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## **A Surplus of Ambition: Can Europe Rely on Large Primary Surpluses to Solve its Debt Problem?**

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Can Europe Rely on Large Primary Surpluses to Solve its Debt Problem?**

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**Abstract**

The EU's Fiscal Compact foresees Europe's heavily indebted countries running primary budget surpluses of as much as 5 per cent of GDP for as long as 10 years in order to maintain debt sustainability and bring debt-to-GDP ratios down to a target level of 60 per cent. Using an extensive sample of high- and middle-income countries, we show that primary surpluses this large and persistent are rare. There are just 3 (nonoverlapping) episodes where countries ran primary surpluses of at least 5 per cent of GDP for 10 years. Analyzing both case studies of exceptionally large and persistent surpluses and a less restrictive definition of (more numerous) surplus episodes, we find that large and persistent surpluses are more likely in small open economies with high debt-to-GDP ratios, where external pressure for adjustment is strong, and in countries with strong fiscal and political institutions capable of delivering majority governments and encompassing coalitions. Surplus episodes are more likely when growth is strong and the current account of the balance of payments is in surplus (savings rates are high). Strikingly, left wing governments are more likely to run large, persistent primary surpluses. Overall these findings do not provide much encouragement for the view that Europe's heavily indebted countries will be able to run primary surpluses as large and persistent as projected under the Fiscal Compact.

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## 1 Introduction

Europe's troubled economies have heavy debts and gloomy growth prospects. This raises obvious concerns about the sustainability of public debts that have manifested themselves periodically in increases in yields that investors require to hold governments' debt securities. As we write, investors are relatively sanguine. The question is whether they will remain so. It is whether worries about debt sustainability will be back.

The EU's Fiscal Compact, signed in 2012 as a strengthened version of the Stability and Growth Pact, foresees European governments as reducing their debts to a target of 60 per cent of GDP over 20 years. Sovereigns whose debts exceed this level are limited to a cyclically adjusted (structural) primary budget deficit of 0.5 per cent and in addition are required to run a further surplus sufficient to eliminate  $1/20^{\text{th}}$  of debt in excess of 60 per cent in a given year.<sup>1</sup> A country with a debt of 160 per cent of GDP – think Greece – is thus required to program a surplus of 5 per cent of GDP to retire  $1/20^{\text{th}}$  of that excess. Combined with the 0.5 per cent permissible structural deficit, this produces the 4.5 per cent of GDP primary surplus figure that Greece's EU partners tabled as their opening bid in negotiations with the country last February, for example.

This, then, is the EU's official strategy for dealing with its debt problem, not by restructuring or re-profiling the debt, but by retiring the securities that make up the numerator of the debt-to-GDP ratio and, hopefully, growing the denominator.

Is this strategy economically and politically realistic? The IMF, in its *Fiscal Monitor* (2013a), makes representative assumptions regarding interest rates and economic growth rates and constructs a scenario in which the obligations of heavily indebted European sovereigns stabilize and then fall to the 60 per cent of GDP targeted by the EU's Fiscal Compact over 20 years.<sup>2</sup> These calculations yield a required average primary surplus in the decade 2020-2030 of 5.6 per cent for Ireland, 6.6 per cent for Italy, 5.9 per cent for Portugal, 4.0 per cent for Spain, and 7.2 per cent for Greece.<sup>3</sup>

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<sup>1</sup> Countries with debts below the 60 per cent threshold can run structural deficits of up to 1 per cent of GDP.

<sup>2</sup> This follows the methodology pioneered by Abbas et al. (2010), albeit using different assumptions about the evolution of inherited debt stocks not yet informed by 2011-12 experience.

<sup>3</sup> The cyclical adjustment makes little difference in calculations for as long a period as a decade, and for simplicity we ignore it in what follows.

These are scenarios, not forecasts. But they are the scenarios based on IMF forecasts of the main macroeconomic variables. They are the scenarios consistent with the current European strategy and objective of bringing debt ratios down to 60 per cent by 2030.

Without question, these scenarios imply very large primary surpluses. There are both political and economic reasons for questioning whether they are feasible. When tax revenues rise, legislators and their constituents apply pressure to spend them. In 2014, when Greece, after years of deficits and fiscal austerity, enjoyed its first primary surpluses, the government came under pressure to disburse a “social dividend” of €525 million to 500,000 low-income households. (*Kathmerini*, the Greek newspaper, called these transfers “primary surplus handouts.”) Budgeting creates a common pool problem, and the larger the surplus, the deeper and more tempting is the pool. Only countries with exceptionally strong political and budgetary institutions may successfully mitigate this problem (de Haan, Jong-A-Pin and Mierau 2013).

These are high hurdles. Researchers at the Kiel Institute (2014) conclude that “assessment of historical developments in numerous countries leads to the conclusion that it is extremely difficult for a country to prevent its debt from increasing when the necessary primary surplus ratio reaches a critical level of more than 5 per cent.” One need not subscribe to their 5 per cent threshold to agree that there is an issue.<sup>4</sup>

In this paper we analyze those historical developments more systematically, employing data for 54 emerging and advanced economies between 1974 and 2013. We establish that primary surpluses as large as 5 per cent of GDP for as long as a decade, consistent with the EU’s 60 per cent-2030 target, are rare. There are just 3 such nonoverlapping episodes in the sample. An alternative definition – surpluses averaging “only” 4 per cent for ten years – yields a total of just 5 such episodes.

Given the small number of such cases, it would appear that these are not circumstances that are shared widely. What they have in common is a combination of strong external pressure for adjustment and strong domestic institutions.

A less restrictive definition of surplus episodes– surpluses averaging at least 3 per cent of GDP for 5 years – provides a sample of “large and persistent” surplus episodes sufficient for analyzing their economic and political correlates more systematically. This analysis confirms that

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<sup>4</sup> And where there is an issue, the issuer may need help from debt forgiveness, foreign aid, inflation, or debt restructuring. Reinhart and Rogoff (2013) reach a similarly gloomy conclusion.

small, open economies where market pressure is intense are more likely to exhibit large, persistent surpluses. So are countries where the debt ratio is high, again heightening the pressure for adjustment. In terms of institutional correlates, we find that surplus episodes are more likely when electoral institutions deliver a majority government that controls all houses of parliament or congress, strengthening its ability to push through the requisite policies. In advanced economies, proportional representation electoral systems that give rise to encompassing coalitions are positively associated with surplus episodes. Surprisingly to us, left wing governments are more likely to run large, persistent primary surpluses. Less surprisingly, we find that surplus episodes are more likely when growth is strong and the current account of the balance of payments is in surplus (when savings rates are high).

Europe's highly indebted countries certainly feel strong external pressure to adjust. Some also have the advantage of relatively high saving rates. But the other factors – strong institutions, electoral and otherwise, and a favorable external environment – are not obviously present. On balance these findings provide only limited support for the view that Europe's crisis countries will be able to run primary budget surpluses sufficiently large and persistent to bring debt ratios down to 60 per cent by 2030, as targeted by the Fiscal Compact.

Much has already been written about the prospects for fiscal consolidation in Europe and generally. The study closest to our own is Zeng (2014), who defines episodes of sustained, large primary surpluses as a primary balance of at least 5 per cent of GDP for 5 years. Some of his cases overlap with ours (see the discussions of Belgium, Singapore and New Zealand below). But his sample of surplus episodes is heavily dominated by low and middle-income countries, such as Botswana, Egypt, Lesotho, Jamaica, Dominica, and Seychelles, whose experience does not speak to Europe's challenges, our focus here, so his regression analysis is not directly comparable to ours. Be this as it may, Zeng too finds that large, persistent surpluses are more likely when growth is strong and debts are heavy. On the other hand, a high savings rate appears to reduce the likelihood of a large, persistent surplus in his sample. And the author does not consider the political characteristics that are among our central concerns here.

A second related paper is Mauro, Romeu, Binder and Zaman (2013). Using a long-term historical data set, they regress the primary surplus on the level of debt at the beginning of the period, where both variables are expressed as shares of GDP (they include also a set of controls). Negative estimated coefficients, which they often find, suggest that higher levels of debt increase

the likelihood of observing a primary surplus, other things equal. The estimated coefficients can also be compared with those required for the debt-to-GDP ratio to be stationary, given assumptions about growth rates and interest rates. Their approach differs from ours in that they analyze only the single within-year reaction and treat all primary surpluses equally, as opposed to distinguishing those above and below a threshold level. That said, they find for highly indebted, slowly growing countries facing high interest rates that “the primary fiscal surplus implied by the estimated fiscal policy reaction function is too high to be politically feasible or realistic” (p.13).

A final paper speaking to these issues is Alesina, Perotti and Tavares (1998). Alesina et al. use a different sample (19 OECD countries in 1960-95) and define fiscal adjustment differently (they define a “successful” fiscal adjustment as a year when the primary deficit-to-GDP ratio falls by at least 1.5 percentage points and then is on average at least 2 percentage points below its initial level for three subsequent years, or the debt-to-GDP ratio is at least 5 percentage points below its initial level three years after the adjustment). Still, they reach a number of similar conclusions. Politically, single-party governments are more likely to succeed in consolidating the budget than multiparty coalitions.<sup>5</sup> Economically, currency depreciation tends to be associated with successful adjustment (consistent with our case-study evidence below). Countries undertaking successful adjustments have relatively strong trade balances (current accounts) compared to those whose adjustments fail, as here.<sup>6</sup> In contrast to our results, Alesina et al. do not detect any association between the ideological (left-right) orientation of the government and the likelihood of successful consolidation.

That some of these results differ is hardly surprising. Their analysis focuses on relatively small adjustments (changes of 1.5 per cent of GDP) over relatively short periods (3-4 years), whereas we are concerned with whether countries can maintain much larger surpluses (3-5 per cent of GDP or more) for longer periods (5-10 years). Earlier literature focused mainly on the

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<sup>5</sup> Earlier, Edin and Ohlsson (1991) reached a similar conclusion. Other work similarly points to the importance of strong institutions for successful fiscal consolidations; see Arin, Chmelarova, Feess and Wohlschlegel (2011).

<sup>6</sup> Alesina et al. also find that spending cuts are more likely to lead to long-lasting fiscal adjustments vis-à-vis adjustments that rely on tax increases. While we do not focus on how the surplus is achieved, our results are consistent with this finding. Specifically, we find that during primary surplus episodes tax revenues (measured as a share of GDP) are not significantly higher than country-specific averages but primary public expenditure (measured as a share of GDP) is significantly lower than the country-specific average. For instance, in our sample of 5-year 3 per cent episodes, primary public expenditure over GDP is 2.5 percentage points lower than the country-specific average (p-value 0.00). Government revenues, instead, are 0.6 percentage point higher than the country-specific average, but the difference is not statistically significant (p-value 0.20). Therefore, large and persistent primary surpluses do seem to rely more on spending cuts than on higher tax revenues. Related results are in Alesina et al. (2015).

business cycle impact (whether fiscal consolidation was contractionary or expansionary), whereas we are concerned with the determinants rather than the impact of consolidation and whether it can be sustained for a decade or more, as presently foreseen in Europe.

## **2 Debt sustainability and debt targets**

Public debt can finance high-return investment projects and expansionary fiscal policies during recessions. Adept public debt management also enables the authorities to limit tax distortions over the business cycle. Thus problems, including problems of sustainability, that prevent a government from resorting to debt in these times and circumstances can result in suboptimal public policy. To be sure, public debt can also be used to finance wasteful public spending and facilitate delay in necessary but politically costly structural reforms. High levels of public debt may alter the structure of public expenditure since, for any given interest rate and level of government spending, a higher level of debt implies that a larger share of expenditure needs to be dedicated to paying interest. This constraint could be useful if it creates incentives to reduce wasteful spending. However, wasteful expenditure is often politically difficult to cut. Therefore, debt service often crowds out productive public spending, such as investment in human and physical capital (Bacchiocchi, Borghi and Missale 2011).

High levels of public debt also increase financial fragility. They raise the risk of a crisis, self-fulfilling or otherwise, limiting the government's ability to implement countercyclical policies during recessions. Crises, by raising doubts about future payments of interest and repayments of principal, create uncertainty that depresses consumption and investment. Given that the government often has first call on available resources, it is unusual for other borrowers (corporates etc.) to be regarded as more creditworthy than the sovereign (once upon a time the rating agencies' practice of never assigning a higher credit rating to entities other than the government was known as "the sovereign ceiling"). Thus, problems of debt sustainability for the sovereign can also impair the creditworthiness and ability to borrow of those other entities.<sup>7</sup>

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<sup>7</sup> In the context of developing-country debt, this is known as the debt overhang problem (Sachs 1989, Krugman 1989). For a discussion of sovereign ceiling see Borensztein, Cowan, and Valenzuela (2013). For evidence on the link between public debt and economic growth see Panizza and Presbitero (2013, 2014) and Pescatori, Sandri, and Simon (2014).

Debt sustainability is customarily described in terms of an intertemporal constraint stating that net initial debt plus the present value of expected future government expenditures must equal (or not be greater than) the present value of expected future government revenues. Alternatively, to be sustainable net initial debt must be smaller or equal to the present value of expected future primary surpluses:

$$D_t \leq \sum_{k=0}^{\infty} \frac{E_t(PS_{t+k})}{\prod_{j=1}^k (1 + E_t(i_{t+j}))}$$

where  $D$  is the debt stock at a point in time,  $PS$  is the primary surplus, and  $i_{t+j}$  is the average interest rate on the outstanding stock of debt in period  $t+j$ . The above equation could be augmented with an accumulated stock-flow adjustment term which may include valuation effects, special fiscal operations (such as revenues from privatizations), and even debt restructuring episodes. The standard definition of debt sustainability stating that a “... borrower is expected to be able to continue servicing its debt without an unrealistically large future correction to the balance of income and expenditure” (IMF, 2002, p. 4) implicitly assumes that stock-flow adjustments are not very important.<sup>8</sup>

The above definition requires assumptions about the future path of government revenues, expenditures and on the average interest rate paid on government. Uncertainty about the future paths of these variables can be enough to precipitate a crisis if investors, growing more uncertain, demand higher interest rates in order to take up new debt issues, and those higher interest rates strain the government’s debt servicing capacity (Cole and Kehoe 2000, Morris and Shin 1998).<sup>9</sup>

In other word, debt sustainability is not evaluated a vacuum. A country’s debt may be sustainable even if it stabilizes at a level which is higher than the 60 per cent target specified in

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<sup>8</sup> Stock-flow adjustments, however, can be substantial (Campos et al. 2006). IMF (2013a) discusses the possibility of paying off debt through the sale of government assets and concludes that privatization is unlikely to have a large impact on the debt ratios of highly indebted European countries.

<sup>9</sup> Before the introduction of the euro, European governments that borrowed in domestic currency were less likely to be subject to such uncertainty-induced crises because the national central banks (which can print an unlimited amount of domestic currency) acted as de facto lenders of last resort. But with the introduction of the euro, national central banks could no longer act as lenders of last resort. Eurozone countries have thus become similar to emerging market countries that do not borrow in their own currency (Eichengreen, Hausmann and Panizza, 2005, De Grauwe, 2011, Dell’Erba, Hausmann and Panizza, 2013, De Grauwe and Ji, 2013). We check whether the likelihood of having large and persistent surpluses is correlated with the presence of a hard exchange rate peg (a common currency or a currency board) or fixed exchange rates but do not find any evidence in this direction (see Tables A10.1 and A10.2 in the online appendix).



the Fiscal Compact. However, the target may serve as a focal point, and countries deemed unable to reach the target may be subject to rollover problems.

Consider the case of the highly indebted European countries. While debt sustainability is a long-term concept, the near term evolution of debt may become disproportionately important in these countries if it is believed that policymakers in Northern Europe are more likely to approve ECB-ESM support if the fiscal numbers are good. Since good fiscal numbers increase the likelihood of support were a crisis to happen, they reduce the likelihood that the crisis will happen and that the ECB will be called on “to do whatever it takes.”

Using forecasts for future growth and interest rates, the IMF (2013a) identifies 10 advanced economies that, in order to achieve their debt targets, will have to maintain a cyclically adjusted primary surplus close or greater than 3 per cent of GDP over the entire decade 2020-30 (Table 1).

### 3 The requisite surpluses

In calculating the implied primary surpluses, the IMF uses its macroeconomic projections for the period 2014-20 and assumes a gross debt target for 2030 of 60 per cent of GDP.<sup>10</sup> It then calculates the required primary surplus for 2020-30 by assuming that the cyclically adjusted primary balance will remain constant at a level consistent with achieving the debt target. (These are the primary balances reported in Table 1.) For most countries, the calculations of Table 1 are based on projections for country-specific interest rate-growth differentials based on a model that incorporates the effect of public debt on growth and the interest rate and uses as starting point IMF forecasts for 2019.<sup>11</sup>

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<sup>10</sup> If end of 2013 debt is below 60 per cent of GDP the target is set at the level of 2013 debt (all the countries listed in Table 1 are above this threshold). In the case of Japan, the IMF uses a net debt target of 80 per cent of GDP. In Japan, the difference between net and gross public debt is large. In 2012, Gross public debt stood at approximately 240 per cent of GDP, but net public debt was less than 130 per cent of GDP. Therefore the 80 per cent net debt target corresponds to a gross debt target of 200 per cent of GDP.

<sup>11</sup> The Fund starts with growth and interest rate forecasts for 2013-19 prepared by IMF desks for the World Economic Outlook. It then uses a model in which interest and growth rates are endogenously determined by the country's debt level under the assumption that the interest rate-growth differential converges to the country-specific historical average by 2030. The growth rate in 2020 is set to be equal to the IMF desk forecast for potential growth in 2019. For the following years, growth is determined using estimations of the effect of debt on economic growth ( $GR_{2021} = GR_{2020} + \delta(D_{2020} - D_{2019}); \dots; GR_{2030} = GR_{2029} + \delta(D_{2029} - D_{2028})$ ), where  $\delta=0.00015$  is obtained from Kumar and Woo's, 2010, estimates of the effect on debt on growth). The interest rate for 2030 is then derived using country-specific historical interest rate-growth differentials and the growth rate for 2030 obtained using the

IMF long-run projections of nominal GDP growth and interest rate-growth differentials are not publicly available. However, publicly available projections for 2013-19 are relatively uncontroversial (nominal GDP growth ranges between 2.7 per cent for Italy and 5 per cent for the US, as shown Table 1). They suggest that it is the massive debt reduction implied by the low debt targets that makes the large and persistent primary surpluses reported in Table 1 necessary and not some specific problem with the long-run forecast.<sup>12</sup>

In this paper we study the realism of these required large and persistent primary surpluses. It is worth reiterating that such large surpluses are not necessary for guaranteeing debt sustainability (debt could conceivably be sustained at levels higher than the thresholds of Table 1). These surpluses are, however, necessary to achieve the debt targets listed in Table 1 and enshrined in the Fiscal Compact.

#### **4 Large and persistent primary surplus episodes**

We now identify large and persistent primary surplus episodes in an unbalanced panel of 54 emerging and advanced economies over the 1974-2013 period. Our sample includes 29 advanced economies and 27 middle income countries.<sup>13</sup> Our concern with the debt sustainability prospects of middle and high income countries, in Europe in particular, guides the construction of the sample. However, we also conduct some robustness tests using all economies with income per capita of at least \$2,000.

