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

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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 $1/20^{th}$ of debt in excess of 60 per cent

in a given year.[1] 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 1/20th 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.[2] 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.[3]

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.[4]

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[1] Countries with debts below the 60 per cent threshold can run structural deficits of up to 1 per cent of GDP.

[2] 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.

[3] 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.

[4] 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.

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 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 sustain the requisite policies. In advanced economies, proportional representation electoral systems that give rise to encompassing coalitions are positively associated with surplus episodes. Somewhat surprisingly, 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.[5] Economically, currency depreciation tends to be associated with successful adjustments (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.[6] 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

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[5] 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).

[6] 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).

on the 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 polices 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.[7]

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:

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[7] 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).

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

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.[8]

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).[9]

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 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).

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[8] 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.

[9] 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.

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.[10] 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.[11]

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.[12]

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 that 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 SURPLUSES

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

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[10] 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.

[11] 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 δ=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 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 thanks 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.

[12] 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).

advanced economies and 27 middle income countries.[13] 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 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.[14]

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

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[13] 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 general government data are not available, data for central comparison 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.

[14] 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.

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 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 AND 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.[15]

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 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.

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[15] 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).

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).[16]

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.[17]

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.[18] 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 causality running from the inherited debt to the fiscal balance. Any

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[16] We also experiment with an alternative definition of high and growing debts. Specifically, we define a period as having high and growing debts if: (i) public debt is above 100 per cent of GDP (it was 70 per cent in the baseline) for advanced economies and above 70 per cent of GDP for emerging markets (it was 50 per cent in the baseline); (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 70 per cent of GDP (it was 40 per cent in the baseline); (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 70 per cent of GDP (it was 40 per cent in the baseline). With this methodology, we identify 37 periods of high and growing debt. Ten of them overlap with the 36 5-year 3% episodes, 27 overlap with tranquil periods. The probability of observing a 5-year 3% episode conditional on being on a period of high and growing debt is 27 per cent. A test on the difference with the unconditional probability (15 per cent) yields a p value of 0.16.

[17] In addition, 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 has an episode of high or rapidly growing public debt.

[18] Below we attempt to be more precise about causality using a method based on identification through heteroskedasticity.

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

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.[19] 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.[20]

There is some indication that large, persistent primary surpluses are more likely in high income countries.[21] 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.

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.[22] This effect tends to disappear when controlling for domestic GDP growth, however, as we will see below. We also look at GDP growth of trading partners (specifically for each country in our sample we computed the weighted average of trading partners' GDP growth using trade shares as weights) and find that primary surplus episodes are more likely when partners are growing rapidly. In the next section, we will show that, unlike world GDP growth, trading partners' growth is robust to controlling for domestic GDP growth.

There could be spillovers in the setting of fiscal policies, but the direction of these spillovers is uncertain. On the one hand, there could be a "social norm" effect that makes primary surplus episodes more likely when neighboring countries or trading partners are running large primary surpluses. On the other hand, if primary surpluses are associated with economic contractions in other countries, achieving a primary surplus may become more difficult in an environment of low external demand. We find that the positive effect dominates the negative one. In particular primary surplus episodes are positively correlated with the presence of primary surpluses in trading partners (we weight trading partners primary surpluses with trade shares) and neighboring countries (we weight primary surpluses with the inverse of geographical distance). These effects are often robust to controlling for other variables.

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[19] Recall that we are working with headline as opposed to cyclically-adjusted primary surpluses, which may accentuate the correlation with economic growth

[20] Full results are available in Tables A3 and A4 in the online appendix.

[21] Although, again, the difference is not always statistically significant.

[22] Abbas et al. (2014) 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.

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 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.[23]

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. The difference with the control group is statistically significant for four of our nine definitions of what constitutes a large and persistent episode.[24]

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).[25] In contrast, there is no indication that large, persistent primary surpluses are more or less likely in periods of high unemployment or inflation.[26] 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. 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 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

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[23] 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.

[24] 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).

[25] Again, the difference with the control group is statistically significant only in one case.

[26] 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.

1989a,b).[27] 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, 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 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.[28]

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.

