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Reassessing the Fiscal Mix for Successful Debt Reduction

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Reassessing the Fiscal Mix for Successful Debt Reduction

by

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Paper to be presented for the 55th Panel Meeting of Economic Policy (October 2011)

Abstract

This paper assesses the determinants of successful debt reduction in a large sample of countries over the last three decades using a survival model. Results show that increases in the primary balances are the main source of debt reduction. Expenditure-based fiscal adjustments are key for reducing the length of debt consolidation spells, including in the aftermath of financial crises. Political fragmentation, the proximity of elections, and weak institutions make the adjustment process more difficult to achieve, while structural reforms that help spur growth decrease the duration of debt reduction. In contrast to previous findings, however, we show that when adjustment needs are large—as in many advanced economies today—fiscal consolidations that rely also on revenue-enhancing measures are more likely to accelerate debt reduction. This result is particularly strong when countries experience a financial crisis and underscores the importance of credible fiscal plans to reduce sovereign credit risk.

I. INTRODUCTION

The recent global financial crisis severely harmed public finances of many countries and raised their rollover risks. Much of the deterioration in fiscal positions of these countries is traceable to revenue losses associated with sharp declines in GDP. The adoption of countercyclical stimulus measures in response to the crisis explains only small part of fiscal worsening. As stimulus measures have started to be unwound, the crisis has left a legacy of high public debts[2] that are expected to continue rising in the near future, in particular in advanced economies due to spillover effects (IMF, 2010a). The main challenge for these countries is to regain fiscal control by reducing their public debt to sustainable levels with credible fiscal adjustment plans that do not hamper growth.

However, lowering public debt will not be easy because of the large size of consolidation needs estimated for many countries and the uncertain global outlook (IMF, 2010b). Although the required adjustment to reduce public debt to pre-crisis levels[3] is not historically unprecedented, as some advanced and emerging economies have successfully reduced debt from high levels in the past (IMF, 2009a), this time around the conditions facing the countries are more difficult. The fiscal adjustment will have to take place in a post-crisis environment of extended private sector deleveraging and uncertainty about economic prospects. This implies that debt reduction may need to be achieved over a longer time span compared to the past. Thus, identifying policies to help shorten the length of the transition to debt sustainability is a key policy question for most countries.

There are a limited number of studies that directly tackle the issue of long-term debt consolidation in a systematic manner. The literature on successful fiscal consolidations stemming from seminal papers by Giavazzi and Pagano (1990) and Alesina and Perotti (1995) focuses on the size and composition of fiscal adjustment episodes and their likelihood of success in the short term. But these studies did not address the question of how fiscal adjustment contributes to sustainable debt reduction in the medium term. A related strand of literature focuses on the impact of fiscal policy on growth, both in the short and the medium term (e.g., the size of fiscal multipliers, expansionary fiscal contractions models). Only a limited number of studies have analyzed debt reduction episodes and their impact on long-term growth (Ardagna, 2008). Even then, a comprehensive analysis of the factors that explain

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[2] Throughout the paper, public debt indicates general government gross debt when available, otherwise central governments gross debt. While net debt would be a better indicator of fiscal solvency, data availability limits its use in cross-country analyses (Baunsgaard and Shin, 2011). We also use public debt and debt interchangeably.

[3] Pre-crisis median debt levels were about 60 percent of GDP in advanced countries and 40 percent of GDP in emerging economies. These levels are not necessarily consistent with fiscal sustainability as debt dynamics depends on the flow of future primary fiscal balances and the interest rate-growth differential (Baldacci, McHugh, and Petrova, 2011). Nonetheless, Baldacci et al. (2011) find similar thresholds for public debt to GDP that signals a high risk of fiscal distress in both advanced and emerging economies.

the time it takes to reduce debt to sustainable levels and to exit from the debt reduction process is lacking.

This paper assesses the determinants of the duration of debt reduction episodes in a large sample of advanced and emerging economies over the last three decades. It focuses on the fiscal adjustment mix that is more likely to shorten the duration of the required debt consolidation. The paper adds to the existing literature in four ways. First, it uses survival analysis to identify determinants of public debt reduction instead of relying on an ad hoc definition of an adjustment episode. Second, the analysis focuses on the channels through which the size of fiscal adjustment and mix of fiscal policy can affect the likelihood of debt reduction, including via their effects on growth and interest rates. Third, it studies the importance of political economy variables in explaining the duration of debt consolidations, given that debt reductions are politically controversial and governments face electoral constraints when designing their debt reduction strategies. Finally, it analyzes whether the duration of debt consolidation after financial crises is different from other episodes.

The paper finds that fiscal adjustment (i.e., an increase in the primary balance) is the key to debt reduction, although the contribution of the interest rate-growth differential to lowering debt is not negligible, particularly for emerging economies that experienced high-growth spells. The results also confirm that, in general, expenditure-based fiscal adjustments tend to be more successful in reducing the duration of debt consolidation episodes, including when public debt accumulation is the result of a financial crisis. Expenditure composition is key to sustained deficit reductions that reduce solvency risks: fiscal adjustments that reform entitlements and increase the share of spending for capital projects are more likely to succeed as shown in earlier studies (for example, Guichard et al., 2007). They lead to higher primary balances but also affect growth positively, thereby contributing to a reduction in the interest rate-growth differential component of debt dynamics. Political fragmentation, the proximity of elections and weak institutions[4] make the adjustment process more difficult. Structural reforms that help spur growth significantly increase the likelihood of debt reduction.

In contrast to previous findings, however, we also show that when adjustment needs are large—as in many advanced economies today—revenues also matter. In these circumstances, fiscal adjustments that rely on revenue-enhancing measures are more likely to accelerate debt consolidation than expenditure-based cuts only. This result holds in general, but it is stronger when debt consolidation follows financial crises that dampen potential output and increase uncertainty. This study underscores the importance of credible fiscal measures to reduce sovereign credit risk perception by financial markets. The fall-out from the banking crisis makes the challenge of regaining fiscal sustainability more daunting.

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[4] See Iara and Wolff (2010) for a discussion of the effect on sovereign bond yields of fiscal rules and other fiscal institutions.

The rest of the paper is organized as follows. Sections II and III respectively summarize the literature and propose a simple framework to assess determinants of public debt reduction. Section 3 introduces the survival analysis methodology used in the paper. Section IV presents the data and highlights some stylized results based on past debt reduction episodes. Econometric results based on a parametric duration model are presented in Section V and the robustness of these results is reported in the following section. The final section draws the policy implications from these findings.

II. Literature review

The literature on public debt reduction can be grouped into three broad strands: (i) studies that describe episodes of debt accumulation and its sources; (ii) studies that assess the economic implications of high debt (on economic growth and interest rates); and (iii) studies that focus on debt reduction episodes, fiscal adjustment and its impact on the economy. Each strand of literature is relevant for understanding the implications of the current episode of large increases in public debt in many advanced and emerging economies.

Debt accumulation and its sources: There are several papers that explore periods of sharp debt accumulation in history.[5] They show that episodes of buildup in sovereign liabilities of the magnitude observed in recent years have occurred in the past, but mostly as a result of major military events. Abbas et al. (2011) have compiled historical series of public debt to GDP data for 174 countries during 1880-2009. They show that for advanced economies, large debt spikes occurred after the two World Wars and that since the mid-1970s public debt ratios were trending up.[6] Typically, debt increases have originated from a combination of factors including the deterioration in the primary fiscal balance, positive interest rate-growth differentials over sustained periods, and sharp changes in asset and liabilities valuation, including those arising from exchange rate depreciations.

A related group of studies have focused on public debt levels arising from financial crises. They show that banking crises have had large adverse fiscal consequences in both advanced and emerging market economies.[7] In particular, Rogoff and Reinhart (2009) found that

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[5] See Calomiris and Gorton (1991) and Gorton (1988) on pre-WWII banking panics; Reinhart and Rogoff (2008a; 2008b) for an analysis of all post-WWII banking crises in advanced economies; Bordo et al. (2001) for an analysis that encompasses both advanced and emerging market economies.

[6] Debt ratios were more volatile in emerging economies, with the largest spike occurring in Latin America in the early 1980s and in 1990s in Asia. The average (weighted by GDP levels adjusted by purchasing power parities) ratio of public debt to GDP during the 1980s and 1990s was 55 percent in advanced countries and 44 percent in emerging economies. However, the standard deviation of the ratio was slightly higher in emerging economies (24.4 percent of GDP) than in advanced countries (about 20 percent of GDP).

[7] In the last two years, most of the literature on debt accumulation is linked to the eurozone debt crisis. Of particular relevance are the studies that make projections on debt developments (Cecchetti et al, 2010) and those which study the type of debt increases that the crisis has brought about (De Broeck at al, 2011).

government debt on average rose by 86 percent in the three years following a banking crisis in a sample of historical episodes. Baldacci, Gupta, and Mulas-Granados (2009) report an increase in the public debt-to-GDP ratio of about 40 percentage points in a sample of banking crisis episodes. Public debt is also projected to increase by almost 40 percentage points of GDP between 2007 (the pre-crisis year) and 2015 for the largest advanced economies (IMF, 2009a), reflecting lower projected potential output and other crisis-related effects on long-term interest rates.

High debt and its impact: The negative economic effects of high public debt levels have been documented in a series of recent studies. According to this strand of the literature, there are several channels through which high debt could adversely impact medium- and long-run growth: high public debt can adversely affect capital accumulation and growth via higher long-term interest rates (Gale and Orzag, 2003; Baldacci and Kumar, 2010), higher future distortionary taxation (Barro, 1979; Dotsey, 1994), inflation (Sargent and Wallace 1981; Barro 1995; Cochrane 2010), financial instability, and greater uncertainty about prospects and policies (Das at al., 2010).

Reinhart and Rogoff (2009; 2010) provide an estimate of the size of the economic damage generated by high public debt levels. They use simple correlation analysis and find that the difference in the median growth rate of GDP between low-debt countries (below 30 percent of GDP) and high-debt ones (above 90 percent of GDP) is 2.6 percentage points. Kumar and Woo (2010) use a regression-based model to show that a 10 percentage point increase in the initial debt-to-GDP ratio is associated with a slowdown in annual real per capita GDP growth of around 0.2 percentage points per year, with the impact being somewhat smaller in advanced economies.

Fiscal adjustment and debt reduction: Reducing debt from high levels can therefore be good for growth. But what is the best way to reduce public debt? Fiscal contractions tend to harm growth in the short run, if fiscal multipliers are positive. However, there is uncertainty about the size (and even the sign) of multipliers when the economies are open, when the exchange rate is flexible, when debt is high and when the sample comprises developing countries (Iltzetki, Medoza, and Vegh, 2011). There are also circumstances under which fiscal contractions can be expansionary. The literature that developed in the nineties on expansionary fiscal adjustments labeled episodes of deficit reduction as successful or unsuccessful depending on whether they achieved economic growth and/or a short-term reduction in the debt/GDP ratio in the 3 years following the end of the fiscal adjustment episode (Alesina and Perotti, 1995, 1996; Alesina, Perotti, and Tavares, 1998). On the basis of these studies, other papers delved into the sources of successful fiscal consolidation. Four

factors emerged:[8] size of the fiscal consolidation; composition of the adjustment; accompanying policies; and political economy and institutional factors.

In these studies, the fiscal policy mix has been found to be a key ingredient of successful fiscal adjustments. Fiscal adjustments that relied on expenditure cuts (in particular lower public sector wages and untargeted transfers) were longer lasting and had a higher likelihood of success both in advanced countries (Alesina and Ardagna, 2009) and in emerging market economies (Gupta et al., 2005). Fiscal consolidations that protected capital outlays also had a beneficial impact on sovereign credit premia by strengthening market confidence that governments can ensure fiscal solvency (Baldacci, Gupta, and Mati, 2011).[9]

There are a few papers that have focused on the causal relationship between the characteristics of fiscal adjustments (in terms of size and composition) and the likelihood of debt reduction over the medium term. Empirical studies based on past debt reduction attempts have found that lowering high public debt to sustainable levels requires large improvements in the structural primary balance (IMF, 2010c). This is a necessary condition for fiscal solvency along with a favorable projected dynamic of the interest rate-growth differential.[10] In advanced economies, large fiscal adjustments have been a key driver of debt reduction while in emerging economies, a negative interest rate-growth differential has helped reduce public debt.[11]

Ambitious fiscal adjustment plans affect debt sustainability through market perception of credit risks. Afonso and Strauch (2004) and Ardagna (2009) show that interest rates of long-term government bonds and stock market prices worsen considerably in periods of fiscal expansion and improve during large fiscal consolidations.[12]

However, none of these studies has focused on the interplay between the size and composition of fiscal adjustments and their effect on achieving a sustainable debt level in the

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[8] See for example: Von Hagen, Hallet and Strauch (2001); Gupta et al. (2005); Mulas-Granados (2006) Alesina and Ardagna (2009); IMF (2010c); OECD (2010).

