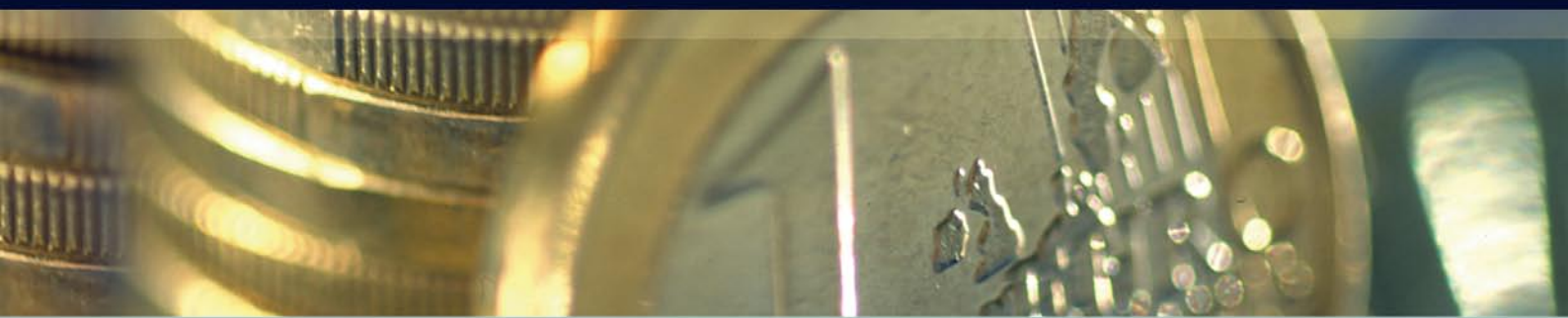


EUROPEAN ECONOMY

Economic Papers 418 | July 2010



EU fiscal consolidation after the financial crisis Lessons from past experiences

Salvador Barrios, Sven Langedijk and Lucio Pench

Economic Papers are written by the Staff of the Directorate-General for Economic and Financial Affairs, or by experts working in association with them. The Papers are intended to increase awareness of the technical work being done by staff and to seek comments and suggestions for further analysis. The views expressed are the author's alone and do not necessarily correspond to those of the European Commission. Comments and enquiries should be addressed to:

European Commission
Directorate-General for Economic and Financial Affairs
Publications
B-1049 Brussels
Belgium
E-mail: Ecfm-Info@ec.europa.eu

This paper exists in English only and can be downloaded from the website
ec.europa.eu/economy_finance/publications

A great deal of additional information is available on the Internet. It can be accessed through the Europa server (ec.europa.eu)

KC-AI-10-418-EN-N

ISSN 1725-3187
ISBN 978-92-79-14904-7
doi 10.2765/42879

© European Union, 2010
Reproduction is authorised provided the source is acknowledged.

EU fiscal consolidation after the financial crisis

*Lessons from past experiences**

Salvador Barrios, Sven Langedijk and Lucio Pench

European Commission
Directorate General for Economic and Financial Affairs

Abstract

The global financial crisis has led to a sharp deterioration of EU countries' public finances. Views are split regarding the most appropriate consolidation strategy to follow, in particular considering: the timing of fiscal consolidation in relation to the path of economic recovery reflecting (a) the trade-off between consolidation and stabilisation; (b) fiscal consolidation in the context of a distressed banking system where the credit channel is hampered and without which economic recovery can hardly take place, (c) the absence of exchange rate adjustment in the euro area which could make it more difficult for countries with competitiveness problems to achieve successful fiscal consolidation. The existing literature on fiscal consolidations provides only partial evidence on these issues. In this paper we set out to investigate these questions by drawing on EU (and non-EU OECD) experiences during the period 1970-2008. We estimate econometrically the determinants of successful fiscal consolidations and show that: (i) in presence of a systemic financial crisis, the repair of the banking sector is a pre-condition for a fiscal consolidation to succeed in reducing debt levels, especially so when fiscal consolidations are sharp (ii) even after the banking sector is repaired, fiscal consolidations are usually less successful than in absence of financial crises, although more vigorous fiscal consolidations (i.e. cold shower) tend to yield higher results (iii) current debt dynamics in the EU are very unfavourable and in some cases, coupled with rising debt servicing costs and much deteriorated growth outlook warranting differentiated consolidation strategies across EU countries (iv) We do not find conclusive evidence in support of exchange rates (including real exchange rate) depreciation/devaluation as enhancing the success of fiscal consolidation as their effect appear to be low and insignificant.

* The authors would like to thank Vesa Vihriala, Lucia Piana and Christine Frayne for useful comments. The authors would also like to thank participants to the Banca d'Italia Fiscal Policy Workshop "Fiscal Policy: Lessons from the Crisis", (Perugia, 25-27 March 2010) for useful comments. The views expressed in this paper are not necessarily those of the European Commission.

Contents

1. Introduction	3
2. Empirical literature on the determinants of successful fiscal consolidations and questions specific to the current debt increase episode	7
2.1 Existing literature	7
2.2 Consolidation, public debt and financial crises	9
3. Defining fiscal consolidations and gauging their success	11
3.1 Defining a fiscal consolidation episode.....	11
3.2 Defining the success of fiscal consolidations.....	12
3.3 Fiscal consolidations and financial crises.....	13
4. Fiscal consolidation with high debt and financial crises: descriptive evidence and econometric analysis.....	13
4.1 Descriptive results.....	13
4.2 Econometric approach.....	15
4.3 Main explanatory variables and equations estimated	16
4.4 Main econometric results	19
4.5 Fiscal consolidations, growth and the interest rate	22
4.6 Do exchange rate depreciations favour successful fiscal consolidations?.....	25
5. Summary of results and policy implications	29
6. References	31
Graphs.....	33
Tables.....	38
Annex: Variables definitions and first-stage Heckman probit estimation results.....	43

1. Introduction

Following the financial crisis, rising government deficits, low economic growth and support to the financial sector are leaving a legacy of rapidly growing government debt ratios. A phasing out of the stimulus measures and cyclical recovery, including a rebound in tax revenue from the crisis-related lows, will be insufficient to prevent government debt ratios rising to even higher levels before the end of the next decade. By historical standards, the projected sharp increase in government debt ratios is nothing out of the ordinary in a financial crisis, however, although the rise in debt in most EU countries comes on top of comparatively high starting levels, reflecting the increase recorded in the 1980s which was only partially stemmed subsequently. Significant consolidation will be needed to reduce public debt and limit its negative impact on output and growth.

Views are split regarding the most appropriate route to follow in the current context given that the need to reduce debt levels comes in a difficult time where growth is still fragile, the credit channel is still impaired and tensions are heightened in financial markets. Many questions remain unanswered, in particular regarding the appropriate timing of the fiscal consolidation in relation to the economic recovery, the role played by the financial turmoil and potential shoot-up in debt servicing cost and the macroeconomic adjustment mechanisms countries avail of, in particular the exchange rate, to weather the difficult times to come.

Although the current situation is exceptional in many respects, in particular regarding the simultaneity of the debt rise across developed economies, it shares many common features with past debt increases episodes which can be investigated in order to yield relevant policy messages. In this paper we therefore consider past evidence regarding the determinants of successful fiscal consolidations considering a panel of EU and non-EU OECD countries during the period 1970-2008. We use as criteria for defining a successful fiscal consolidation the reduction in the debt level after a fiscal consolidation episode has started while other authors, and in fact most existing studies, have focused on the post-consolidation behaviour of the budgetary balance (or the cyclically adjusted budgetary balance). We opt for a debt-based criterion in order to highlight the most immediate objective of policy makers of EU policy makers which is to halt and eventually reverse the increase in public debt following the eruption of the global financial crisis in 2008. The success of fiscal consolidation in reducing the debt-to-GDP ratio depends not only on the improvement of the primary fiscal balances however, but also inter alia on the repair of the banking sector as well as on the dynamic of the growth/interest rate differential. A number of factors are of importance in

determining the best strategy for debt reduction in such a context, in particular (i) the trade-off between consolidation and stabilisation and the timing and time profile of fiscal retrenchment in relation to the financial crisis (ii) the role played by high starting debt level position that prevail across EU countries; (iii) the composition of the adjustment (i.e. expenditure cut or tax increase) (iv) the role of nominal and real exchange rate adjustment.

The existing literature on fiscal consolidations provides a number of indications regarding the determinants of successful fiscal consolidations, in particular regarding their composition (i.e. consolidations based on expenditure cuts vs. tax revenue increase or both), nature (gradual or sharp consolidation), the role played by flanking policies (monetary easing, exchange rate devaluation, structural reforms and reforms of fiscal institutions) and the influence of macroeconomic conditions (starting business cycle position) which are of direct relevance to guide fiscal policy making in the present situation. This literature remains silent on two important aspects specific to the current situation, however, namely, the interplay between the banking crisis resolution and fiscal consolidations on the one hand and the role played by the starting debt level on the other hand. We argue that fiscal consolidation strategies in the current EU circumstances should pay special attention to these two elements for a number of reasons.

First the current debt increase in most EU countries can be thought (at least in part) as representing a transfer from the private –banking – sector to the public sector of the liabilities linked to the financial crisis. The substitution of private sector liabilities by public sector liabilities takes place in a context of deleveraging economies in time where access to credit is hampered following a period of sharp increase in private indebtedness in a number of EU countries. In presence of declining asset prices, subdued credit activity and weak private demand, fiscal consolidations cannot by themselves stabilise and, in the medium-run, even reduce public debt levels without being accompanied by credible policy actions to repair the financial sector. In the present context, therefore, the classical macroeconomic trade-off between consolidation (requiring sharp fiscal contraction) and stabilisation (requiring a soft fiscal retrenchment or even a continuation of the fiscal expansion) gets blurred as long as the credit channel remains impaired. We set out to examine these questions building on previous papers describing and analysing the consequences of systemic financial crises, in particular on Laeven and Valencia (2008) and Reinhart and Rogoff (2009).

Second, a specific feature of the prospective debt increase in the EU is that in today's crisis starting debt level were notably higher compared to past experiences. Countries starting off from high debt

level risk experiencing higher increase in interest rates under a no-policy change scenario and are thus more inclined to curb debt level decisively. Countries with already high debt levels before the global financial crisis will thus have greater incentives to undertake a fiscal consolidation which may also influence their likelihood of success. Put differently, the conditions determining the decision to consolidate might directly influence the chances of achieving successful fiscal consolidation which poses the well-known issue of sample selection bias of direct relevance when conducting econometric analyses. In this paper we investigate these issues econometrically by making use of two-stage probit estimation techniques, see in particular Heckman (1979). While standard in the microeconomic literature (especially in the field of labour economics) sample selection bias has, to the best of our knowledge, not been considered in the existing literature of the determinants of successful fiscal consolidations. In practice, such a selection bias might be especially relevant in the context of fiscal consolidations however, since the decision to initiate a fiscal consolidation episodes is contingent on the starting macroeconomic (including fiscal) conditions which in turns influence directly their chances of success.

In this paper we also address an additional question which has been given special attention recently in the EU, namely the role played by exchange rate adjustment in facilitating successful fiscal consolidations. While this issue has been treated by previous studies, it has often been argued in the current public debate that countries within the euro area would have additional difficulty to succeed in their fiscal adjustment effort as the nominal exchange rate cannot devalued. While the existing literature has provided some evidence suggesting that exchange rate depreciations preceding fiscal retrenchment can play a favourable role to facilitate it, it has to the best of our knowledge not considered the case where the success of fiscal consolidation is assessed against a benchmark reduction in the debt level which, in the present circumstances, seems more relevant.

Our findings show that controlling for sample selection bias when analysing the determinants of fiscal consolidation is important to determine the role played by the starting debt level and interest rate increases (and associated snowball effects) in explaining the success of fiscal consolidations. In particular, we show that, contrary to existing studies making use of simple probit estimations, the use of a two-step estimation procedure *à la Heckman* suggests that the starting debt level (including its indirect effect via the snowball effect) tend to play a secondary role to explain the success of fiscal consolidations. This result suggests that, despite the high starting debt level of EU countries entering the current financial crisis, this feature in itself does not compromise the chances of success of fiscal consolidation plans currently devised by the EU Member States although a differentiation depending

on country-specific situations seems warranted. Our results indeed suggest in particular that countries facing high starting debt level and high interest rate/low GDP growth potential have better chance of achieving successful fiscal consolidations if these were sharp and sustained while other countries where such constraints are less binding would be better off by undertaking more gradual fiscal retrenchment. However, in presence of a financial crisis a far more important factor appears to be represented by the need to repair the financial sector. While our results show that fiscal consolidations tend to be less successful in the aftermath of systemic financial crises (even controlling for sample selection bias), fiscal consolidation undertaken after such crises tend to be significantly more successful than fiscal consolidation undertaken while these are not yet over, especially so when fiscal consolidations are sharp (i.e. cold showers). The repair the EU financial system thus appears to be a paramount condition for maximising the chances of success of current and future fiscal consolidation plans in the EU. Finally we do not find any conclusive evidence regarding the effect of exchange rate devaluation in facilitating successful fiscal consolidations, independently of the exchange rate considered (either nominal or real) or the currency regime (fixed vs. floating exchange rate). However, this result does not necessarily mean that a devaluation/depreciation might not facilitate fiscal consolidations per se, it does however suggest that devaluations/depreciation do not necessarily lead to significant reduction in the debt level.

The rest of the paper is organised as follows. Section 2 examines the empirical literature on the determinants of successful fiscal consolidations and considers more specifically the incidence of financial crises and high starting debt levels on the success of fiscal consolidations. The third section defines and discusses fiscal consolidations and the criteria used to gauge their success. The fourth section provides econometric evidence gauging the effect of specific factors and conditions on the probability of successful fiscal consolidations. Finally, we summarise the novel aspects of our analysis and draw some policy conclusions for successful debt reduction in the fifth section.

