Navigating the New Era of Public Debt Build-ups

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The enormous public debt build-ups that developed markets (DMs) have accumulated over the past few years—from around 75% in 2007 to almost 110% of GDP in 2012—will likely rank among the longest-lasting legacies of the Great Recession. They are unprecedented in an environment with no major global wars and stand in contrast with the moderate debt increases seen in emerging markets (EMs) during the crisis. To complicate matters further, IMF projections for the next few years suggest that debt levels are unlikely to decline any time soon.

It is easy to see how these trends have brought attention to the potentially negative impact of public debt on growth—a focus that has been heightened by the debt crisis in the Euro area periphery and the electoral debate in the United States. Concerns extend to whether there is a certain threshold of public debt after which risks to growth increase rapidly, what is the magnitude of those negative effects, and how the paths out of similar debt build-ups could look like. In this piece we exploit large sets data to find answers to those questions. Our goal is to provide a better understanding of the balance of risks so that policy makers and market participants can successfully navigate the new era of public debt build-ups around the world.

I. Public Debt May Hurt Growth for Several Reasons

Debt is not intrinsically bad for growth, but it may become problematic at very high levels relative to a country's GDP. There are several reasons why this may be the case. The first is simply that at some point debt needs to be repaid. After periods of significant debt accumulation, fiscal consolidation will usually be needed to ensure sustainability. At the same time, fiscal consolidation tends, on average, to be a drag on growth.

High levels of debt may be particularly dangerous because they have the potential to create additional problems. Worries about sustainability could lead borrowers to demand a more abrupt adjustment or lead to a full-blown debt or currency crisis. High tax burdens, weak budgetary discipline or ongoing fiscal deficits could crowd out private spending or create distortions. Excessively loose monetary policy or increased inflation used as part of the solution to debt build-ups may hurt growth by damaging confidence. Lastly, an association between high debt and lower growth may arise if both were influenced by common events. After banking crises, for instance, public debt may be higher (as systemic losses are assumed by governments) and growth may be weak (as deleveraging pressures weigh). But that association would not necessarily mean that high public debt was responsible for the weakness in growth.

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[1] This article was adapted from three pieces published as part of Goldman, Sachs & Co.'s *Global Economics Weekly* series on GS360, the Goldman Sachs internal client website: "Risks to Growth from Build-ups in Public Debt" (March, 2012); "The Paths Out of Public Debt Build-ups" (April, 2012); and "'Great Debt Reversals': lessons and trade-offs" (September, 2012). All relevant disclaimers and research disclosures associated with such paper are accessible through the original publications.

II. Data Show There Is Effectively a Negative Effect of Debt on Growth…

An important part of the discussion is the notion that beyond a certain threshold of public debt, the risks to growth may increase rapidly. The most commonly cited evidence for these kinds of debt 'thresholds' comes from the work by Carmen Reinhart and Kenneth Rogoff,[2] whose publicly-available data we use in some of our analyses. They have shown that in a sample of advanced economies in the postwar period, public debt levels above 90% of GDP on average are associated with substantially lower GDP growth, while apparently finding little association between growth and debt below that threshold. Many commentators assume not just that higher public debt levels may lead to lower growth, but that risks rise exponentially as debt increases. Here we look at how robust is the evidence to *both* sample selection and to the inclusion of other factors that may explain the apparent links.
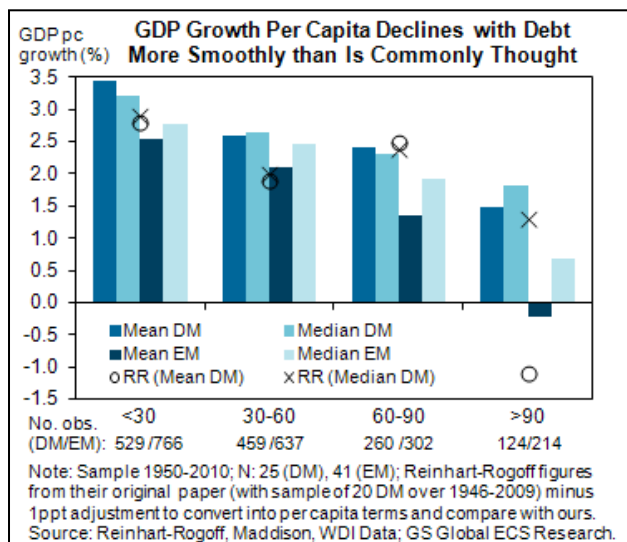
The original Reinhart-Rogoff exercise, which covered 20 DMs for the period 1946-2009, showed a sharp fall in average GDP growth outcomes for countries with public debt above 90% of GDP (more than 300bp for the mean and about 100bp for the median). They explained that this threshold is not a bright red line, partly because of measurement problems and because differences in external and domestic composition of debt may matter. But the notion that there is a significant increase in growth risks from higher public debt has gained broader traction.