[9] Akitoby and Stratmann (2008) also show that financial markets react to the composition of the budget. In their study, revenue-based adjustments lower government spreads more than expenditure-based ones, and debt financed spending increases sovereign risks in a sample of emerging market economies.

[10] In a seminal paper, Giavazzi, Jappelli, and Pagano (2000) found that large improvements in the fiscal position help signal a regime change and can spur economic growth.

[11] During the largest fiscal consolidation episodes in advanced economies since the mid-1980s, the median change in the primary balance was close to 7 percent of GDP and the median duration of the adjustment was 7 years. In emerging economies, the median adjustment was above 8 percent of GDP, but the median duration of the large consolidation episode was only 3 years (IMF, 2010c).

[12] Fiscal policy can also affect corporate bond spreads (Durbi and Ng, 2005; Cavallo and Valenzuela, 2007).

medium term. Also, there is no study (to the best of our knowledge) that analyzes the challenge of regaining debt sustainability after banking crises.[13] As noted earlier, this is one important contribution of this study.

The starting point of our study is that when accumulated debt is large and the economic environment extremely uncertain as today, an excessive reliance on expenditure-based fiscal adjustment may generate undesirable effects. These include (i) the implementation of across-the-board cuts that may penalize the efficient delivery of government services; (ii) the adoption of exceptional measures—such as wage freezes—that could lead to short-term savings, but are reversed over the medium term; and (iii) compression of less visible but important budget items, such as allocation for operation and maintenance which could eventually harm growth.[14] The fiscal mix may therefore have nonlinear effects on the probability of successfully reducing debt.

Accompanying policies also play an important role for sustainable debt reduction. In particular, reforms to spur economic growth, accommodative monetary conditions, and exchange rate devaluations are important ingredients of episodes of debt reduction (IMF, 2010a; 2010b). Political economy constraints may also limit the implementation of needed reforms to reduce fiscal deficits. Studies have shown that the likelihood of debt consolidation could be lowered by institutional weaknesses, lack of political cohesion, and government fragmentation (for example, Person and Tabellini, 1999 and Buti and van den Noord, 2003).

Political constraints may also lead to a weaker adjustment mix. For example, fiscal adjustment plans designed by G-20 countries rely mostly on expenditure cuts, but the underlying measures are not well specified in many cases (Gerson et al., 2011). Harnessing sufficient political consensus to reform entitlements in advanced countries and untargeted subsidies in emerging economies is also difficult. An assessment of past fiscal adjustment plans shows that in many cases implementation of planned spending cuts was problematic and had to be reversed (IMF, 2011c). This could jeopardize the initial fiscal objectives and undermine the sustainability of the debt reduction strategy.[15]

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[13] Claessens et al. (2008) studied recessions caused by credit contraction, those associated with house price declines, and episodes of equity price declines. They find evidence that recessions associated with credit crunches and house price busts tend to be deeper and longer than other recessions.

[14] These facts have been documented in an analysis of past debt reduction episodes in Mauro (2011). Front-loaded fiscal consolidations, including when based mostly on expenditure savings do not seem to have a higher likelihood of success. Studies on duration of adjustment episodes point to adjustment fatigue, but front-loaded adjustments run the risk of being discontinued over the medium term, jeopardizing short-term results. See IMF (2010c) for a review of the lessons from the literature on the phasing of fiscal adjustment.

[15] Results show that the public opinion's support is critical for the execution of fiscal adjustment plans.

III. PROPOSED FRAMEWORK

The paper uses a simple framework to assess successful debt reduction. To analyze the components of debt declines, we follow Escolano (2010):

$$d_t - d_{t-1} = \frac{r_t - g_t}{1 + g_t} d_{t-1} - pb_t + sfa_t. \tag{1}$$

The change in the debt-to-GDP ratio ($d_t - d_{(t-1)}$) is the sum of three terms: (i) the product of the lagged debt ratio and the differential between the effective real interest rate on debt (r_t) and the real GDP growth rate (g_t); (ii) the primary balance (pb_t); and (iii) a residual stock-flow adjustment term (sfa_t) capturing valuation effects and "below-the-line" fiscal operations, including errors and omissions (Abbas et al., 2011).

The probability of successfully reducing debt to the desired target in turn depends on (i) the size of the primary balance that can be sustained during the period; and (ii) the projected growth-interest rate differential. Debt sustainability conditions can be formally derived from (1) assuming no stock-flow adjustment and defining growth and interest rates in constant terms as follows:

$$d_{t+1} = \frac{1+r}{1+g} d_t - pb_t \tag{2}$$

Assuming a fiscal reaction function as in Bohn (1998), with X_t indicating a set of control variables that affect the primary balance and adding a constant and an error term, we have:

$$pb_{i,t} = \alpha_i + \rho * d_{i,t-1} + \sum_{j=1}^{J} \beta_j X_{j,i,t} + \varepsilon_{i,t} \tag{3}$$

We follow Alesina and Ardagna (2009) and assume that the composition of expenditure and revenue measures can influence the sustainability of large fiscal consolidations during the adjustment process. Adjustments based on structural fiscal reforms are likely to generate larger savings and be more durable than fiscal deficit reductions relying on across-the-board spending cuts. At the same time, the fiscal mix can also affect the interest rate and growth channels through

- risk premia on government debt;

- efficiency-oriented fiscal adjustment packages that minimise the adverse effects of fiscal consolidation on growth; and

- realistic consolidation plans which reassure private sector and have positive effects on growth.

Replacing equation (3) in the debt dynamic equation above and expressing the equation in first differences of the debt ratio we obtain:

$$\Delta d_{t+1} = \left(\frac{r-g}{1+g} - \rho \right) d_t - x_t \tag{4}$$

which forms the basis of the empirical analysis in the next section. Changes in debt are the result of (i) initial debt; (ii) interest rate; (iii) growth; and (iv) other factors affecting the the primary balance, including the fiscal mix and political economy variables.

IV. METHODOLOGY

We define the length of a successful debt consolidation spell on the basis of the time interval between periods in which the ratio of debt to GDP declined from a high level to reach the prudent threshold. This threshold is set at the level of 60 percent of GDP for advanced economies and 40 percent of GDP for emerging economies as these were the values of the median debt-to-GDP ratio before the crisis.[16] The debt reduction episode ends (fails) when the debt ratio rises above the threshold. A survival model is used to estimate the likelihood of successfully reducing debt to the target level.

Survival models have been mainly used by labor economists[17] to assess the duration of employment and unemployment spells and the determinants of labor market entry and exit rates.[18] These models have been applied to the analysis of fiscal consolidation spells by Von Hagen, Hallett, and Strauch (2001), Gupta et al. (2005), and Maroto and Mulas-Granados (2006).

The main aim of this approach is to model duration. If we define T as the discrete random variable that measures the time span between the periods in which debt is below the prudent thresholds and periods in which it is above, the observations in the sample consist of a series of data (t_1, t_2,... t_n) which correspond to each of the observed durations of each debt consolidation episode in the sample. The probability distribution of the duration variable can be specified by the cumulative distribution function:

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[16] We test the robustness of the results to alternative thresholds in Section 5.

[17] Duration models have been also used in the field of industrial organization to analyze for example the life duration of multinational subsidiaries in the U.K. manufacturing industry (Mc Cloughan and Stone, 1998), or to analyze investment decisions (Licandro, Goicolea and Maroto, 1999).

[18] See Kiefer (1988) for a literature review. See also Sosvilla-Rivero and Maroto (2001) for a detailed study of the duration of exchange rates regimes in the European Monetary System (EMS). This section draws on their study.

$$F(t)=Pr(T<t) \tag{5}$$

which indicates the probability that the random variable T is smaller than a certain value t. The survivor function can be defined as $S(t)=Pr(T \geq t)=1-F(t)$ and the resulting hazard function is $h(t)=Pr(T=t/ T \geq t)$. Survival and hazard functions are linked through the following expression:

$$S(t) = \prod_{s=1|t}(1-h(s)) \tag{6}$$

Non-parametric analysis can be used to estimate the unconditional hazard function which registers the observations for which there is a change, that is, the relative frequency of observations with $T=t$. The hazard function is calculated as follows:

$$\hat{h}(t) = \frac{d_t}{n_t} \tag{7}$$

where d_t represents the number of failures registered in t, and n_t is the surviving population in t, before the change takes place. From the hazard function, it is possible to obtain the cumulative hazard function given by $\hat{H}(s) = \sum_{s=1}^{t} \hat{h}(s)$. The Kaplan-Meier survivor function for duration t is calculated as the product of one minus the existing risk until period t:

$$\hat{S}(t) = \prod_{j|t_j \leq t}(\frac{n_j - d_j}{n_j}) \tag{8}$$

The non-parametric analysis is very limited because it does not take into account other variables that can influence the probability of ending a period of fiscal consolidation. In order to address the issue of other variables determining this probability, we also include in this paper a section dedicated to parametric analysis. In the literature, the model that has usually been used to characterize the hazard function is the *model of proportional hazard*, which assumes that the hazard function can be split as follows: $h(t,X) = h_0(t) * g(X)$ where $h_0(t)$ is the baseline hazard function that captures the dependency of data to duration, and $g(X)$ is a function of individual variables. In this proportional specification, regressors intervene re-escalating the conditional probability of abandoning the period of fiscal consolidation, not its own duration.

A better estimation can be obtained by imposing one specific parametric form to the function $h_0(t)$. A commonly used general specification used the *Weibull* distribution for the baseline hazard: $h_0(t)=pt^{p-1}$, where p is a parameter that has to be estimated. When $p=1$, this model is equal to the *exponential model*, where there is no dependency on duration. When the

parameter *p>1*, there is a positive dependency on duration, and a negative dependency when *p<1*. Therefore, by estimating *p*, it is possible to test the hypothesis of duration dependency of fiscal consolidations.

V. DATA AND STYLISED FACTS

Data

To assess the determinants of successful public debt reduction, we use a dataset spanning over the last three decades for a large sample of advanced and emerging economies. We include (i) fiscal and other macroeconomic variables from the IMF's World Economic Outlook database; (ii) political economy variables capturing government strength and election cycles drawn from Keefer (2010);[19] (iii) an expanded version of the index of structural reforms that boost growth based on Lora (2001);[20] and (iv) data on budget composition from the IMF's Government Finance Statistics database. We also include a variable that captures the occurrence of banking crises using the data compiled by Laeven and Valencia (2008).[21]

Stylised facts

In this section, we present a series of stylised facts based on a sample of debt reduction episodes. The following section will use survival analysis to assess the determinants of debt reduction.

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[19] The author created a Database of Political Institutions (DPI) which comprises information on a range of political economy variables for a large sample of countries during 1975-2009, based on four sources: Europa World Online-2010; Political Handbook of the World-2010 (printed and online editions); Parline Database; and IFES Election Guide. In cases where data were not available on a comparative basis, the authors used national sources.

[20] The Index of Structural Reforms was originally developed for Latin American countries. We have extended it to the rest of countries in our dataset using the methodology in Lora (2001). This index is an average of four sub-indexes, namely: trade policy reform; financial policy reform; labour market reform, and privatisation reform. We excluded a fifth area of reform initially considered by Lora (e.g., tax policy reform) because we control directly for tax changes in our empirical analysis.

[21] Episodes of consolidation in the following countries are included: Albania, Argentina, Armenia, Australia, Azerbaijan, Belarus, Benin, Bolivia, Bosnia and Herzegovina, Brazil, Bulgaria, Cameroon, Canada, Cape Verde, Central African Republic, Chad, Chile, China, Colombia, Costa Rica, Croatia, Czech Republic, Côte d'Ivoire, Dominican Republic, Ecuador, Egypt, El Salvador, Equatorial Guinea, Eritrea, Finland, France, Germany, Guinea, Guyana, Haiti, Hungary, India, Indonesia, Jamaica, Japan, Jordan, Kenya, Korea, Kuwait, Kyrgyz Republic, Lithuania, FYR of Macedonia, Malaysia, Mexico, Morocco, Nepal, Nicaragua, Norway, Panama, Paraguay, Peru, Philippines, Poland, Russia, Saudi Arabia, Senegal, Slovak Republic, Slovenia, South Africa, Swaziland, Sweden, Tunisia, Turkey, United Kingdom, United States, Uruguay, Venezuela, and Yemen.

