

---

## Current Debt Crisis in Historical Perspective

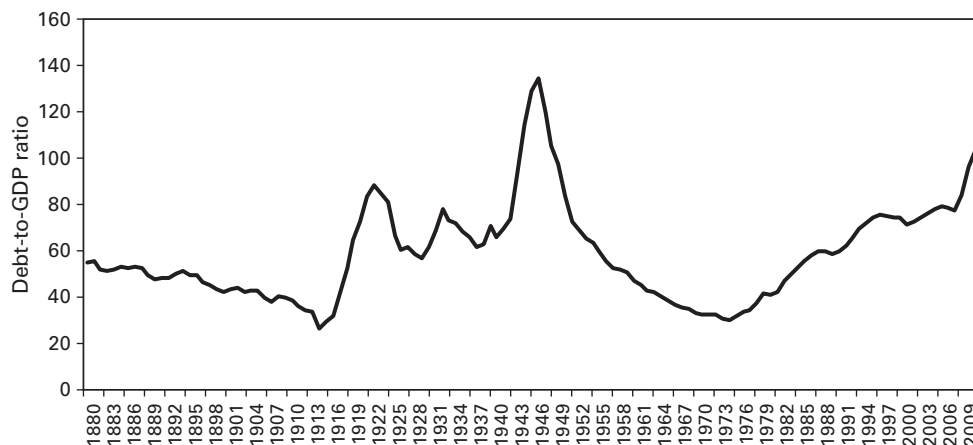
S. Ali Abbas, Nazim Belhocine, Asmaa El-Ganainy, and Anke Weber

### 7.1 Introduction

The simultaneity and scale of debt accumulations in a number of advanced countries in the wake of the global financial crisis and the accompanying so-called Great Recession have renewed attention and interest in the historical behavior of public debt in advanced economies, and first research on this topic has already emerged, such as Reinhart and Rogoff (2011), Abbas et al. (2011), IMF (2012), and Reinhart et al. (2012).

These studies have indicated, consistent with figure 7.1, that the current debt buildup is certainly not unique in its scale if the entire past century is considered.<sup>1</sup> Debt ratios in 19 advanced economies, 14 of which are European, underwent a number of major spikes (followed by reversals) since the early 1900s.<sup>2</sup> The most notable of these relate to World Wars I and II, when the weighted-average debt ratio rose to about 90 and 130 percent, respectively.<sup>3</sup> Major debt buildups during peacetime, which would constitute a more relevant comparator for the ongoing debt surge, occurred around the Great Depression (1929 to 1932) and over the four decades leading up to the current crisis (1970 to 2007). During the Great Depression, 15 out of 19 countries witnessed increases of 10 percentage points of GDP or more in their public debt ratios, with the weighted-average increase recorded at 23 percent of GDP. By comparison, during the period 1970 to 2007, public debt ratios in 14 out of 19 countries registered increases of more than 10 percent of GDP, with a weighted-average increase of 45 percent of GDP.

However, a number of important questions related to historical episodes of debt buildup merit further attention. For example, what is the *explanation* for the relative size and composition of past debt surges (i.e., contribution of cumulative primary deficits vs. interest-rate–growth differential) when compared with the current debt buildup? In particular, why is the debt increase in the Great Recession larger than that observed during the Great Depression despite the fact that the growth decline has been much smaller this time around? To what extent did a larger initial debt and



**Figure 7.1**

Public debt in 19 advanced countries, 1880 to 2009

Sources: Historical Public Debt Database; authors' calculations

size of state contribute to this anomalous result? Similarly, what were the key drivers of the seminal debt increase witnessed over the period 1970 to 2007, and to what extent were these constant through the decades? What insights can be gleaned regarding the *composition* of stock-flow adjustments, which Abbas et al. (2011) highlighted as an important driver of past debt surges?

A second set of questions relates to what we can learn from past debt reductions. While examining the debt buildups related to the World Wars may not be that interesting from a policy perspective, their unwinding certainly is. Debt is debt, whether created out of military spending or financial crisis, and policy makers confronted with high debt could benefit from an analysis of the factors guiding postwar debt reductions which, incidentally, remain unprecedented in scale and scope: during 1945 to 1970, debt ratios in the advanced economies fell in weighted-average terms by about 90 percentage points, with large reductions in each of the cases of the United Kingdom, the United States, and Japan. The key policy issue here is whether debt reduction strategies adopted during that period, such as financial repression (Reinhart et al. 2011), can be realistically replicated in today's globalized financial markets, and given the markedly different holder profiles of public debt.

This chapter attempts to shed light on these questions that have clear policy relevance for debt sustainability and prospects for debt reduction in today's advanced economies. The rest of the chapter is organized as follows: Section 7.2 presents our analytical framework and a brief literature review. Section 7.3 analyzes the ongoing

debt buildup in advanced economies, drawing comparisons with the Great Depression and identifying key distinguishing features. Section 7.4 examines the gradual but pervasive debt increase during 1970 to 2007 (the so-called Great Accumulation), identifying both the evolution of the relative contributions of the primary deficit and interest–growth differential components, as well as analyzing the role of large stock-flow adjustments linked to currency and banking crises. Section 7.5 sheds light on major successful debt reduction episodes in the immediate aftermath of World War II (WWII), highlighting the role of negative real interest rates, and presenting a contrast with debt reductions during periods of greater financial liberalization.

## 7.2 Analytical Framework and Literature Review

A standard framework for decomposing large debt ratio increases (decreases) is represented by the following equation (Escolano 2010):

$$d_T - d_0 = \sum_{t=1}^T \frac{i_t - \gamma_t}{1 + \gamma_t} d_{t-1} + \sum_{t=1}^T p_t + \sum_{t=1}^T sfa_t. \quad (7.1)$$

Equation (7.1) states that the total episode change in the debt-to-GDP ratio ( $d_T - d_0$ ) is the sum of three components, each cumulated over the episode years: (1) the product of the lagged debt ratio and the differential between the effective interest rate on debt ( $i_t$ ) and the nominal GDP growth rate ( $\gamma_t$ ), (2) the primary deficit ( $p_t$ ), and (3) a residual stock-flow adjustment term ( $sfa_t$ ).<sup>4</sup> It is important to note up front that this decomposition likely understates the true contribution of economic growth to debt reduction, since high growth eases the political constraints on improving the primary fiscal balance.

Using a similar methodology, a number of cross-country studies have attempted to explain the sources of changes in public debt, although lack of long time series data has limited the time coverage of most of these studies to the post-1970 period. For instance, Campos, Jaimovich, and Panizza (2006) examine public debt changes in 117 countries over the period 1972 to 2003 and find that traditional factors (i.e., primary balances and interest–growth differentials) largely explained the debt buildups (and reductions) changes in advanced economies, whereas stock-flow adjustments were critical for developing economies.<sup>5</sup> Easterly (2001) invokes the debt decomposition framework to highlight the role of real economic growth in driving large debt changes. He argues that the buildups in the 1980s and 1990s in advanced economies were caused by an unanticipated growth slowdown and a delay in calibrating fiscal policies to that slowdown.

Abbas et al. (2011) is the only study, however, to systematically apply this framework to historical debt increases in advanced economies over a sufficiently long time period. They identify 60 major episodes of debt ratio increases (of 10 percentage

**Table 7.1**

Debt ratio increases for 60 large debt ratio increases in 19 advanced economies, 1880 to 2007 (in percent of GDP unless otherwise indicated; averages across episodes)

Large debt increases	Number of episodes	Starting debt ratio	Ending debt ratio	Total increase	Components (as share of total increase)				
					Primary deficit	Interest–growth differential ( $i - \gamma$ )	$i$	$-\gamma$	Debt-increasing stock-flow adjustment
War	16	71.4	109.5	38.0	45.3	5.0	47.1	–42.0	49.7
Peacetime	44	46.7	92.5	45.8	30.0	24.1	67.0	–45.0	45.9
Nonrecession	16	39.6	86.4	46.8	38.5	–11.5	81.5	–95.9	72.9
Recession	28	50.8	96.0	45.2	25.0	45.1	58.4	–14.9	29.9
All (simple average)	60	53.3	97.0	43.7	33.6	19.7	62.4	–44.3	46.8
All (median)	60	43.5	81.3	32.5	21.4	31.4	57.1	–31.5	44.4

Source: Abbas et al. (2011)

points or more) for 19 advanced countries over 1880 to 2007 (reported in appendix table A7.1 of this chapter), the largest of which were Greece (169 percentage points, 1886–1894, and 78 percentage points, 1979–1993) United Kingdom (149 percentage points, 1940–1946), Italy (95 percentage points, 1963–1994), Austria (56 percentage points, 1974–1996), Switzerland (56 percentage points, 1928–1944), and Spain (56 percentage points, 1974–1996). The mean (median) debt increase was sized around 44 (33) percentage points; while the median speed was about 6 percentage points of GDP per year.

The identified episodes were then divided into different subsamples according to their timing (e.g., coincidence with periods of military conflict, global recession), as shown in table 7.1. Interestingly, and while wartime debts accumulated faster than those during peacetime, the rapid increase in advanced economies' debts during the Great Recession represents an exceptional feature of the current debt crisis. Moreover, although wartime debt increases started from higher debt levels and were associated with larger primary deficits, they were smaller in size than peacetime debt increases. The key driver of this anomalous result appears to be the interest–growth differential component, the contribution of which was relatively modest in wartimes (5 percent of the debt increase), but sizable in peacetimes (24 percent); during global recessions (prior to 2007), it rose to 45 percent. Another interesting result they report is that debt increases during nonrecessionary periods were slightly larger than those during global recessions. The key contributors to these good time debt surges were fiscal profligacy, but also SFAs. While the average contribution of SFAs over all

60 debt buildup episodes amounted to 47 percent, they were noticeably larger during nonrecessionary episodes (73 percent).

In the next section, we extend the debt decomposition exercise to analyze the ongoing debt build up in advanced economies (i.e., during the Great Recession) and contrast it to the surge witnessed during the Great Depression, the last time advanced economies together experienced a large, negative, and sustained shock to output during peacetime.

