

Debt, Financial Crisis and Economic Growth^{*} **

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Abstract

Following the leverage binge in advanced economies (AEs) over the three decades preceding 2008, debt growth is generally likely to be low in the years ahead. Deleveraging is likely to continue to weigh heavily on growth in highly indebted economies, and the deleveraging process will be costlier and take longer unless adequate policies are implemented to support it.

Debt in the non-financial sector of AEs has almost doubled as a share of GDP between 1980 and 2008 – a period during which GDP grew rather briskly. It initially grew more strongly in the private sector, but only for public debt shot up sharply after the 2007-09 North-Atlantic financial crisis. Since 2008, debt growth has slowed by a third in real, and by half in nominal, terms. It would have fallen even more sharply if public debt growth had not more than doubled.

The speed of deleveraging varies widely in different countries and sectors. On average, household and non-financial corporate debt has fallen, while public debt is still rising. Private (and sometimes public) deleveraging has generally been faster where GDP and income growth have held up, and is impeded by weak income growth in countries where deleveraging pressures are intense, such as in Greece, Ireland, Portugal or Spain. Safe debt is rapidly becoming an oxymoron.

Hangovers from credit booms are serious. Increases in debt can cause systemic crises which generally tend to be both long-lived and costly. Large increases in debt also make such crises more painful – we find that the ‘GDP loss’ relative to trend in the aftermath of financial crises is almost twice as large in countries which had a large pre-crisis increase in debt than in countries that did not. Today, growth is weakest, on average, in countries with the largest pre-crisis debt increases. But even when debt does not cause a major crisis, debt reduction through higher saving rates tends to be contractionary because the poor coordination of deleveraging, saving and investment decisions give rise to Keynes’s ‘paradox of thrift’.

Deleveraging – shrinking balance sheets – occurs when households, businesses or the public sector either desire to save more or are forced to do so. Economic actors may want to save more, or may be forced to save more by a combination of illiquid assets and restricted access to external funding or because their net worth is perceived to be inadequate. Both net worth and gross debt therefore matter for saving and deleveraging behaviour.

Some of the costs of deleveraging are likely unavoidable, but policies can help to reduce the avoidable costs of deleveraging. First among those is access to liquidity. A well-capitalised banking system would be a good start, but the private provision of liquidity – a public good - in crises is usually highly inefficient, so central banks will likely retain a key role in liquidity provision for the coming years. Mechanisms to allow the gross deleveraging, i.e. the ‘netting’ of assets and liabilities, especially among banks and other financial intermediaries, should be encouraged. Where higher financial surpluses are required, policies should encourage higher saving rather than lower investment. Extensive debt restructuring for governments, banks, and in some countries also households, using yet-to-be-created orderly debt restructuring mechanisms, is both desirable and likely. In the medium-term, the lessons should be clear. First, to better coordinate saving and investment decisions, while supporting financial markets with more effective and sustainable fiscal and monetary policies. Second, on the liability side of any balance sheet: more equity, less debt.

1. Introduction

There is a lot more private and public debt today in the advanced economies than has been the norm during peacetime periods. In 1980, the total non-financial sector (NFS) gross debt in 17 developed markets amounted to \$12.3trn or 168% of the GDP of these countries. In 2011, the total stood at just over ten times that value (\$128.5trn), amounting to 315% of GDP.

Debt is attractive to holders because it offers, or appears to offer, a predictable safe income stream. It is attractive to issuers because, among other advantages, it provides leverage, in the economic sense of the word: *"...leverage exists whenever an entity is exposed to changes in the value of an asset over time without having first disbursed cash equal to the value of that asset at the beginning of the period."*¹ Debt has the further advantage to the issuer that, as long as the borrower adheres to the terms of the debt contract, the creditor has fewer control rights over the use of the borrowed funds than would be the case with equity-type liabilities.

Debt has grown in most countries and in most sectors. Private debt, both household debt and debt of businesses grew strongly from the 1980s until quite recently. Public debt grew more modestly until the North-Atlantic financial crisis that erupted in August 2007 confronted governments with large revenue losses, as well as the need for fiscal stimuli and banking sector bail-outs. Public debt growth has now overtaken the growth in private debt. In 1980, 27% of the debt of advanced economies was household (HH) debt, 47% non-financial corporation (NFC) debt and 26% general government (GG) debt. By 2011, the share of general government debt had grown to 37% of the total. It is likely to continue rising in the coming years, with the share of NFC debt strongly down (to 37%) and the share of HH debt only slightly down (26%).

Now that debt levels are perceived to be excessive in many places, debt and credit growth from here on is likely to be low in most DMs for the foreseeable future. Real growth in gross debt in DMs since 2008 has been roughly one third lower than it was between 2001 and 2008. Nominal debt growth has roughly halved from the pre-crisis average.

Even though credit growth has generally fallen, the years since the North-Atlantic financial crisis of 2007-2009 have on average only seen a modest degree of private sector deleveraging – from a peak of around 205% of GDP in 2009 to maybe 5ppts of GDP less in Q2 2012. Total NFS gross debt continues to increase, as public debt has generally risen strongly in nominal and real terms. As a share of GDP, it has gone up by 30ppts in the space of less than four years since 2008.

We expect debt reductions to have a lot further to run in many countries. Deleveraging pressures are likely to be particularly severe in Cyprus, Ireland, Portugal, and Spain. In most other countries, private sector credit growth is likely to remain sharply below the growth rates of previous years. In addition, real GDP growth is likely to be low during this period of deleveraging, due to an increase in desired net saving and its adverse affect on the level of economic activity due to the paradox of thrift.

Some of the adverse consequences that large-scale debt reduction brings with it are probably unavoidable. But policy responses should be focused on minimizing the avoidable costs of deleveraging. First among those should be measures to allow gross deleveraging (shrinking balance sheets through equal reductions in assets and liabilities, without the need to raise financial net worth by running financial surpluses/'saving') to take place in an orderly and coordinated fashion.

Creating institutions or arrangements to help heterogeneous, decentralized, independent and uncoordinated private and public entities to coordinate the netting of gross financial assets and liabilities in complex networks of creditors and debtors should help, too. Clearing houses for a much wider range of financial claims should therefore be considered.

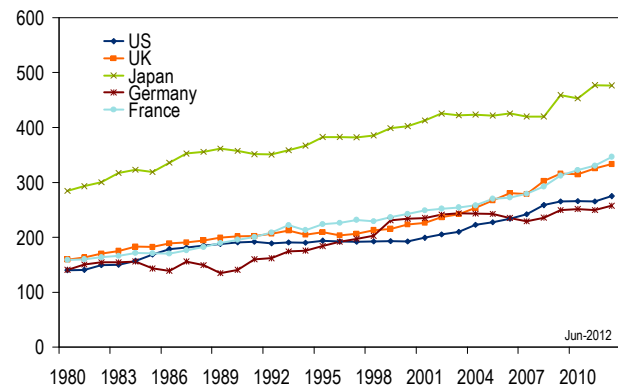
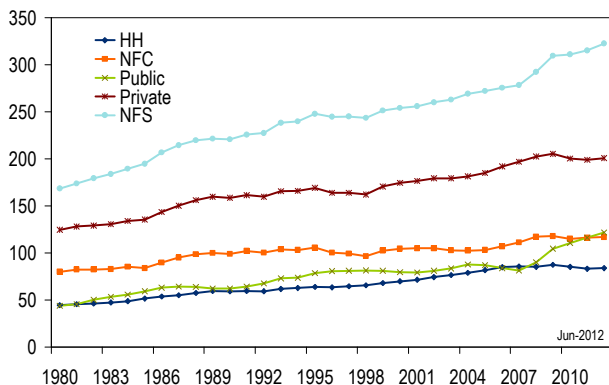
Additionally, debt restructuring will often be needed to bring about timely net deleveraging, that is adding to the net worth of financially fragile sectors by running financial surpluses or by saving. Where gross

¹ See Counterparty Risk Management Group II (2005), P A1. Clearly debt can be used to leverage equity, but many other financial instruments other than debt can be used to create leverage. This includes initial margin in futures contracts, and embedded leverage through options. These broader forms of leverage played a role in the North-Atlantic financial crisis, but will not be part of our focus.

debt is excessive and net worth inadequate, socially efficient deleveraging will in many cases require establishing orderly and efficient debt restructuring mechanisms and procedures for banks and sovereigns (where they generally don't exist) and improving insolvency and bankruptcy procedures for households and non-financial corporates.