We define a primary surplus episode as large when the average value of the primary surplus during the episode is, alternatively, greater than 3, 4, or 5 per cent of GDP. We define it

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procedure outlined above. The same procedure (together with the assumption that interest rate is increasing in the level of debt) is used to iterate backward the 2030 interest rate-growth differential (we would like to thank Sanjeev Gupta for guiding us through the procedure). For countries that have lost market access (Greece and Portugal) calculations on the growth-interest rate differentials is based on country-specific debt sustainability analyses.

<sup>12</sup> Perhaps, under a very benign scenario, one could assume a lower interest rate-growth differential for Italy and Spain, leading to slightly smaller required primary surpluses. But the implied changes would be small. For a detailed discussion of the Italian case, see Panizza (2015).

<sup>13</sup> Data on surpluses are from the IMF's World Economic Outlook database as supplemented by Mauro, Romeu, Binder and Zaman (2013), OECD, and the World Development Indicators. Mauro et al. provide data for general government budgets and, when not general government data are not available, data for central government budgets. To ensure compatibility with the WEO database, we add only observations for general government budgets. Table A1 in the Appendix lists the countries and periods included in our sample. For years prior to 1990 fiscal data for emerging market countries are often unavailable or of poor quality. To make the sample more balanced, we report results that use data for 1974-2013 for advanced economies, data for 1990-2013 for emerging market economies and data for 1995-2013 for transition economies. We also drop observations for an 8-year window around sovereign default episodes. See Table A12 for details on data sources.

as persistent when it lasts at least 5, 8, or 10 years. We thus have a total of 9 definitions of large and persistent surpluses.<sup>14</sup>

Studying the economic and political conditions under which countries have large and persistent primary surpluses requires comparison groups. For the five-year episodes, the comparison group consists of all nonoverlapping five-year periods between 1974 and 2013 (1974-78; 1979-83; 1984-88; 1989-93-1994-98; 1999-03; 2004-08-2009-13) that: (i) do not overlap with a window starting two years before and ending two years after the episodes identified in Table 2 and (ii) do not overlap with any other period for which the five-year average was above the threshold (these periods are listed in Table A2 in the online appendix). We follow the same procedure for our eight and ten-year episodes.

The resulting sample (in Table 2) shows that large and persistent primary surpluses are relatively rare. Out of 235 nonoverlapping five-year periods in our dataset, there were 36 five-year nonoverlapping episodes with an average primary surplus of at least 3 per cent of GDP (15 per cent of the sample), 18 five-year episodes with an average primary surplus of at least 4 per cent of GDP (8 per cent of the sample), and 12 five-year episodes with an average primary surplus of at least 5 per cent of GDP (5 per cent of the sample).

Eight-year periods of large primary surpluses are even more exceptional. Out of 185 nonoverlapping episodes, we find 17 episodes with an average primary surplus of at least 3 per cent of GDP (9 per cent of the sample), 12 episodes with an average primary surplus of at least 4 per cent of GDP (6 per cent of the sample), and 4 episodes with an average primary surplus of at least 5 per cent of GDP (2 per cent of the sample).

Finally, out of 113 nonoverlapping ten-year episodes, there are 12 episodes with an average primary surplus of at least 3 per cent of GDP (11 per cent of the sample), 5 episodes with

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<sup>14</sup> Note that we define episodes focusing on the average surplus over a given period and do not require that the surplus is above the threshold for any single year over a given period. Also note that, in several cases a series of overlapping periods satisfies one or more of our definitions. Belgium, for instance, had an average primary surplus greater than 3 per cent of GDP for each five-year period from 1989-93 to 2004-08 and for each ten-year period from 1987-96 to 2000-09. Since these overlapping episodes would be problematic for our statistical analysis, we build a dataset of nonoverlapping episodes by selecting, among all possible candidates, the episode with the largest average primary surplus in any given 5, 8, and 10 year window. In the example of Belgium described above, this procedure produces only one non-overlapping episode (1998-2002). There are, however, cases in which long strings of primary surpluses identify more than one episode. For instance, Denmark had an average primary surplus greater than 3 per cent of GDP for each five-year period from 1996-2000 to 2005-09. This string of episodes yields 2-five year non-overlapping periods with local maxima (1997-2001 and 2004-08). Therefore, we classify these two episodes as large and persistent under the 3 per cent five year category. An alternative way of identifying non-overlapping periods would be to employ a Chow test for structural breaks and select the episode that maximizes the test. This procedure is, however, problematic in our context because some countries have short primary surplus series.

an average primary surplus of at least 4 per cent of GDP (5 per cent of the sample), and 3 episodes with an average primary surplus of at least 5 per cent of GDP (2.5 per cent of the sample).

Large primary surpluses for extended periods are possible, in other words, but they are the exception.

## **5 Are large, persistent surpluses simply a response to high and rising debt?**

It can be objected that these historical data are not particularly informative about the likely response of the current set of highly indebted countries. Whereas the average public-debt-to-GDP ratio is on the order of 50 and 60 per cent in our control and treatment groups, in today's Eurozone it averages 90 per cent, and in Europe's heavily indebted countries the debt ratio is even higher and has been growing even faster. The argument would be that high and rapidly rising debt increases the urgency of adjustment, and the likelihood that a country will respond to that urgency by running a large and persistent primary surplus.<sup>15</sup>

The fact that we have considerable variation in debt-to-GDP ratios in our sample allows us to address the problem. Specifically, we can divide our large and persistent primary surplus episodes into those that occur in periods when debt is high or growing fast, and those that do not occur in such periods. We define as high or rapidly growing public debt a situation that meets at least one of the following conditions: (i) public debt is above 70 per cent of GDP for advanced economies and above 50 per cent of GDP for emerging markets; (ii) the debt-to-GDP ratio has grown by more than 20 percentage points over the ten years that preceded the first year of the episode and debt is greater than 40 per cent of GDP; and/or (iii) the debt-to-GDP ratio has grown by more than 15 percentage points during the 5 years that preceded the first year of the episode and debt is greater than 40 per cent of GDP.

We identify 77 five-year periods of high or rapidly growing debt and 26 eight- and ten-year periods of high or rapidly growing debt (see bottom panel of Table 2; all periods of high or rapidly growing debt that overlap with a primary surplus episode are labeled with an asterisk in

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<sup>15</sup> Fears of impending loss of market access ("the imposition of market discipline") may add to the perceived urgency of this adjustment, although the evidence on market discipline is mixed (see Lane 2012, Beirne and Fratzscher 2013).

Table 2). The average debt-to-GDP ratio is 88 per cent in five-year periods of high and rapidly growing debt and 33 per cent in tranquil periods.

Periods of high or growing debt are more likely to coincide with the beginning of large and persistent primary surplus episodes than with our control-group episodes. The unconditional probability of observing a primary surplus episode ranges between only 2 and 15 per cent, while the probability of observing a surplus episode conditional on being in a period of high or growing debt ranges between 8 and 39 per cent. The difference between the conditional and unconditional probabilities is statistically significant under 6 of our 9 definitions (Table 3).

While the unconditional probability of observing a period of high or rapidly growing debt ranges between 14 and 33 per cent, the probability of observing such a period conditional on being in a large primary surplus episode ranges between 50 and 67 per cent. Again, the difference between the conditional and unconditional probabilities is statistically significant in 6 out of 9 definitions of period (Table 3).

In sum, large and persistent primary surpluses appear more likely in the presence of high or growing public debt. If so, the incidence of such episodes in our historical data set, in which debts were typically lower, may understate the likelihood of such episodes now. The question is whether or not any such understatement is first order. We provide direct evidence on this below.<sup>16</sup>

## **6 The correlates of large and persistent primary surpluses**

We now examine the correlation between primary surplus episodes and other economic and political variables. Without an instrumental variable strategy we are unable to make strong claims of causality.<sup>17</sup> However, some correlations are clearly more causal than others. For example, the debt-to-GDP ratio is a “state variable” – the stock of debt is slowly moving and largely predetermined at a point in time, and any correlation with the primary surplus plausibly reflects

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<sup>16</sup> Some episodes are not obviously linked to debt sustainability problems. These exceptions will figure importantly in the analysis that follows. For example, the largest and longest episode in our sample (Norway 1999) happened when public debt was low and not growing rapidly (but when oil revenues came on stream, as we describe below). The same is true of New Zealand in 1994 (one of the five cases we discuss in detail in below). Singapore is an interesting case. IMF WEO data indicate high levels of public debt (close to 100 per cent of GDP in 2012 and above 70 per cent of GDP in the 1990s). However, Singapore also has two large sovereign wealth funds and net debt is probably much lower than gross public debt. Unfortunately, we do not have data for net public debt in Singapore and, for consistency, we classify Singapore 1990 as an episode of high or rapidly growing public debt.

<sup>17</sup> Below we attempt to be more precise about causality using a method based on identification through heteroskedasticity.

causality running from the inherited debt to the fiscal balance. Any endogeneity due to causality running from primary surpluses to the debt stock will bias the coefficient estimates away from those we find. For other variables, such as the current account balance, in contrast, simultaneity is likely to be a serious issue, and due caution when interpreting the results is advised.

## 6.1 Univariate analysis

Table 4 reports average values for the economic variables for the control group and surplus episodes, the difference between the two averages, and the two-sided p-value of a mean comparison test (in bold when the difference between the two groups is significant at the 10 per cent confidence level).

Large primary surpluses coincide with periods of above-average growth. This is what one would expect if revenues respond more strongly than spending to the economic cycle.<sup>18</sup> Interestingly, the difference in growth is statistically significant when we consider five-year episodes but not when we look at eight and ten-year episodes.

There is some indication that large, persistent primary surpluses are more likely in high income countries.<sup>19</sup> It could be that the level of per capita GDP is standing in for the strength of institutions and that countries with stronger institutions are better able to run large, persistent surpluses. We consider this possibility below.

World GDP growth is positively related to large, persistent primary surpluses. For 6 of our 9 possible definitions of a large and persistent surplus, we find that world GDP growth is significantly higher during episodes of high primary surpluses than control periods.<sup>20</sup> This effect tends to disappear when controlling for domestic GDP growth, however, as we will see below.

Larger and more diversified countries should be better able to absorb domestic and external shocks and may therefore be able to support deficits and higher debts, whereas small countries may feel more pressure to adjust. Consistent with this intuition, economic size (measured by the log of total real GDP) is negatively correlated with the likelihood of observing

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<sup>18</sup> Recall that we are working with headline as opposed to cyclically-adjusted primary surpluses, which may accentuate the correlation with economic growth

<sup>19</sup> Although, again, the difference is not always statistically significant.

<sup>20</sup> Abbas et al. (2013) similarly find that successful debt reversals are more likely when global growth is high. But they do not undertake the formal statistical tests we report here.

a primary surplus episode, although the correlation is only occasionally significant at standard confidence levels.

Surplus episodes are more frequent in countries that trade more with the rest of the world. The difference is statistically significant for 7 of our 9 definitions. Primary surplus episodes are also associated with current account surpluses, and the difference with the control group is always large and statistically significant. This is what one would expect from basic national accounts insofar as the current account is equal to government savings plus private savings minus investment.<sup>21</sup>

We expect a high debt-to-GDP ratio to be associated with an increase in the need for fiscal adjustment and, therefore, the likelihood of a large, extended surplus, given what we found in Section 5 above. Consistent with this presumption, we find that debt-to-GDP ratios tend to be higher during episodes of high and persistent primary surpluses. Strikingly, however, the difference with the control group is statistically significant only for one of our nine definitions of what constitutes a large and persistent episode.<sup>22</sup>

Surplus episodes seem to be associated with depreciated exchange rates (consistent with the finding that primary surpluses are associated with current account surpluses, and consistent with the idea that depreciation is useful for crowding in exports in periods of fiscal consolidation).<sup>23</sup> In contrast, there is no indication that large, persistent primary surpluses are more or less likely in periods of high unemployment or inflation.<sup>24</sup> There is some indication that sustained primary surpluses are more likely in countries with faster population growth. In contrast, there is no evident correlation between financial development and primary surpluses.

We also examine whether large and persistent primary surpluses are associated with national political characteristics (Table 5). In only one instance there is a statistically significant difference in the likelihood of a large primary surplus episode between countries with presidential and parliamentary forms of government. Interestingly, primary surplus episodes are more likely

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<sup>21</sup> Aficionados of the literature on global imbalances will recognize this as the twin-deficits hypothesis in another guise. It is worth noting that among our economic and political variable, the current account balance is probably the most endogenous with respect to primary surplus episodes.

<sup>22</sup> Celasum, Debrun and Ostry (2006) look at a panel of annual data (as opposed to five year periods, as year) and the level or change in the primary balance (as opposed to whether the primary balance exceeds 3 per cent, as here) and find that a high debt-to-GDP ratio is positively associated with the primary balance (as here).

<sup>23</sup> Again, the difference with the control group is statistically significant only in one case.

<sup>24</sup> We consider these two variables because a high unemployment rate may increase the political costs of a fiscal adjustment and above average inflation may reduce the need of running a primary surplus because inflationary surprise may reduce the debt-to-GDP ratio.

with left-of-the-center governments, contrary to the findings of the literature analyzing the political determinants of short-term budget balances (Roubini and Sachs 1989a,b).<sup>25</sup> Note, however, that subsequent literature (e.g. Cusack 1999) suggests that such partisan differences have attenuated over time and are contingent on current economic conditions (including, plausibly, the debt situation considered here). In addition, it has been suggested (by *inter alia* Persson and Svensson, 1989) that right-wing governments with a preference for low public expenditure and therefore low taxes may prefer high debts to commit their left-wing successors to those policies; right-wing governments, behaving strategically, may therefore be less inclined to commit to sustained large primary surpluses.

In the univariate comparisons of Table 5, primary surplus episodes are more likely if the governmental party controls all houses of congress or parliament, but the difference is statistically significant for only one of our nine definitions. We find no statistically significant effect of democracy and electoral rules (first-past-the-post elections, proportional representation, and average district magnitude), nor any effect linked to the vote share of government parties or government fractionalization and polarization. Some of these variables, however, show signs of importance in multivariate comparisons (see below).

Figure 1 illustrates the dynamics of some of these variables during our 5-year-3-per-cent episodes. Whereas the solid lines plot median values for the surplus episodes, the dashed lines show the average value in the full sample. The first three panels suggest that surplus episodes typically occur in periods of average inflation, high growth and low unemployment, but that growth deteriorates during the episode (austerity bites). Growth begins declining in the third year of the surplus episode on average and falls to the sample mean by the end of the episode.

The bottom panel confirms that large and persistent surpluses succeed in reducing debt ratios on average. At the beginning of the episode, the debt-to-GDP ratio is about 10 percentage points above the sample average and by the end of the episode it is about 10 percentage points lower. However, most of the adjustment takes place at the beginning of the episode. After the third year, debt stabilizes and stops falling, consistent with the onset of slowing growth. This pattern is also evident in the panel focusing on the primary surplus itself, which shows the surplus

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<sup>25</sup> Although, again, the difference is statistically significant only in one of our nine definitions of a large and persistent primary surplus episode.



reaching a maximum in the second year of the episode and then declining. By the fifth year of the episode, the median surplus is below the 3 per cent threshold.

The final graph in the bottom panel confirms that episodes tend to happen with center-left governments. Large changes in the political orientation of the government are not typical during primary surplus episodes, consistent with the notion that stability matters.

Figure 1 shows that primary surplus episodes reduce debt ratios by about twenty percentage points. When we split the sample between episodes that start during periods of high and growing debt, versus other periods, we find that debt ratios drop more rapidly in the former group (Figure 2, left hand panel). In addition, in episodes where initial debt levels are high, debt ratios keep decreasing after the end of the episode. However, when the initial level of debt is low, debt ratios start increasing immediately after the end of the episodes, as if the pressure to maintain fiscal discipline in these instances is less intense.

We also split the sample between episodes in periods of high and low growth.<sup>26</sup> Prior to the episode, there is no difference between the debt ratios of the two groups (Figure 2, right hand panel). However, debt falls more rapidly during episodes with higher average GDP growth. High GDP growth both decreases the numerator (by allowing for higher surpluses) and, by definition, increases the denominator of the debt-to-GDP ratio. We also find that in high-growth episodes debt starts growing rapidly once again in the last two years of the episode. This is consistent with our previous finding that both GDP growth and primary surpluses start decreasing towards the end of the episode.

## 6.2 Multivariate analysis

We now analyze the relationship between large and persistent primary surpluses and other economic and political variables using probit regressions, where the dependent variable takes a value of one during surplus episodes and zero in control periods. The probit model is non-linear and its coefficients should be interpreted as the effect of an infinitesimal change in the explanatory variables on the likelihood of observing the episode. We concentrate on 3 per cent, 5-year episodes, but also consider other thresholds and period lengths.

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<sup>26</sup> We define as high growth all episodes that happen when average GDP growth is above 4.7 per cent (this is the median GDP growth during 3 per cent five-year episodes, Table 4) and vice versa.

## *Economic Variables*

Table 6, which focuses on economic variables, shows that GDP growth, the debt-to-GDP ratio, the current account balance, GDP per capita, and trade openness are significantly correlated with the likelihood of large and sustained primary surpluses. The point estimates (Table 6, column 1) suggest that a one percentage point increase in domestic growth is associated with a 7.5 percentage point increase in the likelihood of a large, persistent primary surplus (this compares with the unconditional likelihood of a primary surplus episode of the current magnitude of 15 per cent). And a one percentage point increase in the current account balance is associated with a 1.8 percentage point increase in the likelihood of a primary surplus episode.

A 10 percentage point increase in the debt-to-GDP ratio is associated with a 2.4 percentage point increase in the likelihood of a primary surplus episode (subject to the caveat about nonlinearities above). Raising the debt-to-GDP ratio from 50 to 90 per cent (from the average in our sample to the average in Europe today) increases the likelihood of a surplus episode by 11.5 percentage points.<sup>27</sup>

In columns 2 through 4 of Table 6 we drop the real exchange rate and debt-to-GDP ratio, two variables that limit the number of observations. The results do not change except that trade openness is sometimes insignificant.

Results are also similar if we limit our analysis to advanced economies, though a few changes are worth noting. For example, we obtain a larger effect of domestic growth and find that the current account balance is no longer statistically significant. Population growth is now statistically significant with a negative coefficient, suggesting that countries with unfavorable demographics feel pressure to run surpluses in anticipation of possible increases in pension obligations in the future (Table A8 in the online appendix).

As we noted above, the correlation between primary surplus episodes and GDP per capita is robust. It may be that GDP per capita is capturing the effect of institutional quality and that strong institutions are necessary to support long and persistent fiscal surpluses. Strong institutions may make for better tax compliance. They may make it easier for governments and societies to

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<sup>27</sup> In computing this change in probability we take into account the nonlinearity of the probit model. Had we assumed linearity, we would have found a slightly smaller effect (the increase in the likelihood of observing an episode would have been 9.6 percentage points).

make credible commitments to maintaining a policy, such as the policy of retiring public debt, over extended periods. Consistent with this presumption, if we augment our regressions with an index of institutional quality (the ICRG indicator of quality of government, QOG, obtained as the mean of the ICRG's control of corruption, law and order, and bureaucratic quality measures), GDP per capita is no longer statistically significant.<sup>28</sup> Opinions will differ as to whether Europe's crisis countries (our motivation), notwithstanding their high per capita GDP, should be regarded as countries where the relevant institutions are strong. Note, moreover, that the interpretation that stronger institutions support persistent primary surpluses required to accomplish fiscal adjustments is not fully satisfactory, insofar as countries with strong institutions should be less likely to need a fiscal adjustment in the first place.

