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The Blind Side of Public Debt Spikes

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The Blind Side of Public Debt Spikes[1]

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Abstract

What explains public debt spikes since the end of WWII? To answer this question, this paper identifies 179 debt spike episodes from 1945 to 2014 across advanced and developing countries. We find that debt spikes are not rare events and their probability increases with time. We then show that large public debt spikes are neither driven by high primary deficits nor by output declines but instead by sizable stock-flow adjustments (SFAs). We also find that SFAs are poorly forecasted, which can affect debt sustainability analyses, and are associated with a higher probability of suffering non-declining debt paths in the aftermath of public debt spikes.

JEL Classification Numbers: H60, H63

Keywords: Public Debt, Debt Spikes, Stock Flow Adjsutment, SFA, Debt Forecasting

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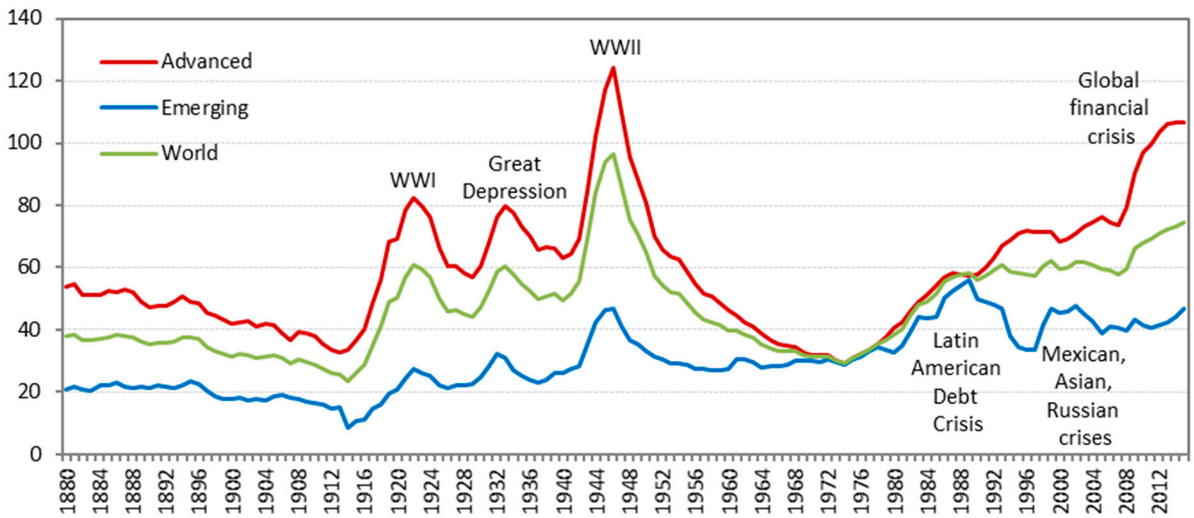
Contents

I. INTRODUCTION

For close to half a century, public debt has been on a consistent upward trend. At end 2015, advanced economies reached levels of debt close to 106 percent of GDP, above those during the Great Depression and only slightly below the level registered in the aftermath of World War II (Figure 1). Developing economies also suffered recently from increases in public debt since the beginning of the Global Financial Crisis.

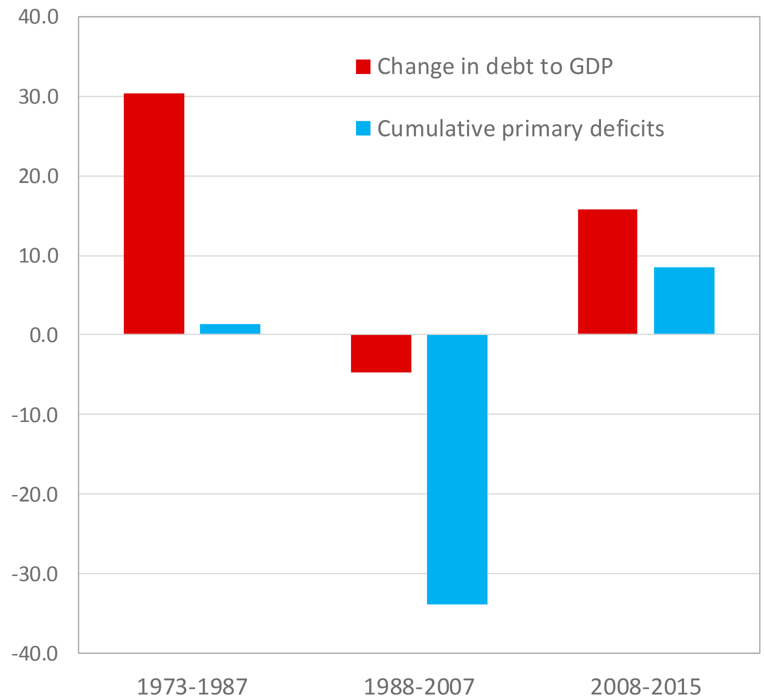
Figure 1. Public Debt, 1880-2015 *(percent of GDP)*



Source: FAD Historical Public Debt Database and IMF Fiscal Monitor.
Note: The chart above uses weighted averages.

Surprisingly, increases in public debt are not the result of large primary deficits. Figure 2 illustrates this point for advanced and developing countries, by contrasting the increase in debt to GDP and cumulative primary deficits during three periods. During 1973-1987, debt increased by about 30 percentage points, but cumulative primary deficits amounted to less than 1½ percent of GDP. During 1988-2007 public debt decreased by about 5 percent of GDP, while cumulative primary surpluses reached almost 34 percent of GDP. During 2008-2015, public debt again increased almost 16 percentage points, although cumulative primary deficits amounted to only 8½ percent of GDP.

Figure 2. Advanced and Developing Countries: Changes in General Government Debt to GDP and Cumulative Primary Deficits, 1973-2015 ***(percent of GDP)***



Source: FAD Historical Public Debt Database, Mauro (2013), IMF Fiscal Monitor, and authors' estimates Note: Each sub-period shows the averages across advanced and developing countries for which data is available.

So, if not primary deficits, what explains the increase in public debt to GDP? To answer this question, we focus specifically on episodes of public debt spikes, that is, episodes where debt to GDP increased by at least 10 percentage points of GDP. We identify 179 episodes of debt spikes from a sample of 90 countries, including advanced and developing economies. We find that the biggest driver of public debt spikes is not primary deficits, nor output, nor interest payments. Indeed, we find that the main driver is large stock flow adjustments (SFAs), the residual term in a traditional debt decomposition exercise. For the median episode among advanced economies, public debt increased by 25 percent of GDP while SFA increased by 20 percent of GDP. For the median episode among developing economies, debt increased 24 percent of GDP while SFA increased by 30 percent of GDP.

The paper digs deeper into this "blind side" of debt dynamics. We first focus on a reduced sample of 28 European Union countries where more granular data on SFAs is available. We find that the net acquisition of financial assets is the main component of SFA increases in those countries. To look at a broader group of advanced and developing countries we use regression analysis. We find that the cost of realized contingent liabilities from the private sector is a major driver of sizable SFA and public debt spikes. The paper also shows that higher SFA accumulation during debt spikes is associated with a higher probability of non-declining debt paths in the aftermath of those episodes. We end the paper by showing that forecasts of SFAs are typically downward biased, which can affect debt sustainability analyses.

This paper is structured as follows: section 2 reviews the scarce literature in this field and section 3 presents the data and the criteria to select debt spike episodes. Section 4 performs debt decomposition of the 179 episodes in our cross-country sample. Section 5 looks into what is behind SFAs, using detailed data for EU countries and regression analysis for a broader sample of countries. Section 6 discusses the consequences of sizable and unforecasted SFAs for debt sustainability analysis. Section 7 summarizes the main findings of the paper and concludes.

II. Literature Review

Many public finance scholars have explored the drivers of debt increases, but the contribution of SFA to debt accumulation has often been neglected.

Some papers have identified the role of SFAs in public debt accumulation. Campos, Jaimovich and Panizza (2006) assemble a dataset of debt spikes in 117 countries (24 high income, 59 middle income, and 34 low income countries) for the period 1972 to 2003. They conclude that debt spikes have little to do with budget deficits, but instead arise from stock flow adjustments, which can be partly explained by contingent liabilities and balance sheet effects. However, they note that these two components only explain 20 percent of the intra-country variance of SFA, and conclude that there is still much that we do not understand about SFA. Abbas et al. (2011) looked at 60 episodes of debt increases between 1880–2007 and found that key contributors to debt surges during non-recessionary periods were both primary deficits and stock-flow adjustments.

Other papers have focused on the link between SFAs and fiscal transparency. Weber (2012), using data for 163 countries between 1980 and 2010, shows that stock-flow adjustments were a significant source of debt increases, while they played only a minor role in explaining debt decreases. SFAs can only be partly explained by balance sheet effects and the realization of contingent liabilities, and significant differences exist in average stock-flow adjustments across countries reflecting country-specific factors. Weber concludes that fiscal transparency has a major role to play in this since fiscally transparent countries tend to have a smaller magnitude of SFA in their debt increases. Using a sample of European Union countries, Von Hagen and Wolff (2006) show how governments use SFA (a form of creative accounting according to the paper) to circumvent the fiscal rules put in place by the European Economic and Monetary Union. They emphasize the need to improve fiscal transparency and reinforce the monitoring of these supranational rules, to reduce off-budget operations.

This paper expands and improves on these works by updating the data to include a longer time series that encompasses the Global Financial Crisis, and by deepening the analysis of the causes and consequences of large SFA accumulation during public debt spikes. We make at least three innovative contributions to the literature in this article. First, we dig deeper into the subcomponents of SFA using new databases and examine statistically the role that major economic variables, contingent liabilities, and underlying political factors have in explaining average SFA contribution to debt spikes.[2] Second, we show how higher SFA accumulation increases significantly the probability of suffering from non-declining debt paths in the aftermath of debt spike episodes. And third, we explore the link between the downward bias in debt forecasts and the underestimation of SFAs. This leads us to conclude that proper forecasting of SFAs is needed to improve debt sustainability analysis.