2. The Great Leveraging

Figure 1. Advanced Economies – Gross Debt by Sector (% of GDP) – 1980-Q2 2012 **Figure 2. Selected Countries – Non-financial Sector Gross Debt (% of GDP) – 1980-Q2 2012**



Note: Advanced Economy gross debt by sector is constructed as gross debt weighted by the time-varying shares of nominal GDP in 17 countries (Australia, Austria, Belgium, Canada, Finland, France, Germany, Greece, Italy, Japan, Korea, the Netherlands, Portugal, Spain, Sweden, UK and US). NFS is the non-financial sector (sum of HHs, NFCs and the GG). Gross debt is equal to total financial liabilities for HH and the public sector, and to total financial liabilities less shares and other equities for NFC. Values are on a non-consolidated basis except for Portugal and Australia.

Source: IMF, OECD, National Sources and Citi Research

Debt has risen over the past few decades, almost everywhere in the advanced economies and according to most measures (McKinsey Global Institute (2010, 2012), Cecchetti et al (2011), BIS 82nd Annual Report (2012), Tang and Upper (2010). Take gross non-financial sector (NFS) debt (the sum of the gross debt of households, non-financial corporations, and the general government) in advanced economies.

In a sample of 26 countries, gross NFS debt relative to GDP rose in every single one between 1995 and today.² For the 17 countries for which data are available since 1980, debt rose substantially in all.³ For these 17 countries, the average NFS gross debt-to-GDP ratio, weighted by GDP shares (which is of course the same as aggregate NFS gross debt as a share of aggregate GDP), almost doubled since 1980 (Figure 1), rising by just under 5ppts of GDP each year, on average.⁴

² The countries are Australia, Austria, Belgium, Canada, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Italy, Japan, Lithuania, the Netherlands, Norway, Poland, Portugal, Slovakia, Spain, South Korea, Sweden, UK, and US. In addition to these countries, we often consider four countries for which data are only available for a shorter sample period: Ireland (from 2001), Latvia (from 1998), Slovenia (from 2001) and Switzerland (1999 to 2009).

³ These countries are Japan, Italy, UK, Portugal, Spain, Belgium, Greece, France, Finland, Netherlands, US, Korea, Australia, Austria, Sweden, Germany and Canada.

Let D_i be the gross debt of country i (measured in a common currency) and Y_i the GDP of country i

⁴ (measured in a common currency), then,

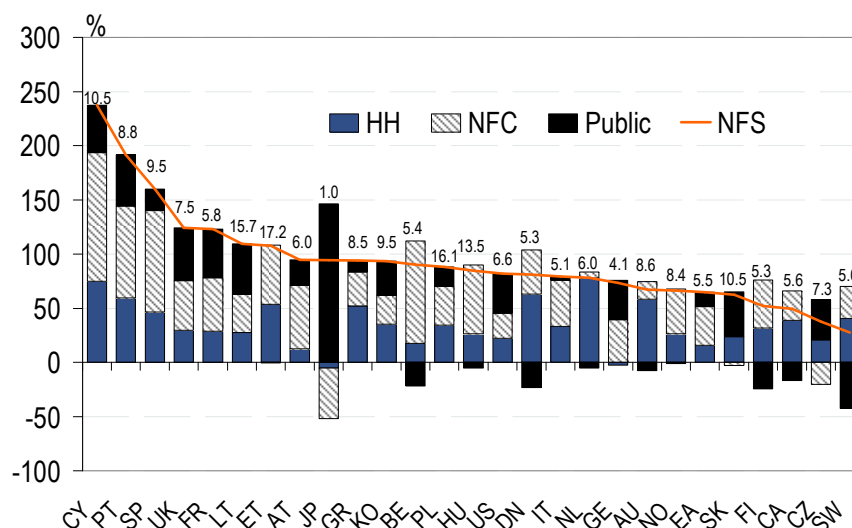
$$\frac{\sum_{i=1}^N D_i}{\sum_{i=1}^N Y_i} \equiv \sum_{i=1}^N \frac{D_i}{Y_i} \left(\frac{Y_i}{\sum_{j=1}^N Y_j} \right)$$

Elsewhere we also use the unweighted (or rather, equally weighted) average debt-to-GDP ratio, $\frac{1}{N} \sum_{i=1}^N \frac{D_i}{Y_i}$.

Since 1995, this aggregate debt-to-aggregate GDP ratio still rose by 75ppts of GDP (4.5ppts of GDP/year on average).⁵ Over this period, real GDP, measured in constant USD at market exchange rates, grew by 37% (2.3%pa) in the 17 countries, and nominal GDP (measured in current USD) by 95% (5.9%pa), so the growth in real and nominal debt levels was even larger than the growth in debt-to-GDP ratios. In terms of the increase in the gross NFS debt to GDP ratio, the US was squarely in the middle of the pack, the UK was in the top quartile, while Germany was in the group of countries with the smallest increases.

The aggregate picture conceals much diversity. First, there is a difference between smaller and larger countries: in our sample, larger countries on average had smaller proportional increases in their gross NFS debt to GDP ratio and more of the total debt increase was accounted for by increases in public debt. Thus, the simple average (not GDP-weighted) increase in the gross NFS debt-to-GDP ratio across the sample of 26 countries between 1995 and H1 2012, was 94ppts of GDP (5.7ppts of GDP per year) compared to the GDP-weighted average increase of 5.3 percentage points; it was 89ppts for the 17 countries with longer data series – countries that were on average still larger.⁶ These data do not even include some of the small countries with the largest increases in debt, as data for the earlier period are not available for them. For example, for Ireland and Latvia, the data are only available from 2001 and 1998, respectively, but between these dates and today, their total non-financial debt as a share of GDP increased by 307ppts (19ppts per year) and 93ppts (5.6ppts), respectively.

Figure 1. Selected Countries – Non-Financial Sector debt/GDP ratio, change 1995-latest



Note: Public is the general government. For the EA change corresponds to 1999-2011. Latest values are for Jun-12, except for Italy, the Netherlands, Ireland (all Mar-12), and Cyprus (Dec-11). Numbers above the columns are average growth rates of the nominal stock of gross debt in local currency between 1995 and the latest observation. All values are expressed on a non-consolidated basis except for Australia and Portugal. See Figure for a list of country labels.

Source: National sources, Eurostat, OECD, and Citi Research

Cyprus, Portugal and Spain were the countries in our sample that had the largest increases in NFS gross debt to GDP ratios, with NFS gross debt-to-GDP ratios rising by at least 150ppts (or almost 10ppts/year). Ireland and Latvia would likely also have been in this category, if the data had been available for the entire period. The countries which saw the largest increase in debt often shared certain characteristics, including being an emerging European country (the Baltic countries, Hungary), being a financial centre (Cyprus, UK, Ireland) or having had a housing boom (Baltics, Ireland, Spain). Despite similarities in economic development and structure, some regional differences exist. For example, the Czech Republic and Slovakia had among the smallest increases in their gross NFS debt ratio (while

⁵ For the broader sample of 26 countries, the GDP-weighted increase in gross debt since 1995 was 89% of GDP.

⁶ The GDP weighted average increase in real GDP (measured in constant USD) was 39% (2.4%pa), and nominal GDP grew on average by 100.4% (6.3%pa) since 1995.

Hungary did not), and gross NFS debt ratios in Finland and Sweden also grew only modestly, while the debt ratio increase in Norway was larger.⁷

Gross debt ratios increased, on average, in each one of the household, non-financial corporate and general government sectors. Of the 89ppts increase in the GDP-share-weighted gross NFS debt ratio between 1995 and today, fairly little (less than 25ppts) was due to increases in the NFC gross debt ratio. Households added 23ppts and general governments the rest – just over 43ppts. However, again, small and large countries differed: in the simple cross-section of countries the contribution of the HH and NFC sectors to the increase in the total non-financial gross debt ratio was much higher, on average, at 36ppts of GDP and 40ppts, respectively, while general government debt increased the total non-financial debt ratio by a mere 19ppts.

2.1 Debt and debt service relative to debt servicing capacity

Relative to disposable income, HH gross debt also increased strongly in most countries, and the relative ranking of countries is also broadly similar. The *level* of HH gross debt currently exceeds annual disposable income in the majority of advanced economies, and is more than twice annual disposable income in Denmark, the Netherlands, Norway, Ireland, and Switzerland.

