

Introduction

The global gross debt of the nonfinancial sector has more than doubled in nominal terms since the turn of the century, reaching \$152 trillion in 2015.¹ About two-thirds of this debt consists of liabilities of the private sector. Although there is no consensus about how much is too much, current debt levels, at 225 percent of world GDP (Figure 1.1), are at an all-time high. The negative implications of excessive private debt (or what is often termed a “debt overhang”) for growth and financial stability are well documented in the literature, underscoring the need for private sector deleveraging in some countries. The current low-nominal-growth environment, however, is making the adjustment very difficult, setting the stage for a vicious feedback loop in which lower growth hampers deleveraging and the debt overhang exacerbates the slowdown (Buttiglione and others 2014; McKinsey Global Institute 2015; Gaspar, Obstfeld, and Sahay 2016). The dynamics at play resemble that of a debt deflation episode in which falling prices increase the real burden of debt, leading to further deflation. Weak bank balance sheets in some countries have further contributed to dampening economic activity, as private credit has been curtailed beyond what would be desirable.

A key priority in those countries currently facing a private debt overhang is to identify policies that can help with the repair process while minimizing the drag on the economy. This task is particularly challenging because the room for policy maneuver has narrowed since the start of the global financial crisis and the effectiveness of some policies (notably monetary) may be more limited. These constraints put a premium on how to use the fiscal space that may still be available, including leveraging complementarities across different policy tools to get more mileage out of any fiscal intervention. Against this backdrop, this issue of the *Fiscal Monitor* addresses the following questions:

¹The nonfinancial sector comprises the general government, nonfinancial firms, and households. Gross debt represents the unconsolidated liabilities of the three. The statistics for the world reported throughout this chapter cover 113 countries accounting for 94 percent of global GDP.

- How high is global private and public debt, and how far are we in the deleveraging process?
- Can fiscal policy help with private sector deleveraging and, if so, how?

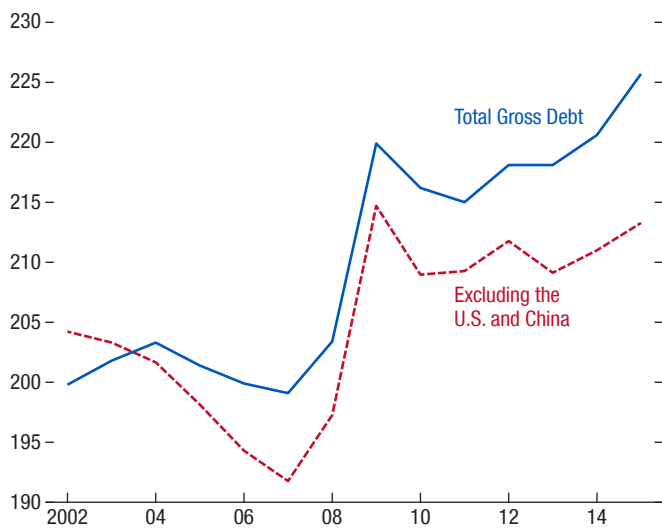
This issue of the *Fiscal Monitor* goes beyond the existing literature, significantly expanding the country coverage of previous studies by including emerging market economies and low-income countries as well as advanced economies. It also looks at the sectoral composition of leverage by analyzing both public and private nonfinancial debt (for households and non-financial corporations). The analysis attempts to cover the asset side as well to arrive at broader measures of the health of private and public balance sheets. A key contribution is the use of a novel analytical framework developed by Batini, Melina, and Villa (2016), which explicitly models the interactions between private and public debt in analyzing the role of fiscal policy during the deleveraging process.

The chapter starts by giving an overview of debt trends around the world and taking stock of the deleveraging process. Next, it explains why debt levels matter for growth as well as macroeconomic and financial stability. It then examines empirically and through model simulations how fiscal policy can help a country get out of a debt overhang while drawing on country case studies to illustrate the types of measures—and key design features to enhance their effectiveness—that would support a smooth deleveraging process.

The main findings can be summarized as follows:

- Private debt is high not only among advanced economies, but also in a few systemically important emerging market economies. High private debt not only increases the likelihood of a financial crisis but can also hamper growth even in its absence, as highly indebted borrowers eventually decrease their consumption and investment.
- The chapter’s analysis also suggests that the current process of private sector deleveraging in highly indebted countries will likely take some time to play out. General government balance sheets have also weakened, particularly in advanced economies,

Figure 1.1. Global Gross Debt
(Percent of GDP; weighted average)



Sources: Abbas and others 2010; Bank for International Settlements; Dealogic; IMF, *International Financial Statistics*; IMF, Standardized Reporting Forms; IMF, *World Economic Outlook*; Organisation for Economic Co-operation and Development; and IMF staff estimates.

Note: U.S. = United States.

although low interest rates have temporarily eased budget constraints.

- Empirical analysis shows that fiscal policy can significantly reduce the depth and duration of a financial recession associated with a private sector debt overhang. However, a government's ability to play such a stabilizing role depends on the health of its fiscal position prior to the crisis, especially in emerging market economies. This underscores the importance of building fiscal buffers and properly accounting for financial cycles in assessing the strength of the fiscal position in periods of expansion while ensuring the close monitoring of private debt to limit fiscal risks (IMF 2016a).
- At the current juncture, the array of growth-friendly fiscal policies should include measures that facilitate the repair of balance sheets in those countries facing a private debt overhang or where the financial system is impaired. This is particularly important in some European countries, where the weak banking system is retarding the recovery, and in China, where high corporate debt levels raise the risk of a disorderly deleveraging. Such targeted fiscal interventions may include government-sponsored programs to help restructure private debt—such as subsidies for creditors to lengthen maturities,

guarantees, direct lending, and asset management companies—that can facilitate the deleveraging process. To the extent that weaknesses in a country's financial system threaten financial stability, impair the credit channel, and hamper growth, addressing the underlying problems swiftly is essential.

- The design of such fiscal interventions is critical for minimizing their cost, mitigating moral hazard, and ultimately ensuring their success. The limited policy room calls for exploiting the synergies among fiscal, monetary, and financial, as well as structural, policies to facilitate the deleveraging process, reinvigorate growth, and bring inflation to target.

How High Is Debt?

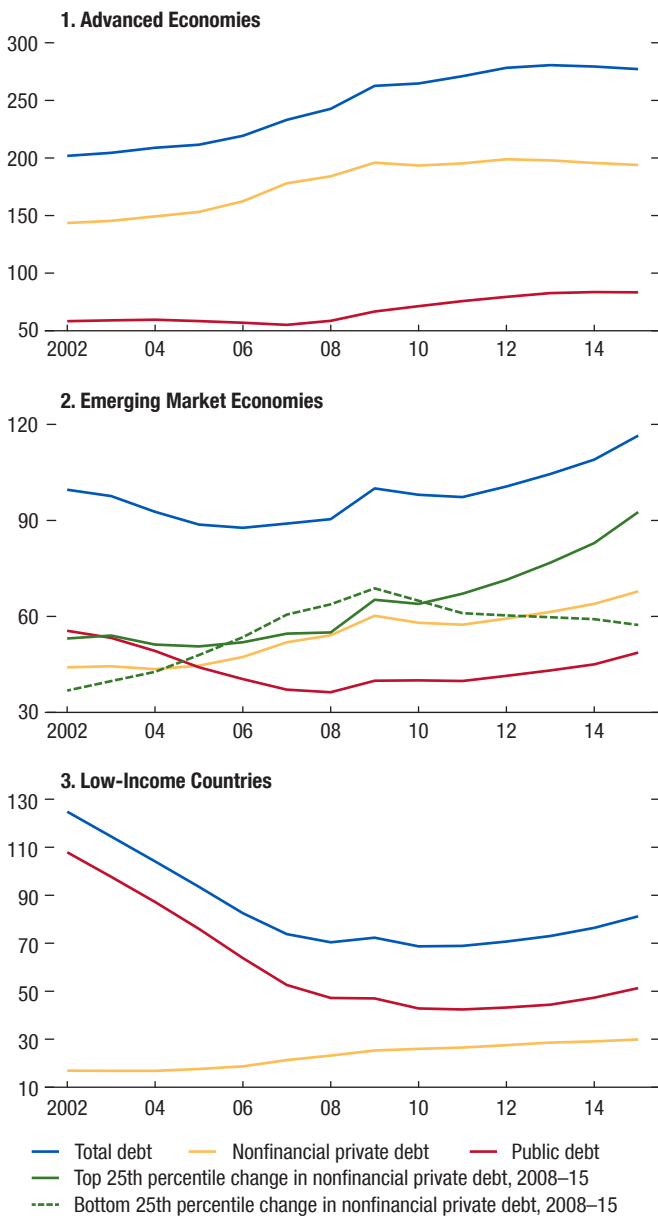
This section provides a broad perspective on global debt, expanding the country coverage of previous studies and looking at recent developments in advanced economies, emerging market economies, and low-income countries. It also explores the drivers behind recent trends and how far we are in the deleveraging process.

The Global Picture

The genesis of the global debt overhang problem resides squarely within advanced economies' private sector.² Enabled by the globalization of banking and a period of easy access to credit, nonfinancial private debt increased by 35 percent of GDP in advanced economies in the six years leading up to the global financial crisis (Figure 1.2). The credit boom was not limited to the U.S. mortgage sector but was broad based within this country group, with more than half of the debt coming from households (Figure 1.3). In emerging market economies, the increase in nonfinancial private debt during this period was also driven by the household sector but was generally less pronounced. Low-income countries, on the other hand, were largely shielded, as many were (and still are) in the process of financial deepening (IMF 2015a). Interestingly, public debt declined across all country groups up to 2007, particularly among low-income countries—mainly as a result of debt relief under the Heav-

²The analysis in this section is based on a new data set that extends Bank of International Settlements data on private debt to a large panel of 113 advanced economies, emerging market economies, and low-income countries spanning about 40 years, on average (see Annex 1.1).

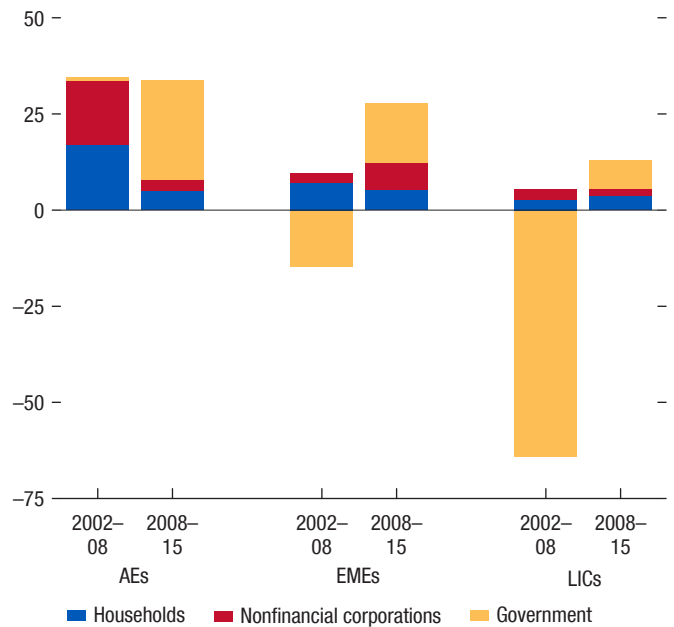
Figure 1.2. Gross Debt by Country Groups
(Percent of GDP, simple average)



Sources: Abbas and others 2010; Bank for International Settlements; Dealogic; IMF, *International Financial Statistics*; IMF, Standardized Reporting Forms; IMF, *World Economic Outlook*; Organisation for Economic Co-operation and Development; and IMF staff estimates.

Note: Countries in the top 25th percentile are Brazil, China, Colombia, Georgia, Malaysia, Oman, Paraguay, Thailand, Turkey, and Venezuela. Countries in the bottom 25th percentile are Bulgaria, El Salvador, Hungary, Jordan, Kazakhstan, Pakistan, Romania, South Africa, Sri Lanka, and Ukraine.

Figure 1.3. Sectoral Changes in Debt
(Percent of GDP)



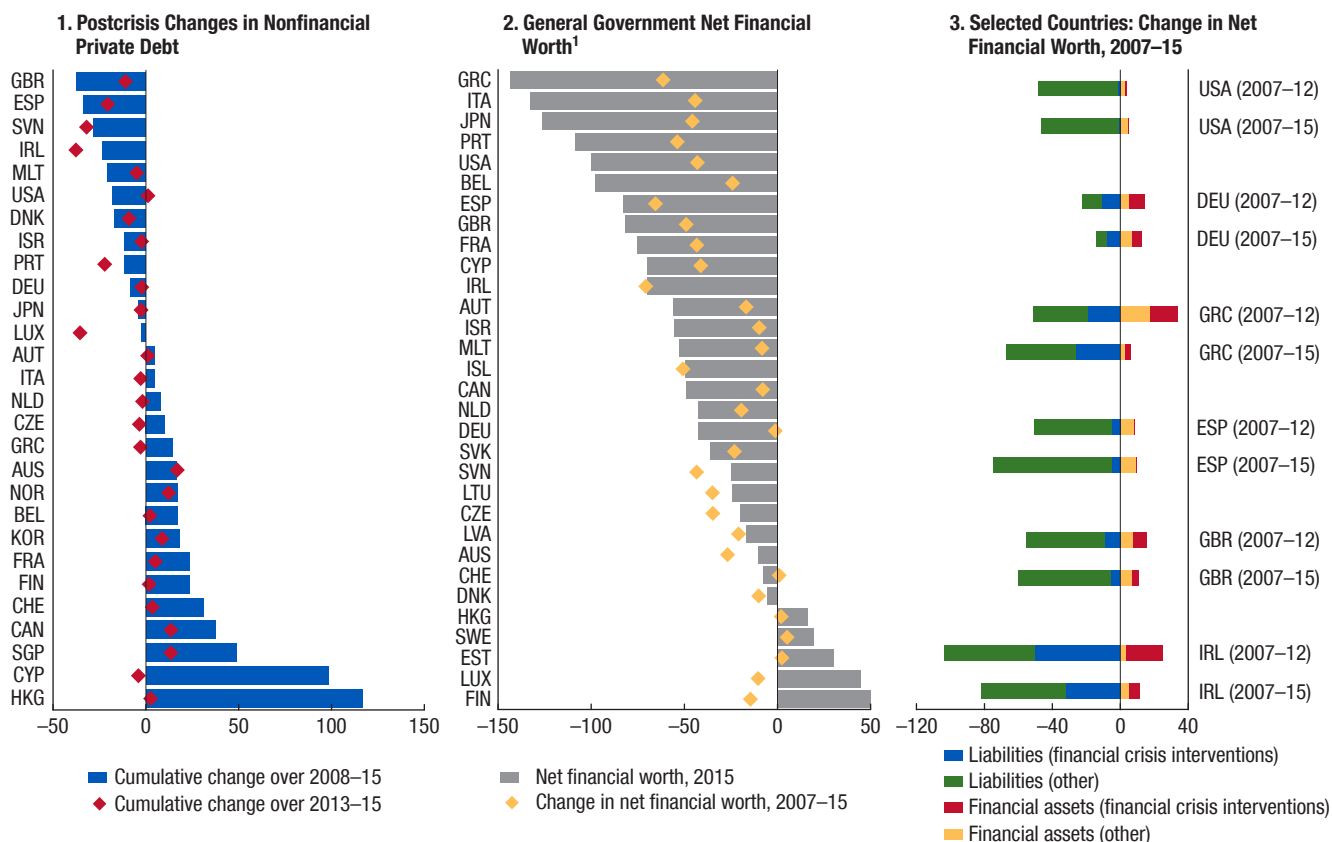
Sources: Abbas and others 2010; Bank for International Settlements; Dealogic; IMF, *International Financial Statistics*; IMF, Standardized Reporting Forms; IMF, *World Economic Outlook*; Organisation for Economic Co-operation and Development; and IMF staff estimates.

Note: Because of data constraints, this figure is based on a smaller sample of 22 advanced economies (AEs), 27 emerging market economies (EMEs), and 35 low-income countries (LICs).

ily Indebted Poor Countries and Multilateral Debt Relief Initiatives. Nevertheless, there is evidence that the financial cycle may have overstated the strength of government balance sheets in some advanced economies that experienced a real estate boom (Budina and others 2015).

After the start of the global financial crisis, public debt in advanced economies rose rapidly, while progress in private sector deleveraging was mixed (Figure 1.4). On average, private debt ratios in advanced economies reached a turning point in 2012, with the largest reductions since then registered in those countries that entered the crisis with high debt levels. In some cases, however, private debt has continued to accumulate at a fast pace—notably, Australia, Canada, and Singapore. As private debt started to retrench, public debt picked up, increasing by 25 percent of GDP over 2008–15. The realization of contingent liabilities with respect to the private sector played an important role (Bova and others 2016), accounting for about a quarter of the change. General government financial balance sheets also deteri-

Figure 1.4. Advanced Economies: Debt Developments
(Percent of GDP)



Sources: Bank for International Settlements; Dealogic; Eurostat; IMF, *Government Finance Statistics*; IMF, *International Financial Statistics*; IMF, Standardized Reporting Forms; IMF, *World Economic Outlook*; Organisation for Economic Co-operation and Development; and IMF staff estimates.

Note: Data labels in the figure use International Organization for Standardization (ISO) country codes.

¹Data are from 2007 to latest available. For Switzerland, latest available data are for 2013. For Hong Kong Special Administrative Region, Iceland, Israel, and Japan, latest available data are for 2014. For all others, data are for 2015.

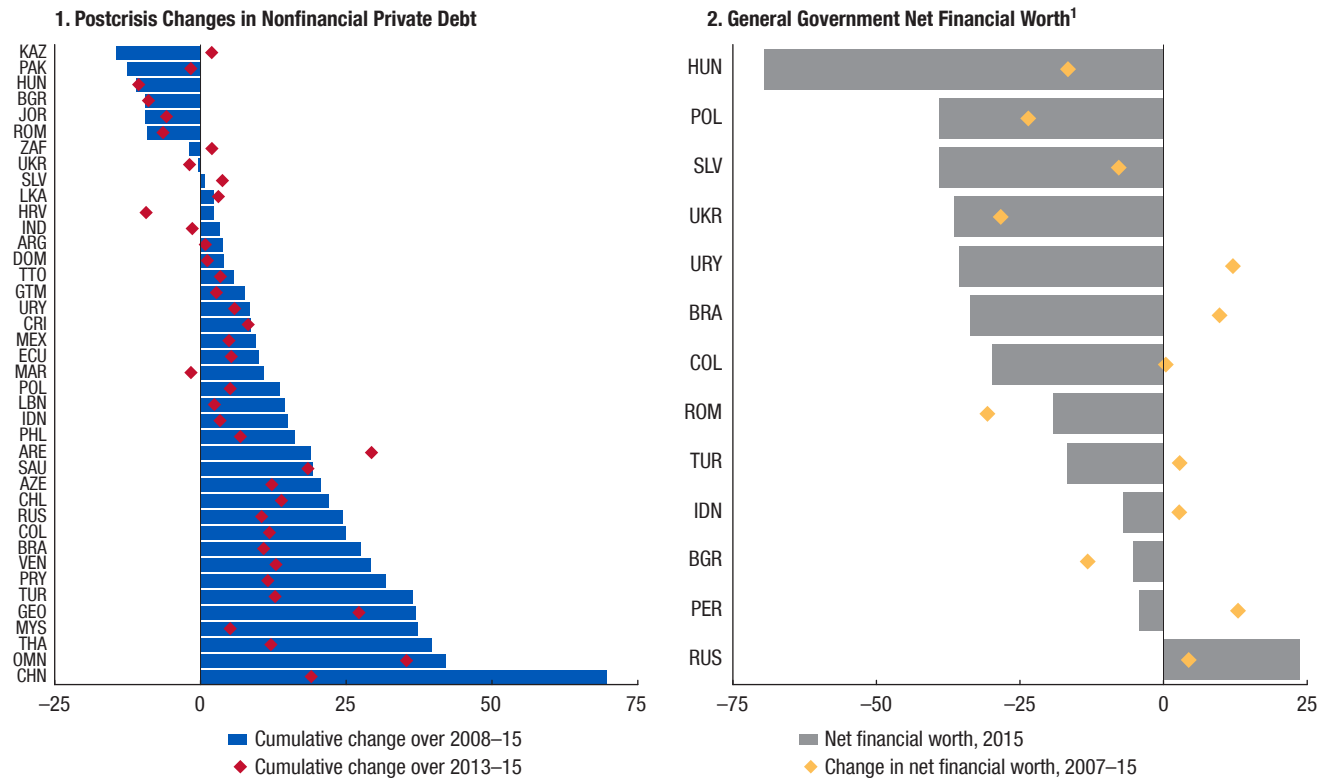
orated, in some cases significantly, in part reflecting the assumption of private sector liabilities as a result of bank bailouts (Figure 1.4, panel 3). Only about one-third of advanced economies have made inroads in improving general government net financial worth since 2012 and, on average, these inroads have been small.