III. Selection of Episodes

We use a combination of criteria to identify debt spike episodes, using a historical database spanning from 1945 to 2014. First, we identify years where public debt increased by more than 1 percent of GDP. Second, we observe the multi-year trend in the debt increase. If the overall change in debt over consecutive years is equal to or beyond 10 percent of GDP, we define it as a debt spike episode.[3] Note that we do not impose any time limit in terms of duration: the episode can last as long as the debt-to-GDP ratio continues to increase (at least one percent per year). Once the debt-to-GDP ratio changes by less than one percent for two consecutive years, the episode comes to an end. A similar selection criteria was used in earlier works by Abbas et al. (2011) and Weber (2012). The final criterion to select an episode is that there be sufficient data available to calculate the debt decomposition for the duration of the episode. Data on public debt are from the FAD Historical Public Debt Database and the IMF Fiscal Monitor. Data for the debt decomposition are from the Mauro et al. (2013) and the Fiscal Monitor.

We find a total of 179 debt spike episodes of multiyear debt accumulation greater than 10 percent of GDP, 80 among advanced economies and 99 among developing countries. The 179 episodes span 76 countries (28 advanced economies, 26 emerging market economies, 22 low income economies).[4] Annex 3 provides a description of these episodes, by country and the years in which they occurred.

Debt accumulation over the length of the debt spike is very similar across groups of countries. Figure 4 shows that the median debt spike for advanced economies is 25 percent of GDP and 24 percent for developing countries. However, at the median, the duration of the episode is slightly shorter for developing countries (4 years) than for advanced economies (6 years).

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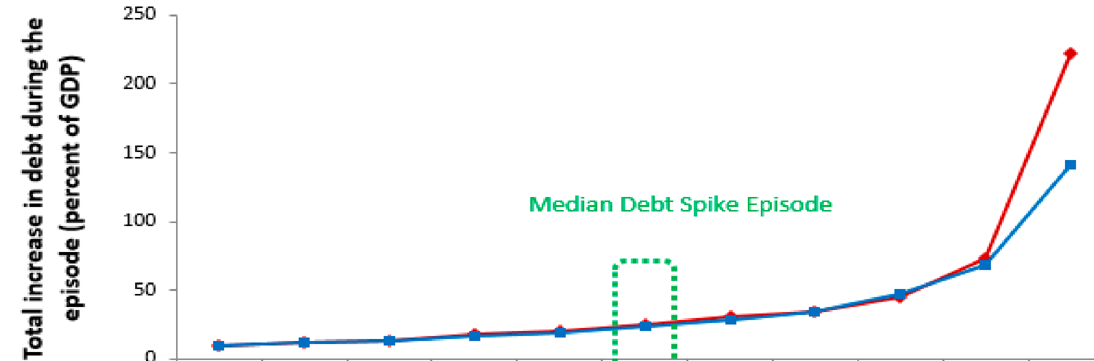
[2] We thank Bova and others (2016) for sharing their data on the cost of contingent liabilities.

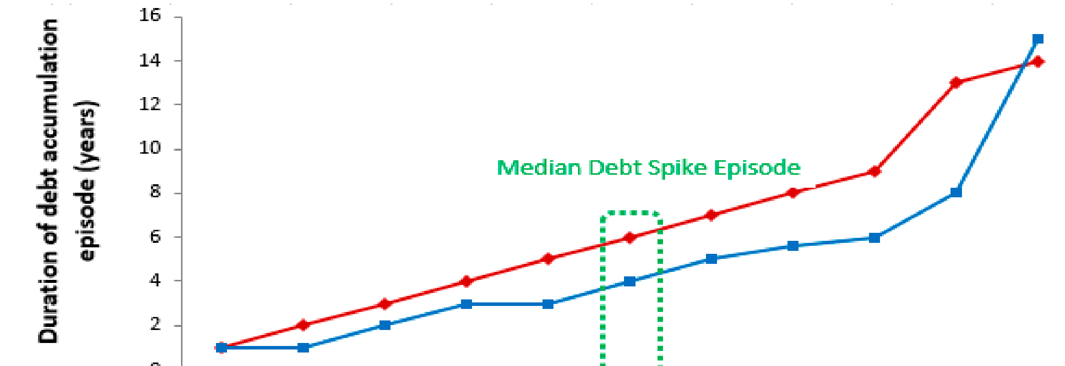
[3] As a robustness check, we also use a 20 percent of GDP debt accumulation threshold. See Annex 1.1.

[4] The 1970s oil-price crisis and the 2008 Global Financial Crisis are not the main drivers of public debt spikes in our sample. For example, the oil-price crisis of 1973 was only followed by 13 debt spike episodes (nine in advanced economies and four in developing economies). Following the global financial crisis, 24 debt spike episodes emerged between 2008 and 2014 (five in advanced economies and 19 in developing economies).

Figure 3. Public Debt Spikes: Size and Duration



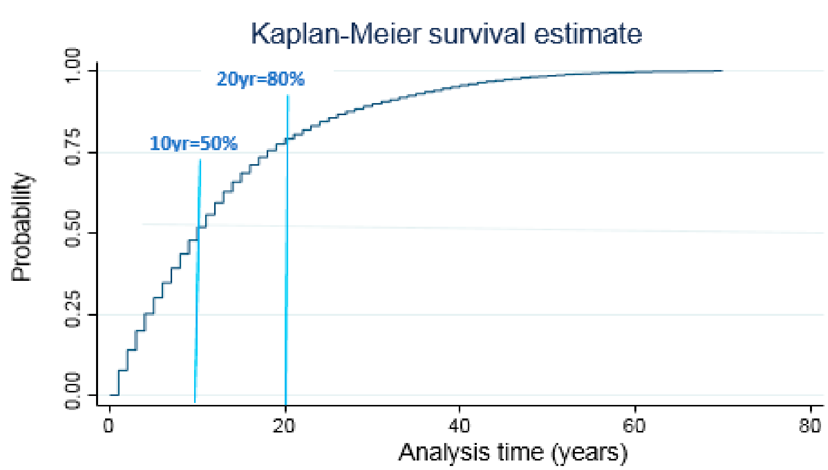
Percentile cut-off	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
Advanced	10.1	12.1	13.7	17.4	20.2	25.4	30.5	34.7	45.4	73.4	221.8
Developing	10.0	12.1	13.0	16.4	18.7	23.6	28.0	34.6	47.2	67.9	141.4



Percentile cut-off	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
Advanced	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	13.0	14.0
Developing	1.0	1.0	2.0	3.0	3.0	4.0	5.0	5.6	6.0	8.0	15.0

Source: Authors' estimates

Figure 4: Probability of Entering a Debt Spike Episode



Source: Authors' estimates

The probability of a country facing a debt spike of 10 percent of GDP is relatively high. We estimate this probability using a non-parametric analysis based on the inverse Kaplan-Meier survival estimator (see Annex 2). The estimator measures the length of time left until an event occurs, thereby estimating the probability of surviving or staying in the current state over time. In our analysis, we look at the probability of entering a debt spike episode of at least 10 percent of GDP for a country that until that moment faced non increasing debt to GDP. Our findings indicate that after 10 years, the probability of falling into a debt spike episode is about 50 percent. After 20 years, the probability increases to about 80 percent (Figure 5).

IV. What Drives Debt Spikes?

Debt spikes can be the result of multiple factors like growth slowdowns, spending booms, or bailouts to the private sector. These factors are typically correlated (Bova et al., 2016; IMF, 2016). In order to understand what drives these large spikes in debt, we carry out a debt decomposition analysis. Equation 1 provides the standard equation for decomposing debt changes (see Escolano, 2010).

$$d_T - d_0 = \sum_{t=1}^{T} \frac{r_t - G_t}{1+G_t} d_{t-1} + \sum_{t=1}^{T} p_t + \sum_{t=1}^{T} s_t \quad (1)$$

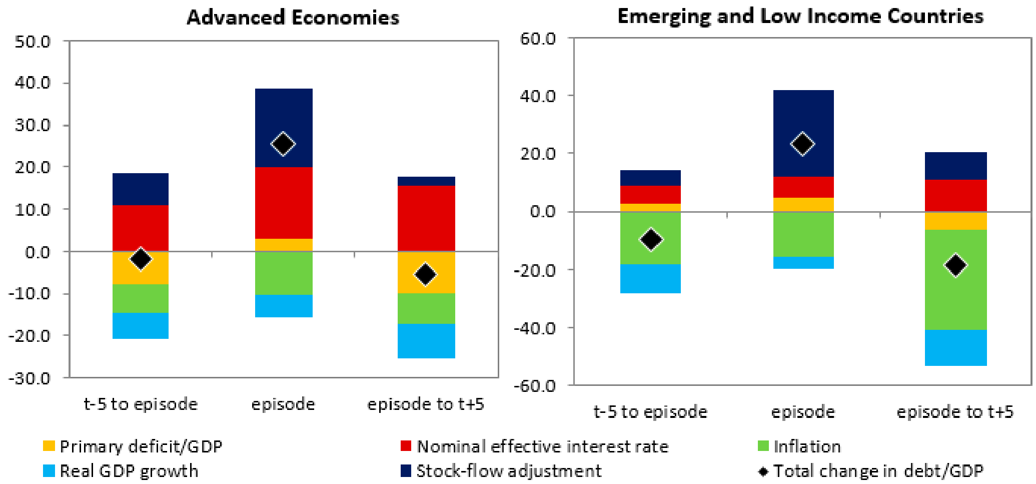
$$d_T - d_0 = \sum_{t=1}^{T} \frac{r_t}{1+G_t} d_{t-1} - \sum_{t=1}^{T} \frac{\pi_t}{1+G_t} d_{t-1} - \sum_{t=1}^{T} \frac{g_t}{1+g_t} d_{t-1} + \sum_{t=1}^{T} p_t + \sum_{t=1}^{T} s_t \quad (2)$$

Equation (1) states that the total episode change in the debt-to-GDP ratio ($d_T - d_0$) is the sum of three components: (i) the product of the lagged debt ratio (d_{t-1}) and the differential between the nominal effective interest rate on debt (r_t) and the nominal GDP growth rate (G_t), cumulated over the episode years; (ii) the cumulative primary deficit to GDP (p_t); and (iii) a cumulative stock-flow adjustment (s_t) that captures valuation effects and "below-the-line" fiscal operations (for example financial sector recapitalization, or privatizations), as well as errors and omissions. Equation 2 decomposes the interest rate growth differential ($\frac{r_t - G_t}{1+G_t}$) further into the contributions from nominal effective interest rate, the growth rate of the GDP deflator (π_t), and real GDP growth (g_t).[5] We use data on fiscal variables and real GDP growth from the WEO where available, and IFS and Mauro et al. (2013) for the historical series.