2. Empirical literature on the determinants of successful fiscal consolidations and questions specific to the current debt increase episode

The existing literature on fiscal consolidations covers a range of possible determinants of success from economic (business cycle, state of public finance, etc.) to political factors (fiscal governance, electoral outcome, gradual vs. cold shower consolidations, etc.). The overview provided below focuses on the most relevant aspects of fiscal consolidations in the current EU context, namely the nature of fiscal consolidation (tax increases and/or expenditure cuts), the timing of fiscal consolidations in relation to the business cycle the importance of fiscal institutions, the role of exchange rates devaluations/depreciations. In the sequel we draw a number of questions specific to the current financial crisis.

2.1 Existing literature

Fiscal consolidation based on expenditure cuts are found to be more effective, see for instance Alesina and Perotti (1995), Alesina et al. (1998), Alesina and Ardagna (1998), Von Hagen et al. (2002), Maroto, R. and C. Mulas-Granados (2007).¹ Tax-based consolidations can also be successful if the starting tax-to-GDP ratio is relatively low and implementation is gradual, see in particular Tsibouris et al., (2006). One important explanation of the superiority of expenditure cuts is that they are often accompanied by reforms aimed at improving public services' efficiency, see European Commission (2007). Tax-increases, on the other hand, often signal weak commitment to undertake structural reforms, see in particular Kumar et al. (2007). Measures directed toward long-run spending containment also send reassuring signals to financial markets on the long-run sustainability of public finances, see in particular Cotarelli and Viñals, (2009). Improvements in fiscal institutions, medium-term budgeting and improved expenditure control help laying the foundations for sound long run public finances management, see European Commission (2007) and Kumar et al. (2007). A special case in point concerns the run-up to the EMU as many EU countries adopted explicit budgetary rules including balanced budget and expenditure rules, to qualify for euro area membership, see Debrun et al. (2008).

¹ We do not discuss here results concerning the nature of public expenditure cuts, be it wages, consumption or investment cuts which also play a role. A more detailed review of these papers and econometric estimates can be found in European Commission (2007).

The evidence regarding the role played by the economic situation (both domestic and international) and monetary conditions is inconclusive: some argue that it is easier to build a consensus in support of fiscal consolidation during or shortly after a sharp downturn, see Drazen and Grilli (1993) and Kumar et al. (2007) while others suggest the opposite is true, see von Hagen and Strauch (2001). The role played by monetary policy is equally inconclusive with Hagen and Strauch (2001) and Lambertini and Tavares (2005) analyses suggesting that monetary policy actions have no influence on the success of fiscal consolidations. In a recent contribution Corsetti et al. (2010) further suggest that prospective spending cuts generally enhance the expansionary effect of current fiscal stimulus due to anticipation of lower inflationary pressure and long-term interest rates, although the timing of fiscal consolidation remains crucial if short-term interest rates are at their zero lower bound. Even in absence of the zero lower bound constraint, the fiscal contraction must not come too early and remain gradual in order to secure the economic recovery.

Finally, it has been argued that successful fiscal consolidations would be more difficult to achieve in the euro area given that countries cannot devalue their nominal exchange rate paving the way for an export-led recovery that would make successful fiscal consolidation easier to achieve. Two conditions must be fulfilled in order for this strategy to be successful, however: (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 is needed 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) and are harder to monitor and control, see Goldberg and Knetter (1997) and Alesina and Perotti (1997). 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 others 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).

While these papers provide useful policy messages, they remain silent on a number of aspects which are especially relevant in the aftermath of the 2008/2009 global financial crisis. We discuss two prominent aspects of the current crisis, namely, the interplay between the banking crisis resolution

and fiscal consolidations on the one hand and the role played by high starting debt levels on the other hand.

2.2 Consolidation, public debt and financial crises

The current debt increase in most EU and non-EU OECD countries can be thought (at least in part) as representing a transfer from the private – banking- sector to the public sector of the liabilities linked to the financial crisis. Importantly, a high starting debt level renders the no-policy change debt dynamics very unfavourable in the EU, see in particular European Commission (2009a). Such context is expected to favour fiscal consolidation while the effect of the debt level on the success of consolidations depends on other conditioning factors, notably the resolution of the financial crisis. Generally speaking, financial crises are characterised by public sector liabilities replacing those of the private sector. Such substitution takes place directly as governments step in to inject liquidity and capital in the banking sector and guarantee its liabilities and indirectly as a consequence of a sharp contraction in private demand and private sector deleveraging in time where access to credit is particularly difficult (usually after a period of boom in credit). It follows that fiscal consolidations need to be accompanied by credible policy actions to repair the financial sector in order to achieve policy objectives including resuming growth and reducing debt levels.

The existing literature on systemic financial crises has underlined the distressful effects such crises may have on public finances, see in particular Laeven and Valencia (2008) and Reinhart and Rogoff (2009). In particular, an early consolidation with respect to the resolution of the financial crisis is likely to be ineffective if the economy settle at a (permanently) lower level of output. Factual evidence suggests that the potential fiscal costs of financial crises are directly linked to the time taken or needed to repair the financial sector. For instance the Japanese experience in the early 1990s suggests that too early fiscal retrenchment while the credit channel has not been fixed properly can prove highly counter-productive, see Bayoumi (2000). The case of Sweden in the early 1990s is often considered as a success as this country managed to quickly restructuring its banking sector allowing the initial fiscal stimulus to effectively sustain economic activity and to be followed by successful fiscal consolidations throughout the second half of the 1990s, see European Commission (2009b). The existing evidence regarding successful fiscal consolidations during or after systemic financial crises remains largely anecdotal however, while before the 2008/2009 global

financial turmoil, EU countries had been relatively immune to systemic financial crises, see European Commission (2009a) and Table A1 in Annex.

Nearly all EU countries are expected to experience sharp rises in their debt level in the coming years with those countries primarily concerned being also those most directly affected by the 2008/2009 financial crisis as suggested earlier. According to the European Commission Spring 2010 forecast, the increase in the debt to GDP ratio between 2007 and 2011 should equal 25.2% of GDP on average in the EU, a figure in line with past experiences of systemic financial crises, see Graph 1 and European Commission (2009a). A specific feature of the debt evolution compared to past experiences, however, is that in today's crisis EU countries started from higher debt levels. The magnitude of the debt increase foreseen during the 2007-2011 period does not represent an unprecedented event, however, as many EU countries have experienced large debt rises in the wake of the two oil shocks in the 1970s and the 1980s. Graph 2 illustrates this by plotting the evolution of the average debt to GDP ratio of countries having experienced major debt increases since 1970 (a major debt increase being defined here as an increase of at least 20% in the debt to GDP ratio over a period of five years, this definition being chosen as it is close to the average EU figure in the current crisis). Compared to other large debt increase episodes, the global financial crisis makes the current situation of the EU resembles much that of Finland and Sweden during the 1990s, with pre-crisis period being preceded by a period of stable or even slightly declining debt ratio, which can be explained by the favourable economic conditions that preceded the financial crises in both cases. The ratio of public debt to GDP appears to rise very fast in the current the financial crisis (2008 for today's EU27 and 1991 for Sweden and Finland).² By contrast, in previous non-financial crisis-related debt episodes a comparable increase in the debt ratio took place over a much longer period of time.

Since 1970 EU countries have experienced a growing number of large debt increase episodes, usually starting off each time from higher level of debt. Graph 3 broadens the set of large debt increase episodes considered by defining large debt increase episodes as an increase of at least 10% (against 20% in Graph 2) over a (maximum) period of three-years. Graph 3 shows that the number of countries experiencing such large debt increases has tended to grow over time with the average starting debt level position also tending to rise.³ As previously indicated, several countries have

² This result also corresponds to the econometric evidence unfold in the European Commission (2009a) showing that the bulk of the debt increase in the aftermath of a systemic financial crisis usually takes place during the first two years of such crisis. This also corresponds to the descriptive evidence reported in Reinhart and Rogoff (2008).

³ Ireland stands out as having entered the current crisis with very low debt to GDP ratio (i.e. 25% of GDP in 2007).

experienced large debt increases comparable in magnitude (and sometimes in speed) to the one foreseen in most countries for the period 2007-2011. This is the case in particular of Denmark, Belgium and Ireland during the 1970s, Greece, Italy and Sweden during the 1980s and Finland and Sweden during the 1990s. By contrast, countries such as Germany, France and Portugal have tended to experience an almost continuous increase in debt to GDP ratio since the 1970s with some rare episodes of stable or slightly declining debt levels.

3. Defining fiscal consolidations and gauging their success

3.1 Defining a fiscal consolidation episode

To define a fiscal consolidation episode we use as criteria the value of the change in the cyclically adjusted primary balance (hereafter CAPB). We follow the existing literature by defining a fiscal consolidation as an improvement in the CAPB of at least 1.5% taking place in one single year (cold shower) or taking place over three years if each and every year the CAPB does not deteriorate by more than 0.5% of GDP (gradual consolidation), see for instance Alesina and Perotti (1995) and European Commission (2007).⁴ With such definition, one-year consolidations (i.e. cold showers) are considered as full episodes while each year of multi-year consolidations episodes (i.e. gradual consolidations) are considered as episodes on their own. Such definition was also used in Alesina and Ardagna (1998) and Alesina, Perotti and Tavares (1998). Alesina and Ardagna (2009) considered instead only one benchmark year for multi-year consolidation episodes. There is a priori no reason to consider that one definition is superior to the other as suggested by Alesina and Ardagna (2009) as results remain in general broadly similar in both cases.

⁴ Alternatively, the OECD defines the start of a fiscal consolidation episode as an improvement in the CAPB by at least one percentage point of potential GDP in one year or in two consecutive years with at least a ½ percentage point improvement occurring in the first of the two years, see Guichard et al. (2007) and Ahrend et al. (2006). The fiscal consolidation continues as long as the CAPB improves. An interruption is allowed without terminating the episode as long as the deterioration of the CAPB does not exceed 0.3 percentage points of GDP and is more than offset in the following year (by an improvement of at least 0.5 percentage points of GDP). The consolidation episode stops if the CAPB stops increasing or if the CAPB improves by less than 0.2 percentage points of GDP in one year and then deteriorates. The consistency of the definition of fiscal consolidation episodes used here with the OECD one was checked. In most cases consolidation episodes are found to coincide. The correlation coefficient between the two series is equal to 0.71.

3.2 Defining the success of fiscal consolidations

While the definition of a fiscal consolidation episode is quite homogenous across existing empirical studies, the success of fiscal consolidations can be gauged in different ways according to their impact on deficits and debt or on the growth performance, see Alesina and Ardagna (2009). Given that our intention to consider past experiences with fiscal consolidation to highlight features which are relevant to explain the current situation in the EU we use as measure of the success of fiscal consolidations the level of debt following a fiscal consolidation episode as in Alesina and Perotti (1995). Accordingly, a fiscal consolidation is considered as successful if it brings down the public debt level by at least five percentage points of GDP in the three years following a consolidation episode. Previous definition used in particular in European Commission (2007) considered instead that a fiscal consolidation episode was successful if the consolidation effort was safeguarded in the subsequent years (i.e. whether the change in CAPB remained below a given threshold).⁵ Both criteria (i.e. considered the post-consolidation episode debt or the CAPB level) have their pros and cons. By using the CAPB criterion one avoids classifying as successful consolidations episodes where the debt reduction is due to favourable, albeit non-policy related circumstances. At the same time, it cannot exclude that consolidations that were insufficient to stem the increase in debt are labelled as success. The debt criterion was also preferred here in light of policy considerations. The global financial crisis has significantly affected EU countries' public finances with debt increasing very fast in most countries as evidenced above. The most immediate objective of policy makers in the current circumstances shall therefore be halting and reversing the increase in public debt. Tensions in financial markets that have emerged since the end of 2008 have highlighted the risk of feedback loop between high and increasing debt and the cost of debt servicing and its possible ramification to the rest of the economy. One could also argue that the use of discrete variables based on definitions of successful consolidation based on a given value debt reduction is too arbitrary. One could for instance consider alternative thresholds to qualify consolidations as successful or consider the possibility of measuring success making use of truncated variable (although the latter would require to the use of different econometric estimation method). Although we acknowledge these other possible alternative definitions and methods, in the present paper we chose to follow the existing literature on the topic and dealing with European countries in particular as mentioned above.

⁵ More precisely, in the European Commission Public Finances Report 2007, a consolidation was labelled as successful if in the three years after the end of the consolidation episode the CAPB did not deteriorate by more than 0.75% of GDP in cumulated terms compared to the level recorded in the last year of the consolidation period, i.e., at least half of the overall minimum fiscal correction required to qualify as consolidation was safeguarded three years after.