To check the robustness of this relationship, we first broaden the sample to encompass more DM countries and to include a large set of EM countries, in both cases using GDP per capita growth rates. We then fix the sample period to 1950-2010, because the second half of the 1940s presents a distorted picture—not only because debt was abnormally high due to WWII, but because the unwinding of militarized economies generated 'artificial' contractions in GDP.

Our results confirm that higher debt is associated with lower GDP growth, but the decline in growth outcomes looks much more continuous. Exhibit 1 compares our results for the DM sample with those from the original Reinhart-Rogoff exercise, adapted to GDP per capita. The decline in growth above the 90% debt threshold—at slightly below 100bp for the mean and at about 50bp for the median—is considerably smaller than the one they presented, and the fall in average growth rates at that point is similar in magnitude to that of passing the 30% threshold into the next bracket. The exhibit also shows that the notion of a 'cliff effect' is more visible in EM, where there is a noticeable deterioration in average growth rates after the 90% threshold (160bp for the mean and 125bp for the median). But even here growth rates decline at lower levels of debt. Extending the sample back to 1870 confirms these patterns.

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[2] See in this context their 2010 paper, "Growth in a Time of Debt", *American Economic Review: P&P*, May, pp. 573-578.

Exhibit 1

GDP Growth Per Capita Declines with Debt More Smoothly than Is Commonly Thought

GDP pc growth(%)

Legend: ■ Mean DM ■ Median DM ■ Mean EM ■ Median EM ○ RR (Mean DM) × RR (Median DM) ○

No. obs. (DM/EM): <30: 529/766, 30-60: 459/637, 60-90: 260/302, >90: 124/214

Note: Sample 1950-2010; N: 25 (DM), 41 (EM); Reinhart-Rogoff figures from their original paper (with sample of 20 DM over 1946-2009) minus 1ppt adjustment to convert into per capita terms and compare with ours.
Source: Reinhart-Rogoff, Maddison, WDI Data; GS Global ECS Research.

III. …But It Is Partially Weakened when Controlling for Crises and Other Factors
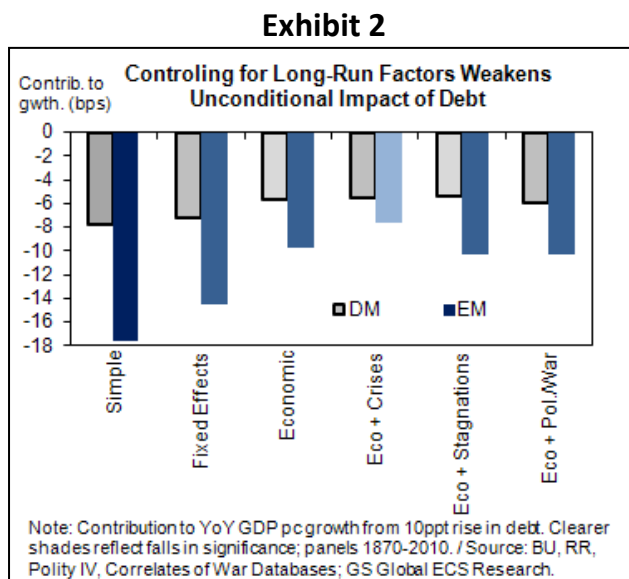
The fact that higher public debt levels are associated with lower growth falls short of demonstrating that the two are linked. At the individual country level, simple threshold splits can be misleading. The example of the US is a case in point. At least until the latest spike associated with the Great Recession and recent policies, all data points where debt exceeded 90% correspond to World War II or its aftermath. The years after 1945 saw significant demilitarization around the world, including in the US. And while the economy contracted during those years, it had expanded greatly in the run-up to the war.