Figure 5 provides the median value for each of the subcomponents during the five years leading to the debt spike (*t-5 to episode*), during the debt spike episode (*episode*) regardless of the duration of the episode, and the five years following the debt spike episode (*episode to t+5*).

[5] This debt decomposition measures only the direct effect of real GDP on the denominator of the debt to GDP ratio. It does not, however, measure the indirect effects of real GDP growth on other subcomponents (such as the primary balance and SFA), which could be significant. For example, Bova et al. (2016) find that realizations of contingent liabilities (often reflected SFA) tend to occur during periods of economic stress.

Figure 5. Decomposition of Changes to Debt to GDP Before, During, and After the Debt Spike Episode *(percent of GDP)*



Source: FAD Historical Public Debt Database, Mauro (2013), IMF Fiscal Monitor, World Economic Outlook, IFS, and authors' estimates.
Note: For each subcomponent, the chart displays the median values across all episodes by country grouping.

For the median episode in advanced economies, SFA is the main driver of debt dynamics during the debt spike episode. In the lead up to the debt spike episode, advanced countries were typically running primary surpluses. Primary balances, real GDP growth and inflation were enough to offset upward pressures on debt from interest costs and stock-flow adjustments. However, during the debt spike episode, primary surpluses turned into mild primary deficits. Importantly, the stock-flow adjustment increased significantly, reaching 20 percent of GDP at the median. After the episode, primary surpluses return, although interest costs are higher (on account of both higher debt stock and slightly higher nominal effective interest rates). The impact of stock-flow adjustments diminishes.

In contrast to advanced economies, in the lead up to the debt spike episodes, developing countries were typically running small primary deficits. However, relatively higher inflation and stronger growth were enough to reduce debt. During the debt spike episode, a sharp increase in the stock-flow adjustment (close to 30 percent of GDP) explains the bulk of the increase in debt to GDP. After the episode, debt falls somewhat. Primary surpluses help to reduce debt, but part of this effect is offset by higher interest costs on account of the larger stock of debt (the nominal effective interest rate basically returns to the levels observed before the episode). Inflation now plays a more important role in reducing debt to GDP.[6]

[6] Because of limited data on foreign currency denominated debt, we are not able to provide a full decomposition that breaks down the increase in debt related to currency depreciation. Data on foreign currency denominated debt is only available for 24 out of the 99 developing country episodes. For these 24 episodes, stock-flow adjustments at the median amount to 16 percent of GDP, of which 6 percent of GDP can be attributed to the depreciation of the exchange rate.

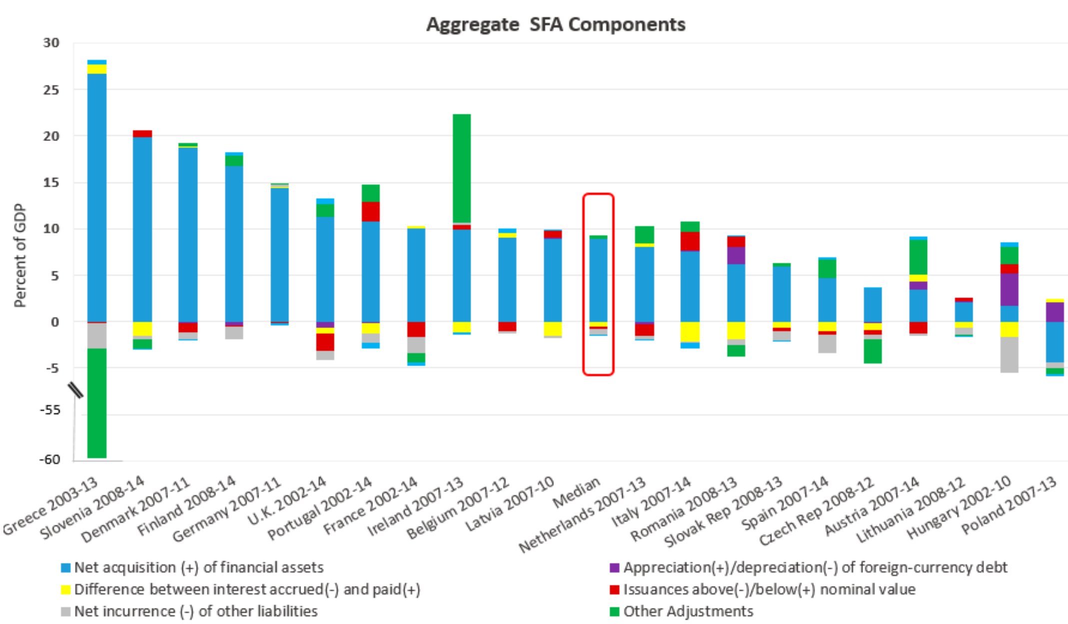
V. What is Behind SFAs?

Given the prominent role of SFA in driving debt spikes, the important question to answer is, what is behind these stock-flow adjustments? There are several reasons why SFA could accumulate and they may be different in advanced and developing economies. These may be a result of underreporting of fiscal deficits, the use of quasi-fiscal spending, or the materialization of contingent liabilities, among others. In some cases, SFA accumulation reflects the government's debt management strategy through financial asset accumulation.

The scarcity of data on the subcomponents of SFA makes it difficult to explore cross-country differences outside advanced economies. To our knowledge, the only credible source of detailed data on SFAs is Eurostat. Eurostat publishes data from 28 EU countries that are required to submit reports of the government deficit and debt levels to the European Commission twice a year. The publicly available data only covers years 2002 to 2014, and a shorter timeframe for countries that joined the EU after 2002. Eurostat breaks SFAs down into seven main subcomponents.[7]

We use this data to look at the behavior of SFA during debt spikes in EU countries (see Figure 6).

Figure 6. EU Member States: Breakdown of SFA During Debt Spike Episodes, 2002-2014



Source: Eurostat, and authors' estimates
Note: For every year, individual SFA subcomponents are divided by the nominal GDP of that year, and then summed up over the episode years.

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[7] (1) net acquisition of financial assets, (2) issuance of debt above or below its nominal value, (3) appreciation or depreciation of foreign currency debt, (4) difference between interest accrued on debt and the interest paid, (5) net incurrece of other liabilities, (6) statistical discrepancies and (7) other adjustments.

After matching the Eurostat data with our database, we found that 21 out of the 28 EU countries had a debt spike between the years 2002 and 2014 (see Annex 3). For this sample, the median debt increase amounted to 27 percent of GDP, and the median SFA amounted to 12 percent of GDP. As evident from Figure 6, net acquisition of financial assets was the largest component of SFA during debt spikes in EU countries, representing about nine percent of GDP.

Besides net acquisition of financial assets, there are several one-off outliers that are worth noting. The largest of these outliers came from Greece in 2012, due to extensive restructuring of government debt (including private investors exchanging bonds). Ireland also had a significantly large portion of its SFA under *Other Adjustments*, related to the consolidation of Irish Bank Resolution Corporation (IBRC).[8] This is also observed in Austria, and the Netherlands albeit on a lesser scale. Other notable SFA adjustments were the result of: (1) pension transfers to the government in the case of Hungary in 2011, which was recorded as a financial advance in government accounts, and (2) the depreciation of local currencies for Hungary, Poland, and Romania between 2008 and 2011 which resulted in a higher value of foreign-currency denominated debt.

Some items under net acquisition of financial assets tend to be illiquid, and can be more difficult to unwind.[9] Currency and deposits, and debt securities can be considered to be liquid assets.[10] The remaining components of the net acquistion of financial assets can be considered to be illiquid assets and therefore unlikely to be easily reversed after the debt spike episode. These are: (1) loans (lending to non-government units such as public corporations); (2) shares and other equity (privatization proceeds, equity injections in public corporations or portfolio investments); (3) other account receivables (the ESA follows the accrual accounting method which allows for recording of transactions when obligation to pay arises instead of when the payment is actually made); and (4) other financial assets (receivables in taxes and social contributions or reimbursements from the EU for amounts paid by governments on its behalf). Figure 7 showns the breakdown of the net acquisition of financial asset by country. Figure 8 groups some of these components and shows that illiquid asset accumulation is a major contributor to SFA accumulation. This suggests that unloading these assets to reduce debt after the episode can be a difficult undertaking.

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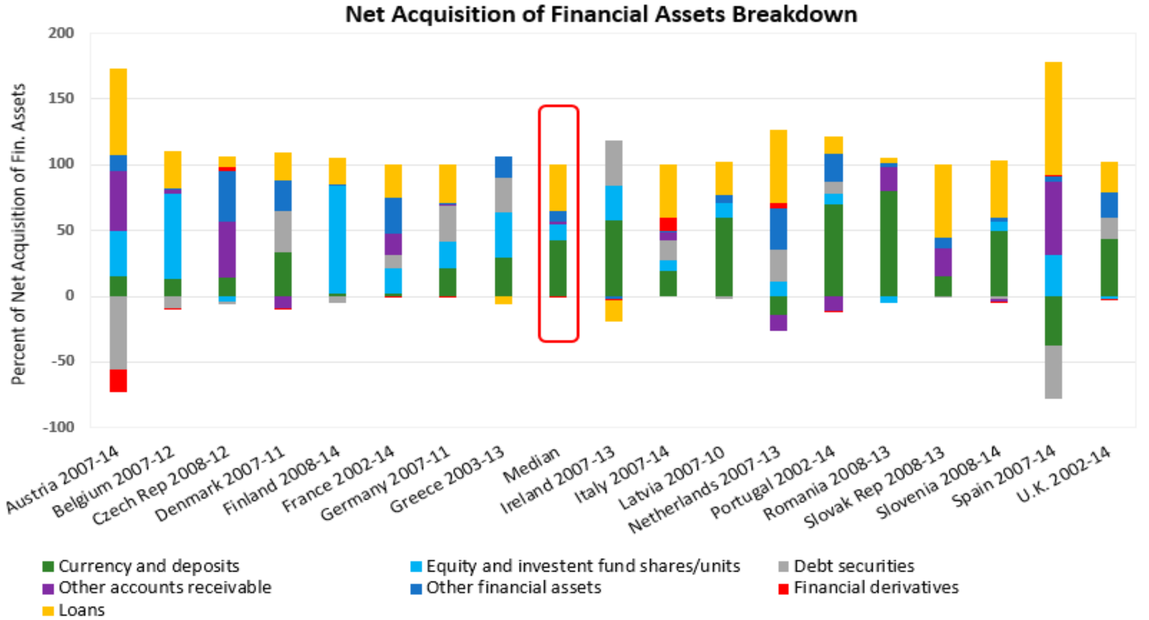
[8] This was later reversed when IBRC was liquidated in 2013.