3.3 Fiscal consolidations and financial crises

Graph 4 provides evidence regarding the incidence of financial crises on the success of fiscal consolidations. When looking at the specific case of financial crisis episodes, this evidence suggests that fiscal consolidations tend to be more successful when the financial crisis is resolved before the fiscal exit. This result holds in particular for EU countries while for non-EU OECD countries there is no clear indication that successful consolidations depend on whether these started during or after a financial crisis episode. Considering the EU, success rates are about 56% when consolidation is started after the financial crisis ended and only 9% when consolidation started during a financial crisis against a benchmark case (i.e. no financial crisis) of 34% of successful consolidations. The econometric analysis presented in the next section includes also both EU and non-EU OECD economies in order to get sufficiently large data sample, especially in order to include cases of fiscal consolidations during or in the aftermath of systemic financial crises as discussed earlier. Based on data for the EU and a set of other non-EU OECD countries (namely Australia, Canada, Switzerland, Japan, Mexico, Norway, Turkey and the US) during the period 1970-2008, econometric analysis the next Section provides more evidence on the determinants of successful fiscal consolidation coinciding with (or immediately following) the occurrence of a systemic banking crisis.⁶

4. Fiscal consolidation with high debt and financial crises: descriptive evidence and econometric analysis

4.1 Descriptive results

Table 1 provides an assessment of the degree of success of past consolidation episodes in the EU15 by decade since 1970.⁷ Fiscal consolidations succeeded in only 1/3 of cases, with most successful consolidations episodes occurring in the 1990s and 2000s. This result can be explained at least partly by the general fall in interest rates in the EU during these periods as suggested earlier. The second row of Table 1 shows that consolidations following large debt increases tend to be less successful with a success rate of 24.1%, which could simply reflect the fact that debt-reduction objectives are especially difficult to achieve in the wake of large debt increases episodes. Extending the time span

⁶ South Korea or Iceland could not be retained due to insufficient data coverage. Table A1 in Annex provides information regarding the systemic financial crisis episodes of countries included in our sample.

⁷ The recently acceded Member States are not considered here in order to get consistent country groups over time.

following a consolidation episode to gauge the success or failure of fiscal consolidation from three to five years only marginally increases the success rate of consolidations as indicated by the fourth row of Table 1 while extending the time span further, i.e., till 10 years after a fiscal consolidation, brings the success rate down again, possibly reflecting the occurrence of successive debt increase episodes. Table 2 reports results on the success rate of fiscal consolidations by splitting consolidation episodes into cold showers against gradual consolidations. Overall, gradual consolidations tend to be more successful, a result also in line with the existing literature, see in particular European Commission (2007).⁸ It is worth noting, however, that the difference in the success rates between gradual consolidations and cold showers becomes much lower when considering consolidations during or immediately after large debt increase episodes as indicated by the third and fourth rows of Table 2.

While the success of fiscal consolidation seems at first sight limited, counter-factual analysis suggests that in the absence of fiscal consolidations, debt levels increased significantly more in the aftermath of large debt rises episodes. The low success rate of fiscal consolidations documented earlier could simply reflect the fact that consolidations are more often undertaken in cases where debt increases are large and starting debt levels are high.⁹ Thus, in order to gauge the benefit of consolidation one need to take into account the initial debt level and to consider only countries that experienced large debt increases. Graph 5 illustrates this by depicting the evolution of the (average) debt to GDP ratio in the aftermath of a large debt increase episodes depending on whether a consolidation was or was not carried out in the EU15 during the period 1970-2007. To abstract from the differences in the initial debt level, the debt to GDP ratio at the end of a debt increase episode is set equal to 100 in both cases. Graph 5 shows that the post-crisis rise in the debt to GDP ratio is clearly more contained in cases where a fiscal consolidation was undertaken than in those where this was not the case.¹⁰ These results thus suggest that consolidations, even if not successful in reducing the level debt, help containing further upward drift in debt compared to a no-consolidation scenario.

The previous results highlight that not in all instances large debt increases led to consolidation efforts by governments nor were these efforts always successful in reducing debt. The causes and

⁸ Gradual consolidation have also been less often implemented as indicated by the figures in parentheses indicating the frequency of consolidation episodes.

⁹ In the polar case, countries with initially low debt level and moderate debt increase undertaking consolidation are more likely to succeed.

¹⁰ When considering actual data underlying Graph 5, the debt to GDP ratio increase by 6.1% and 8.6% for the three and five year time horizon respectively in case of no consolidation and by 3.4% and 4.4% respectively in case a consolidation was undertaken in the aftermath of a major debt increase episode.

context of large debt increases episodes are presumably relevant in explaining policy responses and their outcome.¹¹

4.2 Econometric approach

The existing literature has generally considered the determinants of successful fiscal consolidations separately from the decision to undertake fiscal consolidations while these two questions are likely to be closely linked, especially in a high debt environment. Our approach is based on the premise that the determinants of the *success* of fiscal consolidation must be considered together with the factors influencing the *decision* to consolidate. This question has direct econometric implications given that the causes of fiscal consolidations are also likely to influence (at least partly) their probability of success. These questions are especially relevant to the current situation as high debt levels are likely to influence both the decision to undertake fiscal consolidation and the likelihood to achieve sufficient debt reduction which is the criterion used here to gauge the success of fiscal consolidations. To illustrate this, Table 3 displays the observed probabilities of debt reduction depending on whether consolidation a fiscal consolidation is undertaken or not for the countries considered here. Table 3 shows in particular that a debt reduction is more likely to be achieved when a consolidation effort is carried out (i.e. debt reduction is observed in 32.3% of cases when a consolidation is undertaken vs. 19.4% in absence of fiscal consolidation). Table 4 in turn shows that the starting debt level is higher when consolidation is undertaken, which simply reflects the fact that countries with higher debt may also have a greater incentive to undertake fiscal consolidation. It is thus rather logical to observe that fiscal consolidations in a context of higher debt are also more likely to be successful while this would not necessarily indicate that a higher debt favours successful fiscal consolidation. Table 3 and 4 considered together imply that the relationship between the debt level and the success of fiscal consolidation is likely to be biased upward as it may simply reflect the fact that the initial debt level tends to be higher when a debt reduction is observed for reasons which may have nothing to do with fiscal consolidation. This in turn may have direct consequences for the analysis of the determinants of successful fiscal consolidations. Ideally one would like to estimate the link between the initial debt level and the probability to achieve successful

¹¹ For instance, as noted by Boltho and Glyn (2006) a fundamental difference exists between the consolidation efforts put in place in the 1980s (following the 1970s successive crises) and during the 1990s. During the first period, main concerns were geared towards inflationary pressures and balance of payment problems following a period of rapid rise in public expenditure. During the latter period, concerns regarding long-term debt sustainability (together with the pressure exerted by rising real interest rates at the beginning of the 1990s) became prominent, with the additional feature in the EU context linked to the run-up to EMU.

consolidation by controlling for cases where no consolidation is undertaken. In doing so one would also control for the fact that consolidations are more likely to take place with a high initial debt level.

The case for a sample selection in assessing the determinants of successful fiscal consolidations for a given level of debt could also be applied to other variables which, as the debt variable, can be thought as having an influence on the decision to consolidate and the success of consolidation. For instance, existing evidence suggested that the probability to achieve successful consolidation is facilitated with good fiscal governance, see European Commission (2007).¹² However, a good fiscal framework also means that consolidation is more likely for a given deterioration of public finances (keeping all other determinants constant) and debt reduction are more likely when consolidations are undertaken rather than when they are not undertaken as suggested earlier. An estimation of the role played by a fiscal governance variable for the success of consolidation might thus lead to biased estimate if such an estimate is not corrected for the influence of the quality of fiscal governance on the decision to consolidate. Generally speaking, given the above arguments, the success of fiscal consolidations cannot be considered as being the result of a random draw which is independent from the conditions influencing the undertaking of fiscal consolidations. When considering only cases where a consolidation is undertaken, one uses a draw which is in fact deterministic, leading to biased estimators. Because of this, one must also consider cases where fiscal consolidation was not undertaken as well. In order to deal with the issue of selection bias we make use of a Heckman probit two-step estimator to analyse first the determinants of the decision to consolidate and, in a second step, to estimate the determinants of successful fiscal consolidations. The following section explains in detail the estimation procedure as well as the explanatory variables retained for these estimations.

4.3 Main explanatory variables and equations estimated

The set of variables used to analyse the determinants of the *decision* and *success* of consolidations are the following: a dummy variable to measure the occurrence of a financial crisis episode, a variable measuring the business cycle position to deal with issues related to the timing of fiscal consolidation vs. a potential economic recovery, the debt level at the start of a fiscal consolidation episode, an indicator of fiscal governance measuring the quality of fiscal institutions, a variable controlling for cases where an IMF stabilisation programme was put in place and a variable

¹² The term "fiscal governance" (or fiscal framework) comprises all rules, regulations and procedures that impact on how the budget and its components are being prepared.

controlling for the nature of the fiscal consolidation (i.e. whether expenditure cut or tax increase based). In addition to these variables and, as commonly done when using Heckman probit estimator, we need at least one additional variable in the first-step estimation to explain the decision to undertake a fiscal consolidation which is not included in the second step estimation. The variable used here is a dummy indicating whether year prior or during a fiscal consolidation general elections took place in a given country. While such variable is likely to influence the decision to undertake a fiscal consolidation, its incidence on the outcome of fiscal consolidation (i.e. whether fiscal consolidation leads to sufficient debt reduction) is a priori not clear. The set of explanatory variable used is summarised below. It is thus fair to believe that the occurrence of general elections is an important determinant of the first step estimation where the dependent variable is the decision to consolidate and can be excluded from the second step estimation where the dependent variable is the success of a fiscal consolidation.

The set of explanatory variables and expected impact are summarised below.

- We consider econometrically the role of financial crises as a determinant of successful fiscal consolidation including a variable indicating whether a country experienced such crisis in a given year. Following Laeven and Valencia (2008), financial crises episodes are defined in this paper as episodes during which a *"country's corporate and financial sectors face great difficulties repaying contracts on time, experience a large number of defaults, non-performing loans increase sharply and most of the banking system capital is exhausted"*. The situation may be accompanied by falling assets prices, sharply rising real interest rates and a reversal of capital inflows. Thus, financial crises in this definition do not include banking stress limited to individual banks. However, banking crises may have coincided with and have been aggravated by episodes of currency and sovereign debt crises. Since Laeven and Valencia (2008) only define the starting points of banking crises but not their length, this paper uses for the latter the information provided in Demirgüç-Kunt and Detragiache (2005) and Reinhart and Rogoff (2008).¹³ A dummy variable indicating whether in a given year a country was experiencing a systemic financial crisis as described in Table A1 in the Annex. In addition

¹³ In case of missing or conflicting information in those sources, the end of the crisis was determined as the year when domestic credit growth bottomed out. Accordingly, in absence of additional indications, the end of the banking crisis episode corresponds to the year in which the private credit-to-GDP ratio recovers. Since the credit-to-GDP ratio fall often occurs with a delay, a credit ratio increase after the start of the crisis does not imply classifying the episode as lasting one year only, except if the credit-to-GDP ratio grows continuously for at least three years without interruption.

we include a variable indicating whether a given fiscal consolidation episode takes place in the aftermath of a financial crisis (up to 5 years).

- The business cycle position is measured using dummy variables constructed according to the values taken by the output gap during the year (t) when a fiscal consolidation starts. "Expansion" are years of positive output gap level and positive annual change, "Recovery" are years of negative output gap level and positive annual change, "Downturn" are years of positive output gap level and negative annual change, "Protracted slowdown" are years of a widening negative output gap level. In the current context, the most relevant episodes are the one with negative output gap levels: recovery and protracted slowdown.
- The debt level in ($t-1$) where t indicates the year a fiscal consolidation takes place, enters as determinant as explained earlier together with its interaction with the differential between the nominal GDP growth and implicit interest rate paid on all outstanding public debt (i.e. the snowball effect of public debt).¹⁴ This effect is stronger when debt-ratios are high. The role played by the starting debt level position and potential snowball effects are important to consider in the current EU context. When the no-policy change debt dynamics are less favourable, i.e. with high starting debt level and deficits, or through rapidly increasing snowball effects of public debt, cold shower type of consolidations are more likely to be chosen to contain further debt rise. The debt-to-GDP ratio reflecting the incentives to consolidate and influencing the success of consolidation is thus considered as well as additional determinant of the success of fiscal consolidation together with its interaction with the differential between the growth rate of GDP and the implicit interest rate on public debt.
- An indicator of fiscal governance indicating whether or not a given country uses a budget deficit rule when setting its fiscal plans (drawing on Commission database and Guichard et al. (2007) for non-EU OECD countries).
- A variable indicating whether a given country is subject to IMF balance of payments assistance and conditionality in order to control for the fact that emerging economies and, depending on the period considered, some recently acceded Member States may have had additional incentives to undertake and continue a fiscal consolidation episode.

¹⁴ The snowball effect is also sometimes termed the debt-stabilising primary balance and is defined according to the following expression: $\text{Debt}/\text{GDP}_{(t-1)} * (i - y / (1 + y))$, where i is the interest rate and y is the nominal GDP growth in year t .

- The nature of fiscal consolidation is measured through the change between $t-1$ and $t+3$ of the cyclically adjusted primary expenditure, with t being the year where a fiscal consolidation is observed.

The two equations estimated are therefore:

$$D_{i,t} = \alpha X_{i,t} + \delta \text{general elections}_{i,t} + u_{i,t} \quad (1)$$

$$S_{i,t} = \beta X_{i,t} + v_{i,t} \quad (2)$$

Equation (1) is our *selection equation* and $D_{i,t}$ is a dummy variable indicating whether a country i undertakes a fiscal consolidation in a given year t or not. The set of variable $X_{i,t}$ includes all the variables listed above and, in addition to these we include a dummy variable indicating whether general elections took place during the same year or the year preceding the decision to consolidate as indicated earlier. The equation (2) describes the determinants of successful fiscal consolidations where the success is measured according to the debt level reached three years after a consolidation episode starts off. The error term $u_{i,t}$ of equation (1) is assumed to have the classical *iid* properties while the term v is correlated with u such that:

$$\text{Corr}(u,v) = \rho \quad \text{with} \quad \rho \neq 0 \quad (3)$$

Following Heckman (1979), the two-step estimates of β are obtained by augmenting the regression equation with a non-selection hazard term m obtained using probit estimates of the *selection equation* (1). A test of whether ρ is significantly different from zero can also be conducted in order to check whether estimating equations (1) and (2) using the Heckman estimator is justified.