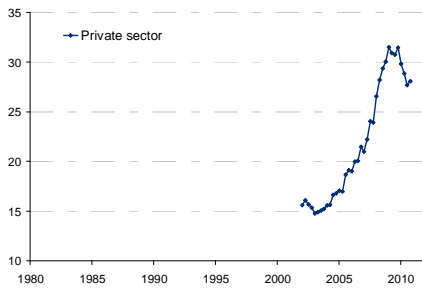
Increases in debt service ratios (interest and principal repayment) relative to disposable income for private sectors (household and non-financial businesses) were more muted, on average, as increases in indebtedness were at least partly (and in some cases fully or more than 100 percent) offset by reductions in interest rates (see Figure 2). In Canada, where gross debt has fallen relative to GDP since 1995, private sector debt service ratios have fallen roughly by half since the peak in the early 1990s. In Germany and Switzerland private sector debt service ratios also fell, and in France ratios rose only modestly. In many countries, however, private sector debt service ratios also increased very substantially in the decade leading up to the financial crisis, including in Ireland, Spain, the UK, and the US, but also Denmark, Italy, Australia and Norway, despite falls in nominal and real interest rates over this period.

Debt in the banking sector, and in the financial sector generally has increased enormously over the past few decades (see Figure 3). In fact, in some financial centres, including Ireland and the UK, increases in debt in the financial sector dwarfed increases elsewhere, and increases in simple, unweighted, measures of gross debt and total balance sheet size generally suggest much larger increases in debt than more complex (or esoteric) measures such as risk-weighted asset ratios, net debt/net worth, or different definitions of leverage based on (non-independently verifiable) risk weights or on net debt ratios.

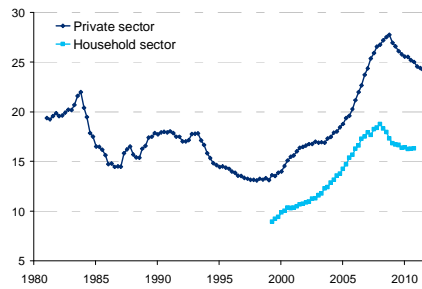
⁷ In Norway public gross debt remained relatively stable over this period, while it fell sharply in Sweden, Finland and Denmark. The differential between the CEE countries was mostly driven by differential increases in NFC gross debt.

Figure 2. Selected Countries – Private sector and Household Debt Service Ratios (%), 1980-2011

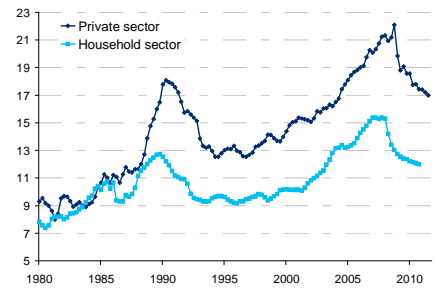
Ireland



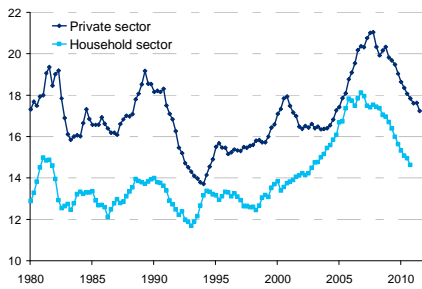
Spain



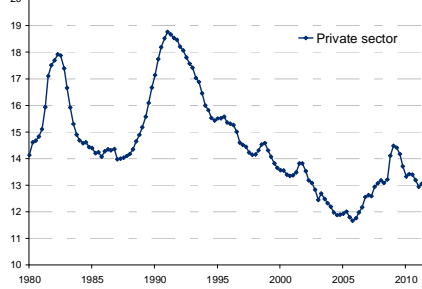
United Kingdom



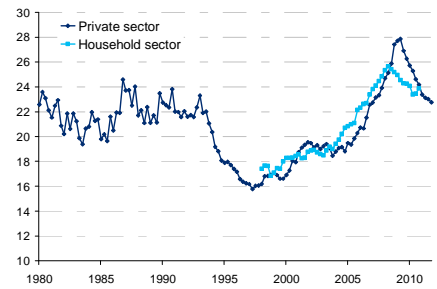
United States



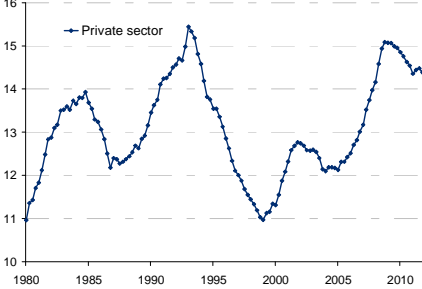
Canada



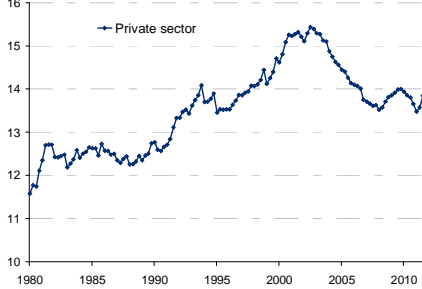
Denmark



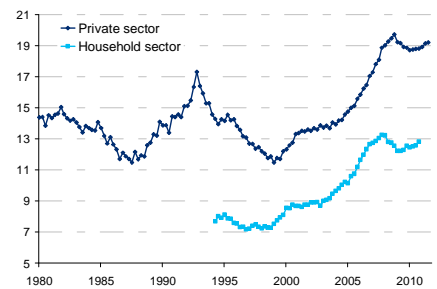
France



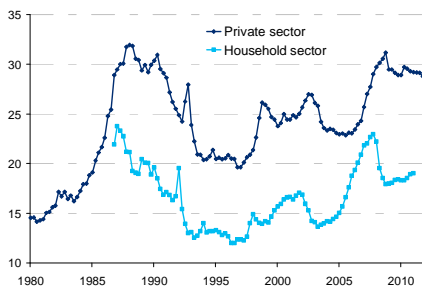
Germany



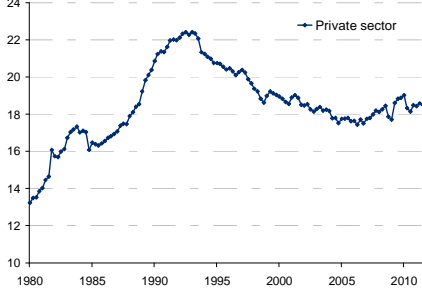
Italy



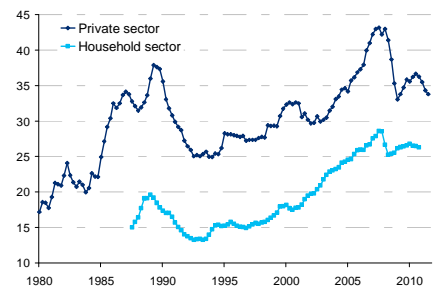
Norway



Switzerland



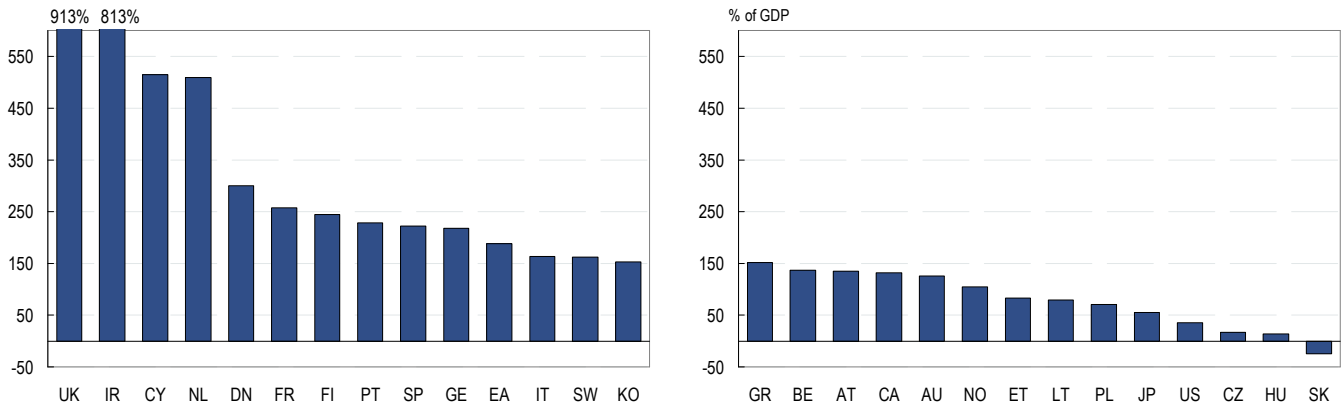
Australia



Note: The debt service ratio is the sum of interest payments and debt repayments, divided by disposable income.