[9] From a portfolio management point of view, acquiring high quality and liquid assets can be as good a debt management strategy as reducing liabilities.

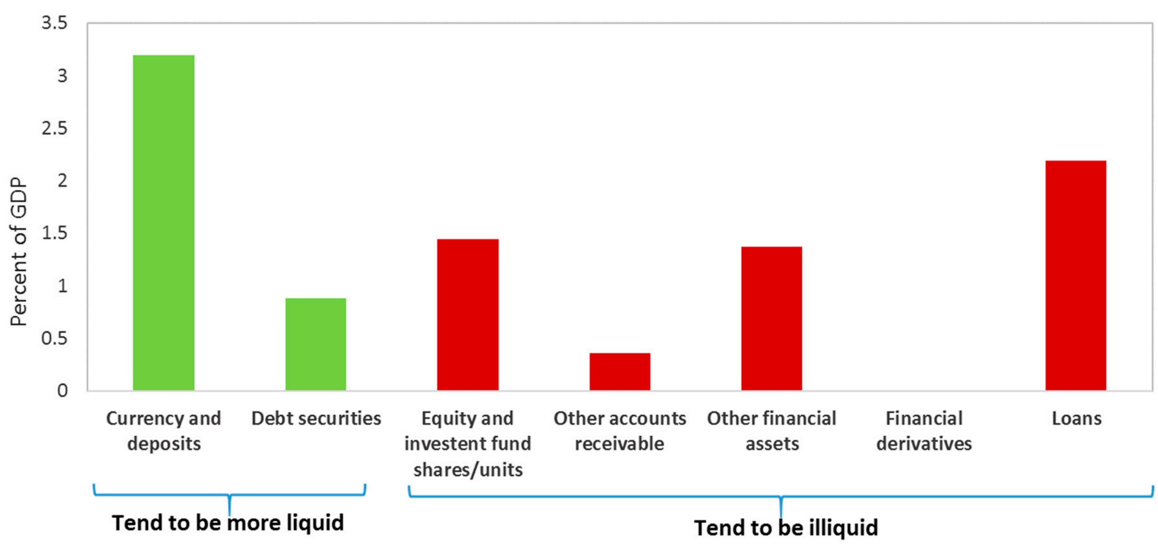
[10] Currency and deposits reflects the movement of government deposits at banks, which mainly depends on treasury operations, although other government units can also hold bank accounts. Debt securities mainly reflect the net purchases of bills, notes or bonds issued by foreign governments, banks, and non-financial corporations. It is expected that governments can easily access their cash and deposits and the part of the debt securities from foreign governments that are unlikely to default.

Figure 7. EU Member Countries: Breakdown of Net Acquisition of Financial Assets During Debt Spike Episodes, 2002-2014



Source: Eurostat, and authors' estimates.
Note: The chart above includes only countries where net acquisition of financial assets over the episode was greater than 2 percent of GDP.

Figure 8. Liquidity of SFA Components



Source: Eurostat, and authors' estimates

In order to provide a picture of the possible elements underlying SFAs beyond EU countries, we rely on regression analysis. SFAs can arise from the materialization of contingent liabilities, for example bailouts of subnational entities or state owned enterprises (see Bova et al., 2016). Other economic factors important to understand the size of SFA include the pre-existing level of debt, inflation, currency depreciation, and the share of external debt

(Campos and others, 2006). Political conditions (like elections or fragmentation) and the existence of fiscal rules and strong institutions (Weber, 2012) may also affect the size of SFAs.

Using our initial dataset of 179 episodes of debt spikes, we regress the average size of SFA during debt spikes on the economic and political factors mentioned above. Data on contingent liabilities is from Bova et al. (2016), and data on other macroeconomic variables is from the World Economic Outlook database. After controlling for underlying economic conditions like the initial level of debt and average inflation, Table 1 shows that the size of realized contingent liabilities is a major driver of SFA accumulation. This is especially the case in developing countries (see Annex 1.2). Contingent liabilities coming from the financial sector have a stronger impact on SFA than other contingent liabilities (Annex 1.3). Also, currency depreciation is a major source of debt accumulation, especially in those countries with higher external debt. In terms of political conditions, forthcoming elections and fragmented coalition cabinets are also associated with higher average SFA during debt spikes, though this result is not significant once the sample is separated into advanced and developing countries (Annex 1.2). Having strong fiscal rules seems to be an important factor in increasing transparency and reducing the size of SFAs.[11]

Table 1. Regression Analysis: Explaining the Size of SFA During Debt Spikes[12]

	Average Size of SFA	Average Size of SFA	Average Size of SFA	Average Size of SFA	Average Size of SFA	Average Size of SFA	Average Size of SFA	Average Size of SFA
Initial debt level (t-1)	0.251***	0.252***	0.226***	0.171***	0.158***	0.160***	0.159***	0.170***
	(0.0381)	(0.0383)	(0.0301)	(0.0288)	(0.0275)	(0.0272)	(0.0270)	(0.0267)
Average inflation		0.0147***	-0.00240	-0.0133***	-0.0124***	-0.0116***	-0.0125***	-0.0123***
		(0.00481)	(0.00411)	(0.00414)	(0.00394)	(0.00392)	(0.00392)	(0.00384)
Average currency depreciation			0.651***	0.472***	0.415***	0.390***	0.402***	0.376***
			(0.0631)	(0.0645)	(0.0627)	(0.0632)	(0.0631)	(0.0626)
Average depreciation * High External Debt				0.671***	0.685***	0.697***	0.699***	0.683***
				(0.111)	(0.106)	(0.105)	(0.104)	(0.102)
Size of realized contingent liabilities					0.409***	0.413***	0.398***	0.432***
					(0.0953)	(0.0943)	(0.0939)	(0.0928)
Future elections dummy						4.265**	4.328**	3.540*
						(2.037)	(2.021)	(2.001)
Coalition government dummy							3.729*	5.031**
							(1.981)	(1.998)
Fiscal rule dummy								-7.218***
								(2.614)
Constant	1.815	1.202	-3.424*	-1.216	-2.085	-0.292	-2.371	-2.305
	(2.204)	(2.267)	(1.829)	(1.699)	(1.628)	(1.824)	(2.120)	(2.078)
Observations	177	169	169	169	169	169	169	169
R-squared	0.198	0.240	0.538	0.622	0.660	0.669	0.676	0.691

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

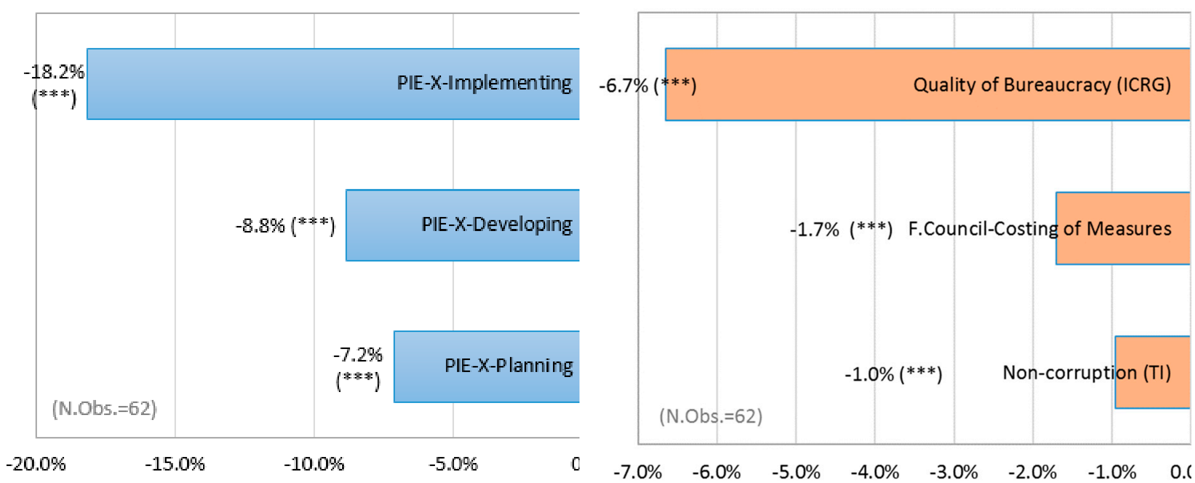
[11] In our sample, countries that have fiscal rules and stronger fiscal institutions experience a lower frequency of debt spikes, but the size of these spikes (whenever they happen) is similar to the sample average.

[12] A similar table explaining the size of SFA for debt spikes above 20 percent of GDP is included in Annex 1.1.

While data scarcity makes it impossible to include in our regressions the role of strong budget institutions on SFA accumulation, simple correlation analysis shows that many variables associated with the quality and efficiency of public investment management help reduce average SFAs as shown in Figure 9a. This is because countries with strong management systems are also those countries with more transparent public finances, and better management of fiscal risks and potential contigent liabilities. For example, a one percent increase in the PIE-X (Public Investment Management Efficiency) index measuring the efficiency in the implementation stage is associated with a 18.2 percent lower average SFA.[13] A similar change in the PIE-X score during the developing and planning stages is associated with a 8.8 percent and 7.2 percent drop in SFA values respectively. In addition, positive changes in institutional indicators also lower the contribution of SFA to total debt. As shown in Figure 9b, the quality of the bureaucracy is important in that a point gain as measured by International Country Risk Group (ICRG) is associated with a 6.7 percent drop in SFA level. Lower levels of corruption and a higher score on the fiscal council's costing of measures indicator, which quantifies the short or long term effects of the measures and reforms put in place, is also associated with lower SFA levels.