All EU27 countries are considered together with a set of non-EU OECD countries including Australia, Canada, Japan, Mexico, Norway, Switzerland, Turkey and the US. Consolidations episodes are observed for the period 1970 to 2005, where 2005 is the last year of consolidation in a consolidation episode (and 2008 the last year during which the success of a consolidation episode is gauged). Using the above definition of fiscal consolidation, we have set up a dataset of 235 consolidation episodes, with 160 consolidation episodes in the EU, of which 116 in the EU15 .

4.4 Main econometric results

In this section we estimate econometrically the determinants of successful fiscal consolidations as represented by equation (2) conditional on the decision to consolidate and further control for the potential bias represented by the omission of the conditions that lead countries to start a fiscal

consolidation episode which are represented by the same set of variables used to explain their success and, in addition, a variable indicating whether general elections took place the same year or the year before a fiscal consolidation is observed.

The estimations of the determinants of the success of fiscal consolidation conditional on the decision to consolidate are presented in Table 5. The main result concerns the effect of systemic financial crises. According to the estimates reported in Column (1) of Table 5, the occurrence of a systemic financial crisis makes it less likely for fiscal consolidations to reduce debt significantly with the probability to achieve successful fiscal consolidation being 30% lower when these consolidations take place during such crises. While fiscal consolidations taking place after a financial crisis also display on average lower chances of success, the effect is somewhat lower (-24.4% chances of success) but still relatively large and significant. This result thus suggests that, while fiscal consolidation must come after the banking system has been repaired in order to increase chances of success, still fiscal consolidations undertaken in the aftermath of systemic financial crises have also significantly lower chances of success.¹⁵

We now turn to the coefficient estimate for the debt variable. As suggested earlier, the coefficient on this variable is not clear a priori as a higher debt level can provide additional incentive to fiscal retrenchment but also make successful fiscal consolidation more difficult to achieve through higher debt servicing, especially when GDP growth rates/interest rates are relatively low/high. The results reported in Column (1) suggest that the debt level plays a positive and significant role favoring the success of fiscal consolidations while the snowball effect exerts a counteracting (negative) influence. Using the marginal effect reported in Column (1) one finds that a 25pp increase in the debt to GDP ratio implies an increase in the probability of a successful consolidation by 15.1%.¹⁶ However, a higher debt level, when considered together with the snowball effect of public debt (i.e. a higher differential between the nominal GDP growth rate vs. the interest rate for a given starting level of debt) can also magnify the potential negative impact of the higher debt level on the success of fiscal consolidations. Estimating the joint effect of these two variables (i.e. using their estimated marginal effect and multiplying those by the respective standard deviation of these two variables) yields a combined positive effect of 7.3%, i.e., once the positive and negative effect of higher debt

¹⁵ We have also tested whether coefficients of the *During financial crisis* and *Post financial crisis* dummy variables were significantly different using simple Wald test. We failed to reject the null according to which these two variables displayed identical coefficients (at 10%).

¹⁶ This figure is simply obtained by multiplying the standard deviation of the debt variable for the estimation sample by the estimated marginal effect reported in Table 6. All probabilities are estimated at the average values of the variables.

are accounted for together, the debt level appear to exert a positive albeit small influence on the probability to achieve successful fiscal consolidation.

The rest of variables display coefficient estimates which are generally in line with prior expectations and the existing literature. Expenditure-cut based consolidations tend to be more successful, a result in line with the existing literature, while consolidations episode starting during period of protracted slowdown (i.e. while the output gap is negative and declining) are more likely to lead to failure.¹⁷ The dummy variable indicating whether countries were engaged into an IMF programme also displays a positive and significant coefficient which is also in line with our prior. Our variable measuring the quality of fiscal institutions, while playing a positive role, does not display a significant coefficient. While a priori surprising this result can be explained by the fact our measure of the quality of fiscal governance captures only one specific aspect of the quality of fiscal institutions, i.e. the existence of a budget deficit rule, is rather loose and does not reflect the complexity of the role played by fiscal institution is ensuring sound budgetary outcome, see in particular Debrun et al. (2008). In addition, one could argue that the effect of fiscal governance may already be captured by the variable indicating the nature of fiscal consolidation to the extent that the quality of fiscal institutions reflects the commitment of governments to achieve their budgetary targets over a longer period (as in the case of gradual consolidations).

Column (2) of Table 5 shows the estimated elasticities using the two-step Heckman probit estimations of the determinants of successful fiscal consolidation (where the first step estimations concern the determinants of the decision to consolidate, results are reported in Table 4 and include as additional determinant a dummy variable indicating whether during the year preceding a consolidation episode general elections took place in the country concerned).¹⁸ Interestingly, all debt-related explanatory variable now display coefficients which are clearly lower than the probit estimate reported in Column (1). These results thus tend to suggest that the influence of the debt

¹⁷ It is important to note that when estimating the influence of the starting business cycle position one needs to make a choice about the benchmark cases (i.e. the dummy variable to be excluded from the equation estimated). Here we use as benchmark are the cases where consolidations start during years of expansion, i.e. when the economic recovery is firmly grounded. Conversely, one could also use as benchmark cases where consolidations started during years of economic recovery and therefore illustrate the trade-off between stabilisation and fiscal consolidation. We have also estimated all equations reported in Table 5 using this alternative specification. While the results were qualitatively similar (i.e. years of protracted slowdown being negative and significant in most specifications), for specifications corresponding to Column (2) and (3) in Table 5 the marginal effect of the *Protracted slowdown* variable, albeit still negative, was no longer significant. This suggests that our result concerning the influence of the starting business cycle condition is not totally independent of the specification used.

¹⁸ Table A2 in Annex provides results of the first stage estimations concerning the determinants of the decision to undertake fiscal consolidation and used to estimate results reported in Column (2) and (3) of Table 4.

level on the success of consolidation is biased upward when not controlling for the correlation between the decision to consolidate and the likelihood to achieve successful consolidation. Considering the case of the debt level for instance, one now finds that the impact of a 25 pp increase in the debt-to-GDP ratio increases the probability of success by barely 2.6% (against 15.1% previously). The negative influence of the snowball effect is also lowered such that the combined effect of higher public debt (i.e. discounting the effect of the debt level from the effect of the snowball effect) decreases on average the probability of success of fiscal consolidation by -1.3%. Two other coefficients estimates are also much affected by these new estimates: the positive influence of being in an IMF programme now falls down to 13.1% (from 44.1% previously) while influence of the nature of fiscal consolidation (i.e. public expenditure-cut vs. tax revenue increase based) is much lower and only significant at 10% (against 1% previously). The financial crisis dummy variable and the business cycle variable remain highly significant and their marginal effect on the probability to achieve successful consolidation remains broadly similar, although more so for the financial crisis variable as these appear to exert the bigger influence on the likelihood to achieve successful fiscal consolidation. It is worth pointing out that the estimated overall probability of success increases when controlling for the sample selection bias from 26% to 30% when estimating it using the Heckman two-stage procedure controlling for sample selection bias and to 36% when further controlling for the lower probability of success concerning cold-shower based consolidations as in the specification of Column (3) of Table 5.

We have also tested whether the use of a specification *à la Heckman* allows reducing the bias in the estimators of the determinants of successful fiscal consolidations, i.e. whether the coefficient ρ of equation (3) can be considered as being significantly different from zero in which case simple probit estimators would be preferable. The χ -square statistics for the null-hypothesis reported at the bottom row of Table 5 suggests that the one-stage probit estimator yields biased estimators and that a Heckman procedure is warranted.

4.5 Fiscal consolidations, growth and the interest rate

As suggested by the descriptive analysis in Section 2 and the overview of the literature in Section 3, cold shower consolidations usually tend to be less effective than gradual consolidation when it comes to reduce debt level. Column (3) of Table 5 further extends the set of explanatory variable by including a dummy variable indicating whether the consolidation episode can be considered as a cold shower rather than a gradual consolidation according to the definition used here. The marginal

effect for this variable appears to be negative and significant, suggesting that cold shower types of consolidation are effectively less likely to succeed possibly through their negative short-term effect on demand and economic activity. Despite the apparent lower probability of success, cold showers are still more often chosen compared to gradual consolidation as suggested earlier by the descriptive statistics

The estimates reported in Column (1)-(3) suggest that the effect of higher debt levels is dual: on the one hand it enhances the chances of achieving successful fiscal consolidation and on the other hand it makes success more difficult through higher debt servicing costs if interest rates are large compared to nominal GDP growth. Once the selection bias related to the influence of the debt level of the decision to undertake fiscal retrenchment these effects remain somewhat subdued and tend to cancel out each other. It becomes clear that the influence of the starting debt level at the onset of a fiscal consolidation process depends much on broad monetary (i.e. via the interest rates) and economic (i.e. via nominal GDP growth) conditions, i.e., a high debt level might or might not compromise the chances of achieving successful fiscal consolidation depending on these conditions. Different consolidation strategies might thus be more or less warranted depending on these conditions: cold showers (gradual) consolidations will be more justified if debt levels are high (low), interest rates high (low) and GDP growth rate low (high), holding all other factors constant.

In the sequel we consider whether, depending on the debt level, gradual or cold shower types of consolidations are better suited depending on the value of the initial debt level vs. the snowball effect of public debt (which embeds the influence of the GDP growth rate and of the implicit interest rate paid on public debt). In order to be able to apply Heckman two-stage procedure we consider only cases where a consolidation was effectively implemented, therefore we do not control for cases no consolidation was implemented which may result in a higher sample selection bias compared to the general estimations reported in Columns (2-3). The results of estimating separately the determinants of successful cold showers and gradual consolidations are reported in Column (4) and (5) of Table 5. The determinants of success appear to be rather different depending on whether one strategy is used instead of the other. Three results are relevant in this respect. First the influence of business cycle conditions appear to matter only for cold showers, with fiscal consolidations of this type having significantly lower chances of success when undertaken in years of downturn or protracted slowdown. Second, the negative coefficient obtained for the financial crisis and post-financial crisis dummy variable holds only for gradual consolidations while cold shower

consolidations undertaken after a financial crisis is resolved have significantly higher chances of success. In addition we also used a Wald test to check whether the coefficients on the *financial crisis* and *post financial crisis* variables were statistically different and found strong evidence for this both when considering the cases cold shower (although this is already evident from the coefficients themselves) and gradual consolidations. These results thus suggest that when fiscal consolidations coincide with financial crises episodes, success is more likely if these consolidations take place after the banking sector has been repaired, and especially so in the case of cold shower types of consolidations.

The effect of the debt level and the snowball effect of public debt also seem to differ depending on whether a cold shower or gradual consolidations are undertaken. The impact of the snowball effect on the relative chances of success of gradual vs. cold shower types of consolidation is not uniform however, and depends also on the starting level of debt. In order to investigate how the level of debt and the snowball effect of public debt interact to determine whether a cold shower or a gradual type of consolidation yield better chances of success, we have estimated the probability of success of fiscal consolidations at three different values of debt for varying values of the snowball effect (from -2% to 5% of GDP) holding all other variables constant (and equal to their average value) and using the estimations reported in Column (3) and (4).¹⁹ Results are reported in Graph 6 distinguishing three groups of countries according to the debt level of EU countries estimated for the year 2011 (using the European Commission Spring 2010 forecast): high debt (above 70% of GDP), medium debt (below 70% and greater than 40% of GDP) and low debt (below 40% of GDP). Graph 6 shows that the cut-off point of the snowball effect beyond which gradual or cold shower consolidation yield higher probability of success differ depending on the level of debt. In high-debt countries, cold shower consolidations are more likely to succeed than gradual consolidations in reducing debt if the snowball effect is positive and greater than 1% of GDP. Gradual consolidations are warranted only in cases where the snowball effect is negative or positive but very small.

Considering these results in the current EU context would suggest that countries that entered the 2008/2009 crisis with relatively low levels of debt but with fiscal positions substantially worsened by the current crisis (e.g. Ireland or Spain) do not appear to be exempt from pressure exerted by

¹⁹ In other words, we do as if the parameters estimated were identical to the one reported in Table 2 although we only consider as explanatory variables the debt level, the three business cycle variables, the debt-stabilising primary balance and the fiscal governance variable in order to be able to compare the same model for cold shower and gradual consolidations. The range of values chosen for the debt-stabilising primary balance appear to correspond to the values observed for the countries included in the sample used to estimate results reported in Table 2.

potential rise in interest rate and thus, despite relatively low initial level of debt before 2010, may be better off by undertaking a cold shower rather than a gradual consolidation. It is however difficult to make precise forecast about the value of the snowball effect for the post 2010 period given that this variable is highly sensitive to small changes in the interest rate and the GDP growth rate. Using the average value of the snowball effect between 2009 and 2011 as benchmark for Spain (2.5%) and Ireland (4.3%) for instance, these two countries would fall in the category of countries with both high debt and high snowball effect, however. In medium-debt countries, cold shower would yield higher probability of success for a snowball effect higher than 3.5% of GDP. The cut-off point for the snowball effect is rather high although it must be noted that even above this threshold the probabilities of success of cold shower vs. gradual consolidations are both very low (around 10%) in that case. In low-debt countries, cold shower consolidations are always less likely to succeed in reducing debt than gradual consolidations.

4.6 Do exchange rate depreciations favour successful fiscal consolidations?

It has often been argued in the press and policy circles that successful fiscal consolidations in the aftermath of the global financial crisis of 2008/2009 would be particularly difficult to achieve in a context of unwinding of intra-EU imbalances where, in particular, peripheral EU countries would have to face the dual challenge of containing rising debt level and to restore competitiveness problems, see European Commission (2009). Some have in addition suggested that these countries would be better off being (temporarily) outside rather than within the euro area in order to let their domestic currency depreciate and to facilitate growth-led economic recovery and, by the same token, soften the consolidation and adjustment processes, see Feldstein, (2010).

