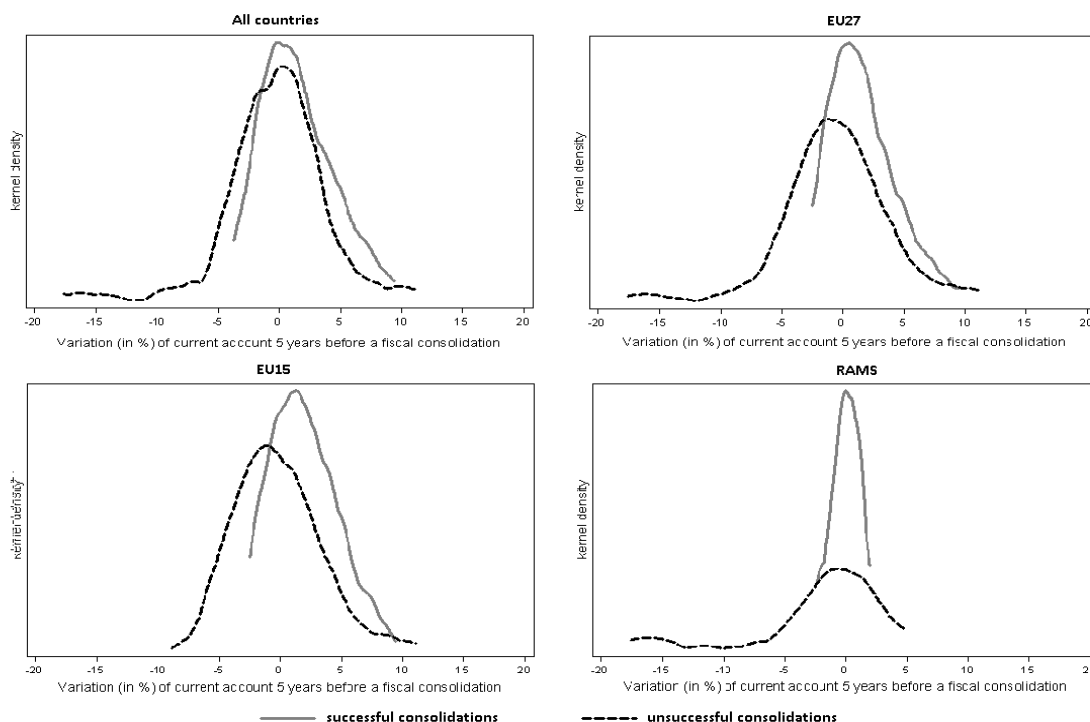
The evidence shown in Graph 1 suggests that a depreciation of the real exchange rate needs not be necessarily associated with successful fiscal consolidations. In fact, in order to better understand the link between exchange rate depreciations and the outcome of fiscal consolidations it is necessary to consider also the context under which these depreciations take place. For example a country may run a large current account deficit stemming from buoyant internal demand and low interest rates during a relatively long period of time. These evolutions may lead to REER appreciation and high levels of private debt while the level of public debt might remain stable or even tend to decline. In such context, a severe adverse macroeconomic shock may lead to a significant reduction in economic activity, higher interest rates, and/or to sharp private deleveraging process and protracted economic slowdown. While a rapid depreciation of the REER would help improve the external balance and positively contribute to the growth recovery, domestic demand may remain depressed not only due to the fiscal consolidation, but also due to prices and wages deflation and the high level of private debt. Thus at the time when public finances need to be consolidated, the high level of private debt may push the private sector to consolidate too, further reducing economic growth and possibly counteracting the direct positive impacts of the REER depreciation on the outcome of fiscal consolidation. Generally speaking, an analysis of the link between external imbalances and the success fiscal consolidations must also take consider the role played by current account dynamics. Graph 2 provides descriptive evidence on this: a kernel plot density curves (equivalent to histograms represented over a continuous space) trace the frequency of successful and unsuccessful fiscal consolidations against past current account dynamics (represented on the x-axis by the change in the current account five years before a fiscal consolidation episode starts).¹⁰ Evidence for all countries in the sample included in the top left diagram (i.e. EU27 + OECD no EU countries) suggests that, while both successful and unsuccessful fiscal consolidations are more frequently distributed around small values, there is a tendency for successful consolidations to be associated with positive past current account changes relative to unsuccessful fiscal consolidations. The same definition of success for fiscal consolidations used in Graph 1 is used here. Evidence for the EU27 and the EU15 in the top right and bottom left diagrams provides more

⁹ See Feldstein, (2010).