During 1980-2010, there were 120 episodes of public debt reduction defined as periods of at least two consecutive years of continuous reduction in the ratio of public debt to GDP. We excluded countries that benefitted from debt relief.[22] Thus, the sample covers 104 episodes of debt consolidations, with a minimum length of 2 years and a maximum duration of 13 years. Figure 1 shows that half of these episodes achieved a reduction in debt to GDP of at least 20 percentage points (this is the difference between the debt ratio at the end of the consolidation episode and the initial debt level). In more than a third of cases, public debt reduction was higher than 40 percentage points of GDP.

(Insert Figure 1 here)

The geographical and temporal dispersion of the adjustment episodes shows that the bulk of debt reductions took place in the late 1980s and first half of the 1990s and that fiscal consolidation was more frequent in Africa and Europe (around 60 percent of the episodes were concentrated in these regions (Figure 2)). The quickest and more aggressive debt reductions were experienced in countries that only needed two years to reach the sustainability thresholds. Europe had the highest concentration of debt reduction episodes during the 1990s in the run-up to the monetary union, but they were small when compared with other regions. Typically countries with high initial debt levels were forced into a faster debt consolidation (this was specially the case in Africa--with an average duration of 5.7 years--see Table 1). In relation to the composition of the fiscal adjustments that led to debt reduction, Europe was also the one that relied more heavily on spending cuts, and therefore scored higher in the Quality index. As regards to the components of debt reduction, about half of the decline stemmed from stronger primary balances (particularly in Africa). However, for emerging economies (especially in Latin America and Asia) the bulk of debt reduction was generated by higher growth and lower interest rates.

(Insert Figure 2 here)

(Insert Table 1 here)

Results also show, however, that debt consolidation takes time. The typical debt consolidation episode lasted about 6 years; debt was reduced by more than 29 percentage points of GDP reflecting an improvement in the primary balance (net of cyclical effects) of about 4.5 percent of GDP (Table 2). In more about half of the cases, the country was

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[22] Including one-year debt reduction episodes would increase the sample somewhat but not change the results presented in the paper. One-year debt reduction episodes are, however, less likely to be informative about medium-term consolidation.

successful in reaching a prudent debt threshold,[23] while the probability of being partially[24] successful was much higher, at around more than 80 percent.

(Insert Table 2 here)

The fiscal adjustment mix matters for the duration and the size of the fiscal consolidation. In the average episode, about half of the primary balance improvement during the consolidation period was a result of expenditure savings as measured by the quality of fiscal adjustment index.[25] Expenditure-based debt reduction episodes delivered larger improvements in the primary balance than revenue-based adjustments (7 percentage points of GDP in the former, compared to 4 percentage points of GDP in the latter). However, the likelihood of successfully reducing public debt below the target threshold was lower in episodes of expenditure-based adjustments, in part reflecting higher initial debt levels in these spells.

Fiscal consolidations lasted longer in countries that improved public finances mostly through revenue measures. The duration of adjustment episodes was two years shorter in expenditure-based spells at 5 years, compared to almost 7 years revenue-based episodes in the sample (Figure 3 and Table 1). The length of the adjustment was also negatively correlated with the adjustment size, but dispersion around this linear relation was large (Figure 3).

Fiscal consolidation was harder to achieve after banking crises. Initial debt conditions were less favorable in these cases, owing to crisis-related deterioration in public finances. As a consequence, it took longer than the average adjustment spell to reach the debt target. The success probability was lower (at 52 percent) than in the average episode while the improvement in the primary balance was similar at about 4 percent of GDP (Table 1). However, less demanding partial success was slightly more likely in these episodes.

In post-crisis episodes, the contribution of spending cuts to fiscal adjustment was lower than in the overall sample (about a third of the primary balance improvement reflected savings), as revenue-based adjustments were more likely to achieve successful debt reduction. Furthermore, debt reductions took less time to implement when revenue contribution was large (Figure 3).

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[23] Our baseline results define successful adjustment with respect to an absolute prudent debt threshold. Returning to the pre-crisis public debt level may prove insufficiently ambitious for countries that had high debt ratios at the onset of the crisis, as growth could be severely harmed by high debt.

[24] Partial success is defined as a reduction in public debt to GDP compared to the pre-adjustment year of at least 50 percent of the difference between the initial debt level and the target debt threshold.

[25] The quality of fiscal adjustments is measured by the contribution of cyclically adjusted current primary expenditures in percent of potential GDP to the change in the fiscal deficit in percent of GDP (von Hagen, Hallett, and Strauch; 2001). This variable takes values between 0 and 1.

Larger public debt reductions were also associated with weaker initial conditions. High levels of public debt made fiscal adjustment needs more pressing in these countries (Figure 3), including in post-crisis episodes. Success of debt consolidation was, however, less likely in countries with higher initial public debt (Table 2;): this did not only reflect lower fiscal adjustment during the debt reduction spell, but also the adverse implication on debt dynamics of the difference between interest rate and growth in countries with high levels of sovereign liabilities.

The length of fiscal consolidation episodes was also associated to non-fiscal variables (Figure 3). Political economy factors played a role. The duration of debt reduction spells was longer in countries where governments commanded a smaller majority in parliament, which made sustaining fiscal adjustment policies more difficult. Supply-side reforms that boosted growth helped reduce public debt more quickly by improving debt dynamics.

(Insert Figure 3 here)

VI. ECONOMETRIC RESULTS

We use the survival model described in Section III to assess the determinants of successful debt reduction. The length of a successful debt consolidation spell in defined on the basis of the time interval between periods in which the ratio of debt to GDP declined until it reached (or stayed within) the prudent threshold defined above. The episode ends (fails) when the debt ratio rises above the threshold. The model is used to estimate the likelihood of successfully reducing debt to the target level.

The average length of a successful debt reduction episode is almost seven years (Table 3). This is slightly higher than the average length of debt consolidation episodes found in the previous section (which included also unsuccessful adjustment attempts). As we relax the definition of success, the duration shortens and the likelihood of success increases. The average duration of partially successful episodes (that is, the episodes with a decline in debt equivalent to 50 percent of distance from the target) is slightly more than five years.

(Insert Table 3 here)

We use a duration model to assess what factors affect the likelihood of successful debt reduction based on the following specification:

$$h(t,X) = h_0(t) * \exp(X'\beta) \tag{9}$$

where $h_o(t)$ is a baseline hazard function and $g(X)=exp(X'\beta)$ is a function of individual variables. As discussed in Section 3, we estimate this model using a parametric form for the function $h_o(t)$ based on the *Weibull* distribution.[26]

The following variables are included in the baseline regressions reported in Tables 4 and 5:

- *Initial conditions*. These include the initial distance from the debt target (in percent of GDP) at the onset of the debt consolidation attempt and a dummy for an OECD country, which is a proxy for institutional quality.

- *Fiscal adjustment mix and size*. We include the composition of fiscal adjustment based on the quality of adjustment index (Table 4) and its interaction with the adjustment size (Table 5), measured by the change in the cyclically adjusted primary fiscal balance (in percent of potential GDP) during the debt reduction period.[27] We interpret the combined effect of these two variables to assess how the fiscal mix affects the likelihood of debt reduction when adjustment needs are large. As discussed above, in countries that have large consolidation needs, relying only on spending cuts may not be sufficient to generate the needed fiscal deficit reduction. This implies that the adjustment may need to be based on a more balanced combination of spending cuts and revenue increases.

(Insert Table 4 here)

- *Accompanying policies*. These variables include the change in the share of private investment in total investment (to control for the private sector contribution to growth) and an indicator of structural supply-side reforms that indicate the extent to which fiscal adjustment has been accompanied by pro-growth policies.[28]

- *Political economy factors*, controlling for the presence of a majority in parliament and elections held during the adjustment using the DPI dataset. Political fragmentation and uncertainty about government stability may be detrimental for fiscal adjustment success.

- *Budget composition* variables capturing the change in the weight of specific expenditure and revenue programs in the budget.

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[26] Using alternative parametric distribution does not alter the results, but the Weibull model is found to have the best fit of the data. It also allows to test the assumption on hazard dependency on duration.

[27] Using the headline fiscal balance in percent of GDP does not alter the results.

[28] We did not control for structural fiscal reforms on entitlements for lack of data. However, long-term spending pressures are important for fiscal risks. However, long-term spending pressures are found to be highly correlated with debt to GDP ratios in most countries.

We then add a few more controls to assess the channels through which the fiscal mix affects the likelihood of debt reduction. In particular, we control for the following variables:

- *Interest rate*. This variable is included in the model specification presented in Table 6. Higher nominal interest rates, reflecting both higher premia stemming from increased credit risk perception and higher monetary policy rates (triggered by responses to inflation), are expected to increase debt service cost and affect growth and investment negatively.

- *Real GDP growth*. In addition to interest rate, we control for output growth (Table 7). This variable is expected to be important for raising budget revenues, trimming the duration of adjustment, and increasing the likelihood of success in reducing debt. We also estimate the model by controlling for growth and interest rate for a subsample of debt reduction spells that were mostly caused by contractions in the primary fiscal deficit and not by the contribution of the growth-adjusted interest rate (Table 8).

- *Banking crises*. We also account for the effect of banking crises (Table 9). A dummy capturing fiscal consolidations occurring after systemic banking crises, which is interacted with the adjustment mix-size factor. This assesses the legacy of weak fiscal conditions, high debt, and uncertain economic prospects after these crises and allows us to test whether the fiscal mix effects change in these episodes. We also run separate regressions for the subsamples of episodes that followed banking crises and debt consolidation attempts that were not triggered by such crises (Tables 10 and 11).

Consistent with previous studies, we find that debt consolidation is less likely when the initial distance from the debt target is high (Tables 4).[29] High public debt levels are a constraint to achieving a prudent debt target, because adjustment needs are larger and because the negative impact of high debt on interest rates and growth. Countries with weaker initial positions are therefore forced to implement more ambitious consolidation plans if they want to credibly lower public debt.

The probability of achieving debt reduction is higher when fiscal adjustments rely on current expenditure cuts. This is also in line with previous studies showing the importance of relying on expenditure savings to reduce debt. However, for countries that require large improvements in the cyclically adjusted primary balance,[30] successful debt reduction is delivered more effectively by a combination of spending cuts and revenue-generating measures (Table 5). This result holds when controlling for the initial level of tax pressure

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[29] To control for possible endogeneity of some regressors we also run the model with lagged exogenous variables and estimate a probit model of the probability of reducing debt below the target threshold with instrumental variables (using lagged exogenous variables as instruments). These results confirm that reverse causality is not an issue in our sample.

[30] Large adjustments are estimated as changes in the cyclically adjusted primary balance of at least 11 percent of GDP. This is equivalent to an annual adjustment of almost 2 percent of GDP per year for the sample.

(measures by revenue to GDP) and confirms the assumption in this paper that avoiding inefficient across-the-board spending cuts may help sustain fiscal consolidation.

(Insert Table 5 here)

However, we find that the composition of spending and revenue measures is also important (Table 4). Raising tax revenues (as a share of total revenues) in the aftermath of the crisis increases the likelihood of reducing public debt, reflecting the impact of more stable revenue sources to the budget. Reducing the share of goods and services in public expenditure is also significantly related to successful fiscal adjustments. Relying less on transfers for pensions and other entitlements raises the likelihood of debt reduction. This is because spending on transfers is not easily reversible after a crisis (despite unwinding of automatic stabilisers, such as unemployment insurance) and imposes a heavy burden on the budget over time. Finally, increasing the share of public investment raises the likelihood of successful debt reduction by shifting the composition of the budget toward pro-growth programs.

Debt reduction is more successful when it is combined with supply-side structural reforms to support growth (Table 4). Policies to strengthen output growth boost revenue collection and ameliorate debt dynamics. Growth also helps reduce the ratio of public expenditure to GDP and enhances the fairness of fiscal consolidation. Indeed, growth surprises have also been found to be critical in fiscal adjustment (IMF, 2011). A higher contribution of the private sector to investment also helps boost debt consolidation, as growth spells are likely to last longer in countries where economic development is broad based and relies on the private sector.

As expected, political risks can weigh on the chance of achieving fiscal consolidation. This points to the importance of government cohesion during periods of fiscal retrenchment. Countries that have a strong majority in parliament are more likely to experience successful adjustment spells compared to politically unstable economies. Political elections during the adjustment period, however, can lower the chances of success. The strength of institutions is another significant factor: OECD countries, with relatively stronger institutions, tend to have a higher probability of success in lowering their debt compared to other economies.

We also find evidence of adjustment fatigue. Results point to time-dependency: other things being equal, as the duration of the adjustment episodes increases the probability of ending the episode also rises. This is related to waning political support for reforms that take long to achieve debt reduction. This suggests that front-loaded fiscal adjustment may be more successful in lowering debt.