The correlation between persistent surpluses and income per capita (as a proxy for the strength of institutions) may also reflect the fact that when a country with good institutions receives a positive wealth shock it saves the windfall and runs a series of large surpluses (for example, Norway, Singapore and New Zealand are three of our episodes of large and persistent primary surpluses). In this case, the adjustment is not associated with the need to restore debt sustainability. Rather it is simply a manifestation of optimal fiscal smoothing.

We can test this hypothesis by interacting the level of debt with income per capita and checking whether the link between GDP per capita and primary surplus episodes is stronger in countries with low levels of debt. Consistent with optimal fiscal smoothing, we find that the relationship between GDP per capita and the probability of a fiscal adjustment is statistically significant only when public debt is less than 80 per cent of GDP (see Figure A1 in the online appendix).<sup>29</sup>

### *Political and Institutional Variables*

In Table 7 we look more closely at the political and institutional correlates of surplus episodes. Column 1 shows that such episodes are less likely with right-wing governments and more likely

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<sup>28</sup> Another possible interpretation of the positive coefficient on GDP per capita is that it is picking up the different incentives of advanced countries and emerging markets to run primary surpluses, where emerging market debt was often held by foreigners, giving governments an incentive to default and restructure rather than run primary surpluses to retire the debt. But the fact that the direct measure of institutional strength dominates income per capita argues against this interpretation. Also note that we dropped default episodes from our sample.

<sup>29</sup> Our finding below that GDP per capita is not statistically significant during periods of high and growing debt is further consistent with this conclusion.

in proportional systems and when the governing party controls all houses of parliament or congress. In addition, there is a positive association between the likelihood of a persistent fiscal surplus on the one hand and government fractionalization or polarization on the other (where polarization is defined as the maximum difference between the chief executive's party's economic orientation and the values of the three largest government parties and the largest opposition party). These latter results are surprising, but we will see that they are not robust. In contrast, the results are robust to dropping democracy and district magnitude, variables that limit the sample size (column 2).

If we limit the sample to advanced economies (column 3), the effect of proportional representation is stronger than in the full sample. While Milesi-Ferretti, Perotti and Rostagno (2002) find that primary spending tends to be higher in countries with proportional systems, Atkinson, Rainwater and Smeeding (1995) have shown that countries with proportional representation typically exhibit higher average tax rates. They show as well that proportional systems are associated with more even distributions of post-tax incomes, making widespread sharing of the burden of debt reduction easier.

Our results suggest that there are country-periods in which the latter effect dominates. The knock on proportional systems is that they can give rise to party proliferation and government fractionalization, which makes sustaining policy more difficult. Given that our regressions control for government fractionalization, this observation does not necessary contradict theories suggesting that proportional representation is conducive to fractionalization, which gives rise to gridlock and wars of attrition.<sup>30</sup>

### *Synthesis*

We now consider economic and political variables together. In the full sample, the likelihood of an extended primary surplus episode is negatively associated with country size and positively associated with GDP growth, the debt-to-GDP ratio, and the current account balance. The significant political variables are the dummy for when the government controls all relevant houses of congress or parliament and the economic orientation of the government. As before, we

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<sup>30</sup> However, the result is robust to dropping fractionalization from the model, indicating that our findings are strongly consistent with the view that proportional systems encourage the construction of encompassing coalitions that makes compromise possible.

find that primary surplus episodes are less likely with right wing governments (column 1 of Table 8).

In the next four columns of Table 8 we drop the variables with missing observations that limit sample size (proportional representation, economic orientation of the government, and debt-to-GDP ratio). The results are unchanged except that we do not always find a statistically significant effect of the variable that indicates that the government controls all relevant houses.

If we estimate the models of Table 8 restricting the sample to advanced economies, we find similar results except that there is now a statistically significant and robust effect of proportional representation (Table A9 in the online appendix). The contrast with Table 8 suggests that any positive effect of proportional representation is limited mainly to the advanced economies (we provide more details on this result below).

We also check robustness by estimating the model of Table 8 all countries with income per capita greater than \$2000 and for which we have data (i.e., we go beyond our advanced and emerging economies sample – for a full list of episodes see Tables A5-A7 in the Appendix). The results show more evidence of a positive correlation between primary surplus episodes and GDP growth, the debt-to-GDP ratio, GDP per capita, and the economic orientation of the government.<sup>31</sup>

In the full sample, proportional representation is never statistically significant. This suggests that proportional representation works well in countries where institutions are strong, but does not make a difference (or may even have negative effects) in countries with poor institutions. We test this hypothesis by interacting proportional representation with income per capita or the quality of government index. Consistent with the above, the effect of proportional representation is only positive and statistically significant for countries with either high income per capita or high institutional quality, and it is negative (and statistically significant in the case of quality of government) in countries with low institutional quality or income per capita (Figure A2 in the online appendix).

We also ran regressions like those reported in Tables 6-8 using higher thresholds for the primary surplus and length of the episode. When we consider 5 year episodes with 4 per cent thresholds, we find that only GDP growth, GDP per capita and proportional representation remain significantly correlated with primary surplus episodes. However, the proportional

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<sup>31</sup> Full regression results are in Tables 11-13 of Eichengreen and Panizza (2014).

representation dummy is no longer significant when we consider 5 per cent five-year episodes. Looking at eight-year 3 and 4 per cent episodes, we obtain results which are similar to those of five-year 4 and 5 per cent episodes, but in this case we again find a significant effect of the “all-houses” dummy, suggesting that governments that have control of all relevant houses are more likely to be able to implement long-lasting fiscal consolidation programs.

No robust correlations are evident when we consider the drivers of eight-year five per cent episodes. This is not surprising, since there is only a small handful of such episodes and we cannot even estimate our probit model. The only variables correlated with ten-year 3 per cent episodes are GDP growth, GDP per capita, and the “all-houses-of-congress-or-parliament” dummy. Similarly, none of our economic or political variables is significantly correlated with ten-year 4 per cent episodes. As in the case of eight-year episodes, we cannot estimate the determinants of 10-year 5 per cent episodes because we only have three of such episodes.

Episodes with an average surplus which is either larger than 3 per cent and that lasts more than 8 years appear to be special and idiosyncratic in the sense that none of our economic and political variables helps to explain their incidence.

### *The role of high and growing debt*

Table 3 showed that large and persistent primary surplus episodes are more likely in the presence of high and growing debt.<sup>32</sup> To better understand which factors have differential effects when debt is high, we estimate a set of regressions in which we interact our explanatory variables with a dummy that takes value one in periods of high or rapidly growing debt as defined in Section 5. Using a probit specification we estimate:

$$\Pr(EP_i = 1|\mathbf{X}) = \Phi \left( (\mathbf{X}_i \times HGD_i)' \Psi + (\mathbf{X}_i \times (1 - HGD_i))' \Gamma + \delta HGD_i \right)$$

where  $\mathbf{X}$  is a matrix of explanatory variables and  $HGD$  is a dummy that takes value 1 in period of high or rapidly growing debt. In this set up,  $\Psi$  is a vector of parameters that measure the

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<sup>32</sup> The unconditional probability of observing a five-year 3 per cent episode is 15 per cent, the probability of observing such an episode conditional on being in a period of high and growing debt is 33 per cent. This is also consistent with our finding that the likelihood of observing an episode is positively correlated with the debt-to-GDP ratio.

correlation between the explanatory variables and the probability of observing an episode in periods of high or rapidly growing debt and  $\Gamma$  a vector of parameters that measure the correlation between the explanatory variables and the probability of observing an episode in tranquil periods ( $\delta$  measures the effect of high and growing debt).

We estimate the above equation for the benchmark model of column 2 of Table 8.<sup>33</sup> The first column of Table 9 reports the results for the correlation between explanatory variables and the probability of observing an episode in high and rapidly growing debt periods (the  $\Psi$  vector above). The second column then reports the correlation during tranquil periods (the  $\Gamma$  vector), while the third column reports the difference between the first two columns ( $\Gamma - \Psi$ ).

When we control for economic and political variables, we find that the high and growing debt dummy is no longer statistically significant (recall it was highly significant in Table 3, when we did not include controls).<sup>34</sup> This presumably reflects that, by construction, this variable is highly correlated with the debt-to-GDP ratio.

We find that GDP growth and the current account balance are statistically significant (and with similar coefficients) in both subsamples, but the debt-to-GDP ratio and economic orientation of the government are only significant in the high debt subsample and GDP per capita and openness are only significant in the tranquil periods subsample.

That the debt-to-GDP ratio is correlated with the likelihood of observing an episode in the high-debt subsample suggests that above a certain threshold countries with high debt face stronger pressure to adjust. The point estimates are similar to those in Table 6, indicating that a country like Italy with a debt to GDP ratio 40 percentage points higher than the high-debt mean of 88 per cent is 10 percentage points more likely to have a large and persistent primary surplus than the average high-debt country. Even in this extreme case, the likelihood to have a high and persistent primary surplus would remain below 35 per cent (and we are using our most generous definition of large and persistent: 3 per cent of GDP over a five-year period).

The fact that the presence of left wing governments is only statistically significant in periods of high and growing debt is consistent with theories suggesting that right-wing governments may strategically decide to accumulate high debt to tie the hands of future governments (Persson and Svensson, 1989). This finding is also consistent with “It takes Nixon

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<sup>33</sup> Table A11 in the online appendix also reports estimate for the benchmark equations of column 1 of Tables 6 and 7.

<sup>34</sup> In fact it is also significant if we only include political controls; again see Table A11 in the online appendix.

to go to China” theories (Rodrik, 1993, and Cukierman and Tommasi, 1998) suggesting that left-wing governments may have more leverage on public sector unions and pensioners. That GDP per capita is only significant in our low debt sample is consistent with our previous result that countries with strong institutions are more likely to react to positive wealth shock by saving the windfall and running large surpluses.

Trade openness is the only variable which switches sign across subsamples (and also the only variable for which the difference between the high and low debt subsample is statistically significant). In fact the openness coefficient is positive and almost statistically significant (the p-value is 0.11) in the high debt subsample and negative and significant in the low debt subsample. This is consistent with the idea that more open high debt countries are under stronger pressure to adjust, but that this mechanism is not at work in low debt countries.

In sum, the results discussed in the previous section continue to hold when we focus on high debt countries. The likelihood of a surplus is increasing in economic growth, in the current balance and in the debt-to-GDP ratio. However, the likelihood of running such a large surplus remains moderate (below 40 per cent) even for countries with very high levels of debt.

### *Causality*

To this point we eschewed claims of causality. To be sure, there is reason to think that slowly-moving country characteristics (such as the structure of the political system, relative country size, and the debt-to-GDP ratio at the start of an episode) are unlikely to be caused by the episode itself. But other variables, for example the current account balance and GDP growth, are problematic insofar as they are affected by the stance of fiscal policy.

We attempt to identify how GDP growth and the current balance affect the likelihood of a large and persistent primary surplus using a statistical technique that exploits the presence of heteroskedasticity in the regression residuals, using the technique developed by Rigobon (2003), as applied by Lewbel (2012).<sup>35</sup> Assume that we are interested in estimating the following model:

$$y_1 = a + bX + cy_2 + u_1$$

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<sup>35</sup> The discussion follows Arcand et al. (2012).



where  $X$  is a matrix of exogenous variables, but  $y_2 = a + bX + cy_1 + u_2$ . If to the standard assumptions that  $u_1$  and  $u_2$  are uncorrelated with the matrix of exogenous variables  $X$  and are also uncorrelated with each other (i.e.,  $E(Xu_1) = E(Xu_2) = cov(X, u_1u_2) = 0$ ) we add an heteroskedasticity assumption (i.e.,  $cov(X, u_2^2) \neq 0$ ), then we can use  $Xu_2$  as an instrument for  $y_2$ . Assuming that  $cov(X, u_1u_2) = 0$  guarantees that  $Xu_2$  is uncorrelated with  $u_1$  (the exogeneity condition for a valid instrument), while heteroskedasticity ( $cov(X, u_2^2) \neq 0$ ) guarantees that  $Xu_2$  is correlated with  $y_2$  (the relevance condition).

This instrument is valid only in the presence of heteroskedasticity. That is, as  $cov(X, u_2^2)$  approaches 0, the instrument will be weak. We can therefore use a weak instrument test to check the validity of our heteroskedasticity assumption.

If we assume that only GDP growth and the current account are endogenous, we can generate up to seven instruments for each endogenous variable. In practice, we will report results with only two instruments for each endogenous variable, although the results are robust to using richer instrument sets.

Column 1 of Table 10 estimates the same model in column 2 of Table 8 using a linear probability model without instruments, yielding similar results to the probit estimates. Column 2 of Table 10 then estimates the linear probability model using identification through heteroskedasticity (IH). The results are qualitatively similar to the OLS estimates. In the IH estimates, the statistically significant coefficients are larger in absolute value but not too different from what we found with OLS. We still find that primary surplus episodes are more likely in smaller countries, when public debt, the current account and economic growth are high, and when the government controls all houses of parliament.

The bottom panel of Table 10 reports the weak instrument and over identification tests. The Anderson LM statistic rejects the null of underidentification. The Wald statistic is below the 5 per cent Stock and Yogo critical value but above the 10 per cent critical value. This suggests that while our instruments are not terribly strong they are also not terribly weak. Finally, the Sargan test does not reject our over identifying restrictions.

We can use the same instrumenting strategy for a probit model. The results differ only slightly from what we found in the non-instrumented probit. The main difference is that we find a

statistically significant effect of GDP per capita, while the current account balance is no longer statistically significant.<sup>36</sup>

## 7 Exceptions

We have shown that large, persistent primary surpluses – especially surpluses as large and persistent as those required to reach the debt targets of the Fiscal Compact, which in some cases will require surpluses of 5 per cent of GDP or more for periods as long as ten years – are rare. That it is difficult to identify correlates of these episodes suggests that they are politically and economically idiosyncratic. In this section we therefore consider the episodes in question in more detail.

The three ten-year episodes of 5+ per cent primary surpluses in our sample are Belgium starting in 1995, Norway starting in 1999, and Singapore starting in 1990. We also have two additional cases of countries that have run surpluses of at least 4 per cent of GDP for as long as ten years: Ireland starting in 1991 and New Zealand starting in 1994.

Figures 3 to 7 show that these episodes happened when GDP growth and the unemployment rate were hovering around the country-specific long-run average and that the episodes were effective in reducing debt ratios in Belgium, Ireland, and New Zealand, but were associated with higher debt ratios in Norway and Singapore. This latter finding highlights the problem associated with working with gross debt figures in countries that have large sovereign wealth funds. In Belgium and Ireland, the end of the episode is preceded by a decline in GDP growth and in Singapore the end of the episode is preceded by an increase in unemployment.

This is a diverse collection of countries. All five, however, are small, open economies characterized by relatively low levels of income inequality. These observations provide hints about conditions that may motivate and sustain efforts to run large primary surpluses. Small, open economies are economically vulnerable to financial disruptions in the event that doubts develop about, *inter alia*, sovereign debt sustainability and access to international financial markets is curtailed (Katzenstein 1985, IMF 2013). The transactions costs of reaching a social consensus on difficult measures may be easier to reach in small polities. (Recall that economic

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<sup>36</sup> The fact that the IV estimates yield a larger coefficient for the debt-to-GDP ratio and a smaller coefficient for the primary balance is consistent with our priors about biases in the OLS estimations.

size and trade openness showed up in a manner consistent with these intuitions in the earlier univariate and multivariate comparisons.) It is further relevant in this connection that Belgium, Ireland, New Zealand and Norway all have proportional representation electoral systems (see the discussion above).<sup>37</sup> And where income inequality is less pronounced, the distributional consequences of difficult fiscal decisions may be less. Several studies (see e.g. Woo 2006) suggest that inequality exacerbates distributional conflict, which governments then seek to subdue by increasing spending, in turn making concerted consolidation more difficult. Finally, these countries have relatively strong and transparent budgeting institutions (the importance of which is emphasized by inter alia Lassen 2010).

Belgium is the outlier in this grouping: it has the largest and most (religiously and linguistically) diverse population of our five, although it has the second lowest Gini coefficient for incomes after taxes and transfers according to the United Nations (2014).<sup>38</sup> But there were also special circumstances: the Belgian case of surpluses starting in 1995 was associated with the convergence criteria for qualifying for monetary union. Those criteria included a debt-to-GDP ratio of no more than 60 per cent of GDP or rapidly converging to that level. Belgium in the mid-1990s had a debt ratio roughly twice that high. Thus, large primary surpluses were needed to signal the country's European partners that it was committed to bringing its debt ratio down toward Maastricht-compliant levels (the Maastricht criteria were interpreted to allow debts to exceed the 60 per cent threshold if they were approaching this "at a satisfactory pace"). Not qualifying as a founding member of the monetary union was regarded as a high cost for a country that had been a founding member of the EU itself and was closely linked to the economies of Germany and France, the two countries at the center of the process.<sup>39</sup> It is revealing that primary budget surpluses of this magnitude did not persist much after the country's entry into the Eurozone in 1999 had been accomplished.

This explanation for Belgium's large primary surpluses begs the question of why other European countries in its position, Italy for example, which also entered the 1990s with debts significantly in excess of the Maastricht criterion, and also valued euro-area membership, did not

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<sup>37</sup> For discussion of the Singapore case see below.

<sup>38</sup> Data for Singapore are not provided by the UN. We take these from Statistics Singapore (2013).

<sup>39</sup> As Jean-Luc Dehaene, prime minister at the time, put it in 1992, "[T]he consolidation of public finances is an indispensable element of the integration of Belgium in the European Monetary Union. Our country, that lies at the heart of Europe, and whose economy is orientated towards foreign countries and especially towards Europe, our country has to be in the first group of countries that will take part in the European Monetary Union before the end of this century." Quoted in Wenzelburger (2011).

behave similarly. IMF (2011) points to the role played by institutional reforms put in place by Belgium in the 1980s in anticipation of the need to sustain large primary surpluses. Belgium reformed its tax code in the mid-1980s (enlarging the tax base and lowering top marginal income tax rates) and rationalized its system of fiscal federalism at the end of the decade (constraining spending by regional governments). It empowered the Federal Planning Bureau to issue nonpartisan, independent forecasts of the budget in the mid-1990s, and restructured the High Finance Council (HFC) to give it a clear mandate to monitor and coordinate fiscal policies between the federal and regional levels (more on which below). Frankel (2011) points to the value of independent agencies or committees for the formulation of unbiased fiscal forecasts and the importance of those unbiased forecasts for good fiscal outcomes. They clearly played an important role in the Belgian case.