The US example points to a broader issue with interpreting the linkages. Debt build-ups across history are often preceded by crises. In fact, debt appears to be significantly higher in DMs precisely after periods of war and after periods of banking or currency crises. These factors could be the 'true' cause for weaker growth and the associations may not reflect a causal link between debt and growth. In fact, higher debt levels are generally associated with (increasingly) below-average growth, measured by a simple regression. But as we control first for country and time-specific factors, and then for crises, the estimated size of these effects falls sharply.

So we want to account explicitly for whether this relationship between growth and debt depends on other features of the economy. We start with the longest possible sample, focusing on the starting level of debt (and most other control variables) to explain subsequent growth over the coming five years, rather than looking at the two contemporaneously. This helps reducing the problem that debt can be both cause and effect of growth, and allows us to interpret our findings in terms of the impact that a certain level of debt could have on future growth.

Exhibit 2 shows the results for DMs and EMs. The first pair of bars represents the simple correlation between debt and growth, while the second pair adds fixed effects. The third pair

adds economic controls (initial per capita GDP and CPI inflation). The last three pairs add different layers of further controls: the presence of crises (banking, currency and inflation), periods of economic stagnation (of eight-year duration) and political/war variables (specifically, a measure of the degree of democratization and an indicator for major conflicts). Our findings suggest that the negative relationship between debt and growth is solid even after controlling for these other features. But accounting for these factors somewhat reduces the size of that effect.

Exhibit 2

Note: Contribution to YoY GDP pc growth from 10ppt rise in debt. Clearer shades reflect falls in significance; panels 1870-2010. / Source: BU, RR, Polity IV, Correlates of War Databases; GS Global ECS Research.

Restricting our sample period to the past three or four decades allows us to include the average years of schooling in the population, the degree of openness of the economy and the level of government expenditures. This helps us check whether the relationship between debt and growth survives when other standard drivers of growth are included. To those economic controls, we then gradually add variables which reflect the channels that may explain the links between higher debt and lower growth:
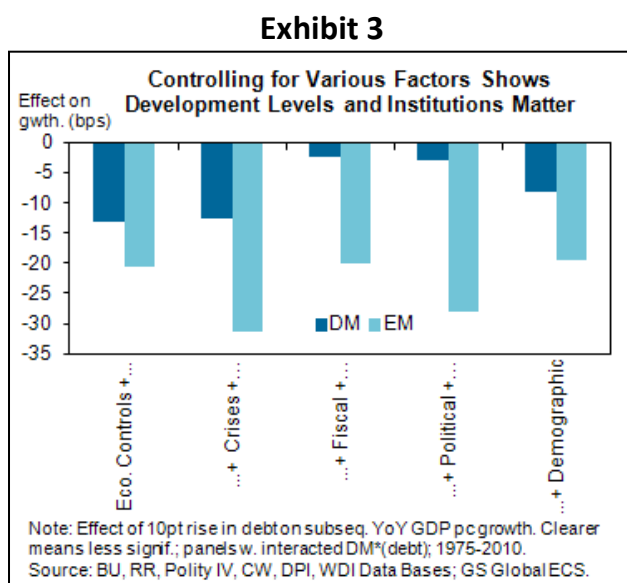
- Broader set of *crises indicators*: banking, currency, inflation and stock-market crashes.
- New group of *fiscal variables*: the volatility of government expenditures and the fiscal deficit.
- Broader set of *political variables*: the degree of democratic advancement, the checks and balances implied by the distribution of power across parties, and the constraints that the system imposes on the executive to make budgetary decisions.
- Couple of *demographic variables*: the population size and the old-age dependency ratio.[3]

This full-blown exercise still confirms a statistically significant negative link between debt and growth. So, there really exists a link between higher public debt and lower GDP growth. But the magnitude of that effect is reduced by accounting for those features. Overall, these regressions imply that a shift in public debt ratios from 60% to 100% of GDP would be associated with a

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[3] This approach is similar to that of Kumar, Manmohan S., and Jaegoon Woo. 2010. "Public Debt and Growth," *IMF Working Papers*, No. 174.

reduction in average per capita GDP growth rates of around 40bp for DM and 60bp for EM. These impacts are significant and fit with the risk of stagnation in several DM economies that we have highlighted before (see *GS Global Economics Weekly* 11/30, "From the 'Great Recession' to the 'Great Stagnation'?"). But they fall short of the kind of sharp drop-off in growth rates implied by simpler exercises.