To investigate the channels that affect fiscal adjustment success, we control for change in interest rates and growth. Lower (nominal) interest rates help stimulate investment and spur growth if credible fiscal consolidation aims at reducing solvency risks. We find that when interest rates are higher, it takes longer to lower debt to GDP (Table 6). As expected, fiscal consolidation is also more likely when economic growth resumes, and we also control for

interest rates (Table 7). What is noteworthy is that the size of the quality of adjustment coefficient barely changes between results presented in Tables 4-7. This suggests that the fiscal policy mix has a stronger impact on the adjustment size than the interest rate-growth differential. This result is reinforced when we only run our model on a subsample of episodes where most of the debt cut was due to systematic amelioration of the cyclically adjusted primary balance (Table 8).

(Insert Table 6 here)

(Insert Table 7 here)

(Insert Table 8 here)

The augmented model points to the importance of financial crises' legacy for the fiscal mix. In countries with large adjustment needs, revenue reforms become more important for success than in other fiscal consolidation episodes and more so in post-crisis debt reduction periods (Table 9). These results are further confirmed when the analysis is based on separate samples for countries that experienced banking crises and those that did not (Tables 10 and 11).[31]

(Insert Table 9 here)

(Insert Table 10 here)

(Insert Table 11 here)

VII. ROBUSTNESS ANALYSIS

As a robustness check of the augmented model results presented in Table 9, we introduced several modifications.

- *A different definition of debt thresholds*. The results above are robust to an alternative definition of the debt threshold (80 percent of GDP for advanced economies and 50 percent of GDP for emerging economies). The findings in the text are confirmed as illustrated in Table 12.

- *A different definition of success (partial success)*. A requirement of debt consolidation to reach at least half of the distance between the initial debt and the debt target does not alter the findings. Our results still hold, but as expected the size of the initial

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[31] In post-crisis episodes, fiscal adjustment needs above 8 percent of GDP trigger a negative marginal impact on the success probability of expenditure-based fiscal consolidations.

conditions coefficient is lower than in the case when success is defined as attaining the debt threshold (Table 13).

- *A redefinition of the dependent variable*. We tested our results using two alternative definitions of the dependent variable: (i) first, we assessed the determinants of changes in the debt-to-GDP ratio using a continuous variable which measures the annual change in the ratio of public debt to GDP;[32] and (ii) second, we tested the determinants of success in reaching the debt threshold.[33] In this case, the dependent variable was a dummy that took value of one when the target was reached or maintained, and zero otherwise. These variables were regressed on the same set of variables as in the baseline model. Results show that our findings based on the survival analysis are robust to these alternative specifications (both using a fixed-effects estimation in Table 14 and a probit model in Table 15). The reduction in public debt is larger when fiscal consolidation is based mostly on current expenditure savings measures. However, when adjustment needs are large, fiscal consolidations accompanied by reforms to boost revenue collection are more successful. These findings are stronger when the debt consolidation attempt follows a banking crisis.

- We also estimate the model without the interaction variable to check the robustness of the results. The findings are consistent with the preferred model (Table 16) but goodness of fit is lower. Similar results are obtained when we estimate the model excluding the quality variable and including only size variable (Table 17). We further tried an interaction between the quality of adjustment and size of debt accumulated during the crisis, which yields results that are similar to the ones presented earlier (Table 18). Finally, we checked the potential dependence of the fiscal mix on the adjustment length and found no significant evidence of such a link (Table 19).

- We finally estimated the model for a subsample of advanced economies. The baseline results are confirmed. The only difference is that for advanced economies a decline in the ratio of transfers to GDP has a stronger impact on successful debt reduction (Table 20).

(Insert Tables 11-20 here)

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[32] A positive change is an increase in the debt ratio and a negative change is a reduction in the ratio. We are indebted to David Romer for suggesting this approach.

[33] We also run the model for the determinants of partial success. Results are very similar and are available from the authors upon request.

VIII. POLICY IMPLICATIONS

Many countries around the world have accumulated large public debts in the aftermath of the recent banking crisis. As the economies recover from the recession, the challenge for governments is to regain fiscal stability by unwinding the exceptional fiscal stimulus when economic conditions permit and reducing public debt with credible adjustment plans. The unprecedented simultaneous increase in public debt levels worldwide, however, makes this effort particularly demanding. Debt consolidation tends to be less successful when countries are hit by severe banking crises. This reflects higher uncertainty and permanent output losses resulting from these crises that make fiscal consolidation more challenging.

Successful debt consolidations are in general more likely when they are based on cuts in current expenditures, including reforms to lower entitlements that put upward pressure on deficits. Reducing expenditures is key for sustaining primary fiscal balances required to reduce debt to prudent levels in many countries. Reforms that preserve capital outlays and ensure that current expenditures are reduced have the highest likelihood of achieving the required debt reduction.

In contrast with the previous literature, however, we find that raising tax revenues is important for debt reduction in countries with large adjustment needs (in particular after banking crises). This reflects the need to maintain a balance between expenditure savings and revenue-raising measures when the debt challenge is large by avoiding inefficient across-the-board expenditure cuts.

Curtailing essential programs may also lead to unsustainable and unfair outcomes that could jeopardise public support for reforms and harm fiscal consolidation efforts in the medium term. Political fragmentation and political cycles may also make debt reduction more challenging and call for credible medium-term fiscal plans backed by strong and transparent fiscal institutions.

These results challenge the traditional argument of non-Keynesian effects of expenditure-based adjustments. We find that in the aftermath of banking crises, when credit is restrained and agents lack confidence, revenue-based strategies may increase future growth potential. However, higher taxation should not harm efficiency and has to minimize distortions, particularly in countries with high tax ratios. Simplifying the tax system by reducing excessive tax rates and broadening the tax base could help enhance revenue collection while shifting the burden of taxes from income and capital to consumption, fuel-products and property taxes.

Accompanying policies are also important; when monetary conditions are allowed to remain accommodative and risk premia are contained by credible adjustment plans, public debt

reduction is more likely to be achieved. This result also highlights the importance of fiscal adjustment strategies that anchor market expectations about fiscal sustainability.

These fiscal adjustment strategies require supporting actions to revive growth. This includes structural reforms to enhance productivity and reduce economic distortions in the economy. Improving the budget composition could be an additional important ingredient in the strategy to support growth by removing efficiency harming distortions and raising labour supply and savings.

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Table 1. Average Value of Explanatory Variables, by Region

Region	Initial Debt (t-1)	Episode Duration	Size of Debt Cut[1]	Size of Deficit Cut[2]	Change in Spending	Change in Revenues	Av. Change in Growth[3]	Av. Change in Interest[3]	Av. Change in Debt[3]	Av. Change in Bud. Bal.[3]	Quality of Adjustment	Eletion during Episode	Majority in Parliament	Supply Reforms
Africa	68.58	5.41	28.58	3.19	-0.65	2.54	1.28	1.77	-5.64	-2.88	0.32	0.51	0.58	0.39
Europe	64.12	5.76	12.41	3.11	-2.72	0.13	2.54	2.55	-2.13	-0.21	0.71	0.51	0.41	0.33
Latin	72.04	6.52	32.04	2.85	0.71	3.55	2.52	2.17	-4.41	-1.05	0.25	0.41	0.57	0.39
Asia	71.03	6.46	27.08	4.83	0.35	5.21	1.92	1.44	-3.14	-1.86	0.33	0.73	0.49	0.46
Middle East	85.01	6.28	45.01	19.62	-10.17	9.44	1.04	1.79	-14.7	2.41	0.61	0.57	0.58	0.51
N. America	84.37	10.49	24.37	4.38	-3.71	0.67	1.31	1.52	-2.43	1.02	0.49	0.51	0.76	0.27
OECD	66.69	5.99	11.51	3.71	-2.94	0.69	1.07	1.76	-1.56	-0.55	0.62	0.48	0.47	0.49
NON-PECD	71.51	6.17	31.51	5.08	-1.01	3.98	2.51	2.19	-5.81	-1.16	0.38	0.55	0.53	0.44

1/ Difference between the debt-to-GDP ratio in the last year of the episode and the initial debt level.

2/ Difference between the deficit-to-GDP ratio in the last year of the episode and the initial deficit ratio.

3/ Average annual changes in these variables during episodes.

Table 2. Success and Duration of Debt Reduction Episodes[1]

	Average Duration (in years)	Complete Success[2]	Partial Success[3]	Initial Debt (Distance From Target % GDP)	Debt Reduction (% GDP)	Deficit Reduction (% GDP)	Quality of Fiscal Adjustment Index
ALL EPISODES (105)	5.9	58.8	83.5	30.9	29.0	4.5	0.5
EXP-BASED (49)	5.0	50.0	75.0	37.9	29.9	7.1	0.8
REV-BASED (56)	6.7	60.2	92.2	26.8	31.6	4.3	0.1
POST-CRISIS EPISODES (51)	6.8	52.0	88.0	36.7	35.5	4.3	0.3

Source: Authors' calculations.

1/ Debt and deficit reduction variables, as well as the quality of fiscal adjustment index are based on differences between the start and the end of the consolidation period.
2/ Share of episodes in which the debt reached the target level at the end of the episode.
3/ Share of episodes in which the debt reached at least half the target level at the end of the episode.

Table 3. Duration of Successful Debt Reduction Episodes

Absolute debt target 1/	Mean	Std. Dev.	Absolute debt target 2/	Mean	Std. Dev.
Complete success	6.62	2.231		5.14	2.345
Partial success	5.18	2.420		3.89	2.876

Source: Authors' calculations.
1/ Debt lower or equal to 60 percent of GDP in advanced economies and 40 percent of GDP in emerging economies. Episodes where initial debt was below the debt target are not included.
2/ Debt lower or equal to 80 percent of GDP in advanced economies and 50 percent of GDP in emerging economies. Episodes where initial debt was below the debt target are not included.

Table 4. Regression Results: Baseline Model

Duration of adjustment to reach debt threshold	(1)	(2)	(3)	(4)	(5)
Initial distance from debt target	1.021***	1.018***	1.025***	1.025***	1.019***
	(5.97)	(4.73)	(6.47)	(6.43)	(5.25)
OECD country	5.534***	7.087***	10.922***	9.771***	6.111***
	(3.39)	(3.98)	(4.35)	(4.19)	(3.54)
Majority in Parliament	-0.017***	-0.018***	-0.017**	-0.014***	-0.017***
	(-2.52)	(-2.65)	(-2.41)	(-2.56)	(-2.59)
Elections during adjustment	9.327***	5.745***	9.190***	9.279***	6.287***
	(3.53)	(2.88)	(3.59)	(3.58)	(2.96)
Private investment	-0.907	2.347***	2.603***	2.326***	1.503
	(-0.50)	(3.27)	(3.16)	(2.67)	(1.33)
Supply-side reforms	-0.018**	-0.071	-0.035*	-0.031**	-0.045*
	(-2.32)	(-1.58)	(-1.89)	(-1.99)	(-1.81)
Quality of adjustment	-0.004***	-0.004***	-0.002***	-0.002***	-0.002***
	(-3.91)	(-2.53)	(3.33)	(-3.41)	(-3.38)
Change in tax revenues (1)		-0.319***			
		(-3.85)			
Change in goods & services expenditures (1)			0.366***		
			(3.56)		
Change in transfers expenditures (1)				0.416***	
				(3.04)	
Change in public investment expenditures (1)					-0.576**
					(-1.96)
Constant (/ln_p)	-0.049	0.137	0.064	0.024	-0.021
	(-0.29)	(0.80)	(0.39)	(0.15)	(-0.12)
P	0.952	1.147	1.066	1.025	0.979
Wald chi2	65.97	82.22	78.54	74.92	68.35
No. of failures	79	79	79	79	79
Number of obs.	2652	2652	2652	2652	2652

Source: Authors' calculations. (***) Significant at a 1 percent level; (**) significant at a 5 percent level; (*) significant at a 10 percent level.

Note: this sample includes all episodes of debt consolidation (including those performed in normal times, and those during post-financial crises)

(1) These variables are expressed as a share of total revenue or total expenditure, in order to avoid multi-collinearity.