At the same time, there are some aspects of budgetary arrangements in Belgium that are hard to square with this institutional success story.<sup>40</sup> Belgium is characterized by large vertical fiscal imbalances, whereby the regions are responsible for more spending than they have power to tax and rely on transfers from the federal government. Previous studies have shown that such systems may give rise to deficit bias insofar as local governments spend now in an effort to extract more resources from the federal level (von Hagen and Eichengreen 1996).<sup>41</sup> The country did make progress in the course of the 1990s in addressing this imbalance, raising the revenues of the regions and communes from their own sources from 14 per cent to 20 per cent of the total (IMF 2003).<sup>42</sup> It imposed restrictions of borrowing by the regions (subjecting the issuance of public debt to the prior approval of the federal Minister of Finance), which international experience suggests is important for limiting the moral hazard associated with vertical

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<sup>40</sup> It will be important in what follows to avoid the temptation to automatically impute “sound” fiscal institutions conducive to good outcomes to the exceptional cases with sustained good outcomes that are the subject of this section.

<sup>41</sup> Inman (2008) refers to the general tendency for subcentral expenditures to be higher when financed with grants than own resources as the “flypaper effect.”

<sup>42</sup> There was then a 2001 amendment (The Lambermont Agreement) to the Special Financing Act of 1989, under which additional fiscal powers had been devolved to the regions that stabilized tax transfers to the region, arguably rendering regional tax resources more predictable and simplifying budgeting. The agreement also devolved additional tax resources to the regions, reducing further the vertical imbalances. Details are in Karpowicz (2012).

imbalances.<sup>43</sup> And learning by doing by the HFC in monitoring and coordinating regional and federal fiscal policies undoubtedly helped as well.<sup>44</sup>

Be this as it may, it is hard to identify similar institutional reforms in Italy. Thus, the timing of the Belgian exception (including the fact that the large primary surpluses disappear after the turn of the century while institutional reforms do not) points to the importance of exceptional circumstances (like the Maastricht deadline) and strong institutions *in combination* as the explanation for the exception.<sup>45</sup>

Norway's primary surpluses are associated with the peak in North Sea oil production and the operation of the country's petroleum fund. Production in the Norwegian sector of the North Sea nearly doubled in the 1980s and remained at high levels before declining after 1993. The Government Petroleum Fund (previously the Petroleum Fund and now part of the Government Pension Fund) was created to husband these revenues from peak oil for future generations. Budget surpluses associated with oil revenues were paid into the fund starting in the mid-1990s.

As in Belgium, the practice was encouraged by the development of strong fiscal institutions. Budget documents refer to the non-oil deficit, making transparent the dependence of revenues on natural resources and encouraging a long-term approach to budgeting. Starting in 2001, the government adopted guidelines for fiscal policy stating that the cyclically-adjusted non-oil deficit could not exceed 4 per cent of total financial assets in the Government Pension Fund, reflecting the assumption that the long run return on the assets of the pension fund is 4 per cent.<sup>46</sup> Forecasts of the structural non-oil deficit are presented to parliament and the public in budget documents published twice a year, enhancing transparency. Multi-year planning provides a further check on the consistency of the process. As we write, Norway's general government

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<sup>43</sup> Again, evidence to this effect is presented in von Hagen and Eichengreen (1996). In addition, the federal government was empowered to restrict borrowing by a region for up to two years if it was considered a threat to the achievement of important economic goals by the HCF.

<sup>44</sup> In addition, federal/regional fiscal relations were also addressed under the terms of the Stability Programs the country negotiated with the EU starting, perhaps coincidentally, in 1994.

<sup>45</sup> A more positive view is that Italy has now implemented a different type of reforms which will yield larger surpluses in the future. Specifically, Italy implemented drastic health care and pension reforms which are expected to greatly reduce future public expenditure (see Table 12a of IMF 2013a, for cross-country comparisons). Thanks to these reforms, Italy's infinite-horizon fiscal gap is the lowest in the developed world (in fact, Italy has an infinite-horizon fiscal surplus). This has led Kotlikoff (2015) to conclude that Italy is the most fiscally responsible advanced economy in the world. There is, however, substantial uncertainty around the figures that are necessary to calculate the infinite-horizon fiscal gap and it is possible that there will pressure to reverse pension reforms when a new generation of Italians will realize that their pensions are not as generous as those of their parents.

<sup>46</sup> See Jafarov and Leigh (2007). Net interest payments and unemployment benefits, neither of which are large in the Norwegian case, are excluded from the 4 per cent limit.

primary balance is still in substantial surplus, but it is declining as a share of GDP (along with oil revenues).

All this begs the question of how Norway was able to come up with these constructive solutions to its problems. The country had experienced a boom-bust cycle during a previous oil-price boom in the 1970s and then a banking crisis and learned from hard experience (Steigum and Thogersen 2014). In addition, Norway, like a number of the other countries that represent exceptions, has an exceptionally low level of income inequality. As a result, potential distributional aspects of salting away such a large share of current revenues may have less salience than elsewhere.

Singapore has run budget surpluses as a way of building up a reserve to insure against volatility. The economy is small and lacking in natural resources. Its status as an entrepot center has come under challenge from Hong Kong and now Mainland China, and the financial and pharmaceutical sectors to which it has turned are volatile. It is exposed geopolitically, and its relations with its Malaysian neighbor have not always been the best.<sup>47</sup>

All this has caused the government to prioritize accumulating surpluses in its sovereign wealth funds, the Government Investment Corporation, which invests globally, and Temasek Holdings, whose holdings are mainly local and regional. In addition, since 1992 a small portion of the surplus has also been invested in the Edusave Endowment Fund and the Medical Endowment Fund, interest earnings from which were used to finance the future growth of social expenditures.<sup>48</sup>

The structure of governance in Singapore, with its strong executive, strong bureaucracy, and strong fiscal rules, enables the government to commit to persistent surpluses (Blondal 2006). The government formulates a multi-year fiscal plan. It has consistently issued conservative growth forecasts that understate revenues, while coming under relatively little pressure to correct those forecasts and increase spending accordingly (Abeyasinghe and Jayawickrama 2008). Insofar as the institutions and circumstances of Singapore are special, it is not clear to what extent its ability to run large, persistent surpluses carries over to other countries.

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<sup>47</sup> In the words of Shanmugaratnam (2008), "...A country's reserves are a key asset in a globalised and uncertain world. But they are especially valuable for a country completely lacking in natural resources, extremely open to the world, and very small in size in a region of large players. Our reserves are our only resource besides our people, and a major strategic advantage for Singapore."

<sup>48</sup> As Bercuson (1995) explains, allocations to the funds are not classified as current expenditures but as allocations of the budget surplus.

Like Norway, Singapore also put in place a fiscal target, although unlike Norway it targeted total expenditure rather than the budget balance. As specified, the government committed to holding total spending net of debt service, investment expense and net lending to 20 per cent of GDP; this can be thought of as a way of attempting to control social spending, pressure for which can be considerable. Finally Singapore, like Norway, is characterized by a relatively even distribution of income, helping to subdue distributional conflicts that can give rise to chronic deficits.

The Irish and New Zealand cases, where governments ran surpluses of 4 per cent for a decade, are similarly worth considering for their exceptional nature, although it is important to emphasize that surpluses of “merely” 4 per cent will not be enough for the most heavily indebted Eurozone countries to work down their debts to targeted levels.

Ireland’s experience in the 1990s is widely pointed to by observers who insist that Eurozone countries can escape their debt dilemma by running large, persistent primary surpluses. Ireland’s move to large primary surpluses was taken in response to an incipient debt crisis: after a period of deficits as high as 8 per cent of GDP, general government debt as a share of GDP reached 110 per cent in 1987. A new government then slashed public spending by 7 per cent of GDP, abolishing some long-standing government agencies, and offered a one-time tax amnesty to delinquents. The result was faster economic growth that then led to self-reinforcing favorable debt dynamics, as revenue growth accelerated and the debt-to-GDP ratio declined even more rapidly with the accelerating growth of its denominator. This is a classic case of expansionary fiscal consolidation (Giavazzi and Pagano 1990).

But it is important, equally, to emphasize that Ireland’s success in running large primary surpluses was supported by special circumstances. The country was able to devalue its currency – an option that is not available to individual Eurozone countries – enabling it sustain growth in the face of large public-spending cuts by crowding in exports. As a small economy, Ireland was in a favorable position to negotiate a national pact (known as the Program for National Recovery) that created confidence that the burden of fiscal austerity would be widely and fairly shared, a perception that helped those surpluses to be sustained. (Indeed, it is striking that every exception considered in this section is a small open economy.) Global growth was strong in the decade of the 1990s (the role of this facilitating condition is emphasized by Hagemann 2013). Ireland, like Belgium (see above), was under special pressure to reduce its debt-to-GDP ratio in order to meet

the Maastricht criteria and qualify for monetary union in 1999. Finally, the country's multinational-friendly tax regime encouraged foreign corporations to book their profits in Ireland, which augmented revenues.

Whether other Eurozone countries – and, indeed, Ireland itself – will be able to pursue a similar strategy in the future is dubious. Acknowledging this fact, Ireland is now moving to strengthen its fiscal institutions, implementing multi-year fiscal planning (including specifying a medium-term budgetary objective in line with EU procedures), and adopting rules for the cyclically adjusted budget balance, expenditure growth, and the correction of previous deviations. Thus, while Irish experience in the 1990s has some general lessons for other countries, it also points to special circumstances that are likely to prevent its experience from being generalized.

The case of New Zealand has also been widely analyzed. New Zealand experienced chronic instability in the first half of the 1980s; the budget deficit was 9 per cent of GDP in 1984, while the debt ratio was high and rising. Somewhat in the manner of Singapore, the country's small size and highly open economy heightened the perceived urgency of correcting the resulting problems. New Zealand therefore adopted far-reaching and, in some sense, unprecedented institutional reforms. At the aggregate level, Public Finance Act of 1989 required government agencies to follow international accounting standards and otherwise improved the reliability of the reported financial information. The Fiscal Responsibility Act of 1994 then further limited the scope for off-budget spending and creative accounting. It required the government to provide Parliament with a statement of its long-term fiscal objectives, a forecast of budget outcomes, and a statement of intentions explaining whether its budget forecasts were consistent with its budget objectives. It required prompt release of aggregate financial statements and regular auditing, using internationally accepted accounting practices. Transparency thus applied pressure for steps to correct fiscal targets that had gone astray sooner rather than later.

At the level of individual departments, the government set up a management framework that imposed strong separation between the role of ministers (political appointees who specified departmental objectives) and departmental CEOs (civil servants with leeway to choose tactics appropriate for delivering outputs). This separation was sustained by separating governmental departments into narrowly-focused policy ministries and service-delivery agencies, and by adopting procedures that emphasized transparency, employing private-sector financial reporting



and accounting rules, and by imposing accountability on technocratic decision makers (Mulgan 2004).

As a result of these initiatives, New Zealand was able to cut public spending by more than 7 per cent of GDP. Revenues were augmented by privatization receipts, as political opposition to privatization of public services was successfully overcome. The cost of delivering remaining public services was limited by comprehensive deregulation that subjected public providers to private competition. The upshot was more than a decade of 4+ per cent primary surpluses, allowing the country to halve its debt ratio from 71 per cent of GDP in 1995 to 30 per cent in 2010.

An extensive literature discusses whether New Zealand-style reforms can be readily translated to other countries. Its conclusions are mixed.<sup>49</sup> The consensus, insofar as there is one, is that countries with exceptionally strong rule of law, low levels of corruption and strong institutions and markets are in the best position to emulate its example.

The New Zealand case suggests that 4+ per cent surpluses for a decade are not inconceivable; they are most likely for relatively small, open economies with strong institutional capacity and an appetite for radical reform. That said, it is worth observing that it took full ten years from the implementation of the first reforms, in 1984, to the emergence of 4+ per cent budget surpluses in New Zealand a decade later.<sup>50</sup>

## **8 Conclusion**

For European governments to reduce their debt-to-GDP ratios to 60 per cent over 20 years, as they are committed to doing under the terms of their Fiscal Compact, they will have to run large primary budget surpluses, in many cases in excess of 5 per cent of GDP, for periods of 10 years and longer. Such behavior, while not unknown, is exceptional. Even applying more moderate criteria (primary budget surpluses of 3 per cent for at least 5 years), such behavior is unusual. Sustained surplus episodes are more likely when growth is strong, the current account of the balance of payments is in surplus (savings rates are high), the debt-to-GDP ratio is high (heightening the urgency of fiscal adjustment), and the governing party controls all houses of

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<sup>49</sup> See Schick (1998) for a skeptical view and Bale and Dale (1998) for a balanced assessment.

<sup>50</sup> On the chronology, see Rudd and Roper (1997).

parliament or congress (its ability to push through measures of fiscal consolidation is strong). Small countries and countries relatively open to trade have a greater tendency to run large, persistent surpluses, other things equal. Historically, left wing governments have been more likely to run large, persistent primary surpluses. In advanced countries, proportional representation electoral systems that give rise to encompassing coalitions are associated with surplus episodes.

On balance, this analysis does not leave us optimistic that Europe's crisis countries will be able to run primary budget surpluses as large and persistent as officially projected. Their growth prospects are not favorable. Many lack the strong fiscal and political institutions possessed by the handful of countries that have succeeded in running such large, persistent surpluses in the past.

The question is what to do instead. It is always possible to imagine a higher growth rate (or, more precisely, a smaller interest rate-growth rate differential) than the IMF uses in its scenario building exercises, though that is apt to be wishful thinking. More realistically, countries can accept the fact of larger public debts and learn to live with them. Recent research has discredited any belief that there is a critical, threshold level of debt above which growth begins to suffer. That said, there is evidence, as described in Section 2, that heavier debts may distort public expenditure and can be a source of financial fragility. Invoking this evidence, many will argue that living with debts far in excess of the 60 per cent target of the Fiscal Compact for an indefinite period is likely to be costly.

The alternative is to restructure existing public debts, imposing haircuts on bondholders sufficient to bring debt ratios down to more manageable levels. Critics of this approach will argue that debt restructuring that entails significant haircuts will damage the creditworthiness and future market access of the sovereign. They warn of destabilizing impacts on banks, firms and others holding those sovereign bonds. They point to capricious distributional consequences, both within and across countries, given how sovereign bonds are unevenly distributed and held.<sup>51</sup>

Determining which of these two approaches is preferable is beyond the scope of the present paper. What is clear is that a scenario in which European officials imagine that debt ratios will be brought down to 60 per cent over 20 years is implausible. A Fiscal Compact and official

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<sup>51</sup> For a discussion of the law and economics of sovereign default, see Panizza, Sturzenegger, and Zettelmeyer (2008).

strategy incorporating this dubious assumption, and an unwillingness to discuss more realistic alternatives, do no one any credit.

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**Table 1: Primary balances necessary to achieve debt targets by 2030 and underlying assumptions**

Country	IMF Forecasts <sup>a</sup>			Debt Target in 2030 <sup>b</sup>	Required cyclically adjusted primary balance (2020-30) <sup>b</sup>
	Real GDP Growth (2019)	Inflation (2019)	Interest rate-growth differential (2013-19 average)		
Belgium	1.6%	1.2%	1.0%	60%	3.8%
France	1.9%	1.8%	-0.1%	60%	2.9%
Greece	3.3%	1.3%	1.0%	60%	7.2%
Ireland	2.7%	1.8%	0.4%	60%	5.6%
Italy	1.2%	1.5%	2.4%	60%	6.6%
Japan <sup>c</sup>	1.1%	2.0%	-2.0%	200%	7.3%
Portugal	1.8%	1.5%	1.2%	60%	5.9%
Spain	1.6%	1.5%	2.2%	60%	4.0%
United Kingdom	2.5%	2.0%	-0.3%	60%	4.2%
United States	2.9%	2.1%	-1.8%	60%	4.1%
Av. for AEs.					3.6%
Av. for G20 AEs					3.8%
Av. for EMs					0.5%

Sources: <sup>a</sup>IMF (2013) Table 12a and WEO database (April 2013) 13b; <sup>b</sup> IMF (2013) Tables 13a and 13b. <sup>c</sup> The gross debt target for Japan corresponds to a net debt of 80% of GDP.

**Table 2: Nonoverlapping primary surplus episodes**

3 % of GDP			4% of GDP			5% of GDP		
5-yr	8-yr	10-yr	5-yr	8-yr	10-yr	5-yr	8-yr	10-yr
BEL1998*	BEL1997*	BEL1995*	BEL1998*	BEL1997*	BEL1995*	BEL1998*	BEL1997*	BEL1995*
BRA2004*	CAN1997*	CAN1996*	CAN1997*	CAN1997*	IRL1991*	CAN1997*	NOR2001	NOR1999
CAN1997*	CHL1991	DNK1984	CHL2004	DNK1984*	NOR1999	CHL2004	SGP1990*	SGP1990*
CHL1991	CHL2001	DNK1999	DNK1985*	DNK2000	NZL1994	DNK1985*	SGP2005	
CHL2004	DNK1984*	FIN1999	DNK2004	FIN2000*	SGP1990*	IRL1996*		
DNK1985	DNK2000	IRL1991*	FIN1998*	IRL1993*		NOR1981		
DNK1997*	FIN2000*	ITA1993*	IRL1988*	ITA1995*		NOR2004		
DNK2004	GRC1994*	KOR1993	IRL1996*	NOR2001		NZL1993		
FIN1976	IRL1993*	NOR1999	ITA1996*	NZL1993		PAN1994*		
FIN1998*	ITA1995*	NZL1994	NOR1981	SGP1990*		SGP1991*		
GRC1996*	KOR1995	SGP1990*	NOR2004	SGP2005		SGP2004		
HKG2007	NOR2001	TUR1999*	NZL1993	TUR1999*		SWE1986*		
IRL1988*	NZL1993		NZL2002					
IRL1996*	SGP1990*		PAN1994*					
ISL2003	SGP2005		SGP1991*					
ISR1986*	SWE1984*		SGP2004					
ITA1996*	TUR1999*		SWE1986*					
KOR1988			TUR2002*					
KOR1999								
LUX1997								
MEX1991								
NLD1996*								
NOR1981								
NOR2004								
NZL1993								
NZL2002								
PAN1994*								
PAN2005*								
PER2004								
PHL2004*								
SGP1991*								
SGP2004								
SWE1986*								
SWE1997*								
THA1991								
TUR2002*								
<b>A. Number of episodes</b>								
36	17	12	18	12	5	12	4	3
<b>B. Total number of periods in the sample</b>								
235	185	113	235	185	113	235	185	113
<b>C. Total number of periods of high or rapidly growing debt</b>								
77	26	26	77	26	26	77	26	26
<b>D. Number of episodes that overlap with periods of high or rapidly growing debt</b>								
18	10	6	11	8	3	7	2	2
<b>E. Share of episodes that overlap with periods of high or rapidly growing debt (D/A)</b>								
0.5	0.59	.05	0.61	0.67	0.60	0.58	0.50	0.67
<b>F. Share of periods of high or rapidly growing debt that overlap with episodes (D/C)</b>								
0.23	0.39	0.23	0.14	0.31	0.12	0.09	0.08	0.08

The year refers to the beginning of the episode (for instance, in column 1, BEL1998 indicates an episode that starts in 1998 and ends in 2002, and in column 3 BEL1995 indicates an episode that starts in 1995 and ends in 2005 \* Denotes episodes which follow periods of high or rapidly growing debt. Tables 3-5 in Eichengreen and Panizza (2014) also report average values for the primary surplus in each episode.