Meanwhile, easier financial conditions in the aftermath of the global financial crisis have led to a private debt boom in some emerging markets, particularly in the nonfinancial corporate sector.³ The surge was concentrated in a small number of emerging market economies in the top 25th percentile of the debt distribution (see Figure 1.2, panel 2), although this group includes large systemically important countries

such as Brazil and China, accounting for 60 percent of emerging market economies' output (Figure 1.5, panel 1). The rise in private debt among these countries, at 38 percent of GDP on average, is of some concern, as it is similar in magnitude to that of advanced economies in the run-up to the crisis. At the other end of the spectrum, private debt in the rest of the emerging market economies has fallen or increased only moderately since the start of the crisis. Overall, the increase in public debt in this country group has been relatively subdued across the board, as spillovers from the private sector have been limited. Nevertheless, data constraints preclude a full assessment of the strength of general government balance sheets, an important information gap particularly in regard to systemically important countries such as China (Box 1.1). For those countries for which data are available, general government net

³For a detailed analysis, see the October 2015 *Global Financial Stability Report*.

Figure 1.5. Emerging Market Economies: Debt Developments
(Percent of GDP)



Sources: Bank for International Settlements; Dealogic; Eurostat; IMF, *Government Finance Statistics*; IMF, *International Financial Statistics*; IMF, Standardized Reporting Forms; IMF, *World Economic Outlook*; Organisation for Economic Co-operation and Development; and IMF staff estimates.

Note: Data labels in the figure use International Organization for Standardization (ISO) country codes.

¹Data are from 2007 to latest available, except in the cases of Colombia, Indonesia, Turkey, and Ukraine, for which data are from 2008. For El Salvador, latest available data are for 2013. For Brazil, Colombia, Indonesia, Peru, Russia, Turkey, Ukraine, and Uruguay, latest available data are for 2014. For all others, data are for 2015.

financial worth has declined only marginally (Figure 1.5, panel 2). However, there is a risk that the resilience of general government balance sheets in those countries undergoing a financial boom may not be as great as the headline numbers may suggest, as was also the case in advanced economies prior to the crisis.

In low-income countries, improved market access over the last few years has resulted in higher private and public debt ratios, although debt levels are generally low. Financial sector development has allowed a gradual increase in private sector borrowing, while advances in microfinance lending and mobile banking have also helped improve financial inclusion in many of these countries (IMF 2016b). In general, the pace of credit growth has been measured except in a few countries, notably Cambodia and Vietnam (Figure 1.6, panel 1). General government debt has increased, in some cases by nontrivial amounts, taking advantage of

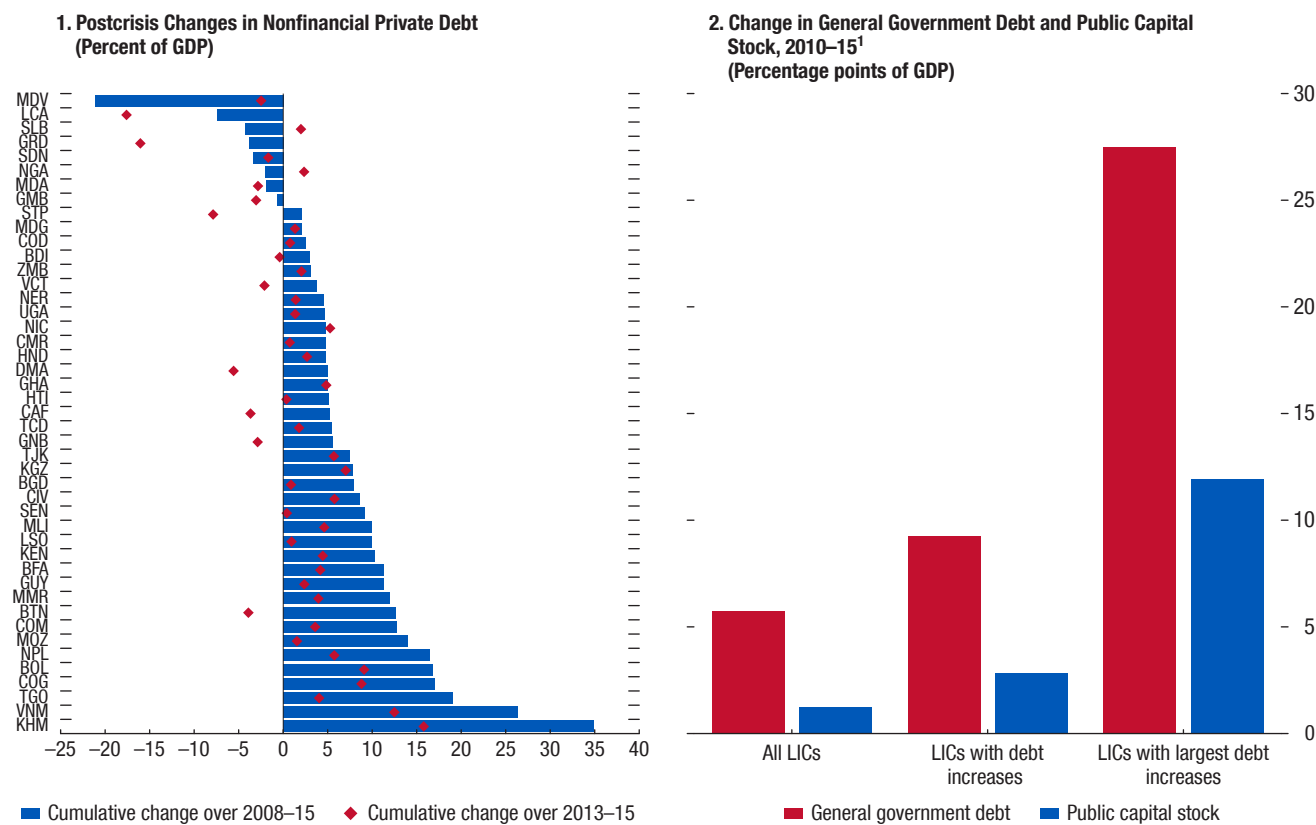
the space created by debt relief. However, the increase in the liability side of general government balance sheets is matched only partially by the buildup of public infrastructure assets (Figure 1.6, panel 2).

What Is Driving These Developments?

Weak macroeconomic conditions have been the major factor impinging on deleveraging efforts in advanced economies. To analyze the drivers behind recent trends, a standard decomposition is undertaken, breaking down the change in debt ratios into “macro-related” (the *interest-growth differential*) and “non-macro-related” factors (Escolano 2010).⁴ Although

⁴Changes in debt-to-GDP ratios can be due to pure inertia imposed by the need to pay interest on the existing debt stock (which increases the ratio’s numerator) and nominal GDP growth (which increases its denominator). The balance of these two opposing forces

Figure 1.6. Low-Income Countries: Debt Developments



Sources: Bank for International Settlements; Dealogic; IMF, *International Financial Statistics*; IMF, Investment and Capital Stock Dataset; IMF, Standardized Reporting Forms; IMF, *World Economic Outlook*; Organisation for Economic Co-operation and Development; and IMF staff estimates.

Note: Data labels in the figure use International Organization for Standardization (ISO) country codes.

¹Data are for 34 low-income countries. Public debt ratios rose for 25 of these between 2010 and 2015. Those with the largest increases (top quartile) were Cameroon, Central African Republic, The Gambia, Ghana, Lesotho, Mozambique, Republic of Congo, Yemen, and Zambia.

the interest rate environment has been relatively benign—which may have arguably contributed to improvements in repayment capacity—low nominal growth in advanced economies has resulted in positive interest-growth differentials, implying a cumulative increase in total debt over 2008–15 (Figure 1.7). This is heavily weighing on general government balance sheets: low nominal growth accounts for close to 50 percent of

is the so-called interest-growth differential ($r-g$). Stripping the debt dynamics from $r-g$ gives a measure of the exogenous change in debt due to savings or other one-off factors (“nonmacro” factors). Effective interest rates on public debt are calculated here using the interest bill from the fiscal accounts as reported in the *World Economic Outlook*. Similarly, the effective interest rates for the private sector are calculated using interest payments from the national accounts as reported by the Organisation for Economic Co-operation and Development (OECD), complemented with national sources for OECD countries. Private sector lending rates from the IMF’s *International Financial Statistics* are used as proxy in all other cases.

the increase in the public debt ratio since the start of the global financial crisis. But it is also hindering deleveraging by households and nonfinancial corporations. As an illustration, even if the private sector in advanced economies had not issued any new debt since 2008 but had simply rolled over the outstanding stock of debt at that time, private sector debt ratios in those countries would have increased by 17 percent of GDP. On the other hand, the effect of nonmacro factors (reflecting, among other things, net debt repayments) has been negative on average for advanced economies, suggesting that the private sector has made genuine efforts to reduce its debt.⁵

⁵It is difficult to disentangle how much the nonmacro factors reflect net debt repayments, debt restructurings, or constraints on the supply of credit. However, the fact that net private savings (defined as gross private savings minus gross private investment) in advanced economies have significantly increased since the start of the crisis suggests that there have indeed been some efforts toward deleveraging.

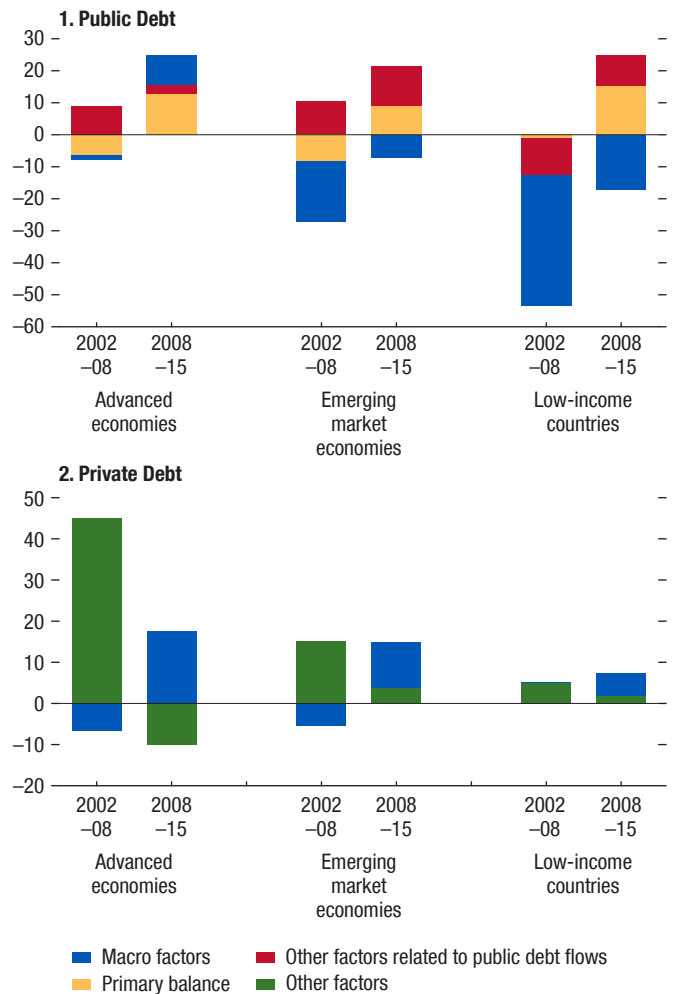
A comparison between the deleveraging experiences of the United Kingdom and United States on one hand and the euro area on the other is very instructive in regard to the importance of growth. The former two experienced a much sharper increase in private debt ratios than the euro area in the run-up to the global financial crisis but were able to reduce debt much more in its aftermath (Figure 1.8). They also enjoyed higher nominal growth—more than 10 percentage points higher in cumulative terms over the period since 2007. Although various factors may explain these differences—including market and financing conditions—it is noteworthy that public debt ratios in these two countries have increased much faster than those in the euro area. This may suggest that fiscal policy and, in particular, the early tightening in the latter may not have helped in facilitating the adjustment. In the euro area, an aggravating factor appears to have been weakness in the banking sector. In particular, there is evidence that some European banks—burdened by high levels of impaired assets and a low-growth environment—may not be in a position to extend the necessary credit flows to sustain normal economic activity, contributing to a deeper economic slump (IMF 2016c). In addition, structural challenges have worsened the outlook for bank earnings in these countries, complicating the cleanup of balance sheets (for more details, see the October 2016 *Global Financial Stability Report*).

In emerging market economies and low-income countries, the strength of growth until recently and favorable interest rates have resulted in lower debt ratios than would have been the case otherwise. This is particularly striking in the case of general government debt, as public savings (measured by the primary balance) were negative across the board over 2008–15 and hence contributed to increasing public debt, as shown in Figure 1.7. The strength of government balance sheets may, however, weaken if financing conditions continue to tighten.

Where Are We in the Deleveraging Process?

Private sector deleveraging in advanced economies thus far has been much slower than previous successful experiences, indicating that the adjustment will have to continue. In an event study including 27 deleveraging episodes in advanced economies from 1980 to 2006, the average private deleveraging episode was found to last five years, although in some countries, it took much longer. On the basis of that metric and taking 2009 as the starting point, it would be expected that at

Figure 1.7. Debt Decomposition
(Percent of GDP; cumulative changes)

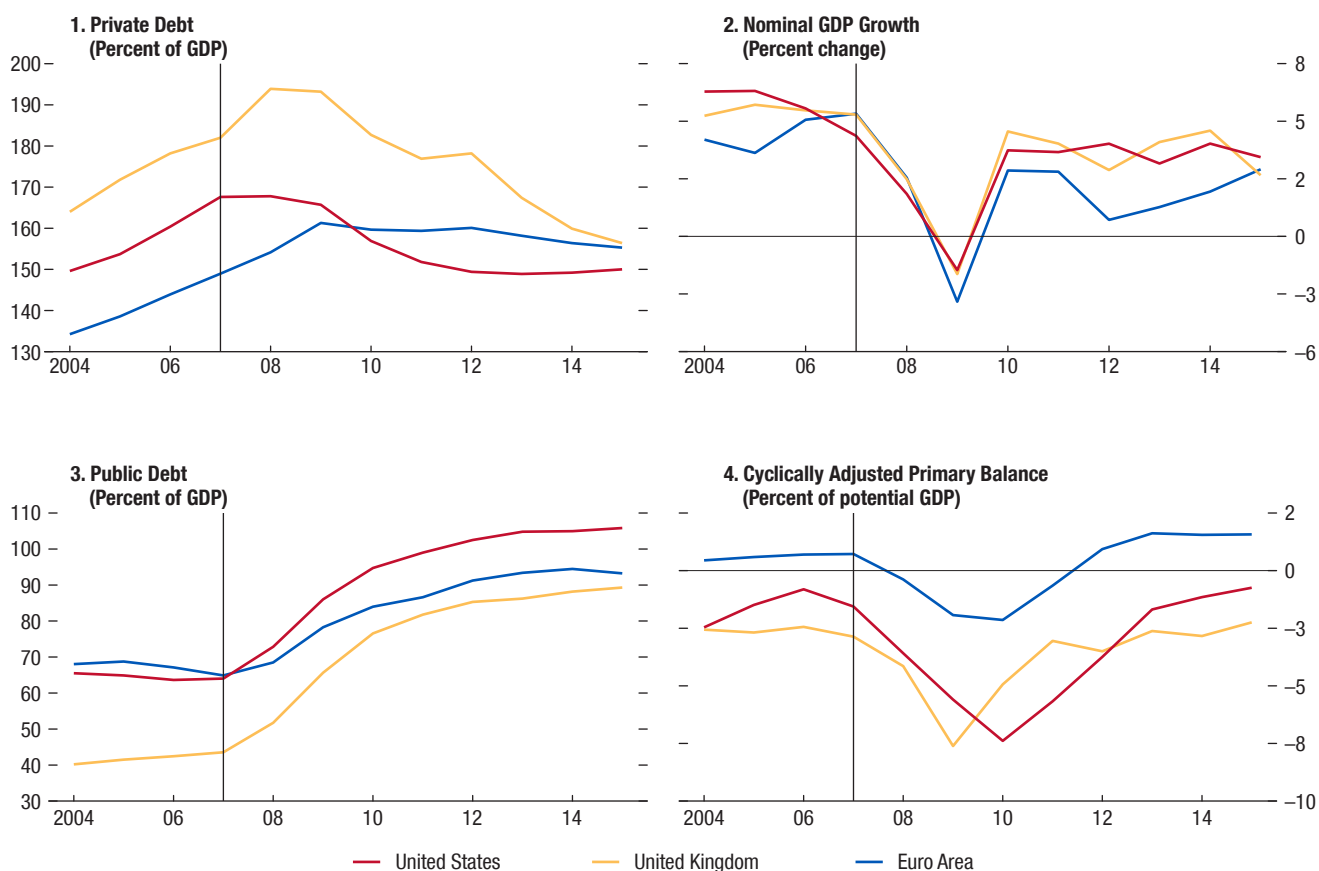


Sources: Abbas and others 2010; Bank for International Settlements; Dealogic; IMF, *International Financial Statistics* (IFS); IMF, Standardized Reporting Forms; IMF, *World Economic Outlook*; Organisation for Economic Co-operation and Development (OECD); and IMF staff estimates.

Note: For OECD countries, effective private sector interest rates are calculated using OECD data on private sector interest payments from the national accounts, augmented with data from national statistics offices. For non-OECD countries, IFS lending rates are used.

the current juncture, the deleveraging process should be well advanced. This, however, does not appear to be the case: the percentage reduction in private debt ratios so far has been only a third of historical precedents at this point in time, and private debt levels are significantly higher (Figure 1.9). Current trends are even starker when compared to those in episodes with sharp increases in private debt prior to a crisis followed by rapid reductions in private debt (dashed blue line in Figure 1.9). As outlined previously, one explanation for

Figure 1.8. Selected Advanced Economies: Current Deleveraging Episodes
(Weighted average)



Sources: Bank for International Settlements; IMF, *World Economic Outlook*; and IMF staff estimates.

the slower pace of adjustment this time around is the weak nominal output growth, which has been half the average of that in previous deleveraging experiences.

But simply looking at the past does not necessarily reveal how long it will take for the current deleveraging process to run its course. In principle, one could compare private-debt-to-GDP ratios with some theoretical threshold to make such an assessment, but there is no consensus on what that threshold should be. Also, such an approach would ignore the asset side of the balance sheet, which is important for evaluating repayment capacity. An alternative is to use the sustainability criterion based on the methodology proposed by Arrow and others (2004) whereby private debt is assessed as sustainable whenever net worth follows a nondecreasing trend.⁶

⁶The concept can be made operational by requiring debt to evolve in line with assets, corrected for transitory valuation effects. A similar approach was introduced by Cuerpo and others (2015),

Widening differences between actual and sustainable debt defined according to this methodology would signal possible deleveraging pressures in the future.

Data for a sample of advanced economies suggest that private debt is high in some cases, even after assets are accounted for, a harbinger of possible deleveraging pressures. In the period leading up to the global financial crisis, the private-debt-to-asset ratio—corrected for transitory valuation effects—displayed an upward trend. For nonfinancial corporations, that ratio has returned to the levels of the early 2000s, but for households, the

who assume debt to be sustainable if the debt-to-asset ratio, adjusted for valuation effects, is stationary. For the purposes of the analysis in this chapter, assets are corrected only for transitory valuation effects, as some of the increase in asset prices may reflect fundamentals. For financial assets, transitory valuation effects are computed as deviations from a linear trend that implicitly account for cyclical movements in financial asset prices, while nonfinancial assets are adjusted for real house price changes.

increase has not been completely reversed (Figure 1.10, panels 1 and 2). Moreover, the gap between actual and sustainable debt in the household sector that opened up during the boom has not yet been closed (Figure 1.10, panel 3). However, the average gaps shown in Figure 1.10 mask significant heterogeneity across countries. In particular, the accumulated gap in the household sector is large and has even grown further in a number of cases (notably Australia and Canada). In other countries, there is no gap (Germany and Japan) or it has been reduced significantly relative to the precrisis period (Spain and the United States). The results for nonfinancial corporations suggest similar gaps (Figure 1.10, panel 4). Moreover, in more than half the sample, nonfinancial corporations have increased their leverage relative to the period before the crisis. Adjustments in the nonfinancial corporate sector might also come into play in the near future in some emerging market economies, as outlined in the October 2016 *Global Financial Stability Report*.⁷

In sum, the findings in this section indicate that private debt is still high in advanced and a few systemically important emerging market economies, raising the question of what the implications are for the current recovery, an issue the chapter explores next.