### 7.3 A Tale of Two Crises: Debt Buildups during the Great Recession and the Great Depression

#### 7.3.1 Debt Buildup during the Great Recession, 2007 to 2013

Table 7.2 shows the results of the decomposition exercise of debt changes for the 17 advanced economies whose debt ratios increased by more than 10 percentage points of GDP during 2007 to 2013. The episodes were defined using trough-to-peak debt ratios, so in some cases the start- and end-years were different from 2007 and 2013, respectively (although the horizon in all cases was bounded within 2007 to 2013). In addition to the standard components driving debt ratio increases (primary deficit and interest–growth differential), currency depreciation effects and financial asset buildups (defined as the difference between changes in gross and net debt), both of which feed into the SFA, are also examined. The main findings are as follows:

- The weighted-average debt increase is about 40 percent of GDP, with the largest surges witnessed in Ireland (93 percentage points), Japan (58 percentage points), Greece (54 percentage points), Portugal (50 percentage points), Spain and the United Kingdom (about 47 percentage points each), and the United States (45 percentage points). All other countries registered debt increases exceeding 10 percent of GDP, except Sweden and Switzerland, whose debt ratios actually declined.
- Sixty-five percent of the weighted-average debt increase was accounted for by cumulative primary deficits, 25 percent by the interest–growth differential component, and 10 percent by SFAs.
- Structural primary deficits account for about 60 percent of the headline primary deficits, although several countries (Belgium, Canada, Finland, Germany, and Italy) ran cumulative structural surpluses during the period.
- In the cases of the larger debt increases noted above, the structural primary deficit contributed, on average, more than 75 percent to the deterioration in the primary deficit.
- The contribution of the interest–growth differential was divergent across countries, broadly mirroring the evolution of interest and growth rates over the period 2007 to 2013 (figure 7.2).<sup>6</sup> Several groups of countries emerge:

**Table 7.2**

Decomposition of debt ratio increases in advanced economies during the Great Recession (in percent of GDP, cumulative over the episode years)

Large debt increases	Starting debt ratio	Ending debt ratio	Components						Residual	
			Increase	Primary deficit	Of which: Structural primary deficit	Interest-growth differential ( $i - \gamma$ )	Debt-increasing stock-flow adjustment	Of which: Buildup in financial assets <sup>a</sup>		
Australia	9.7	24.8	15.1	10.4	10.7	1.3	3.3	-2.3	5.6	
Austria	60.2	75.8	15.5	3.2	1.2	5.4	7.0	1.8	5.2	
Belgium	84.1	98.7	14.6	0.2	-2.3	7.7	6.7	4.0	2.6	
Canada	66.5	86.7	20.2	-0.2	-4.1	6.3	14.1	6.3	7.9	
Finland	33.9	54.2	20.3	2.6	-6.9	1.6	16.0	21.0	-5.0	
France	64.2	93.1	28.9	17.0	5.8	7.9	3.9	1.2	2.7	
Germany	65.2	83.2	18.0	-0.2	-3.4	6.3	11.9	11.6	0.4	
Greece	105.4	159.3	53.9	23.2	28.2	28.3	2.5	0.0	2.5	
Ireland	24.8	118.2	93.3	59.1	29.8	22.8	11.4	-3.0	14.4	
Italy	103.1	126.6	23.5	-10.0	-15.6	28.8	4.8	5.4	-0.6	
Japan	188.6	246.8	58.2	37.6	29.5	28.5	-7.9	-9.4	1.6	
Netherlands	45.3	71.2	25.9	9.9	6.2	7.7	8.3	9.8	-1.5	
New Zealand	17.4	37.7	20.3	12.4	8.5	2.2	5.7	1.8	3.8	
Portugal	68.3	118.6	50.3	13.5	11.6	22.8	14.0	-0.3	14.3	
Spain	36.1	84.0	47.9	31.9	22.9	12.6	3.5	2.7	0.8	
United Kingdom	43.9	90.3	46.4	32.0	23.2	4.7	9.7	-1.6	11.3	
United States	67.2	112.0	44.8	37.3	22.3	4.3	3.2	6.0	-2.8	
<b>PPPGDP-weighted average<sup>b</sup></b>	<b>80.5</b>	<b>120.6</b>	<b>40.1</b>	<b>26.2</b>	<b>16.0</b>	<b>10.1</b>	<b>3.7</b>	<b>3.1</b>	<b>0.6</b>	
<i>Memo items:</i>										
Sweden <sup>c</sup>	40.2	33.8	-6.4	-9.0	-11.3	-0.2	2.8	-4.5	6.8	
Switzerland <sup>c</sup>	55.9	47.5	-8.4	-11.3	-11.0	1.3	1.7	-1.4	3.0	

Sources: World Economic Outlook; authors' calculations.

Note: The Great Recession period was bound to 2007 to 2013 for all countries except Finland (start-year is 2008); Germany (end-year is 2010); Greece (end-year is 2011); and Australia, Belgium, Canada, and New Zealand (end-year is 2012) in order to capture the largest debt increase for each country during the Great Recession.

a. Positive values imply accumulation/acquisition of financial assets.

b. Computed using 2007 PPPGDP weights.

c. Debt-to-GDP ratios for Sweden and Switzerland declined during 2007 to 2013.

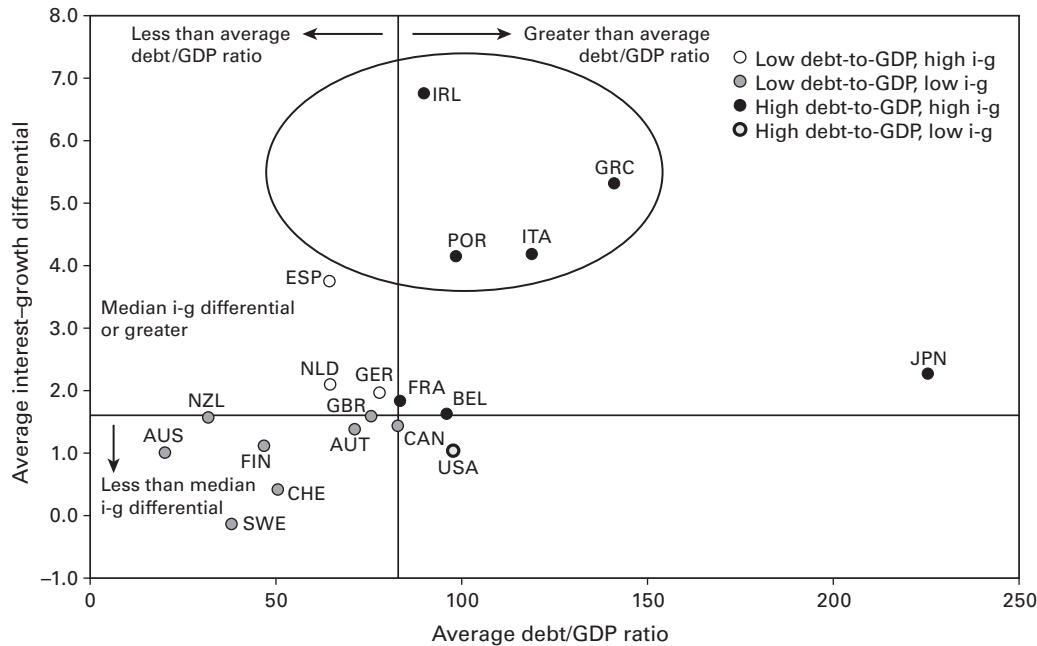


Figure 7.2

Scatterplot of interest-growth differential and debt ratio in advanced economies, 2007 to 2013

Source: Authors' calculations

- The “stress zone,” which included Greece, Ireland, Italy, Spain, and Portugal, had high average debt ratios during the period (with the exception of Spain, whose average debt ratio was moderate at about 65 percent of GDP), and high average interest-growth differentials (about 5 percent).
- The “comfort zone,” featuring Australia, Finland, New Zealand, Sweden, and Switzerland, had low average debt ratios over the period and favorable interest-growth differential (ranging between 0 and 1.5 percent).
- The “middle kingdoms,” comprising countries in between the two extremes above, include Austria, Belgium, Canada, France, Germany, Netherlands, and the United Kingdom.
- Two “special cases,” where debt ratios were high but the interest-growth differential was low, were (1) Japan, which has a large net foreign assets position, big domestic savings pool, and high domestic ownership of debt, and (2) the United States, because of its reserve currency status, coupled with the very substantial monetary policy easing since the crisis.<sup>7</sup>
- Finally, currency valuation effects were found to be negligible as the foreign-currency denominated share of debt was close to zero (in most cases), but

financial asset buildups were significant, accounting for most of the SFA. The majority of these buildups reflected financial sector support operations in the wake of the crisis (e.g., Belgium, Germany, Netherlands, Spain, and the United States; IMF 2011), including through loans to support the housing sector (e.g., Canada).

### 7.3.2 Comparison with Debt Buildup during the Great Depression, 1928 to 1933

It is instructive to compare the current debt buildup with that witnessed during the Great Depression, the last time several advanced economies entered a prolonged economic downturn collectively. Table 7.3 reports the debt increase decomposition for the same countries covered above.<sup>8</sup> Two observations stand out:

- *Debt buildup during the Great Depression was smaller.* The weighted-average increase was 23 percent of GDP, suggesting that the surge in debt ratios over 1928 to 1933 was almost half of the 40 percent of GDP debt increase observed this time around. The result is not driven by a few large countries: debt buildups in 9 of the 17 cases shown in table 7.2 were larger than the corresponding debt ratio increases during the Great Depression.
- *Primary deficits played no role in the accumulation of debts.* Unlike the current debt increase, where the primary deficit contribution was 65 percent, the Great Depression debt surge was accounted for entirely by the interest–growth differential component.<sup>9</sup> The cumulative primary balance was, on a weighted-average basis, a surplus of 2.2 percent of GDP with 10 of the 19 countries registering surpluses. Although the United States ran a small cumulative primary deficit through 1933, the US government’s primary fiscal response to the Depression was procyclical, and became expansionary only from 1933 onward, and this expansion too was offset partly by tight fiscal policy at the state and local government levels (Romer 2012).<sup>10</sup>

### 7.3.3 Identifying Key Distinguishing Factors

At first glance these observations appear somewhat counterintuitive. The Great Depression was accompanied by a much larger drop in output and surge in unemployment than the Great Recession. Indeed, in our sample of countries, real output fell 18 percent, in weighted-average terms, from peak-to-trough during the Depression, as opposed to a 4 percent fall during the Great Recession. Similarly median unemployment in 12 advanced economies (for which data were available) had risen to almost 25 percent at the height of the Great Depression but has remained in single digits this time around.