**Table 3: Probability of observing an episode and a period of high or growing public debt**

Episode group	Probability of observing an episode		Probability of observing a period of high or growing public debt	
	Unconditional	Conditional on periods of high or growing public debt	Unconditional	Conditional on episodes
5 years 3%	15.3%	23.4%**	32.8%	50.0%***
5 years 4%	7.7%	14.3%***	32.8%	61.1%***
5 years 5%	5.1%	9.1%**	32.8%	58.3%***
8 years 3%	9.2%	38.5%***	14.1%	58.8%***
8 years 4%	6.5%	30.8%***	14.1%	66.7%***
8 years 5%	2.2%	7.7%	14.1%	50.0%
10 years 3%	10.6%	23.1%**	23.0%	50.0%***
10 years 4%	4.4%	11.5%	23.0%	60.0%*
10 years 5%	2.7%	7.7%	23.0%	66.7%

The asterisks indicate whether the differences between the conditional and unconditional probabilities are statistically significant (significance levels are obtained by running probit regressions) \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 4: Economic variables during large and persistent primary surplus episodes**

	Five-year episodes			Eight-year episodes			Ten-year episodes		
	3%	4%	5%	3%	4%	5%	3%	4%	5%
<b>GDP Growth (%)</b>									
Control	2.74	2.99	2.98	3.04	3.11	3.05	2.90	2.92	2.95
Episode	4.78	4.33	4.64	3.99	3.75	4.20	3.60	4.42	3.79
Diff.	-2.03	-1.34	-1.66	-0.95	-0.64	-1.15	-0.70	-1.51	-0.83
p-value	<b>0.00</b>	<b>0.02</b>	<b>0.01</b>	<b>0.05</b>	0.27	0.29	0.19	<b>0.07</b>	0.43
<b>GDP per capita (USD)</b>									
Control	23'239	22'701	23'015	22'653	21'957	22'936	23'265	24'054	24'222
Episode	24'645	28'774	29'442	26'926	32'534	39'328	30'765	34'077	38'959
Diff.	-1'405	-6'073	-6'427	-4'273	-10'577	-16'392	-7'500	-10'023	-14'737
p-value	0.60	<b>0.10</b>	0.15	0.28	<b>0.02</b>	<b>0.05</b>	0.11	0.15	<b>0.09</b>
<b>World GDP Growth (%)</b>									
Control	2.74	2.75	2.76	2.79	2.79	2.79	2.79	2.80	2.81
Episode	3.05	3.13	3.12	3.04	3.07	2.97	2.85	2.89	2.92
Diff.	-0.31	-0.39	-0.36	-0.26	-0.28	-0.06	-0.18	-0.09	-0.11
p-value	<b>0.01</b>	<b>0.02</b>	<b>0.06</b>	<b>0.00</b>	<b>0.00</b>	0.70	<b>0.00</b>	0.27	0.29
<b>Total ln(GDP) (size of economy)</b>									
Control	5.70	5.63	5.61	5.49	5.50	5.49	5.59	5.60	5.53
Episode	5.04	5.00	4.82	5.35	5.36	5.14	5.47	4.79	5.14
Diff.	0.65	0.63	0.79	0.14	0.13	0.35	0.12	0.81	0.39
p-value	<b>0.03</b>	0.11	<b>0.10</b>	0.75	0.79	0.70	0.81	0.26	0.67
<b>Trade openness</b>									
Control	72.37	76.74	76.56	72.08	70.88	71.49	79.61	78.14	78.97
Episode	111.09	119.96	143.73	92.06	105.84	181.68	101.50	148.47	180.74
Diff.	-38.72	-43.22	-67.17	-19.98	-34.96	-110.20	-21.89	-70.33	-101.77
p-value	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	0.12	<b>0.02</b>	<b>0.00</b>	0.28	<b>0.02</b>	<b>0.01</b>
<b>Current account balance (% of GDP)</b>									
Control	-1.40	-1.19	-1.13	-1.44	-1.44	-1.30	-0.98	-0.80	-0.87
Episode	1.34	2.82	3.97	1.83	3.17	10.46	3.10	5.94	10.70
Diff.	-2.74	-4.01	-5.10	-3.27	-4.61	-11.75	-4.09	-6.74	-11.57
p-value	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.01</b>	<b>0.00</b>	<b>0.00</b>	<b>0.01</b>	<b>0.00</b>	<b>0.00</b>
<b>Debt over GDP (%)</b>									
Control	52.81	51.91	52.43	46.88	47.51	50.26	51.97	52.29	52.95
Episode	53.96	62.10	61.82	58.17	66.84	73.94	62.68	66.71	75.09
Diff.	-1.15	-10.20	-9.39	-11.29	-19.33	-23.68	-10.71	-14.42	-22.14
p-value	0.85	0.21	0.34	0.14	<b>0.04</b>	0.18	0.26	0.31	0.23
<b>RER (% deviation from average)</b>									
Control	1.39	1.60	1.60	1.32	1.29	1.31	1.50	1.56	1.58
Episode	1.56	1.84	1.82	2.00	1.71	1.24	2.03	1.90	1.25
Diff.	-0.18	-0.25	-0.22	-0.67	-0.42	0.07	-0.53	-0.33	0.33
p-value	0.66	0.84	0.88	<b>0.09</b>	0.59	0.96	0.63	0.83	0.86
<b>Unemployment rate (%)</b>									
Control	7.18	7.01	7.13	6.78	6.75	7.01	6.76	6.80	6.86
Episode	6.51	7.19	5.98	6.95	7.15	4.50	7.00	6.47	4.64
Diff.	0.67	-0.18	1.14	-0.17	-0.40	2.51	-0.24	0.32	2.22
p-value	0.38	0.86	0.35	0.86	0.73	0.25	0.82	0.84	0.28
<b>Inflation (%)</b>									
Control	5.66	5.57	5.59	5.82	5.86	5.56	5.53	5.35	5.30
Episode	5.29	4.35	4.14	5.29	4.82	3.07	4.47	2.92	3.09
Diff.	0.37	1.22	1.44	0.53	1.03	2.49	1.06	2.43	2.21
p-value	0.72	0.36	0.39	0.71	0.53	0.38	0.53	0.30	0.46
<b>Credit to the private sector (% of GDP)</b>									
Control	88.47	86.34	86.17	85.34	82.56	82.49	91.14	89.80	88.68
Episode	80.13	80.67	80.81	78.27	82.48	79.64	81.07	82.07	80.02
Diff.	8.35	5.67	5.36	7.07	0.09	2.84	10.07	7.73	8.65
p-value	0.37	0.65	0.73	0.58	1.00	0.92	0.50	0.73	0.76
<b>Population growth (%)</b>									
Control	0.71	0.77	0.76	0.76	0.76	0.74	0.81	0.78	0.78
Episode	1.05	0.99	1.20	0.86	0.84	1.44	0.83	1.21	1.35
Diff.	-0.34	-0.21	-0.44	-0.10	-0.08	-0.70	-0.01	-0.43	-0.57
p-value	<b>0.02</b>	0.25	<b>0.05</b>	0.63	0.73	0.10	0.95	0.19	0.17
<b>Government balance (% of GDP)</b>									
Control	-3.58	-3.16	-3.09	-2.93	-2.86	-2.76	-2.97	-2.73	-2.68
Episode	1.95	3.31	5.01	1.32	1.67	8.35	1.46	4.67	7.35
Diff.	-5.53	-6.47	-8.10	-4.26	-4.53	-11.10	-4.43	-7.40	-10.02
p-value	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>

**Table 5: Political variables during large and persistent primary surplus episodes**

	Five-year episodes			Eight-year episodes			Ten-year episodes		
	3%	4%	5%	3%	4%	5%	3%	4%	5%
Electoral System (Parliamentary=1; Presidential=0)									
Control	0.81	0.77	0.78	0.81	0.78	0.80	0.77	0.79	0.80
Episode	0.71	0.89	0.83	0.81	1.00	1.00	0.92	1.00	1.00
Diff.	0.10	-0.12	-0.05	-0.01	-0.22	-0.20	-0.14	-0.21	-0.20
p-value	0.19	0.22	0.65	0.95	<b>0.07</b>	0.39	0.25	0.24	0.38
Economic Ideology of the Government (Right=1; Left=3; Center=2)									
Control	1.87	1.91	1.93	1.91	1.94	1.93	1.90	1.91	1.91
Episode	2.13	2.00	1.82	2.08	1.76	1.38	1.84	1.53	1.30
Diff.	-0.26	-0.09	0.11	-0.17	0.17	0.55	0.06	0.39	0.61
p-value	<b>0.09</b>	0.67	0.68	0.40	0.47	0.28	0.77	0.26	0.20
Does party of executive control all relevant houses? (1=yes)									
Control	0.22	0.22	0.22	0.20	0.23	0.23	0.21	0.22	0.22
Episode	0.27	0.36	0.38	0.38	0.35	0.33	0.33	0.26	0.33
Diff.	-0.05	-0.14	-0.17	-0.19	-0.13	-0.10	-0.12	-0.04	-0.11
p-value	0.53	0.15	0.16	<b>0.07</b>	0.30	0.66	0.30	0.84	0.62
Plurality (1= first past the post rule)									
Control	0.54	0.54	0.52	0.54	0.56	0.55	0.59	0.56	0.55
Episode	0.49	0.44	0.50	0.50	0.36	0.33	0.41	0.40	0.33
Diff.	0.05	0.09	0.02	0.04	0.20	0.21	0.18	0.16	0.22
p-value	0.56	0.44	0.87	0.77	0.20	0.47	0.23	0.48	0.45
Proportional representation (1=yes)									
Control	0.80	0.82	0.83	0.81	0.81	0.81	0.79	0.80	0.80
Episode	0.83	0.78	0.67	0.75	0.82	0.67	0.83	0.80	0.67
Diff.	-0.03	0.04	0.17	0.06	0.00	0.15	-0.05	0.00	0.13
p-value	0.71	0.64	0.14	0.55	0.97	0.53	0.72	0.98	0.57
Average District Magnitude, House									
Control	38.94	35.42	33.98	43.37	39.14	35.39	34.81	31.49	30.34
Episode	12.14	8.73	7.99	8.17	8.99	8.34	8.96	10.87	8.49
Diff.	26.80	26.69	25.98	35.20	30.15	27.05	25.86	20.62	21.85
p-value	0.26	0.38	0.47	0.34	0.47	0.72	0.49	0.70	0.75
Average District Magnitude, Senate									
Control	333.44	319.34	323.17	311.30	289.42	324.03	313.54	322.29	335.34
Episode	327.52	446.99	447.99	299.50	447.75	13.00	447.75	450.50	13.00
Diff.	5.91	-127.66	-124.82	11.80	-158.33	311.03	-134.21	-128.21	322.34
p-value	0.96	0.47	0.56	0.95	0.46	NA	0.54	0.68	NA
Vote share of Government Parties									
Control	42.60	42.57	42.89	44.08	43.90	44.11	43.05	43.26	43.52
Episode	44.34	45.91	45.28	45.48	46.95	52.58	46.42	49.46	51.42
Diff.	-1.74	-3.34	-2.39	-1.40	-3.05	-8.46	-3.38	-6.20	-7.91
p-value	0.59	0.44	0.64	0.73	0.50	0.31	0.47	0.37	0.36
Herfindahl Index Government									
Control	0.71	0.70	0.69	0.70	0.71	0.71	0.71	0.71	0.71
Episode	0.69	0.75	0.75	0.69	0.66	0.57	0.66	0.63	0.57
Diff.	0.02	-0.05	-0.05	0.01	0.05	0.14	0.05	0.08	0.14
p-value	0.65	0.40	0.50	0.93	0.55	0.36	0.55	0.50	0.35
Government Fractionalization									
Control	0.30	0.31	0.31	0.30	0.30	0.29	0.30	0.30	0.29
Episode	0.32	0.25	0.26	0.31	0.35	0.43	0.34	0.37	0.43
Diff.	-0.02	0.05	0.05	-0.01	-0.05	-0.14	-0.05	-0.08	-0.14
p-value	0.65	0.40	0.50	0.93	0.55	0.35	0.55	0.50	0.35
Polarization between the executive party and the four principal parties of the legislature									
Control	1.02	1.02	1.05	1.04	1.03	1.05	0.98	1.01	1.04
Episode	1.07	1.16	1.05	1.17	1.26	1.33	1.27	1.42	1.33
Diff.	-0.05	-0.14	0.00	-0.13	-0.23	-0.29	-0.29	-0.41	-0.29
p-value	0.73	0.50	0.99	0.54	0.36	0.54	0.22	0.25	0.52
Democracy Index									
Control	9.26	9.18	9.20	9.23	9.19	9.27	9.20	9.23	9.27
Episode	8.84	9.06	8.84	9.14	9.11	7.91	9.06	8.72	7.89
Diff.	0.42	0.12	0.36	0.10	0.08	1.37	0.14	0.51	1.38
p-value	0.17	0.77	0.44	0.82	0.87	0.13	0.77	0.48	0.12

**Table 6: Primary surpluses and Economic Variables**

	(1)	(2)	(3)	(4)
Pop growth	0.0451 (0.0523)	0.0126 (0.0369)	0.0882* (0.0476)	0.0431 (0.0325)
GDP Growth	0.0752*** (0.0222)	0.0670*** (0.0164)	0.0678*** (0.0218)	0.0590*** (0.0155)
Ln(GDP)	-0.0148 (0.0231)	-0.0266 (0.0187)	-0.0104 (0.0237)	-0.0224 (0.0191)
Log(infl)	0.0610 (0.0406)	0.0351 (0.0285)	0.0462 (0.0356)	0.0201 (0.0249)
Debt-to-GDP	0.00246** (0.00114)	0.00229** (0.000890)		
Credit to priv. sect.	-0.000463 (0.000922)	-0.000422 (0.000754)	-0.000702 (0.000941)	-0.000697 (0.000776)
Current acc. bal.	0.0178** (0.00765)	0.0143** (0.00577)	0.0183** (0.00767)	0.0141** (0.00573)
Log(GDP PC)	0.106** (0.0419)	0.0690** (0.0317)	0.119*** (0.0437)	0.0751** (0.0324)
Unemployment	-0.00263 (0.00802)	-0.00229 (0.00649)	0.00271 (0.00819)	0.00200 (0.00653)
World GDP growth	3.813 (4.667)	1.429 (3.560)	6.241 (4.631)	3.462 (3.571)
RER	0.0121 (0.0131)		0.0101 (0.0134)	
OPENNES	0.00156** (0.000719)	0.000240 (0.000522)	0.00179** (0.000762)	0.000237 (0.000544)
Observations	173	203	173	203
Sample	AE&EM	AE&EM	AE&EM	AE&EM

Probit Regressions, the dependent variable takes value one for five year episodes with a primary surplus of at least 3% of GDP. The table reports the marginal effects estimated at the mean of the dependent variable. Robust standard errors in parentheses, \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 7: Primary Surpluses and Political Variables**

	(1)	(2)	(3)	(4)
Pol. Syst.	-0.0773 (0.0568)	-0.0833 (0.0606)	-0.0407 (0.0930)	-0.0407 (0.0997)
Ec. Orient	0.0767*** (0.0297)	0.0721** (0.0305)	0.0617* (0.0337)	0.0664** (0.0336)
Allhouse	0.161* (0.0832)	0.139* (0.0815)	0.226** (0.0939)	0.217** (0.0894)
Plurality	0.00528 (0.0575)	0.00925 (0.0606)	-0.0564 (0.0681)	-0.0638 (0.0678)
Proportional	0.109** (0.0511)	0.0743 (0.0618)	0.142*** (0.0428)	0.144*** (0.0427)
Numvote	-0.000156 (0.00157)	-0.00137 (0.00162)	0.000215 (0.00220)	-4.65e-05 (0.00183)
Fract.	0.189 (0.116)	0.299** (0.127)	0.0807 (0.155)	0.119 (0.149)
Polariz.	0.0646* (0.0350)	0.0231 (0.0375)	0.0691* (0.0407)	0.0491 (0.0411)
Democracy	-0.0214 (0.0230)		-0.00497 (0.0292)	
Log(ADM)	-0.0186 (0.0157)		-0.00266 (0.0145)	
Observations	192	204	149	160
Sample	AE&EM	AE&EM	Adv. Ec.	Adv. Ec.

Probit Regressions, the dependent variable takes value one for five year episodes with a primary surplus of at least 3% of GDP. The table reports the marginal effects estimated at the mean of the dependent variable. Robust standard errors in parentheses, \*\*\* p<0.01, \*\* p<0.05, \* p<0.1



**Table 8: Primary Surpluses, Economic and Political Variables**

	(1)	(2)	(3)	(4)	(5)
GDP Growth	0.0695*** (0.0151)	0.0588*** (0.0146)	0.0757*** (0.0142)	0.0681*** (0.0141)	0.0741*** (0.0138)
Debt-to-GDP	0.00169*** (0.000637)	0.00211*** (0.000655)	0.00136** (0.000546)		
Log(GDP PC)	0.0405 (0.0287)	0.0476 (0.0296)	0.0427 (0.0264)	0.0424 (0.0305)	0.0439 (0.0270)
Log(GDP)	-0.0529*** (0.0172)	-0.0642*** (0.0185)	-0.0435*** (0.0159)	-0.0437*** (0.0167)	-0.0371** (0.0157)
OPENNES	-0.000756 (0.000543)	-0.000801 (0.000537)	-0.000616 (0.000483)	-0.000831 (0.000603)	-0.000607 (0.000495)
Current acc. bal.	0.0202*** (0.00608)	0.0173*** (0.00585)	0.0187*** (0.00519)	0.0220*** (0.00635)	0.0192*** (0.00519)
Ec. Orient	0.0732*** (0.0271)	0.0721** (0.0289)		0.0641** (0.0268)	
Allhouse	0.132* (0.0715)	0.0899 (0.0672)	0.117* (0.0683)	0.159** (0.0754)	0.130* (0.0710)
Fract.	0.0860 (0.0995)	0.107 (0.103)	-0.0270 (0.0916)	0.101 (0.110)	-0.0310 (0.0951)
Proportional	0.0247 (0.0545)		0.0476 (0.0440)	0.0530 (0.0491)	0.0574 (0.0443)
Observations	183	186	207	183	207
Sample	AE&EM	AE&EM	AE&EM	AE&EM	AE&EM

Probit Regressions, the dependent variable takes value one for five year episodes with a primary surplus of at least 3% of GDP. The table reports the marginal effects estimated at the mean of the dependent variable. Robust standard errors in parentheses, \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 9: Primary surpluses during tranquil periods and periods of high and growing debt.**

	(a) High and Growing debt=1	(b) High and Growing debt=0	(c) (b)-(a)
GDP Growth	0.054*** (0.021)	0.0588*** (0.019)	0.0049 (0.029)
Ln(GDP)	-0.053** (0.023)	-0.0599*** (0.023)	-0.007 (0.029)
Debt-to-GDP	0.002* (0.001)	0.000585 (0.0016)	-0.0014 (0.002)
Current account balance	0.023* (0.013)	0.0146** (0.0062)	-0.0088 (0.015)
Log(GDP PC)	0.041 (0.038)	0.0690* (0.041)	0.0279 (0.055)
OPENNES	0.0015 (0.0009)	-0.0027** (0.001)	-0.001** (0.001)
Economic Orientation	0.138*** (0.054)	0.036 (0.039)	-0.103 (0.064)
Allhouse	0.145 (0.125)	0.0587 (0.086)	-0.086 (0.146)
Fractionalization	0.158 (0.166)	0.0246 (0.119)	-0.134 (0.199)
High and Growing debt		-0.221 (0.537)	
Observations		186	
Sample		AE&EM	

Probit Regressions, the dependent variable takes value one for five year episodes with a primary surplus of at least 3% of GDP. The table reports the marginal effects estimated at the mean of the dependent variable. Note that the table reports the results of just one regression. The first column reports the coefficients for the variables interacted with the “High and Growing debt” dummy and the second column reports the results for the variable interacted with 1 minus the dummy. The third column reports the difference between the first two columns.