¹⁰ Change in the current account over five years (instead of shorter time period) is considered to capture the structural nature of a change in the current account position.

conclusive evidence suggesting that unsuccessful fiscal consolidations tend to be preceded by substantial deterioration in current account positions while successful fiscal consolidations episodes tend to be preceded by improvement in the current account. The evidence is more nuanced for recently acceded Member States (RAMS), reflecting the fact that these countries have tended to run current account deficits linked to their catching up process since the mid-1990s onward, especially so since their accession to the EU.

Graph 2: Past current account variations and the success of fiscal consolidations: evidence using Kernel density graphs



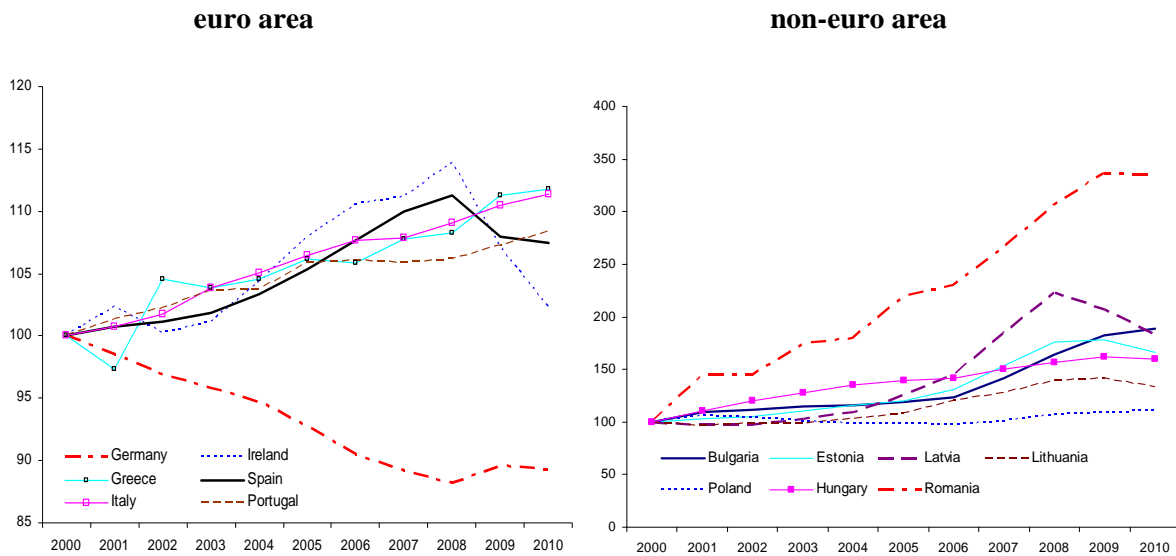
Note: Past current account variations represent change in percentage points of the current account balance between t-5 and t-1 with t being the year a fiscal consolidation episode is started
 Source: Commission services and OECD.

3 External imbalances and public finances in the run-up to the global financial crisis

The run-up to the global financial crisis was characterised by a sharp widening of current account imbalances in the EU (in particular in the euro area) together with growing divergence in real exchange rates, especially in countries where private demand was especially buoyant and asset prices (in particular housing) appreciated most.¹¹ Recently acceded and peripheral euro-area Member States saw thriving domestic demand and credit booms, with domestic prices increasing significantly. At the same time, others experienced slow domestic demand growth and falls in their domestic prices vis-à-vis EU and euro-area competitors which translated into substantial deterioration in their competitiveness as measured by the nominal labour cost, especially with respect to Germany, see Graphs 3.

¹¹ See in particular European Commission (2009)

Graph 3: Nominal unit labour costs- selected countries (2000 = 100)

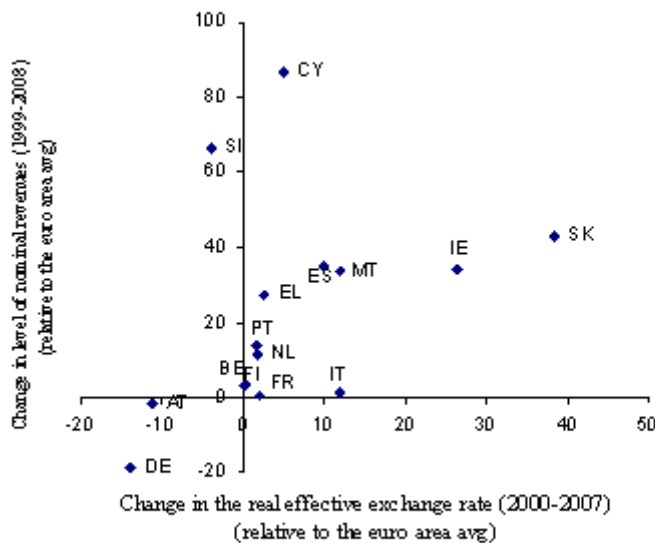


Source: Commission services

The dispersion of current account balances increased steadily from the mid-1990s, reaching an all-time high in 2008.