As suggested earlier, the existing evidence on the impact of exchange rate depreciation/devaluation on the success of fiscal consolidations is relatively scant and, when available, point to a significant albeit small positive effect of exchange rate depreciation/devaluations on the success of consolidations. Here we provide evidence on the link between exchange rate depreciation and the success of fiscal consolidations. Before turning to the econometric estimation, it is worth considering a number of descriptive statistics. Graph 7 plots the evolution of the annual change in the real and nominal effective exchange rate (trade weights against a sample of OECD and non-OECD countries).²⁰ Some small open economies appear to have successfully conducted fiscal

²⁰ Nominal and real effective exchange rates are calculated using trade-weighted average of bilateral exchange rates against 30 OECD countries and seventeen non-OECD countries (Argentina; Brazil; Chile; China; Chinese Taipei;

consolidations while experiencing nominal and real exchange rate depreciations. Graph 7 includes evidence for Ireland and Denmark in particular, two economies often referred to in the literature as having performed successful fiscal consolidations in the wake of exchange rate devaluations during the 1980s and early 1990s respectively. Giavazzi and Pagano (1990) in particular suggested that these countries succeeded in taming down inflationary pressure related to devaluation partly thank to their subsequent peg to the German DM which allowed them to anchor inflation expectations. Indeed fiscal consolidations appeared to be successful and were effectively preceded or coincided with nominal and real exchange rate depreciations in these countries during their respective fiscal consolidation episodes. Importantly, in both these countries the real and nominal exchange rates moved closely enough, i.e., nominal exchange rate depreciation did not translate into substantive inflationary pressure which would have the potential to cancel out the benefit of depreciation via export-led growth. The Finnish and Swedish fiscal consolidations undertaken in the aftermath of their respective financial crises in the 1990s were characterised by successful fiscal consolidations and preceded by exchange rate depreciations with, here again, a close correlation between real and nominal exchange rate suggesting that in both cases upward labour cost pressures were relatively contained.

Many more such cases can be found that provide counter-arguments to the case for exchange rate devaluations that would be needed to conduct successful fiscal consolidations. An especially interesting case illustrated in Graph 7 is Greece which, as mentioned above, has often been considered as a clear example of how the absence of the exchange rate as adjustment device was especially damaging for peripheral EU countries in the current juncture. Greece has in the past undertaken several fiscal consolidations, however these were rarely successful. Here again, the large depreciation of the nominal exchange rate in the early 1980s did not lead to successful fiscal consolidation and an explanation for this can be found in the diverging evolutions of the nominal and the real exchange rates due to inflationary pressures. One reason which could be invoked in the Greek case is that Greece, while being a relatively small EU economy, is not very open by EU standards such that the devaluation/export-led growth nexus would be less likely to yield the expected benefits in the context of fiscal consolidation. Generally speaking one can also find counter-examples of successful large consolidations without exchange rate depreciation/devaluation such as for instance the case Belgium (another small open economy) in the mid-1990s where

Estonia; Hong Kong, China; India; Indonesia; Israel; Malaysia; the Philippines; Russia; Singapore; Slovenia; South Africa, Russia and Thailand).

successful consolidations were not accompanied by strong devaluations/depreciations (actually some appreciation could be observed from 1992 to 1996).

The cases of non-EU OECD economies also reflect the wide array of possible outcomes when it comes to analysing the link between exchange rate variations and the success of fiscal consolidations. For instance, in the case of Japan in the second half of the 1980s, successful fiscal consolidations were preceded or coincided with sharp exchange rate appreciations, both nominal and real. Such result would be at odd with the idea that devaluations are needed to boost export and smooth the negative impact of fiscal consolidations, even in the case of an economy like Japan where export are a key driver of economic growth. The US is another interesting cases given that this country experienced sharp devaluation in the mid-1980s (both nominal and real) but failed to achieve successful fiscal consolidations in the following years. On the contrary, fiscal consolidations in the second half of the 1990s were granted with success and were accompanied by real and nominal exchange rate appreciation.

Overall it is rather difficult to draw a clear picture regarding the link between the success of fiscal consolidations and exchange rate evolutions prior consolidation when considering country-specific evidence in detail. Furthermore, the exchange rates used to construct Graph 7 concern bilateral exchange rate against virtually all potential trade partners. In the case of the EU, EU-wide effective exchange rates might be more appropriate, especially in relation to recent evolutions in real exchange rates within the euro area. Graph 8 provides complementary evidence in order to partly deal with these issues by plotting kernel density curves (which are equivalent to histograms) indicating the density (or frequency) of successful and unsuccessful fiscal consolidations depending on one-year lagged exchange rate percentage change (indicated in x-axis). If the kernel density curve corresponding to successful fiscal consolidations was centered around a given value of the change in the real exchange rate then this would tend to indicate that such value of the exchange rate variation is more likely to be associated with a successful fiscal consolidation. Inspection of the cases concerning all countries in the sample as indicated in the top left diagram (i.e. EU27 + OECD no EU countries) suggest that in general, exchange rate variation do not exhibit any particular change before successful consolidations. The same applies when considering the EU15 (top right graph), the EU15 with EU-specific real effective exchange rates during the period after 1985 (bottom left graph). Some bias toward devaluation can be observed however for the euro area countries also during the period preceding the launch of the euro 1985-1998 (bottom right graph) although, here again, the pattern of successful and unsuccessful fiscal consolidations seems fairly similar.

Several econometric tests were also performed using the Heckman two-stage probit estimation procedure and the results of these are reported in Table 7. The specification used is identical as the one employed in and several effective exchange rates are included as potential determinants together with their interaction with the exchange rate regime to which countries adhered at the time fiscal consolidation was observed using the data provided by Reinhart, C. and Rogoff, K. S. (2004).²¹ This table shows that independently of the exchange rate type and countries considered, the exchange rate variation is never a significant determinant of successful fiscal consolidation. Interestingly though, in the case of the EU15 the observed sign is the expected one (i.e. negative thus indicating that exchange rate depreciation tend to be associated with successful fiscal consolidation) but is never significant. Several robustness checks were performed to consider two-year instead of one-year lag in exchange rate depreciation. In addition, regressions were run for separate groups of countries according to an openness indicator (equal to the sum of export and import in percent of GDP) and also according to the export ratio to GDP ratio indicator to consider the possibility that the expected positive effect of a depreciation on the success of fiscal consolidation is more likely to take place in countries where exports have a potentially higher bearing on growth. None of these additional regressions significant coefficients on the exchange rate variables independently of the specification used.

Are these results at odd with the existing literature? There are a number of reasons suggesting that this is not necessarily the case. First of all the criteria for defining successful consolidation used is not necessarily the same: for instance, Lambertini and Tavares, (2005) consider a definition of successful consolidation as one where the CAPB does not fall below a given threshold after a consolidation episode is kick-started. Hjelm (2002) on the contrary, considers non-fiscal variables as indicator of success of fiscal consolidations such as private consumption, non-residential private investment, exports and changes in unemployment). Furthermore, previous analysis did not use causality analysis but rather simple statistical association or case-study analysis concerning small open economies (e.g. Alesina and Perotti, 1997) while existing evidence considering the role of

²¹ Reinhart and Rogoff exchange rate regime classification is used here as traditional classification (i.e. IMF) have long been questioned in the literature as these rely on self-reported country information on exchange rate arrangements which may differ from practice where dual exchange rate markets may better reflect reality and, in particular, monetary policy and inflation dynamics.²¹ We thus also rely upon an alternative exchange rate classification proposed by Reinhart and Rogoff (2004) who 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.

devaluations/depreciations in reducing debt significantly remains inconclusive (see in particular Ahrend et al., 2006)

5. Summary of results and policy implications

The 2008/2009 global financial crisis has seen public debt to reach unprecedented levels since the second World War prompting EU governments' actions to stem rising debt level by undertaking fiscal consolidations. In this paper we highlight a number of issues of direct relevance for fiscal consolidation in the aftermath of the financial crisis by studying the determinants of successful fiscal consolidations considering EU countries and a sample of non-EU OECD economies during the period 1970-2008. Our analysis in particular focuses on a number of important and novel aspects not yet considered in empirical studies:

- In this paper we make use of the two-stage Heckman probit estimator to obtain estimates of the determinants of successful fiscal consolidations which allow us to link the determinants of successful consolidation with the decision to start off a fiscal consolidation episode. We discuss the reasons why not controlling for sample selection bias in fiscal consolidations is important to derive meaningful policy implications, especially with regards to the role played by the starting debt level which is likely to condition the potential success of EU countries' consolidation strategies in the years to come.
- We consider explicitly the role played by systemic financial crises using information regarding financial crises duration and find evidence suggesting that restoring the financial sector is a pre-condition for achieving successful fiscal consolidations although fiscal consolidations conducted in the aftermath of financial crises tend to be significantly less successful compared to cases where no such crises took place. Our results further show that when considering separately gradual consolidations and cold shower, then it becomes clear that fiscal consolidations are significantly more likely to be successful when these are undertaken after a financial crisis is resolved, although such effect is especially apparent for the cases where cold shower consolidations are undertaken.
- We analyse the incidence of high debt levels on the success of fiscal consolidations which is a feature common to almost all EU and non-EU OECD economies in the aftermath of the 2008/2009 crisis. We show that countries facing high starting debt level and high interest rate/low GDP growth potential have better chance of achieving successful fiscal

consolidations if these were sharp and sustained while other countries where such constraints are less binding would be better off by undertaking more gradual fiscal consolidations.

- Our results concerning the influence of real and nominal exchange rate depreciation/devaluations remain broadly inconclusive suggesting that the arguments according to which fiscal consolidations would be facilitated by such depreciations/devaluations in order to promote export-led growth recovery are not backed by the data.

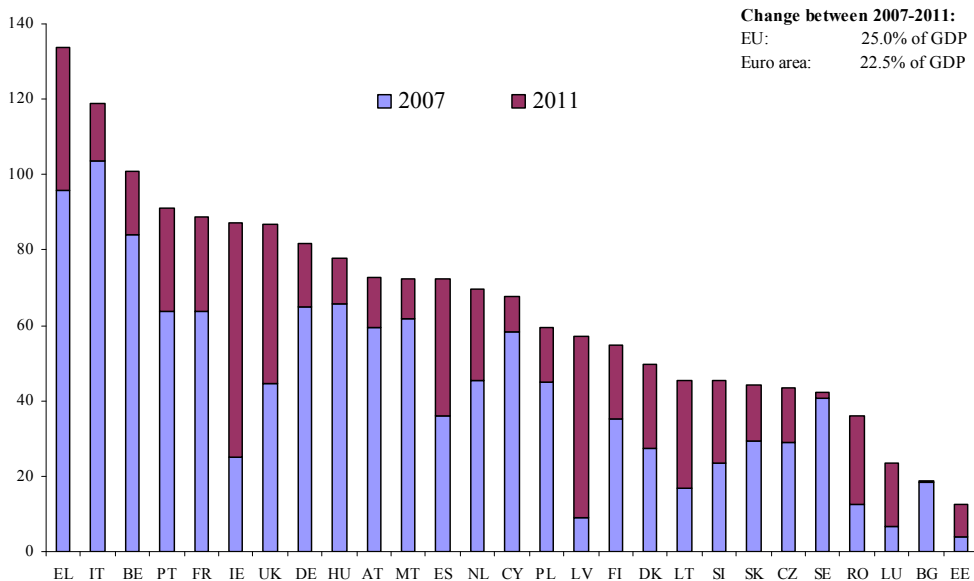
6. References

- Ahrend, R., P. Catte and R. Price** (2006), "Interactions between Monetary and fiscal policy: how monetary conditions affect fiscal consolidations", *OECD Economics Department Working Papers* n°521.
- Alesina, A. and R. Perotti** (1997), "Fiscal Adjustments in OECD Countries: Composition and Macroeconomic Effects" IMF Staff Papers 44: 297-329, (Washington, D.C.: International Monetary Fund).
- Alesina, A. and R. Perotti**, (1995), "Fiscal Expansions and Adjustments in OECD Economies," *Economic Policy*, October 1995 n. 21: 207-48.
- Alesina, A. and S. Ardagna**,(1998), 'Tales of Fiscal Adjustment', *Economic Policy* 13 (27), pp. 487-545.
- Alesina, A. and S. Ardagna**, (2009), "Large changes in fiscal policy: taxes vs. spending", NBER Working Paper 15438.
- Alesina, A., R. Perotti and J. Tavarés** (1998), "The Political Economy of Fiscal Adjustments", *Brookings Papers on Economic Activity* 1998:1, Macroeconomics: 197-266.
- Bayoumi, T.** (2000), "The morning after: explaining the slowdown in Japanese growth". In: T. Bayoumi and C. Collyns (eds.), "Post bubble blues. How Japan responded to asset price collapse: 10-44, Washington D.C., International Monetary Fund.
- Boltho, A. and A. Glyn** (2006), "Prudence or Profligacy: Deficits, Debt, and Fiscal Consolidation," *Oxford Review of Economic Policy*, 22(3): 411-425.
- Corsetti, G., K. Kuester, A. Meier and G.J. Müller** (2010),"Debt consolidation and fiscal stabilization of deep recessions", *American Economic Review: Papers & Proceedings* 100: 41-45.
- Cottarelli, C. and Vinals, J.** (2009), A Strategy for Renormalizing Fiscal and Monetary Policies in Advances Economies, IMF Staff Position Note 09/22
- Debrun, X., L. Moulin, A. Turrini, J. Ayuso-i-Casals and M. S. Kumar** (2008), 'Tied to the mast? The role of national fiscal rules in the European Union', *Economic Policy* 23, pp. 297-362.
- Demirgüç-Kunt, A. and E. Detragiache** (2005), 'Cross-country empirical studies of systemic bank distress: A survey', *National Institute Economic Review* No. 192, 68-83.
- Drazen, A. and V. Grilli**, (1993), "The Benefit of Crises for Economic Reforms," *American Economic Review*, 83(3): 598-607.
- European Commission** (2007), Public finances in EMU – 2007, *European Economy* No 3/2007, (Brussels: European Commission).
- European Commission** (2009a), Public finance report in EMU 2009, *European Economy* 5, Directorate General for Economic and Financial Affairs, European Commission, Brussels.
- European Commission** (2009b), *European Economic Forecast Autumn 2009*, *European Economy*. 10., Directorate General for Economic and Financial Affairs, European Commission, Brussels.
- Feldstein, M.** (2010), "Let Greece take a Eurozone 'holiday'", article published in the *Financial Times*, 16 February.
- Giavazzi, F. and M. Pagano**, (1990), "Can severe fiscal contractions be expansionary? Tales of two small European countries", *NBER Macroeconomic annual* 1990: 75-110.