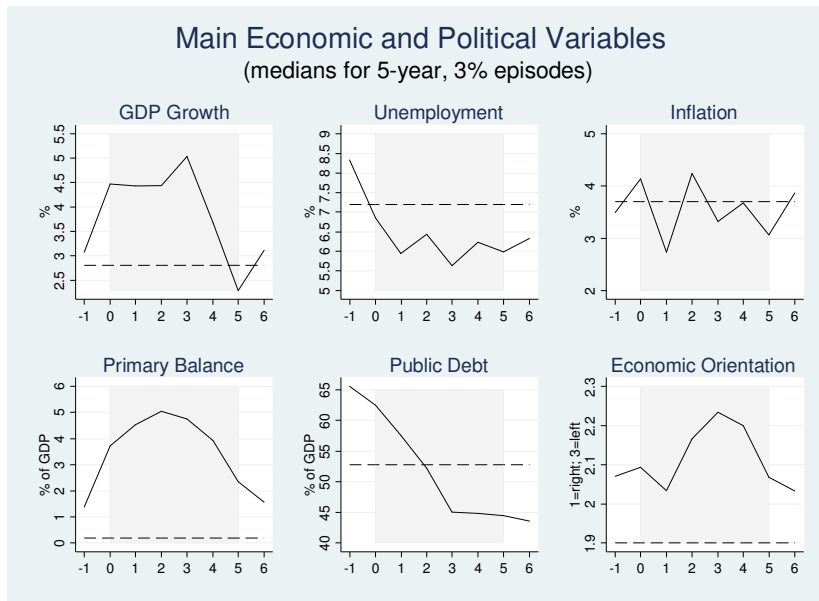
Robust standard errors in parentheses, \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 10: Instrumental variable regressions**

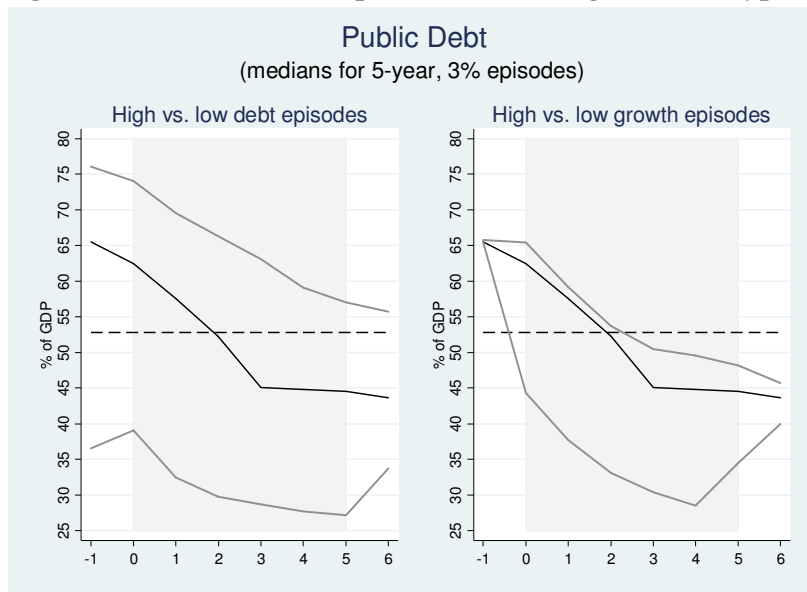
	(1) OLS	(2) Linear IH	(3) Probit IH
Log(GDP PC)	0.0366 (0.0311)	0.0514 (0.0482)	0.452* (0.246)
Debt-to-GDP	0.00189** (0.000751)	0.00220*** (0.000749)	0.0108*** (0.00341)
Log(GDP PC)	-0.0569*** (0.0180)	-0.0687*** (0.0261)	-0.271* (0.141)
OPENNESS	-0.000374 (0.000488)	-0.000933 (0.000704)	-0.00817 (0.00574)
Proportional	0.0569 (0.0621)	0.0629 (0.0659)	0.303 (0.498)
Allhouse	0.139* (0.0705)	0.149** (0.0717)	0.717** (0.336)
Fract.	-0.0834 (0.114)	-0.107 (0.113)	-0.570 (1.100)
Current acc. bal.	0.0231*** (0.00580)	0.0318*** (0.0120)	0.179 (0.128)
GDP Growth	0.0789*** (0.0112)	0.103*** (0.0247)	0.693*** (0.107)
Constant	-0.209 (0.343)	-0.322 (0.646)	-5.891 (5.281)
Observations	183	183	183
R-squared	0.281	0.258	
Rk, LM statistics		10.27	10.27
P-value		0.016	0.016
Rk Wald F-statistics		8.74	8.74
Stock-Yogo 5% critical value		11.04	11.04
Stock-Yogo 10% critical value		7.56	7.56
Sargan test		0.451	0.451
P-value		0.79	0.79

Probit and OLS IV regressions (identification through heteroskedasticity). The dependent variable takes value one for five year episodes with a primary surplus of at least 3% of GDP. The table reports the marginal effects estimated at the mean of the dependent variable. Robust standard errors in parentheses, \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. The results for the probit estimates are not marginal effects and therefore they are not directly comparable with the results of Table 8

**Figure 1: Main economic and political variables during episodes**

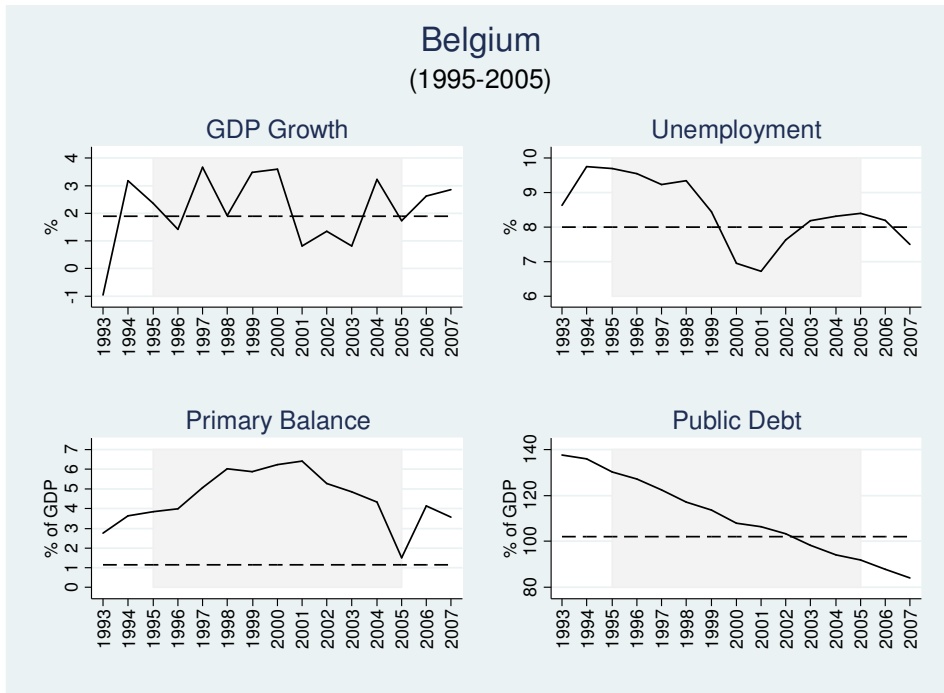


**Figure 2: The evolution of public debt during different types of episodes**

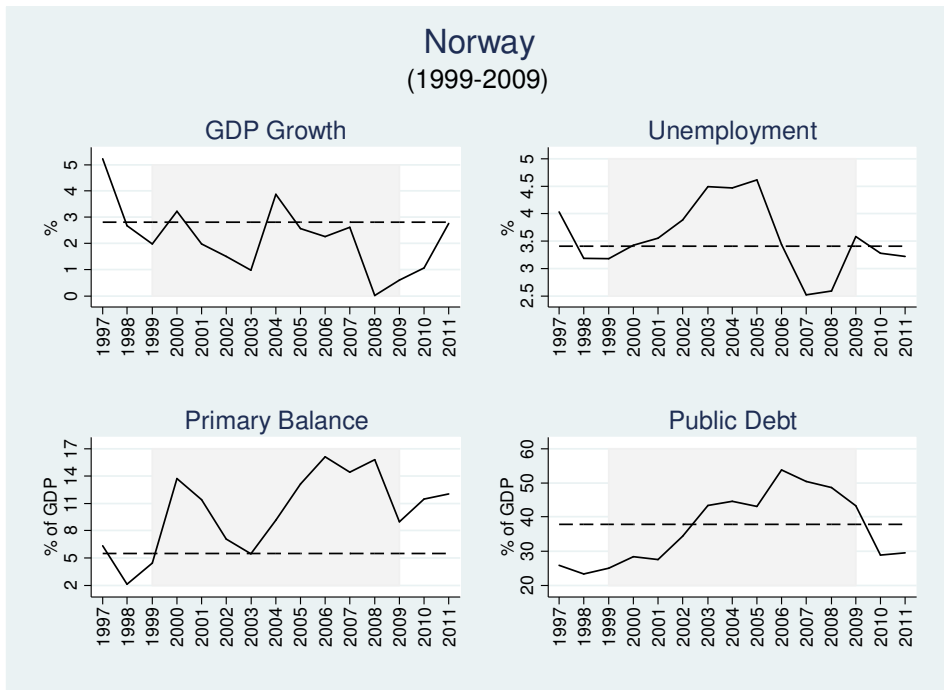


In both panels, the solid line plots median values for all episodes and the grey lines plot median values for the sub-groups. In the left panel, the upper grey line plots episodes that follow periods of high and growing debt (19 episodes) and the lower grey line plots the remaining 17 episodes. In the right panel, the upper grey line plots episodes that happen during periods of low GDP growth and the lower grey plots episodes that happen during periods of high GDP growth.

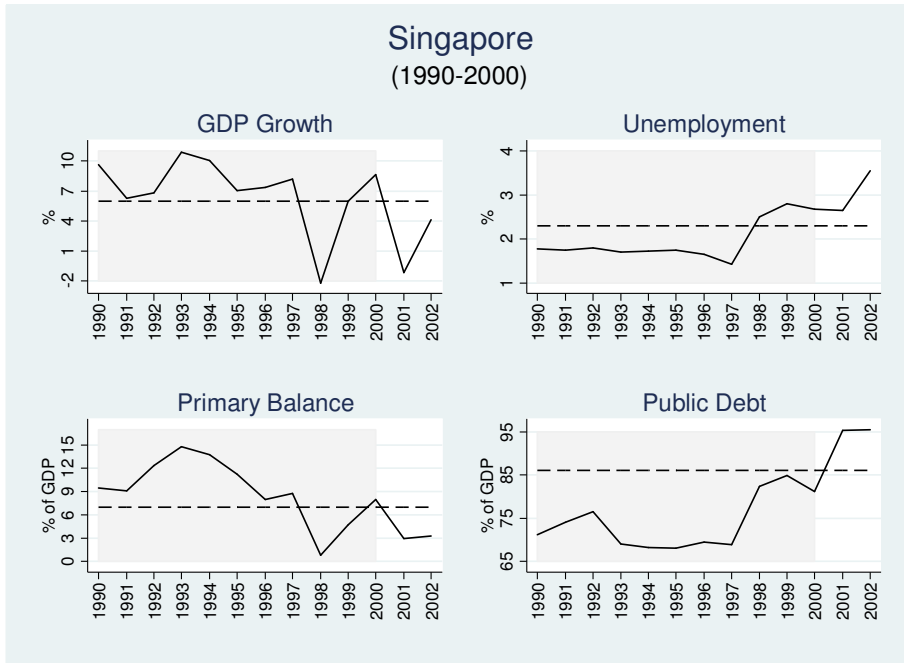
**Figure 3**



**Figure 4**



**Figure 5**



**Figure 6**

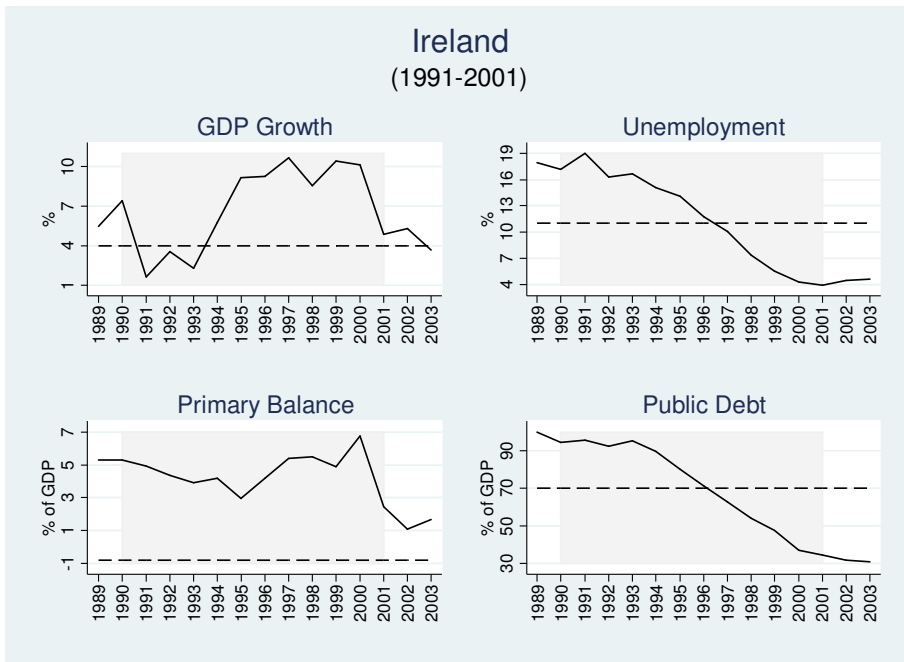
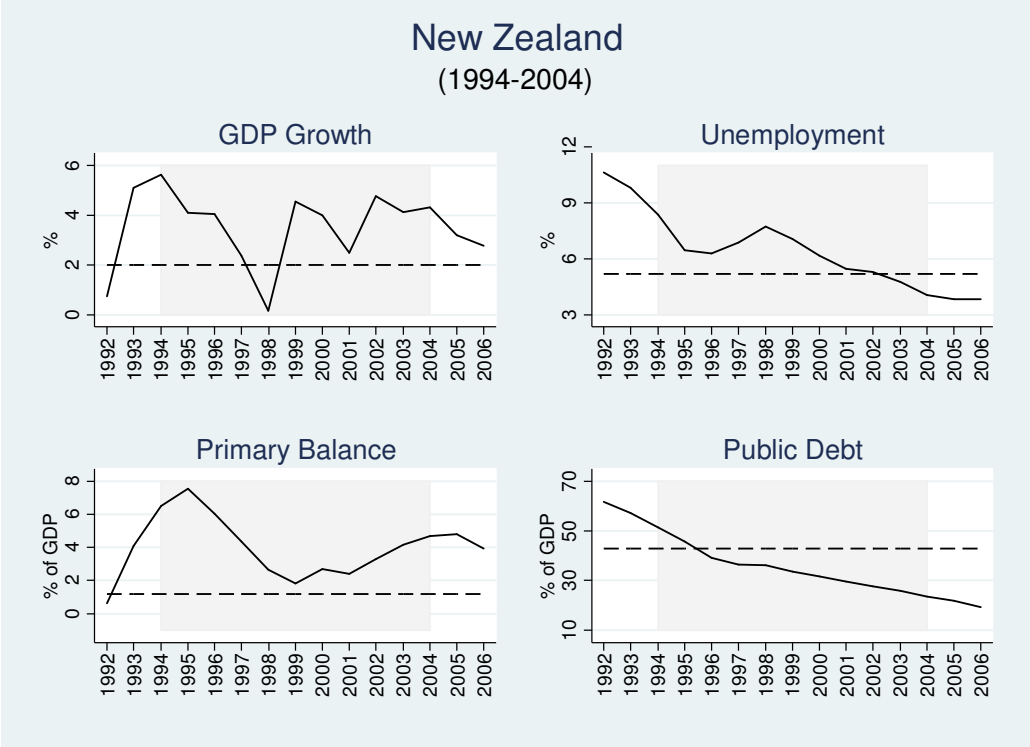


Figure 7



## Tables and Figures for Online Appendix

**Table A1: Country-years included in the sample**

Country	First obs.	Last Obs.	Country	First obs.	Last Obs.
ARG	1992	2013	ISR	1986	2013
AUS	1974	2013	ITA	1974	2013
AUT	1974	2013	JPN	1974	2013
BEL	1974	2013	KOR	1974	2013
BRA	1996	2013	LBN	2000	2012
CAN	1974	2013	LTU	2000	2013
CHE	1974	2013	LUX	1990	2013
CHL	1991	2013	LVA	1996	2013
CHN	1991	2011	MEX	1991	2011
COL	1991	2013	NLD	1974	2013
CRI	1991	2013	NOR	1974	2013
CYP	2000	2012	NZL	1974	2013
CZE	1996	2013	PAN	1991	2013
DEU	1974	2013	PER	1993	2013
DNK	1974	2013	PHL	1997	2013
ECU	1991	1994	POL	1996	2013
ESP	1974	2013	PRT	1974	2013
EST	1996	2013	RUS	2006	2013
FIN	1974	2013	SGP	1990	2013
FRA	1974	2013	SVK	1996	2013
GBR	1974	2013	SVN	1996	2013
GRC	1974	2013	SWE	1974	2013
HKG	2002	2013	THA	1991	2013
IDN	1991	2011	TUR	1991	2013
IND	1991	2013	URY	2010	2013
IRL	1974	2013	USA	1974	2013
ISL	1974	2013	ZAF	2006	2013