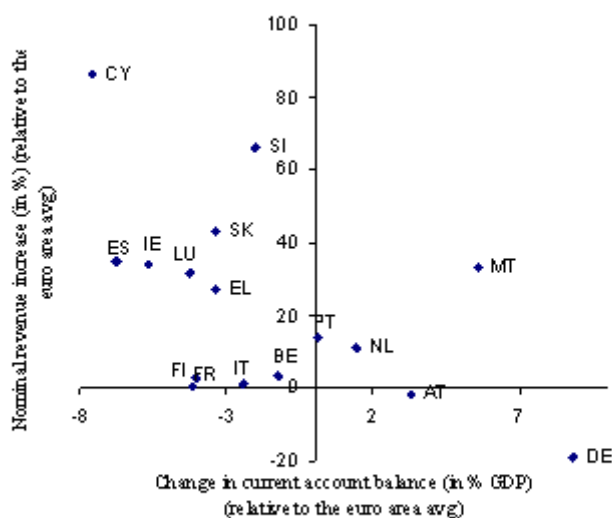
To the extent that they point to a potentially unsustainable growth pattern and inflated nominal GDP, external imbalances may signal future budgetary risks not captured by standard indicators used for budgetary surveillance. In the early years of EMU, high revenue growth has generally been accompanied by deteriorating current account balances and competitiveness, while improving current account balances and competitiveness have been associated with low nominal revenue growth. Graphs 4 and Graph 5 illustrate these features for euro-area countries.

Graph 4: Changes in the real effective exchange rate vs. changes in nominal tax revenues



Note: Figures relative to the euro area average
Source: Commission services

Graph 5: Change in the current account vs. changes in nominal tax revenues



Note: Figures relative to the euro area average
 Source: Commission services

Both the high level of output growth and its composition, which was tilted towards highly taxed components such as domestic consumption and investment in housing, induced high government revenue growth in a number of countries. A rising share of the tax base increase was due to temporary and unsustainable factors however as aggregate demand consistently exceeded output and prices and wages increased at the cost of deteriorating competitiveness. Domestic asset price developments, in particular housing prices, also contributed to windfall revenues and were in some cases promoted by favourable tax treatment, though with large differences across countries.¹² The high revenue growth was generally matched by consistently high nominal growth of government spending. Thus, windfalls stemming from high price and wage inflation and booming domestic demand were spent. To the extent that increases in expenditures more and more reflected revenues that turned out to be temporary, contingent budgetary risks built up.¹³

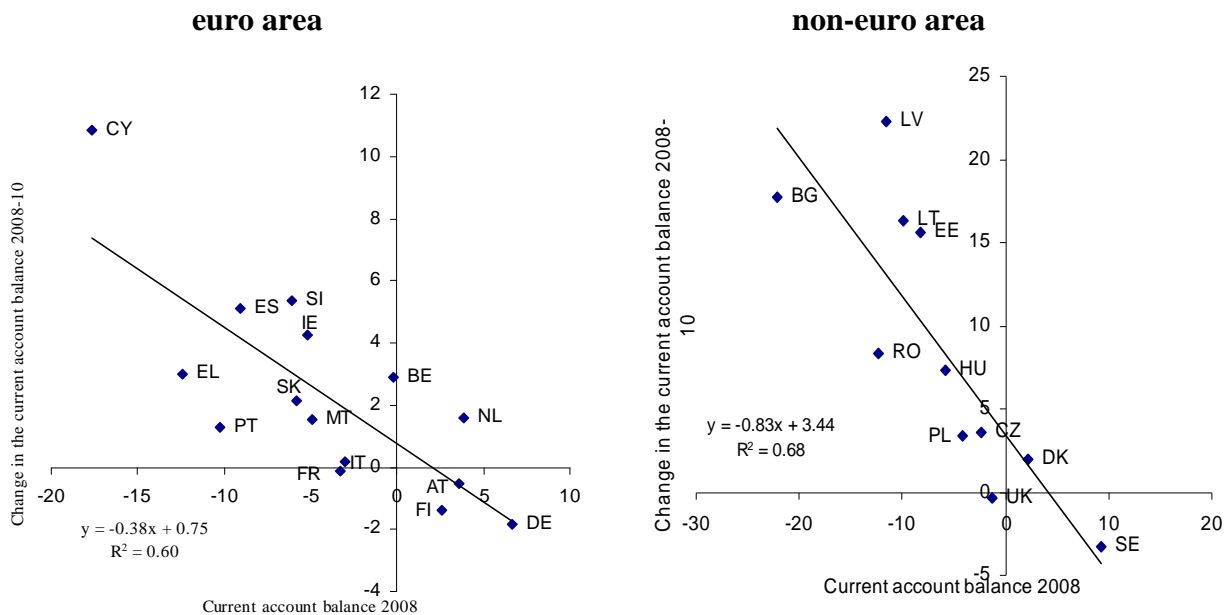
Increased uncertainty and the sudden increase of risk aversion in international capital markets during the crisis forced a rapid unwinding of imbalances. Capital kept on flowing in but at significantly higher cost while domestic credit growth tumbled, reinforcing the sharp contraction in private consumption and investment. As a result, imports contracted more than exports and the current account deficits were reduced as evidenced by Graph 6 showing