Why Does the Level of Debt Matter?

This section discusses why the level of debt matters, drawing from the literature on debt overhang and new empirical results based on the role of private and public debt in past financial crises. It also examines the interlinkages between private and public debt and potential policies to help get out of a private debt overhang.

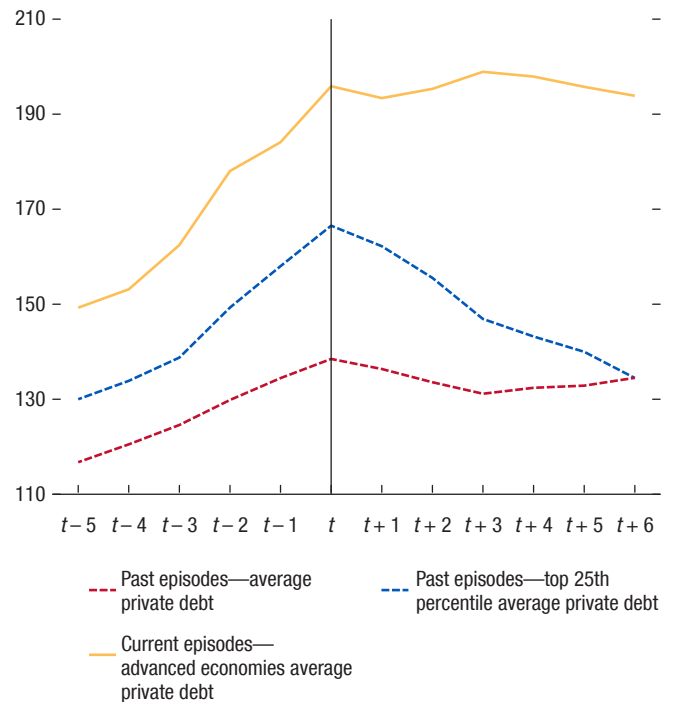
Private Debt Overhang: What Is It and Why Does It Matter?

Private debt overhang can be characterized as a situation in which a borrower's debt service exceeds its future repayment capacity. An extensive literature has established that excessive debt levels are associated with lower growth even in the absence of a crisis.⁸ The reason for this is that highly indebted borrowers

⁷Data limitations preclude extending the foregoing analysis to emerging market economies.

⁸Studies have identified the effect on growth not only for private, but also for public, debt (see, for example, Krugman 1988; Sachs 1989; Cecchetti, Mohanty, and Zampolli 2011; Baum, Checherita-Westphal, and Rother 2013; and Reinhart and Rogoff 2010).

Figure 1.9. Total Private Debt during Deleveraging Episodes (Percent of GDP)



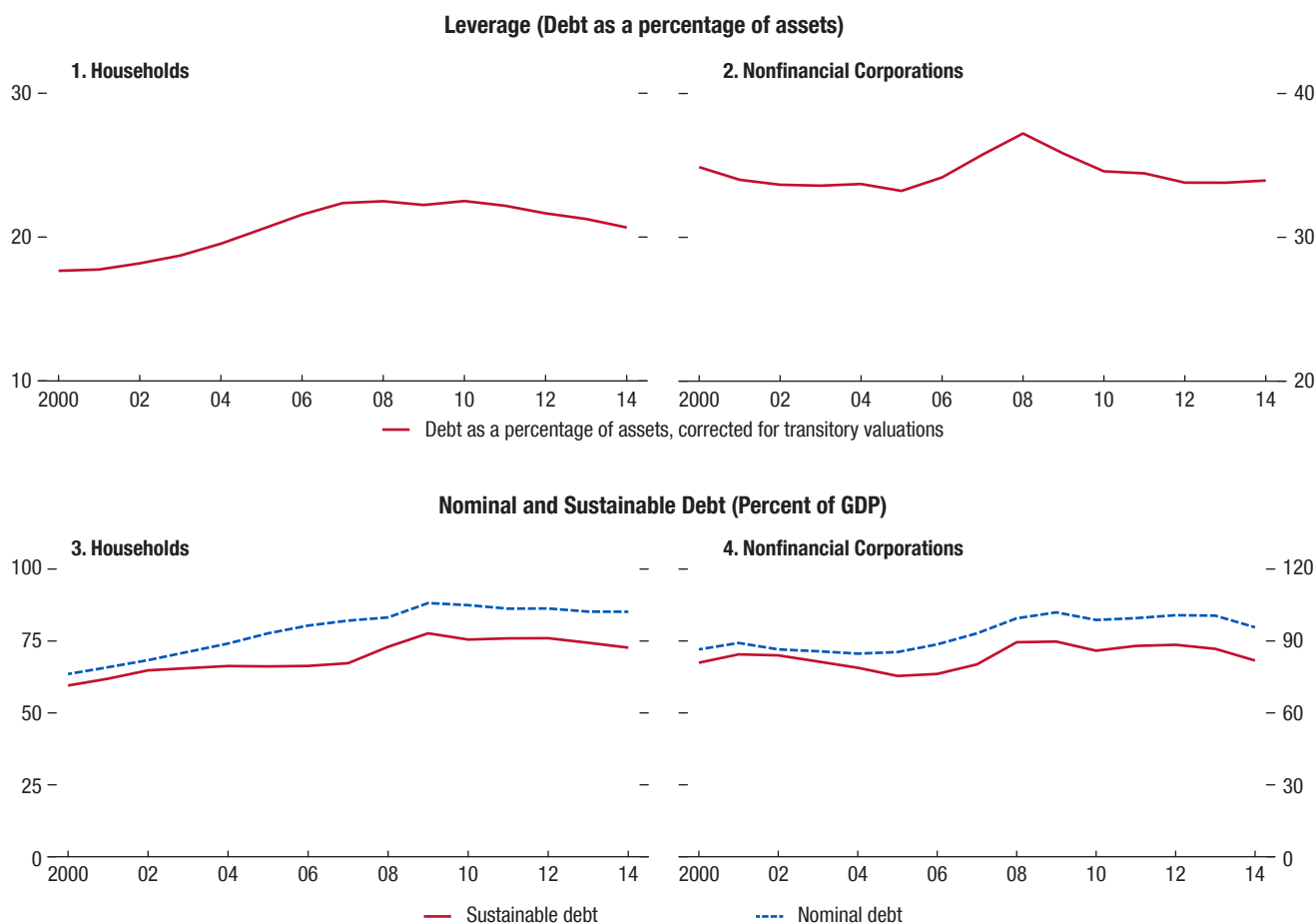
Sources: Bank for International Settlements; IMF, *World Economic Outlook*; and IMF staff estimates.

Note: Past deleveraging episodes have been identified following Chen and others (2015) and include 27 episodes in 21 advanced economies from 1980 to 2006. Current episodes consist of 28 advanced economies in which the deleveraging period starts in 2009. Top 25th percentile average private debt refers to the sample of episodes in which the size of deleveraging on private debt was the largest within the top 25th percentile.

will sooner or later decrease their consumption and investment as they are unable to service their debt and can no longer borrow. There is no consensus on the threshold at which debt levels begin to matter for growth or trigger deleveraging. If initiated early enough, a smooth deleveraging process can eliminate the risks of a disorderly adjustment. However, if such an adjustment is postponed, debt reaches such levels that the private sector becomes very sensitive to shocks, increasing the risk of an abrupt deleveraging process.⁹

Very often, this adjustment is preceded by a financial crisis (Mian and Sufi 2010; Gourinchas and Obstfeld 2012; Jordà, Schularick, and Taylor 2013;

⁹Those shocks may come from changes in risk appetite and market sentiment, a sudden correction in asset prices, financing problems in banks, or a recession that puts pressure on repayment capacity (Bruggeman and Van Nieuwenhuyze 2013). In the context of this chapter, deleveraging is meant to refer to a reduction in the debt-to-income ratio.

Figure 1.10. Selected Advanced Economies: Leverage

Sources: National statistical offices; Organisation for Economic Co-operation and Development; and IMF staff estimates.

Note: The sample comprises 16 advanced economies in the case of households and 15 in the case of nonfinancial corporations. Assets are obtained as the sum of financial and nonfinancial assets. Financial assets corrected for transitory valuations are constructed by adding financial asset transactions and trend revaluations to the stock of financial assets in the initial year. Nonfinancial assets corrected for transitory valuations are calculated by applying real growth rates to the initial stock of nonfinancial assets. Real house prices are used as a deflator in the case of households. For nonfinancial corporations, the analysis is based on a weighted average of house prices and the investment deflator.

Borio 2014). For every percentage point the annual change in the private-credit-to-GDP ratio exceeds the average, the probability of financial crisis goes up by 0.4 percent.¹⁰ Public debt does not appear to increase the probability of a financial crisis, although it matters of course for sovereign crises.

¹⁰A financial crisis is characterized as a situation in which there are significant signs of financial distress and losses in wide parts of the financial system. The probability reported here is based on the estimation of the log odds ratio of a financial crisis following the methodology in Jordà, Schularick, and Taylor 2013. These estimates are slightly lower than in that article, but the sample employed here is different, and thus results are not fully comparable. For more details, see Bernardini and Forni, forthcoming.

Financial crises associated with private debt overhangs can be very costly in terms of output. Following the empirical strategy of Jordà, Schularick, and Taylor (2016), this chapter finds that GDP falls considerably more in financial than in normal recessions and that the pace of recovery is more protracted.¹¹ This is particularly the case in emerging market economies, where, after five years, cumulative output losses are almost double those in advanced economies, when

¹¹Recessions are defined as the period between a peak and the following trough in the level of real GDP per capita. They are classified as financial if a major banking crisis erupts at the peak (the start of the recession) or in the following year. Annex 1.2 provides further details on the estimation methodology and results.

the financial recession has been preceded by a private credit boom.

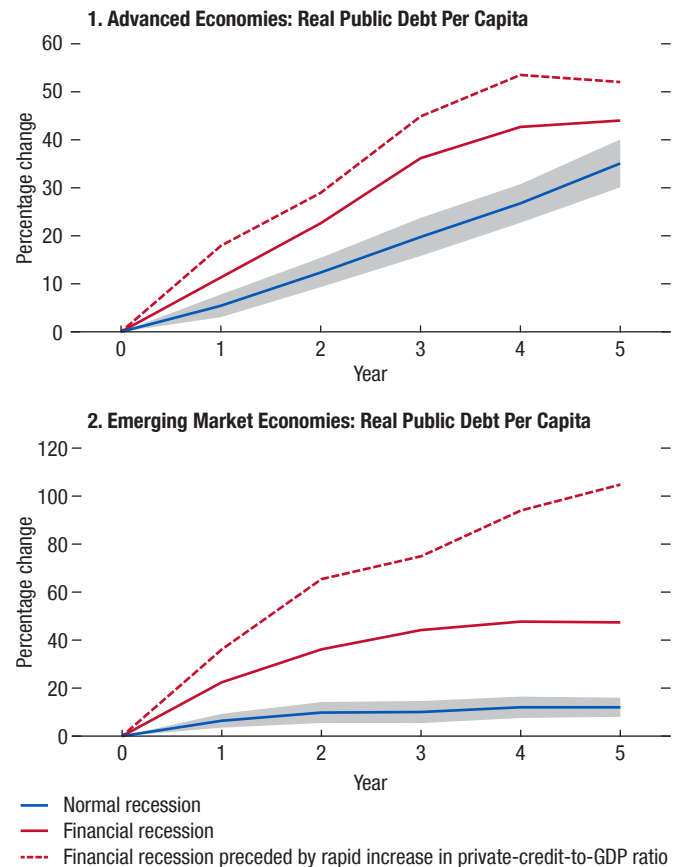
Interlinkages between Private and Public Debt

Although high public debt levels are usually not at the root of the problem, they can intensify the effects of private sector deleveraging in financial recessions (Jordà, Schularick, and Taylor 2016). Indeed, the interlinkages between public and private sector balance sheets exacerbated their weaknesses, significantly contributing to the feeble recovery following the global financial crisis (IMF 2015b; Dell’Ariccia, Martin, and Minoiu, forthcoming). These interlinkages are related to the macroeconomic impact of a financial crisis and spillovers between the public and private sectors as follows:¹²

- *From private to public debt.* The most immediate effect often comes from the use of fiscal resources to repair banks’ balance sheets (bailout cost), which can increase public debt levels significantly, as illustrated by the recent cases of Ireland and Spain. In some cases, the government will also support nonfinancial corporations and households in balance sheet restructuring (see the country case studies in “Deleveraging in Practice: What Does History Teach Us?”). In addition, the collapse in output and asset prices will sap revenues and lead to higher spending through automatic stabilizers. Discretionary fiscal policy may also be used to stabilize output. Estimates obtained using the methodology of Jordà, Schularick, and Taylor (2016) show that public debt does indeed increase substantially in financial recessions preceded by a private credit boom (Figure 1.11, dashed red lines), suggesting that the protracted recovery and financial sector support may weigh on the government balance sheet. The weakening of the government balance sheet may, in turn, result in a higher sovereign risk premium, limiting the government’s ability to implement macroeconomic and financial stabilization policies.
- *From public to private debt.* This interlinkage often works through the banking system. In particular, a perceived loss of sovereign creditworthiness will result in capital losses in banks, reflecting the

¹²See Annex 1.3 for a summary of the literature on the different channels through which private and public debt are interlinked in the deleveraging phase.

Figure 1.11. Public Debt in Normal and Financial Recessions



Source: IMF staff estimates.

Note: The figure shows the dynamics of real public debt per capita in advanced and emerging market economies, starting from the year preceding a recession (peak). The solid lines show the path in normal (blue) and financial (red) recessions. The shaded area around the blue line represents the 95 percent confidence interval. The dashed red lines show how the path deviates from its baseline when the peak before a financial recession coincides with a private credit boom. A country is considered to be in a credit boom if the annual average change in the private-credit-to-GDP ratio in the five years before the crisis is greater than the cross-country average. In particular, a scenario is simulated in which such a difference is equal to 5 percentage points (approximately equal to one standard deviation).

implicit lower value of government guarantees and bond holdings. This was the case, for example, in Greece at the start of the global financial crisis, when the country’s banking sector had large exposures to Greek sovereign debt. In addition, the higher sovereign risk premium may also lead to higher funding costs. If financial repression follows, margins may be compressed and banks’ profitability will decline. All of this will ultimately result in inefficient credit rationing for creditworthy households and firms.

How to Get Out of a Debt Overhang?

Reductions in gross debt ratios can come from two sources: macroeconomic deleveraging (through growth and inflation) and balance sheet deleveraging (through debt repayment, restructuring, and write-downs) (April 2015 *Global Financial Stability Report*). Fiscal policy can help with both:

- *Macroeconomic deleveraging.* Countries with slower nominal growth will take longer to escape a debt overhang problem (Reinhart, Reinhart, and Rogoff 2012). Therefore, demand management policies and, in particular, fiscal stimuli geared toward supporting economic activity can aid in the deleveraging process.
- *Balance sheet deleveraging.* When the debt overhang is severe, balance sheets may also need to be cleaned up. Unfortunately, without government intervention, balance sheet repair often proceeds very slowly, because of coordination problems, market failures, and the inability of distressed banks to absorb losses (Laeven and Laryea 2009; Laryea 2010). However, leaving the debt overhang unaddressed can result in lower consumption and underinvestment (Olney 1999; Myers 1977), which, if compounded by banks' foregoing profitable lending opportunities (Philippon and Schnabl 2013), will weaken the recovery. This is an argument for targeted fiscal intervention to speed up the resolution of the debt overhang problem. These types of interventions are usually geared toward addressing weaknesses in the banking sector and typically include recapitalization, asset purchases, and sometimes guarantees. But they can also include measures to facilitate the repair of households' and firms' balance sheets. A government-sponsored debt-restructuring program in the latter case often includes subsidies for creditors for lengthening maturities, guarantees, or both and direct lending to companies that are viable but unable to access financial markets, as well as the creation of asset management companies.

At present, given the sheer size of the debt, particularly in some advanced economies, it is likely that a combination of macroeconomic and balance sheet deleveraging will be needed. The next section explores whether and how fiscal policy can help and the trade-offs involved.

Fiscal Policy and Private Sector Deleveraging

This section analyzes how fiscal policy can facilitate the deleveraging process that is likely to start or continue in some advanced and emerging market economies

in the near future, while minimizing the associated drag on growth. First, it looks at the output stabilization role of fiscal policy in past financial crises. It then discusses what type of fiscal policy interventions can be most effective when an economy's credit channel is impaired, as is currently the case in the euro area, for example.

Does Fiscal Policy Affect the Speed of Recovery after a Financial Crisis?

Fiscal support to domestic demand can improve recovery prospects in private deleveraging episodes. In particular, econometric estimates based on the methodology of Jordà, Schularick, and Taylor (2016) suggest that fiscal policy can significantly reduce the output cost of a financial crisis, provided that fiscal buffers are available prior to the crisis (Box 1.2). The reason is that countries with fiscal buffers are able to conduct countercyclical fiscal policy, while those that start a financial crisis with a weak fiscal position have to cut government spending at a time when fiscal multipliers are likely to be high. These results are particularly strong for emerging market economies, perhaps because they face tighter financing conditions during a crisis due to the prevalence of the so-called sudden stops during periods of stress (Calvo 1998). This provides a cautionary tale for several emerging market economies, including Brazil (Box 1.3), that have recently experienced rapid private credit growth and have weak public sector balance sheets.

Can Fiscal Policy Facilitate Successful Deleveraging Today?

In addition to supporting demand, fiscal policy can facilitate the repair of balance sheets, particularly when the credit system in a country is clogged. As discussed in the previous section, such fiscal measures could take two forms: (1) *direct intervention*, which helps creditworthy households and firms to access credit at reasonable costs while introducing incentives for the restructuring of bad debt, or (2) *indirect intervention*, through the recapitalization and restructuring of banks. These types of interventions have been used successfully in recent deleveraging episodes, for example, in the United States (for more details, see the next section).¹³ The objective of such measures is

¹³In the United States, both direct and indirect support was provided in the aftermath of the global financial crisis. Among other measures, the government gave loans to the auto industry, condi-

not to prevent private deleveraging from happening, but rather to ensure that the deleveraging is orderly. Whether fiscal policy should play such a role is of great relevance today, particularly for those advanced economies in which lingering banking sector weakness continues to weigh on nominal growth by disrupting the efficient allocation of credit and may reduce the efficacy of monetary policy (Figure 1.12).

To characterize the appropriate fiscal policy response in these cases in which the credit channel in an economy is impaired, three questions are examined, using the analytical framework developed by Batini, Melina, and Villa (2016): (1) What are the trade-offs between fiscal intervention and inaction? (2) What is the most effective way of using public money? and (3) To what extent does the optimal policy response depend on the size of fiscal buffers? The main novelty of the approach presented here is to account explicitly for the interlinkages between private and public debt while examining the role of fiscal policy in supporting private deleveraging (see Box 1.4). Three types of stimuli are considered: (1) *targeted intervention*, taking the form of a temporary subsidized government loan to the private sector in those cases in which an economy's credit channel is not working; (2) *government consumption*; and (3) *public investment*, which can carry either a high or a low rate of return. The targeted intervention in this framework should be interpreted as encompassing both direct and indirect support to the private sector, as the overall objective is to deal with the consequences of an impaired financial system, which could make the deleveraging process more painful than necessary.