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[27] Although, again, the difference is statistically significant only in one of our nine definitions of a large and persistent primary surplus episode.

[28] For the subsample of advanced economies, we also build a list of episodes of rapid debt reduction (defined as five-year periods in which the debt-to-GDP ratio decreased by at least 15 percentage points, 8-year periods in which the debt-to-GDP ratio decreased by at least 20 percentage points, and 10-year periods in which the debt-to-GDP ratio decreased by at least 25 percentage points). We find 15 five-year periods. They overlap with 10 of the episodes listed in column 1 of table 2. There are thus are other ten primary surplus episodes in advanced economies which did not lead to debt reduction. We also find 10 eight-year periods. They overlap with 5 of the episodes listed in the second column of Table 2. Finally, we find 9 ten-year periods with five of them that overlap with the episodes listed in the third column of Table 2 (four ten-year episodes in advanced economies did not lead to substantial debt reduction).

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.[29] 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.

6.2.1. Economic Variables

Table 4, which focuses on economic variables, shows that GDP growth, the debt-to-GDP ratio, the current account balance, GDP per capita, trading partners' growth, trading partners' primary balances, and trade openness are significantly correlated with the likelihood of large and sustained primary surpluses. The point estimates (Table 4, column 1) suggest that a one percentage point increase in domestic growth is associated with a 4.5 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 1.6 percentage point increase in the likelihood of a primary surplus episode (subject to the caveat about

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[29] 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.

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 8 percentage points.[30]

In columns 2 through 4 of Table 4 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 and trading partners' primary balances are sometimes insignificant. In column 5, we replace trading partners' primary balance with neighbors 'primary balance (i.e., instead of weighing other countries primary balance by trade shares, we weigh by the inverse of distance) and find that this variable has a positive coefficient but it is not statistically significant. In column 6, we replace trading partners' growth with world GDP growth and find a negative but not statistically significant coefficient.

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 GDP per capita, the current account balance and public debt are 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 A5 in the online appendix).

The fact that the correlation between primary surplus episodes and GDP per capita is not robust to excluding emerging market countries suggests that GDP per capita may be 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 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.[31] 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.

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[30] 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 6.5 percentage points).

[31] 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.

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 (we do this using a linear probability model because interactive effects are difficult to interpret in non-linear models). 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 between 40 and 90 per cent of GDP.

6.2.2. Political and Institutional Variables

In Table 5 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 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.[32]

6.2.3 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 only significant political variables is the economic orientation of the government. As before, we find that primary surplus episodes are less likely with right wing governments (column 1 of Table 6).

In the next four columns of Table 6 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.

If we estimate the models of Table 6 restricting the sample to advanced economies, we find similar results except that the debt-to-GDP ratio is not always statistically significant and there is a statistically significant and robust effect of proportional representation (Table A6 in the online appendix). The contrast with Table 6 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 6 all countries with income per capita greater than $2000 and for which we have data 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.[33]

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 for countries with either high income per capita or high institutional quality, and it is negative in countries with low institutional quality or income per capita.

We also ran regressions like those reported in Tables 4-6 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 representation dummy is no longer significant when we consider 5 per cent five-year

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[32] 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.

[33] Full regression results are in Tables 11-13 of Eichengreen and Panizza (2014).

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.

6.2.4. 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.[34] 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 linear probability model, we estimate:

$$EP_i = (X_i \times HGD_i)'\Psi + \left(X_i \times (1 - HGD_i)\right)'\Gamma + \delta HGD_i + \varepsilon_i$$

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, Ψ is a vector of parameters that measure the correlation between the explanatory variables and the probability of observing an episode in periods of high or rapidly growing debt and Γ a vector of parameters that measure the correlation between the explanatory variables and the probability of observing an episode in tranquil periods (δ measures the effect of high and growing debt).

We estimate the above equation for the benchmark model of column 3 of Table 6. The first column of Table 7 reports the results for the correlation between explanatory variables and the probability of observing an episode in high and rapidly growing debt periods (the Ψ vector above). The second column then reports the correlation during tranquil periods (the Γ 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,

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[34] 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.

when we did not include controls).[35] This presumably reflects that, by construction, this variable is highly correlated with the debt-to-GDP ratio.