¹² See for instance European Commission (2009) showing the importance of domestic credit growth for government finances. On the other hand European Commission (2006) provides evidence according to which high tax revenue growth was to some extent related to the effect of entry into the euro area, which in some of the Member States led to a large decline in the exchange risk premium feeding credit growth.

¹³ Countries that experienced a long period of high growth and inflation tended to spend revenue windfalls, as potential growth and estimates of structural revenue levels tended to be overestimated. Ex-post downward revisions in potential growth estimates put continuous downward pressure on the measured structural budget balance, as growth declined towards and below its 'true' potential. The assumptions made about the length of cycles in the filtering of cyclical effects from structural effects affect the size and risk of such measurement errors. See Langedijk and Larch (2010) for an assessment of the effect of different smoothing parameters for potential output filtering on ex-post revisions of cyclically-adjusted budget balance estimates.

the high correlation between the level of current account imbalances in 2008 and their change in the period 2008-2010.

Graph 6: Level of the current account balance in 2008 vs. changes in the current account balance in 2008-2010 in selected Member States

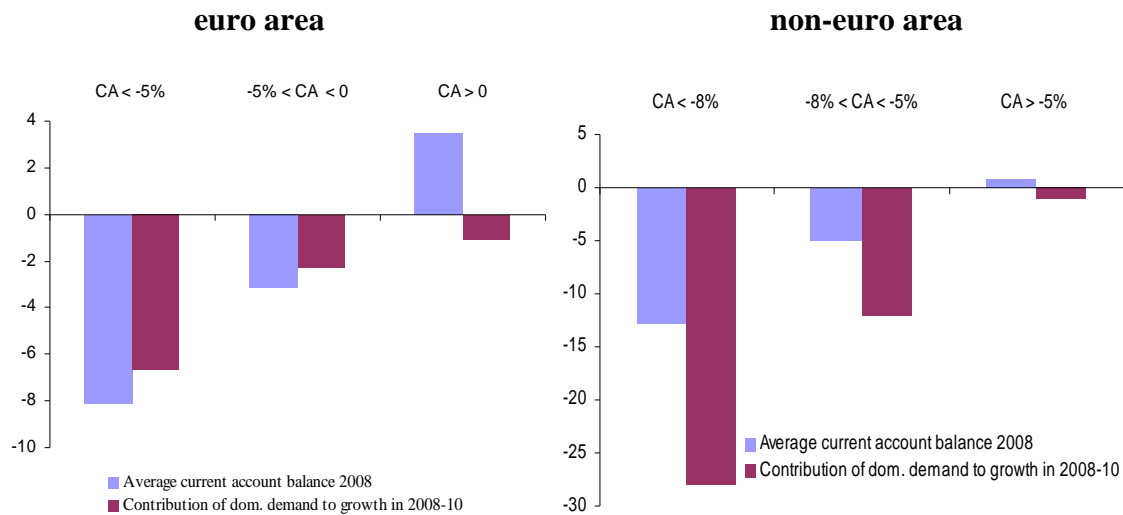


Source: Commission services.

Such an adjustment is, in turn, being characterised by a sharp contraction in domestic demand. As shown in Graph 7, the contribution of domestic demand to growth in 2008–10 is particularly negative in countries that had large current account deficits in 2008.¹⁴ Countries outside the euro-area with that saw a sharp reversal of capital flows had particularly negative contributions of domestic demand to GDP growth over that period (the Baltic states and Bulgaria). In the euro area, domestic demand dropped sharply in Ireland and Spain, and to a lesser extent in Greece. However, the convergence in current accounts is taking place with only limited rebalancing in price competitiveness as previously indicated in Graph 3. In some countries, austerity packages included sizeable cuts in public wages, and private sector wages and prices are also adjusting. Such adjustment occurred in particular in Ireland and the three Baltic states while Greece, Portugal and Spain announced also similar measures in 2010.

¹⁴ The rebalancing comes at a high cost in terms of underutilisation of labour and capital. See Quarterly Review of the euro area I-2009, Directorate General for Economic and Financial Affairs, European Commission.