Figure 9. The Negative Correlation between Governance Indicators and SFAs

9a. Average SFA change, for a 1 percent increase in PIE-X index | **9b. Average SFA change, for a 1 percent increase in institutional indicators**



Sources: Transparency International, International Country Risk Group (ICGR), authors' estimates

Another way of illustrating the positive impact that good governance has on the size of SFAs is by replicating the inverse-Kaplan-Meier estimates under different institutional setups. Using the PIE-X and PIMA (Public Investment Management Assessment) indexes as proxies of the strength of budget institutions, we can test this differential effect. Figure 10 shows that the probability of entering a debt spike in a context of strong (PIE-X/PIMA) budget institutions is significantly lower than when these budget institutions are weak.

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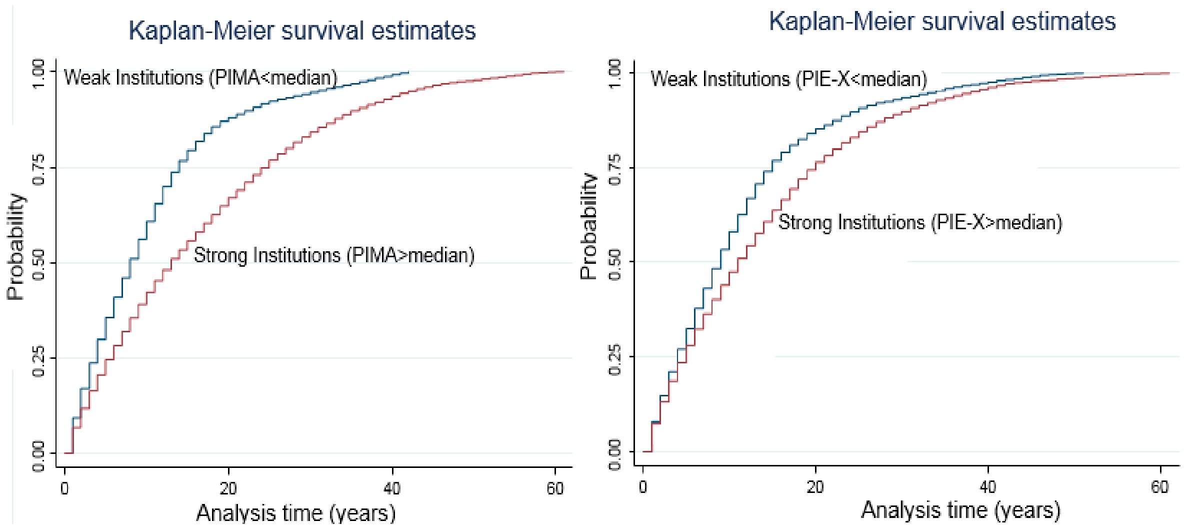
[13] Public Investment Management Efficiency (PIE-X) is an IMF tool that measures the relationship between the accumulated public capital stock per capita and various indicators of the quality of and access to infrastructure. The closer a country is to the efficiency frontier, the more efficient its public investment.

Figure 10. Probability of Entering a Debt Spike with Strong Institutions



Sources: Authors' estimates

VI. What are the Consequences of Sizable and Unforecasted SFAs?

Once we have characterized debt spikes and shown that SFA is a major source of debt accumulation, this final section looks at the consequences of SFAs on subsequent public debt dynamics and debt forecasting.

Note that we do not take any normative position with respect to the necessity to reduce public debt in the aftermath of SFA driven debt spikes, an issue of much debate in the literature. Some have argued in favor of debt reduction because of the burden that it places on economic growth. Panizza and Presbitero (2013) and Cottarelli and Jaramillo (2013) provide an overview of the link between public debt and growth. Others have argued that it is optimal to stabilize debt to GDP at the new level. Barro (1979) and Lucas and Stokey (1983) establish that in the absence of default risk, the optimal debt accumulation depends on the stochastic properties of the shock process. Therefore, while the net effect on public debt of small and mean-reverting business cycle shocks may be zero, the optimal response after a large one-off adverse shock such as an SFA realization may be to continue around that new and higher level of debt for a long time until a large one-off positive shock (such as a privatization episode or secular asset price boom) is realized. According to Ostry, Ghosh and Espinoza (2015), fiscal authorities should just aim at stabilizing the debt ratio at its current level, and only reduce debt-to-GDP ratios opportunistically or organically through growth. Escolano and Gaspar (2016) argue that the optimal fiscal policy in normal times is to reduce debt ratios gradually but persistently in anticipation of future large negative events.

The size of SFA and the 'non-declining debt path syndrome'

In the previous section, we showed that accumulation of illiquid assets is a major contributor to large SFAs during debt spikes. This suggests that unloading these assets to reduce debt after the episode can be a difficult undertaking in the near term. Our hypothesis is that large SFAs could therefore be directly associated with a higher probability of facing a "non-declining debt path syndrome" in the aftermath of debt spikes, preventing countries from rebuilding fiscal buffers.

To test this hypothesis, we use a probit model regression which estimates the probability of debt to GDP following a non-declining path after the debt spike. Here, we look at the change in debt between the last year of the debt spike, and the average of years three, four, and five in the aftermath of that episode. If the average drop in debt between years three to five after the end of the debt spike is less than 10 percent of GDP, we consider that this country suffers from a non-declining debt path (taking a value of 1). On the contrary, if the drop exceeds 10 percent of GDP we consider it to be a declining debt path (taking a value of 0).[14] There are 65 episodes with the value 0 and 78 episodes with the value 1. We regress this binary variable against the following regressors: debt level at the end of the debt spike, average SFA during the episode, average primary balance during the episode, average episode growth, and average inflation.

Results in Table 2 show that the probability of suffering from a "non-declining debt path syndrome" in the aftermath of debt spikes increases with the average size of SFA during the episode, and with the level of debt at the end of the episode. On the contrary, that probability decreases with higher primary surpluses, and is not statistically correlated with either average growth or inflation during the episode.

Table 2. Probit Results for the Ex-Post Non-Declining Debt Path

Probit	Ex-post Flat-debt path	Ex-post Flat-debt path	Ex-post Flat-debt path	Ex-post Flat-debt path
Debt level (end-of-episode)	1.181***	1.017***	1.011***	1.016***
	(0.0569)	(0.0566)	(0.0525)	(0.0533)
Average SFA (during episode)		0.671***	0.782***	0.613***
		(0.1)	(0.0954)	(0.183)
Average Primary Balance (during episode)			-2.841***	-2.776***
			(0.524)	(0.537)
Average Episode Growth (during episode)				-0.214
				(0.576)
Average Episode Inflation (during episode)				0.312
				(0.32)
Constant	25.82***	24.15***	20.45***	20.71***
	(3.281)	(2.935)	(2.805)	(2.832)
Observations	178	177	177	177
R-squared	0.71	0.773	0.806	0.807

Unforecasted SFA and overoptimistic debt projections

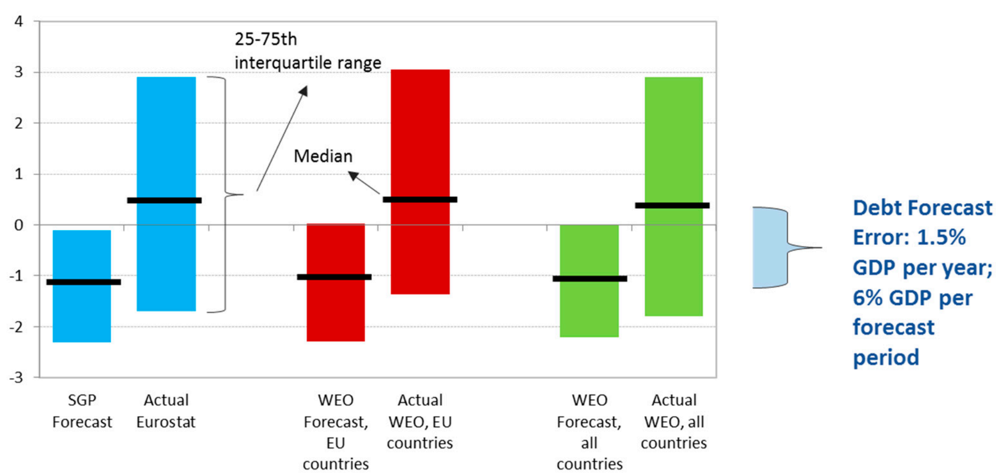
Despite the sizeable impact of SFAs on debt accumulation, this factor is largely ignored when forecasting public debt to GDP ratios, resulting in overoptimistic projections for the debt path over the medium-term. Over-optimism in forecasting of macroeconomic and fiscal

[14] The results shown in this section are robust to alternative thresholds of post-episode debt reduction. Results using a 5 percent of GDP threshold are available from authors upon request.

variables has been highlighted before, but no attention has been given to SFAs. For example, Frankel (2011) looked at government forecasting of real growth and budget forecasts and concluded that there is a positive bias which is much bigger in booms and keeps worsening with time. In addition, he found that countries subject to budget rules, such as the EU member states in the context of Stability and Growth Pact (SGP), have more biased forecasts than their peers. He concluded that having independent experts who are insulated from political pressure may help stem the tendency by governments to satisfy fiscal targets by "wishful thinking" manisfested in the positive forecasts. This sentiment was also shared by Timmerman (2007) who looked at the World Economic Outlook (WEO) data forecasts on real GDP growth and inflation and concluded that there is a tendency for overprediction of GDP growth and underprediction of inflation with the bias getting more significant over time.