It seems plausible that the risks from debt will also vary with an economy's characteristics. Two simple exercises confirm that this is the case. The first is that debt effects on growth are larger in EM than in DM. Exhibit 3 shows the variations in the expected effect of a 10ppt increase in debt on annual GDP per capita growth rates as we progressively include the controls we described above. In all cases, the EM sample shows a larger impact of debt on growth by an average of 16bp (per 10ppt increase in the debt-to-GDP ratio) across specifications.

Exhibit 3

The second observation is that the quality of institutions matters. We find a differential effect that debt may have on growth in countries with 'poor', 'average' or 'good' institutions (as reflected in their degree of democratization and the strength of the checks and balances implied by the distribution of power). In a country with 'good' institutions, the negative impact of debt on growth appears to be 40%-60% smaller than in a country with 'poor' institutions. This makes intuitive sense: countries with stronger institutions can be expected to deal with higher debt levels more effectively. But it highlights the danger of using any single threshold for countries whose circumstances and institutional capacity may be very different.

IV. Debt Build-ups Are More Common and Persistent than Is Commonly Thought

Although the current episode is unusual in its depth and breadth, it is not unique against a longer history. We have found at least some evidence of debt spikes for 19 countries—11 DM and 8 EM—over more than 100 years. Cycles in debt tend to be persistent and it generally takes a long time for debt shocks to dissipate (as indicated by formal "variance ratio" tests).

Since debt shocks are persistent, it is important to understand the paths they tend to follow. We first need to construct a measure of debt build-ups, which we define these as instances in which: (a) the public debt-to-GDP ratio rises 1.5 standard deviations above its 10-year moving average and (b) the move from the troughs is more than 5 percentage points. The goal is to identify periods when there is a sustained rise in public debt, but to set the threshold higher for periods and places where debt developments are more volatile. On that measure, a majority of developed countries (including most of the Euro area, UK, US and Japan) have crossed the threshold to 'qualify' as debt build-ups since 2008.

Applying this filter to almost 20 countries with available data, we find slightly more than 160 episodes of debt build-ups. Exhibit 4 shows that they happen more often in peacetime and that they are relatively evenly distributed across history. Moreover, a significant number of peacetime build-ups are associated with financial crises, as is currently the case.

We can use this history to construct the 'typical' path of debt following these episodes (see Exhibit 5). The Great Depression in the US followed the average blueprint closely, while the current pace of debt build-up in DMs is closer to the upper bound. In related exercises, we find that the typical path for DMs debt build-ups is steeper than for EMs, perhaps because capacity to take on debt is higher. In addition, while debt tends to rise more rapidly in wartime after the initial build-up, it also declines more quickly, reflecting the fact that the need for financing dissipates once wars are over. Against those benchmarks, the current build-up looks less unusual.
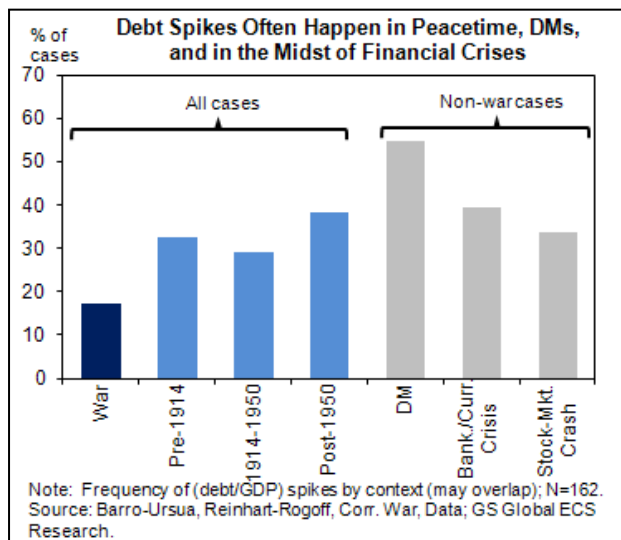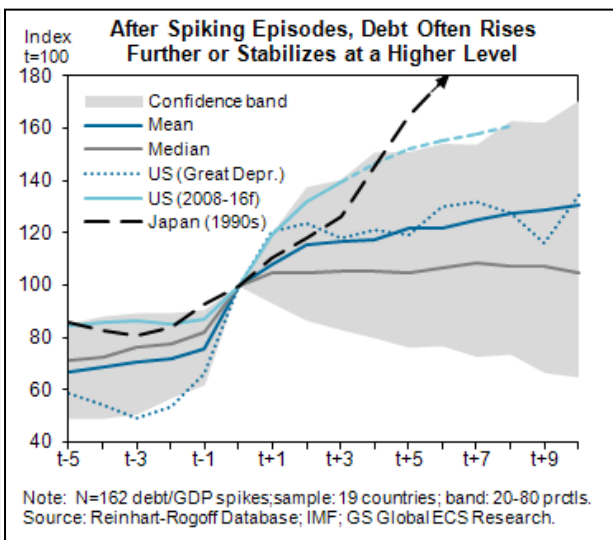
Exhibit 4	Exhibit 5