Graph 7: Current account balance in 2008 and cumulative domestic demand contribution to growth 2008-2010



Source: Commission services.

The success of the fiscal consolidation packages adopted by the aforementioned countries remains largely uncertain, however. In the sequel we investigate the characteristics of fiscal consolidations that are the more conducive to success by revisiting past experiences with fiscal consolidations through econometric analysis.

4. External imbalances, financial crises and the success of fiscal consolidation: econometric evidence and insights for the current crisis.

This section provides econometric evidence on the determinants of successful fiscal consolidations using probit estimation techniques. As mentioned previously the decision to undertake a fiscal consolidation and the success of these consolidations is gauged according to the value taken by the cyclically adjusted primary balance and the debt respectively. The experiences of EU countries and a set of non-EU OECD countries are considered over the period 1970-2008. Overall, Section 2 showed that the evidence on the relationship between exchange rate depreciation/devaluation and successful fiscal consolidations was mixed. However, countries undertaking fiscal consolidations following a period of growing current account deficits tended to experience more difficulties in being successful. In the sequel we provide econometric evidence on the determinants of successful fiscal consolidation where the dependent variable is a dummy indicating whether a consolidation was successful or not, according to the criteria described earlier. Note that the success of a fiscal consolidation is only estimated where the decision to consolidate is observed. The results can therefore be considered as indicative of the determinants of successful fiscal consolidations conditional upon fiscal consolidation taking place. The explanatory variables are:

- The business cycle position, measured for the starting year of each consolidation episode by the value of the output gap as defined in Section III.5.1, captured by three dummy variables. These capture whether the consolidation starts during a downturn, a recovery or a protracted slowdown, with an expansion being the omitted category.
- The debt-to-GDP ratio in year $t-1$, with the year t being the starting year of a consolidation episode.¹⁵
- The nature of fiscal consolidations, i.e., whether predominantly revenue or expenditure based, measured through the change between $t-1$ and $t+3$ of the cyclically adjusted primary expenditure as percentage of GDP. The change in the cyclically adjusted tax revenue as percentage of GDP is also considered, and equally defined over the period $t-1$ and $t+3$. This variable is considered separately from the cyclically adjusted expenditure variable due to co-linearity concerns.
- The strength of fiscal governance, measured for EU countries by a composite indicator based on information reported on the European Commission Fiscal Governance database; for non-EU OECD countries this reduces simply to whether or not the countries have a budget deficit rule in places based on information reported in Guichard et al. (2007). The influence of IMF assistance, measured by a dummy variable taking the value of one for a consolidation episode coinciding with an IMF balance-of-payments assistance programme, zero otherwise.
- Finally, the snowball effect of public debt, defined as an interaction term between the debt level in $t-1$ and the differential between the growth rate and the interest rate paid

¹⁵ The role played by the starting debt level as determinant of successful fiscal consolidation provides a case of potential sample selection bias to the extent that the debt level is also likely to influence the choice of whether to consolidate or not. For a more detailed discussion of the sample selection bias in the context of fiscal consolidations, see Barrios et al. (2010).

on public debt.¹⁶ The choice of a debt-based criterion as opposed to a primary balance criterion for defining consolidation success raises an issue of specification in relation to the definition of consolidation, which remains in terms of primary balance. Simple debt dynamics imply that the size of the consolidation necessary to achieve a reduction in debt is directly proportional to the level of debt with the factor of proportionality equal to the interest rate-growth rate differential. The estimate of the determinants of successful consolidations controls for this debt scale factor by including the combined impact of growth and interest rate on debt accumulation (s.c. snowball effect) among the regressors.

Several econometric tests have been performed using probit estimation of the determinants of successful fiscal consolidations. The marginal effects of each explanatory variable using probit estimations are reported in Table 1.¹⁷ Estimations reported in Columns 1 and 2 of Table 1 show that even controlling for relevant variables the exchange rate depreciations, measured respectively by the effective nominal exchange rate (NEER) and the real effective exchange rate (REER) do not exert a significant influence on the probability of success of a fiscal consolidation, thus confirming that the link between exchange rate depreciation and the success of fiscal consolidations is not automatic.¹⁸ Column 3 includes a variable measuring past current account changes. This estimation shows that countries starting off from more favourable positions are also more likely to achieve debt reduction. This result in turn confirms that the sheer size of current account imbalances at the onset of a fiscal consolidation episode can have a strong bearing on the outcome of fiscal retrenchments.