Table 5. Regression Results: Model with Size of Adjustment

Duration of adjustment to reach debt threshold	(1)	(2)	(3)	(4)	(5)
Initial distance from debt target	1.024***	1.019***	1.028***	1.028***	1.021***
	(6.29)	(4.88)	(6.75)	(6.72)	(5.39)
OECD country	5.991***	8.575***	12.084***	10.747***	6.425***
	(3.45)	(3.99)	(4.46)	(4.29)	(3.50)
Majority in Parliament	-0.035**	-0.064	-0.032**	-0.024**	-0.039**
	(-2.08)	(-1.65)	(-2.02)	(-2.21)	(-1.96)
Elections during adjustment	11.873***	6.456***	11.320***	11.427***	6.829***
	(3.81)	(3.00)	(3.88)	(3.87)	(3.03)
Private investment	-0.869	2.718***	2.852***	2.533***	1.556
	(-0.77)	(3.40)	(3.40)	(2.88)	(1.37)
Supply-side reforms	-0.009***	-0.064	-0.015**	-0.014***	-0.034**
	(-2.89)	(-1.66)	(-2.48)	(-2.57)	(-2.00)
Quality of adjustment	-0.024***	-0.029*	-0.015***	-0.018***	-0.012***
	(-2.97)	(-1.79)	(-2.55)	(-2.66)	(-2.61)
Quality of adjustment*Size of fiscal adjustment	1.173***	1.269***	1.235***	1.224***	1.210***
	(2.74)	(2.63)	(2.69)	(2.68)	(2.54)
Change in tax revenues (1)		-0.283***			
		(-3.84)			
Change in goods & services expenditures (1)			0.339***		
			(3.84)		
Change in transfers expenditures (1)				0.385***	
				(3.31)	
Change in public investment expenditures (1)					-0.552**
					(-2.04)
Constant (/ln_p)	-0.050	0.138	0.079	0.034	-0.024
	(-0.30)	(0.80)	(0.47)	(0.20)	(-0.14)
P	0.951	1.148	1.082	1.034	0.976
Wald chi2	75.20	93.22	89.55	85.53	77.68
No. of failures	79	79	79	79	79
Number of obs.	2652	2652	2652	2652	2652

Source: Authors' calculations. (***) Significant at a 1 percent level; (**) significant at a 5 percent level; (*) significant at a 10 percent level.

Note: this sample includes all episodes of debt consolidation (including those performed in normal times, and those during post-financial crises)

(1)These variables are expressed as a share of total revenue or total expenditure, in order to avoid multi-collinearity.

Table 6. Regression Results: Model with Interest Rates

Duration of adjustment to reach debt threshold	(1)	(2)	(3)	(4)	(5)
Initial distance from debt target	1.029***	1.014**	1.020***	1.026***	1.028***
	(6.68)	(2.41)	(4.53)	(5.66)	(5.23)
OECD country	9.794***	6.098***	26.260***	10.959***	9.680***
	(4.15)	(3.01)	(4.30)	(4.28)	(3.94)
Majority in Parliament	-0.017**	-0.107	-0.221	-0.035**	-0.015**
	(-2.40)	(-1.36)	(-0.93)	(-1.98)	(-2.35)
Elections during adjustment	10.842***	4.912**	11.728***	11.799***	9.512***
	(3.78)	(2.42)	(3.92)	(3.93)	(3.42)
Private investment	-0.416***	7.366**	7.783***	3.040	-0.418
	(-2.64)	(2.34)	(3.42)	(1.30)	(1.26)
Supply-side reforms	-0.009***	-0.112	-0.027**	-0.020**	-0.011**
	(-2.84)	(-1.30)	(-2.05)	(-2.27)	(-2.48)
Quality of adjustment	-0.020***	-0.027*	-0.001***	-0.015***	-0.020***
	(-2.62)	(-1.79)	(-2.90)	(-2.81)	(-2.50)
Quality of adjustment*Size of fiscal adjustment	1.220***	1.287***	1.193**	1.215***	1.223***
	(2.74)	(2.81)	(2.44)	(2.60)	(2.66)
Interest Rates	1.934***	-0.625	-0.008***	-0.368	1.925**
	(2.93)	(-1.24)	(-3.25)	(-0.97)	(1.98)
Change in tax revenues (1)		-0.178***			
		(-3.44)			
Change in goods & services expenditures (1)			0.101***		
			(3.63)		
Change in transfers expenditures (1)				0.109***	
				(2.65)	
Change in public investment expenditures (1)					-0.954***
					(-2.14)
Constant (/ln_p)	0.024	0.150	0.164	-0.022	0.025
	(0.14)	(0.88)	(1.00)	(0.13)	(0.15)
P	1.024	1.162	1.178	1.022	1.026
Wald chi2	83.27	94.72	103.50	86.58	81.26
No. of failures	79	79	79	79	79
Number of obs.	2652	2652	2652	2652	2652

Source: Authors' calculations. (***) Significant at a 1 percent level; (**) significant at a 5 percent level; (*) significant at a 10 percent level.

Note: this sample includes all episodes of debt consolidation (including those performed in normal times, and those during post-financial crises)

(1)These variables are expressed as a share of total revenue or total expenditure, in order to avoid multi-collinearity.

Table 7. Regression Results: Model with Interest Rates and GDP Growth

Duration of adjustment to reach debt threshold	(1)	(2)	(3)	(4)	(5)
Initial distance from debt target	1.032***	1.018***	1.024***	1.030***	1.031***
	(6.75)	(2.91)	(4.80)	(6.01)	(5.54)
OECD country	5.530***	4.459***	15.034***	6.207***	6.482***
	(3.15)	(2.55)	(3.61)	(3.19)	(3.35)
Majority in Parliament	-0.004***	-0.022**	-0.061	-0.006***	-0.004***
	(-3.08)	(-2.12)	(-1.49)	(-2.72)	(-2.92)
Elections during adjustment	7.364***	4.447**	8.514***	7.525***	7.846***
	(3.38)	(2.40)	(3.60)	(3.41)	(3.37)
Private investment	-0.467**	3.840	4.472***	3.333	-0.379
	(-2.32)	(1.58)	(2.74)	(0.40)	(-1.59)
Supply-side reforms	-0.004***	-0.054	-0.010**	-0.005***	-0.006***
	(-2.98)	(-1.52)	(-2.32)	(-2.77)	(-2.57)
Quality of adjustment	-0.017***	-0.018*	-0.003***	-0.016***	-0.020**
	(-2.53)	(-1.71)	(-2.81)	(-2.60)	(-2.32)
Quality of adjustment*Size of fiscal adjustment	1.173**	1.256**	1.160**	1.170**	1.181**
	(2.20)	(2.47)	(2.11)	(2.15)	(2.20)
Interest Rates	1.768***	-0.791	-0.023***	-0.842	1.928**
	(2.65)	(-0.63)	(-2.57)	(-0.15)	(2.22)
GDP Growth	-0.027***	-0.056***	-0.080***	-0.032***	-0.034***
	(-3.93)	(-3.12)	(-2.73)	(-3.66)	(-3.69)
Change in tax revenues (1)		-0.270***			
		(-2.64)			
Change in goods & services expenditures (1)			0.103***		
			(2.92)		
Change in transfers expenditures (1)				0.377***	
				(2.66)	
Change in public investment expenditures (1)					-1.030*
					(-1.91)
Constant (/ln_p)	0.163	0.235	0.219	0.149	0.152
	(0.98)	(1.38)	(1.34)	(0.89)	(0.90)
P	1.178	1.265	1.244	1.161	1.165
Wald chi2	102.14	106.92	112.63	102.60	98.16
No. of failures	79	79	79	79	79
Number of obs.	2652	2652	2652	2652	2652

Source: Authors' calculations. (***) Significant at a 1 percent level; (**) significant at a 5 percent level; (*) significant at a 10 percent level.

Note: this sample includes all episodes of debt consolidation (including those performed in normal times, and those during post-financial crises).

(1)These variables are expressed as a share of total revenue or total expenditure, in order to avoid multi-collinearity.

Table 8. Regression Results: Model with Interest Rates and GDP Growth
(subsample of episodes where most of change is due to structural deficit reduction)

Duration of adjustment to reach debt threshold	(1)	(2)	(3)	(4)	(5)
Initial distance from debt target	1.321***	1.318***	1.334***	1.320***	1.339***
	(6.76)	(2.94)	(4.84)	(5.44)	(5.13)
OECD country	4.531*	3.479**	5.134**	7.202*	5.481**
	(1.95)	(2.05)	(2.11)	(2.09)	(2.35)
Majority in Parliament	-0.014***	-0.012**	-0.067	-0.026***	-0.011***
	(-3.28)	(-2.15)	(-1.56)	(-2.70)	(-2.91)
Elections during adjustment	7.304***	4.442**	8.511***	7.520***	7.840***
	(3.31)	(2.39)	(3.61)	(3.42)	(3.32)
Private investment	-0.462**	3.841	4.470***	3.321	-0.370
	(-2.30)	(1.68)	(2.72)	(0.42)	(-1.59)
Supply-side reforms	-0.014***	-0.053	-0.011**	-0.008***	-0.009***
	(-2.99)	(-1.55)	(-2.34)	(-2.75)	(-2.62)
Quality of adjustment	-0.016***	-0.021*	-0.009***	-0.014***	-0.019**
	(-2.50)	(-1.76)	(-2.80)	(-2.59)	(-2.30)
Quality of adjustment*Size of fiscal adjustment	1.105**	1.204**	1.133**	1.145**	1.165**
	(2.24)	(2.13)	(2.18)	(2.16)	(2.21)
Interest Rates	0.345	-0.348	-0.022	-0.042	0.428
	(1.05)	(-0.63)	(-0.57)	(-0.76)	(0.29)
GDP Growth	-0.021*	-0.036*	-0.057*	-0.034	-0.033
	(-1.93)	(-1.92)	(-1.73)	(-1.65)	(-1.68)
Change in tax revenues (1)		-0.288***			
		(-2.78)			
Change in goods & services expenditures (1)			0.145***		
			(2.99)		
Change in transfers expenditures (1)				0.389***	
				(2.92)	
Change in public investment expenditures (1)					-1.134***
					(-1.98)
Constant (/ln_p)	0.156	0.244	0.221	0.145	0.151
	(0.66)	(1.32)	(1.31)	(0.87)	(0.92)
P	1.170	1.263	1.241	1.162	1.163
Wald chi2	102.33	106.21	112.22	102.34	98.55
No. of failures	48	48	48	48	48
Number of obs.	1567	1567	1567	1567	1567

Source: Authors' calculations. (***) Significant at a 1 percent level; (**) significant at a 5 percent level; (*) significant at a 10 percent level.

Note: this sample includes all episodes of debt consolidation (including those performed in normal times, and those during post-financial crises).

(1)These variables are expressed as a share of total revenue or total expenditure, in order to avoid multi-collinearity.

Table 9. Regression Results: Model with Financial Crises Dummy

Duration of adjustment to reach debt threshold	(1)	(2)	(3)	(4)	(5)
Initial distance from debt target	1.032***	1.018***	1.024***	1.030***	1.031***
	(6.79)	(2.91)	(4.75)	(6.00)	(5.65)
OECD country	5.487***	4.535***	14.481***	6.150***	6.517***
	(3.16)	(2.58)	(3.60)	(3.20)	(3.39)
Majority in Parliament	-0.003***	-0.021**	-0.061	-0.005***	-0.003***
	(-3.12)	(-2.14)	(-1.49)	(-2.74)	(-2.98)
Elections during adjustment	7.172***	4.479**	8.289***	7.325***	7.770***
	(3.34)	(2.41)	(3.57)	(3.38)	(3.39)
Private investment	-0.469**	3.839	4.199***	3.456	-0.355*
	(-2.31)	(1.57)	(2.76)	(0.41)	(-1.74)
Supply-side reforms	-0.004***	-0.054	-0.011**	-0.005***	-0.005***
	(-2.98)	(-1.52)	(-2.26)	(-2.75)	(-2.62)
Quality of adjustment	-0.011***	-0.013*	-0.002***	-0.011***	-0.013***
	(-2.74)	(-1.95)	(-2.96)	(-2.81)	(-2.59)
Quality of adjustment*Size of fiscal adjustment*Post-crisis	1.185**	1.261**	1.171**	1.182**	1.194**
	(2.21)	(2.47)	(2.17)	(2.17)	(2.22)
Interest Rates	1.764***	-0.792	-0.023***	-0.829	1.976**
	(2.64)	(-0.62)	(-2.59)	(-0.16)	(2.33)
GDP Growth	-0.027***	-0.054***	-0.081***	-0.032***	-0.032***
	(-3.96)	(-3.17)	(-2.71)	(-3.68)	(-3.74)
Change in tax revenues (1)		-0.268***			
		(-2.63)			
Change in goods & services expenditures (1)			0.103***		
			(2.93)		
Change in transfers expenditures (1)				0.371***	
				(2.67)	
Change in public investment expenditures (1)					-1.071*
					(-1.95)
Constant (/ln_p)	0.162	0.235	0.218	0.148	0.153
	(0.97)	(1.38)	(1.34)	(0.88)	(0.90)
P	1.176	1.265	1.244	1.160	1.165
Wald chi2	102.59	106.96	113.25	103.06	98.64
No. of failures	79	79	79	79	79
Number of obs.	2652	2652	2652	2652	2652

Source: Authors' calculations. (***) Significant at a 1 percent level; (**) significant at a 5 percent level; (*) significant at a 10 percent level.