- Goldberg, P.K. and M.M. Knetter**, (1997), "Goods prices and exchange rates: what have we learned?" *Journal of Economic Literature* XXXV: 1243-1272.
- Heckman, J.** (1979), "Sample selection bias as a specification error". *Econometrica*, 47, 153–61.
- Hjelm, G.** (2002), "Effects of fiscal contractions: the importance of preceding exchange rate movements", *Scandinavian Journal of Economics* 104(3): 423-41.
- Kumar, M., D. Leigh and A. Plekhanov** (2007), "Fiscal Adjustments: Determinants and Macroeconomic Consequences", IMF Working Paper No. 07/178, (Washington, D.C.: International Monetary Fund).
- Laeven, L. and F. Valencia** (2008), 'Systemic banking crises: a new database', IMF Working Paper 08/224 (Washington, D.C.: International Monetary Fund).
- Lambertini, L. and J.A. Tavares** (2005), "Exchange rates and fiscal adjustments: evidence from the OECD and implications for the EMU", *The B.E. Journal of Macroeconomics*, Contributions to Macroeconomics 5(1) Article 11.
- Lane, Ph. and R. Perotti** (1998), "The trade balance and fiscal policy in the OECD", *European Economic Review* 42(3-5): 887-95.
- Levy-Yeyati, E. and F. Sturzenegger** (2005), "Classifying exchange rate regimes: Deeds vs. words" *European Economic Review* 49(6):1603-1635.
- Maroto, R. and C. Mulas-Granados** (2007) "What Makes Fiscal policy sustainable? a survival analysis of fiscal consolidations in Europe", *Public Choice*, Vol 130. N. 3-4pp: 24-46.
- Reinhart, C. and K.S. Rogoff** (2004), "The modern history of exchange rate arrangements: a reinterpretation", *Quarterly Journal of Economics* Vol. CXIX (1), pp. 1-48.
- Reinhart, C.M. and K.S. Rogoff** (2008), 'Banking crises: an equal opportunity menace', *NBER Working Paper* 14587 (Cambridge, MA: National Bureau of Economic Research).
- Reinhart, C. and K.S. Rogoff** (2009), "This time is different: This time is different: eight centuries of financial folly" , Princeton University Press (2009).
- Reinhart, C. and K.S. Rogoff** (2010), "Growth in a Time of Debt", *American Economic Review*:. 100 No. 2, May 2010.
- Tsibouris, G.C., M.A. Horton, M.J. Flanagan and W.S. Maliszewski**, (2006), 'Experience with large fiscal adjustments', *IMF Occasional Paper* 246, (Washington, D.C.: International Monetary Fund).
- Von Hagen, J. and R. Strauch**, (2001), "Fiscal Consolidations: Quality, Economic Conditions, and Success," *Public Choice* 109(3-4): 327-46.
- Von Hagen, J., A. Hughes Hallett and R. Strauch** (2002), 'Budgetary institutions for sustainable fiscal policies', in M. Buti, J. von Hagen and C. Martínez Mongay (eds.), *The behaviour of fiscal authorities: Stabilization, growth and institutions* (Houdmills, Basingstoke: Palgrave), pp. 94-110.

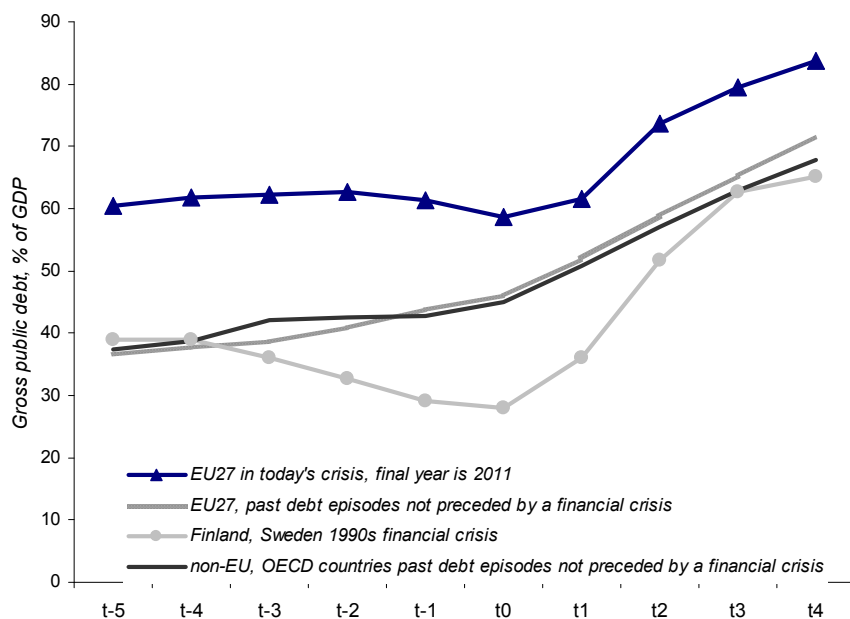
Graphs

Graph 1: Public debt in the EU 2007-2011 1/



Sources: Commission services

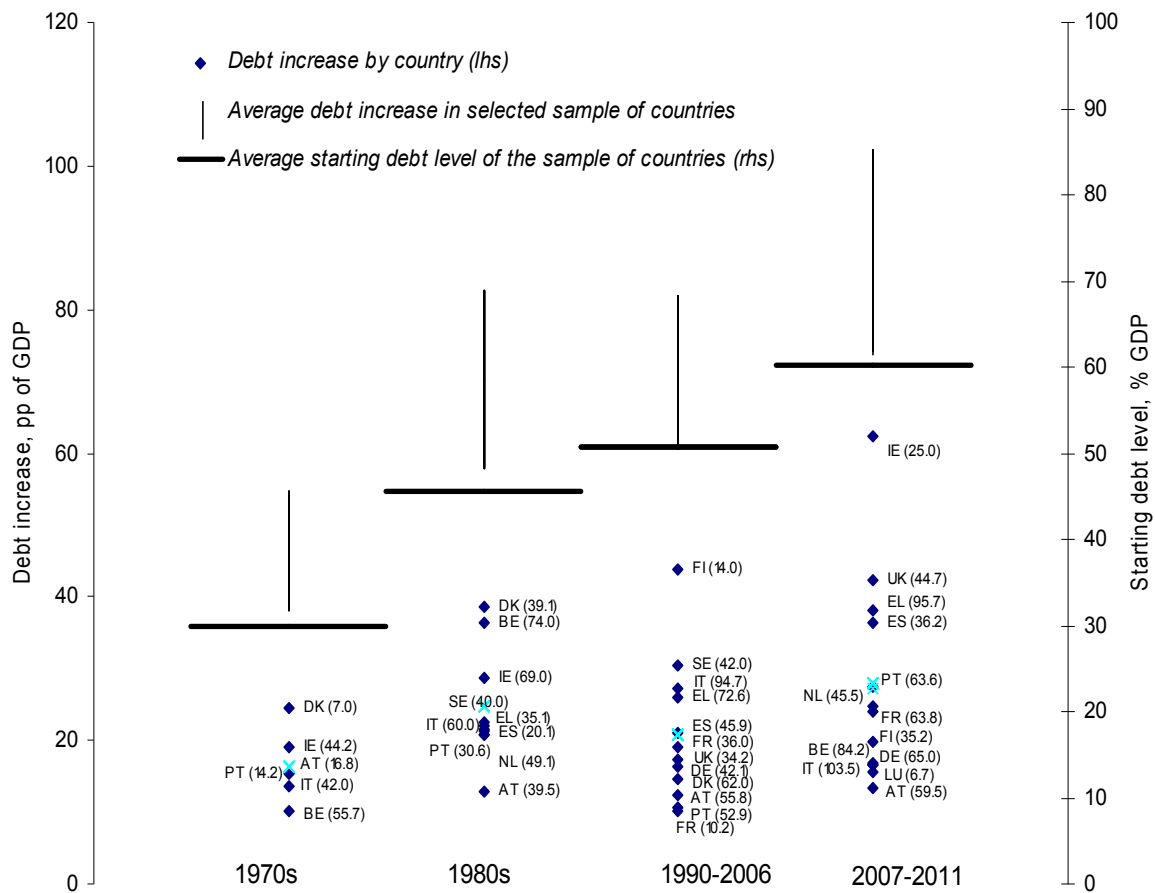
Graph 2: Evolution of debt to GDP ratio during major debt increase episodes 1/



Sources: Commission services

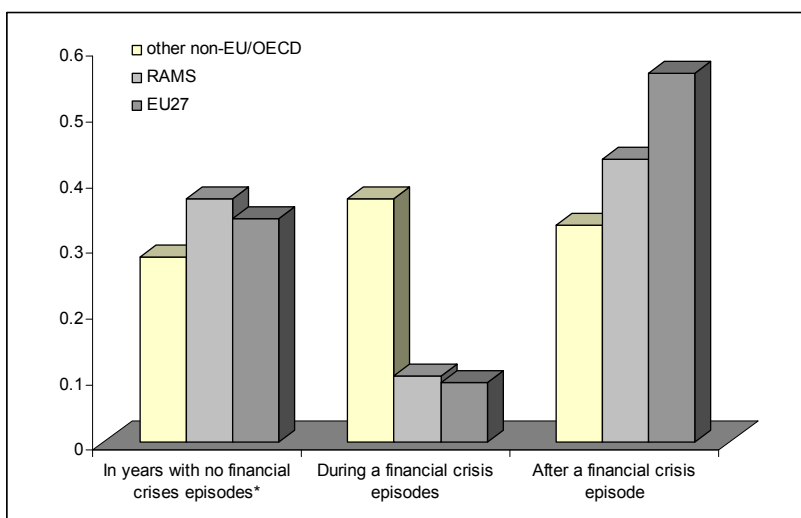
Note: Debt increase episodes are identified as corresponding to a minimum of 20% increase in a maximum of five years. The year t_0 corresponds to the first year marking the debt increase episode which in the current crisis corresponds to 2007. The last year in the current debt increase episode is 2011 (data taken from the Commission Autumn 2009 forecast) and the year $t-5$ is 2002 and is set in order to cover a period of 10 years. For the other debt increase episodes the last year $t+4$ is defined as the one where the debt increase over five year (on a moving average basis) reached its maximum value. The years t_0 and $t-5$ are then determined recursively to cover a time span of 10 years as for the current debt increase episode. The (unweighted) average value of the debt to GDP ratio for the following groups of countries (with time periods covered indicated in parentheses) are considered: **EU, past large debt increases:** Belgium (1974-1983), Denmark (1974-1984), France (1986-1995), Greece (1978-1987), Ireland (1975-1984), Italy (1975-1984 and 1985-1994) Malta (1990-1999), the Netherlands (1976-1985), Portugal (1975-1984), Spain (1976-1985 and 1987-1996), Sweden (1973-1982). **Non-EU, OECD:** Japan (1970-1979), Canada (1976-1985 and 1984-1993) and Iceland (1986-1993). Finland, Sweden 1990s financial crisis: Finland (1985-1994) Sweden (1985-1994)

Graph 3: Moving up the ladder: debt increases and starting debt levels during major debt increases episodes in the EU15 since 1970 1/



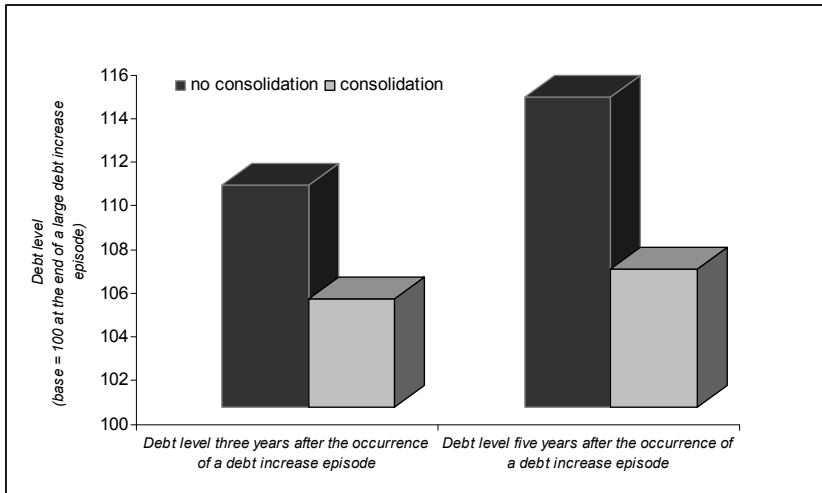
Notes: 1/ Only debt increase over a (maximum of) three-year period and at least equal to 10% of GDP are reported. Country-specific starting debt levels included in parentheses