Figure 7.3 helps us understand the two key drivers of these results:

- *Initial level of debt.* The level of public indebtedness at the beginning of the global financial crisis was much higher (weighted average of 80 percent of GDP)



Table 7.3

Decomposition of debt ratio increases in advanced economies during the Great Depression (in percent of GDP, cumulative over the episode years)

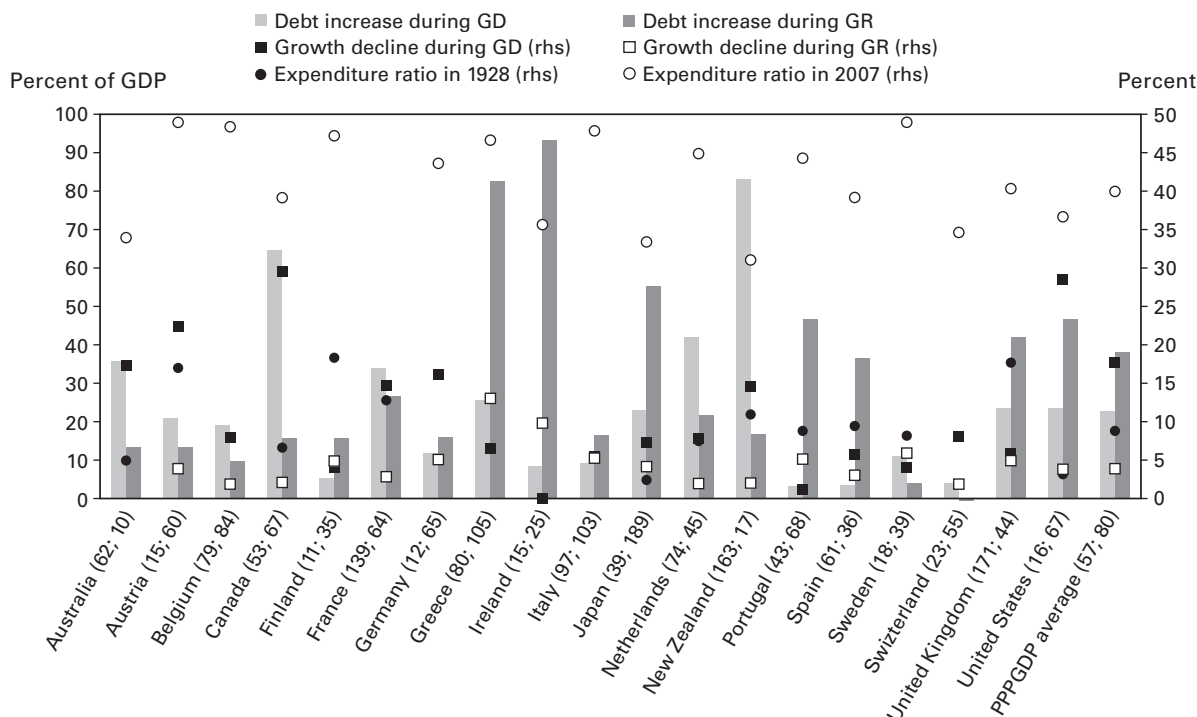
	Starting debt ratio	Ending debt ratio	Increase	Components		
				Primary deficit	Interest-growth differential ( $i - g$ )	Debt-increasing stock-flow adjustment
Australia	62.3	98.2	35.8	-9.2	40.8	4.2
Austria	15.4	36.5	21.0	29.0	11.7	-19.8
Belgium	79.1	98.3	19.2	-6.5	12.4	13.4
Canada	53.2	117.9	64.7	1.2	59.1	4.3
Finland	10.8	16.1	5.4	2.9	8.0	-5.5
France	138.6	172.7	34.1	-6.6	58.8	-18.1
Germany	9.3	23.9	14.6	2.8	10.0	1.7
Greece	80.4	105.9	25.5	11.5	30.5	-16.5
Ireland	14.9	31.4	16.5	-3.3	4.0	15.8
Italy	97.4	106.6	9.2	0.4	16.6	-7.7
Japan	39.1	62.2	23.1	-2.7	6.4	19.5
Netherlands	74.2	116.1	41.9	0.3	33.4	8.2
New Zealand	163.3	246.6	83.3	-11.2	89.9	4.5
Portugal	42.5	45.8	3.2	-38.8	40.2	1.8
Spain	61.4	65.1	3.6	-12.8	10.7	5.8
Sweden	18.4	29.6	11.2	3.1	7.8	0.2
Switzerland	22.7	26.7	4.0	-5.5	9.4	0.1
United Kingdom	170.5	194.0	23.4	-29.5	47.4	5.6
United States	16.3	40.0	23.6	5.3	18.0	0.3
PPPGDP-weighted average	56.9	80.0	23.1	-2.2	24.7	0.6

Source: Abbas et al. (2011)

Note: The SFA component is adjusted for the currency depreciation component for France (-7.1 percent of GDP) and the United Kingdom (7.0 percent of GDP).

than what prevailed at the start of the Great Depression (weighted average of 57 percent of GDP). This result is not driven by a few large economies: for about two-third of the countries in our sample, debt levels in 2007 were higher than they were in 1928. Therefore the consequent snowball effects during the Great Recession for the same output and unemployment shock could be expected to be quantitatively larger than those that obtained during the Great Depression.

- *Government size.* The reported weighted-average size of the state in 2007 (general government expenditure of 40 percent of GDP) was four times the



**Figure 7.3**

Debt surge, growth decline, and the size of the state: Great Depression (GD) versus Great Recession (GR). Numbers in parentheses after country name refer to the debt-to-GDP ratio at the start of the Great Depression (in 1928) and at the start of the Great Recession (in 2007), respectively.

Sources: Historical Public Debt Database; authors' calculations

average size of government in 1928 (9 percent of GDP).<sup>11</sup> This is a well-established phenomenon (see Holsey and Borchering 1997; Tanzi and Schuknecht 2000), which is explained by the so-called Wagner's law: as an economy experiences economic growth, the relative government size increases. A key implication of this phenomenon is that the (small) governments at the time of the Great Depression were incapable of running very large deficits as a *share of GDP*—either via automatic stabilizers or countercyclical fiscal expansion, despite proportionally large swings in nominal revenues and expenditures (30 percent, in weighted-average terms). In the current episode, nominal revenues fell by a much smaller proportion (7.5 percent, in weighted-average terms), although expenditures still increased by 30 percent (in weighted-average terms); but, the overall deficit (and hence debt) impact of these shifts was larger as a *share of GDP* given the markedly bigger government size in relation to the economy.

It is important to note some caveats and trade-offs involved in making the argument that the larger debt buildup during the Great Recession appeared to be associated with a larger government this time around. One key caveat is the differential policy reactions to the Great Depression and the global financial crisis. As mentioned earlier, fiscal policy responded to the Great Depression procyclically; even automatic stabilizers were not allowed to fully operate (see Chandler 1970). The policy response following the global financial crisis was the opposite: not only were automatic stabilizers allowed to fully operate but a substantial coordinated fiscal stimulus was implemented by advanced countries. These differential policies are likely to have been an important explanatory factor for the observed differences in growth and unemployment outcomes across the two episodes.

Another caveat is that with all macro and fiscal variables fully endogenous to one another, it does not follow that a smaller government in 2007 would have resulted in a smaller increase in debt ratios. As noted by many researchers (e.g., see Baunsgaard and Symansky 2009), larger governments are associated with bigger automatic stabilizers, which cushion the fall in output and employment. When supported by monetary accommodation—as was the case this time around—the resulting interest–growth differential turned out to be quite favorable for several advanced economies.<sup>12</sup>

The key trade-off is that a larger government partly buffers private agents from the adverse consequences of an economic slowdown or collapse. The cost in terms of deteriorating public finances must therefore be weighed against the welfare gain implied by softening the adjustment burden on private sector incomes and consumption. This softening is achieved both passively, via increased automatic stabilizers (lower taxes and higher social transfers), and actively, via the support that countercyclical fiscal policy provides to growth and employment. More generally, there may be a second-order welfare gain from a larger government size to the extent that the latter is negatively associated with output volatility (e.g., see Gali 1994; Debrun et al. 2008).

As discussions over the optimal government size (and degree of policy interventionism) are necessarily complex, we focus on the other distinguishing factor (explaining the larger debt increase during the Great Recession) identified above: namely the higher level of public debt prevailing at the start of the Great Recession. The next section studies the gradual but massive buildup of this debt across advanced economies over 1970 to 2007—a period we refer to as the Great Accumulation.

#### 7.4 Analysis of Pre-crisis Vulnerabilities: The Great Accumulation

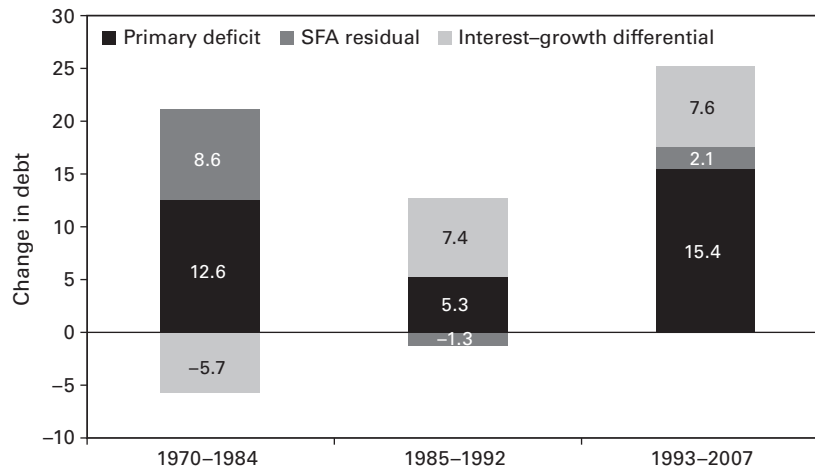
As mentioned above, the 2007 to 2013 episode is characterized by weaker initial conditions relative to previous debt accumulation periods, particularly with respect

to the high starting debt ratios at the onset of the financial crisis in 2007. This section explores the causes of the large initial debt levels in 2007 by looking closely at the gradual but pervasive debt increases in advanced economies over the period 1970 to 2007. In order to shed some light on how the relative contributions of the various components to debt increases have changed over time, the pre-crisis period is split into three subsamples: 1970 to 1984, 1985 to 1992 and 1993 to 2007. These subsamples are chosen to correspond to the beginning of the great moderation in the United States in the mid-1980s (Bernanke 2004) and in other countries, such as the United Kingdom, by end 1992 (Benati 2007).