Note: this sample includes all episodes of debt consolidation (including those performed in normal times, and those during post-financial crises).

(1)These variables are expressed as a share of total revenue or total expenditure, in order to avoid multi-collinearity.

Table 10. Regression Results: Sub-sample Excluding Financial Crises

Duration of adjustment to reach debt threshold	(1)	(2)	(3)	(4)	(5)
Initial distance from debt target	1.027***	1.016***	1.017***	1.023***	1.026***
	(5.83)	(2.66)	(3.41)	(4.43)	(5.02)
OECD country	10.842***	8.512***	31.991***	19.227***	11.569***
	(3.67)	(3.08)	(4.13)	(3.78)	(3.68)
Majority in Parliament	-0.004***	-0.020**	-0.102	-0.020*	-0.006***
	(-2.99)	(-2.04)	(-1.13)	(-1.87)	(-2.59)
Elections during adjustment	9.261***	6.180**	11.909***	11.652***	9.126***
	(2.94)	(2.30)	(2.71)	(2.86)	(2.97)
Private investment	-0.298***	1.697	2.412***	4.995	-0.299**
	(-2.95)	(0.55)	(2.66)	(1.18)	(-2.33)
Supply-side reforms	-0.092	-0.510	-0.800	-0.333	-0.131
	(-1.20)	(-0.32)	(-0.10)	(-0.50)	(-0.92)
Quality of adjustment	-0.003**	-0.008*	-0.000***	-0.001***	-0.003**
	(-2.38)	(-1.83)	(-2.76)	(-2.60)	(-2.37)
Quality of adjustment*Size of fiscal adjustment	1.175	1.286**	1.148	1.174	1.172
	(1.49)	(2.40)	(1.41)	(1.52)	(1.53)
Interest Rates	2.011***	1.089	-0.029**	-0.313	2.002***
	(2.81)	(0.22)	(-2.47)	(-0.95)	(2.56)
GDP Growth	-0.007***	-0.013***	-0.026***	-0.012***	-0.005***
	(-4.54)	(-3.26)	(-3.11)	(-3.93)	(-4.07)
Change in tax revenues (1)		-0.329*			
		(-1.93)			
Change in goods & services expenditures (1)			0.104***		
			(3.00)		
Change in transfers expenditures (1)				0.177*	
				(1.77)	
Change in public investment expenditures (1)					-1.012**
					(-1.96)
Constant (/ln_p)	0.296*	0.352**	0.399**	0.305*	0.267
	(1.71)	(1.98)	(2.36)	(1.77)	(1.51)
P	1.344	1.422	1.490	1.357	1.306
Wald chi2	91.85	91.66	104.41	94.53	86.37
No. of failures	79	79	79	79	79
Number of obs.	1490	1490	1490	1490	1490

Source: Authors' calculations. (***) Significant at a 1 percent level; (**) significant at a 5 percent level; (*) significant at a 10 percent level.

(1)These variables are expressed as a share of total revenue or total expenditure, in order to avoid multi-collinearity.

Table 11. Regression results: sub-sample of financial crises

Duration of adjustment to reach debt threshold	(1)	(2)	(3)	(4)	(5)
Initial distance from debt target	1.030***	1.017***	1.022***	1.028***	1.029***
	(6.54)	(2.94)	(4.49)	(5.52)	(5.34)
OECD country	6.494***	7.846***	18.847***	8.196***	11.030***
	(3.45)	(3.25)	(3.95)	(3.60)	(4.01)
Majority in Parliament	-0.005***	-0.031*	-0.085	-0.011**	-0.008**
	(-2.89)	(-1.89)	(-1.30)	(-2.35)	(-2.39)
Elections during adjustment	8.166***	6.792***	9.775***	8.684***	11.060***
	(3.48)	(2.88)	(3.67)	(3.55)	(3.80)
Private investment	-0.419***	2.193	4.587***	10.882	-0.279**
	(-2.64)	(0.90)	(2.76)	(0.80)	(-2.25)
Supply-side reforms	-0.008***	-0.161	-0.032	-0.014**	-0.029*
	(-2.60)	(-0.94)	(-1.74)	(-2.16)	(-1.75)
Quality of adjustment	-0.006***	-0.005**	-0.000***	-0.006***	-0.004***
	(-2.75)	(-2.00)	(-3.22)	(-2.90)	(-2.60)
Quality of adjustment*Size of fiscal adjustment	1.178**	1.262***	1.158**	1.172**	1.194**
	(2.15)	(2.52)	(2.05)	(2.07)	(2.17)
Interest Rates	1.835***	-0.997	-0.024***	-0.537	2.191***
	(2.79)	(-0.01)	(-2.59)	(-0.54)	(2.73)
GDP Growth	-0.029***	-0.041***	-0.094***	-0.039***	-0.028***
	(-3.97)	(-3.56)	(-2.56)	(-3.51)	(-4.13)
Change in tax revenues (1)		-0.309**			
		(-2.41)			
Change in goods & services expenditures (1)			0.103***		
			(2.98)		
Change in transfers expenditures (1)				0.196**	
				(2.10)	
Change in public investment expenditures (1)					-1.030*
					(-1.91)
Constant (/ln_p)	0.207	0.310*	0.275*	0.190	0.237
	(1.24)	(1.80)	(1.70)	(1.14)	(1.39)
P	1.230	1.364	1.317	1.209	1.267
Wald chi2	95.43	101.76	106.96	96.71	94.57
No. of failures	79	79	79	79	79
Number of obs.	1162	1162	1162	1162	1162

Source: Authors' calculations. (***) Significant at a 1 percent level; (**) significant at a 5 percent level; (*) significant at a 10 percent level.

(1)These variables are expressed as a share of total revenue or total expenditure, in order to avoid multi-collinearity.

Table 12. Regression Results: Robustness (1)
Debt Target 80/50 Percent GDP

Duration of adjustment to reach debt threshold	(1)	(2)	(3)	(4)	(5)
Initial distance from debt target	1.027***	1.019***	1.027***	1.029***	1.028***
	(6.84)	(3.88)	(5.76)	(6.65)	(6.15)
OECD country	4.321***	3.974***	4.306***	4.103***	4.898***
	(2.83)	(2.52)	(2.81)	(2.67)	(2.93)
Majority in Parliament	-0.011***	-0.028**	-0.010***	-0.005***	-0.008***
	(-2.95)	(-2.32)	(-2.68)	(-3.18)	(-3.05)
Elections during adjustment	6.500***	4.929***	6.481***	6.157***	6.848***
	(3.25)	(2.67)	(3.24)	(3.15)	(3.25)
Private investment	-0.513**	2.086	-0.431	-0.038*	-0.353**
	(-2.21)	(0.96)	(-0.42)	(-1.77)	(-2.09)
Supply-side reforms	-0.014***	-0.045*	-0.013***	-0.008***	-0.010***
	(-2.72)	(-1.95)	(-2.61)	(-2.97)	(-2.72)
Quality of adjustment	-0.092**	-0.177	-0.093**	-0.097**	-0.095**
	(-2.09)	(-1.31)	(-2.08)	(-2.05)	(-2.17)
Quality of adjustment*Size of fiscal adjustment	1.101*	1.110*	1.101*	1.098*	1.103*
	(1.86)	(1.85)	(1.85)	(1.84)	(1.89)
Interest Rates	1.613**	-0.937	1.724	4.346**	1.877**
	(2.39)	(-0.19)	(0.69)	(2.03)	(2.44)
GDP Growth	-0.331	-0.526	-0.320	-0.212**	-0.393
	(-1.57)	(-0.96)	(-1.41)	(-2.01)	(-1.32)
Change in tax revenues (1)		-0.435**			
		(-2.06)			
Change in goods & services expenditures (1)			1.091		
			(1.09)		
Change in transfers expenditures (1)				3.764	
				(1.42)	
Change in public investment expenditures (1)					-1.186*
					(1.79)
Constant (/ln_p)	0.077	0.118	0.077	0.097	0.073
	(0.49)	(0.74)	(0.49)	(0.62)	(0.46)
P	1.080	1.125	1.080	1.102	1.075
Wald chi2	82.39	84.51	82.40	84.34	80.09
No. of failures	79	79	79	79	79
Number of obs.	2652	2652	2652	2652	2652

Source: Authors' calculations. (***) Significant at a 1 percent level; (**) significant at a 5 percent level; (*) significant at a 10 percent level.

Note: this sample includes all episodes of debt consolidation (including those performed in normal times, and those during post-financial crises).

(1)These variables are expressed as a share of total revenue or total expenditure, in order to avoid multi-collinearity.

Table 13. Regression Results: Robustness (2)
Partial Success

Duration of adjustment to reach debt threshold	(1)	(2)	(3)	(4)	(5)
Initial distance from debt target	1.035***	1.028***	1.036***	1.035***	1.032***
	(7.47)	(5.46)	(7.58)	(7.44)	(6.36)
OECD country	7.496***	10.554***	9.510***	7.512***	9.313***
	(3.74)	(4.30)	(4.01)	(3.58)	(3.97)
Majority in Parliament	-0.507	-0.400	-0.360	-0.505	-0.419
	(-0.45)	(-0.60)	(-0.66)	(-0.44)	(-0.57)
Elections during adjustment	9.362***	6.509***	11.450***	9.379***	6.991***
	(4.28)	(3.39)	(4.52)	(4.12)	(3.59)
Private investment	-0.413***	1.147	3.909	-0.421	-0.648
	(-3.50)	(0.38)	(0.99)	(-0.54)	(-1.12)
Supply-side reforms	-0.729	-0.663	-0.599	-0.728	-0.785
	(-0.18)	(-0.24)	(-0.30)	(-0.18)	(-0.14)
Quality of adjustment	-0.063***	-0.147	-0.047***	-0.063***	-0.067***
	(-2.85)	(-1.67)	(-2.98)	(-2.84)	(-2.56)
Quality of adjustment*Size of fiscal adjustment	1.357***	1.379***	1.361***	1.357***	1.373***
	(4.72)	(4.42)	(4.78)	(4.72)	(4.56)
Interest Rates	2.012***	1.384*	-0.829	1.997	1.689***
	(3.90)	(1.72)	(-0.34)	(1.08)	(2.53)
GDP Growth	-0.148***	-0.334**	-0.327	-0.149***	-0.217***
	(-4.23)	(-2.25)	(-1.69)	(-2.71)	(-3.09)
Change in tax revenues (1)		-0.456***			
		(-3.27)			
Change in goods & services expenditures (1)			0.317*		
			(1.66)		
Change in transfers expenditures (1)				0.990	
				(1.01)	
Change in public investment expenditures (1)					-0.693*
					(-1.64)
Constant (/ln_p)	0.117	0.186	0.151	0.117	0.126
	(0.83)	(1.32)	(1.07)	(0.83)	(0.88)
P	1.124	1.205	1.162	1.124	1.134
Wald chi2	133.82	142.50	136.45	133.82	132.51
No. of failures	79	79	79	79	79
Number of obs.	2652	2652	2652	2652	2652

Source: Authors' calculations. (***) Significant at a 1 percent level; (**) significant at a 5 percent level; (*) significant at a 10 percent level.

Note: this sample includes all episodes of debt consolidation (including those performed in normal times, and those during post-financial crises).

(1)These variables are expressed as a share of total revenue or total expenditure, in order to avoid multi-collinearity.