We find that GDP growth, the debt to GDP ratio, trading partners' primary balance, and economic orientation of the government are statistically significant in the high debt subsample and country size, trade openness, the current account balance are statistically significant in the low debt sample.

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 larger than 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 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.

While some variables are statistically significant in one subsample but not in the other, most of them have similar magnitudes and the difference between subsamples is not statistically significant. The exceptions are trade openness, trading partner's growth, and trading partners' primary balances. These variables switch sign and the difference between subsamples is statistically significant. The result for trade openness 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. The result for trading partners' primary balances suggests that peer pressure works more powerfully for countries with high and rising debt.

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 and in the debt-to-GDP ratio. However, the likelihood of running such a large surplus remains moderate even for countries with very high levels of debt.

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[35] In fact it is also significant if we only include political controls.

6.2.5. 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).[36] Assume that we are interested in estimating the following model:

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

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.

As Lewbel's (2012) estimator was derived for liner models, we apply the technique to a linear probability specification. In the first two columns of Table 8 we compare the probit estimates to a linear probability model (neither of these models uses instruments) and show that the linear probability model yields results which are similar to the probit model. In column 3 we estimate the linear probability model using identification through eteroskedasticity (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 8 reports the weak instrument and over identification tests. The Anderson LM statistic rejects the null of underidentification. The Wald statistic, however, if

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[36] The discussion follows Arcand et al. (2015).

fairly low (it is close to Stock and Yogo 30 per cent critical value), suggesting that we may have a weak instrument problem. Finally, the Hansen J test does not reject our over identifying restrictions.

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.

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 (see Figures A1-A6 in the online appendix).

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 2013b). The transactions costs of reaching a social consensus on difficult measures may be easier to reach in small polities. (Recall that economic 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).[37] 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

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[37] For discussion of the Singapore case see below.

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).

We now consider these individual exceptions in more detail.

7.1. Belgium

Belgium is the outlier in this grouping: it has the largest and most 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).[38] 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.[39] 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 behave similarly. IMF (2003) 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

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[38] Data for Singapore are not provided by the UN. We take these from Statistics Singapore (2013).

[39] 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).

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.[40] 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).[41] 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).[42] 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 imbalances.[43] And learning by doing by the HFC in monitoring and coordinating regional and federal fiscal policies undoubtedly helped as well.[44]

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.[45]

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[40] 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.

[41] Inman (2008) refers to the general tendency for subcentral expenditures to be higher when financed with grants than own resources as the "flypaper effect."

[42] 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).

[43] 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.

[44] 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.

[45] 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 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 (in May 2015 the Italian constitutional court challenged some provisions of the Italian pension reform).

7.2. Norway

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.[46] 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 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 a 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.

7.3. Singapore

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.[47]

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[46] 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.

[47] 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."

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.[48]

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 mult-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 (Abeysinghe 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.

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.

7.4. Ireland

The Irish case, where the government ran surpluses of 4 per cent for a decade, is similarly worth considering for its 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, abolishing some long-standing government agencies, and offered a one-time tax amnesty to delinquents. According to Devries, Guajardo, Leigh and Pescatori's (2011) "action-based measure" of fiscal consolidation, tax increases and spending cuts amounted to

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[48] As Bercuson (1995) explains, allocations to the funds are not classified as current expenditures but as allocations of the budget surplus.

1.65 per cent of GDP in 1987 and a further 1.95 per cent in 1988.[49] The result was faster economic growth (with GDP growth accelerating from less than 1 per cent in 1986 to 6 per cent in 1989).[50] This then led to self-reinforcing favorable debt dynamics, as revenue growth accelerated and long-term interest rates declined. In all, the deficit fell from 10.6 per cent of GDP in 1986 to 2.6 per cent in 1989 (Perotti 2011). The debt-to-GDP ratio declined even more rapidly (from 122 to 93 per cent of GDP) with the accelerating growth of its denominator (Broadbent and Daly 2010).