#### **7.4.1 The Great Accumulation: from Bretton Woods to the Great Moderation**

The weighted-average debt increase during 1970 to 2007 was 45 percent of GDP, slightly larger than the average debt increase during the Great Recession. The increase was gradual and pervasive and took place over more than thirty-five years. In light of this, the pre-crisis debt buildup period can be described as the Great Accumulation, although this was by no means a homogeneous period. The period prior to the mid-1980s was marked by the oil price shock of the early 1970s, alongside the collapse of the Bretton Woods System of exchange rates, and the stock market crash in advanced economies that led to a recession marked by a remarkable rise in unemployment and rising inflation. It was also characterized by intermittent recessions in the early 1980s with higher oil prices in the context of the second oil price shock in 1979. From the mid-1980s more contractionary monetary policy in the United States and the United Kingdom exacerbated the general slowdown in growth relative to the post-WWII decades (Easterly 2001). In the 1990s growth picked up with the IT boom in the United States, while interest rates came down as markets internalized the low inflation environment. In the latter part of the decade and beginning of the new millennium, significant post-euro convergence growth was observed in Europe. The period as a whole also saw rising government expenditure over time not matched by a commensurate increase in revenue (especially structural revenues). While in 1970, the weighted-average public expenditure-to-GDP ratio in advanced countries amounted to about 30 percent of GDP; it had increased to 40 percent by 2007, reflecting higher government outlays on health care, pension, and social protection (Cottarelli and Schaechter 2010).

The contribution of the various components to changes in debt evolved significantly over the course of the Great Accumulation in line with the developments above (figure 7.4). While the period prior to 1985 was characterized by large contributions of stock-flow adjustments and primary deficits, the interest-growth differential became a more important determinant of debt increases over 1985 to 1992 in line with monetary policy developments in the largest advanced economies and the general growth slowdown. Despite favorable growth developments on the back of the IT boom in the United States and post-euro convergence growth in



**Figure 7.4**

Sources of debt increases in advanced countries during the Great Accumulation, by subperiods (in percent of GDP)

Source: Authors' calculations

Europe, the largest debt increases that averaged 25 percentage points of GDP, in weighted-average terms, were observed between 1993 and 2007. Primary deficits contributed 62 percent to this debt increase. The greater role of primary deficits in debt increases likely reflects, among other factors, the rising share of government expenditure over time. The role of stock-flow adjustments in explaining debt changes decreased significantly after the mid-1980s, perhaps reflecting greater macroeconomic stability, in particular, less volatile exchange rate movements than in the 1970s. However, looking at weighted averages understates the importance of these SFAs for public debt developments. As shown in table 7.4, stock-flow adjustments, in a number of countries, contributed significantly to large debt increases in the post-1985 periods.

#### 7.4.2 Large Stock-Flow Adjustments: Size and Composition

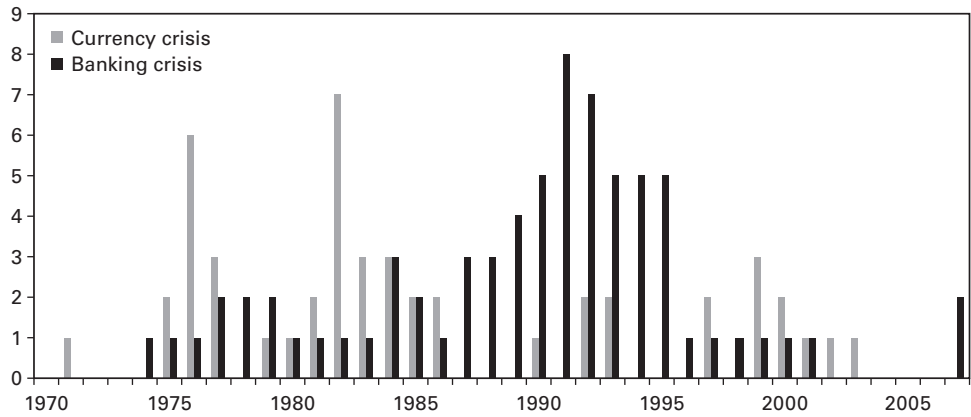
Further decomposing the unexplained changes in public debt seems to suggest that during the 1970s, SFAs were primarily explained by valuation effects. The pre-1985 period was characterized by a significant number of currency crises and a significant share of foreign-currency denominated debt (figures 7.5 and 7.6). Although by World War II the “original sin” had greatly diminished with countries borrowing mainly in their own currencies, some pressures to borrow in foreign currency reemerged in the late 1970s, with the average share of “foreign” debt amounting to about 8 percent. The combination of this together with currency crises could have led to significant valuation effects leading to discrepancies between the change

**Table 7.4**  
Episodes of large unexplained changes in public debt (in percent of GDP)

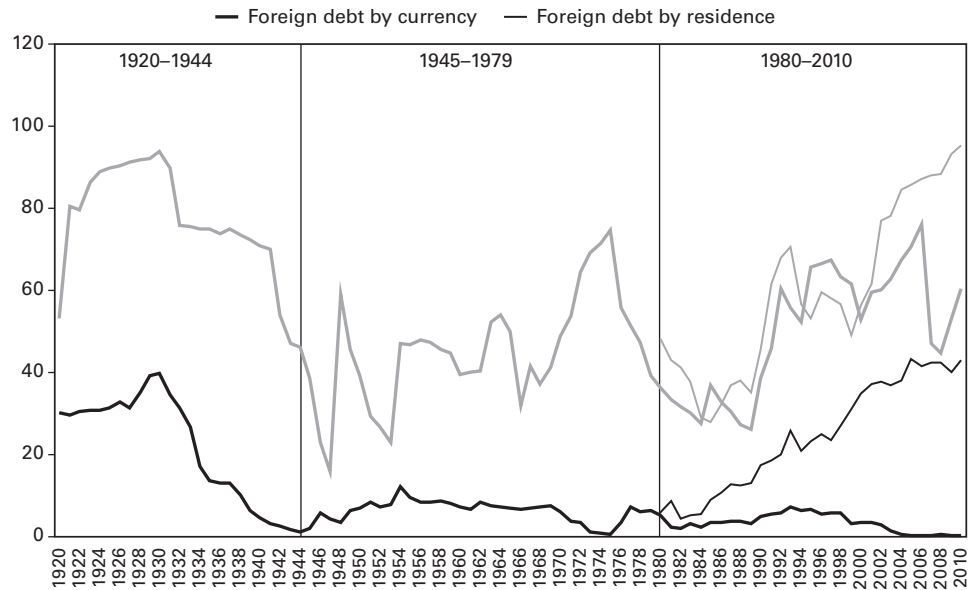
	1970–1984			1985–1992			1993–2007					
	Increase in debt	SFA	Interest-growth differential	Primary deficit	Increase in debt	SFA	Interest-growth differential	Primary deficit	Increase in debt	SFA	Interest-growth differential	Primary deficit
Austria	31.2	17.3	-1.5	15.4	13.6	5.5	2.8	5.3				
Belgium					10.2	1.9	12.0	-3.7				
France	8.3	5.0	-1.7	5.0								
Germany					2.5	2.0	0.6	0.0				
Greece	19.7	13.4	-15.1	21.4	33.4	22.7	-14.4	25.1	9.5	20.8	-9.9	-1.4
Italy	37.8	34.1	-62.2	65.9					6.2	2.8	4.9	-1.5
Japan	55.2	34.1	-8.8	29.9	5.5	5.3	2.6	-2.3	114.9	16.8	34.8	63.3
Portugal	24.3	35.8	-26.9	15.3	3.0	5.6	0.7	-3.3	19.8	8.9	3.2	7.7
Spain	29.8	11.7	-14.0	32.1	5.8	2.4	-0.5	3.9	11.4	2.9	4.1	4.4
Sweden	44.7	31.4	0.5	12.9	27.0	14.8	6.6	5.6				
Switzerland					14.1	10.8	-0.2	3.5	22.7	9.9	6.6	6.2
United Kingdom	5.0	6.9	-7.4	5.5					14.5	5.2	2.1	7.2

Source: Authors' calculations

Note: The table shows the maximum increase in debt (from trough to peak) observed in any of the subsamples and the contribution of the SFA residual to this increase. Only episodes in which the SFA contribution exceeds 15 percent of the change in debt are listed.



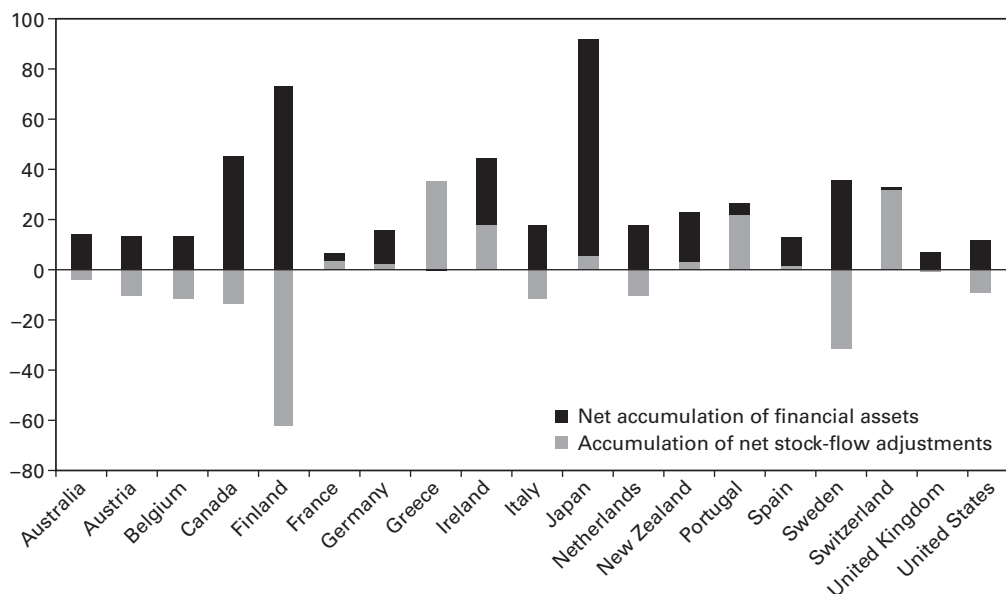
**Figure 7.5**  
Banking and currency crises in advanced economies during the Great Accumulation. Shown are the number of countries in the sample of advanced economies experiencing banking and/or currency crises. Source: Reinhart and Rogoff (2011)



**Figure 7.6**  
Median and maximum shares of foreign debt by currency and residence in advanced countries, 1920 to 2010. The black line represents the median, and the gray line the maximum. Data on foreign currency residence is only available for 1980 to 2010. Sources: WEO; various official publications

in public debt and the deficit. It is interesting that since the 1980s a new vulnerability emerged, namely a rising share of nonresident borrowing, often associated with a less stable investor base since private nonresidents may be more willing to shift their investment out of the country than are domestic investors.