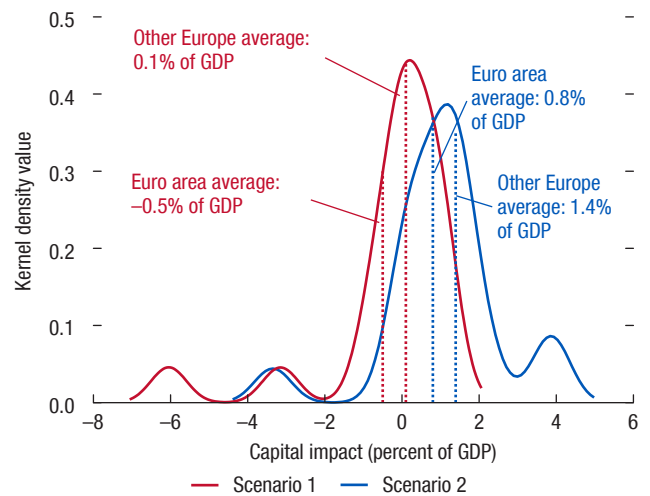
The simulations illustrate that when an economy's credit channel is clogged, hampering investment and consumption:

- Targeted fiscal intervention is far superior to inaction, as it can alleviate the recessionary impact of private sector deleveraging and result in lower public debt, compared to a no-policy-action scenario.
- It is also more effective than other standard fiscal stimulus measures. For the same fiscal cost, the output effects are about four times larger.¹⁴

tional on the implementation of a restructuring plan, while at the same time injecting public capital into stressed financial institutions.

¹⁴The fiscal cost of the targeted intervention is not the full amount of the loan but the subsidy component and the losses arising from the inefficiencies associated with this type of intervention.

Figure 1.12. Europe: Estimated Capital Impact of Immediate Nonperforming Loan Disposal—Density Functions



Sources: Bloomberg L.P.; European Banking Authority; Haver Analytics; IMF, October 2016 *Global Financial Stability Report* (GFSR), Chapter 1; SNL Financial LC; and IMF staff calculations.

Note: The chart reflects the results presented in Chapter 1 of the October 2016 GFSR following the methodology of Jobst and Weber (2016); it shows the distribution of the estimated capital impact—net of losses/gains on sale—from the reduction of nonperforming loans (NPLs) to precrisis levels (June 2009) as of the end of 2015. Scenario 1 reflects the current valuation of NPLs based on common return expectations among distressed debt investors. Under Scenario 2, a hypothetical policy intervention (via state guarantees and effective structural reforms to the insolvency regime) reduces the return expectations from 15 percent to 6 percent, and the time required to recover collateral-supported impaired assets declines by up to two years. The sample comprises banks from 17 European countries: Austria, Belgium, Bulgaria, Czech Republic, France, Germany, Hungary, Ireland, Italy, Macedonia, the Netherlands, Poland, Portugal, Serbia, Slovak Republic, Slovenia, and Spain.

- The optimal level of intervention increases with the size of fiscal buffers. The lower the initial public debt, the higher the optimal level of intervention that minimizes output losses.

The fiscal space necessary to support this type of intervention can be expanded through a comprehensive and credible package of policies. Indeed, there is some evidence that the extraordinary monetary policy actions of recent years might have eased budget constraints in advanced economies (see Box 1.5). In addition, commitments to credible consolidation plans and structural reforms can create policy space by lowering financing costs and increasing potential growth (Gaspar, Obstfeld, and Sahay 2016; April 2016 *World Economic Outlook*).

The effectiveness of targeted fiscal interventions, however, depends on their design and implementation, which are quite challenging in the real world. For instance, problems can arise in the selection of benefi-

Table 1.1. Private Sector Deleveraging Episodes: Basic Facts

Country	Start	End	Initial Private Debt (percent of GDP)	Initial Public Debt (percent of GDP)	Duration	Size of Deleveraging (percentage points)	Sector
Finland	1992	1998	164	39	6	55	NFC
Japan	1995	2007	221	95	12	55	NFC
Korea	1997	2004	163	10	7	24	NFC
Thailand	1997	2007	182	40	10	91	NFC
Iceland	2007	2015	272	27	7	176	HH
United States	2008	2013	168	73	5	19	HH

Source: IMF staff estimates.

Note: Following Chen and others (2015), the start and end of the deleveraging episodes correspond, respectively, to peaks and troughs in the private-debt-to-GDP ratio, with the exception of that in Iceland, where deleveraging is still ongoing. HH = household sector; NFC = nonfinancial corporate sector.

ciaries, resulting in nonviable firms or financial institutions' being supported. In addition, these measures can create distortions by, for example, providing opportunities for tax avoidance. Finally, government intervention can lead to moral hazard and excessive risk taking. These considerations point to the importance of appropriately designing these measures and complementing them with other policies (such as strong insolvency frameworks and macroprudential measures) to minimize risks. The next section describes how these types of interventions have been used in practice and discusses some of the issues involved in designing them so as to enhance their effectiveness.

Deleveraging in Practice: What Does History Teach Us?

This section examines six deleveraging episodes in which fiscal policy was deployed as part of a policy package aimed at reducing private sector debt while minimizing the so-called deleveraging drag on output. It discusses what worked and did not work as well as complementarities between fiscal and other policies.

What Was the Role of Fiscal Policy?

The six deleveraging episodes considered cover a broad range of macroeconomic conditions: Finland in the early 1990s; Japan in the mid-1990s; Korea and Thailand following the Asian financial crisis; and Iceland and the United States in the aftermath of the global financial crisis. Table 1.1 and Annex 1.5 summarize some of the key features of these episodes. In virtually all cases, private debt decreased in nominal terms (Figure 1.13). Such decreases appear to have been predominant in Iceland and Japan, while macroeconomic conditions seem to have played a more important role in Finland and the United States. Korea and Thailand fall some-

what in between.¹⁵ Government-sponsored purchases of bad loans and voluntary debt write-offs were the centerpiece of corporate debt restructuring in Japan, Korea, and Thailand. Meanwhile, restructuring of residential mortgages was an important component in Iceland and the United States.

All six countries implemented a fiscal stimulus, but the timing, size, and composition varied (Figure 1.14). Fiscal expansions were larger and more front-loaded in those cases following the global financial crisis (6 percent of GDP in the United States and 12 percent in Iceland). In other countries, the fiscal expansion was small (Finland), back-loaded (Thailand), or dispersed across the period (Japan and Korea). Fiscal tightening, when it happened, reflected concerns about rising debt and fiscal risks (Iceland, Japan, and Thailand), automatic spending cuts (the U.S. sequesters), or accession convergence criteria for participation in the euro area (Finland).

Targeted fiscal policy interventions were also a core part of the strategy to facilitate measured and orderly deleveraging in specific sectors. The overriding motivation was the need to unclog the bank lending channel, which required cleaning up bank balance sheets and creating incentives for debt restructuring and write-downs. The interventions varied depending on (1) their objectives (improve real incomes, prop up assets, and restructure liabilities), (2) the policy instrument employed (tax incentives, transfers, subsidies, direct lending, and government guarantees), (3) the targeted sector (households or corporations), (4) the recipients (households, corporations, or financial intermediaries), and (5) the conditionality attached to the intervention (that is, whether adjustments were

¹⁵The growth in Korea's nominal debt reflected a surge of new loans to small and medium-sized enterprises (supported by government guarantees) and households that more than outweighed deleveraging by large corporations (IMF 2004).

required on the part of the recipient as part of the deal). Table 1.2 summarizes the features of the main types of interventions, while Table 1.3 provides some quantification of the fiscal costs to the extent data are available. Overall, financial restructuring accounted for the lion's share of the fiscal cost. In the case of Iceland, fiscal costs were partially defrayed as a result of bailing-in foreign depositors (for more details, see Annex 1.5).

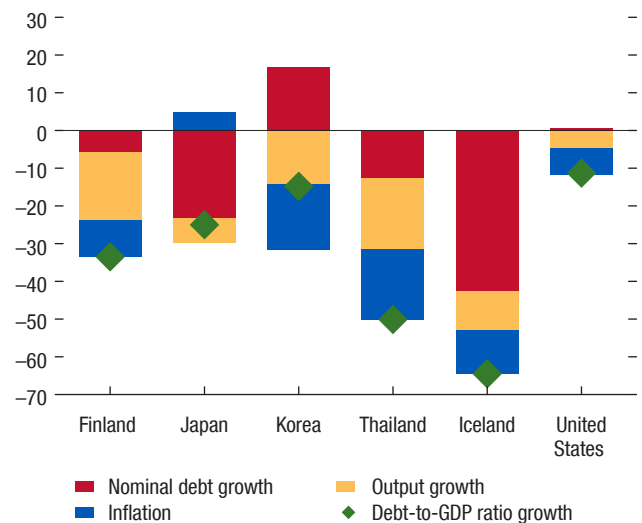
What Worked?

Expansionary macroeconomic policies and targeted fiscal interventions complemented and reinforced one another. To the extent that they did not work in sync, the recovery was frail. A case in point is Japan, where too gradual a monetary easing allowed low inflation expectations to become entrenched (Ueda 2012; Arbatli and others 2016) and the absence of a credible medium-term fiscal framework led to fiscal stimuli being short lived and quickly reversed (IMF 2009a). Generally, availability of ample fiscal space at the beginning of the crisis allowed a more powerful response. As an example, fiscal policy remained expansionary in Korea through most of the deleveraging process, thanks to low public debt prior to the crisis. This allowed an increase in social safety nets and provision of tax incentives to support corporate debt restructuring (Lane and others 1999). In many instances, fiscal tightening was introduced only gradually to avoid exacerbating the deleveraging drag. For example, in the United States fiscal consolidation came only after the repair of banks and monetary policy had restored credit flows, thereby bolstering economic activity—although it has been argued that the pace of withdrawal should have been slower (Buttiglione and others 2014; IMF 2012b).

Beyond macroeconomic policies, the design features of the targeted fiscal interventions were critical for their success. Some key aspects were

- *Timing.* In most cases, early action geared toward bank recapitalization and corporate restructuring was instrumental in unclogging the economy's credit system, encouraging write-downs, and minimizing output losses. The least successful case was that of Japan, where delays in addressing weaknesses in the banking sector and regulatory forbearance postponed the recognition of losses, adding to the final costs and ultimately contributing to the slow recovery in the 1990s (Laryea 2010; IMF 2009a; Ueda 2012). At the other end of the spectrum, the

Figure 1.13. Contribution to Deleveraging
(Percent of GDP)



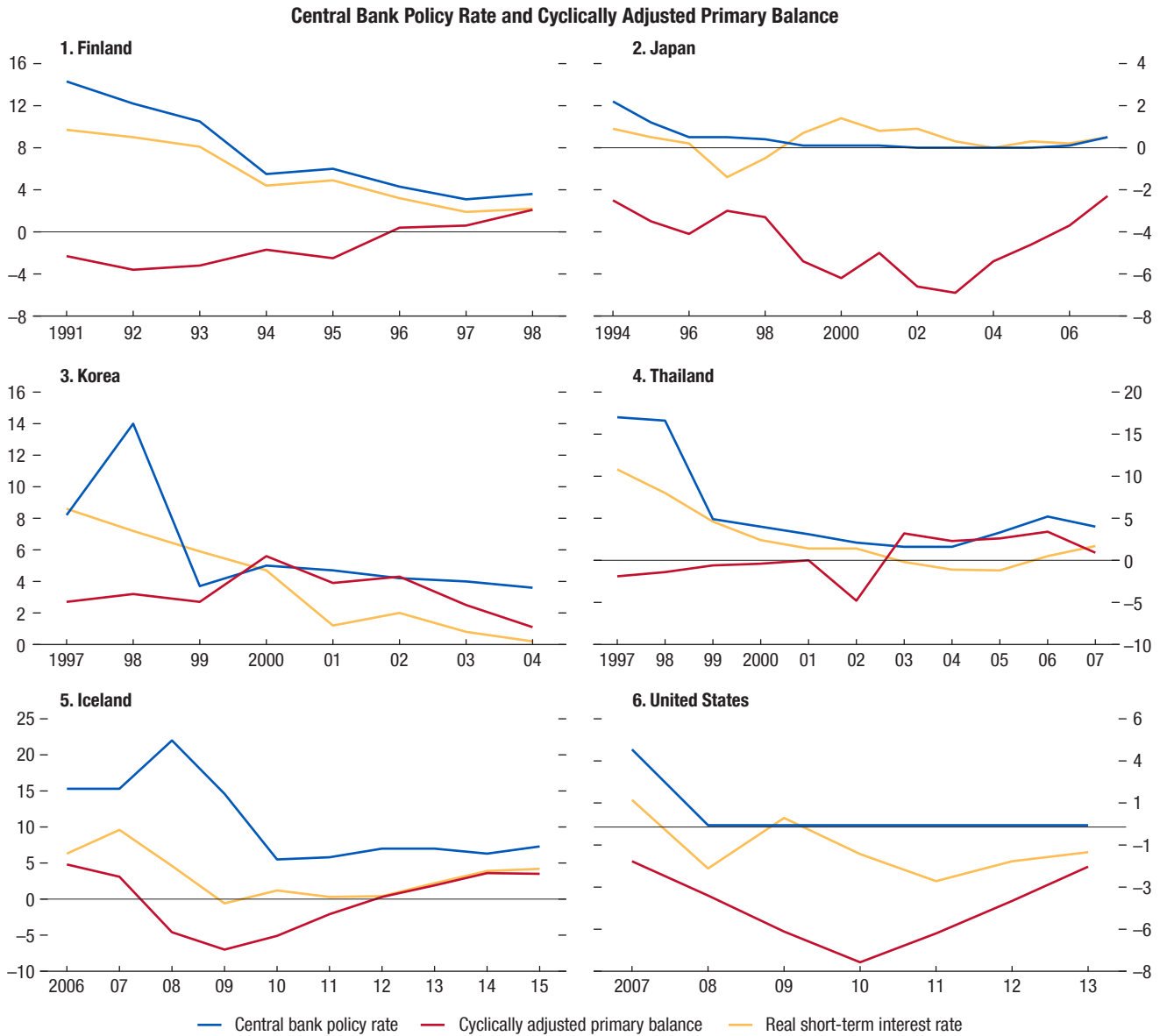
Sources: Bank for International Settlements; IMF, *World Economic Outlook*; and IMF staff estimates.

Note: The figure shows the percentage contribution of each variable to the growth in the debt-to-GDP ratio (the percentage change in the private sector debt ratio), using the methodology of Chen and others (2015). In the case of Iceland, the positive contribution of inflation is discounted by the share of loans indexed to the consumer price index.

use of asset management companies in Finland and Korea contributed to accelerating the disposal of nonperforming loans and corporate debt restructuring (Klingebiel 2000; Aiyar and others 2015). Part of the success stemmed from the asset management companies' narrow objectives, which focused on resolving insolvent and nonviable financial institutions and selling off their assets. Political independence, appropriate funding, and adequate bankruptcy and foreclosure laws also contributed to their effectiveness (Klingebiel 2000).

- *Sequencing.* In cases of systemic failure, financial sector restructuring took precedence over fiscal intervention targeting firms and households. Nevertheless, incentives were provided to engage in debt restructuring as part of the package, as in Korea and Thailand, where regulatory suasion was used to require all banks to sign on to workout principles (Pomerleano 2005; Lieberman and others 2005). Still, in some instances, the systemically important nature of some corporations and potential spillovers to the industry value chain required a parallel intervention. That was the case with Chrysler and General Motors in the United States, where the government granted loans to prevent the companies'

Figure 1.14. Macroeconomic Policies and Deleveraging
(Percent of GDP)



Sources: IMF, *International Financial Statistics*; IMF, *World Economic Outlook*; and IMF staff estimates.
 Note: For Finland and Thailand, the central bank policy rate refers to the short-term interest rate.

Table 1.2. Selected Fiscal Policy Interventions during Deleveraging Episodes

Type	Sector	Recipient	Description	Cases
1. Direct				
Transfers	Household	Household, Financial	Temporary cash payments to creditors for write-offs (principal and interest payments) and to compliant homeowners under the Home Affordable Modification Program (HAMP)	United States (2008–13)
	Household	Household	Temporary mortgage interest subsidy	Iceland (2007–)
	Household	Household	Temporary transfers to write down mortgage principal	Iceland (2007–)
Tax Incentives	Household	Household	Progressive tax rebate for mortgage interest payments	Iceland (2007–)
	Household	Household	Tax exemption of early withdrawals from pillar III pension contributions to pay mortgages	Iceland (2007–)
	Household	Household, Financial	Income tax deductibility for mortgages write-offs under HAMP	United States (2008–13)
	Corporate	Corporate, Financial	Deductibility of debt write-offs for creditors and deferral of corporate income tax on written-off debt for debtors	Thailand (1997–2007)
	Corporate	Corporate	Exemption of capital gains, transaction, and income taxes on sale, transfer, or reevaluation of assets of restructured companies	Japan (1995–2007), Korea (1997–2004), Thailand (1997–2007)
	Corporate	Corporate	Exemption of capital gains, transaction, and income taxes on capital injections from shareholders, mergers, and reorganization of subsidiaries	Japan (1995–2007), Korea (1997–2004), Thailand (1997–2007)
	Corporate	Corporate	Removal of tax exemptions for debt service payments of heavily indebted firms (for example, those whose debt exceeded 500% of equity, as of 2000)	Korea (1997–2004)
Direct Lending	Corporate	Corporate	Disbursement of emergency funds to General Motors and Chrysler under Troubled Asset Relief Program (TARP) for debt restructuring	United States (2008–13)
2. Indirect				
Guarantees	Household	Financial	Government guarantees of positive net worth of government-sponsored residential mortgage insurers (Fannie Mae and Freddie Mac) to enable mortgage refinancing	United States (2008–13)
	Corporate	Financial	Government guarantees to small and medium-sized enterprises	Japan (1995–2007), Korea (1997–2004)
Financial Sector Restructuring	Corporate	Financial	Public fund injections into commercial banks to ensure deposit protection, recapitalization, and purchase of bad loans	All cases
Tax Incentives	Corporate	Financial	Tax deductibility of write-offs in the sale of bad loans to asset management companies	Japan (1995–2007)

Source: IMF staff compilation.

Note: Dates in the “Cases” column refer to the period over which the private sector was deleveraging.

Table 1.3. Costs of Selected Fiscal Policy Interventions
(Percent of GDP)

Type	Cost	Source
Direct		
Transfers and Direct Lending		
U.S. HAMP	0.1	U.S. Treasury
Iceland Mortgage Interest Subsidy	0.7	IMF (2011)
Iceland Write-Down of Consumer Price Indexed Mortgages	4.3	IMF (2014)
U.S. Auto Industry Bailout	0.5	U.S. Treasury
Tax Incentives		
Iceland Tax Rebate for Mortgage Service	0.3	IMF (2011)
Iceland Tax Exemption for Early Pension Withdrawals	4.3	IMF (2014)
Indirect		
Guarantees		
Japan SME Guarantees	6.0	IMF (2009a)
U.S. GSE Guarantees	1.2	Frame and others (2015)
Financial Sector Restructuring		
Finland	12.8	Laeven and Valencia (2012)
Japan	12.0	IMF (2009a)
Korea	31.2	Laeven and Valencia (2012)
Thailand	43.8	Laeven and Valencia (2012)
Iceland	44.2	Laeven and Valencia (2012)
United States	2.3	U.S. Treasury
Tax Incentives		
Japan Tax Deductibility of Bad Loans Write-Offs	9.2	Hoshi and Kashyap (2005)

Source: IMF staff estimates based on the sources listed in the table.

Note: Except for figures obtained from Laeven and Valencia 2012, for which the fiscal cost is already provided in percent of GDP, the fiscal cost is provided in local currency and divided by the average GDP over the fiscal intervention period. Iceland cost figures are estimates. Financial sector restructuring includes recapitalization. GSE = government-sponsored enterprise; HAMP = Home Affordable Modification Program; SME = small or medium-sized enterprise.

liquidation, allowing them to honor their commitments to suppliers.

- *Incentives.* For the most part, government recapitalizations tried to curb moral hazard by ensuring that only viable institutions benefited from taxpayer money and that rescued institutions repaid the recapitalization funds in full as soon as conditions permitted. That was not the case in Japan, where virtually every bank of significant size received assistance, though the amounts involved were relatively small, and the government did not require recipients to find private sources of capital. Thus, the recapitalization program did little to foster corporate restructuring or to restart bank lending.
- *Targeting.* To ensure the cost-effectiveness of intervention, measures were often targeted to specific sectors and subjected to conditionality. As an example, the Home Affordable Modification Program (HAMP) in the United States provided cash payments for loan servicers choosing to renegotiate residential mortgages and to borrowing households that remained current on their modified mortgages. Similarly, the first round of household debt restructuring in Iceland was supported via transfers and

tax rebates, the amount of which depended on the household's net worth. These two cases, however, underscore the difficult trade-offs between limiting moral hazard and the effectiveness of intervention. In the United States, where great emphasis was placed on strict eligibility criteria, take-up rates under HAMP were only about 40 percent of the original target, or less than 2 percent of total mortgages (April 2012 *World Economic Outlook*). In contrast, the first debt-restructuring program in Iceland enjoyed take-up rates of more than 50 percent of all mortgages. Nevertheless, fiscal risks may have increased in Iceland, particularly as a result of the second debt-restructuring program, launched in 2014, which did not target households on the basis of their net worth (unlike the first round) and did not cap fiscal costs.