Note: Frequency of (debt/GDP) spikes by context (may overlap); N=162.
Source: Barro-Ursua, Reinhart-Rogoff, Corr. War, Data; GS Global ECS Research.

Note: N=162 debt/GDP spikes; sample: 19 countries; band: 20-80 prctls.
Source: Reinhart-Rogoff Database; IMF; GS Global ECS Research.

V. Characterizing 'Great Debt Reversals' Helps Assessing the Current Situation

We now narrow our focus to identify the contributing factors to successful debt reversals in developed countries in the modern (post-war) era. The most dramatic debt reductions of that period occurred in the immediate post-war years (for example, debt in the US reached almost

120% of GDP in 1945-46, but five years later it had been reduced to almost 75%). But the unique features of that period make them less relevant to today, so we focus on the period since 1950.

To identify successful reversal experiences we use two algorithms, one designed to identify 'large' reductions in the debt/GDP ratio, the other to identify 'rapid' ones. The algorithm based on size selects peak-to-trough reversals of at least 20ppt in the debt/GDP ratio (neglecting temporary blips smaller than 10ppt). This algorithm basically picks up large reversals no matter how long they took to accomplish. The algorithm based on speed identifies the maximum reductions achieved in a time span of 10 years (regardless of their size, although we end up focusing on cases with a speed of at least 2ppt/year).

Selected 'large' reversals cover a wide range of economies and several substantial reductions (over 100% of GDP in the UK), and the same applies for 'rapid' reversals (with average reductions in debt of 3.6% of GDP per year), which are most dramatic in the early 1950s. Because size and speed actually tend to be positively related, our two methods for classifying episodes overlap.

These debt reversals have occurred in two major waves: 1950s-70s and 1980s-2000s. The first wave picks up part of the post-war debt reversals. Those improvements faded through the challenging cycles of the 1970s and 1980s, before picking up with improvements in the macro picture during the mid-1990s. That second wave, which lasted well into the 2000s and ended with the financial crisis, included a range of European and smaller English-speaking countries. Ironically, given their status in the current Euro area crisis, both Spain and Ireland are identified as countries that delivered large and rapid public debt reversals in the period before the crisis. There were broadly three waves of rapid debt reductions. The first two encompassed periods of widespread adjustment in the early 1950s and the mid-1960s, which were followed by a slowdown in the 1980s. The pace picked up again with a third wave in the 1990s-2000s.

VI. Fiscal Adjustment and Economic Growth Are Key Contributors

What macro forces made these debt reductions possible? Mechanically speaking, debt reversals can be attributed to four contributing factors (1) Fiscal adjustment; (2) Difference between the real interest rate and real GDP growth; (3) 'Stock-flow' adjustments (due to valuation practices and 'below-the-line' operations or errors); and (4) Restructuring (in our sample since 1950, no developed markets restructured their debt). The Box describes how we can decompose the debt reduction episodes that we identified into these components. Exhibit 6 shows our case-by-case decomposition, while Exhibit 7 shows the average contributions across the two major waves.

Across all countries and time periods, both fiscal discipline and healthy growth appear to have made important contributions. Primary surpluses appear to have contributed to some degree to the improvement in the public debt position in all major cases. And real GDP growth has also been a consistent contributor to the episodes of public debt reduction.