Source: BIS 82nd Annual Report (2012), and Citi Research

Figure 3. Selected Countries - Financial Corporation debt/GDP ratio (%), 1995-2011 change



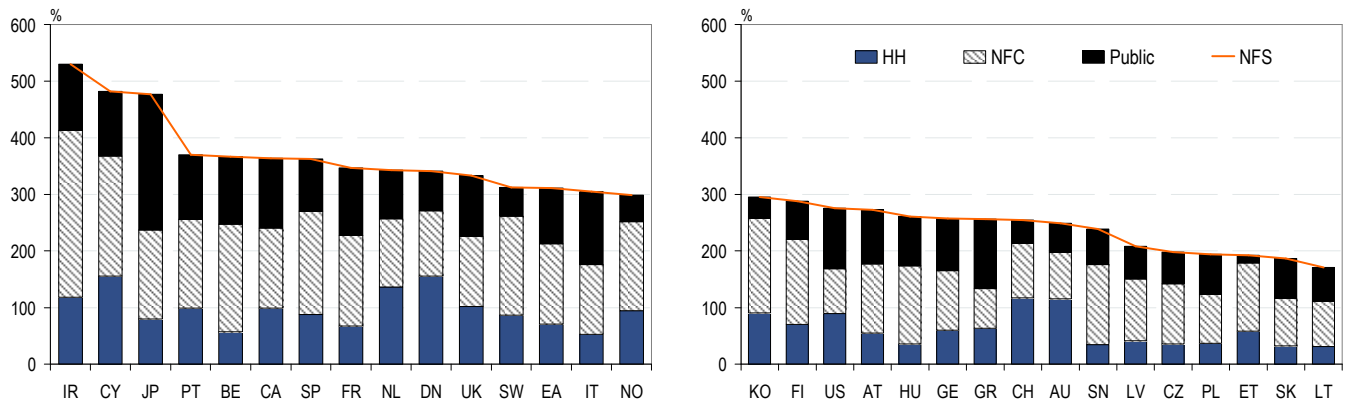
Note: Financial Corporations include NCBs. Gross debt is equal to total financial liabilities less shares and other equities from national balance sheet statistics. For the US, financial corporations' debt is "credit market instruments". For the EA, the change is between 1999 and 2011 and between 2001 and 2011 for Ireland. All values are expressed on a non-consolidated basis except for Australia and Portugal.

Source: OECD, Eurostat, National sources, and Citi Research

In terms of the *levels* of NFS gross debt, in our sample of 30 countries, Ireland, Cyprus and Japan are the mostly highly indebted countries, with NFS gross debt in each case amounting to close to or more than five times GDP (Figure 4). Portugal and Spain also have very high levels of gross NFS debt. The average level of gross NFS debt across the countries in our sample is three times the level of GDP (301% of GDP). The US (275% of GDP), but also Italy (304%), find themselves in the middle of the pack, and countries like Greece (256%), Germany (258%), but also the Baltics and most CEE countries, are at the lower end of the spectrum. Lithuania is the country with the lowest level of (NFS gross) debt in our sample at 171% of GDP.

The composition of debt levels across sectors also varies a lot between countries. In many countries, including Belgium, Ireland, Spain, but also Sweden, the Baltics and the CEE countries, non-financial corporates account for most of the gross debt. Only in a few cases is public debt the major contributor to total NFS gross debt, the most notable case being Japan, but also in Greece, Italy and the US. In some countries, including Ireland, Cyprus, Portugal and Spain, all three non-financial sectors have relatively high levels of gross debt.

Figure 4. Non-Financial Sector Gross debt/GDP ratio, Latest



Note: NFS is the sum of HHs, NFCs and GG. Latest values are for Jun-12, except for Italy, the Netherlands, Ireland (Mar-12), Cyprus, the EA (Dec-11) and Switzerland (Dec-09).

Source: National sources, OECD, Eurostat, and Citi Research

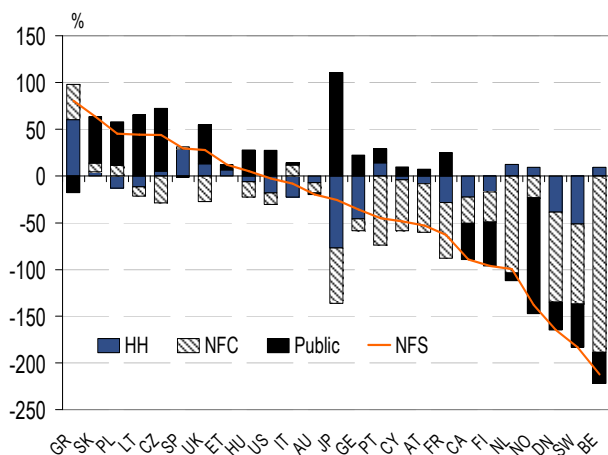
2.2 The other side of the balance sheet – changes in net debt and net worth

HHs, NFCs and the public sector also have assets that could potentially be sold to reduce debt or generate income used to service debt. It therefore makes sense to consider these asset holdings when assessing debt sustainability, even though the potential liquidity, currency or maturity mismatch between assets and liabilities suggests that netting assets and liabilities may not generally be advisable.

For broad measures of *net* debt which only reflect liquid asset holdings, such as gross debt minus holdings of currency and deposits, the picture is often qualitatively and quantitatively quite similar to that for gross debt (Figure 6).⁸ Such levels of net debt have generally increased across most countries across all three sectors, and the relative ranking of countries according to the broad net debt increase is similar to the case of gross debt. The size of the increase is smaller, as holding of currency and deposits have generally increased – a simple average of narrow net debt increased by 62ppts of GDP against 93ppts of GDP for gross debt. In relative terms, the UK in particular looks somewhat better once we allow for currency and deposit accumulation.

Narrow measures of net debt did not increase to the same extent as gross debt, and often fell. For example, a narrow measure of net debt that accounts for all financial assets (i.e. including equity and fixed income claims and pension fund assets, but not ownership claims on land and real estate or unfunded pension entitlements) *fell* by 37% of GDP between 1995 and 2011 (or 23.1% in GDP-weighted terms), most of it due to the fact that net debt of NFCs decreased on average (Figure 5), even though HH net debt also fell. However, the reduction or at least moderation in levels of net debt was not generally driven by an increase in private saving rates, but rather an increase in asset values, mainly on stocks, in the 1990s.

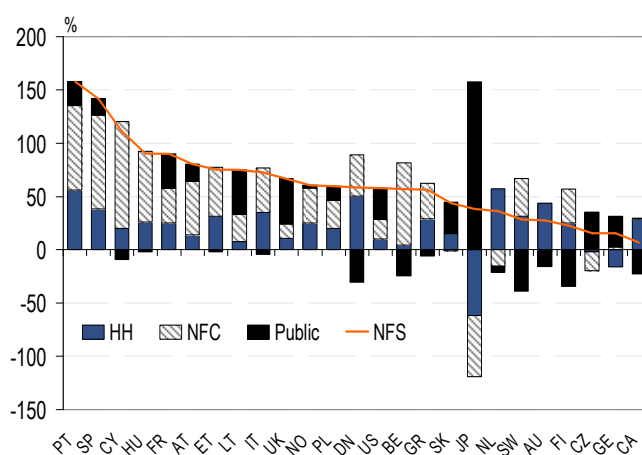
Figure 5. Selected Countries – Non-Financial Sector Narrow Financial Net Debt, 1995-2011 change



Note: Narrow financial net debt is defined as gross debt minus total financial assets. All values are expressed on a non-consolidated basis except for Australia and Portugal. Countries missing include Ireland (data start only from 2001), Latvia (1998), Slovenia (2001) and Switzerland (1999)

Source: National sources, OECD, and Citi Research

Figure 6. Selected Countries – Non-Financial Sector Broad Financial Net Debt, 1995-2011 change



Note: Broad financial net debt is defined as gross debt minus holdings of currency and deposits. All values are expressed on a non-consolidated basis except for Australia and Portugal. Countries missing include Ireland (data start only from 2001), Latvia (1998), Slovenia (2001) and Switzerland (1999)