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 in 1986 – 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.) The wage restraint that resulted meant that the improvement in Irish competitiveness endured. 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.

7.5. New Zealand

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

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[49] Perotti (2011) criticizes Devries et al. for missing the tax amnesty and tax self-assessment in 1988, actions that raised revenues by an additional 2.4 per cent of GDP in addition to the above; his estimate of the discretionary improvement in the budget balance between 1986 and 1988 is 5.8 per cent of GDP..

[50] And even faster growth in 1990.

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 and Barnes and Leith 2001).

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.[51] 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.[52]

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[51] See Schick (1998) for a skeptical view and Bakem and Dale (1998) for a balanced assessment.
[52] On the chronology, see Rudd and Roper (1997).

8. CONCLUSIONS

For European governments to reduce their debt-to-GDP ratios to 60 per cent within 20 years, they will have to run large primary budget surpluses, in many cases in excess of 5 per cent of GDP, for extended periods. Such behavior, while not unknown, is exceptional. Even applying 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, savings rates are high, fiscal adjustment is urgent, and the governing party controls all houses of parliament or congress (so that 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. Proportional representation electoral systems that give rise to encompassing coalitions are associated with surplus episodes in advanced countries at least. This is an extensive list of prerequisites or facilitating conditions, only a subset of which European countries plausibly meet.

We also find that countries with strong fiscal institutions at the national level have been best able, historically, to run persistent primary surpluses and bring down high debts by pursuing this strategy. This observation points to the question of whether the EU's Fiscal Compact might in fact substitute for the missing fiscal institutions – and that our criticisms of the Compact are misplaced. Notwithstanding this objection, our view of the compact remains negative. The Fiscal Compact focuses on fiscal outputs rather than inputs: it focuses on the results of fiscal policies, like 0.5 structural deficits, 3.0 current deficits, and 60 per cent debts, rather than the institutions and procedures by which the policies leading to those results are made. Fiscal institutions and procedures facilitating the maintenance of large, persistent surpluses in countries like Belgium and New Zealand focused in the inputs rather than the outputs. They gave agenda setting powers to the prime minister and required strong separation between political appointees and civil servants. They emphasized coherent budgeting at the departmental level, limits on off-budget spending and creative accounting, employment of private-sector financial reporting and accounting rules, and the imposition accountability on technocratic decision makers. This approach is more productive than focusing on arbitrary numerical rules, or so our analysis of exceptional cases suggests.

The closest the Fiscal Compact comes to this is its requirement for member states to create independent fiscal advisory councils to monitor and guide efforts to implement its numerical rules, and that members enshrine in national legislation (or in a constitutional amendment) the compact's requirement that they limit their deficits to prescribed levels. For enforcement it allows the European Court of Justice to fine countries that fail to do so and that violate its ceilings on permissible debts and deficits. Experience in the EU and elsewhere suggests that such sanctions are unlikely to be consistently and effectively enforced precisely because they are externally imposed. Such sanctions are unlikely to be consistently and effectively

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enforced, moreover, because they are not tailored to national circumstances. Other than minor differences in permissible structural deficits for countries with debts greater and less than 60 per cent of GDP, they apply a one-size-fits-all approach, which is poorly suited to individual national circumstances and therefore lacking in credibility.[53] The literature on IMF and World Bank programs emphasizes the importance of "ownership" – that reforms are only sustained and only produce desired results when they are tailored to national circumstances and not seen as externally imposed (Khan and Sharma 2001).

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 relevant institutional reforms need to be adopted at the national level, which will entail a laborious, time-consuming parliamentary process; they cannot be effectively imposed on national polities and societies by EU fiat.

The question is what to do in the meantime. 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 the 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.[54]

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. And continuing to insist on an implausible strategy does neither European policy makers nor anyone else any credit.

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[53] In particular, Whelan (2012) shows that these rules are especially unsuitable for countries with relatively high rates of growth of nominal GDP and relative volatile economies.

[54] For a discussion of the law and economics of sovereign default, see Panizza, Sturzenegger, and Zettelmeyer (2008).

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