**Table A2: Overlapping primary surplus episodes, 5-year periods**

3% of GDP						4% of GDP				5% of GDP	
BEL1989	3.06	HKG2006	3.20	NZL1993	5.69	BEL1994	4.52	SGP1990	11.90	BEL1996	5.44
BEL1990	3.18	HKG2007	3.23	NZL1994	5.41	BEL1995	4.97	SGP1991	12.26	BEL1997	5.93
BEL1991	3.11	IRL1987	4.05	NZL1995	4.48	BEL1996	5.44	SGP1992	12.03	BEL1998	5.97
BEL1992	3.28	IRL1988	4.78	NZL1996	3.51	BEL1997	5.93	SGP1993	11.30	BEL1999	5.73
BEL1993	3.86	IRL1989	4.75	NZL2000	3.44	BEL1998	5.97	SGP1994	8.51	BEL2000	5.42
BEL1994	4.52	IRL1990	4.53	NZL2001	3.86	BEL1999	5.73	SGP1995	6.69	CAN1997	5.05
BEL1995	4.97	IRL1991	4.07	NZL2002	4.17	BEL2000	5.42	SGP1996	6.03	CHL2004	5.33
BEL1996	5.44	IRL1992	3.92	NZL2003	4.14	BEL2001	4.47	SGP1997	5.03	DNK1984	5.22
BEL1997	5.93	IRL1993	4.13	NZL2004	3.55	BEL2002	4.01	SGP1999	4.73	DNK1985	5.49
BEL1998	5.97	IRL1994	4.44	PAN1991	4.97	CAN1996	4.82	SGP2000	4.73	DNK1986	5.25
BEL1999	5.73	IRL1995	4.58	PAN1992	5.45	CAN1997	5.05	SGP2001	4.44	FIN1974	5.23
BEL2000	5.42	IRL1996	5.34	PAN1993	5.70	CAN1998	4.57	SGP2002	4.99	FIN1975	6.08
BEL2001	4.47	IRL1997	4.99	PAN1994	6.77	CHL2003	4.60	SGP2003	6.44	FIN1976	5.19
BEL2002	4.01	IRL1998	4.13	PAN1995	3.85	CHL2004	5.33	SGP2004	6.48	IRL1996	5.34
BEL2003	3.67	IRL1999	3.36	PAN2005	3.35	DNK1984	5.22	SGP2005	5.17	NOR1981	5.39
BEL2004	3.20	ISL2003	3.71	PAN2006	3.21	DNK1985	5.49	SGP2006	5.03	NOR1982	5.20
BRA1999	3.28	ISR1986	3.14	PER2004	3.01	DNK1986	5.25	SGP2007	5.46	NOR1996	6.31
BRA2000	3.40	ITA1993	3.32	PHL2003	3.07	DNK2003	4.41	SGP2008	4.80	NOR1997	7.62
BRA2001	3.48	ITA1994	3.87	PHL2004	3.47	DNK2004	4.76	SGP2009	4.90	NOR1998	7.77
BRA2002	3.44	ITA1995	4.43	PHL2005	3.17	FIN1998	4.75	SWE1985	4.52	NOR1999	8.43
BRA2003	3.46	ITA1996	4.81	SGP1990	11.90	FIN1999	4.59	SWE1986	5.43	NOR2000	9.37
BRA2004	3.58	ITA1997	4.62	SGP1991	12.26	FIN2000	4.41	SWE1987	5.08	NOR2001	9.25
BRA2005	3.24	ITA1998	3.87	SGP1992	12.03	IRL1987	4.05	TUR2002	4.48	NOR2002	10.19
CAN1995	3.71	ITA1999	3.16	SGP1993	11.30	IRL1988	4.78	TUR2003	4.35	NOR2003	11.66
CAN1996	4.82	KOR1987	3.09	SGP1994	8.51	IRL1989	4.75			NOR2004	13.71
CAN1997	5.05	KOR1988	3.16	SGP1995	6.69	IRL1990	4.53			NZL1993	5.69
CAN1998	4.57	KOR1989	3.14	SGP1996	6.03	IRL1991	4.07			NZL1994	5.41
CAN1999	3.96	KOR1990	3.10	SGP1997	5.03	IRL1993	4.13			PAN1992	5.45
CAN2000	3.28	KOR1992	3.02	SGP1998	3.94	IRL1994	4.44			PAN1993	5.70
CHL1991	3.54	KOR1993	3.02	SGP1999	4.73	IRL1995	4.58			PAN1994	6.77
CHL1992	3.34	KOR1996	3.14	SGP2000	4.73	IRL1996	5.34			SGP1990	11.90
CHL1993	3.10	KOR1997	3.32	SGP2001	4.44	IRL1997	4.99			SGP1991	12.26
CHL2003	4.60	KOR1998	3.64	SGP2002	4.99	IRL1998	4.13			SGP1992	12.03
CHL2004	5.33	KOR1999	3.77	SGP2003	6.44	ITA1995	4.43			SGP1993	11.30
CHL2005	3.97	KOR2000	3.53	SGP2004	6.48	ITA1996	4.81			SGP1994	8.51
DNK1983	3.70	LUX1997	3.39	SGP2005	5.17	ITA1997	4.62			SGP1995	6.69
DNK1984	5.22	LUX1998	3.07	SGP2006	5.03	NOR1974	4.17			SGP1996	6.03
DNK1985	5.49	MEX1991	3.78	SGP2007	5.46	NOR1976	4.21			SGP1997	5.03
DNK1986	5.25	MEX1992	3.26	SGP2008	4.80	NOR1977	4.31			SGP2003	6.44
DNK1987	3.90	NLD1996	3.48	SGP2009	4.90	NOR1978	4.36			SGP2004	6.48
DNK1996	3.10	NLD1997	3.41	SWE1984	3.58	NOR1979	4.75			SGP2005	5.17
DNK1997	3.50	NOR1974	4.17	SWE1985	4.52	NOR1980	4.85			SGP2006	5.03
DNK1998	3.43	NOR1975	4.00	SWE1986	5.43	NOR1981	5.39			SGP2007	5.46
DNK1999	3.18	NOR1976	4.21	SWE1987	5.08	NOR1982	5.20			SWE1986	5.43
DNK2000	3.00	NOR1977	4.31	SWE1997	3.45	NOR1983	4.88			SWE1987	5.08
DNK2001	3.31	NOR1978	4.36	SWE1998	3.29	NOR1996	6.31				
DNK2002	3.82	NOR1979	4.75	THA1991	3.65	NOR1997	7.62				
DNK2003	4.41	NOR1980	4.85	THA1992	3.24	NOR1998	7.77				
DNK2004	4.76	NOR1981	5.39	THA1993	3.02	NOR1999	8.43				
DNK2005	3.62	NOR1982	5.20	TUR1999	3.84	NOR2000	9.37				
FIN1976	3.39	NOR1983	4.88	TUR2000	3.38	NOR2001	9.25				
FIN1977	3.01	NOR1984	3.70	TUR2001	3.23	NOR2002	10.19				
FIN1997	3.96	NOR1995	3.88	TUR2002	4.48	NOR2003	11.66				
FIN1998	4.75	NOR1996	6.31	TUR2003	4.35	NOR2004	13.71				
FIN1999	4.59	NOR1997	7.62	TUR2004	3.64	NZL1992	4.95				
FIN2000	4.41	NOR1998	7.77			NZL1993	5.69				
FIN2001	3.34	NOR1999	8.43			NZL1994	5.41				
FIN2003	3.09	NOR2000	9.37			NZL1995	4.48				
FIN2004	3.30	NOR2001	9.25			NZL2002	4.17				
GRC1994	3.24	NOR2002	10.19			NZL2003	4.14				
GRC1995	3.61	NOR2003	11.66			PAN1991	4.97				
GRC1996	3.91	NOR2004	13.71			PAN1992	5.45				
GRC1997	3.54	NZL1991	3.85			PAN1993	5.70				
GRC1998	3.01	NZL1992	4.95			PAN1994	6.77				

The year refers to the beginning of the episode (for instance, in column 1, ARG2002 indicates an episode that starts in 2002 and ends in 2006). The numbers report the average primary surplus over the period.

**Table A3: Overlapping primary surplus episodes, 8-year periods**

3% of GDP						4% of GDP				5% of GDP	
BEL1995	5.34	ITA1992	3.38	SGP1990	10.93	BEL1992	4.17	SGP2005	5.84	BEL1994	5.14
BEL1996	5.47	ITA1993	3.86	SGP1991	9.85	BEL1993	4.68	SGP2006	5.71	BEL1995	5.34
BEL1997	5.51	ITA1994	3.95	SGP1992	9.30	BEL1994	5.14	TUR1999	4.11	BEL1996	5.47
BEL1998	5.06	ITA1995	4.04	SGP1993	8.75	BEL1995	5.34	SGP2005	5.84	BEL1997	5.51
BEL1999	4.82	ITA1996	3.80	SGP1994	7.27	BEL1996	5.47	SGP2006	5.71	BEL1998	5.06
BEL2000	4.53	ITA1997	3.46	SGP1995	5.96	BEL1997	5.51	TUR1999	4.11	NOR1978	5.11
BEL2001	4.07	KOR1986	3.02	SGP1996	5.15	BEL1998	5.06			NOR1979	5.13
BRA1999	3.39	KOR1987	3.10	SGP1997	4.74	BEL1999	4.82			NOR1994	5.36
BRA2000	3.42	KOR1988	3.11	SGP1998	4.46	BEL2000	4.53			NOR1995	6.45
BRA2001	3.47	KOR1989	3.02	SGP1999	5.07	BEL2001	4.07			NOR1996	6.94
BRA2002	3.30	KOR1990	3.04	SGP2000	5.80	CAN1996	4.01			NOR1997	7.48
BRA2003	3.19	KOR1993	3.11	SGP2001	5.43	CAN1997	4.01			NOR1998	8.32
BRA2004	3.17	KOR1994	3.13	SGP2002	4.82	DNK1984	4.24			NOR1999	10.07
CAN1994	3.32	KOR1995	3.38	SGP2003	5.14	DNK1985	4.07			NOR2000	11.31
CAN1995	3.83	KOR1996	3.34	SGP2004	5.52	DNK2000	4.02			NOR2001	11.57
CAN1996	4.01	KOR1997	3.11	SGP2005	5.84	FIN2000	4.12			SGP1990	10.93
CAN1997	4.01	KOR1999	3.07	SGP2006	5.71	IRL1987	4.09			SGP1991	9.85
CAN1998	3.73	NOR1974	4.49	SWE1983	3.37	IRL1988	4.37			SGP1992	9.30
CAN1999	3.42	NOR1975	4.17	SWE1984	3.82	IRL1989	4.38			SGP1993	8.75
CHL1991	3.02	NOR1976	4.29	TUR1999	4.11	IRL1990	4.40			SGP1994	7.27
CHL2001	3.26	NOR1977	4.47	TUR2000	3.59	IRL1991	4.42			SGP1995	5.96
DNK1983	3.71	NOR1978	5.11	TUR2001	3.13	IRL1992	4.42			SGP1996	5.15
DNK1984	4.24	NOR1979	5.13	TUR2002	3.18	IRL1993	4.72			SGP1999	5.07
DNK1985	4.07	NOR1980	4.72			IRL1994	4.53			SGP2000	5.80
DNK1986	3.53	NOR1981	3.97			IRL1995	4.14			SGP2001	5.43
DNK1997	3.09	NOR1982	3.24			ITA1995	4.04			SGP2003	5.14
DNK1998	3.52	NOR1993	3.46			NOR1974	4.49			SGP2004	5.52
DNK1999	3.88	NOR1994	5.36			NOR1975	4.17			SGP2005	5.84
DNK2000	4.02	NOR1995	6.45			NOR1976	4.29			SGP2006	5.71
DNK2001	3.87	NOR1996	6.94			NOR1977	4.47				
DNK2002	3.16	NOR1997	7.48			NOR1978	5.11				
FIN1976	4.36	NOR1998	8.32			NOR1979	5.13				
FIN1997	3.55	NOR1999	10.07			NOR1980	4.72				
FIN1998	3.85	NOR2000	11.31			NOR1994	5.36				
FIN1999	3.92	NOR2001	11.57			NOR1995	6.45				
FIN2000	4.12	NZL1988	3.39			NOR1996	6.94				
FIN2001	3.57	NZL1989	3.82			NOR1997	7.48				
GRC1994	3.27	NZL1990	4.03			NOR1998	8.32				
GRC1995	3.06	NZL1991	4.04			NOR1999	10.07				
IRL1986	3.39	NZL1992	4.20			NOR2000	11.31				
IRL1987	4.09	NZL1993	4.46			NOR2001	11.57				
IRL1988	4.37	NZL1994	4.24			NZL1990	4.03				
IRL1989	4.38	NZL1995	3.84			NZL1991	4.04				
IRL1990	4.40	NZL1996	3.42			NZL1992	4.20				
IRL1991	4.42	NZL1997	3.26			NZL1993	4.46				
IRL1992	4.42	NZL1998	3.31			NZL1994	4.24				
IRL1993	4.72	NZL1999	3.47			PAN1993	4.11				
IRL1994	4.53	NZL2000	3.64			PAN1994	4.93				
IRL1995	4.14	NZL2001	3.45			SGP1990	10.93				
IRL1996	3.99	PAN1991	3.96			SGP1991	9.85				
IRL1997	3.78	PAN1992	3.89			SGP1992	9.30				
IRL1998	3.43	PAN1993	4.11			SGP1993	8.75				
IRL1999	3.20	PAN1994	4.93			SGP1994	7.27				
BEL1995	5.34	ITA1992	3.38			SGP1995	5.96				
BEL1996	5.47	ITA1993	3.86			SGP1996	5.15				
BEL1997	5.51	ITA1994	3.95			SGP1997	4.74				
BEL1998	5.06	ITA1995	4.04			SGP1998	4.46				
BEL1999	4.82	ITA1996	3.80			SGP1999	5.07				
BEL2000	4.53	ITA1997	3.46			SGP2000	5.80				
BEL2001	4.07	KOR1986	3.02			SGP2001	5.43				
BRA1999	3.39	KOR1987	3.10			SGP2002	4.82				
BRA2000	3.42	KOR1988	3.11			SGP2003	5.14				
BRA2001	3.47	KOR1989	3.02			SGP2004	5.52				
BRA2002	3.30	KOR1990	3.04								

**Table A4: Overlapping primary surplus episodes, 10-year periods**

3% of GDP				4% of GDP				5% of GDP			
BEL1987	3.04	ITA1993	3.60	TUR1999	3.74	BEL1990	4.07	BEL1994	5.12		
BEL1988	3.39	ITA1994	3.51			BEL1991	4.27	BEL1995	5.19		
BEL1989	3.79	ITA1995	3.47			BEL1992	4.60	NOR1994	5.55		
BEL1990	4.07	ITA1996	3.16			BEL1993	4.91	NOR1995	6.63		
BEL1991	4.27	KOR1987	3.06			BEL1994	5.12	NOR1996	7.78		
BEL1992	4.60	KOR1988	3.09			BEL1995	5.19	NOR1997	8.91		
BEL1993	4.91	KOR1991	3.04			BEL1996	4.96	NOR1998	9.71		
BEL1994	5.12	KOR1992	3.17			BEL1997	4.97	NOR1999	11.07		
BEL1995	5.19	KOR1993	3.33			BEL1998	4.82	SGP1990	9.30		
BEL1996	4.96	KOR1994	3.22			BEL1999	4.46	SGP1991	9.15		
BEL1997	4.97	KOR1995	3.07			IRL1988	4.45	SGP1992	8.53		
BEL1998	4.82	NOR1974	4.46			IRL1989	4.59	SGP1993	7.62		
BEL1999	4.46	NOR1975	4.42			IRL1990	4.55	SGP1994	6.62		
BEL2000	3.66	NOR1976	4.80			IRL1991	4.70	SGP1995	5.71		
BRA1998	3.02	NOR1977	4.75			IRL1992	4.45	SGP1996	5.24		
BRA1999	3.43	NOR1978	4.62			IRL1993	4.13	SGP1997	5.01		
BRA2000	3.32	NOR1979	4.23			NOR1974	4.46	SGP1998	5.19		
BRA2001	3.22	NOR1980	3.60			NOR1975	4.42	SGP1999	5.61		
BRA2002	3.19	NOR1992	3.43			NOR1976	4.80	SGP2002	5.23		
BRA2003	3.08	NOR1993	4.61			NOR1977	4.75	SGP2003	5.62		
CAN1994	3.09	NOR1994	5.55			NOR1978	4.62	SGP2004	5.69		
CAN1995	3.49	NOR1995	6.63			NOR1979	4.23				
CAN1996	3.72	NOR1996	7.78			NOR1993	4.61				
CAN1997	3.71	NOR1997	8.91			NOR1994	5.55				
CAN1998	3.42	NOR1998	9.71			NOR1995	6.63				
DNK1983	3.18	NOR1999	11.07			NOR1996	7.78				
DNK1984	3.44	NZL1987	3.42			NOR1997	8.91				
DNK1985	3.24	NZL1988	3.75			NOR1998	9.71				
DNK1996	3.20	NZL1989	3.76			NOR1999	11.07				
DNK1997	3.66	NZL1990	3.67			NZL1993	4.13				
DNK1998	3.92	NZL1991	3.68			NZL1994	4.14				
DNK1999	3.97	NZL1992	3.87			SGP1990	9.30				
DNK2000	3.31	NZL1993	4.13			SGP1991	9.15				
FIN1997	3.47	NZL1994	4.14			SGP1992	8.53				
FIN1998	3.92	NZL1995	3.96			SGP1993	7.62				
FIN1999	3.95	NZL1996	3.69			SGP1994	6.62				
FIN2000	3.31	NZL1997	3.48			SGP1995	5.71				
IRL1985	3.03	NZL1998	3.36			SGP1996	5.24				
IRL1986	3.43	NZL1999	3.21			SGP1997	5.01				
IRL1987	3.99	PAN1991	3.62			SGP1998	5.19				
IRL1988	4.45	PAN1992	3.49			SGP1999	5.61				
IRL1989	4.59	PAN1993	3.39			SGP2000	4.95				
IRL1990	4.55	PAN1994	3.84			SGP2001	4.74				
IRL1991	4.70	SGP1990	9.30			SGP2002	5.23				
IRL1992	4.45	SGP1991	9.15			SGP2003	5.62				
IRL1993	4.13	SGP1992	8.53			SGP2004	5.69				
IRL1994	3.90	SGP1993	7.62								
IRL1995	3.74	SGP1994	6.62								
IRL1996	3.70	SGP1995	5.71								
IRL1997	3.65	SGP1996	5.24								
IRL1998	3.18	SGP1997	5.01								
ITA1991	3.17	SGP1998	5.19								
ITA1992	3.50	SGP1999	5.61								
BEL1987	3.04	ITA1993	3.60								
BEL1988	3.39	ITA1994	3.51								
BEL1989	3.79	ITA1995	3.47								
BEL1990	4.07	ITA1996	3.16								
BEL1991	4.27	KOR1987	3.06								
BEL1992	4.60	KOR1988	3.09								
BEL1993	4.91	KOR1991	3.04								
BEL1994	5.12	KOR1992	3.17								
BEL1995	5.19	KOR1993	3.33								
BEL1996	4.96	KOR1994	3.22								
BEL1997	4.97	KOR1995	3.07								