Source: National sources, OECD, and Citi Research

2.3 Non-financial assets are significant

Our discussion above misses some very substantial components of wealth and net worth, notably ownership claims to real estate or land. Unfortunately, the availability of data on holdings of real estate and other real assets is quite limited and measurement and definitional issues make cross-country comparisons tricky. But the available data indicate that these non-financial assets are sometimes of a similar order of magnitude for households alone as total financial assets for the entire non-financial sector. For example, in Spain HH non-financial assets were valued at almost 500% of GDP in 2011 (Figure), and in France at just under 400% of GDP in 2010. In Germany (2009) or the US (2011) on the

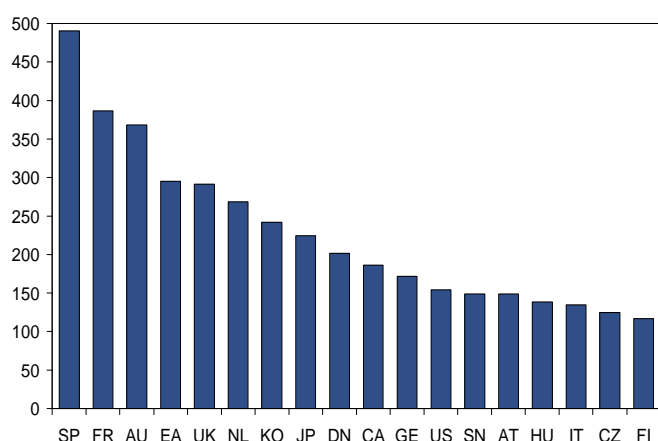
⁸ We call a measure of net debt that only deducts currency and deposits from gross debt 'broad' as only a narrow range of assets is deducted from gross debt. Narrow net debt therefore reflects a broader range of assets.

other hand, non-financial assets of HHs were valued just at around 150% of GDP, although for both countries this excludes land. There is also at least a suspicion that the prices at which Spanish real assets (and possibly French real assets as well) were valued in these data err on the side of generosity.

As real estate prices have risen, the value of non-financial assets has generally increased over the last few decades, often supported further by a boom in real estate construction. Changes in the value of these assets can easily overwhelm other changes on HH and business balance sheets. Many countries with long and large real estate booms have seen large falls in HH net worth in recent years. In the case of Spain, HH net worth has fallen by around 100% of GDP since 2007, mostly driven by a reduction in the value of non-financial assets. However, in those same countries, HH net worth is often still above the levels seen in the early 2000s. The fall in real estate valuations in Spain has brought HH net worth back to the levels of around 2004, with large increases in the years prior to 2004. Of course, continuing falls in house prices in Spain are likely to erode HH net worth in Spain substantially further in the years ahead.

In the US, HH net worth also fell along with house prices by about 100% of GDP in 2007 and 2008, but has recently stabilized. In countries that have not seen a major housing bust, HH net worth is generally close to previous peaks, with the exception of Japan, where HH net worth is still down substantially from the peak in the early 90s and HH net worth has continued falling at a gradual and slowing pace since then (Figure 8).

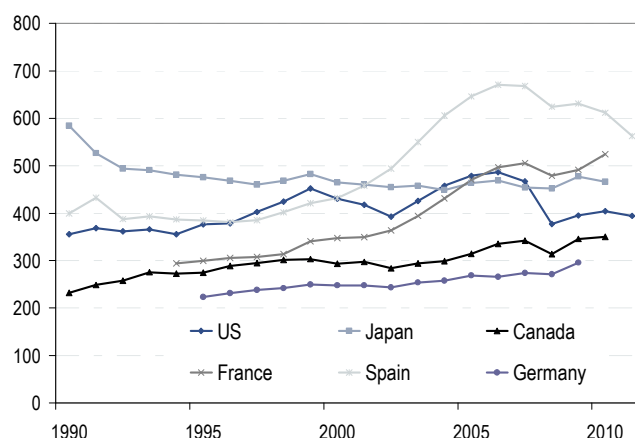
Figure 7. Selected Countries – Holdings of Non-financial Assets by Households (% of GDP), latest



Note: Values correspond to holdings of total non-financial assets by HHs. Non-Financial Assets include fixed assets, inventories, fisheries, and land. For Italy, values correspond to total dwellings, while for the UK and Hungary values exclude land. For the US, Germany, Slovenia, Austria, Denmark, Finland and Spain, values exclude land and inventories, due to data availability. Latest is end-2011 except for Japan, Canada, Australia, France, Czech Republic, Korea, Netherlands, and Slovenia (2010), and Germany, Italy and Hungary (2009).

Source: National Sources and Citi Research

Figure 8. Selected Countries – Household Net Worth (% of GDP), 1990-2011



Note: Net worth is defined as total assets (financial and non-financial) minus total financial liabilities.

Source: OECD, IMF, FED, Bank of Spain and Citi Research

3. The Drivers of the Great Leveraging

There were many drivers of the increase in debt in the last few decades (starting around 1980 in the UK and the US), including financial sector liberalisation, financial ‘innovation’, a boom in real estate prices and construction (themselves fed by the growing debt issuance), a fall in lending standards, a global fall in real interest rates (often associated with the ex-ante saving glut produced by China and other high-saving EMs and oil-producing countries), and the perception of a fall in macroeconomic volatility and of enduring faster growth – the Great Moderation.

Of course, profligacy of many governments in the run-up to the financial crisis, which was partly fed by a misidentification of highly cyclical, or at least unsustainable, revenue increases as permanent, played a role, too.

The recent global recession and financial crisis clearly played a major role in the build-up of sovereign debt through the collapse of certain sources of unsustainable tax revenues the sovereigns had grown dependent on (especially taxes on real estate and on financial sector earnings). Other sources of public debt growth were the operation of the automatic fiscal stabilizers during the downturn caused by the crises, the discretionary measures to provide fiscal stimuli and the bail-outs of banks, other financial institutions and sometimes non-financial companies deemed too systemically significant or too politically well-connected to be allowed to fail. In Europe, and especially the EA, this migration of bad and impaired private sector assets to the public balance sheet continues. That there are limits to this migration because at some point 'too big to fail' gives way 'to too big to bail' should have been clear since the collapse of Iceland's banking sector in the Fall of 2008, with recent reminders from Greece, Ireland, Spain, Portugal, Cyprus and Slovenia.

These factors implied that both the supply curve and the demand curve for credit shifted outwards in the two or three decades leading up to the financial crisis. Some of the drivers, such as the reduction in global real interest rates and a perception of greater macroeconomic stability, likely affected both private and public debt accumulation. The rise in real estate prices and the fall in lending standards likely had a stronger effect on private debt than on public debt. Many of the drivers were also inter-related and often reinforced each other. For much of this period, there was what seemed to be a virtuous circle where credit growth boosted demand, which in turn boosted economic growth and asset prices which both improved superficial mark-to-market measures of balance sheet health and underpinned further increases in credit and demand.

One arithmetically obvious candidate as a driver of the increases in debt-to-GDP ratios can plead 'not guilty': The rise in debt-to-GDP ratios was not generally due to a fall in or weak growth of the denominator, i.e. a lack of (real) GDP growth. Real (and also nominal) GDP growth was generally positive in most countries in recent decades, and was often higher in the '95-'08 period than in the one or two decades prior to that – although, not surprisingly, lower than real and nominal GDP growth in the 'Golden Age' for the advanced economies between 1946 and 1973. Indeed, the countries with the highest rates of nominal or real GDP growth between 1995 and 2008 generally tended to have *larger* increases in (NFS gross) debt ratios and the relationship was pretty tight.

Likewise, rising asset prices in recent decades, and rising of real estate prices in particular, contributed to the credit boom. As asset prices continued to increase, many households and corporations interpreted these higher asset prices as sustainable. Even more extravagantly, particularly for housing, many extrapolated the growth in house prices into the indefinite future. Some of the debt was explicitly linked to asset price increases – mortgages got larger (in absolute terms or relative to income or GDP) as the price of houses increased. In other cases, the increase in asset values was leveraged by withdrawing equity from homes to finance consumption and other spending

Financial liberalization, i.e. the deregulation of financial markets both domestically and for cross-border transactions, spurred what was at the time often referred to as 'financial innovation' and 'financial engineering', but today is more often called 'financial excesses' and sometimes worse, including regulatory and tax arbitrage. Deregulation affected a number of areas, including the reduction of credit and interest rate controls, the reduction of entry barriers into the financial sector and of restrictions on cross-border capital account transactions, a lowering of prudential regulations and an easing of supervision in the banking sector and in securities markets. There were also many reductions in reserve requirements for financial institutions, and reductions in effective capital requirements through disintermediation out of more tightly regulated financial intermediaries, products and activities into more loosely regulated ones, like the shadow banking sector.