The results concerning the other explanatory variables confirm the evidence put forward in the existing literature (see in particular Barrios et al., 2010 who use a similar specification for the same set of countries): the debt level and servicing cost of public debt tend to exert counter-acting effects: a high debt promotes fiscal consolidation and their success; a high debt is also associated with higher servicing cost and make a failure to reduce debt more likely. In addition, expenditure cut-based consolidations have higher chances of success as they enhance the viability (by penalising less medium-term growth prospects) of fiscal consolidation plans as well as their political credibility (by ensuring that public spending is lowered durably (which is less likely in case of tax hike-based consolidations)). We also find that adverse starting business cycle conditions lower the chances of success.

The inconclusive result concerning the effect of exchange rate depreciation/devaluation could reflect the fact that exchange rate realignments alone are not sufficient and/or that other policy changes are better suited to contributing to successful fiscal consolidations through wage and price adjustment.¹⁹ A more direct way to measure the impact of fiscal

¹⁶ More precisely, the snowball effect of public debt is measured by $\text{Debt/GDP}(t-1) * (i(t) - y(t) / (1 + y(t)))$, where i = interest rate and y is the nominal GDP growth in year t . The average value of this variable over the three-years following a consolidation episode is considered in order to match the criteria used to determine the success of a fiscal consolidation.

¹⁷ Note that when considering explanatory dummy variables (i.e. as in the case of the fiscal governance variable) the estimated marginal effect can be interpreted directly as indicating the impact of a given variable on the probability to achieve a successful fiscal consolidation while for continuous variables such interpretation cannot be made directly and requires a prior transformation of the explanatory variable which are done only to illustrate certain specific results.

¹⁸ The REER used in the econometric estimations reported in Table IV.4.1 is measured using unit labour cost differentials (source: OECD). The use of REER based on cpi differential as in Graph IV.4.1 did not yield qualitatively different results.

¹⁹ The absence of significant result on the exchange rate variable is also not in line with the limited evidence in the empirical literature, see for instance Hjelm (2002) and Lambertini and Tavares, (2005). However it must be noted that the criteria used here to define successful fiscal consolidations is different to the one used in the existing literature which is based on the cyclically adjusted primary balance and/or other macroeconomic

policy changes on countries' competitiveness is to use instead measures of public expenditure with a distinction between wages and non-wages government expenditure as in Lane and Perotti (2003). As suggested earlier, such changes might facilitate consolidation through export-led recovery directly, by reducing the government wage bill, and also indirectly by spilling to private sector wages and by the same token, improving external competitiveness.

Column 4 includes two additional explanatory variables measuring the change between the years t and $t-1$ (i.e. the year t indicating the first year of a fiscal consolidation episode) in the composition of public expenditure split into wage and non-wage components.²⁰ This additional estimation shows that a reduction in government wage spending significantly increases the likelihood of achieving a successful fiscal consolidation while a reduction in non-wage public spending also exert similar effect although not significantly so.

The role played by fiscal consolidations containing or reducing public wages expenditure would become relatively more important in the absence of nominal exchange rate adjustment, i.e., in fixed (or pegged) exchange rate regimes as external competitiveness cannot be restored via nominal exchange rate adjustment. Columns 6 and 7 provide evidence on this by including interaction terms between a variable indicating the type of exchange rate regime a country follows during a fiscal consolidation episode (i.e. either fixed or variable exchange rate) and the two variables reflecting the composition of fiscal adjustment used in Column 4 (i.e. either wages or non-wage expenditure). Two alternative definitions of the exchange rate regimes are used: Column 5 includes results using the IMF classification of exchange rate regimes, while Column 6 provides result based on the exchange rate regime classification proposed by Reinhart and Rogoff (2004).²¹ In both cases, the influence of the change in government wage spending appears to be larger for countries in fixed-exchange rate regimes, although the significance of this result varies slightly depending on the definition of exchange rate regime used. This result would tend to confirm that fiscal consolidation strategies based on public expenditure cuts and, in particular, on public wages reduction and/or containment are more likely to succeed in countries where exchange rates are fixed because these countries cannot resort to exchange rate devaluations to promote export-led recoveries.

variables. Furthermore, most empirical analysis advocating the relevance of exchange rate devaluation/depreciation for fiscal consolidation usually make use of more basic statistical association (e.g. based on correlation coefficients) or case-study analysis concerning small open economies (e.g. Alesina and Perotti, 1997).

²⁰ In order to avoid multi-collinearity the variable measuring the change in the total public expenditure adjusted for the business cycle included in Column 1-3 is removed from Columns 4-6. The changes in the composition of public expenditure are measured by the first difference in the logarithm of the variables expressed in constant prices (source: OECD). The first year of a fiscal consolidation episode is used in order to reflect the fact that, in order for wages and other public expenditure cuts to promote an export-led recovery these changes must take place relatively quickly during a consolidation episode (in order to spread to the rest of the economy). The latter was confirmed by the insignificance of non-reported results obtained considering wage and non-wage public expenditure changes over longer time spans.