Graph 4: The success rate of fiscal consolidation and financial crises episodes (% of consolidation episodes leading to reduction of debt level by at least 5 pp GDP 3 years later)



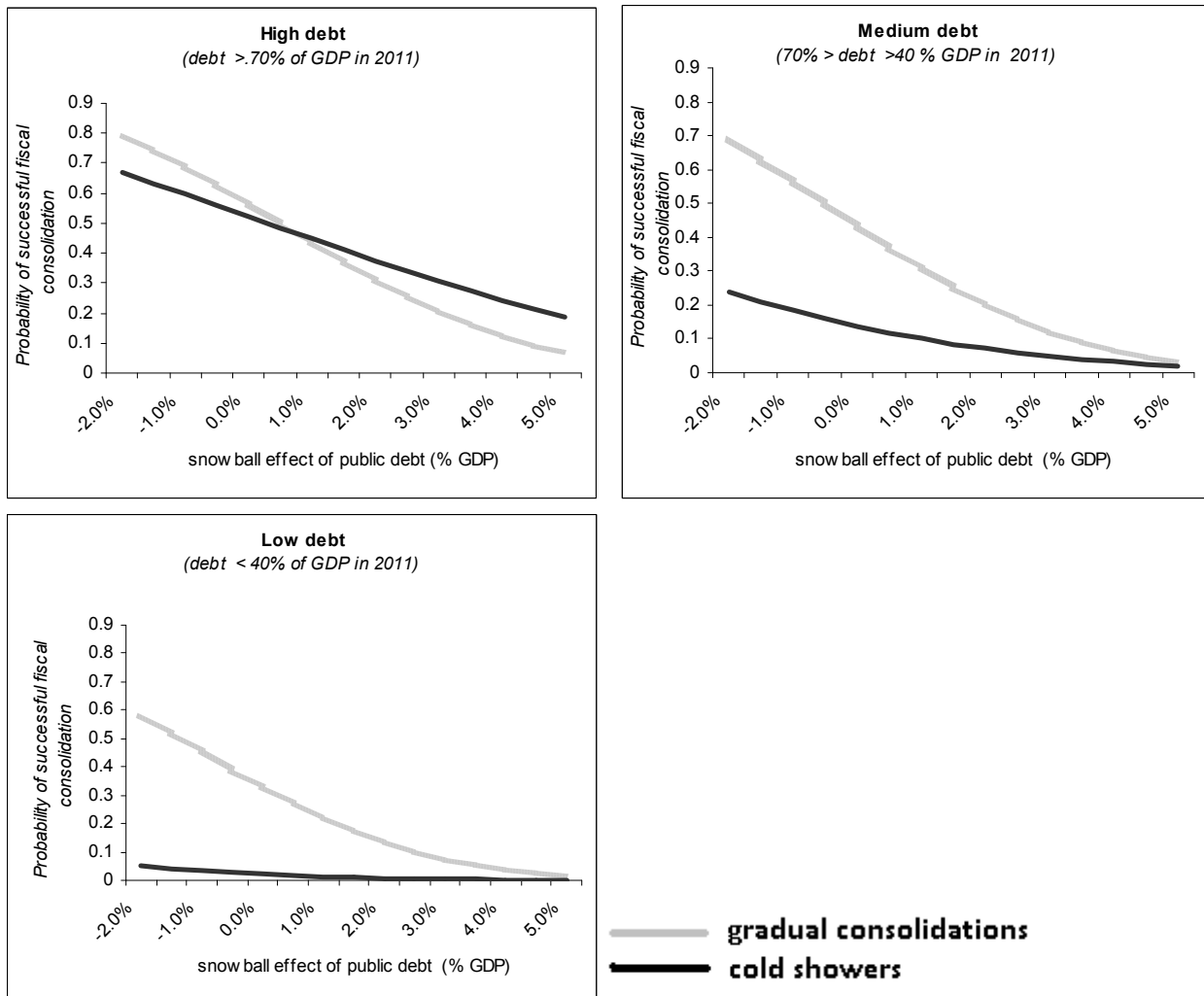
Note: * years with no financial crisis episodes exclude both financial crisis and post (up to five years) financial crisis episodes. RAMS stands for recently acceded Member States. Source: Commission services

Graph 5. Evolution of the debt to GDP ratio following a large debt increase episode



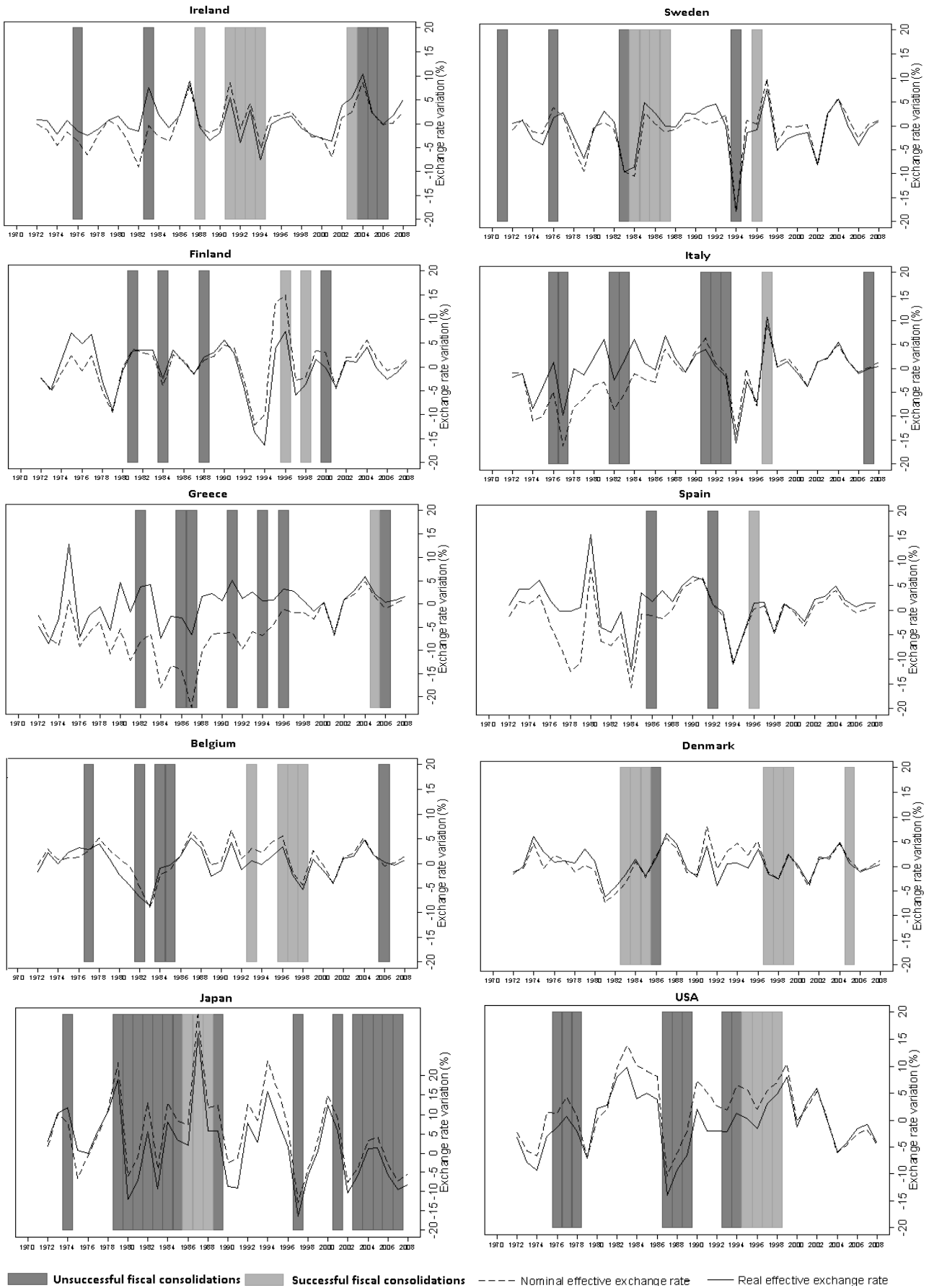
Note: Based on major debt increase episodes as reported in Table 1.

Graph 6: The probability of success of gradual and cold shower fiscal consolidation depending on the snowball effect and the level of debt.



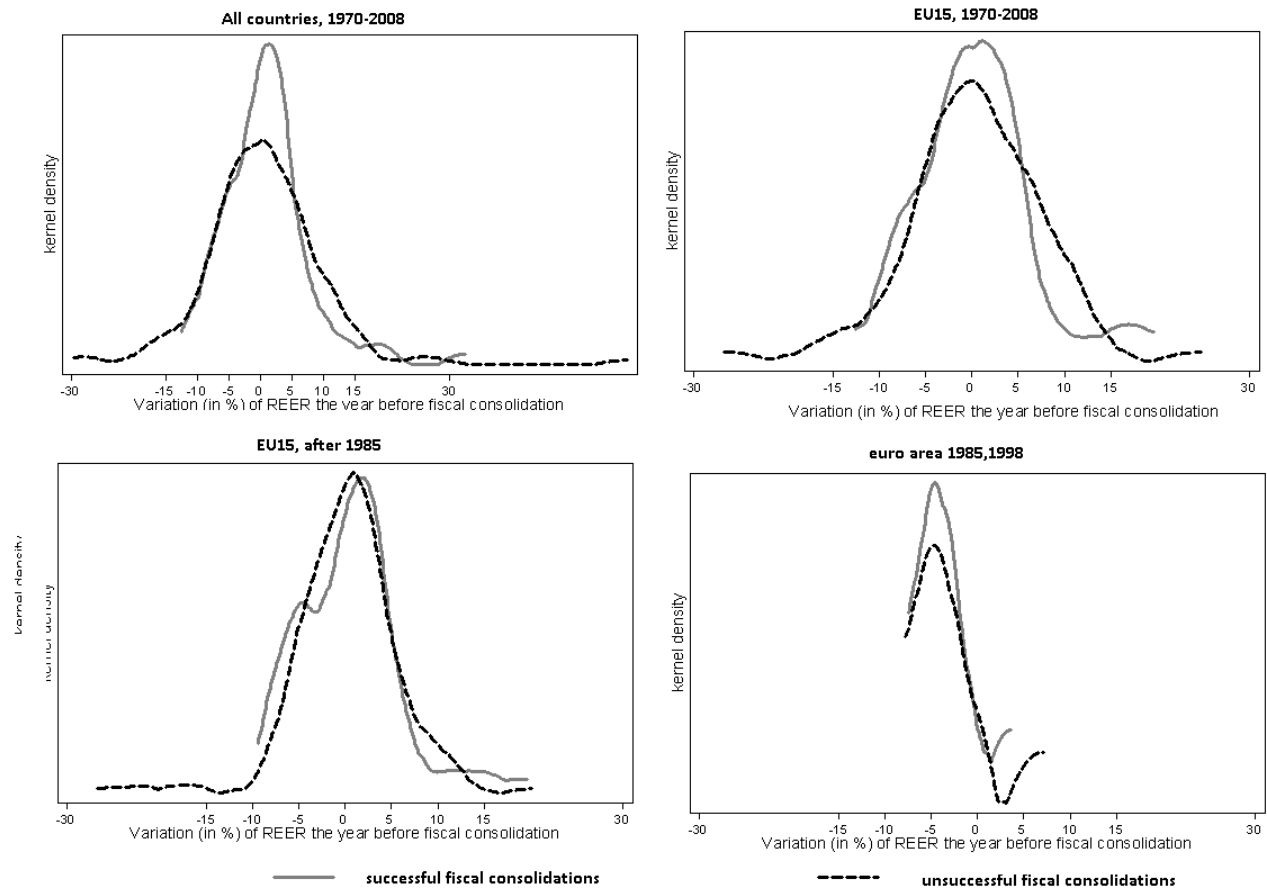
Note: Figures based on two-stage probit estimations as reported in Table 5 (specifications used correspond to columns 4 and 5).

Graph 7: Successful and unsuccessful fiscal consolidations and real and nominal exchange rates variation in selected sample of countries



Sources: Commission services

Graph 8: Successful and unsuccessful fiscal consolidations and real exchange rates variation: evidence using kernel graphs



Sources: Commission services

Tables

Table 1: The success rate of fiscal consolidations under alternative success criteria, 1970-2008 1/

	1970s	1980s	1990s	2000s*	Overall
Success criterion based on Debt reduction (t+3)*	25.0 (16)	22.7 (44)	47.6 (42)	42.9 (14)	34.5 (116)
Success criterion based on Debt reduction during or following major debt increase periods (t+3)*	0.0 (5)	25.9 (27)	31.6 (19)	0.0 (3)	24.1 (54)
Success criterion based on Debt reduction during or following major debt increase periods (t+5)**	0.0 (5)	29.6 (27)	36.8 (19)	0.0 (2)	28.3 (53)
Success criterion based on Debt reduction during or following major debt increase periods (t+10)***	0.0 (5)	3.7 (27)	47.4 (19)	-	19.6 (51)

1/ Concerns EU15 countries only. * Consolidations are defined as being successful if during the three years following a consolidation episode the debt to GDP ratio is lower by at least 5% relative to the level of debt in the last year of a consolidation episode. Last year of consolidation is 2005. ** Successful consolidations defined as in (*) but extending the post-consolidation period to 5 years. Last year of consolidation is 2003 *** Successful consolidations defined as in (*) but extending the post-consolidation period to 10 years. Last year of consolidation is 1998. Number of consolidation episodes considered in parentheses.