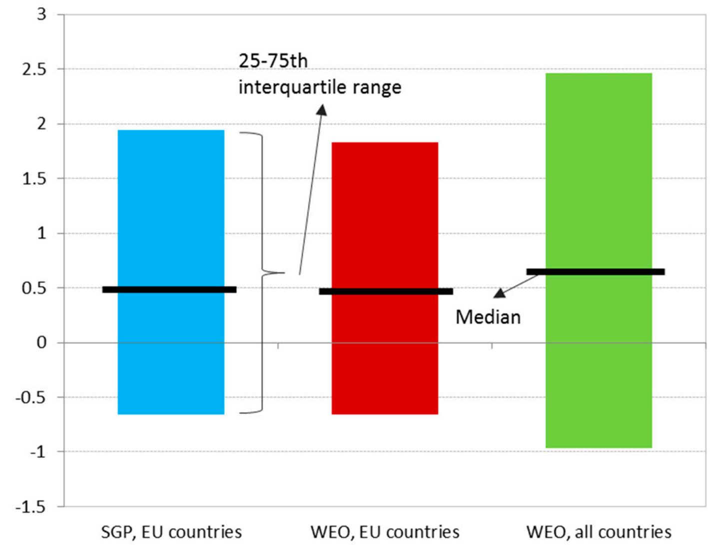
We find that most countries have a downward bias in their debt forecasts, resulting in large discrepancies between forecasted and actual data. Part of this forecasting error stems from consistent and systemic disregard for stock flow adjustments (SFA). Debt forecasting errors for EU countries are calculated using SGP and Eurostat data for 27 EU countries, and also WEO data for the same sample of EU countries. For our larger sample of advanced and developing countries, debt forecast errors are calculated using WEO data. Figure 12 shows that these discrepancies can be sizeable, regardless of whether the country is in a debt spike episode. The median country underestimates debt by 1.5 percent of GDP each year, or 6 percent of GDP for a standard forecast period of 4 years. At the 75th percentile of the distribution, that number can go up to three percent of GDP per year, or 12 percent of GDP in a 4-year forecast period. Underestimation of SFAs is an important contributor to debt forcast errors. Figure 12 shows that SFAs are underestimated, at the median, by ½ percent of GDP per year, with some variation by country (Figure 13).

Figure 11. Distribution of Actual and Forecast Annual Changes in Debt to GDP



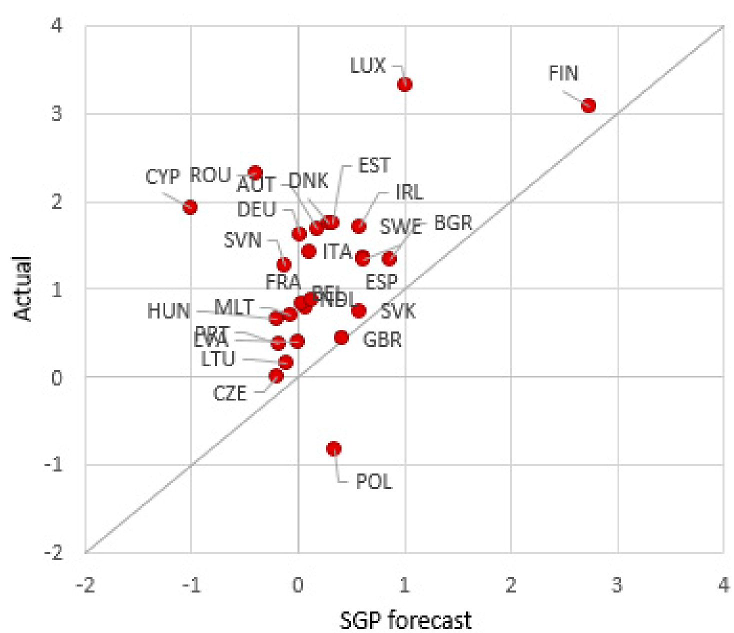
Sources: World Economic Outlook (WEO), Eurostat, and authors' estimates.
Note: Forecasts for t+2, t+3, and t+4. Columns for "EU countries" correspond to observations for 27 countries for annual forecast vintages between 1991 and 2014. Columns for "all countries" correspond to observations for 85 countries for Spring WEO vintages between 1995 and 2014.

Figure 12. Distribution of Annual Forecast Errors of SFAs



Note: Forecasts for t+2, t+3, and t+4. Columns for "EU countries" correspond to observations for 27 countries for annual forecast vintages between 1991 and 2014. Columns for "all countries" correspond to observations for 85 countries for Spring WEO vintages between 1995 and 2014.

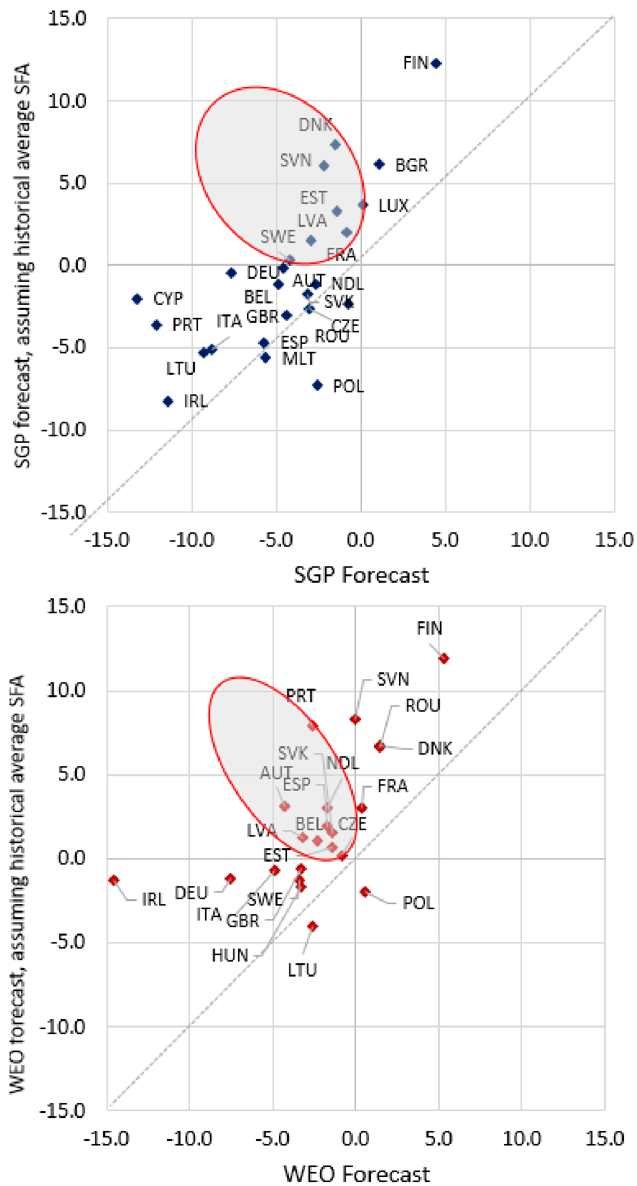
Figure 13. EU Countries: Average Stock Flow Adjustments, Actual vs Forecast, 1991–2014



Sources: World Economic Outlook (WEO), Eurostat, and authors' estimates.

We carry out a simple exercise to illustrate the effect of underestimating SFAs for debt sustainability analysis. Forecasts in the October 2015 Fiscal Monitor showed that by 2018 debt would be on a declining path in 17 out of 23 European countries. Similarly, in the April 2015 SGP forecasts for 2018, 22 out of 25 countries would be facing declining debt ratios. If, instead, we apply historical SFA trends to forecast the debt to GDP ratios for these countries, only 9 would have debt on a declining path by 2018 in the WEO forecast, and only 16 in the SGP forecast (Figure 14).

Figure 14. Using Historical Trends to Forecast Future SFAs



Sources: World Economic Outlook (WEO), Eurostat, and authors' estimates.

The difficulty in forecasting SFAs contributes to their being overlooked in debt sustainability analyses (DSAs). There are nevertheless a few options to improve forecasting in this area. For example, a greater use of sensitivity analysis in DSAs for the potential existence and realization of SFAs is one possible approach. In addition, the use of fiscal stress tests may be a better vehicle than using baseline forecasts to identify the potential effect of financial sector-related SFAs. The use of stochastic methods can also help in managing fiscal risks which could be conducive to future accumulation of SFAs (IMF, 2016). Also, the variance of idiosyncratic shocks in the DSA may be increased to take into account the impact of exchange rate shocks (particularly in EMs). Finally, analysts could make use of other diagnostic tools, such as the IMF Fiscal Transparency Evaluation, to help identify the potential impact of SFAs on debt, particularly those related to quasi-fiscal spending and contingent liabilities.

VII. Conclusions

This paper has used a long historical time series to show that large debt spikes are typically driven by large stock-flow adjustments, rather than primary deficits or declines in output. Stock-flow adjustments have been largely overlooked, becoming a blind spot for debt sustainability analysis and management of fiscal risks

The consequences of large SFAs can be long-lasting. SFAs are often linked to an accumulation of illiquid assets that can not easily by offloaded to reduce debt. Indeed, we find that higher SFA accumulation increases significantly the probability of suffering from non-declining debt paths in the aftermath of debt spike episodes, preventing countries from going back to lower debt levels.

We also show that debt forecasts typically have a downward bias, attributed in part to the underestimation of SFAs. This allows us to conclude that better forecasting of SFAs is needed to improve debt sustainability analysis. This can be done making greater use of probabilistic forecasting methods to map uncertainty around trajectories of public debt in combination with fiscal stress tests (IMF, 2016). Better forecasting will help countries get a proper understanding of their debt vulnerabilities and build fiscal buffers that could cushion them against unexpected shocks. This awareness will also help with instituting policies and measures necessary to meet their objectives for debt to GDP in the medium to long run.

ANNEX 1. Robustness Checks

Annex 1.1. Using a 20 percent of GDP threshold to identify debt spike episodes

Here, we follow the same approach discussed in Section III, but use 20 percent of GDP as the threshold of cumulative debt accumulation to identify a debt spike episode. We identify 107 episodes. Table 1.1.1 provides the corresponding descriptive statistics of the selected episodes. Table 1.1.2 replicates the regression analysis on the average size of SFA using this new sample. Similar to our earlier results, we find that after controlling for underlying economic conditions like the initial level of debt and average inflation, the size of realized contingent liabilities, currency depreciation, and level of external debt are major drivers of SFA accumulation.