²¹ The reason why we use an alternative definition of the exchange rate regime is that the IMF classification has sometimes been questioned in the literature as it relies on self-reported country information on exchange rate arrangements which may differ from practice where dual exchange rate markets might better reflect monetary policy and inflation dynamics and/or where de jure pegged exchange rate might de facto translate into flexible ones (e.g. as in the case of the EU in the early 1990s). Reinhart and Rogoff (2004) propose instead a taxonomy based on a broad variety of statistics measuring exchange rate volatility matched to official arrangements and chronologies on exchange rate intervention to derive a "natural" grouping of exchange rates regimes taking into account of differences between announced exchange rate regime and real ones (derived from the statistics) and thus relying on market-determined rather than official exchange rate regime.

Table 1 External imbalances and the success of fiscal consolidations: results from probit estimations

	(1)	(2)	(3)	(4)	(5)	(6)
Debt	0.486*** (0.163)	0.508*** (0.164)	0.419** (0.163)	0.209 (0.181)	0.179 (0.175)	0.193 (0.180)
Δ cyclically adjusted expenditure	-0.041*** (0.012)	-0.045*** (0.012)	-0.037*** (0.013)			
Downturn	-0.109 (0.109)	-0.098 (0.114)	-0.064 (0.128)	-0.091 (0.121)	-0.167** (0.083)	-0.13 (0.113)
Recovery	-0.027 (0.104)	-0.026 (0.104)	-0.037 (0.108)	-0.091 (0.107)	-0.077 (0.098)	-0.118 (0.107)
Protracted slowdown	-0.159* (0.090)	-0.168* (0.090)	-0.15 (0.096)	-0.225** (0.094)	-0.262*** (0.085)	-0.253*** (0.095)
Debt-stabilising primary balance (snowball effect of public debt)	-5.812*** (1.893)	-5.602*** (1.787)	-5.078*** (1.937)	-6.600*** (2.518)	-7.620*** (2.609)	-7.381*** (2.598)
Fiscal governance	0.036 (0.090)	0.025 (0.092)	0.063 (0.094)	-0.122 (0.095)	-0.141* (0.079)	-0.142 (0.092)
Δ Nominal exchange rate (t-1, t-2)	-0.001 (0.001)					
Δ Real exchange rate (t-1, t-2)		0.005 (0.004)				
Δ Current account change (t-1;t-5)			0.024** (0.011)	0.039*** (0.014)	0.037*** (0.013)	0.035** (0.014)
Δ Gov. wage spending				-3.713*** (1.116)		
Δ Government non-wage spending				-0.44 (0.649)		
Δ Gov. wage spending * Fixers – IMF definition					-8.175*** (1.929)	
Δ Gov. wage spending * Non-fixers – IMF definition					-0.619 (1.362)	
Δ Government non-wage spending * Fixers – IMF definition					1.729 (1.550)	
Δ Government non-wage spending * Non-fixers - IMF definition					-0.834 (0.867)	
Δ Gov. wage spending * Fixers - Reinhart-Rogoff(2004)						-5.803* (3.273)
Δ Gov. wage spending * Non-fixer - Reinhart-Rogoff(2004)						-3.635*** (1.135)
Δ Government non-wage spending * Fixers - Reinhart-Rogoff(2004)						-0.089 (2.458)
Δ Government non-wage spending * Non-fixer - Reinhart-Rogoff(2004)						-0.388 (0.617)
Estimated probability of success	0.28	0.29	0.30	0.28	0.21	0.27
% of probability correctly predicted	0.72	0.71	0.68	0.70	0.74	0.71
Observations	181	179	170	143	143	143