Macroeconomic factors also played a role, beside the effect that adaptive or extrapolative expectations likely implied that robust current economic growth and rising asset prices fed into higher expectations of future growth and further increases in asset prices. Real interest rates were low in many countries, as nominal interest rates fell by more than inflation. And the so-called 'Great Moderation' phase of low macroeconomic volatility (see Stock and Watson (2002), Bernanke (2004)) may also have contributed to an increase in credit demand and supply, as both debtors and creditors, supervisors, regulators and those in charge of financial legislation underestimated the degree of riskiness of economic activity, as actual volatility fell. In Europe, the introduction of the euro gave an additional boost, through reductions

in interest rates in many countries, rapid financial integration and rapid (if with hindsight unsustainable) economic growth in some of the countries. The fact that from the launch of the euro in 1999 till 2008, spreads over ten year Bunds of Irish, Portuguese, Spanish and Italian sovereign debt rarely rose above 25bps, and that the same extraordinarily low spread prevailed for the Greek 10-Y sovereign bond from 2001 till 2008 bears testimony to the wholesale loss of common sense in the markets, and the resulting massive underpricing of differences in EA sovereign risk (see Buiter and Sibert (2006)).

4. Why debt matters today

There are at least two specific and concrete reasons why debt matters in advanced economies today. The first is that excessive debt can cause systemic crises, and such systemic crises can have very large and potentially long-lasting effects on actual and potential output, unemployment, and capacity use. The second reason is that if debt is considered excessive, the process of bringing down debt can be long-lasting and painful, even if it does not create a financial crisis or even after the crisis phase has passed. Coordination problems in the process of debt reduction often substantially increase the private and social cost of debt reduction, as agents attempt to raise their saving rates in response to the excessive level of their debt without a matching increase in planned investment (capital expenditure) by either the agents planning to raise their saving rates or by other agents at home or abroad. This can give rise to Keynes's so-called 'paradox of thrift'.

4.1 What is deleveraging?

Language use is non-uniform when it comes to debt and deleveraging, something which can create confusion in a discussion of their significance. It pays to be precise.

The flow-of-funds account of a sector defines its financial surplus – the excess of its saving over its capital formation (capital expenditure or investment in real reproducible capital) as the value of its net acquisitions of financial assets minus the value of the additional net financial liabilities it incurs over some period of time. The change in a sector's net worth (net worth is also called financial wealth, capital or equity, although all these terms have multiple different meanings as well), is its saving plus the capital gains, (or minus the capital losses) on its existing assets and liabilities, real and financial.

Gross balance sheet contraction or **gross deleveraging** for short is a reduction in the size of the balance sheet (real and financial) without a change in net worth (i.e. net saving plus capital gains for the entity or sector in question is zero). Gross deleveraging can be the result of capital losses on real and financial assets and liabilities, which we shall describe as *passive* gross deleveraging, as well as *active* gross deleveraging, that is, a reduction in the size of the balance sheet through equal value reductions in stocks of assets and liabilities at given prices. Active gross deleveraging does not require any change in either the flow of saving or the flow of investment spending by any individual agent or sector. However, active gross deleveraging does require *coordination* of gross sales and purchases of assets or of gross lending and borrowing across agents and sectors. Either asset markets or some other mechanism must coordinate the planned transactions in each of the assets and liabilities and translate them into actual sales and purchases.

However, the problems associated with the 'paradox of thrift' discussed below need not strike if all that is required is passive or active gross deleveraging by one, several or all sectors in the economy. **Active gross financial balance sheet contraction** or *active gross financial deleveraging* is a reduction in the size of the financial balance sheet alone, that is, excluding the physical capital assets, but with the value of financial assets and liabilities shrinking by the same amount (at current prices). Capital gains are excluded.

Net wealth accumulation or net deleveraging by a sector means an increase in the net worth of that sector, either through saving or through capital gains. **Active net wealth accumulation or active net deleveraging** by a sector, which ignores capital gains or losses, is therefore just another name for positive saving by that sector. Although higher saving is good news from the point of view of the future growth of actual and potential output if a planned increase in saving is matched by an equal planned increase in investment, the paradox of thrift warns us about coordination failures between those who would raise their saving and those who would boost their investment. These coordination failures can result in short-run and medium term negative impacts on output and employment from a poorly

coordinated saving boost by one or more sectors. **Active net financial wealth accumulation** or active net financial deleveraging means running a financial surplus, that is, saving exceeding investment.

Note that the terms gross and net are not used to denote saving or investment inclusive of capital depreciation or excluding it. Gross debt is all liabilities. Net debt is liabilities minus assets.

4.2 Debt causes systemic crises

High debt held by some agents or institutions can make them vulnerable to shocks and unanticipated (by them) changes in their economic environments. It enhances the fragility of these agents and institutions. High indebtedness of many agents or institutions, especially if the economic-financial network is characterised by a high degree of complexity, can result in opacity of that network and in widespread ignorance (throughout the network and among supervisors and regulators) about the distribution of exposures and counterparty risk, risk chains and clusters across the network. This can create systemic fragility.

The high debt burdens in the DMs brought with them vulnerabilities that triggered systemic financial crises recently. The first was a (mainly) private sector financial crisis – especially in the banking and shadow banking sectors of the North-Atlantic region, that started in August 2007 and lasted until the end of 2009. The second crisis is the sovereign debt and banking sector crisis that erupted in the euro area (EA) at the beginning of 2010, and is still ongoing.

Both the North-Atlantic financial crisis and the EA sovereign debt and banking crises have impacted more severely on output and employment because in many DM national economies (the main exceptions have been Germany, Italy and Japan), the private sector too has become highly indebted.

A few simple scatter plots can illustrate the role that debt has played in recent poor economic performance. Figure 9 plots the difference between what the level of real GDP in 2011 would have been had real GDP continued to grow at its pre-recession (1997-2004) trend growth rate and actual GDP in 2011 (the ‘GDP loss’) against the change in the ratio of NFS gross debt to GDP between 2001 and 2007. The relationship between the recent growth performance and the extent of the prior buildup in NFS gross debt is strongly negative – for a 10ppts larger increase in the pre-crisis non-financial sector gross debt-to-GDP ratio, the GDP loss has been 2.2ppts higher, on average, in our sample of 30 industrial countries. The increase in debt alone can ‘explain’ – in a purely statistical sense – almost 40% of the variation in GDP performance relative to trend.

Figure 9. Selected Countries – GDP loss in 2011 (% vs trend) and Prior Increase in Debt

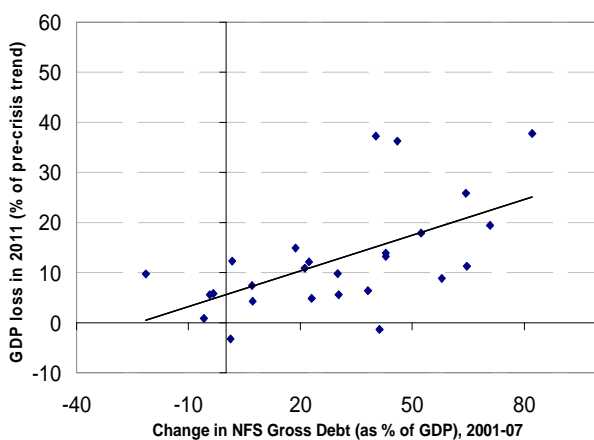
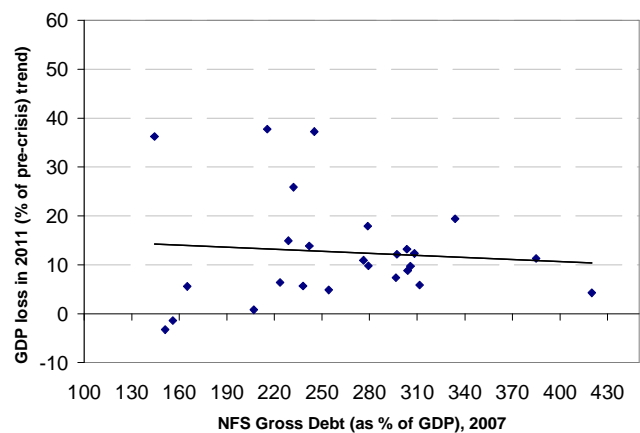


Figure 10. Selected Countries – GDP loss in 2011 (% vs trend) and 2007 Debt Levels



Note: GDP loss is the deviation of real GDP from its pre-recession trend. The pre-recession trend is calculated as the average growth in real GDP between 1997 and 2004. Source: OECD, World Bank, National Sources and Citi Research

Interestingly, there is very little evidence of a statistical relationship between the GDP loss and the *levels* of the gross debt to GDP ratio at the end of 2007 – the beginning of the North Atlantic financial crisis (Figure 100). Although we do not want to over-emphasise the significance of this simple (possibly simplistic) statistical exercise, to us the finding that changes in NFS gross debt ratios are significant in explaining the variation in cross-country experience suggests both that country-specific factors are very important (so cross-country comparisons of levels of debt cannot tell the whole story) and that some of the increase in the NFS gross debt ratios in the years of the Great Leveraging was excessive and is therefore likely to result in some mean reversion towards historical averages. The pre-crisis increase in debt ratios may also be a better guide to the extent of *desired* deleveraging than the realised debt reduction or the level of debt since the beginning of the crisis – as the process of deleveraging is nowhere complete and in many countries and sectors has not yet started. The reason is that, in an environment where there has been a widespread increase in the (precautionary) desire to save, the so-called ‘paradox of thrift’ can exert powerful effects and actual saving may well fall short of desired saving, a point we will discuss below in more detail.