- *Tax measures.* Tax incentives, such as those employed in Japan (IMF 2000a), may have contributed to restructuring corporate debt. However, these measures are difficult to monitor and prone to be exploited for purposes of tax avoidance in light of the complexity of the taxable event. That proved to be the case in Korea, where incentives ended up

being misused through cosmetic rather than real restructuring while adding to the complexity of the tax system (Claessens, Klingebiel, and Laeven 2001), although the imposition of sunset clauses provided a way out. Nevertheless, easing or eliminating the taxation of debt relief—at least as a temporary crisis measure and accompanied by safeguards to limit its abuse—was shown to facilitate debt restructuring in the United States.

- *Spending measures.* Subsidies, transfers, and loans created fewer distortions than other measures, when appropriately targeted. Targeting was, however, difficult, since technical decisions as to who should be the beneficiaries were often made in an environment prone to strong political pressures. The successful U.S. government bailout of the automobile industry stresses the importance of ensuring that such intervention is undertaken under sound governance principles that protect public funds and fiscal authorities' independence. In this particular case, key ingredients contributing to the early repayment of loans were (1) taking a technically oriented approach to identifying viable companies, (2) requiring credible restructuring and viability plans as a condition for government loans, and (3) a government “hands off” and time-bound approach in the management of the intervened companies (Goolsbee and Krueger 2015).
- *Guarantees.* These instruments can be a less costly avenue, provided that appropriate provisions are in place. As an example, government guarantees have been provided to government-sponsored enterprises in the United States to support the housing market, with positive outcomes and little cost to the Treasury (Frame and others 2015). In contrast, while the special credit guarantee program for lending to small and medium-sized enterprises introduced in Japan mitigated the negative consequence of the systemic credit crunch (Uesugi 2008), it may have delayed necessary restructuring, because participation in the program included heavily indebted firms facing a high risk of default (Matsuura and Hori 2003; IMF 2009a).

Targeted interventions were particularly effective when accompanied by reforms of bankruptcy procedures and the introduction of out-of-court frameworks. For example, Iceland reformed its household insolvency regime (IMF 2009b); Japan and Korea did the same for the corporate sector, removing impediments to debt restructuring while improving the system's

speed and efficiency (IMF 1999, 2009a). Nevertheless, the reformed insolvency regime in Korea was mainly applied to small and medium-sized enterprises, reflecting legal enforcement challenges, which allowed heavily indebted corporations to avoid bankruptcy for long periods of time (Claessens 2005). Special in-court processes for small and medium-sized enterprises in Japan and the United States also helped preserve the simplicity and efficiency of the insolvency process and avoid risks of delay (Bergthaler and others 2015). On the other hand, enhanced out-of-court frameworks in Korea and Thailand contributed to expediting restructuring while minimizing costs, thanks to regulatory suasion, agreements to arbitrate disputes, and the imposition of penalties for failure to meet deadlines (Laryea 2010).

After the crisis, ensuring a timely upgrade of prudential and supervisory frameworks was also critical to avoiding the materialization of moral hazard problems following costly government recapitalizations. This was the case in Finland; regulatory reforms were introduced in the United States and Iceland as well, although it is too early to tell whether these reforms have been effective. Failure to take this step in Korea led to a credit card lending boom—which ended in a credit bust in 2003—as the financial sector took advantage of ample liquidity, partly the result of fresh government capital, to shift lending from distressed firms to the largely unregulated consumer finance market (Kang and Ma 2007).

Conclusion

At \$152 trillion, global debt is at an all-time high, but not all countries are in the same phase of the debt cycle, nor do they face the same risks. In a few systemically important emerging market economies, private credit has expanded briskly in recent years. The speed of the increase dangerously resembles that in advanced economies in the run-up to the global financial crisis. In advanced economies, progress with private sector balance sheet repair has been mixed. Moreover, the interaction between the incipient deleveraging and low nominal growth has resulted in a vicious loop that in some cases, notably in Europe, has delayed the resolution of banks' distressed assets, hampering the efficient flow of credit and further depressing output.

The empirical evidence in this chapter confirms that financial crises tend to be associated with excessive private debt levels in both advanced and emerging market economies. Nevertheless, entering a financial crisis with

a weak fiscal position exacerbates the depth and duration of the ensuing recession, as the ability to conduct countercyclical fiscal policy is significantly curtailed in that case. New analysis suggests that this effect is particularly strong for emerging markets which, in the absence of fiscal buffers, tend to cut government spending, reflecting perhaps tighter financing conditions in these countries during a crisis. The implications are important, as financial recessions in emerging market economies result in output losses that are almost double those in advanced economies after five years. These results underscore the importance of having the prudential and regulatory frameworks necessary to keep private debt in check as well as the value of prudent fiscal policy.

The resolution of the debt problem in an era of low nominal growth is likely to require growth-friendly fiscal policies with two objectives: (1) supporting economic activity and (2) creating incentives for the restructuring of private debt while facilitating the repair of banks' balance sheets. These policies are important for those advanced economies, particularly in the euro area, in which the slow progress in addressing banks' remaining weaknesses is currently impinging on growth. It is also a priority in emerging market economies, notably China, in which the corporate debt overhang is creating vulnerabilities in the banking sector, increasing the risk of a disorderly deleveraging. Specifically:

- *The fiscal stance should be carefully calibrated.* Premature tightening of fiscal policy in depressed economies with weakened financial systems should be avoided to the extent possible, as the parallel retrenchment of public and private debt could contribute to prolonging the recession.
- *Targeted fiscal interventions could be used to facilitate balance sheet repair.* Government-sponsored programs—including measures such as subsidies for creditors to lengthen maturities, guarantees, and direct lending—can expedite the voluntary restructuring of private debt. On the other hand, financial sector restructuring, including through public capital injections and the creation of asset management companies, can aid in the cleanup of banks' balance sheets. The simulations in this chapter suggest that the effect of this type of intervention, if well designed, could be more powerful than standard fiscal stimuli, particularly when an economy's credit channel is clogged.

The effectiveness of targeted fiscal interventions depends, however, on their design. Lessons from

successful experiences with deleveraging highlight the following principles:

- *Cleaning up private balance sheets.* Direct government support measures (such as targeted subsidies, transfers, and loans) are preferable to tax incentives, to the extent that such incentives can be exploited for tax avoidance and add complexity to a country's tax system. However, without strong insolvency and bankruptcy procedures, this type of intervention may lead to strategic behavior on the part of debtors and creditors and will not necessarily maximize asset value. To ensure cost-effectiveness and mitigate moral hazard problems, these measures should be targeted to specific sectors or individuals, subjected to conditionality (for example, continued debt servicing of modified loans), and involve burden sharing with borrowers. Strong governance principles should be applied in the decision-making process to safeguard public funds.
- *Recognizing banks' losses and addressing capital shortfalls.* In-depth diagnosis needs to be conducted, including through strict and transparent stress tests. If recapitalization or restructuring of liabilities is necessary, it should be carried out swiftly for viable institutions, with the private sector taking the lead and public capital support provided only as a last resort to limit moral hazard problems. Past experience underscores that procrastination may prolong a recession and weaken the recovery and could even increase the fiscal cost down the road. In this context, in those systemic cases in Europe in which state intervention may be warranted to facilitate the repair of banks' balance sheets, the EU state aid rules and Bank Recovery and Resolution Directive should be applied flexibly as permitted (for more details, see IMF 2016c and the October 2016 *Global Financial Stability Report*).

The specific policy package that is appropriate for a particular country will depend of course on country circumstances and in particular on the available room for fiscal policy action. Fiscal policy cannot, however, solve debt problems alone. A comprehensive approach is required to tap synergies among all available policy levers to steer a country's economy away from a low-inflation and low-growth trap, especially in the current context of limited policy space. Therefore, monetary policy should remain accommodative in those countries where inflation is still well below target. Financial policies, including asset quality reviews and supervisory

action to provide incentives for banks to recognize losses, can also facilitate balance sheet repair. Creating markets for distressed assets (for example, through the introduction of effective asset management companies) can help with this task while minimizing fiscal costs. Structural reforms can also complement growth-friendly fiscal policies by raising potential output and thereby improving intertemporal budget constraints.

In those countries not yet facing a debt overhang problem, efforts should focus on curbing excessive private debt buildup and limiting spillovers to public sector balance sheets. This is particularly relevant in emerging markets where private sector leverage has increased significantly over the past few years. Countries should conduct countercyclical fiscal policy in

upturns, thereby creating fiscal buffers that could be deployed if needed in times of crisis. Recent experience suggests that the strength of government balance sheets can be easily overstated in a financial boom, advocating for integrating financial cycles in the assessment of fiscal positions. Buffers should also be complemented by regulatory and supervisory policies that ensure the close monitoring and sustainability of private debt. Over the medium term, phasing out the debt bias in taxation and penalizing debt financing in those sectors in which the negative externalities are relevant, such as the financial sector, should be considered as part of structural reforms to prevent excessive leverage from building up in the first place (De Mooij 2011; IMF, forthcoming).

Box 1.1. China: What Do We Know about the General Government's Balance Sheet?

As in other emerging market economies, incomplete information prevents a full assessment of the fiscal buffers in China. However, preliminary estimates suggest the general government's net financial worth could range between 0 and a negative 23 percent of GDP, better than that in other emerging market economies. Nonfinancial assets may provide additional buffers, but the extent of contingent liabilities and age-related spending increases are important sources of vulnerability.

With high and rising corporate debt and potential contingent liabilities from the financial sector and state-owned enterprises (IMF 2016d), it is important to assess the strength of the general government's balance sheet in China to facilitate a necessary adjustment. While it is often difficult to estimate the general government's net financial worth in emerging market economies given the dearth of information especially on the asset side, in the case of China, shortcomings in data on the fiscal accounts and an intricate network of cross-financing make this task particularly challenging:

- **Liabilities.** Until recently, a significant amount of liabilities associated with off-budget local infrastructure spending, which benefited from implicit or explicit government guarantees, was not included in debt aggregates. Under the 2015 budget law,¹ aimed at improving transparency of local government finances, about 20 percent of GDP of these liabilities have been explicitly recognized as part of China's general government debt, resulting in a doubling of the debt ratio. An additional 12 percent of GDP has been recognized as contingent government liabilities. Nevertheless, there may be other off-budget contingent liabilities incurred in 2015, estimated at 5 percent of GDP, that have yet to be acknowledged.
- **Assets.** Available estimates suggest that the general government's largest financial asset is related to its participation into state-owned enterprises (Chinese Academy of Social Science 2015; Xu and Zhang 2014; People's Bank of China), but detailed data about the government's total holding of equity in state-owned enterprises is not publicly available.

¹The January 2015 budget law establishes that all local government activities and borrowing should be on-budget. The implementation of the new budget law is largely on track, although some local governments continued to guarantee borrowing by local government financing vehicles.

A first attempt to estimate the general government's net financial worth suggests that it is between a positive 3 percent and a negative 23 percent of GDP, better than the negative 24 percent on average in other emerging market economies (Figure 1.1.1). In particular, at the end of 2015, financial liabilities amounted to 38–55 percent of GDP (depending on whether off-budget and contingent liabilities are included). Financial assets (comprising deposits in financial institutions—5 percent of GDP—and equity holdings in state-owned enterprises) are estimated at between 32 and 41 percent of GDP. This wide range is related to significant uncertainties regarding the valuation of state-owned enterprises, as many of them are not traded. On the basis of these enterprises' net asset positions, the government's equity holdings could be worth around 36 percent of GDP.² A more conservative assumption based on their profitability would reduce this estimate to 27 percent of GDP.

The general government's net financial worth may not, however, give a full picture of the available buffers. Ideally one would like to look at the public sector (including the central bank), but limitations of available data on public corporations, including estimates of the value of implicit government guarantees, preclude a full assessment. In addition, other nonfinancial assets and other contingent liabilities of the general government should be accounted for. For example, the value of land ownership (a nonfinancial asset) estimated by computing the net present value of net use right fees for the next 25 years could be up to 51 percent of GDP. On the other hand, under current policies, estimated increases in age-related spending (following the methodology in Clements and others 2015) would amount to 128 percent of GDP in net present value terms. Also, contingent liabilities such as potential losses on corporate loans from rapid and inefficient credit expansion may put further pressure on the fiscal accounts (April 2016 *Global Financial Stability Report*). Additional losses can be expected in other parts of the financial system, especially in shadow credit products.

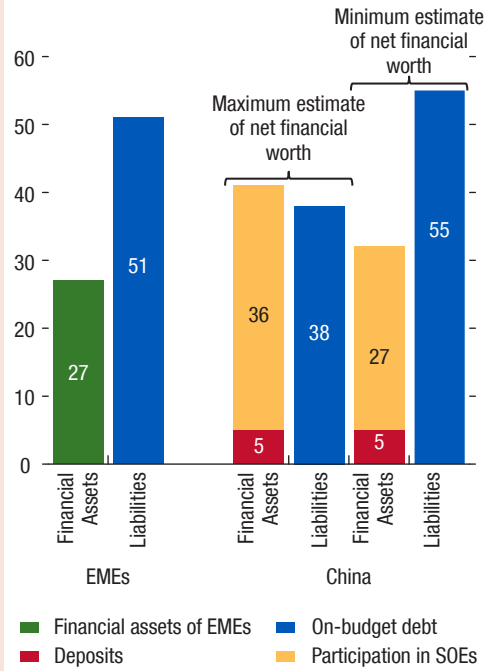
Limited information makes it difficult to manage risks and can lead to markets' overreaction to policy

²Government ownership is assumed to be 60 percent on average.

Box 1.1 (continued)

changes. From that perspective, a priority for China should be to strengthen its fiscal risk analysis and management framework, starting with a clear and transparent identification of assets, liabilities, and exposures. Full implementation of the 2015 budget law would be a step in this direction. Once risks are identified and quantified, tools to mitigate risks (including limits on exposures, regulations, and a mechanism to transfer risks) could be considered, along with decisions about risk provisions, contingency budgeting, and buffer funds.

Figure 1.1.1. China and Other Emerging Market Economies: Estimates of Net Financial Worth at the End of 2015
(Percent of GDP)



Source: IMF staff estimates.
 Note: Estimates for emerging market economies (EMEs) are based on the average for Brazil, Bulgaria, Colombia, El Salvador, Hungary, Indonesia, Peru, Poland, Romania, Russia, Turkey, Ukraine, and Uruguay, for which data are available. SOEs = state-owned enterprises.

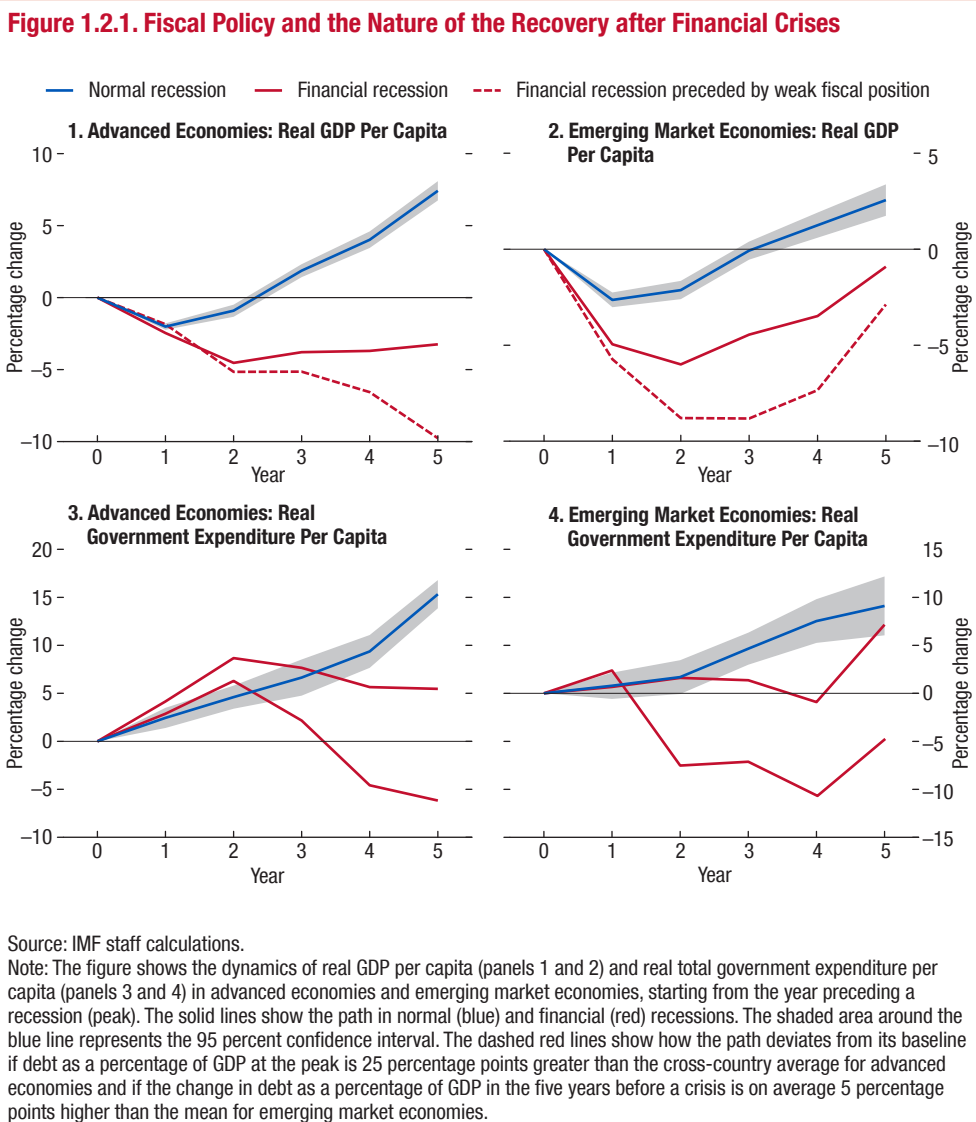
Box 1.2. The Role of Fiscal Policy during Financial Recessions

Empirical estimates suggest that entering a financial crisis with a weak fiscal position exacerbates the depth and duration of the ensuing recession, particularly in emerging market economies. This is because fiscal policy tends to be procyclical in these cases.

Financial crises preceded by rapid private credit surges are usually followed by deep and long recessions. But does public debt have similar implications? And to what extent is this related to the response of fiscal policy in the aftermath of a crisis? Following Jordà, Schularick, and Taylor’s (2016) local projection method, this box

estimates the response of real per capita GDP and real government spending in normal and financial recessions (see Annex 1.2). Figure 1.2.1 presents the conditional cumulated changes in both variables from the start of recessions for advanced and emerging market economies. The solid lines show the dynamics in normal (blue) and financial (red) recessions. The dashed red lines refer to the path in a financial recession when it has been preceded by a weak fiscal position (proxied by high or rapidly increasing public debt).

Overall, the findings confirm that output falls considerably more in financial than in normal recessions,



Box 1.2 (continued)

but with a larger effect in emerging market economies (panels 1 and 2, red versus blue lines). The recovery path is also found to be consistently worse when a country enters a crisis with a weak fiscal position (dashed red lines). A key question is whether the response of fiscal policy in the aftermath of the crisis can explain this negative effect. In other words, does the weak fiscal position lead to a procyclical fiscal tightening that magnifies the recession's severity?

To assess the response of fiscal policy, the behavior of real per capita government spending for countries

entering a financial recession with relatively strong and weak fiscal positions is compared (panels 3 and 4, solid red versus dashed red lines). In advanced economies, government spending increases initially, suggesting some accommodative role of fiscal policy, but the response is more muted and fades out if the initial fiscal position is weak. In emerging market economies, on the other hand, government spending falls rapidly. These results suggest that fiscal policy tends to be procyclical when fiscal buffers are limited prior to the crisis, especially in emerging market economies.