Table 1.1.1. Descriptive Statistics: Debt Spikes (20 percent threshold)

	Number of Episodes	Debt Change(% of GDP)					Episode Duration(Years)				
		Min	25%	75%	Max	Median	Min	25%	75%	Max	Median
All countries	107	20.1	26.5	56.9	221.8	35.2	1	3	8	15	6
Advanced countries	49	20.1	27.6	62.0	221.8	34.5	1	5	10	14	7
Developing countries	58	20.2	26.1	55.9	141.4	36.2	1	2	6	15	4

Table 1.1.2. Regression Analysis: Explaining the Size of SFA During Debt Spikes (20 percent threshold)

	Average Size of SFA	Average Size of SFA	Average Size of SFA	Average Size of SFA	Average Size of SFA	Average Size of SFA	Average Size of SFA
Initial debt level (t-1)	0.281***	0.271***	0.247***	0.196***	0.188***	0.188***	0.195***
	(0.0509)	(0.0504)	(0.0385)	(0.0372)	(0.0361)	(0.0362)	(0.0358)
Average inflation		0.0646***	0.0273	0.0288*	0.0209	0.0205	0.0171
		(0.0241)	(0.0188)	(0.0173)	(0.0170)	(0.0171)	(0.0169)
Average currency depreciation			0.704***	0.498***	0.462***	0.455***	0.477***
			(0.0830)	(0.0897)	(0.0876)	(0.0898)	(0.0890)
Average depreciation*High external debt				0.606***	0.617***	0.624***	0.617***
				(0.139)	(0.134)	(0.136)	(0.133)
Size of contingent liabilties realized					0.340***	0.342***	0.326***
					(0.121)	(0.121)	(0.120)
Future elections dummy						-1.383	-1.696
						(3.321)	(3.268)
Coalition government dummy							6.398**
							(3.093)
Constant	3.664	2.929	-3.789	-1.781	-3.159	-2.660	-6.757**
	(3.349)	(3.403)	(2.709)	(2.530)	(2.492)	(2.775)	(3.371)
Observations	105	101	101	101	101	101	101
R-squared	0.228	0.277	0.585	0.654	0.680	0.681	0.695

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Annex 1.2. Results dividing the sample into advanced and developing countries

We split our sample into advanced and developing countries to see if SFAs are driven by different factors across the two groups of countries. Our findings below indicate that developing countries have larger coefficients than reported in the main text across most factors: pre-existing level of debt, currency depreciation, and the share of external debt. Inflation appears to be the main factor in the case of advanced economies.

Table 1.2.1. Regression Analysis: Explaining the Size of SFA During Debt Spikes (Advanced vs. Developing Economies)

ADV	Average Size of SFA	Average Size of SFA	Average Size of SFA	Average Size of SFA	Average Size of SFA	Average Size of SFA	Average Size of SFA
Initial debt level (t-1)	0.00656	0.0146	0.00577	0.00577	0.00438	0.00909	0.00944
	(0.0432)	(0.0257)	(0.0258)	(0.0258)	(0.0258)	(0.0262)	(0.0264)
Average inflation		0.622***	0.628***	0.628***	0.611***	0.598***	0.599***
		(0.0511)	(0.0505)	(0.0505)	(0.0524)	(0.0539)	(0.0542)
Average currency depreciation			0.367*	0.367*	0.359*	0.372*	0.370*
			(0.214)	(0.214)	(0.214)	(0.214)	(0.216)
Average depreciation*High external debt				-	-	-	-
Size of contingent liabilties realized					0.111	0.114	0.110
					(0.0938)	(0.0939)	(0.0958)
Future elections dummy						-1.574	-1.540
						(1.597)	(1.613)
Coalition government dummy							0.507
							(1.948)
Constant	5.515**	1.211	1.839	1.839	1.579	2.265	1.842
	(2.156)	(1.357)	(1.388)	(1.388)	(1.401)	(1.565)	(2.265)
Observations	79	75	75	75	75	75	75
R-squared	0.000	0.673	0.686	0.686	0.692	0.696	0.697

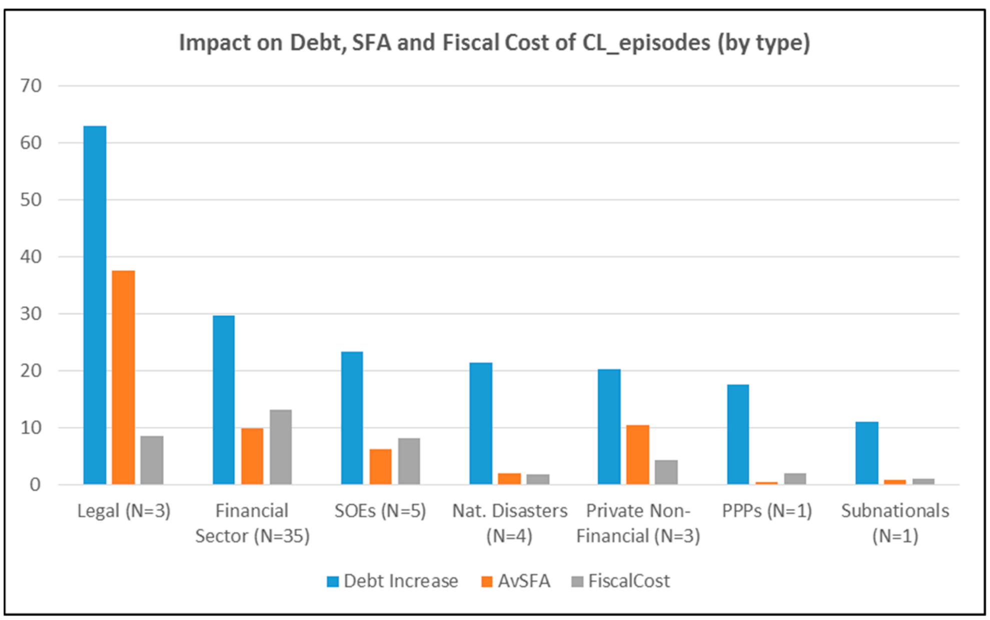
Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

EME	Average Size of SFA	Average Size of SFA	Average Size of SFA	Average Size of SFA	Average Size of SFA	Average Size of SFA	Average Size of SFA
Initial debt level (t-1)	0.326***	0.330***	0.319***	0.253***	0.237***	0.236***	0.231***
	(0.0501)	(0.0505)	(0.0363)	(0.0349)	(0.0337)	(0.0339)	(0.0338)
Average inflation		0.0123**	-0.00371	-0.0129***	-0.0120***	-0.0119***	-0.0126***
		(0.00540)	(0.00425)	(0.00421)	(0.00402)	(0.00407)	(0.00405)
Average currency depreciation			0.694***	0.537***	0.478***	0.474***	0.455***
			(0.0749)	(0.0737)	(0.0727)	(0.0747)	(0.0749)
Average depreciation*High external debt				0.571***	0.588***	0.591***	0.598***
				(0.115)	(0.110)	(0.111)	(0.110)
Size of contingent liabilties realized					0.365***	0.367***	0.365***
					(0.115)	(0.116)	(0.114)
Future elections dummy						-0.647	-0.659
						(2.967)	(2.939)
Coalition government dummy							4.667
							(2.849)
Constant	3.223	2.101	-9.185***	-6.283**	-6.568***	-6.307**	-7.396***
	(3.179)	(3.292)	(2.662)	(2.440)	(2.325)	(2.626)	(2.684)
Observations	98	94	94	94	94	94	94
R-squared	0.306	0.343	0.664	0.737	0.764	0.764	0.771

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Annex 1.3. Are Contingent Liabilities from the Financial Sector Different?

The lack of detailed data on contingent liabilities realized and what sectors were affected is a challenge to more precise analysis. From the dataset provided by Bova et al. (2016), we are able to match about 53 cases to our episodes. Despite the small sample, there seems to be some correlation between contingent liabilities realized in the financial sector and large SFA episodes. The relationship seems much stronger with contingent liabilities realized in the legal sector, but this is attributed to the presence of two sizable outliers.



Using a simple regression analysis due to the sample size, we observe that the impact of contingent liabilities realized in the financial sector is twice as high as that in other cases.

Table 1.3.1. Regression Analysis: Financial Contingent Liabilities and Size of SFA

SIMPLE REGRESSIONS

	10% Threshold	
Coefficients (simple regressions)	**Average Size of SFA**	**Number Obs**
Size of Realized Contingent Liabilities	0.383***	N=51
	[2.34]	
Size of Realized Contingent Liabilities (financial)	0.639***	N=35
	[3.30]	

	20% Threshold	
Coefficients (simple regressions)	**Average Size of SFA**	**Number Obs**
Size of Realized Contingent Liabilities	0.393***	
	[2.06]	N=39
Size of Realized Contingent Liabilities (financial)	0.618***	N=26
	[2.60]	

T-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

ANNEX 2. The Kaplan-Meier Survival Estimation Technique

We define *T* as the discrete random variable that measures the time span between the periods in which countries fail to maintain public debt under control and are thus experiencing a debt spike episode.[15] In other words, the observations of variable *T* in the sample consist of a series of data (*t1, t2,… tn)* which correspond to each observed non-increasing debt to GDP year in the sample. The following hypothetical example explains how the data are constructed.

Country/Year	Non-increasing debt episode (*id dummy*)	Non-increasing debt episode [*T*] (*duration variable*)	Debt spike episode (*failure variable*)
Country A-2001	0	0	1
Country A-2002	0	0	1
Country A-2003	1	1	0
Country A-2004	1	2	0
Country A-2005	1	3	0
Country A-2006	1	4	0
Country A-2007	0	0	1
Country B-2001	0	0	1
Country B-2002	1	1	0
Country B-2003	1	2	0
Country B-2004	1	3	0
Country B-2005	1	4	0
Country B-2006	1	5	0
Country B-2007	0	0	1

The probability distribution of the duration variable can be specified by the cumulative distribution function:

$$F(t)=Pr(T<t) \qquad (1)$$

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

Survival and hazard functions are linked through the following expression:

$$S(t) = \prod_{s=1/t}(1 - h(s)) \qquad (2)$$

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

$$\hat{h}(t) = \frac{d_t}{n_t} \quad (3)$$

where *dt* represents the number of failures registered in *t*, and *nt* is the surviving population in *t*, before the change takes place.