Table 14. Regression Results: Robustness (3)
Dependent Variable Change in Debt-to-GDP (Fixed effects)

Change in Debt-to-GDP ratio	(1)	(2)	(3)	(4)	(5)
Initial distance from debt target	0.054***	0.010	0.064***	0.063***	0.011
	(4.58)	(1.00)	(5.33)	(5.26)	(1.04)
OECD country	3.467**	4.915***	4.950***	5.005***	5.290***
	(2.06)	(3.65)	(2.88)	(2.90)	(3.89)
Majority in Parliament	-7.756	-1.613	-6.581	-6.694	-1.944
	(-1.53)	(-0.42)	(-1.31)	(-1.33)	(-0.50)
Elections during adjustment	5.460***	3.729***	5.951***	5.853***	3.547***
	(4.71)	(3.62)	(5.13)	(5.06)	(3.42)
Private investment	2.468***	7.145***	6.848***	6.824***	7.057***
	(4.25)	(11.01)	(5.24)	(5.11)	(10.78)
Supply-side reforms	-10.798*	-0.400	-9.639	-9.676	-0.211
	(-1.85)	(-0.09)	(-1.66)	(-1.67)	(-0.05)
Quality of adjustment	1.475	3.707***	1.907	1.676	3.195**
	(0.94)	(2.55)	(1.21)	(1.07)	(2.19)
Quality of adjustment*Size of fiscal adjustment	0.535***	0.394***	0.519***	0.514***	0.391***
	(8.14)	(6.74)	(7.92)	(7.84)	(6.67)
Interest Rates	-1.471***	-2.487***	-2.345***	-2.341***	-2.441***
	(-4.07)	(-7.76)	(-5.47)	(-5.42)	(-7.59)
GDP Growth	-1.05e-10	5.32e-10	4.18e-11	2.30e-11	5.00e-10
	(-0.05)	(0.31)	(0.02)	(0.01)	(0.29)
Change in tax revenues (1)		-4.132***			
		(-11.65)			
Change in goods & services expenditures (1)			2.969***		
			(3.73)		
Change in transfers expenditures (1)				2.986***	
				(3.62)	
Change in public investment expenditures (1)					-4.625***
					(-11.26)
Constant	-2.860	-2.469	-3.176	-1.171	-2.671
	(-0.56)	(-0.64)	(-0.63)	(-0.23)	(-0.69)
Wald chi2 (10)	144.94	284.21	160.81	159.54	274.10
Prob chi2	0.000	0.000	0.000	0.000	0.000
Number of obs.	1042	1031	1042	1042	1031

Source: Authors' calculations. (***) Significant at a 1 percent level; (**) significant at a 5 percent level; (*) significant at a 10 percent level.

Note: Fixed-effects estimates. This sample includes all episodes of debt consolidation (including those performed in normal times, and those during post-financial crises).

(1) These variables are expressed as a share of total revenue or total expenditure, in order to avoid multi-collinearity.

Table 15. Regression Results: Robustness (5)
Dependent Variable Complete Success (Probit)

Complete Success	(1)	(2)	(3)	(4)	(5)
Initial distance from debt target	-0.209***	-0.270***	-0.196***	-0.198***	-0.206***
	(-2.86)	(-2.89)	(-2.66)	(-2.68)	(-2.52)
OECD country	0.701**	0.690*	0.566	0.631*	0.825**
	(2.01)	(1.74)	(1.55)	(1.77)	(2.21)
Majority in Parliament	2.366*	1.317	2.551**	2.466**	1.983
	(1.92)	(0.82)	(2.04)	(1.99)	(1.49)
Elections during adjustment	0.032	-0.271	-0.008	0.009	-0.085
	(0.12)	(-0.92)	(-0.03)	(0.04)	(-0.32)
Private investment	0.160	-8.314***	0.467**	0.343	-2.751**
	(1.15)	(-3.97)	(1.95)	(1.47)	(-2.37)
Supply-side reforms	1.979	0.097	2.383*	2.197*	1.540
	(1.60)	(0.06)	(1.90)	(1.76)	(1.13)
Quality of adjustment	1.090**	1.150*	1.109**	1.097**	1.181*
	(2.03)	(1.73)	(2.04)	(2.03)	(1.94)
Quality of adjustment*Size of fiscal adjustment	-0.018	-0.019	-0.019	-0.019	-0.011
	(-1.12)	(-0.84)	(-1.18)	(-1.16)	(-0.55)
Interest Rates	-0.032	3.313***	-0.123	-0.088	1.061**
	(-0.34)	(3.88)	(-1.14)	(-0.81)	(2.23)
GDP Growth	1.05e-09	1.13e-09	1.07e-09	1.05e-09	1.08e-09
	(0.30)	(0.35)	(0.28)	(0.30)	(0.35)
Change in tax revenues (1)		4.400***			
		(4.15)			
Change in goods & services expenditures (1)			0.245*		
			(1.58)		
Change in transfers expenditures (1)				0.132	
				(0.97)	
Change in public investment expenditures (1)					-1.572***
					(-2.67)
Constant	-2.595**	-1.132	-2.544**	-2.549**	-3.516***
	(-2.28)	(-0.75)	(-2.22)	(-2.23)	(-2.82)
Wald chi2 (10)	31.19	70.09	33.88	32.16	44.22
Prob chi2	0.0005	0.000	0.0004	0.0007	0.000
Number of obs.	134	134	134	134	134

Source: Authors' calculations. (***) Significant at a 1 percent level; (**) significant at a 5 percent level; (*) significant at a 10 percent level.

Note: Probist estimates. This sample includes all episodes of debt consolidation (including those performed in normal times, and those during post-financial crises).

(1)These variables are expressed as a share of total revenue or total expenditure, in order to avoid multi-collinearity.

Table 16. Robustness (6): Baseline Model with Interest Rates and GDP Growth excluding the interaction Quality-Size

Duration	(1)	(2)	(3)	(4)	(5)
Initial distance from debt target	0.614***	0.609***	0.618***	0.621***	0.615***
	(2.34)	(2.41)	(2.34)	(2.38)	(2.31)
OECD country	-0.602***	-0.604***	-0.605***	-0.611***	-0.612***
	(-2.20)	(-2.25)	(-2.27)	(-2.29)	(-2.31)
Majority in Parliament	-0.136***	-0.132***	-0.124***	-0.129***	-0.131***
	(-2.47)	(-2.40)	(-2.51)	(-2.52)	(-2.47)
Elections during adjustment	0.153**	0.158**	0.157**	0.149**	0.151**
	(2.31)	(2.42)	(2.41)	(2.37)	(2.39)
Private investment	-0.065*	-0.062*	-0.059*	-0.064*	-0.062*
	(-1.90)	(-1.92)	(-1.91)	(-1.94)	(-1.89)
Supply-side reforms	-0.200**	-0.202**	-0.212**	-0.209*	-0.206**
	(-1.98)	(-1.99)	(-2.00)	(-1.95)	(-1.99)
Quality of adjustment	-0.301***	-0.298***	-0.303***	-0.310***	-0.309***
	(-2.91)	(-2.94)	(-2.96)	(-2.90)	(-2.93)
Interest Rates	0.032*	0.028*	0.030*	0.036*	0.027*
	(1.87)	(1.82)	(1.91)	(1.89)	(1.90)
GDP Growth	-0.154**	-0.147**	-0.149**	-0.155**	-0.149**
	(-3.34)	(-3.17)	(-3.28)	(-3.25)	(-3.27)
Change in tax revenues (1)		-0.288**			
		(-2.14)			
Change in goods & services expenditures (1)			0.307***		
			(3.11)		
Change in transfers expenditures (1)				0.211***	
				(2.90)	
Change in public investment expenditures (1)					-0.126**
					(-1.99)
Constant	-4.552***	-4.446***	-4.517***	-4.498***	-4.513***
	(-6.77)	(-6.77)	(-6.77)	(-6.77)	(-6.77)
P	1.234	1.221	1.255	1.567	1.450
Wald chi2 (10)	21.22	40.02	30.02	23.11	31.03
Prob chi2	0.005	0.008	0.004	0.007	0.003
Number of obs.	2652	2652	2652	2652	2652

Note: this sample includes all episodes of debt consolidation (including those performed in normal times, and those during post-financial crises)

Source: Authors' calculations. (***) Significant at a 1 percent level; (**) significant at a 5 percent level; (*) significant at a 10 percent level.

Table 17. Robustness (7): Baseline Model with Interest Rates and GDP Growth Including Quality and Size as different variables

Duration	(1)	(2)	(3)	(4)	(5)
Initial distance from debt target	0.706***	0.701***	0.698***	0.703***	0.677***
	(2.96)	(2.98)	(2.92)	(3.01)	(2.87)
OECD country	-0.664**	-0.631**	-0.645**	-0.662**	-0.637**
	(-2.11)	(-2.13)	(-2.10)	(-2.08)	(-2.19)
Majority in Parliament	-0.144***	-0.151***	-0.149***	-0.150***	-0.142***
	(-2.56)	(-2.55)	(-2.41)	(-2.50)	(-2.49)
Elections during adjustment	0.181**	0.183**	0.187**	0.171**	0.190**
	(2.14)	(2.20)	(2.18)	(2.14)	(2.13)
Private investment	-0.056*	-0.053*	-0.050*	-0.052*	-0.061**
	(-1.94)	(-1.89)	(-1.93)	(-1.88)	(-1.97)
Supply-side reforms	-0.196**	-0.182*	-0.187**	-0.193**	-0.191*
	(-1.98)	(-1.94)	(-1.96)	(-2.01)	(-1.93)
Quality of adjustment	-0.311***	-0.310***	-0.309***	-0.308***	-0.301***
	(-2.84)	(-2.93)	(-2.81)	(-2.87)	(-2.94)
Size of adjustment	-0.045*	-0.056**	-0.077*	-0.089*	-0.063**
	(-1.78)	(-1.99)	(-1.82)	(-1.95)	(-2.02)
Interest Rates	0.022*	0.020*	0.019*	0.015*	0.028*
	(1.89)	(1.82)	(1.87)	(1.92)	(1.93)
GDP Growth	-0.164**	-0.162**	-0.169**	-0.171**	-0.168**
	(-3.15)	(-3.09)	(-3.13)	(-3.04)	(-3.14)
Change in tax revenues (1)		-0.302**			
		(-2.10)			
Change in goods & services expenditures (1)			0.305***		
			(3.14)		
Change in transfers expenditures (1)				0.239***	
				(2.99)	
Change in public investment expenditures (1)					-0.148**
					(-1.98)
Constant	-6.181***	-6.100***	-6.123***	-6.121***	-6.177***
	(-4.97)	(-4.43)	(-4.76)	(-4.55)	(-4.72)
P	1.678	1.657	1.642	1.631	1.651
Wald chi2 (10)	62.11	62.43	61.83	61.42	62.74
Prob chi2	0.000	0.000	0.000	0.000	0.000
Number of obs.	2652	2652	2652	2652	2652

Note: this sample includes all episodes of debt consolidation (including those performed in normal times, and those during post-financial crises)

Source: Authors' calculations. (***) Significant at a 1 percent level; (**) significant at a 5 percent level; (*) significant at a 10 percent level.

Table 18. Robustness (8): Baseline Model with Interest Rates and GDP Growth including the interaction Quality-Size of Debt Reduction

Duration	(1)	(2)	(3)	(4)	(5)
Initial distance from debt target	0.811*	0.809*	0.804*	0.816*	0.821*
	(1.89)	(1.85)	(1.82)	(1.92)	(1.88)
OECD country	-0.405*	-0.405*	-0.398*	-0.411*	-0.408*
	(-1.91)	(-1.90)	(-1.88)	(-1.94)	(-1.92)
Majority in Parliament	-0.129**	-0.120**	-0.125**	-0.127**	-0.131**
	(-2.11)	(-2.08)	(-2.10)	(-2.23)	(-2.09)
Elections during adjustment	0.133**	0.135**	0.124**	0.127**	0.134**
	(2.00)	(2.02)	(2.01)	(1.97)	(1.99)
Private investment	-0.035**	-0.028*	-0.031*	-0.029*	-0.032*
	(-1.96)	(-1.93)	(-1.95)	(-1.94)	(-1.89)
Supply-side reforms	-0.197*	-0.190**	-0.193**	-0.186**	-0.191**
	(-2.02)	(-2.12)	(-2.13)	(-2.09)	(-2.06)
Quality of adjustment	-0.335***	-0.329***	-0.330***	-0.341***	-0.332***
	(-3.40)	(-3.42)	(-3.51)	(-3.49)	(-3.55)
Quality of adjustment*Size of debt cut	0.030	0.035	0.038	0.029	0.037
	(1.07)	(1.09)	(1.08)	(1.12)	(1.14)
Interest Rates	0.017*	0.013*	0.015*	0.019*	0.015*
	(1.89)	(1.92)	(1.91)	(1.88)	(1.94)
GDP Growth	-0.139**	-0.128**	-0.129**	-0.133**	-0.132**
	(-2.44)	(-2.39)	(-2.28)	(-2.39)	(-2.41)
Change in tax revenues (1)		-0.189**			
		(-2.18)			
Change in goods & services expenditures (1)			0.341***		
			(3.55)		
Change in transfers expenditures (1)				0.219***	
				(3.18)	
Change in public investment expenditures (1)					-0.116*
					(-1.89)
Constant	-5.335***	-5.322***	-5.365***	-5.299***	-5.302***
	(-3.77)	(-3.70)	(-3.81)	(-3.72)	(-3.75)
P	1.201	1.254	1.247	1.533	1.456
Wald chi2	65.71	65.68	64.92	65.13	65.35
No. of failures	96	96	96	96	96
Number of obs.	2610	2610	2610	2610	2610

Note: this sample includes all episodes of debt consolidation (including those performed in normal times, and those during post-financial crises)

Source: Authors' calculations. (***) Significant at a 1 percent level; (**) significant at a 5 percent level; (*) significant at a 10 percent level.