Previous episodes of deleveraging after financial crises have also generally been associated with poorer economic performance.⁹ Figure 11 to Figure 15 depict the behavior of several macroeconomic variables (relative to their pre-crisis trend) in response to financial crises that were associated with deleveraging in 86 countries between 1960 and 2006.¹⁰ There were 18 episodes of financial crisis associated with deleveraging in our sample, starting with Chile in 1981 and ending with the Dominican Republic in 2003.¹¹

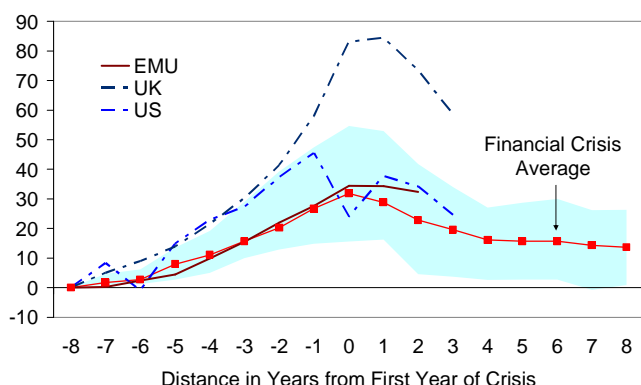
On average in this sample of episodes, the stock of private sector credit as a share of GDP grew by 30ppts in the eight years preceding the financial crisis and fell by around 15-20ppts over the following eight years (Figure 11). The effect of financial crises on real GDP was fairly dramatic: GDP fell by around 10ppts relative to the pre-crisis trend, on average, in the first two years and made up very little ground in subsequent years. Compared to this historical average of financial crises, the GDP performance of the US, the UK and the euro area to date have actually been broadly similar, with the UK underperforming the historical average of our 18 episodes moderately. The increase in private sector credit in the UK prior to the financial crisis much exceeded those in the US or euro area, and also that of the average in the 18 countries in our past financial crises sample, which may partly account for the UK’s sub-par economic performance since 2007.

⁹ See also Michael Saunders (2011), “What’s the Damage? Debt and Growth in Deleveraging”, [Global Economic Outlook and Strategy - Prospects For Economies And Financial Markets In 2012 And Beyond](#), “What’s the Damage? Medium-Term Output Dynamics after Financial Crisis”, IMF World Economic Outlook, September 2009. See also Cecchetti et al (2012).

¹⁰ Episodes of deleveraging are identified, following McKinsey (2010), as episodes where the ratio of gross NFS debt to GDP has fallen for at least three years and by at least 10ppts of GDP, or where the stock of nominal debt declined by 10ppts or more. Unlike in other parts of this study, NFS debt is defined as the sum of private sector credit and public sector debt (both provided by the IMF), due to data availability for this longer sample period. Financial crises are taken from Laeven and Valencia (2008) and episodes of financial crises-cum-deleveraging are the interface of the two lists. The exercise provided a total of 31 deleveraging episodes, of which 18 were preceded by a financial crisis. These 18 episodes were: Argentina (2001), Bolivia (1994), Chile (1981), Dominican Rep (2003), Ecuador (1998), Finland (1991), Indonesia (1997), Japan (1997), Korea (1997), Malaysia (1997), Mexico (1994), Nicaragua (2000), Norway (1991), Paraguay (1995), Philippines (1997), Sweden (1991), Thailand (1997), and Uruguay (2002). Please see the appendix for further details.

¹¹ Our filter rules out ongoing and very recent deleveraging episodes by construction. Our filter also excludes transition economies during the period of the transition (e.g. Russian and Ukraine) because the output developments in these economies were strongly related to the shift away from central planning rather than to financial crises per se.

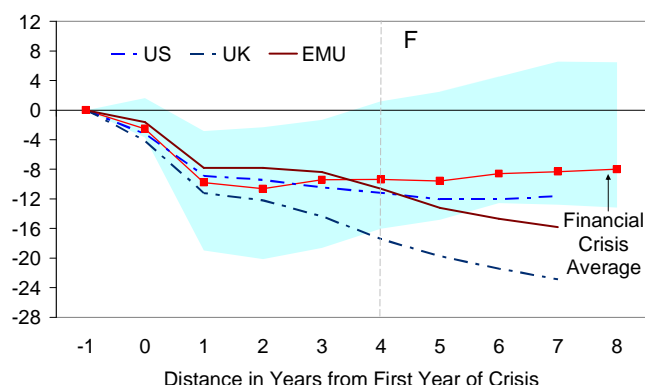
Figure 11. Selected Countries – Change in Domestic Credit to the Private Sector (% of GDP), 2007-11



Note: Accumulated change in domestic credit to the private sector from T-8 to T+8, where T is the beginning of the banking crisis. For the US, the crisis is dated (T=0) in 2007, for the UK in 2008 and for the EA in 2009. The shaded area covers the interquartile range of previous episodes, which indicates the middle 50 percent of all crises.

Source: IMF and Citi Research

Figure 12. Selected Countries – Real GDP Versus Pre-Crisis Trend, 2007-16F



Note: The shaded area corresponds to the interquartile range of previous episodes, which indicates the middle 50 percent of all crises. From T+4 (2012), real GDP corresponds to Citi Research forecasts.

Source: IMF, World Bank, BEA, Eurostat and Citi Research

As Figure 13 and Figure 14 show, both private consumption and investment fall sharply in the aftermath of financial crises with deleveraging. The fall in consumption is similar to the fall in GDP, but the fall in investment is more than three times as large – an example of the investment accelerator at work. Net exports on the other hand add substantially to GDP growth, but the contribution is almost entirely due to import compression, while exports were on average flat in these episodes. This suggests that the gains in external competitiveness and real exchange rate depreciations experienced by many of the countries in the sample (those that had a floating exchange rate, devalued a currency peg or abandoned a currency board) following their financial crises, boosted the trade balance in much the same way as fiscal austerity would at a constant real exchange rate: by depressing demand and lowering living standards. The improvement in external competitiveness was often associated with a worsening in the terms of trade that acted like a tax by lowering household real income (measured in terms of the consumption bundle).

Figure 13. Selected Countries – Real Private Consumption vs Pre-Crisis Trend, 2007-11

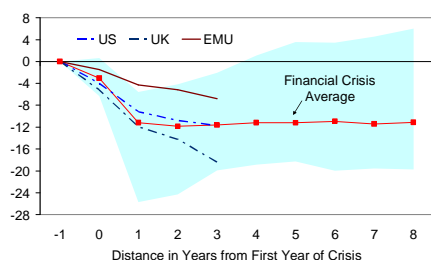


Figure 14. Selected Countries – Real Investment vs Pre-Crisis Trend, 2007-11

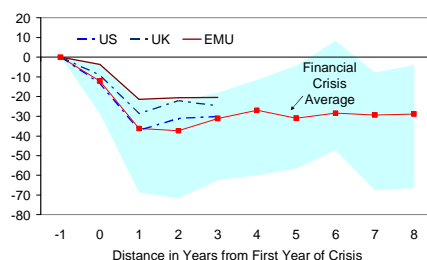
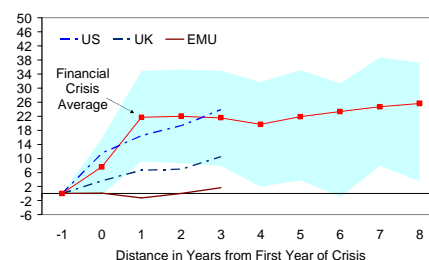


Figure 15. Selected Countries – Real Net Exports vs Pre-Crisis Trend, 2007-11



Note: The shaded area corresponds to the interquartile range of previous episodes, which indicates the middle 50 percent of all crises.