From the hazard function, it is possible to obtain the cumulative hazard function given by:

$$\hat{H}(s) = \sum_{s=1}^{t} \hat{h}(s) \quad (4)$$

The Kaplan-Meier survivor function for duration *t* is calculated as the product of one minus the existing risk until period *t:*

$$\hat{S}(t) = \prod_{j/t_j \leq t} (\frac{n_j - d_j}{n_j}) \quad (5)$$

The non-parametric analysis is very limited because it does not take into account other variables that can influence the probability of ending a period of non-increasing debt.

In the literature, the model that has usually been used to characterize the hazard function is the *model of proportional hazard*, which assumes that the hazard function can be split as follows: $h(t, X) = h_0(t) * (g(X)$ where *ho(t)* is the baseline hazard function that captures the dependency of data to duration, and *g(X)* is a function of individual variables. In this proportional specification, regressors intervene re-escalating the conditional probability of abandoning the period of non-declining debt, not its own duration.

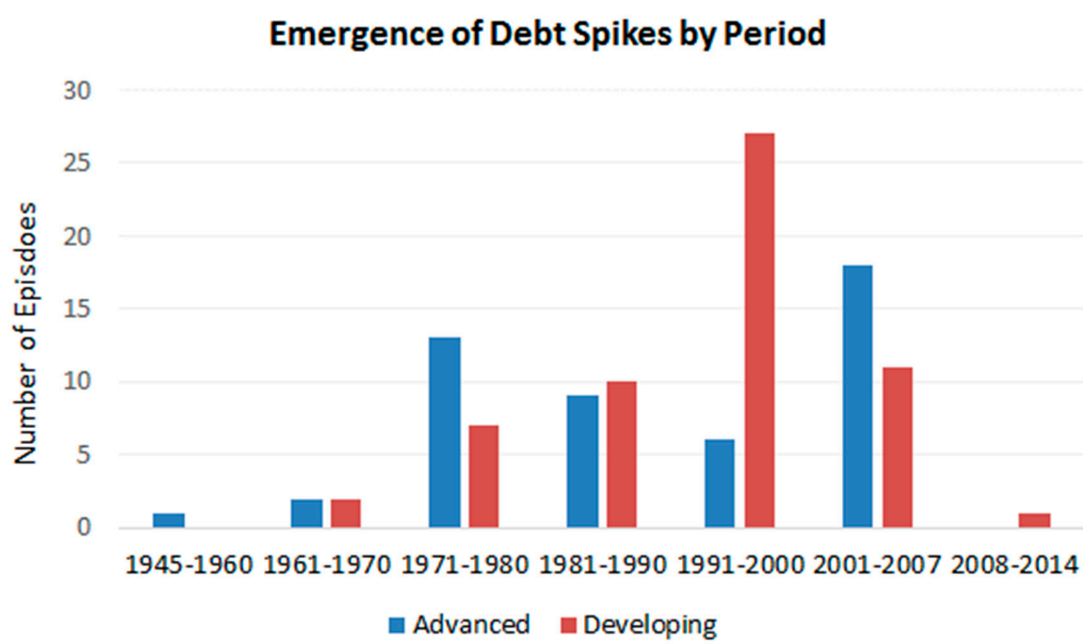
A better estimation can be obtained by imposing one specific parametric form to the function *h0(t)*. A commonly used general specification used the *Weibull* distribution for the baseline hazard: $h0(t)=pt^{p-1}$, where *p* is a parameter that has to be estimated. When $p=1$, this model is equal to the *exponential model*, where there is no dependency on duration. When the parameter $p>1$, there is a positive dependency on duration, and a negative dependency when $p<1$. Therefore, by estimating *p*, it is possible to test the hypothesis of duration dependency of non-increasing debt episodes.

[15] As define above, a debt spike episode is identified when there is an annual change of at least 1 percent of GDP and the cumulative multiannual debt spike is equal or greater than 10 percent of GDP.

ANNEX 3. Description of Debt Spike Episodes

Country	Episodes	Income Group	Episodes Years
Australia	3	Advanced	1964-1966,1991-1994,2007-2014
Austria	3	Advanced	1974-1987,1992-1995,2007-2014
Belgium	4	Advanced	1969-1970,1974-1987,1989-1993,2007-2012
Canada	3	Advanced	1980-1986,1988-1995,2007-2012
Czech Republic	2	Advanced	1997-2003,2008-2012
Denmark	3	Advanced	1976-1984,1991-1993,2007-2011
Finland	2	Advanced	1990-1994,2008-2014
France	3	Advanced	1980-1987,1989-1997,2001-2014
Germany	3	Advanced	1974-1983,1989-1997,2007-2012
Greece	3	Advanced	1958-1963,1988-1993,2003-2013
Iceland	3	Advanced	1981-1984,1987-1995,2005-2011
Ireland	3	Advanced	1948-1958,1973-1987,2007-2013
Israel	2	Advanced	1973-1984,2000-2003
Italy	3	Advanced	1970-1975,1980-1994,2007-2014
Japan	4	Advanced	1965-1972,1974-1987,1991-2005,2007-2014
Korea	2	Advanced	1969-1972,2002-2006
Latvia	1	Advanced	2007-2010
Lithuania	1	Advanced	2008-2012
Netherlands	2	Advanced	1980-1989,2007-2013
New Zealand	4	Advanced	1966-1968,1974-1979,1981-1986,2007-2011
Norway	5	Advanced	1969-1970,1974-1980,1984-1986,1990-1993,1998-2006
Portugal	2	Advanced	1974-1985,2000-2014
Singapore	2	Advanced	1997-2013,2007-2012
Slovak Republic	2	Advanced	1998-2000,2008-2013
Slovenia	1	Advanced	2008-2014
Spain	3	Advanced	1977-1986,1988-1996,2007-2014
Sweden	3	Advanced	1966-1968,1976-1985,1991-1994
Switzerland	3	Advanced	1969-1970,1989-1998,2001-2004
United Kingdom	2	Advanced	1991-1995,2002-2014
United States	3	Advanced	1981-1987,2001-2004,2007-2014
Argentina	6	Developing	1961-1962,1974-1975,1980-1983,1986-1989,1993-2002,2011-2014
Armenia	1	Developing	2008-2013
Bolivia	2	Developing	1970-1985,1999-2005
Brazil	3	Developing	1971-1980,1982-1984,1995-2002
Bulgaria	2	Developing	1992-1993,1995-1996
Cameroon	1	Developing	2009-2014
Chad	1	Developing	2008-2013
Chile	2	Developing	1972-1975,1981-1986
China	2	Developing	1997-2002,2004-2009
Colombia	2	Developing	1982-1985,1994-2003
Congo, Democratic Republic of	1	Developing	2000-2001
Congo, Republic of	4	Developing	1992-1994,1996-1998,2000-2003,2010-2013
Egypt	2	Developing	2002-2005,2008-2014
Ethiopia	2	Developing	1992-1994,1997-2002
Georgia	1	Developing	2007-2010
Ghana	5	Developing	1962-1963,1982-1989,1991-1995,1998-2000,2006-2014
Haiti	2	Developing	1998-2003,2011-2014
Honduras	5	Developing	1968-1971,1973-1987,1989-1990,1992-1994,2008-2014

		Episodes	
Country	Episodes	Income Group	Years
Hungary	1	Developing	2001-2010
India	3	Developing	1954-1961,1992-1993,1998-2003
Indonesia	2	Developing	1981-1987,1997-1999
Jordan	2	Developing	1988-1990,2008-2014
Malaysia	1	Developing	2008-2009
Mexico	5	Developing	1963-1970,1972-1977,1980-1983,1985-1986,1994-1995
Moldova	1	Developing	1995-1998
Morocco	2	Developing	1991-1997,2009-2014
Mozambique	2	Developing	2004-2005,2011-2014
Myanmar	1	Developing	1999-2001
Nicaragua	1	Developing	2000-2002
Pakistan	4	Developing	1961-1972,1984-1990,1997-2001,2007-2012
Peru	3	Developing	1981-1985,1987-1990,1997-2003
Philippines	3	Developing	1973-1987,1991-1993,1996-2003
Poland	1	Developing	2007-2013
Romania	1	Developing	2008-2013
Russian Federation	1	Developing	1996-1999
Senegal	1	Developing	2006-2014
South Africa	4	Developing	1964-1965,1975-1977,1988-1994,2008-2014
Sudan	2	Developing	1997-1998,2008-2012
Tanzania	1	Developing	2007-2011
Thailand	2	Developing	1980-1986,1996-2000
Turkey	3	Developing	1980-1987,1993-1994,1997-2001
Uganda	2	Developing	1998-2002,2009-2014
Ukraine	3	Developing	1997-1999,2007-2010,2012-2014
Vietnam	1	Developing	2006-2014
Yemen	1	Developing	2008-2012
Zambia	1	Developing	2008-2014



EU debt spike episodes 2002-2014

EU 2002-2014 Episodes

Country	Income Group	Years	Country	Income Group	Years
Austria	Advanced	2007-2014	Latvia	Advanced	2007-2010
Belgium	Advanced	2007-2012	Lithuania	Advanced	2008-2012
Czech Republic	Advanced	2008-2012	Netherlands	Advanced	2007-2013
Denmark	Advanced	2007-2011	Poland	Developing	2007-2013
Finland	Advanced	2008-2014	Portugal	Advanced	2000-2014
France	Advanced	2001-2014	Romania	Developing	2008-2013
Germany	Advanced	2007-2012	Slovak Republic	Advanced	2008-2013
Greece	Advanced	2003-2013	Slovenia	Advanced	2008-2014
Hungary	Developing	2001-2010	Spain	Advanced	2007-2014
Ireland	Advanced	2007-2013	United Kingdom	Advanced	2002-2014
Italy	Advanced	2007-2014			

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