Decomposing 'Great Debt Reversals'—some algebra and a lot of data

Our decomposition exercise requires an algebraic derivation and data on its main components. The formula breaks up changes in debt reversals as percentage of GDP, D, from period $t = 0$ to $t = n$, into [1] Cumulated sum of primary deficits as percentage of GDP, P; [2] Difference between the interest rate applicable to the amount of debt outstanding, r, and the rate of economic growth, g; [3] Stock-flow adjustments, SF; and [4] Restructuring or residual, R. The interest rate in factor [2] can in turn be broken into the difference between the nominal interest rate, i, and the inflation rate, π, which together with g are scaled by the stock of debt in period $t - 1$. The key equation looks like this:

$$D_n - D_0 = \sum_{t=1}^{n} P_t + \sum_{t=1}^{n} [i_t - \pi_t - g_t](D_{t-1}) + \{SF_t + R_t\}$$

In terms of the data, series on P and i were the most challenging to obtain. Whenever not available from standard sources, like the IMF, we estimated P with information on headline deficits and our own estimates for i. We got the latter by weighting available yields on bills and bonds at various maturities (especially short-term and 10-year), by their amounts outstanding, which we estimated based on the historical profile of US debt.[*] The rest of the data was obtained from sources we have described in previous research.

[*] The closest effort that we are aware of is in the work of Sbrancia and Reinhart in "The Liquidation of Government Debt" (NBER wp 16893, March 2011). Two IMF papers are useful in this context but are less clear in terms of how these data challenges were overcome: "Strategies for Fiscal Consolidation in the Post-Crisis World" (Fiscal Affairs Department, Feb. 2010), and "Historical Patterns and Dynamics of Public Debt – Evidence from a New Database" (Abbas et al., *IMF Economic Review*, 59:4, 2011).
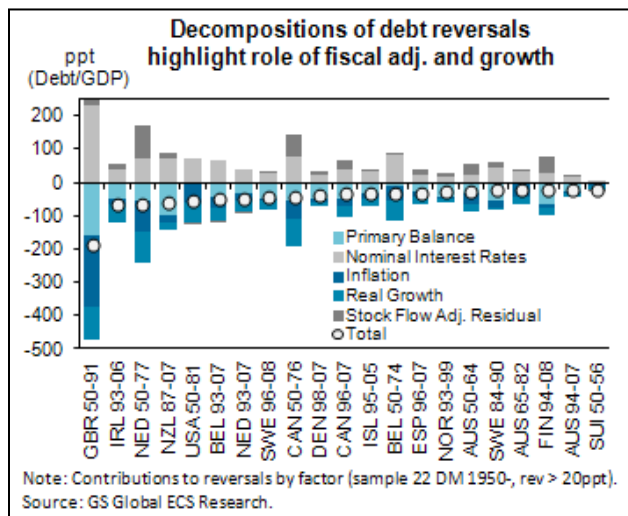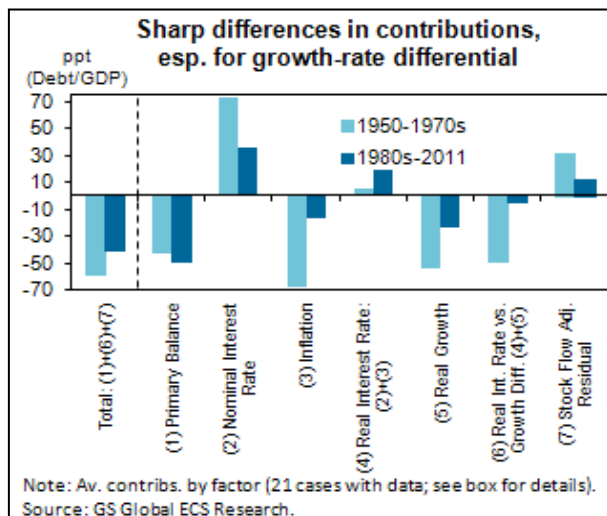
Exhibit 6

Note: Contributions to reversals by factor (sample 22 DM 1950-, rev > 20ppt).
Source: GS Global ECS Research.

Exhibit 7

Note: Av. contribs. by factor (21 cases with data; see box for details).
Source: GS Global ECS Research.