Box 1.3. Brazil: Private Debt and the Strength of the Public Sector Balance Sheet

Private and public debt in Brazil have increased since the mid-2000s, fueled by a credit boom and procyclical fiscal policy. The sharp deceleration in credit growth in 2015 has exacerbated the country's economic recession, but weaknesses in the public sector balance sheet limit the country's ability to cushion the impact of private deleveraging.

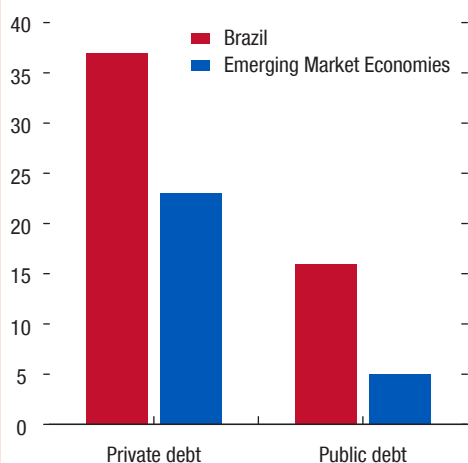
Although levels of private debt (including that of nonfinancial firms and households) in Brazil are comparable to those of other emerging market economies, their pace of increase over the last decade has been double that of its peers (Figure 1.3.1). This is a source of significant vulnerabilities, as documented by extensive empirical evidence. About 70 percent of the country's debt comes from the nonfinancial corporate sector, which has used the leverage to build cash cushions instead of augmenting its capital stock. Moreover, a recent analysis suggests that Brazilian firms are particularly vulnerable to a worsening in the growth outlook, especially when coupled with tighter financial conditions (IMF 2015c). Indeed, the economic downturn in the country in 2015–16 has put pressure on the private sector, and credit growth

has decelerated and turned negative in 2016 (Figure 1.3.2), but debt ratios have continued rising as a result of low growth.

In this context, an important question is whether public finances are sufficiently strong to cope with the macroeconomic consequences of a possible retrenchment in private debt. For much of the past decade, fiscal policy in Brazil has been expansionary, with cyclically adjusted primary balances declining most years from 2007 to 2014. This has resulted in general government debt that, at 73 percent of GDP, is 30 percentage points higher than that of the average emerging market economy. Nevertheless, an assessment of the strength of the country's government should go beyond liabilities and include the asset side while covering the broader public sector.

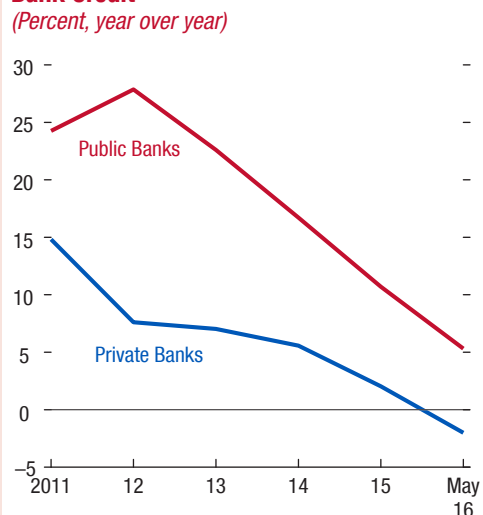
In Brazil, extensive information on the public sector balance sheet is publicly available, which allows for a more comprehensive analysis than is possible for most emerging market economies. The high level of public gross debt in Brazil partly explains the country's general government negative financial net worth in 2014 (Table 1.3.1). Accrued pension entitlements for public sector employees and retirees (including at the

Figure 1.3.1. Change in Debt, 2005–15: Brazil versus Other Emerging Market Economies
(Percent of GDP)



Source: IMF staff estimates.

Figure 1.3.2. Brazil: Change in Stock of Bank Credit
(Percent, year over year)



Source: Central Bank of Brazil.

Note: Calculations for 2011–15 are based on end-of-year data.

Box 1.3 (continued)

Table 1.3.1. Brazil: Public Sector Balance Sheet, 2014
(Percent of GDP)

	Consolidated General Government	Public Corporations			Public Sector
		Nonfinancial	Financial	Central Bank	
Stocks					
Assets	166	19	62	38	216
Nonfinancial	117	13	0	0	131
Financial	49	6	62	38	86
Liabilities	168	17	62	38	217
Liabilities, Other Than Equity	168	12	58	38	217
Of which: Pension Liabilities to Civil Servants	88				88
Equity	0	6	4	0	0
Net worth	-3	2	0	0	-1
Net financial worth	-120	-11	-1	0	-131

Sources: Brazilian authorities; and IMF staff estimates.

subnational level) represent by far the largest liability. Nonfinancial assets, including nonrenewable natural resources, are also substantial (more than 100 percent of GDP), although the valuation of these assets is uncertain.

The expansion of some state-owned enterprises, partly owing to large investments in the oil and gas sector, has further worsened the financial position of the public sector. The main contributor has been Petrobras, which has quadrupled its debt since 2011 to fulfill public policy objectives. Its financial position has also weakened with the fall in oil prices and allegations of corruption.

In addition, the sharp increase in the size of state-owned banks prior to the recession limits their capacity to compensate for the retrenchment in credit of private banks. The increase in state-owned banks' credit portfolios, at more than 450 percent since 2007, has been four times faster than the increase in credit of private banks. Some of the loans of the public banks have been made to other public entities, and some of the liabilities of the public banks consist of debt owed to the federal government. Neverthe-

less, after all cross-holdings are netted out, the public sector's net financial worth is a negative 131 percent of GDP.¹

In summary, current vulnerabilities in Brazil's public sector balance sheet limit the government's capacity to help soften the macroeconomic impact of private sector deleveraging. This underscores the importance of the government's efforts to strengthen the public sector with a view to providing greater room for fiscal policy. Toward this end, the government has prepared measures to contain the growth of government spending (to put the country's deficit and debt on a more sustainable trend) and is preparing a proposal on pension reform. There are also ongoing efforts to strengthen the management and financial health of state-owned enterprises and public banks.

¹By way of comparison, Brazil's net financial worth is generally lower than that of other emerging market economies such as Peru (-34 percent of GDP), the Philippines (-22 percent), and Russia (-18 percent) but is higher than that of some European countries such as Ireland (-157 percent of GDP) and Portugal (-232 percent of GDP). The latter two countries also have high pension liabilities (73 and 134 percent of GDP, respectively).

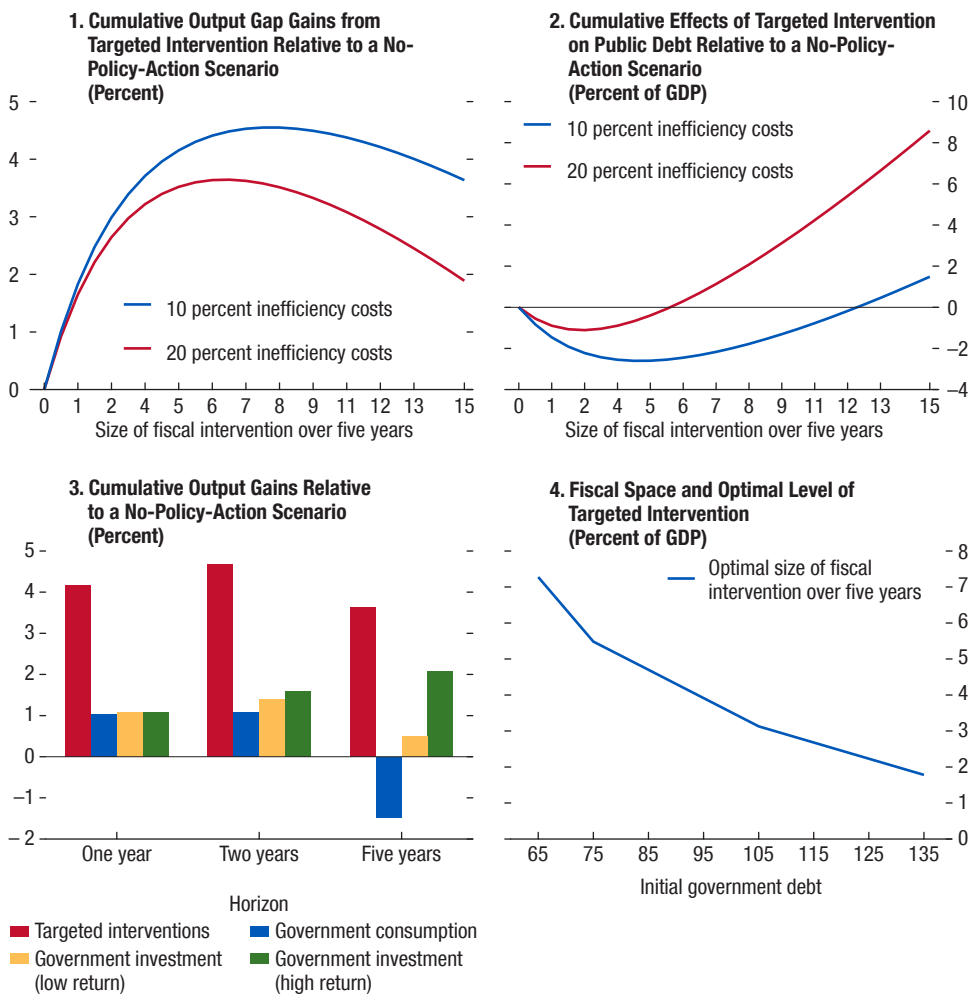
Box 1.4. Benefits of Targeted Fiscal Intervention during Times of Private Deleveraging

Model simulations suggest that during private deleveraging, targeted fiscal interventions should be used to help unclog an economy’s credit system, as the cost of inaction is much higher including from a public debt sustainability perspective. However, the optimal size of the intervention depends on the available fiscal space and the efficiency of intervention, underscoring the importance of carefully designing these measures.

In the current global environment of low growth and private sector deleveraging—and with a strained

financial system in some countries diminishing the effectiveness of monetary policy—there is a question of whether fiscal policy can play a role in facilitating the ongoing adjustment. The dynamic general equilibrium model developed by Batini, Melina, and Villa (2016) is used in this box to assess the benefits of alternative fiscal policy measures (for more details on the model, see Annex 1.4). The simulations assume that there is a shock in house prices similar in size to that observed in the United States during the

Figure 1.4.1. Impact of Targeted Interventions in a Deleveraging Phase



Sources: Batini, Melina, and Villa 2016; and IMF staff calculations.
 Note: The inefficiency costs refer to losses associated with this type of intervention in percent of the value of the loans. In the context of U.S. unconventional monetary policy, Gertler and Karadi (2011) assume an inefficiency cost of 10 percent, which they consider to be large. Simulations in panels 3 and 4 assume high inefficiency costs. The output elasticity to public capital is assumed at 0.05 and 0.10, for the low- and high-return scenarios, respectively, as in Baxter and King 1993 and Leeper, Walker, and Yang 2010.

Box 1.4 (continued)

global financial crisis, pushing the private sector into deleveraging. Three types of stimuli are considered: (1) a targeted intervention in the form of a subsidized government loan to the private sector when the credit channel is not working, (2) government consumption, and (3) public investment. Figure 1.4.1 shows the relative benefits of these measures compared to a no-policy-action scenario.

Overall, targeted fiscal intervention can alleviate the recessionary impact of private sector deleveraging, with the output gap up to $4\frac{1}{2}$ percentage points higher relative to no action (panel 1). By relaxing the private sector's borrowing constraints, this type of measure allows households and firms to spend while deleveraging, supporting aggregate demand. In addition, public debt is slightly lower than under no intervention, despite the up-front fiscal cost as a result of the boost to growth (panel 2). The benefits of intervention (in terms of minimizing output losses) for a given size of stimulus decrease with the inefficiency costs associated

with poor targeting (red versus blue lines in panels 1 and 2).

The output benefits of targeted intervention are four times larger than those of more standard stimulus measures (panel 3). The main reason for this powerful result is that, by lending to credit-constrained households and firms, the government can leverage a much larger amount of spending than through other policy stimuli of equal cost. That is because the fiscal cost of targeted intervention is only a fraction of the total government loan.

The higher the initial public debt (a proxy of the available fiscal buffers), the lower the optimal level of intervention that minimizes output losses (panel 4). With higher public debt, the sovereign risk premium goes up, increasing the fiscal cost of intervention and thereby limiting the optimal amount of credit that the government can intermediate. Still, intervening pays off as long as there are some buffers, suggesting that multipliers are very high.

Box 1.5. How Much Do Financial Markets Value Government Balance Sheets?

The sovereign net worth implied by market prices tends to be on average about 20 percent of GDP higher than its accounting value for a sample of 31 advanced economies and emerging market economies. Differences between market and accounting values are more positive for countries with weaker fiscal fundamentals and have increased disproportionately for euro area countries over the past two years.

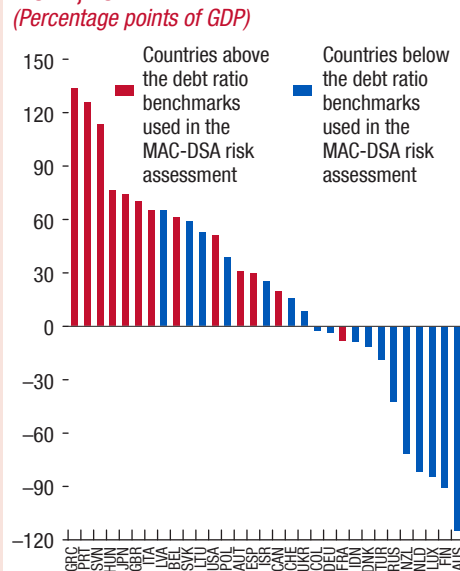
Sovereign credit indicators (such as credit default swap spreads and bond yields) offer valuable information about the size and riskiness of government balance sheets, as perceived by the market. Higher credit spreads, which measure the default risk borne by public bond holders, indicate that a government's financial solvency has deteriorated. This occurs when the government net worth declines and eventually becomes negative—at which point government assets become insufficient to fully cover outstanding liabilities.

This box relies on a finance model that builds on the contingent claim analysis framework of Jobst and Gray (2013). The model's purpose is to infer a market-implied estimate of government assets, which are mostly unobservable, from the (observed) amount and maturity structure of outstanding debt securities and their prevailing market valuation, under the assumption that available credit indicators imply an accurate assessment of sovereign risk.¹ The market-implied sovereign net worth is then computed and compared with the accounting data reported by statistical agencies. The framework is applied to monthly observations between April 2012 and the end of 2015 from 31 advanced and emerging market economies for which comprehensive accounting balance sheets are available.

Overall, the analysis shows a significant gap between market- and accounting-based assessments. Results for 2014 suggest that market-implied sovereign net worth exceeds its accounting equivalent by about 20 percent of GDP on average, with considerable cross-country variation (Figure 1.5.1). The market assessment is forward looking and thus may reflect various factors, including valuation effects and the acknowledgment of unobserved or unmeasured effects that have an impact

¹The analysis assumes that among all available market indicators, credit default swap spreads most accurately reflect sovereign default risk. For some specific countries, the lack of liquidity of the credit default swap market represents a caveat acknowledged by the literature.

Figure 1.5.1. Difference Between Market-Implied and Accounting-Valued Net Worth, 2014
(Percentage points of GDP)



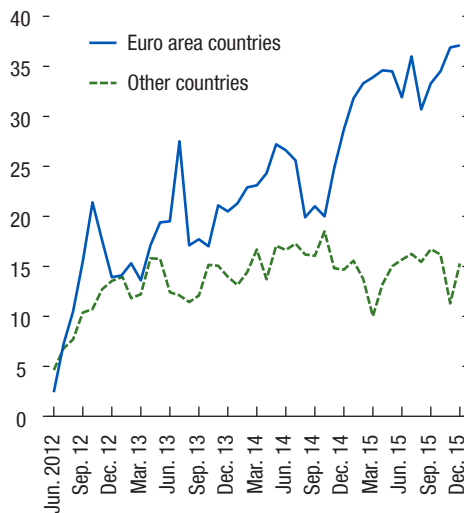
Sources: Bloomberg L.P.; IMF, *Government Finance Statistics*; IMF, *International Financial Statistics*; IMF, *World Economic Outlook*; Organisation for Economic Co-operation and Development; and IMF staff estimates. Note: The benchmark for the debt ratio in the Debt Sustainability Analysis for Market Access Countries (MAC-DSA) is 70 percent of GDP for emerging market economies and 85 percent of GDP for advanced economies. These benchmarks should not be construed as levels beyond which debt distress is likely or inevitable, but rather as an indication that risks increase with the level of indebtedness. Data for 2013 are used for Japan and Switzerland and data for 2012 for New Zealand. Data labels in the figure use International Organization for Standardization (ISO) country codes.

on debt sustainability but are not recorded by statistical offices (such as future primary balances and implicit guarantees received or granted by the government).

Moreover, the gap between the market and accounting measures of sovereign net worth is positive and widens for countries with weaker fiscal positions (in Figure 1.5.1, fiscal stress is defined as debt ratios exceeding debt sustainability analysis thresholds, but the result is consistent with broader measures of fiscal soundness). Because the model controls for changes in sovereign risk, this means that for these countries, market prices would justify a significantly higher net worth than measured by accounting data. Conversely, accounting balance

Box 1.5 (continued)

Figure 1.5.2. Median Evolution of Market-Implied Net Worth, 2012–15
(Percentage points of 2012 GDP)



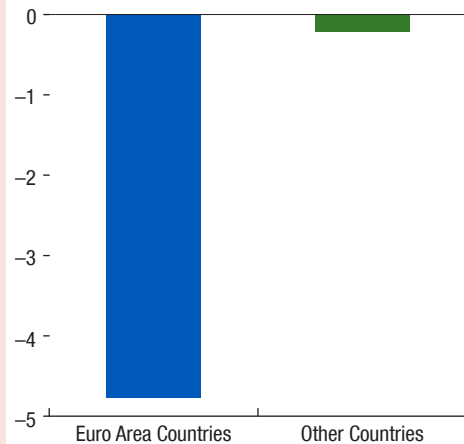
Sources: Bloomberg L.P.; IMF, *Government Finance Statistics*; IMF, *International Financial Statistics*; IMF, *World Economic Outlook*; Organisation for Economic Co-operation and Development; SDM; and IMF staff estimates.

Note: Medians are based on 15 euro area members (EA-19 excluding Cyprus, Ireland, Malta, and Slovenia) and 16 other advanced (Australia, Canada, Denmark, Israel, Japan, New Zealand, United Kingdom, United States, Switzerland) and emerging market (Colombia, Hungary, Indonesia, Poland, Russia, Turkey, Ukraine) economies.

sheets would be consistent with sovereign credit spreads above those currently observed.

Interestingly, euro area countries have experienced a much higher increase in market-implied net worth than other countries in the sample since mid-2012. In these countries, net worth rose by more than 30 percent of GDP on average between mid-2012 and the end of 2015, with half of the surge occurring in the months following European Central Bank President Mario Draghi's July 2012 pledge to do "whatever it

Figure 1.5.3. Change in Market-Implied Expected Losses on Sovereign Debt, 2012–15
(Percentage points of GDP)



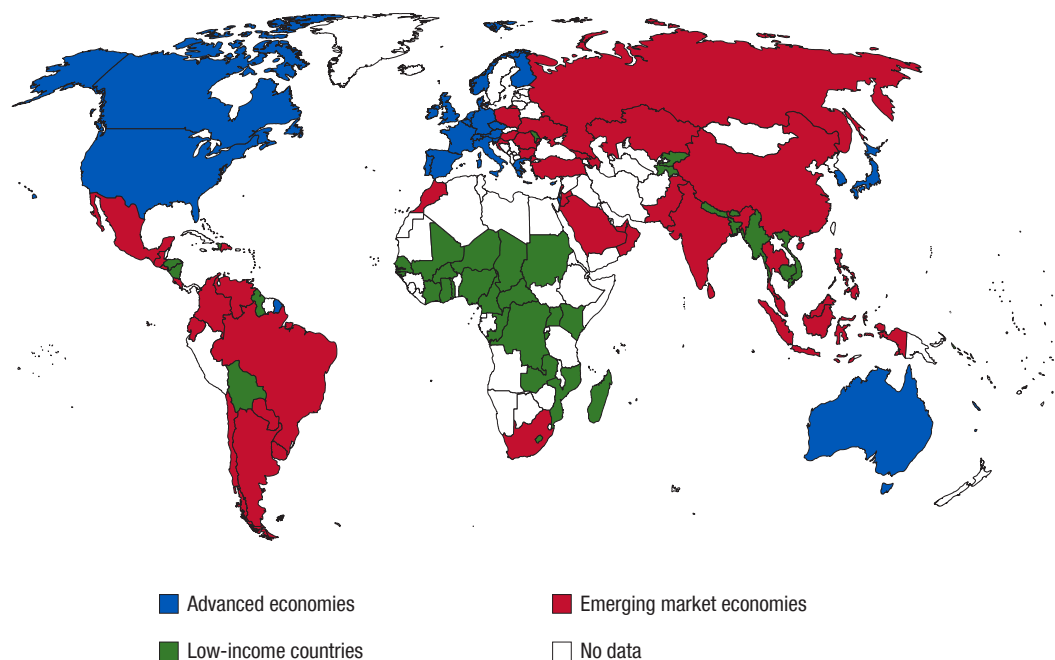
Sources: Bloomberg L.P.; IMF, *Government Finance Statistics*; IMF, *International Financial Statistics*; IMF, *World Economic Outlook*; Organisation for Economic Co-operation and Development; and IMF staff estimates.