Since the 1980s, stock-flow adjustments were mainly the result of significant accumulations of financial assets. Looking at the total accumulation of stock-flow adjustments shows that changes in financial assets account for a large proportion of them between 1980 and 2007, although in some countries (Greece, Ireland, and Portugal) significant stock-flow adjustments net of financial assets are observed (figure 7.7). Some of the financial asset accumulations are likely linked to banking crises, the frequency of which greatly increased in the mid-1980s (figure 7.5). However, this may not be the case for all countries and all periods. There are at least two other potential explanations for these financial asset accumulations. Some countries may invest their budget surpluses into financial assets instead of paying back debt (Finland, Sweden, and New Zealand). In Japan the large accumulation of financial assets



**Figure 7.7**

Stock-flow adjustments and the accumulation of financial assets, 1980 to 2007. The accumulation of net stock-flow adjustments measures the sum of net stock-flow adjustments between 1981 and 2007, as a percentage of 2007 GDP. Net stock-flow adjustments are defined as the difference between the change in the level of annual net debt minus the overall budget balance (in levels). Thus they measure gross stock-flow adjustments net of transactions in financial assets. The net accumulation of financial assets then corresponds to the difference between cumulative gross stock-flow adjustments and net stock-flow adjustments.

Sources: Country authorities; IMF staff calculations



**Table 7.5**

Unbalanced fixed effects panel regressions with stock-flow adjustments as the dependent variable, 1970 to 2007 (in percent of GDP)

Dependent variable	Coefficient and standard errors		
	1970–2007	Pre-1985	Post-1985
Constant	2.65	4.02	1.89
	0.12***	0.13***	0.17***
Valuation effect	0.30	1.27	0.13
	0.26	0.61**	0.29
Banking crises	0.70	0.25	0.96
	0.34**	0.52	0.45**
R <sup>2</sup> (within)	0.03	0.06	0.03
Number of observations	274	95	179

Sources: World Economic Outlook; Reinhart and Rogoff (2011)

Note: The dependent variable is defined as  $\frac{SF_t}{NGDP_t} = \frac{Debt_t - Debt_{t-1}}{NGDP_t} - \frac{Deficit_t}{NGDP_t}$ , where *Debt* denotes gross debt, *Deficit* denotes overall budget deficit, *SF* denotes the stock-flow adjustment, and *NGDP* denotes nominal GDP; \* denotes significance at 10 percent level, \*\* denotes significance at 5 percent, and \*\*\* denotes significance at 1 percent. Valuation effect denotes the percentage change in the nominal effective exchange rate interacted with the public sector debt denoted in foreign currency (in percent of GDP); a positive change denotes exchange rate depreciation. Banking crises takes a value of 1 during banking crisis.

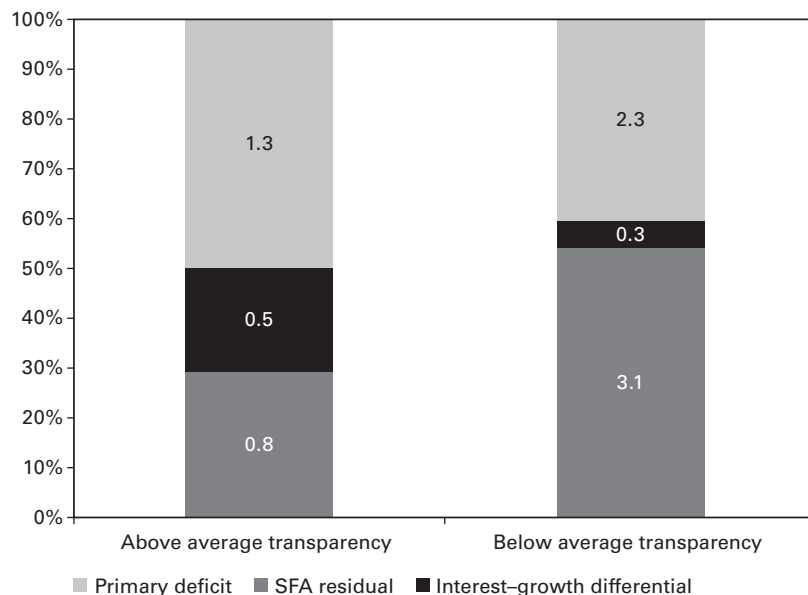
is likely linked to its large public pension fund. Moreover some countries may have had an incentive to shift expenditure below the line, by injecting capital into public companies, thereby pushing spending to entities excluded from the fiscal accounts (Von Hagen and Wolff 2006).

Results from a fixed effects panel regression confirm that valuation effects were a key determinant of stock-flow adjustments prior to 1985, whereas the role of banking crises increased after the mid-1980s (table 7.5). However, running two subsample regressions and dividing the sample into pre- and post-1985 periods, shows that valuation effects very significantly contributed to stock-flow adjustment prior to 1985. Similarly comparing the post-1985 period to the whole sample period shows that banking crises become an even more important determinant of stock-flow adjustments since 1985.

### 7.4.3 Fiscal Transparency on the Rise

The problem of large discrepancies between the change in public debt and deficits in general seems to have diminished over the pre-crisis period. While some stock-flow adjustments are perfectly legitimate owing to accounting issues, large and persistent stock-flow adjustment could point to an inappropriate recording of budgetary

operations and, if positive, lead to ex post upward revisions of deficit levels (IMF 2011). Greater fiscal transparency may have played a role in explaining the diminishing role of SFAs over the pre-crisis period. While there are no data showing the evolution of fiscal transparency over time, it is likely that openness toward the public at large about government structure and functions, fiscal policy intentions, and public sector accounts has increased since the 1970s in advanced economies. Greater fiscal transparency allows better scrutiny of government accounts and would make it harder for government to engage in deceptive fiscal stratagems. It should also enhance the quality of fiscal data and thereby decrease SFAs arising from measurement errors. Using an index of fiscal transparency that was constructed for most countries for 2007, it is possible to look at the contribution of SFAs to debt changes between 1980 and 2007 in countries that experience above and below average fiscal transparency.<sup>13</sup> Interestingly, in countries with above average fiscal transparency the contribution of stock-flow adjustments to increases in debt is significantly smaller than in countries with below average fiscal transparency (figure 7.8). Thus greater fiscal



**Figure 7.8**

Sources of debt increases and fiscal transparency. Debt increases denote any positive change in gross debt between 1980 and 2007. Data labels denote the mean of the components of debt increases (in percent of GDP). Higher values of the transparency index denote greater fiscal transparency. Above (below) average denotes group of countries with a fiscal transparency index above (below) the average of its peer group (advanced economies). The fiscal transparency index is extracted from the Report on Observance of Standards and Codes (ROSC; see Hameed 2005).

Sources: Country authorities; authors' calculations

transparency overall may be an important factor behind the comparatively smaller contribution of SFAs during the debt surge prior to the Great Recession.

## 7.5 Analysis of Episodes of Successful Debt Reductions

This section motivates a discussion of the prospects for achieving lower debt levels in today's advanced economies by documenting the drivers of successful large debt reductions over the past century and a half. Most research in this area has focused on the post-WWII period, but with fairly divergent results for different subperiods. For the 1945 to 1970 period—when the largest documented debt reductions occurred—Reinhart et al. (2011) identify artificially low real interest rates as the main debt “liquidating” vehicle. For the post-1970 period, Abbas et al. (2010) find that primary surpluses did all the heavy lifting. IMF (2012) examined fifteen episodes of debt reductions in a number of advanced countries during 1884 to 1995 and also find that debt reduction ultimately requires primary surpluses—this was indeed the case in the post-1980s debt reductions, including that of Italy in 1992 to join the European Monetary Union; and of Canada in 1995 to address fiscal imbalances of the early 1980s. Below we take a closer look at the post-WWII debt reductions, contrasting them with episodes from earlier and later periods, with a view to extracting policy conclusions for policy makers facing high debts today.