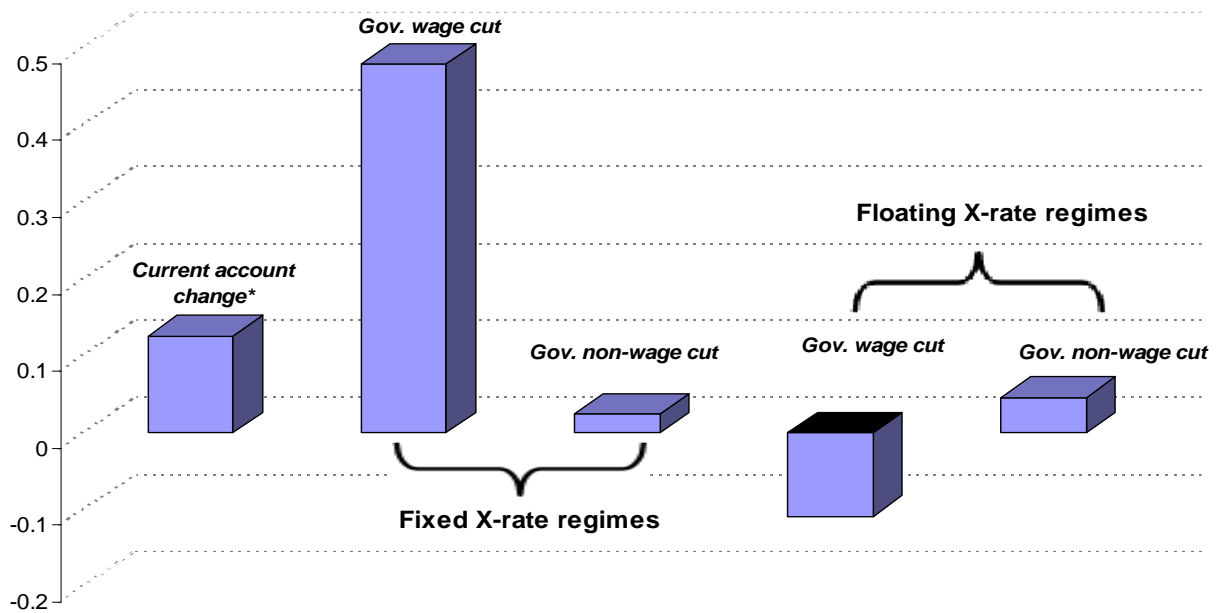
Note: The IMF and Reinhart-Rogoff definitions and data on fixed and flexible exchange rate can be found in Reinhart and Rogoff (2004) and <http://terpconnect.umd.edu/~creinhar/Papers.html>

Results reported in Table 1 can be used to gauge the relative importance of wage-based consolidations under different exchange rate regimes. This is simply done by multiplying the marginal effects reported in Table 1 with the standard deviation of the corresponding explanatory variable. We set out to compare the elements relating to external imbalances and report the estimated impact on probability of successful fiscal consolidation for a one-standard deviation change in the current account and the level of government wage and non-wage spending considering separately the case of countries under fixed vs. floating exchange rate through interaction terms. Graph 8 illustrates two of the main results reported in Table 1, namely that: (i) countries entering fiscal consolidation episodes with large current account deficit are less likely to achieve successful fiscal consolidations (ii) public expenditure cuts-based consolidations are especially beneficial for countries under fixed-exchange rate

regimes when these are based on public wage cuts. As discussed in Section 3, a possible explanation for this result lies on the potential demonstration effects of public wages onto private wage formation whereby public wage cuts would favour wage reduction or moderation in the private sector and by the same token help improve competitiveness and export-led recovery during fiscal consolidation episodes.

Graph 8 The composition and success of fiscal consolidations: does the exchange rate regime matter?

Estimated change in probability of achieving a successful fiscal consolidation for a cut (by one-standard deviation) in the government wage and non-wage spending



Note: * change from t-5 to t-1. Based on estimated probabilities for EU + non-EU OECD countries during 1970-2008. Estimations obtained using probit controlling for starting debt level, snowball effect of public debt and business cycle conditions.

4 Summary and policy implications

In this paper we provide evidence suggesting that while exchange rate devaluations or depreciations do not necessarily lead to successful fiscal consolidations although this does not necessarily exclude the fact that devaluations/depreciations may help to complement fiscal consolidation efforts. A number of possible factors can explain this result. First, the contribution of a devaluation or depreciation depends on the degree of exchange-rate pass-through and the degree of trade-openness. Furthermore, past experiences of successful fiscal consolidations following large exchange rate devaluations were made possible through the anchoring of inflation expectations by pegging the national currency to an 'inflation-proof currency', a role which was typically played by the Deutsche Mark in the EU before the advent of the euro. More generally, ongoing discussions on the difficulty to undertake fiscal consolidations in the absence of exchange rate devaluation in the euro area tend to disregard the fact that past successful devaluations have often come together with wide-ranging macroeconomic reform packages, which were arguably the most important factor of adjustment and did not depend on devaluation in order to be implemented. Second, we find that the exchange rate regime does matter for determining which type of fiscal consolidation strategy is most likely to succeed. In particular, we show that expenditure-cut-based consolidations and, in particular, the reduction or contention of public wages tends to

enhance the success of fiscal consolidation for countries under fixed-exchange rate regime. Interpreting these results in the current context suggests that countries facing the dual challenges of fast rising debt ratios and competitiveness adjustments would be well advised to undertake fiscal consolidation strategies that (indirectly) contribute to the correction of external imbalances by attempting to influence price and wages setting in the private sector.

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