Note: The expected loss is calculated as the product of the default probability and the loss given default. For country classifications, see Figure 1.5.2.

takes to preserve the euro" (Figure 1.5.2). Over the same time period, expected losses on public debt, which underpin the estimation of market-implied net worth, declined sharply (Figure 1.5.3).² Fiscal consolidation efforts and overall financial conditions are certainly part of the story, but they are not sufficient to explain such a sharp increase in a short period of time. Other factors are also at play, most likely monetary policy actions and perceptions about future monetary stance, suggesting benefits from coordinated policy measures (IMF 2016c).

²In the model, the expected losses from holding a claim on the government decline as implied sovereign assets increase.

Annex Figure 1.1.1. Nonfinancial Private Sector Debt: Country Coverage



Source: IMF staff compilation.

Annex 1.1. Debt Data Set

This annex provides a short description of the debt data compiled for the analysis presented in this issue of the *Fiscal Monitor*.

Private Debt

The private debt data set builds on the methodology developed by the Bank for International Settlements (BIS) (Dembiermont, Drehmann, and Muksakunratana 2013), extending the BIS's original sample of 42 countries to a large panel of 113 advanced economies, emerging market economies, and low-income countries, spanning 40 years on average (Annex Figure 1.1.1).

Definition

Private nonfinancial debt is defined as the total stock of loans and debt securities issued by households and nonfinancial corporations, irrespective of the lender. This excludes debt issued by financial

institutions, as well as equities, investment fund shares, financial derivatives, trade credit and advances, and accounts payable or receivable. For nonfinancial corporations in emerging market economies, the methodology follows Chapter 3 of the October 2015 *Global Financial Stability Report*. World debt figures are calculated as the sum of total debt of the nonfinancial sector, expressed in U.S. dollars, for those countries in the chapter's sample. World GDP is calculated as the sum of the nominal GDP in U.S. dollars for the same countries.

Source of Data

As a first-best approach, national accounts data, which provide the most comprehensive coverage of private debt, have been used. Harmonized series come from the BIS for a sample of 27 advanced economies and emerging market economies, with adjustments for breaks due to differences in borrower, lender, or instrument coverage (Dembiermont, Drehmann, and Muksakunratana 2013).

In the absence of national accounts data, private debt is estimated as the sum of three components: (1) bank loans to domestic households and nonfinancial corporations, drawn from the IMF’s Standardized Reporting Forms (SRFs) and *International Financial Statistics* (IFS);¹⁶ (2) outstanding stock of debt securities issued by nonfinancial corporations, calculated from Dealogic; and (3) cross-border bank loans, from the BIS. This follows closely the BIS’s approach for estimating private debt, but improves upon it by using debt securities from Dealogic, which should capture securities held by all entities; in contrast, the BIS data capture only securities held by banks. For low-income countries, private debt estimates cover only loans by domestic banks, because of data limitations. In the case of China, private debt is captured by total social financing adjusted for local government bond swaps, excluding equity financing and local government financing vehicle (LGFV) borrowings that have been recognized, or are likely to be recognized, as explicit local government debt (see IMF 2016d).

Constructing Long Series for Total Private Debt

Given the heterogeneity of data sources, coverage across instruments, lenders, and borrowers is not always homogeneous over time, leading to breaks in the series. To adjust for breaks (particularly when some components of debt are missing), the BIS’s methodology is followed:

$$Adjustedprivatedebt_t = \begin{cases} d_t + c_t if t \geq t_0 \\ d_t * \left(\frac{d_{t_0} + c_{t_0}}{d_{t_0}} \right) if t < t_0 \end{cases}, \tag{A.1.1.1}$$

in which c_t is, for example, the stock of cross-border debt flows available starting only at t_0 and d_t is the stock of domestic debt available throughout the period.

Debt of Households and Nonfinancial Corporations

Separate debt series are calculated for households and nonfinancial corporations, based on flow-of-funds data from the BIS, whenever available. Otherwise, sectoral bank loan series are drawn from

¹⁶Because of data limitations, bank claims on the private sector have been used in lieu of bank loans for 18 countries in the sample. This assumption is likely to have only a limited impact, as loans accounted on average for 98 percent of bank claims in countries’ reporting in the SRFs in 2015.

the SRFs, while all debt securities and cross-border flows are assumed to be related to nonfinancial corporations.

Public Debt

The public debt data are a version of the IMF historical debt data set (Abbas and others 2010), updated for the latest years with *World Economic Outlook* data (as of April 2016) up to 2015. The data cover general government debt for 37 advanced economies, 90 emerging market economies, and 60 low-income countries, spanning 103, 47, and 37 years on average, respectively.

Annex 1.2. Private and Public Debt and the Pace of the Recovery

This annex summarizes the econometric approach used in this chapter to estimate the impact of private and public debt on the pace of recovery after a financial crisis.¹⁷ The analysis extends results of previous studies to a larger sample of 32 advanced economies and presents new results for a sample of 50 emerging market economies using the Local Projection Method (LPM) developed by Jordà (2005) and Jordà, Schularick, and Taylor (2016).¹⁸ The baseline model regresses changes in the variables of interest y (real GDP per capita, real public debt per capita, and real total government expenditure per capita), from the peak before the crisis until five years into the recession, on a set of controls as follows:

$$y_{i,p+h} - y_{i,p} = \theta_N d_{i,p}^N + \theta_F d_{i,p}^F + \beta_h^{NPR} (d_{i,p}^N x_{i,p}^{PR}) + \beta_h^{FPR} (d_{i,p}^F x_{i,p}^{PR}) + \beta_h^{NPU} (d_{i,p}^N x_{i,p}^{PU}) + \beta_h^{FPU} (d_{i,p}^F x_{i,p}^{PU}) + \beta_h^{NPRPU} (d_{i,p}^N x_{i,p}^{PR} x_{i,p}^{PU}) + \beta_h^{FPRPU} (d_{i,p}^F x_{i,p}^{PR} x_{i,p}^{PU}) + \sum_{l=0}^L \gamma_{b,l} Y_{i,p-l} + \alpha_i + u_{i,p+h}, \tag{A1.2.1}$$

in which $y_{i,p+h} - y_{i,p}$ is the log difference (cumulated change) in y , h years after the peak; $d_{i,p}^N$ and $d_{i,p}^F$ are dummy variables that take value 1 in the peaks

¹⁷This annex draws from a forthcoming paper by Bernardini and Forni.

¹⁸Countries have been selected on the basis of data availability.

Annex Table 1.2.1. Advanced Economies: Local Projection Results from Equation (A1.2.1)

	Real GDP Per Capita					Real Public Debt Per Capita					Real Government Expenditure Per Capita				
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 1	Year 2	Year 3	Year 4	Year 5	Year 1	Year 2	Year 3	Year 4	Year 5
θ_N	-2.01***	-0.91***	1.87***	4.02***	7.42***	5.43***	12.37***	19.77***	26.76***	35.09***	2.44***	4.60***	6.64***	9.37***	15.33***
	-0.11	-0.22	-0.23	-0.29	-0.34	-1.21	-1.55	-2.02	-2.05	-2.54	-0.53	-0.61	-0.96	-0.87	-0.75
θ_F	-2.46***	-4.53***	-3.79***	-3.70***	-3.24***	11.33***	22.62***	36.18***	42.68***	44.02***	4.15**	8.67***	7.66**	5.65*	5.46*
	-0.35	-0.53	-0.58	-0.8	-1.16	-3.24	-4.35	-5.61	-6.05	-6.82	-1.64	-1.64	-3.19	-3.19	-3.41
β_h^{NPR}	0.09**	0	-0.11	-0.10	-0.18*	-0.05	0.12	0.11	-0.02	-0.45	0.12	0.09	-0.14	0.08	0.42
	-0.03	-0.09	-0.13	-0.13	-0.15	-0.38	-0.58	-0.83	-1.06	-1.08	-0.24	-0.31	-0.39	-0.48	-0.54
β_h^{FPR}	0.14*	-0.17*	-0.50***	-0.78***	-1.30***	1.34***	1.26*	1.74*	2.17***	1.60*	0.07	-0.13	-0.40	-1.22**	-1.66**
	-0.12	-0.11	-0.12	-0.19	-0.3	-0.45	-0.67	-0.91	-0.78	-0.92	-0.24	-0.17	-0.49	-0.45	-0.69
β_h^{NPU}	0.01*	0.01	-0.01	-0.03*	-0.06*	0.12*	0.01	-0.13*	-0.33**	-0.52***	-0.00	-0.06*	-0.10*	-0.14*	-0.11*
	-0.01	-0.01	-0.02	-0.02	-0.03	-0.08	-0.1	-0.12	-0.12	-0.17	-0.03	-0.05	-0.06	-0.09	-0.09
β_h^{FPU}	0.02*	-0.03	-0.05*	-0.11*	-0.26***	-0.23*	-0.30*	-0.39*	-0.51**	-0.42*	-0.05	-0.09*	-0.22**	-0.41***	-0.47**
	-0.01	-0.03	-0.04	-0.06	-0.08	-0.13	-0.16	-0.21	-0.21	-0.24	-0.06	-0.06	-0.08	-0.1	-0.18
β_h^{NPRPU}	-0.01**	-0.01*	-0.01*	-0.01	-0.00	0	0.01	0.02	0.03	0.06*	-0.00	0	0.01	-0.01	-0.01
	0	0	-0.01	-0.01	-0.01	-0.02	-0.03	-0.04	-0.05	-0.06	-0.01	-0.01	-0.02	-0.02	-0.02
β_h^{FPRPU}	0.01*	-0.00	-0.01*	-0.02*	-0.04**	-0.05**	-0.07*	-0.04	-0.04	-0.05	-0.03**	-0.01	-0.03*	-0.03*	-0.03
	-0.01	-0.01	-0.01	-0.01	-0.02	-0.02	-0.04	-0.06	-0.05	-0.06	-0.01	-0.01	-0.03	-0.02	-0.03
R^2	0.74	0.62	0.64	0.69	0.78	0.66	0.71	0.75	0.79	0.82	0.52	0.6	0.64	0.59	0.66
Peaks	128	127	126	125	111	128	127	126	125	111	128	127	125	124	110

Source: IMF staff calculations.

Note: Each column reports the output related to the estimation of the local projections. The variables are the cumulative percentage changes in real per capita GDP, real per capita public debt, and real per capita total government expenditure at years 1 to 5, starting from the peak before a recession. The local projections are conditional on a set of fixed country dummies and lagged controls (not reported). Robust standard errors, clustered by country, are reported in parentheses. * $p < .32$ (1 standard deviation); ** $p < .05$ (2 standard deviations); *** $p < .01$ (3 standard deviations).

before normal and financial recessions, respectively, and 0 in the remaining years; $x_{i,p}^{PR}$ measures the average annual change in the five years before the peak of private debt; $x_{i,p}^{PU}$ measures the level of public debt as a percentage of GDP at the peak for advanced economies and the annual change in the five years before the peak for emerging market economies; $Y_{i,p-l}$ and α_i are a set of lagged control variables and fixed country effects; and $u_{i,p+h}$ is the model's residual. Controls include fixed country effects and lags of the growth (in real per capita terms) of GDP, private debt, public debt, and government expenditures. Robustness checks were conducted using different model specifications and sets of controls, windows to compute the precrisis buildup in debt, and selection criteria for crisis episodes, without significant changes.

Banking crises episodes are taken from studies by Jordà, Schularick, and Taylor (2016), Laeven and Valencia (2012), and Reinhart and Rogoff (2011). In total there are 50 episodes in advanced economies and 93 in emerging market economies. Data on public debt and private credit come from a newly compiled data set (see Annex 1.1), while data on real GDP per capita are from the *World Economic Outlook*, complemented with data from the Penn World Table (release 9.0). Data on total government spending are taken from work by Mauro and others (2015).

The results for real GDP per capita show that financial recessions are much deeper than normal recessions in both advanced economies and emerging market economies, with output levels 10 and 4 percent lower by year 5, respectively (see Annex Tables 1.2.1 and 1.2.2). They are even deeper when pre-

Annex Table 1.2.2. Emerging Market Economies: Local Projection Results from Equation (A1.2.1)

	Real GDP Per Capita					Real Public Debt Per Capita					Real Government Expenditure Per Capita				
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 1	Year 2	Year 3	Year 4	Year 5	Year 1	Year 2	Year 3	Year 4	Year 5
θ_N	-2.64*** (-0.19)	-2.13*** (-0.24)	-0.07 (-0.24)	1.25*** (-0.33)	2.56*** (-0.42)	6.43*** (-1.47)	9.82*** (-2.23)	10.04*** (-2.36)	12.03*** (-2.28)	12.03*** (-2.02)	0.79* (-0.7)	1.69* (-0.9)	4.65*** (-0.85)	7.53*** (-1.16)	9.11*** (-1.56)
θ_F	-4.95*** (-0.94)	-6.00*** (-1.13)	-4.45** (-1.74)	-3.48* (-2.37)	-0.91 (-2.31)	22.45*** (-7.28)	36.14*** (-10.62)	44.20*** (-14.43)	47.71*** (-12.88)	47.40*** (-13.32)	0.67 (-3.25)	1.61 (-3.94)	1.37 (-5.54)	-0.91 (-7.79)	7.15* (-7.07)
β_h^{NPR}	-0.12 (-0.16)	0.01 (-0.34)	0.17 (-0.56)	-0.34 (-0.72)	-0.89 (-0.9)	-2.22 (-3.29)	-3.67 (-3.92)	-2.44 (-4.36)	1.99 (-4.17)	3.2 (-4.96)	0.38 (-0.79)	0.01 (-1.09)	0.07 (-1.15)	-0.37 (-1.56)	-0.45 (-2.04)
β_h^{FPR}	-0.71* (-0.37)	-0.90* (-0.46)	-1.13*** (-0.4)	-1.18*** (-0.42)	-1.05* (-0.53)	2.75* (-2.17)	5.86* (-4.31)	6.14* (-4.78)	9.27* (-5.45)	11.47** (-4.27)	-0.42 (-1.2)	-0.59 (-1.81)	-2.07* (-1.35)	-1.29 (-2.09)	-2.41* (-1.48)
β_h^{NPU}	-0.13* (-0.08)	-0.35** (-0.16)	-0.61*** (-0.21)	-0.85*** (-0.22)	-1.01*** (-0.26)	0.05 (-0.41)	0.23 (-0.76)	1.10* (-0.97)	0.71 (-1.32)	0.39 (-1.53)	0.1 (-0.37)	0.17 (-0.49)	-0.09 (-0.62)	-0.68* (-0.61)	-0.68 (-0.75)
β_h^{FPU}	-0.16 (-0.3)	-0.56* (-0.32)	-0.87** (-0.4)	-0.77* (-0.5)	-0.39 (-0.66)	0.84 (-2.28)	2.46 (-3.14)	3.03 (-3.91)	3.41 (-4.46)	7.63* (-4.11)	0.34 (-0.84)	-1.82* (-1.71)	-1.69 (-1.98)	-1.95 (-2.08)	-2.38 (-2.44)
β_h^{NPRPU}	-0.00 (-0.01)	-0.01 (-0.02)	0.03* (-0.03)	0.03* (-0.03)	0.05* (-0.04)	0.29* (-0.19)	0.54** (-0.24)	0.65*** (-0.21)	0.17 (-0.33)	0.1 (-0.38)	0.05 (-0.06)	0.23** (-0.11)	0.29** (-0.11)	0.22* (-0.11)	0.19* (-0.15)
β_h^{FPRPU}	-0.06 (-0.07)	-0.09* (-0.08)	-0.09 (-0.1)	-0.02 (-0.11)	-0.02 (-0.14)	0.16 (-0.57)	0.43 (-0.79)	0.24 (-0.98)	0.58 (-1.1)	1.69* (-1.04)	0.02 (-0.22)	-0.44* (-0.41)	0.05 (-0.41)	0.16 (-0.48)	-0.01 (-0.58)
R^2	0.74	0.51	0.42	0.43	0.48	0.33	0.44	0.48	0.64	0.64	0.37	0.44	0.49	0.46	0.45
Peaks	168	162	152	149	134	168	161	151	148	133	168	162	151	148	133

Source: IMF staff calculations.

Note: Each column reports the output related to the estimation of the local projections. The variables are the cumulative percentage changes in real per capita GDP, real per capita public debt, and real per capita total government expenditure at years 1 to 5, starting from the peak before a recession. The local projections are conditional on a set of fixed country dummies and lagged controls (not reported). Robust standard errors, clustered by country, are reported in parentheses. * $p < .32$ (1 standard deviation); ** $p < .05$ (2 standard deviations); *** $p < .01$ (3 standard deviations).

ceded by a private credit buildup. Both higher public debt levels and faster increases in public debt make the pace of recovery in advanced economies consistently worse in the aftermath of a financial crisis. By contrast, a rapidly increasing public-debt-to-GDP ratio prior to the crisis is what puts a drag on the postcrisis recovery in emerging market economies.¹⁹ The response of real per capital total government

spending during financial recessions points to a countercyclical stance in advanced economies (consistently positive coefficients), but a muted response in emerging market economies (smaller coefficients that are not always positive).²⁰ Moreover, in the case of emerging market economies, starting with rapidly increasing public debt leads to a negative cumulative effect on real government spending.

¹⁹This result is consistent with recent studies looking at both advanced economies and emerging market economies that show that public debt buildups are particularly damaging for growth and that countries with a high but declining level of debt fare similarly to countries with lower levels of debt (Chudik and others 2016; Pescatori, Sandri, and Simon 2014). Moreover, for advanced economies, most of the episodes of banking crisis pertain to the 2008–09 crisis (when countries had, on average, relatively high levels of public debt), while for emerging market economies, a number of episodes refer to the 1980s and 1990s, when countries had low levels of public debt.

²⁰Ideally, the change in the cyclically adjusted primary balance would be better placed to capture the discretionary response of fiscal policy, but data constraints prevent the inclusion of that variable in the analysis. Following Kaminsky, Reinhart, and Végh (2005), real public spending, for which longer time series are available, is used here instead.