### 7.5.1 Debt Reductions in the Aftermath of World War II

Large reductions in the public debt-to-GDP ratio in selected advanced economies in the aftermath of WWII are decomposed following the same approach detailed in section 7.2. The key results are as follows (table 7.6):

- Debt reduction was accounted for primarily by the interest–growth differential, with primary surpluses playing a smaller role.<sup>14</sup> The differential contributed over three-fourth of the 86 percent of GDP average debt reduction, thus eroding the debt stock at a rate of about 4 percent of GDP per year.
- The contribution of the primary surplus varied across episodes, as well as subperiods of episodes. For instance, primary balances contributed to almost half of the debt reduction in the United States over the period 1946 to 1974. In the United Kingdom the share was lower (one-fourth) but fluctuated through the decades: primary surpluses accounted for about half the debt reduction in the late 1960s but only about one-sixth in the first half of the 1970s, when inflation surged to 12 percent per annum (figure 7.9).
- The favorable interest–growth differential during the pre-1980 period arose from low and often negative real interest rates and was supported by rapid economic growth. The median annual growth rate was about 4.5 percent over

**Table 7.6**

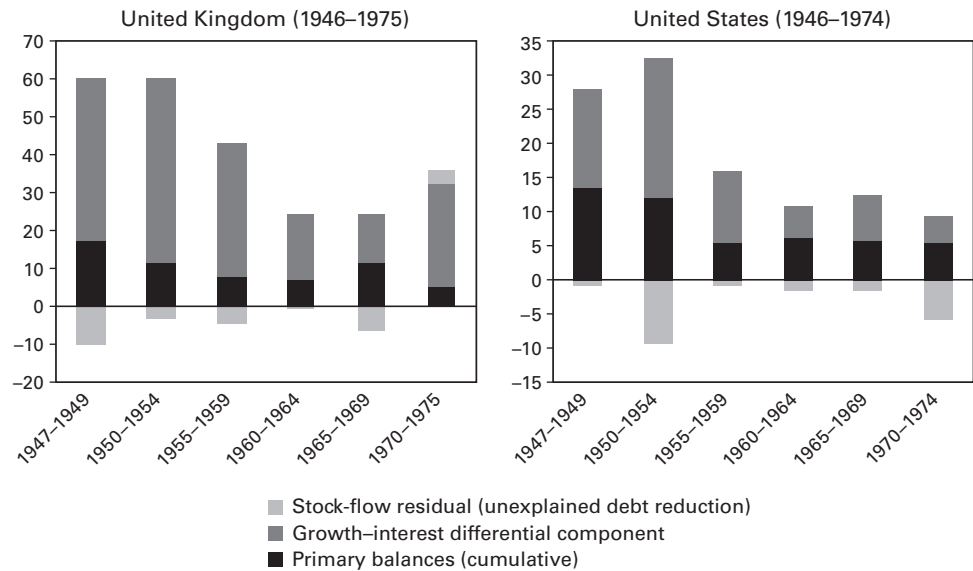
Major post-WWII debt-to-GDP reductions in advanced economies (in percent of GDP, cumulative over the episode years, except last three years columns, which are in percent)

	Start year	End year	Duration (years)	Starting debt ratio	Ending debt ratio	Debt reduction	Primary balance	Growth-interest differential component	Unexplained debt reduction	Average real GDP growth	Average effective real interest rate	Average inflation rate
Australia	1946	1963	17	92.5	29.3	63.2	19.1	67.0	-22.9	4.6	-2.3	5.7
Canada	1945	1957	12	155.5	58.7	96.7	43.1	69.6	-16.0	4.3	-1.4	4.0
France	1949	1969	20	44.3	14.4	29.9	9.5	42.4	-21.9	5.3	0.8	3.7
New Zealand	1946	1974	28	147.6	40.6	107.0	-63.9	157.2	13.7	3.9	-2.9	4.9
Sweden	1948	1954	6	41.6	28.7	12.9	-12.8	12.3	13.4	3.7	-3.9	6.5
Switzerland	1945	1962	17	78.9	12.0	66.9	5.5	28.0	33.4	5.1	1.6	1.3
United Kingdom	1946	1975	29	270.0	47.0	223.0	60.4	182.9	-20.4	2.6	-1.5	5.5
United States <sup>a</sup>	1946	1974	28	121.2	32.2	89.0	48.1	60.6	-19.7	3.5	0.2	3.4
Average (unweighted)			19.6	119.0	32.9	86.1	13.6	77.5	-5.1	4.1	-1.2	4.4
Average (PPP-GDP-weighted) <sup>b</sup>			25.5	127.9	33.1	94.8	42.0	71.3	-18.5	3.7	-0.2	3.8
Median <sup>c</sup>			18.5	92.5	29.3	66.9	23%	77%		4.1	-1.5	4.5

a. Overlaps with the 1951 conversion of short-term marketable US Treasury debt for 29-year nonmarketable bonds.

b. Computed using 2007 PPPGDP weights.

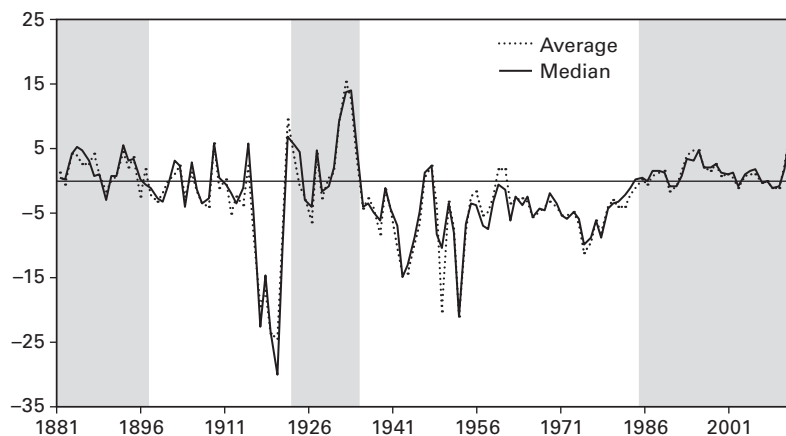
c. For the debt decomposition component columns, the median share in the “explained” portion of debt reduction is reported.



**Figure 7.9**  
Postwar debt reductions in the United Kingdom and the United States  
Source: Authors' calculations

the period, led by strong postwar reconstruction and investment activity in some countries, and by catch-up effects in others. While this pace of growth was healthy by historical standards, the real hallmark of this period was *negative* real effective interest rates (median of  $-1.5$  percent). As a result the interest-growth differential was significantly negative during this period, reaching a median of  $5.1$  percent (figure 7.10).

- Negative real interest rates were fostered by a range of financial repression instruments, including widespread capital controls. It appears that the liquidating force of “financial repression, accompanied by a steady dose of inflation” was at play during the post-WWII period (Reinhart et al. 2011; IMF 2012).<sup>15</sup> These instruments—presented as prudential regulation—included interest rate ceilings and reserve requirements on banks, directed financial sector credit to government, prudential floors on pension fund assets to be held as government securities, caps on deposit rates to boost retail demand for government bonds, and restrictions on cross-border foreign exchange transactions. Their ubiquity across advanced economies, combined with widespread capital controls, helps explain their persistence and success through this period (Reinhart et al. 2011).
- Central bank holdings of government paper were high, and to the extent that these represented a monetization of fiscal deficits, they are likely to have enabled



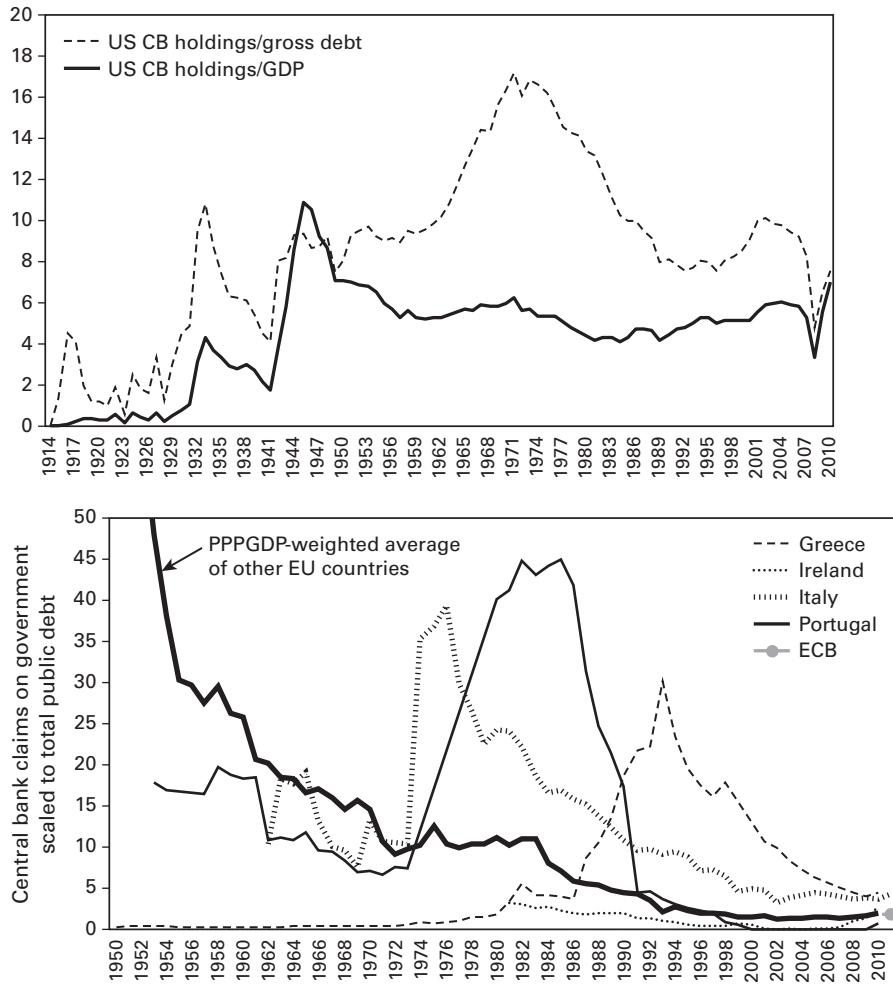
**Figure 7.10**  
Interest-growth differential, 1881 to 2010  
Source: Authors' calculations

the maintenance of moderate to high inflation rates. It is clear from figure 7.11 that by historical standards, the central bank share of government securities was quite high (6.5 percent of GDP and 11 percent of gross debt) in the United States during 1945 to 1980. For euro area countries as well, the central bank share of securities was noticeably high in the aftermath of WWII before falling sharply (except for Greece, Italy, and Portugal, which continued to rely on substantial central bank funding until later).