In the first wave (1950s-1970s), the differential between real GDP growth and real interest rates accounted for almost all of the fall in debt ratios. The contribution from primary balances was
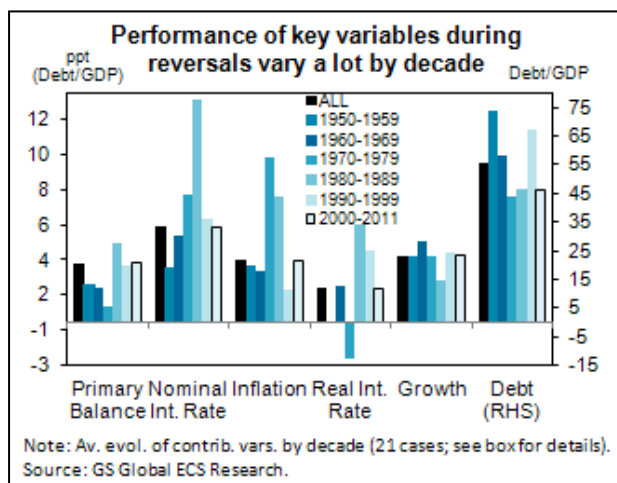
almost fully offset by 'stock-flow adjustments', suggesting that shifts in public-sector balance sheets 'above and below the line' may have played a smaller role than the macroeconomic backdrop. The second wave (1980s onwards) of debt reductions looked very different. The differential between real GDP growth and real interest rates played almost no role in reducing debt. The dominant role was played instead by 'paying debt back'—primary surpluses account for nearly all of the debt reductions. So the pattern of the first wave is almost entirely reversed: fiscal consolidation and not the macro backdrop dominated, though a strong global environment may have facilitated the ability to make the necessary fiscal adjustments.

VII. As Always, Mind the Trade-offs

Most economic problems involve some kind of trade-off—in Milton Friedman's terms, there are 'no free lunches'—and debt reduction is no exception. In achieving the set of conditions they require, policymakers inevitably find that elements of that set are in tension. A government may attempt to consolidate by cutting the budget deficit. But this may hurt GDP growth. A government may try to inflate away the debt by generating unexpected inflation, but this is likely to generate higher interest rates subsequently, thereby increasing debt-servicing costs. And while delaying adjustment given economic weakness may seem sensible, it increases its ultimate size.

The differences in the sources of debt reduction can be seen by looking at how the main variables varied by decade (Exhibit 8). The 1950s debt reductions were characterized by strong growth, low nominal interest rates and significant positive inflation. In the 1960s, strong growth was the main distinguishing feature, with real interest rates turning positive. In the 1970s, high inflation pushed real rates sharply negative, helping some countries to reduce debt further. But in the 1980s, the price was paid for that burst of inflation, with high real interest rates and low growth interrupting the long trend towards lower public debt. The 1990s saw a rise in growth alongside strong primary balances in many countries. Across all periods, growth averaged almost 4% during reversals, again illustrating the important role it has played in successful experiences.

Exhibit 8

Note: Av. evol. of contrib. vars. by decade (21 cases; see box for details).
Source: GS Global ECS Research.

'Great Debt Reversals' from the 1950s provide interesting parallels to the current situation, as they occurred at a time when debt levels were comparably high and they entailed successful consolidations. Moreover, they featured a significant contribution from low real interest rates without 1970s-style inflation, although that may have been helped by 'financial repression'—a term now used frequently but loosely—involving restrictions on the flow of capital, caps on lending rates and other direct restrictions. Although these do not operate now, recent shifts in liquidity and banking regulation may push in similar directions, even if they are not identical to the past.

The conditions that underpin that period—and the other successful episodes—also expose the challenges ahead. The main determinants of debt accumulation that drive our decompositions currently look very differently across DMs. Primary deficits remain the norm, so the surpluses that have characterized past debt reductions are still a long way off. And GDP growth remains weak relative to past experiences of success. Offsetting this, outside the Euro area periphery, real interest rates are clearly negative for the major economies. As a result, the differential between growth and interest rates is working to reduce debt burdens, even as primary deficits increase them. Easy monetary policy and central bank unconventional policies—alongside the impact of private-sector deleveraging—are clearly a tailwind to public debt stabilization.

In trying to deliver the combination of growth and improved fiscal balances, it may be desirable to ensure a robust private-sector recovery first and to be confident that economies are free of their zero interest rate constraints before moving too fast on the fiscal front. This does not mean that the risks involved in postponing too far the correction of large debt build-ups should be overlooked. In effect, skepticism related to countries' ability to handle them can easily trigger confidence crises. Moreover, our results shows that high levels of debt can themselves become a drag on growth. Supporting growth in the short run is important—especially in the current circumstances—but in the medium and longer run, healthier public finances do the trick.

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