Table 2: The success rate of fiscal consolidations: gradual consolidation vs cold showers* 1970-2008 1/

	1970s	1980s	1990s	2000s*	Overall
Gradual consolidations	42.9 (7)	41.7 (12)	62.5 (16)	50.0 (6)	51.2 (41)
Cold showers	11.1 (9)	15.6 (32)	38.5 (26)	37.5 (8)	25.3 (75)
Gradual consolidations after large debt increases*	-	50.0 (6)	0.0 (3)	0.0 (1)	30.0 (10)
Cold showers after large debt increases*	0.0 (5)	19.0 (21)	37.5 (16)	0.0 (2)	22.7 (44)

1/ Concerns EU15 countries only. * Consolidations are defined as being successful if during the three years following a consolidation episode the debt to GDP ratio is lower by at least 5% relative to the level of debt in the last year of a consolidation episode. Last year of consolidation is 2005. Number of consolidation episodes considered in parentheses.

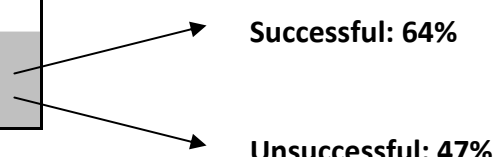
Table 3: The probability to achieve debt reduction vs. the decision to consolidate

<i>Consolidation *</i>	<i>Debt reduction **</i>	
	<i>no</i>	<i>yes</i>
no	80.6% (518)	19.4% (125)
yes	67.7% (159)	32.3% (76)

Notes: Figures in parentheses indicate number of country-year cases. Shaded area indicates cases where fiscal consolidations were undertaken. * Improvement of the CAPB of at least 1.5pp over a maximum of three years. ** Debt reduction of at least 5 pp over maximum of three years

Table 4: Starting debt level with and without consolidation

<i>Consolidation*</i>	<i>Average starting debt level</i>
no	0.48
yes	0.53



* Improvement of the CAPB of at least 1.5pp over a maximum of three years.

Table 5: The determinants of successful fiscal consolidations, financial crises and the business cycle

1/

	<i>All cases</i>	<i>All cases</i>	<i>All cases</i>	<i>Cold showers</i>	<i>Gradual</i>
				2/	2/3/
<i>Method of estimation</i>	(1) Probit 4/	(2) Heckman probit	(3) Heckman probit	(4) Heckman probit	(5) Heckman probit
During financial crisis	-0.303*** (0.040)	-0.289*** (0.083)	-0.340*** (0.067)	-0.415*** (0.098)	-0.967*** (0.009)
Post financial crisis	-0.244*** (0.060)	-0.208** (0.102)	-0.174* (0.100)	0.311** (0.135)	-0.836*** (0.033)
Cold showers	-	-	-0.075*** (0.017)	-	-
Debt	0.605*** (0.138)	0.104** (0.055)	0.140* (0.076)	1.037*** (0.283)	0.656*** (0.145)
Δ cyclically adjusted expenditure	-0.053*** (0.013)	-0.012* (0.007)	-0.015*** (0.004)	-0.037 (0.023)	-0.029*** (0.008)
Downturn	-0.112 (0.102)	-0.045 (0.050)	-0.050 (0.038)	-0.429*** (0.067)	0.082 (0.099)
Recovery	-0.093 (0.094)	-0.069 (0.052)	-0.072 (0.050)	-0.272* (0.156)	0.037 (0.121)
Protracted slowdown	-0.210** (0.087)	-0.150** (0.052)	-0.145*** (0.038)	-0.506*** (0.141)	-0.044 (0.118)
Snowball effect of public debt	-5.687*** (1.847)	-2.068** (0.092)	-2.147*** (0.372)	-6.312** (3.137)	-7.308** (2.949)
Fiscal governance	0.050 (0.087)	0.028 (0.034)	0.0362 (0.031)	0.111 (0.121)	0.098 (0.087)
IMF programme	0.441** (0.174)	0.131** (0.042)	0.131*** (0.042)	-0.101 (0.247)	0.700*** (0.046)
$\chi^2(\rho=0)$	-	12.79	2.87	3.76	0.75
<i>p-value</i>		[0.00]	[0.09]	[0.05]	[0.388]
<i>Observations</i> 5/	181	824	710	181	181

1/ Marginal effect using Probit estimations, dependent variable is a dummy variable taking value 1 when consolidation is successful and 0 when it fails. * significant at 10%; ** significant at 5%; *** significant at 1%

2/ Dependent variable success of gradual (cold shower) consolidation conditional on consolidation taking place

3/ The coefficient on systemic financial crises variables could not be estimated due to low number of non-zero outcome for these variables.

4/ Success/failure are conditional on fiscal consolidation being undertaken.

5/ The total number of observations reported in columns (1), (4) (4) appears to be lower than the total number of consolidation episodes available in our dataset. The reason for this is that the explanatory variables, in particular the fiscal governance variable was not available for all countries/years.

Robust standard errors in parentheses.

Table 6: The role of expenditure-cut/ tax revenue increase based consolidations and the business cycle: evidence from Heckman probit estimations

	Δ cyclically adjusted expenditure			Δ cyclically adjusted tax revenues		
	<i>All consolidations</i>	<i>Cold showers</i>	<i>Gradual consolidations</i>	<i>All consolidations</i>	<i>Cold showers</i>	<i>Gradual consolidations</i>
Downturn	-0.002 (0.017)	0.035* (0.011)	-0.093 (0.085)	0.013 (0.034)	0.014 (0.025)	0.026 (0.071)
Recovery	-0.040* (0.023)	-0.042* (0.022)	0.004 (0.093)	-0.017 (0.023)	-0.007 (0.016)	-0.160 (0.119)
Protracted slowdown	-0.047* (0.025)	-0.069** (0.028)	-0.030 (0.047)	-0.028** (0.014)	-0.027** (0.011)	-0.113* (0.070)

*Notes Marginal effect using two-stage Heckman Probit estimations (first stage variables as indicated in Table 5 Column 2 excluding "Δ cyclically adjusted expenditure". Dependent variable is a dummy variable taking value 1 when consolidation is successful and 0 when it fails. Success/failure are conditional on fiscal consolidation being undertaken. Robust standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%. Only explanatory variables concerning the interaction between expenditure/revenue based consolidation and starting business cycle conditions included.*

Table 7: Exchange rate variation, exchange rate regime and the success of fiscal consolidations. Results from Heckman-Probit estimations 1/

	No distinction of exchange rate regime	Fixed/quasi fixed- exchange rate regimes 2/	Floating/quasi floating- exchange rate regimes 2/
Nominal effective exchange rate	0.003 (0.004)	0.003 (0.005)	0.003 (0.006)
Real effective exchange rate <i>Unit labour cost</i>	0.002 (0.003)	0.003 (0.005)	-0.001 (0.005)
Real effective exchange rate <i>cpi</i>	0.001 (0.005)	0.005 (0.007)	-0.005 (0.008)
Real effective exchange rate EU15 <i>Unit labour cost</i>	-0.009 (0.007)	-0.016 (0.012)	-0.004 (0.010)
Real effective exchange rate EU15 <i>cpi</i>	-0.013 (0.009)	-0.014 (0.011)	-0.008 (0.012)

Notes: Robust standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%

1/ Non-reported control variables include the Debt level in t-1, Business cycle indicators for years of economic recovery downturn and protracted slowdown, an indicator on the quality of fiscal governance, snowball effect of public debt and a dummy variable indicating whether consolidation took place during a systemic financial crisis as defined in the PFR 2009.

2/ Coefficient estimates obtained using interaction term between exchange rate variable and exchange rate regime using data provided in Reinhart and Rogoff (2004).

Annex: Variables definitions and first-stage Heckman probit estimation results

Dependent variables:

Table 3 Success of fiscal consolidation: =1 if the Debt to GDP ratio is lower by at least 5pp three years after the start of a fiscal consolidation episode. *Source: European Commission, DG ECFIN.*

Table 4: Start of fiscal consolidation episode = 1 if $\Delta\text{CAPB} \geq 1.5\%$ of GDP in one year or in three years (in the latter case as long as annual $\Delta\text{CAPB} \geq -0.5\%$). *Source: European Commission, DG ECFIN.*

Explanatory variables:

Debt corresponds to the debt to GDP ratio the year a fiscal consolidation episode is started. *Source: European Commission, DG ECFIN.*

Business cycle variables: The business cycle is measured using output gap level and annual change: "Recovery" are years of negative output gap level and positive annual change, "Downturn" are years of positive output gap level and negative annual change, "Protracted slowdown" are years of a widening negative output gap level. In the current context, the most relevant episodes are the one with negative output gap levels: recovery and protracted slowdown. Business cycle dummy variables are estimated against benchmark case of expansionary years which are years of positive output gap level and positive annual change. *Source: European Commission, DG ECFIN.*

Financial crisis: Financial crises episodes are defined as episodes during which a country's corporate and financial sectors face great difficulties repaying contracts on time, experience a large number of defaults, non-performing loans increase sharply and most of the banking system capital is exhausted following the study by Laeven and Valencia (2008). The situation may be accompanied by falling assets prices, sharply rising real interest rates and a reversal of capital inflows. Thus, financial crises in this definition do not include banking stress limited to individual banks. However, banking crises may have coincided with and have been aggravated by episodes of currency and sovereign debt crises. Since Laeven and Valencia only define the starting points of banking crises but not their length, this study uses for the latter the information provided in Demirgüç-Kunt and Detragiache (2005) and Reinhart and Rogoff (2008b).²² *Sources: Laeven and Valencia (2008), Demirgüç-Kunt and Detragiache (2005), Reinhart and Rogoff (2008) and European Commission, DG ECFIN.*

Snowball effect of public debt: this variable corresponds to the debt-stabilising primary balance which is measured by $\text{Debt}/\text{GDP}(t-1) * (i - \gamma / (1 + \gamma))$, where i = interest rate and γ = nominal GDP growth. The value of this variable the year before the start of a consolidation episode is considered. *Sources: European Commission, DG ECFIN.*

²² In case of missing or conflicting information in those sources, the end of the crisis was determined as the year when domestic credit growth bottomed out. Accordingly, in absence of additional indications, the end of the banking crisis episode corresponds to the year in which the private credit-to-GDP ratio recovers. Since the credit-to-GDP ratio fall often occurs with a delay, a credit ratio increase after the start of the crisis does not imply classifying the episode as lasting one year only, except if the credit-to-GDP ratio grows continuously for at least three years without interruption.

IMF programme indicates whether a given country is subject to IMF balance of payments assistance and conditionality in order to control for the fact that emerging economies and, depending on the period considered, some recently acceded Member States may have had additional incentives to undertake and continue with a fiscal consolidation. *Source: IMF*

Fiscal governance: dummy variable indicating whether or not a given country uses a budget deficit rule. *Sources: European Commission, DG ECFIN fiscal governance database and Guichard et al. (2007) for non-EU OECD countries.*

General elections: dummy variable indicating whether or not general elections took place a year before in a given country. *Source: The International Institute for Democracy and Electoral Assistance.*

Table A1: Systemic financial crises duration in EU and other non-EU OECD countries

Country	Systemic financial crisis experienced during 1970-2007
Australia	-
Austria	-
Belgium	-
Bulgaria	1996-1999
Canada	-
Switzerland	-
Cyprus	-
Czech republic	1996-1997
Germany	
Denmark	
Spain	1977-1980
Estonia	1992-1995
Finland	1991-1994
France	-
United Kingdom	2007
Hungary	1991-1995
Ireland	-
Italy	-
Japan	1997-2002
Lithuania	1995-1997
Luxembourg	-
Latvia	1995-1999
Mexico	1981-1982, 1994-1997
Malta	-
Netherlands	-
Norway	1991-1993
Poland	1992-1995
Portugal	-
Romania	1990-1999
Slovakia	1998-1999
Slovenia	1992-1994
Sweden	1991-1994
Greece	-
Turkey	1982-1985, 2000-2003
USA	1988-1991, 2007

Table A2: First-stage Heckman probit estimations concerning Table 5 1/

<i>Table 5 column number:</i>	(2)	(3)	(4) 2/	(5) 2/
Debt	0.374** (0.190)	0.403*** (0.169)	-0.146 (0.290)	0.204 (0.325)
Downturn	0.009 (0.167)	-0.013 (0.126)	0.394* (0.226)	-0.490 (0.324)
Recovery	0.142 (0.139)	0.124 (0.138)	0.458* (0.286)	-0.546** (0.277)
Recession	0.292** (0.131)	0.272** (0.105)	0.387 (0.261)	-0.454* (0.250)
Financial crisis	0.221** (0.110)	0.227** (0.103)	0.213 (0.520)	-0.276 (0.446)
Post financial crisis	0.302 (0.213)	0.355 (0.214)	-0.127 (0.217)	0.002 (0.383)
Parliamentary elections	-0.077 (0.091)	-0.058 (0.076)	-0.125 (0.192)	-0.056 (0.189)
Fiscal governance	-0.022 (0.112)	-0.023 (0.103)	-0.293 (0.207)	0.286 (0.222)
IMF programme	-0.145 (0.194)	-0.154 (0.193)	0.309 (0.484)	-0.304 (0.433)
Snowball effect of public debt	1.671 (2.441)	2.062 (0.194)	3.191 (5.217)	-3.435 (4.862)

1/ First-step elasticities using two stage Heckman Probit estimations, dependent variable is a dummy variable taking value 1 when consolidation is implemented and 0 when it is not. Robust standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%

2/ Dependent variable success of gradual (cold shower) consolidation conditional on consolidation taking place