### 7.5.2 Debt Reductions during Periods of Greater Financial Liberalization

We now turn to an analysis of debt reductions during periods whose degree of financial interlinkages and capital account liberalization more closely resemble present realities than does the immediate post-WWII period. Two such period include 1880 to 1914, or the first era characterized by large capital flows; and the post-1980 period of financial liberalization. We find that the factors explaining debt reductions during these two periods align closely but diverge substantially from the pattern of post-WWII debt reduction discussed above. Most important:

- Primary surpluses did the heavy lifting. The contribution of the interest-growth differential to overall debt reduction was, on average, one-fourth during 1880 to 1914, one-third during 1914 to 1944, and nil post-1980 (table 7.7). This pattern also holds for other large debt reductions reported in IMF (2009) and in Abbas et al. (2011). For instance, the decline in the United Kingdom's national debt from a peak of 288 percent of GDP in 1821 (at the end of the Napoleonic wars)



**Figure 7.11**  
 Central bank holdings of government securities in advanced economies  
 Sources: Balance sheets of the Federal Reserve System; *International Financial Statistics*

**Table 7.7**

Decomposition of large debt reductions in different historical periods (in percent of GDP, cumulative over the episode years, simple averages)

<i>Period</i>	Number of episodes	Starting debt ratio	Ending debt ratio	Debt reduction	Primary surplus	Growth–interest differential component	Unexplained debt reduction
Pre-1914	14	101.7	61.1	40.6	20.1	10.2	10.3
Inter-war	17	127.2	80.9	46.3	22.2	16.1	7.9
Post-WWII	8	119.0	32.9	86.1	13.6	77.5	–5.1
Post-1980	17	76.1	47.3	28.7	24.9	–1.3	5.1

Source: Authors' calculations

to 27 percent of GDP in 1914 was accounted for by consistently large peacetime primary surpluses.

- However, the aforementioned dominant primary surplus contributions usually occurred in the context of strong growth. Beyond the experience of the United Kingdom after the Napoleonic wars, this is also true of other pre-WWI debt reductions, such as Japan (1887–1898), the United States (1880–1916), Italy (1897–1913), and Austria (1892–1899): annual economic growth averaged almost 4 percent during these episodes (Abbas et al. 2011). For the post-1980 debt reduction episodes—such as Belgium (1993–2007), Ireland (1987–2002), Spain (1996–2007), Canada (1996–2008), Sweden (1996–2008), and New Zealand (1986–2001)—annual growth averaged 3.5 percent (Abbas et al. 2010). That conventional fiscal adjustment and growth have led the way in periods of global financial integration is intuitive as well as consistent with previous studies (e.g., IMF 2010). As mentioned earlier, it is important to keep in mind that high growth rates ease the political constraints on consolidation which facilitates the generation and maintenance of large primary surpluses.

### 7.5.3 Prospects for Debt Reduction in Today's Advanced Economies

A number of factors may complicate a rapid reduction of debts in advanced economies.<sup>16</sup> First, despite the substantial fiscal consolidation in train, the residual required adjustment needs to bring debt down to prudent levels (e.g., 60 percent of GDP) remain very significant.<sup>17</sup> Second, long-term structural factors related to aging (e.g., pension and health care) will weigh on fiscal space in a way that they did not in the past. Third, the growth lever, which proved very important in lowering debt levels (and which relaxes the political constraints on consolidation), is expected to be less strong today compared to the post-WWII period. Fourth, achieving improvements via negative real interest rates as witnessed during the post-WWII period will prove



difficult given the current context of independent central banks, and the large synchronized supply of government bonds by a number of advanced economies in the face of more elastic demand for government paper (given highly integrated capital markets). Even if resort to higher inflation were possible, debt ratio simulations, given the current maturity and currency structure of public debt, suggest that the liquidation impact of such higher inflation will be limited (appendix table A7.2).

Looking ahead, the pursuit of unconventional options, such as liquidation of debt through financial repression and/or inflation (or outright restructuring), will likely prove difficult and may come with high costs and uncertainty (Cottarelli et al. 2010). A gradual, but steady, adjustment would appear to be the right course of action. Indeed history presents several episodes of orderly adjustment in the context of sustained medium-term growth. This suggests that there is a premium on both implementing structural measures that improve competitiveness and the business environment, and designing fiscal adjustment in a manner that minimizes the drag on growth.

## APPENDIX A: Episodes of Debt-to-GDP Increases by Country

**Table A7.1**  
Episodes of debt-to-GDP increases by country

Number	Country	Start year	End year	Duration	Starting level	Ending level	Increase
1	Austria	1880	1886	6	69.6	84.1	14.6
2	Austria	1929	1935	6	15.4	40.4	25.0
3	Austria	1974	1996	22	12.8	68.4	55.6
4	Belgium	1881	1886	5	31.8	47.3	15.5
5	Belgium	1890	1898	8	41.9	54.0	12.0
6	Belgium	1974	1979	5	38.8	49.4	10.6
7	Belgium	1982	1987	5	98.8	128.1	29.3
8	Finland	1990	1994	4	14.1	57.7	43.6
9	France	1882	1887	5	90.1	117.1	26.9
10	France	1891	1895	4	103.9	114.5	10.5
11	France	1929	1932	3	138.6	172.7	34.1
12	France	1980	1998	18	20.7	59.4	38.7
13	Germany	1880	1894	14	25.4	47.0	21.6
14	Germany	1973	2005	32	18.1	68.0	49.9
15	Greece	1886	1894	8	48.2	217.0	168.8
16	Greece	1898	1990	2	181.0	218.1	37.1
17	Greece	1960	1963	3	11.6	22.6	11.0
18	Greece	1965	1972	7	16.5	26.5	10.0
19	Greece	1979	1993	14	22.6	100.5	77.9

(continued)

**Table A7.1**  
(continued)

Number	Country	Start year	End year	Duration	Starting level	Ending level	Increase
20	Ireland	1973	1987	14	35.1	87.1	52.0
21	Ireland	1989	1991	2	77.4	94.5	17.2
22	Italy	1880	1884	4	91.6	117.2	25.6
23	Italy	1963	1994	31	27.2	121.8	94.7
24	Netherlands	1920	1923	3	62.0	88.9	26.9
25	Netherlands	1929	1936	7	74.2	122.2	48.0
26	Netherlands	1977	1993	16	37.8	78.5	40.7
27	Netherlands	1982	1987	5	53.7	73.0	19.3
28	Portugal	1920	1921	1	45.0	66.9	21.9
29	Portugal	1974	1985	11	13.5	56.5	43.0
30	Portugal	2000	2007	7	48.5	68.3	19.8
31	Spain	1884	1889	5	73.1	83.6	10.5
32	Spain	1893	1896	3	79.7	95.9	16.2
33	Spain	1897	1902	5	91.4	123.6	32.2
34	Spain	1974	1996	22	11.4	67.4	56.0
35	Sweden	1930	1933	3	18.4	29.6	11.2
36	Sweden	1967	1971	4	16.1	29.3	13.2
37	Sweden	1976	1984	8	26.1	70.8	44.7
38	Sweden	1990	1996	6	46.3	84.4	38.0
39	Switzerland	1928	1944	16	22.7	78.9	56.2
40	Switzerland	1989	1998	9	31.0	63.7	32.7
41	Switzerland	2000	2005	5	61.1	72.2	11.2
42	United Kingdom	1929	1933	4	170.5	194.0	23.4
43	United Kingdom	1940	1946	6	121.1	269.8	148.7
44	United Kingdom	1991	1997	6	38.0	57.9	19.9
45	Australia	1925	1932	7	55.3	98.2	42.9
46	Australia	1942	1946	4	62.0	92.5	30.5
47	Canada	1928	1933	5	53.2	117.9	64.7
48	Canada	1937	1945	8	87.9	155.5	67.5
49	Canada	1979	1996	17	45.3	101.7	56.4
50	Japan	1919	1936	17	22.6	63.5	40.9
51	Japan	1937	1944	7	57.0	204.0	146.9
52	Japan	1970	1987	17	11.9	74.1	62.2
53	Japan	1974	1987	13	18.9	74.1	55.2
54	Japan	1991	2005	14	67.9	191.6	123.8
55	New Zealand	1921	1933	12	117.7	246.6	128.9
56	New Zealand	1940	1946	6	128.1	147.6	19.5
57	United States	1916	1919	3	2.7	33.3	30.5
58	United States	1929	1934	5	16.3	41.0	24.6
59	United States	1941	1946	5	38.6	121.2	82.6
60	United States	1981	1995	14	41.4	71.1	29.7

Note: Debt increases that started from 2007 onward due to the financial crisis are excluded from this list, with the exception of debt increases that were already in place (defined as debt increases above 5 percent of GDP) by the time the financial crisis struck.

## APPENDIX B: Simulating the Impact of Higher Inflation on Debt Ratios

We simulate the impact on debt ratios if inflation were to average 4, 6, or 8 percent annually over 2011 to 2016, rather than the average of 1.7 percent over 2011 to 2016 (as per *World Economic Outlook*, WEO) baseline projections for the eight largest advanced economies over the medium term.<sup>18</sup> As shown in table A7.1, raising the average inflation rate to 8 percent annually—about six percentage points higher than in the WEO baseline—would only reduce the 2016 debt-to-GDP ratio for the sample by 14 percentage points. This is despite the fact that medium- and long-term, nonindexed, domestic currency-denominated debt—exactly the type of debt that should be easiest to inflate away—accounts for almost two-thirds of the government debt stock in many of the advanced economies.

Table A7.2

Impact of higher inflation on debt ratios in advanced economies, 2011 to 2016

	2001		2011–16	2016			
	Total debt	MT-LT debt <sup>a</sup>	Inflation, WEO <sup>b</sup>	Total debt, with average inflation equal to:			
				WEO	4 Percent <sup>c</sup>	6 Percent <sup>c</sup>	8 Percent <sup>c</sup>
Australia	24.1	17.3	2.0	20.6	19.6	18.4	17.3
Canada	84.2	33.0	2.2	72.6	70.7	68.6	66.6
France	87.6	65.6	1.8	86.7	82.5	78.0	73.9
Germany	80.1	71.0	1.1	71.9	67.5	62.8	58.5
Italy	120.3	103.5	2.0	118.0	111.2	103.9	97.2
Japan	229.1	169.7	−0.1	250.5	239.4	227.4	216.3
United Kingdom	83.0	59.5	2.9	81.3	77.7	73.8	70.1
United States	99.5	65.1	1.5	111.9	107.2	102.1	97.4
<b>Simple Average</b>	<b>101.0</b>	<b>73.1</b>	<b>1.7</b>	<b>101.7</b>	<b>97.0</b>	<b>91.9</b>	<b>87.2</b>

Sources: IMF, WEO; OECD; Fund staff estimates

Note: WEO inflation figures reported in percent; all other figures are percentages of GDP.

a. Medium- and long-term debt in domestic currency, nonindexed.

b. GDP deflator inflation, average over the period as projected in the WEO.

c. This could imply an increase in inflation by 2.3, 4.3, and 6.3 percentage points, respectively, over projected average inflation of 1.7 percent.