Table 19. Robustness (9): Baseline Model with Interest Rates and GDP Growth including the interaction Quality-Length of Adjustment

| Duration	(1)	(2)	(3)	(4)	(5)
Initial distance from debt target	0.920***	0.919***	0.921***	0.934***	0.920***
	(2.30)	(2.41)	(2.39)	(2.37)	(2.51)
OECD country	-0.402**	-0.397**	-0.405**	-0.412**	-0.421**
	(-2.22)	(-2.32)	(-2.40)	(-2.39)	(-2.27)
Majority in Parliament	-0.234***	-0.224***	-0.235***	-0.242***	-0.235***
	(-2.45)	(-2.65)	(-2.51)	(-2.48)	(-2.49)
Elections during adjustment	0.129*	0.119*	0.125*	0.120*	0.126*
	(1.85)	(1.83)	(1.86)	(1.84)	(1.91)
Private investment	-0.055**	-0.049**	-0.052*	-0.058*	-0.050*
	(-2.05)	(-1.99)	(-1.96)	(-1.95)	(-1.88)
Supply-side reforms	-0.203***	-0.212***	-0.206***	-0.209***	-0.210***
	(-2.43)	(-2.51)	(-2.48)	(-2.45)	(-2.52)
Quality of adjustment	-0.287***	-0.291***	-0.280***	-0.285***	-0.282***
	(-2.99)	(-2.67)	(-2.99)	(-2.79)	(-2.91)
Quality of adjustment*Size of fiscal adjustment	0.140**	0.146**	0.147**	0.151**	0.155**
	(2.20)	(2.17)	(2.19)	(2.21)	(2.25)
Interest Rates	0.210***	0.214***	0.211***	0.209***	0.212***
	(2.79)	(2.77)	(2.82)	(2.91)	(2.99)
GDP Growth	0.011**	0.015*	0.012*	0.014*	0.010*
	(1.98)	(1.92)	(1.93)	(1.89)	(1.94)
Change in tax revenues (1)	-0.123***	-0.122***	-0.128***	-0.131***	-0.127***
	(-2.47)	(-2.51)	(-2.49)	(-2.52)	(-2.62)
Change in goods & services expenditures (1)		-0.244**			
		(-2.39)			
Change in transfers expenditures (1)			0.301***		
			(3.16)		
Change in public investment expenditures (1)				0.322***	
				(3.19)	
Constant					-0.148***
					(-2.33)
P	1.245	1.355	1.312	1.248	1.251
Wald chi2	65.44	64.41	65.32	63.40	65.42
No. of failures	78	78	78	78	78
Number of obs.	2652	2652	2652	2652	2652

Table 20. Robustness (10): Baseline Model estimated on the sub-sample of advanced economies

Duration of adjustment to reach debt threshold	(1)	(2)	(3)	(4)	(5)
Initial distance from debt target	1.031***	1.014***	1.021***	1.023***	1.021***
	(6.53)	(2.91)	(4.48)	(5.51)	(5.36)
Majority in Parliament	-0.013***	-0.032*	-0.055*	-0.012**	-0.010**
	(-2.80)	(-1.84)	(-1.76)	(-2.35)	(-2.39)
Elections during adjustment	8.162***	6.791***	9.772***	8.655***	11.034***
	(3.46)	(2.89)	(3.62)	(3.53)	(3.82)
Private investment	-0.403***	-2.122*	-4.507***	-10.081	-0.279**
	(-2.64)	(-1.90)	(-2.77)	(-0.80)	(-2.26)
Supply-side reforms	-0.010***	-0.162*	-0.033	-0.015**	-0.031*
	(-2.65)	(-1.94)	(-1.75)	(-2.18)	(-1.76)
Quality of adjustment	-0.011***	-0.015**	-0.014***	-0.016***	-0.024***
	(-2.76)	(-2.55)	(-3.25)	(-2.92)	(-2.61)
Quality of adjustment*Size of fiscal adjustment	1.145**	1.222***	1.156**	1.171**	1.190**
	(2.18)	(2.66)	(2.15)	(2.17)	(2.18)
Interest Rates	1.830***	-0.992	-0.027***	-0.535	2.194***
	(2.75)	(-0.11)	(-2.52)	(-0.53)	(2.74)
GDP Growth	-0.089***	-0.087***	-0.084***	-0.089***	-0.099***
	(-3.92)	(-3.57)	(-2.58)	(-3.52)	(-4.10)
Change in tax revenues (1)		-0.312**			
		(-2.43)			
Change in goods & services expenditures (1)			0.123***		
			(2.98)		
Change in transfers expenditures (1)				0.398***	
				(3.45)	
Change in public investment expenditures (1)					-1.031*
					(-1.95)
Constant (/ln_p)	0.208	0.312*	0.273*	0.191	0.230
	(1.25)	(1.82)	(1.73)	(1.55)	(1.23)
P	1.230	1.364	1.317	1.209	1.267
Wald chi2	94.44	100.64	102.91	92.78	93.52
No. of failures	79	79	79	79	79
Number of obs.	1135	1135	1135	1135	1135

Source: Authors' calculations. (***) Significant at a 1 percent level; (**) significant at a 5 percent level; (*) significant at a 10 percent level.
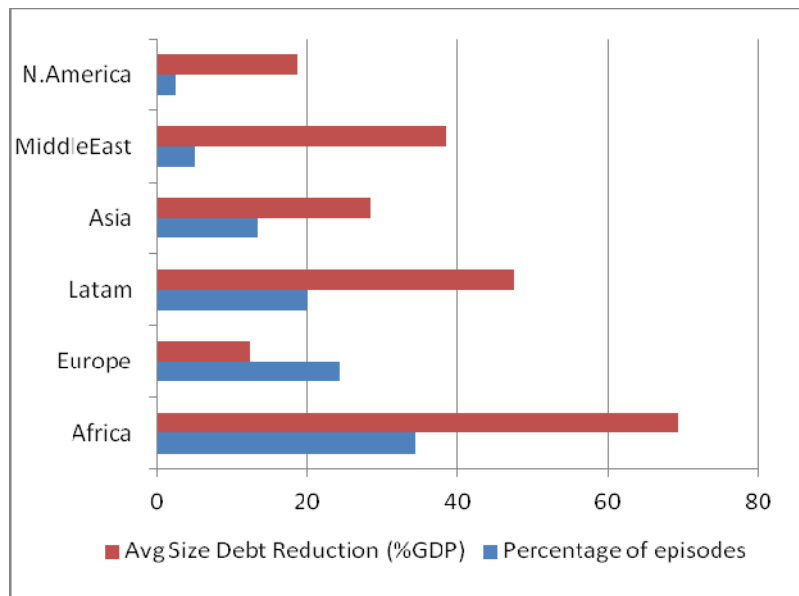
(1)These variables are expressed as a share of total revenue or total expenditure, in order to avoid multi-collinearity.

Figure 1. Distribution of Public Debt Reduction Episodes by Debt Consolidation Size
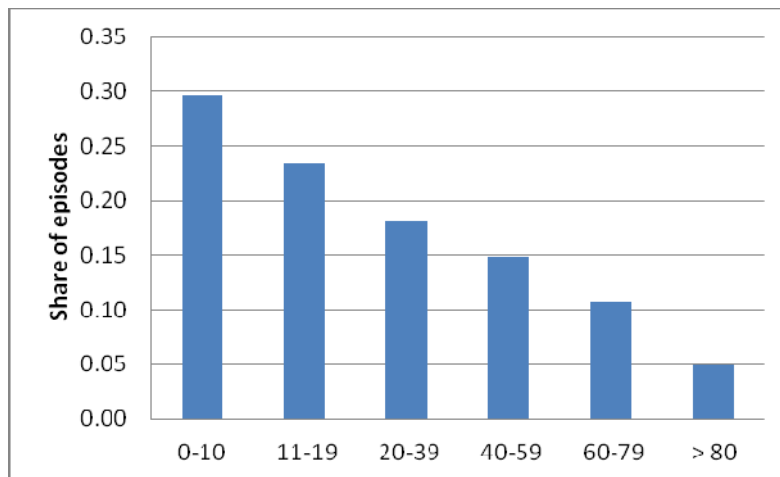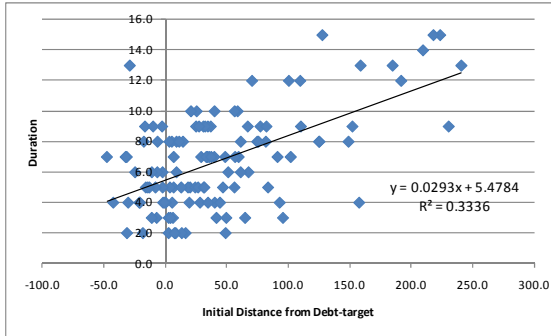

Source: Authors' calculations.

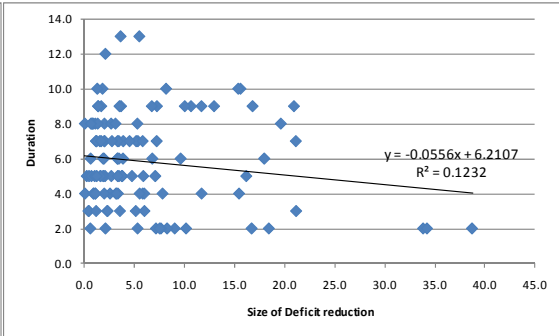## Figure 2. Distribution of Public Debt Reduction Episodes by Size and Region

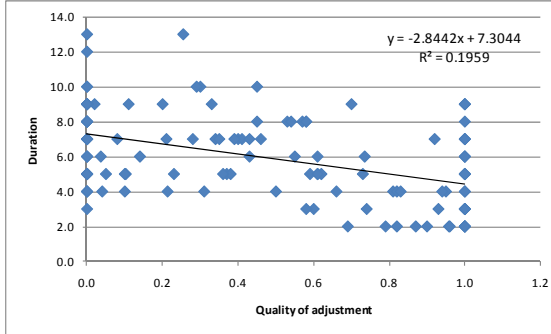# Figure 3. Debt Reduction and Characteristics of Fiscal Consolidation
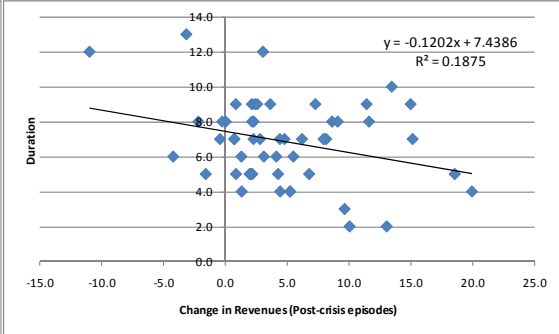
2.a. Duration and initial debt

2.b. Duration and size of adjustment

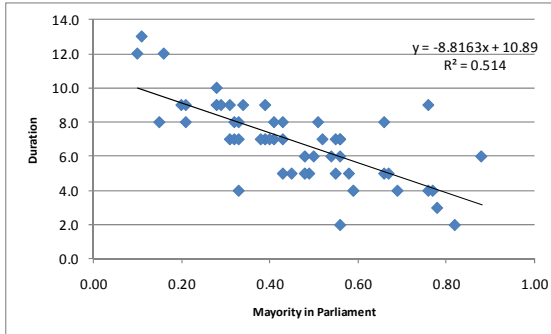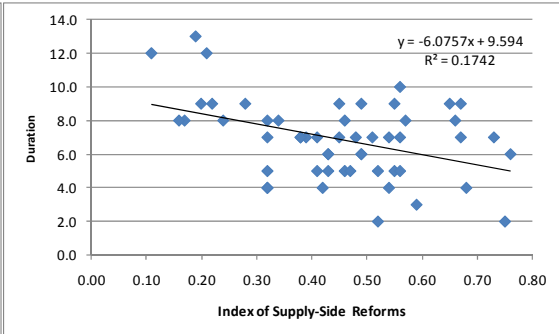*2.c. Duration and quality of adjustment*

2.d. Duration and change in revenues (post-crisis)

2.e. Duration and majority in Parliament

2.f. Duration and supply side reforms

Source: Authors' calculations.

Note: Duration is in years. Initial distance from debt target is in percent of GDP. Quality of Adjustment is a continuous variable that takes values between 0 and 1, and measures the percentage of the fiscal adjustment due to cuts in cyclically adjusted current spending. The larger the contribution of spending cuts to the adjustment, the higher the value of the variable. The variable that measures Majority in Parliament also varies from 0 to1 and measures the percentage of seats in Parliament (Congress) held by the party in government. The Index of Supply-side reforms is an expanded version of the index of structural reforms that boost growth based on Lora (2001). Change in revenues and deficit reductions are in percent of GDP.