Annex 1.3. Interlinkages between Public and Private Debt: Selected Summary of the Literature

Channel	References	Description
Macroeconomic	Cipriani, Fostel, and Houser 2012; Gârleanu and Pedersen 2011; Fostel and Geanakoplos 2008; Lettau and Ludvigson 2004; Ludwig and Slok 2004; Eschenbach and Schuknecht 2004; Bernanke, Gertler, and Gilchrist 1999; Kiyotaki and Moore 1997	Private sector leverage is positively associated with asset prices in a collateralized-borrowing environment that can lead to changes in public debt through direct and indirect channels. The direct impact works through revenues related to asset prices (capital gains and wealth-related consumption taxes), amplified by transaction volumes. The indirect impact works through output, with asset prices feeding into the economy via a financial accelerator affecting consumption and investment, and consequently fiscal revenues and public debt.
	Cimadomo, Hauptmeier, and Zimmermann 2014; Bassett and others 2014; Elekdag and Wu 2013; Kaminsky, Reinhart, and Végh 2005; Andres, Arce, and Thomas 2016	Public debt can also lead to changes in private debt. A fiscal tightening may exert a negative impact on output, reducing bank capital bases and therefore weakening standard measures of capital adequacy. The resulting tightening in credit supply may hamper output and businesses' and households' capacity to borrow from banks, in addition to widening credit spreads. As a consequence, private debt may decrease. The government, through procyclical fiscal policy, may fuel credit booms, so fiscal policy acts as an amplifier of business cycles.
Spillover	Bruggeman and Van Nieuwenhuyze 2013	Public and private debt are intertwined through price and quantity effects.
	Espinoza and Segoviano 2016; Altavilla, Pagano, and Simonelli 2016; Erce 2015; Acharya, Drechsler, and Schnabl 2014; Corsetti and others 2013	The <i>price effect</i> encompasses a bidirectional relationship between the public and private sectors. When vulnerabilities build up in the financial sector, including in the form of high leverage, and markets expect eventual government bailouts, the sovereign risk premium may go up. There may also be some pass-through from sovereign risk to interest rates faced by banks through benchmarking and contagion effects, in part directly through banks' holding of governments bonds. This may lead to tighter prudential ratios, lower bank leverage, and consequently reduced private credit.
	Bocola 2016; Altavilla, Pagano, and Simonelli 2016; Cimadomo, Hauptmeier, and Zimmermann 2014	The <i>quantity effect</i> captures how public debt affects private debt through liquidity and risk channels. The liquidity channel works through the exposure of banks to risky government bonds, which in turn limit the banks' ability to borrow from capital markets, constraining their funding and hampering lending to the private sector. The risk channel works through an increase in sovereign risk that raises the chance of large balance sheet losses and tight funding, generating a precautionary motive for banks to deleverage and reduce credit to firms.
Contingent Liability	Hoggarth, Reis, and Saporta 2002; Honohan and Klingebiel 2003; Laeven and Valencia 2013	Excessive borrowing from the banking sector by nonfinancial corporations and households could weaken the banking sector's balance sheets. This could in turn trigger a systemic failure of the banking sector and require government intervention, hence contaminating the sovereign's balance sheet. These interventions typically include bank recapitalization, asset purchases, and in some cases, guarantees.
	Stone 2000; Claessens, Klingebiel, and Laeven 2005; Grigorian and Raei 2010; Laeven and Laryea 2009	Private nonfinancial debt may also migrate to the sovereign through government-sponsored debt-restructuring programs for firms and households. These may include (1) incentives or subsidies for borrowers and creditors, (2) direct lending to companies that are viable but unable to access markets, and (3) creation of asset management companies.

Annex 1.4. Private Deleveraging and the Role of Fiscal Policy

This annex summarizes the main features of the dynamic stochastic general equilibrium (DSGE) model used in this issue of the *Fiscal Monitor* to analyze the role of fiscal policy in supporting private deleveraging. The model is that of Batini, Melina, and Villa (2016), which explicitly considers the government's fiscal limit and private-public debt interlinkages. Its backbone presents financial frictions in the Kiyotaki and Moore (1997) and Iacoviello (2005) closed-economy tradition. This basic structure has been extended to account for fiscal policy, government indebtedness, and the sovereign risk premium. The economy is populated by patient households, impatient households, entrepreneurs, the government, and the central bank. To keep the model simple, but without loss of generality, it does not include banks.²¹

Private Agents

Patient households work, consume, buy housing, and invest in riskless private bonds and in government bond holdings. Holding government debt is subject to sovereign default risk. *Impatient households* work, consume, and borrow subject to collateral constraints. *Entrepreneurs* also borrow subject to collateral constraints and invest and produce in monopolistic competition.

Government

The government has the role of lender of last resort and is tasked not just with providing public goods and smoothing the economic cycle, but also with providing financial assistance in the form of loans to constrained agents borrowing in the aftermath of financial shocks.²² This targeted fiscal intervention bears a budgetary cost, which is given by (1) the inefficiency costs arising from nonperforming loans²³ and (2) a

²¹Including banks would add further financial frictions, and under certain modeling assumptions, could magnify leverage cycles by allowing a greater mismatch between debt maturities and risk between ultimate borrowers and lenders. Nevertheless, this would just reinforce the economic forces driving the model's results.

²²This type of intervention captures real-world policy measures taken during the crisis to facilitate mortgage payments by agents in distress, government credit for home renovation, or other initiatives to spur spending on consumer durables.

²³Inefficiency costs arise because the government is not in the business of intermediation, risk is not priced correctly, and there is

subsidy, as the government lends at a market-risk-free rate but has to pay a sovereign risk premium—which is a function of its debt level.

The government finances its expenditures by raising a mix of lump sum and distortionary taxes and by issuing government bonds. Fiscal rules imply that government expenditures and taxes react to stabilize public debt compatibly with the government's fiscal limit. Following Corsetti and others (2013), the fiscal limit is calibrated on real-world default cases. This feature delivers dynamics similar to more complicated open-economy setups in which the fiscal limit reflects the fact that government debt is mainly external or denominated in foreign currency (original sin/sudden-stop-type fiscal limit).²⁴

Central Bank

The central bank conducts monetary policy following a Taylor-type rule, according to which the official interest rate is set to close inflation deviations from a prespecified target and the output gap.

Annex 1.5. Policies during Deleveraging Episodes

This annex summarizes the key features and main policies (including targeted fiscal interventions) implemented in the six deleveraging episodes studied in the chapter.

Key Features

In all cases, deleveraging was triggered by the bursting of a credit-fueled asset bubble. In Finland,²⁵ Iceland, and the United States, the rapid expansion associated with financial innovation and declining lending standards led to a real estate boom (April 2012

some probability that a percentage of the loans will not perform. In the context of U.S. unconventional monetary policy, Gertler and Karadi (2011) consider a cost equal to 10 percent of the value of loans to be large. Therefore, high inefficiency costs are assumed here to amount to 20 percent of the value of loans. In the simulations, the fiscal cost at the optimal level of intervention amounts to about 4 percent of GDP over four years (assuming high inefficiency).

²⁴While the model captures a convex increase in the risk premium as the level of government debt approaches the fiscal limit, it is solved within a region of fiscal solvency, with possibly a very small fiscal space. In the real world, when the fiscal limit is reached and a situation of sudden stop in capital flows materializes, the government clearly has no fiscal space for targeted intervention.

²⁵In the case of Finland, the economic collapse and subsequent disintegration of the former Soviet Union was a factor contributing to the bursting of the credit bubble.

Annex Table 1.5.1. Private Sector Deleveraging Case Studies: Macroeconomic Conditions

Country	Average Growth (percent)	Average Inflation (percent)	Change in NEER (percent change)	Average Global Growth over the First Five Years of Deleveraging (percent)	Output Gap Trough (percent)	Output Gap Trough to 0	
						Number of Years	Change in Private Demand (percent of GDP)
Finland	2.8	1.5	-1.8	3.0	-7.9	5	-1.8
Japan	1.2	0.0	-16.5	3.5	-1.9	8	0.7
Korea	5.1	3.6	-21.9	3.5	-8.3	2	9.4
Thailand	3.3	3.1	-7.7	3.5	-5.8	5	11.2
Iceland	2.0	5.9	-43.5	3.7	-3.4	3	3.2
United States	0.8	2.0	-10.3	3.2	-5.0	4	2.9

Sources: Haver Analytics; IMF, International Financial Statistics; IMF, World Economic Outlook; and IMF staff estimates.

Note: The deleveraging process in Iceland is ongoing. Average growth, average inflation, changes in nominal effective exchange rate (NEER), and output gap trough over the deleveraging period are displayed in Table 1.1. A negative change in NEER refers to depreciation. Change in private demand refers to the change during the period over which output gap moves from trough to 0. For the United States, number of years reflects the time period from the output gap trough to the end of the deleveraging period, as the U.S. output gap has yet to close.

World Economic Outlook). In Japan, Korea, and Thailand, the liberalization of capital markets, along with expansionary monetary policy in Japan and preferential credit lines to large conglomerates in Korea, were associated with an unprecedented boom in commercial real estate and equity markets.

The macroeconomic environment varied widely across countries during the deleveraging process (Annex Table 1.5.1). Conditions were particularly adverse in Japan (deflation) and the United States (weak growth). On the other hand, positive growth and inflation rates contributed to eroding the real value of private debt in Korea and Thailand, although this erosion was partly offset by exchange rate depreciations that increased the burden of foreign-currency-denominated debt. In Iceland, a large depreciation of the krona leading to massive inflation during 2008–09 undermined deleveraging prospects since most mortgage loans were indexed to the exchange rate and consumer prices. Nevertheless, all deleveraging episodes, except for those in Japan and the United States, took place amidst V-shaped recoveries, with rapid rebounds in private demand in Korea and Thailand.

Main Policies

Finland in the Early 1990s

Macroeconomic Policies

Monetary policy was expansionary through most of the deleveraging period—except for an initial tightening to preserve exchange rate stability. The fiscal stance was expansionary in the first two years and thereafter gradually consolidated to meet Economic and Monetary Union (EMU) accession convergence criteria.

Targeted Fiscal Interventions

Actions were swift and focused mainly on indirect types of interventions. In March 1992, the government increased capital and provided liquidity to nearly all banks in the form of preferred capital certificates. The Government Guarantee Fund was also established in April 1992 as a crisis management institution funded by the state budget. The fund provided direct and conditional support mainly to savings banks through share capital, capital notes, and guarantees. In addition, the equivalent of a blanket guarantee to all Finnish banks was announced in August 1992 and maintained until 1998. All these measures amounted to about 13 percent of GDP (Sandal 2004; Laeven and Valencia 2012).

Japan in the Mid-1990s

Macroeconomic Policies

Monetary policy was eased only gradually before the deleveraging episode (six times between mid-1991 and mid-1995) and had already approached the zero lower bound by the start of the episode. A two-year fiscal stimulus of about 8 percent of GDP was implemented only in 1998 (IMF 1999). Fiscal consolidation resumed in the mid-2000s to contain rapidly rising public debts.

Targeted Fiscal Interventions

- *Indirect.* A tax-deductible write-off scheme was implemented in the early 1990s at a cost of about 9.2 percent of GDP (IMF 1995; Hoshi and Kashyap 2005). Comprehensive measures totaling about 12 percent of GDP for the pool of funds earmarked for recapitalizing solvent banks,

resolving failing banks, and supporting deposit insurance were taken only in 1998, three years into the deleveraging episode (IMF 2009a). Delays in rescuing troubled banks added to the final costs and contributed to the slow recovery (Laryea 2010; IMF 2009a; Ueda 2012). Japan also introduced a special credit guarantee program on lending to small and medium-sized enterprises that by 2001 fully covered nearly ¥30 trillion in bank loans (IMF 2009a). Although this measure was aimed at mitigating the credit crunch, it may have delayed necessary restructuring, based on evidence that participation was dominated by heavily indebted firms (Matsuura and Hori 2003).

- *Direct.* Following an overhaul of the insolvency system that began in 1996, several temporary tax incentives were implemented in 1999 to promote corporate reorganization (IMF 1999; Levy 2000). They included a deferral of the taxation of capital gains realized in the transfer or reorganization of subsidiaries and divisions. The number of government-approved restructuring plans doubled in the first year after these incentives were announced (IMF 2000a).

Korea after the Asian Financial Crisis

Macroeconomic Policies

Monetary policy was tightened from the start of the deleveraging episode through early 1998 to stabilize the exchange rate and avoid a depreciation-inflation spiral. Thereafter, it was progressively eased (Lane and others 1999). Low levels of public debt allowed fiscal policy to be loosened by the second half of 1998 and to remain expansionary throughout most of the deleveraging period. Fiscal expansions helped finance an increase in social safety nets, temporary tax incentives, and corporate debt restructuring. Fiscal consolidation ensued in a later stage when the economy was already recovering.

Targeted Fiscal Interventions

- *Indirect.* A three-year financial restructuring program initiated in 1997 provided fiscal support to financial intermediaries at the very early stages of the deleveraging process. At a cost of about 31.2 percent of GDP—mainly financed through the issuance of government-guaranteed bonds—the program recapitalized financial institutions, purchased nonperforming loans through a government-sponsored asset

management company, and protected depositors (Laeven and Valencia 2012).

- *Direct.* Korea implemented a number of tax measures to encourage corporate debt restructuring and reduce the debt bias in 1998 and 1999. Most of the measures were temporary, with up to five-year sunset clauses. Main measures included (1) the exemption or deferral of capital gains, transaction, and income taxes on the sale, transfer, and reevaluation of assets of restructured companies and capital injection from shareholders and (2) removal of preferential tax treatment for firms with a debt-to-equity ratio above 500 percent (Dalsgaard 2000). Tax incentives were accompanied by insolvency reforms to remove impediments to corporate debt restructuring early in 1998, which provided a better balance between the rights of debtors and creditors and improved the speed and efficiency of the system (Claessens 2005).

Thailand after the Asia Financial Crisis

Macroeconomic Policies

Monetary policy was tightened to deter depreciation until August 1998 and loosened thereafter. Except for a small fiscal stimulus in 2001, the fiscal stance was kept tight during the deleveraging period, reflecting concerns about rapidly growing public debt (IMF 2001).

Targeted Fiscal Interventions

- *Indirect.* Between 1998 and 2002, the government implemented two consecutive bank recapitalization programs at a cost of about 44 percent of GDP (Laeven and Valencia 2012).
- *Direct.* The government implemented temporary and permanent measures in 1998–99 to facilitate corporate restructuring. The temporary measures included (1) tax deductions of written-off debt for creditors and elimination or deferral of corporate income tax on written-off debt for debtors, (2) elimination of all taxes on asset transfers from debtors to creditors, (3) elimination of taxes on accrued but unpaid interest, and (4) limitation of taxes on restructurings that involved interest rate reductions by creditors. Permanent measures designed to support corporate restructuring included (1) provision for tax-free mergers and noncash acquisition of assets in the case of full mergers and (2) elimination of the value-added tax and specific business tax on the transfer of assets to a special-purpose vehicle providing tax incentives to speed up debt restruc-

turing by debtors and creditors (Pomerleano 2005). A wide range of legal reforms was also introduced to facilitate corporate debt restructuring: (1) the bankruptcy law was amended in 1998 and 1999 to improve the prospects for the rehabilitation of companies and (2) the foreclosure law was revamped to strengthen the rights of creditors and increase the incentive for debtors to negotiate (IMF 2000b).

Iceland since the Great Recession

Macroeconomic Policies

A large (about 12 percent of GDP) front-loaded fiscal expansion was implemented through 2008 to counter the crisis but was followed by a consolidation starting in mid-2009. Monetary policy, which initially focused on stabilizing the exchange rate, gradually became accommodative as depreciation pressures eased.

Targeted Fiscal Interventions

- *Indirect.* Starting at the end of 2008, the Icelandic government assumed control of, recapitalized, and restructured three failed large banks to avoid a credit crunch. Failed banks were too big to be rescued and were partially bailed-in by foreign depositors, while domestic depositors were protected. Icelandic deposits and assets were carved out of the failing banks and transferred to new state-owned banks, while most of the foreign-owned assets and liabilities were allocated to the existing banks, which were declared insolvent (IMF 2012a). Creditors of the existing banks became the shareholders of two of the new banks through a debt-to-equity swap operation (IMF 2012a). Subsequently, the government also recapitalized savings banks and nonbank financial institutions. The recapitalization of the core financial system was completed in 2011 and cost about 44.2 percent of GDP (Laeven and Valencia 2012).²⁶
- *Direct.* Fiscal interventions targeted households for the most part. Targeted fiscal interventions took the form of a tax rebate (announced in 2008 and extended in 2010) and subsidy (two-year subsidy introduced in 2010) on mortgage interest payments to support government-sponsored household-debt-restructuring initiatives (IMF 2011).²⁷

²⁶Fiscal costs encompass the costs associated with the recapitalization of banks, the recapitalization of the central bank, and the called guarantees of the State Guarantee Fund.

²⁷See the April 2012 *World Economic Outlook* for a detailed review of these initiatives.

Annex Table 1.5.2. Costs of Selected U.S. Fiscal Interventions

	US\$ Billion	Percent of GDP
TARP Programs	476	3.1
Financial Sector Restructuring	347	2.3
Auto Industry	83	0.5
Residential Mortgages	46	0.3
Of which: HAMP	23	0.1
GSE Guarantees	188	1.2
Total	663	4.3

Sources: Frame and others 2015; U.S. Treasury; and IMF staff estimates. Note: The Troubled Asset Relief Program's (TARP's) initially approved budget of US\$700 billion was reduced to about US\$475 billion by the Dodd-Frank Act. Financial sector restructuring costs account for programs for banking investment, credit markets, and the insurer AIG. Residential mortgages include all fiscal interventions under the Making Home Affordable (MHA) and Hardest Hit Fund (HHF). The Home Affordable Modification Program (HAMP) is part of the MHA program. Government-sponsored enterprise (GSE) guarantees correspond to the amount called between 2008 and 2011.

New household debt relief measures were launched in 2014, envisaging across-the-board reductions in household mortgages over 2014–17 financed in equal shares by a tax on banks capped at 4½ percent of GDP and tax-free early withdrawals from Pillar III pension accounts, with costs uncapped and estimated at about 4½ percent of GDP (IMF 2014).

United States during the Great Recession

Macroeconomic Policies

Monetary easing preceded the start of the deleveraging period and was sustained through unconventional monetary policies in the form of liquidity provision and purchases of assets, including mortgage-backed securities, through the deleveraging episode. Fiscal expansion was front-loaded with the implementation of two large fiscal stimulus packages in 2008–09 of about 6 percent of GDP (IMF 2009c). Fiscal consolidation started in 2011, reflecting debt sustainability concerns and the application of automatic spending cuts later in 2013.

Targeted Fiscal Interventions

Implemented mainly as part of the Troubled Asset Relief Program (TARP) in 2008, fiscal interventions cost 4½ percent of GDP (Annex Table 1.5.2). The main measures were

- *Indirect.* In September 2008, the U.S. Treasury issued guarantees in the form of senior preferred stock purchase agreements and Treasury liquidity facilities to maintain the positive net worth of

government-sponsored enterprises, allowing them to continue the securitization of residential mortgages. This intervention helped support the supply of conforming mortgages and enabled fixed-rate mortgages to be refinanced and was critical to stabilizing housing prices (Frame and others 2015). In addition, in October 2008, the government implemented several programs under TARP aimed at restructuring the financial sector through public capital injections to stressed financial institutions, government purchases of non-government-sponsored-enterprise mortgage-backed securities and small business loans, and government guarantees of banks and money market fund assets.

- *Direct.* Support was provided to households and firms as follows:
 - *Loan modifications.* To restructure household debt, prevent foreclosures, and stabilize house prices, the government launched the Home Affordable Modification Program (HAMP) in early 2009.²⁸ HAMP reduced mortgage payments of qualifying distressed homeowners through modifications of first-lien loans.²⁹ Loan modifications were encouraged through cash payments to loan servicers

²⁸For an overview of current and previous U.S. household debt-restructuring programs, see “Making Home Affordable” (<https://www.treasury.gov/initiatives/financial-stability/TARP-Programs/housing/mha/Pages/Programs-Under-Making-Home-Affordable.aspx>) and the April 2012 *World Economic Outlook*.

²⁹The program was amended in October 2010 to allow principal write-downs and was expanded in June 2012 to broaden eligibility and increase incentives. It is set to expire in December 2016.

that chose to renegotiate residential mortgages and to borrowers that demonstrated compliance with modified mortgages.³⁰ The effectiveness of HAMP has been mixed, with take-up rates falling below original targets, despite some evidence of housing price stabilization in regions with greater exposure to the program (Agarwal and others 2013).³¹ The lower-than-expected take-up rates have been attributed to tight eligibility criteria, including a six-month trial period, and the inability to provide proper incentives for large loan servicers to engage in costly renegotiation (IMF 2012b; Agarwal and others 2013).

- *Automobile industry bailout.* Direct government financial support was provided in 2008 to the holding companies for Chrysler and General Motors, their financial arms (Chrysler Financial and General Motors Acceptance Corporation, or GMAC), and automotive suppliers and to guarantee customer warranties. Loans were conditional on the submission and strict implementation of restructuring plans. Initial plans were rejected and revised plans submitted. The government decided to sell stakes acquired in the companies as a result of the bailout as soon as conditions permitted, in 2014.

³⁰Loan servicers were already partially compensated for legal costs related to foreclosures.

³¹HAMP was envisaged to reach 4 million homeowners at a cost of about US\$75 billion (0.5 percent of GDP). As of the first quarter of 2016, about 2.4 million homeowners had been assisted at about one-fifth of the initially projected cost (U.S. Treasury 2016).

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