## Notes

The authors would like to thank Malin Hu for her outstanding research assistance, Luis Catao (IMF Research , Department) for providing historical exchange rate data on advanced economies, and Keiko Takhashi (Ministry of Finance, Japan) and Oliver Bush (Bank of England) for supplying historical public debt composition data for Japan and the United Kingdom, respectively.

1. The average increase (in PPPGDP-weighted terms) in the public debt ratio in 19 advanced economies by 2013 is projected at 40 percent of GDP relative to 2007 (pre-crisis) levels, with 17 out of the 19 countries covered in this chapter registering debt surges of more than 10 percentage points of GDP.
2. The 19 countries covered in this chapter are: Australia, Austria, Belgium, Canada, Finland, France, Germany, Greece, Ireland, Italy, Japan, Netherlands, New Zealand, Portugal, Spain, Sweden, Switzerland, the United Kingdom, and the United States. The choice of countries is guided primarily by constraints on the availability of historical data.
3. Throughout this chapter, “weighted-average” refers to averages in PPPGDP-weighted terms, whereas “average” refers to simple averages.
4. The SFA is defined as the difference between the annual change in public debt and the budget deficit. Such discrepancies could reflect valuation effects operating on foreign currency debt, time of recording effects (deficits are often measured in accrual terms while debt is a cash concept), and other below-the-line operations, such as assumption of debts of non-governmental entities, debt restructuring or default, privatization, drawdown and buildup of government deposits, transactions in financial assets, as well as measurement errors.
5. The result is also confirmed by Weber (2012), who finds that the relative contribution of stock-flow adjustments to large debt increases in advanced economies has diminished over time in line with greater fiscal transparency.
6. Over the sample period, the average interest–growth differential is about 2 percent.
7. The size of the Federal Reserve System’s balance sheet rose by about 10 percentage points of GDP from Q2-2008 to end-2010, double the increase observed over the same period in the balance sheets of the Bank of Japan and the European Central Bank. This has contributed to both record-low US Treasury yields, and the return of growth, producing a negative interest–growth differential for the United States.
8. As in the case of the Great Recession, the start and end-years of the episodes were bounded between 1928 and 1933 (i.e., trough-to-peak increases identified during this period) to ensure that we captured the impact of the Great Depression and not other developments.
9. SFAs appear to play a negligible role during the Great Depression, on average, but are quite large for some individual episodes. We were able to (partially) identify the sources of these SFAs in some cases. For example, the sterling’s depreciation added 7 percent of GDP to the UK debt burden, while in France, the franc’s appreciation knocked off a similar amount of the debt. For the remaining cases, the large SFAs likely reflect a combination of data quality issues, mismatch between concepts used for stock vs. flow reporting, or lack of fiscal transparency.
10. Chandler (1970) and Romer (1992) document the implementation of a large tax increase via the Revenue Act of 1932, which was followed by the modestly countercyclical fiscal expansion (New Deal) initiated under US President Roosevelt.

11. Although data are mostly available on central government expenditure during the Great Depression, spending outside central government cannot explain this 31 percentage point of GDP gap in the size of the state in 1928 and its size in 2007.
12. Of course, policy accommodation has its limits and if debt keeps growing, interest-growth differentials would ultimately begin to rise as well (as indicated by recent research; e.g., Kumar and Woo 2010; Baldacci and Kumar 2010).
13. The starting year for the analysis is 1980 in order to avoid large data gaps for some of the debt changes components in some advanced countries.
14. Note that in the case of debt reductions, the interest-growth differential more conveniently captures the contribution of the (negative of the) interest growth differential.
15. In this regard, the experience of advanced economies at that time appeared similar to that of emerging economies, where the interest-growth differential has turned out negative for the most part of the past few decades (IMF 2011).
16. For a more detailed discussion, see chapter 16 on the post-crisis fiscal outlook.
17. As documented in IMF (2011), the projected weighted-average adjustment of 3.5 percent of GDP between 2010 and 2016 amounts to less than half of what is needed through 2020. Post-2016 gaps are larger than 3 percent of GDP, in weighted-average terms, for several advanced economies, including Belgium, Ireland, Japan, Spain, and the United States.
18. This scenario is based on the latest available WEO projections of October 2011. The simulations assume that the structure of government debt (shares of medium- and long-term debt; average maturity; and portion that is foreign currency denominated) remains constant over time; economic growth rates are unaffected by changes in inflation; and interest rates on newly issued debt adjust one-for-one (full Fisher effect) to increases in inflation. If nominal interest rates on domestic currency, nonindexed, short-term debt in 2012 to 2013 adjust between 2012 and 2013 only by half of the increase in inflation between 2012 and 2013, but a full Fisher effect resumes thereafter (without compensating for the temporary decline in the real interest rate), then the overall impact of inflation on the debt ratio by 2016 is larger, but only by 1 percent of GDP.

## References

- Abbas, S. M. A., O. Basdevant, S. Eble, G. Everaert, J. Gottschalk, F. Hasanov, J. Park, C. Sancak, R. Velloso, and M. Villafuerte. 2010. *Strategies for Fiscal Consolidation in the Post-crisis World*. IMF Fiscal Affairs Department. Washington, DC: International Monetary Fund.
- Abbas, S. M. A., N. Belhocine, A. El-Ganainy, and M. Horton. 2011. Historical patterns and dynamics of public debt: Evidence from a new database. *IMF Economic Review* 59 (4): 717–42.
- Baldacci, E., and M. Kumar. 2010. Fiscal deficits, public debt, and sovereign bond yields. Working paper 10/184. IMF, Washington, DC.
- Baunsgaard, T., and S. Symansky. 2009. Automatic fiscal stabilizers: How can they be enhanced without increasing the size of government? Staff position note 09/23. IMF, Washington, DC.
- Benati, L. 2007. The great moderation in the United Kingdom. Working paper 769. ECB, Frankfurt.

- Bernanke, B. 2004. The Great Moderation. *federalreserve.gov*. <http://www.federalreserve.gov/BOARDDOCS/SPEECHES/2004/20040220/default.htm>.
- Campos, C., D. Jaimovich, and U. Panizza. 2006. "The Unexplained Part of Debt," Inter-American Development Bank, Research Department, Working Paper No., 554 (Washington, Inter-American Development Bank)
- Chandler, Lester V. 1970. *America's Greatest Depression: 1929–1941*. New York: Harper Row.
- Cottarelli, C., L. Forni, J. Gottschalk, and P. Mauro. 2010. Default in today's advanced economies: Unnecessary, undesirable and unlikely. Staff position note 10/12. IMF, Washington, DC.
- Cottarelli, C., and A. Schaechter. 2010. Long-term trends in public finances in the G-7 economies. Staff position note 10/13. IMF, Washington, DC.
- Debrun, Xavier, Jean Pisani-Ferry, and André Sapir. 2008. Government size and output volatility: Should we forsake automatic stabilization? Working paper 08/122. IMF, Washington, DC.
- Easterly, William R. 2001. Growth implosions and debt explosions: Do growth slowdowns cause public debt crises. *Contributions to Macroeconomics* 1 (1): 1–26.
- Escolano, J. 2010. *A Practical Guide to Public Debt Dynamics, Fiscal Sustainability, and Cyclical Adjustment of Budgetary Aggregates*. Washington, DC: IMF.
- Gali, Jordi. 1994. Government size and macroeconomic stability. *European Economic Review* 38: 117–32.
- Hameed, F. 2005. Fiscal transparency and economic outcomes. Working paper 05/225. IMF, Washington, DC.
- Holsey, Cheryl M., and Thomas E. Borcherding. 1997. Why does government's share grow? An assessment of the recent literature on the U.S. In Dennis C. Mueller, ed., *Perspectives on Public Choice: A Handbook*. New York: Cambridge University Press, 562–91.
- International Monetary Fund. 2009. Fiscal implications of the global economic and financial crisis. Occasional paper 269. Fiscal Affairs Department. IMF, Washington, DC.
- International Monetary Fund. 2010. Strategies for fiscal consolidation in the post-crisis world. Departmental paper 10/04. Fiscal Affairs Department. IMF, Washington, DC.
- International Monetary Fund. 2011. *Fiscal Monitor. Shifting Gears: Tackling Challenges on the Road to Fiscal Adjustment* (April).. Washington, DC: IMF.
- International Monetary Fund. 2012. *World Economic Outlook. The Good, the Bad, and the Ugly: 100 Years of Dealing with Public Debt Overhangs* (October). Washington, DC: IMF, 101–27.
- Kumar, M., and J. Woo. 2010. Public debt and growth. Working paper 10/174. IMF, Washington, DC: IMF.
- Reinhart, M. C., J. F. Kirkegaard, and M. B. Sbrancia. 2011. Financial repression redux. *Finance and Development* 48 (2): 22–26.
- Reinhart, M. C., and K. Rogoff. 2011. From financial crash to debt crisis. *American Economic Review* 101: 1676–1706.
- Reinhart, M.C., V. R. Reinhart, and K. S. Rogoff. 2012. Public debt overhangs: Advanced-economy episodes since 1800. *Journal of Economic Perspectives* 26 (3): 69–86.

Romer, Christina D. 1992. What ended the Great Depression? *Journal of Economic History* 52 (December): 757–84.

Romer, Christina D. 2012. An interview with Christina Romer on *Learning from the Great Depression*. <http://fivebooks.com/interviews/christina-romer-on-learning-great-depression> Accessed on October 2, 2013.

Tanzi, Vito, and L. Schuknecht. 2000. *Public Spending in the 20th Century*. Cambridge: Cambridge University Press.

Von Hagen, J., and G. B. Wolff. 2006. What do deficits tell us about debt? Empirical evidence on creative accounting with fiscal rules in the EU. *Journal of Banking and Finance* 30 (12): 3259–79.

Weber, A. 2012. Stock-flow adjustments and fiscal transparency: A cross-country comparison. Working paper 12/39. IMF, Washington, DC: IMF).