**Table A5: Nonoverlapping primary surplus episodes, 5-year periods, all countries**

3%		4%		5%	
BEL1998	5.97	NZL1993	4.29	BEL1998	5.97
BGR1998	3.61	NZL2002	4.17	BWA1990	14.62
BGR2004	3.51	OMN2004	11.28	CAN1997	5.05
BHR2004	3.14	PAN1990	4.74	CHL2004	5.33
BLZ2005	3.43	PAN2005	3.35	DMA2003	4.47
BRA2004	3.58	PER2004	3.01	DNK1985	5.49
BWA1990	14.62	QAT2004	12.07	DNK2004	4.76
CAN1997	5.05	SAU2004	21.52	DZA2004	9.44
CHL1990	3.67	SGP1991	12.26	ECU1990	4.52
CHL2004	5.33	SGP2004	6.48	FIN1974	4.69
DMA2003	4.47	SMR2004	5.70	FIN1998	4.75
DNK1985	5.49	SWE1986	5.43	IRL1988	4.78
DNK1997	3.50	SWE1997	3.45	IRL1996	5.34
DNK2004	4.76	MEX1990	3.62	ITA1996	4.81
DZA2004	9.44	MYS1993	4.63	JAM1993	6.83
ECU1990	4.52	NAM2005	4.00	JAM2003	9.11
FIN1974	4.69	NLD1996	3.48	KAZ2003	4.51
FIN1998	4.75	NOR1981	5.39	KNA2009	5.69
GRC1996	3.91	NOR2004	13.71	KWT2004	18.87
HKG2007	3.23	NZL1993	4.29	LBY2004	26.35
IRL1988	4.78	NZL2002	4.17	MYS1993	4.63
IRL1996	5.34	OMN2004	11.28	NOR1981	5.39
IRN2003	3.60	PAN1990	4.74	NOR2004	13.71
ISL2003	3.71	PAN2005	3.35	NZL1993	4.29
ITA1996	4.81	PER2004	3.01	NZL2002	4.17
JAM1993	6.83	QAT2004	12.07	OMN2004	11.28
JAM2003	9.11	SAU2004	21.52	PAN1990	4.74
KAZ2003	4.51	SGP1991	12.26	QAT2004	12.07
KNA2009	5.69	SGP2004	6.48	SAU2004	21.52
KOR2000	3.23	SMR2004	5.70	SGP1991	12.26
KWT2004	18.87	SWE1986	5.43	SGP2004	6.48
LBY2004	26.35	SWE1997	3.45	SMR2004	5.70
LUX1997	3.39	SYC1990	10.07	SWE1986	5.43
MEX1990	3.62	SYC2008	8.00	SYC1990	10.07
MYS1993	4.63	TTO2004	7.04	SYC2008	8.00
NAM2005	4.00	TUR2004	3.64	TTO2004	7.04
NLD1996	3.48	VEN1990	4.20	VEN1990	4.20
NOR1981	5.39	VEN1990	4.20		
NOR2004	13.71				

**Table A6: Nonoverlapping primary surplus episodes, 8-year periods, all countries**

3%		4%		5%	
BEL1997	5.51	BEL1997	5.51	BEL1997	5.51
BGR1998	3.30	CAN1997	4.01	DZA2000	8.16
CAN1997	4.01	DNK1984	4.24	LBY2001	18.22
CHL1990	3.50	DNK2000	4.02	NOR2001	11.57
CHL2001	3.26	DZA2000	8.16	SGP1990	10.93
DMA2002	3.24	FIN2000	4.12	SGP2005	5.84
DNK1984	4.24	IRL1993	4.72		
DNK2000	4.02	ITA1995	4.04		
DZA2000	8.16	LBY2001	18.22		
FIN1974	3.77	NOR2001	11.57		
FIN2000	4.12	NZL1993	4.46		
GRC1994	3.27	PAN1990	4.24		
IRL1993	4.72	SGP1990	10.93		
ITA1995	4.04	SGP2005	5.84		
KAZ2005	3.56	TUR1999	4.11		
KNA2006	3.84				
KOR1995	3.06				
LBY2001	18.22				
NOR2001	11.57				
NZL1993	4.46				
PAN1990	4.24				
SGP1990	10.93				
SGP2005	5.84				
SWE1984	3.82				
TUR1999	4.11				

**Table A7: Nonoverlapping primary surplus episodes, 10-year periods, all countries**

3%		4%		5%	
BEL1995	5.19	BEL1995	5.19	BEL1995	5.19
BGR1998	3.45	DZA1999	7.52	DZA1999	7.52
CAN1996	3.72	IRL1991	4.70	NOR1999	11.07
DNK1984	3.44	NOR1999	11.07	SAU1999	13.43
DNK1999	3.97	NZL1994	4.14	SGP1990	9.30
DZA1999	7.52	SAU1999	13.43		
FIN1999	3.95	SGP1990	9.30		
IRL1991	4.70				
ITA1993	3.60				
KOR1993	3.33				
NOR1999	11.07				
NZL1994	4.14				
PAN1990	3.56				
SAU1999	13.43				
SGP1990	9.30				
TUR1999	3.74				

**Table A8: Primary surpluses and Economic Variables (advanced economies)**

	(1)	(2)	(3)	(4)
Pop growth	-0.152**	-0.107***	-0.127*	-0.0980**
	(0.0619)	(0.0374)	(0.0710)	(0.0420)
GDP Growth	0.132***	0.0863***	0.135***	0.0834***
	(0.0301)	(0.0208)	(0.0356)	(0.0203)
Ln(GDP)	0.0116	-0.00270	0.00740	-0.0168
	(0.0559)	(0.0330)	(0.0629)	(0.0364)
Log(infl)	-0.0196	-0.0260	-0.00716	-0.0259
	(0.0247)	(0.0163)	(0.0325)	(0.0178)
Debt-to-GDP	0.00250*	0.00198**		
	(0.00133)	(0.000793)		
Credit to priv. sect.	-0.000486	-0.000208	-0.000925	-0.000556
	(0.000935)	(0.000595)	(0.00106)	(0.000699)
Current acc. bal.	0.00380	0.00473	0.00256	0.00483
	(0.00846)	(0.00513)	(0.00957)	(0.00607)
Log(GDP PC)	0.215**	0.0835	0.232**	0.0714
	(0.101)	(0.0590)	(0.113)	(0.0695)
Unemployment	-0.00420	-0.00431	0.00214	2.88e-05
	(0.00879)	(0.00555)	(0.00946)	(0.00592)
World GDP growth	5.521	1.732	8.462	3.759
	(5.790)	(3.304)	(6.143)	(3.427)
RER	0.00968		0.00509	
	(0.0126)		(0.0167)	
OPENNES	0.00210**	0.000393	0.00386*	0.000601
	(0.000984)	(0.000405)	(0.00214)	(0.000461)
Observations	116	145	116	145
Sample	Adv. Economies	Adv. Economies	Adv. Economies	Adv. Economies

Probit Regressions, the dependent variable takes value one for five year episodes with a primary surplus of at least 3% of GDP. The table reports the marginal effects estimated at the mean of the dependent variable. Robust standard errors in parentheses, \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table A9: Primary Surpluses, Economic and Political Variables (advanced economies)**

	(1)	(2)	(3)	(4)	(5)
GDP Growth	0.0557***	0.0739***	0.0557***	0.0567***	0.0721***
	(0.0177)	(0.0181)	(0.0177)	(0.0163)	(0.0174)
Debt-to-GDP	0.00111**	0.00133**	0.00111**		
	(0.000556)	(0.000645)	(0.000556)		
Log(GDP PC)	0.104*	0.117**	0.104*	0.113*	0.115*
	(0.0570)	(0.0576)	(0.0570)	(0.0589)	(0.0636)
Log(GDP)	-0.0328**	-0.0407**	-0.0328**	-0.0266*	-0.0324*
	(0.0159)	(0.0188)	(0.0159)	(0.0159)	(0.0182)
OPENNES	-0.000556	-0.000445	-0.000556	-0.000654	-0.000383
	(0.000503)	(0.000500)	(0.000503)	(0.000562)	(0.000525)
Current acc. bal.	0.00957*	0.0109**	0.00957*	0.0106*	0.0110**
	(0.00504)	(0.00503)	(0.00504)	(0.00555)	(0.00527)
Fract.	0.0583	-0.0595	0.0583	0.111	-0.0263
	(0.0948)	(0.110)	(0.0948)	(0.113)	(0.119)
Ec. Orient	0.0831**	0.0928**	0.0831**	0.108***	0.115***
	(0.0353)	(0.0384)	(0.0353)	(0.0348)	(0.0381)
Allhouse	0.0665***		0.0665***	0.0660***	
	(0.0226)		(0.0226)	(0.0238)	
Proportional	0.143**	0.119*	0.143**	0.211***	0.183**
	(0.0645)	(0.0695)	(0.0645)	(0.0695)	(0.0749)
Observations	140	150	140	140	150
Sample	Adv. Ec	Adv. ec	Adv. Ec	Adv. Ec	Adv. Ec

Probit Regressions, the dependent variable takes value one for five year episodes with a primary surplus of at least 3% of GDP. The table reports the marginal effects estimated at the mean of the dependent variable. Robust standard errors in parentheses, \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table A10.1: Primary surpluses and Economic Variables, controlling for hard pegs**

	(1)	(2)	(3)	(4)
Pop growth	0.0521 (0.0533)	0.00976 (0.0376)	0.0965** (0.0476)	0.0397 (0.0336)
GDP Growth	0.0730*** (0.0228)	0.0647*** (0.0161)	0.0657*** (0.0221)	0.0571*** (0.0153)
Ln(GDP)	-0.0123 (0.0232)	-0.0243 (0.0187)	-0.00703 (0.0241)	-0.0210 (0.0189)
Log(infl)	0.0669 (0.0416)	0.0285 (0.0286)	0.0554 (0.0374)	0.0137 (0.0253)
Debt-to-GDP	0.00233** (0.00116)	0.00231*** (0.000874)		
Credit to priv. sect.	-0.000484 (0.000933)	-0.000381 (0.000725)	-0.000709 (0.000952)	-0.000651 (0.000752)
Current acc. bal.	0.0193** (0.00796)	0.0124** (0.00607)	0.0202** (0.00799)	0.0125** (0.00607)
Log(GDP PC)	0.111*** (0.0421)	0.0659** (0.0308)	0.125*** (0.0443)	0.0718** (0.0318)
Unemployment	-0.00368 (0.00836)	-0.00133 (0.00620)	0.00100 (0.00875)	0.00297 (0.00623)
World GDP growth	4.243 (4.748)	1.273 (3.449)	6.698 (4.707)	3.340 (3.472)
RER	0.0133 (0.0130)		0.0114 (0.0133)	
OPENNES	0.00130* (0.000741)	0.000603 (0.000561)	0.00142* (0.000741)	0.000564 (0.000571)
HARDPEG	0.115 (0.137)	-0.0996 (0.0661)	0.153 (0.132)	-0.0911 (0.0691)
Observations	173	203	173	203
Sample	AE&EM	AE&EM	AE&EM	AE&EM

Probit Regressions, the dependent variable takes value one for five year episodes with a primary surplus of at least 3% of GDP. The table reports the marginal effects estimated at the mean of the dependent variable. Robust standard errors in parentheses, \*\*\* p<0.01, \*\* p<0.05, \* p<0.1



**Table A10.2: Primary surpluses and Economic Variables, controlling for fixed exchange rates**

	(1)	(2)	(3)	(4)
Pop growth	0.0635	0.0143	0.108**	0.0490
	(0.0518)	(0.0352)	(0.0467)	(0.0312)
GDP Growth	0.0712***	0.0654***	0.0644***	0.0580***
	(0.0219)	(0.0161)	(0.0217)	(0.0155)
Ln(GDP)	-0.00929	-0.0257	-0.00366	-0.0210
	(0.0225)	(0.0183)	(0.0232)	(0.0187)
Log(infl)	0.0593	0.0344	0.0457	0.0203
	(0.0399)	(0.0280)	(0.0351)	(0.0246)
Debt-to-GDP	0.00214*	0.00221**		
	(0.00114)	(0.000876)		
Credit to priv. sect.	-0.000440	-0.000411	-0.000642	-0.000675
	(0.000885)	(0.000737)	(0.000894)	(0.000759)
Current acc. bal.	0.0176**	0.0141**	0.0179**	0.0141**
	(0.00752)	(0.00578)	(0.00745)	(0.00576)
Log(GDP PC)	0.104**	0.0673**	0.114***	0.0727**
	(0.0409)	(0.0310)	(0.0427)	(0.0322)
Unemployment	-0.00203	-0.00215	0.00255	0.00199
	(0.00751)	(0.00628)	(0.00768)	(0.00633)
World GDP growth	3.604	1.381	5.613	3.242
	(4.427)	(3.469)	(4.357)	(3.472)
RER	0.0138		0.0130	
	(0.0128)		(0.0131)	
OPENNES	0.00138*	0.000204	0.00152**	0.000118
	(0.000712)	(0.000550)	(0.000726)	(0.000574)
FIX	0.0725	0.00845	0.103	0.0340
	(0.0703)	(0.0506)	(0.0712)	(0.0513)
Observations	172	202	172	202
Sample	AE&EM	AE&EM	AE&EM	AE&EM

Probit Regressions, the dependent variable takes value one for five year episodes with a primary surplus of at least 3% of GDP. The table reports the marginal effects estimated at the mean of the dependent variable. Robust standard errors in parentheses, \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

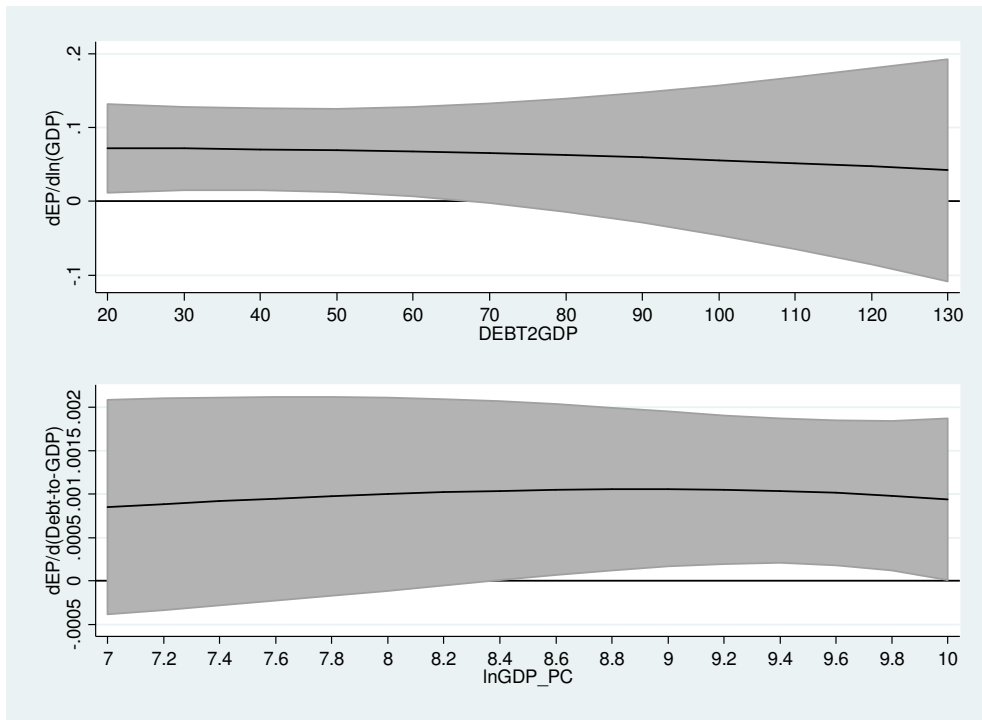
**Table A11: Estimations in tranquil periods and periods of high or rapidly growing debt**

	1. Economic Variables			2. Political Variables			3. Economic & Political Variables		
	(a) H&GD=1	(b) H&GD=0	(c) (b)-(a)	(a) H&GD=1	(b) H&GD=0	(c) (b)-(a)	(a) H&GD=1	(b) H&GD=0	(c) (b)-(a)
Pop growth	-0.108 (0.0768)	0.157*** (0.0574)	0.265*** (0.0976)						
GDP Growth	0.101*** (0.0339)	0.0578** (0.0246)	-0.0436 (0.0435)				0.0539*** (0.0206)	0.0588*** (0.0188)	0.00490 (0.0290)
Ln(GDP)	0.0108 (0.0367)	-0.0154 (0.0263)	-0.0261 (0.0456)				-0.0529** (0.0233)	-0.0599*** (0.0227)	-0.00703 (0.0293)
Log(infl)	0.116 (0.0776)	0.00225 (0.0465)	-0.114 (0.0879)						
Debt-to-GDP	0.00220 (0.00184)	-0.000880 (0.00280)	-0.00308 (0.00338)				0.00201* (0.00110)	0.000585 (0.00164)	-0.00143 (0.00199)
C. to priv. sect.	-0.00019 (0.00190)	-0.00053 (0.00101)	-0.00034 (0.00215)						
Cur. acc. bal.	0.0254 (0.0159)	0.0113 (0.00811)	-0.0141 (0.0172)				0.0234* (0.0132)	0.0146** (0.00622)	-0.00875 (0.0149)
Log(GDP PC)	0.0792 (0.0616)	0.0986** (0.0440)	0.0195 (0.0750)				0.0411 (0.0380)	0.0690* (0.0407)	0.0279 (0.0548)
Unemp.	0.00842 (0.0104)	-0.0165 (0.0136)	-0.0249 (0.0171)						
W. GDP gr.	4.067 (7.540)	4.247 (5.311)	0.180 (9.037)						
RER	-0.00138 (0.0201)	0.0162 (0.0116)	0.0176 (0.0231)						
OPENNES	0.00301* (0.00178)	0.00143** (0.000687)	-0.00158 (0.00184)				0.00115 (0.000937)	-0.0027** (0.00108)	-0.0016** (0.000644)
Pol. Syst.				-0.0799 (0.0893)	-0.108* (0.0596)	-0.0284 (0.104)			
Ec. Orient				0.0674* (0.0385)	0.0644* (0.0339)	-0.00300 (0.0499)	0.138*** (0.0535)	0.0358 (0.0386)	-0.103 (0.0644)
Allhouse				0.103 (0.0923)	0.222* (0.122)	0.119 (0.147)	0.145 (0.125)	0.0587 (0.0863)	-0.0863 (0.146)
Plurality				-0.0550 (0.0636)	0.0671 (0.0679)	0.122 (0.0940)			
Proportional				0.0593 (0.0538)	0.271** (0.117)	0.189 (0.138)			
Numvote				0.00165 (0.00189)	-0.00123 (0.00187)	-0.00288 (0.00266)			
Fract.				0.0732 (0.146)	0.251* (0.132)	0.177 (0.196)	0.158 (0.166)	0.0246 (0.119)	-0.134 (0.199)
Polariz.				0.0294 (0.0522)	0.0932** (0.0392)	0.0639 (0.0650)			
Democracy				-0.0881* (0.0468)	-0.0230 (0.0276)	0.0651 (0.0563)			
Log(ADM)				0.0113 (0.0172)	-0.062*** (0.0174)	-0.073*** (0.0252)			
H&GDebt		-0.304 (0.626)			0.962*** (0.189)			-0.221 (0.537)	
Observations		173			192			186	
Sample		AE&EM			AE&EM			AE&EM	

## **A12: Data Sources**

The *government balance* (primary and total) data and *macroeconomic controls* are from the WEO database (April 2014), OECD economic outlook, World Development Indicator and old issues of the IMF Government Finance Statistics. We first use WEO data, and when WEO data are missing, we complete the dataset with the historical public finance dataset (Mauro et al., 2013), OECD, WDI, and GFS data (in that order). For *public debt*, we use the same sources but also use the historical debt dataset of Abbas et al. All *political and institutional variables* are from the World Bank's DPI dataset, with the exception of the indexes of democracy and quality of government. The index of quality of government is from ICRG and the index of democracy is the average of the freedom house and polity indexes of democracy. Both variables were downloaded from the Quality of Government Dataset at [www.qog.pol.gu.se](http://www.qog.pol.gu.se).

**Figure A1: Marginal effect of GDP per capita at different level of public debt and marginal effect of debt at different levels of GDP per capita.**



**Figure A2: Marginal effect of proportional representation at different levels of GDP per capita and quality of government**