Source: IMF, World Bank, BEA, Eurostat and Citi Research

Excessive debt not only creates the vulnerabilities that lead to financial crises. It also increases the cost of financial crises, as Figure 16 and Figure 17 show. In these figures we divide the sample into two groups, depending on the increase in debt prior to the financial crisis during the four years before the crisis.¹² The average increase in the debt-to-GDP ratio was 18ppts of GDP for the group with the larger debt increases, while this debt ratio actually fell by 3.5ppts in the other group, on average, in the 4 years before the financial crisis.¹³ As we can see in Figure 16, the fall in GDP for the larger-debt increase

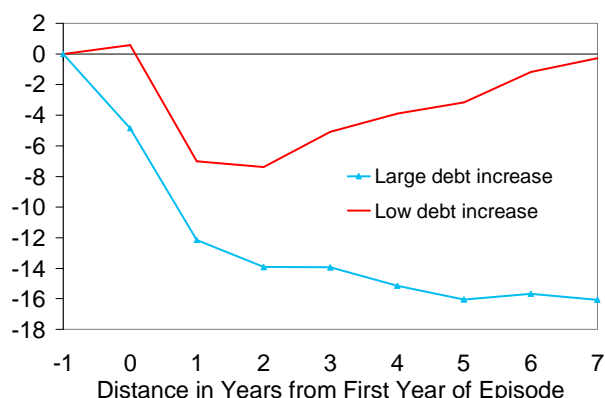
¹² We define a 'large' increase in debt as an increase above the median of all episodes over the three years leading up to the crisis (between T-4 to T-1), as in IMF (2012).

¹³ The cutoff increase in NFS debt was 8.8ppts of GDP.

group was almost twice what it was in the other group two years after the crisis. Even worse, it continued to fall relative to the trend, while the 'smaller debt increase' group crept back to trend. The fall in private sector debt post-crisis on the other hand was much steeper for the large debt increase group, while private sector credit fell modestly. The falls in investment and consumption were larger and more persistent, and so were the increases in saving rates for the countries where debt had risen more ahead of the financial crisis.

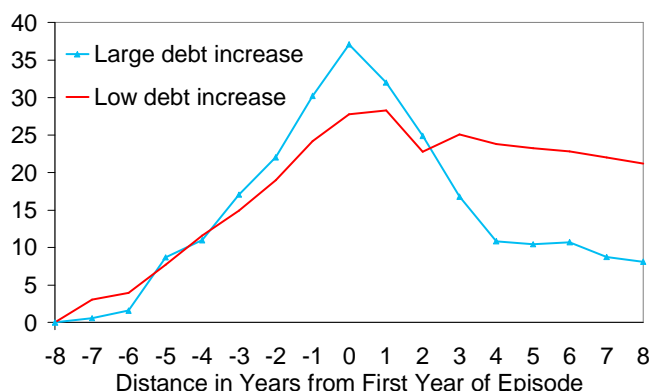
For the many countries that had large increases in private debt up until the North Atlantic financial crisis, the outlook may therefore be even gloomier than the average experience depicted in Figure 17 would suggest. Out of the 30 countries in our sample, all but 6 (Germany, Netherlands, Canada, Japan, Slovakia and Czech Republic) had increases in NFS gross debt in the three years leading up to the crisis that would have put them into the 'larger debt increase' group of the financial crisis sample.

Figure 16. Real GDP Versus Pre-Crisis Trend After Banking Crises, 1980-2011 **Figure 17. Change in Domestic Credit to the Private Sector (% of GDP) after Banking Crises, 1980-2011**



Note: "Large debt increase" group includes countries with above-median increases in gross debt in the three years leading up to the crisis.

Source: IMF, World Bank, and Citi Research



Note: "Large debt increase" group includes countries with above-median increases in gross debt in the three years leading up to the crisis.

Source: IMF, and Citi Research

4.3 Even 'orderly' deleveraging is likely to be costly - coordination failures and the 'paradox of thrift'

Systemic crises are particularly painful, as they often combine impairments to credit availability with an additional desire to increase saving. But debt reduction can impose heavy costs even outside episodes that feature a weak banking system and widespread restrictions on credit availability.

Increased planned saving implies lower spending on goods and services, and lower net income from the production of these goods and services for somebody unless that shortfall in demand is somehow replaced by increased spending elsewhere. However, the main reason that heavy economic, social and human costs are often associated with deleveraging by the public and private sectors is the fundamental coordination problem faced by decentralised capitalist market economies with large financial sectors and significant financial intermediation. This coordination problem can arise from an increased desire to save, no matter whether this was driven by liquidity or solvency concerns. This coordination problem has preoccupied macroeconomists since Keynes, and probably before Keynes also.

In a closed system (like the world economy) it has to be the case that system-wide aggregate saving has to equal system-wide aggregate investment. Even though this relationship holds identically *ex-post*, that is, for realized saving and investment flows and for actual purchases and sales of financial instruments, it need not hold *ex-ante*, for planned investment and saving and for planned financial asset accumulation and decumulation. It can therefore be viewed, *ex-ante*, as a coordination constraint. Failure for it to hold *ex-ante* can result in the revenge of the 'paradox of thrift'.

Unlike in a subsistence peasant economy, where a decision to save (that is, a decision to abstain from consumption of current goods and services), constitutes *ipso facto* an identical decision to invest (to add to the stock of real reproducible capital – by adding the grain that is not consumed to the stock of grain to be used in sowing for the next harvest), in a decentralised financially developed economy,

households save (abstain from consumption) but invest very little in the form of capital expenditure. Instead household saving flows into a range of financial instruments. Likewise, firms do most of the capital expenditure, but when they cut their investment, they don't raise corporate consumption demand by the same amount. Instead they either retain profits or distribute their disposable income to households and other beneficial owners. This physical, institutional and legal separation of the saving and investment decisions places a big coordination burden on the financial markets linking households and NFCs, and, in a more complex world, households, NFCs, financial institutions, the government and the rest of the world. Much of the time, financial markets do a reasonable job of performing the task of balancing saving and investment at levels of employment close to full employment. But as the years since 2007 remind us, there can be spectacular (financial) market failures, sometimes aided and abetted by labour market failures and by policy failures.

In the Keynesian textbook model, the *paradox of thrift* described a situation where a planned increase in saving by households (that is, a planned or *ex-ante* reduction in household consumption demand at a given level of household disposable income) weakens output and employment to the point that actual, realized or *ex-post* saving instead of rising as planned, rises less, stays constant or even falls because lower consumption demand lowers production and thus household disposable income. We can see variants of these destructive feedback loops at work throughout the periphery of the euro area, in the UK and in core EA countries like the Netherlands, where the realization in 2011 by households that they had excessive gross (mortgage debt) and illiquid assets that were falling in value contributed to a major slowdown in private consumption demand and a recession.

It is key to recognise that the 'paradox of thrift' is not restricted to the consequences of fiscal austerity implemented by governments that are trying to reduce their debt burdens or deficits. It applies to the adverse feedback loops created by any economic agent, or sector, whose individually rational defensive actions when faced with an unsustainable debt and deficit configuration (or with any other reason for boosting his individual saving) creates negative income or demand externalities for other agents in the economy by cutting his consumption and thus the effective demand for output and actual output – externalities that are not effectively captured by the price signals, quantity signals or other information conveyed by these actions. Indeed, the original paradox of thrift does not involve fiscal austerity at all. Instead, it analysed the consequences of a 'spontaneous' decision by the private sector to raise the household saving rate.

Financial markets and financial asset prices and yields are supposed to coordinate the spending and saving plans of producers, consumers and other economic agents. Unfortunately, they do so least effectively when it is most needed. Allocation over time and the pooling, sharing, pricing and trading of risk are the areas of economics where both markets and governments are weakest. The incompleteness of markets (due to private and asymmetric information and costly contract enforcement, poor governance of private and public enterprises, the inability of governments to commit their successors and indeed often even themselves for any length of time, a pervasive lack of trust in people and institutions and a scarcity of all key ingredients of social capital) is a major obstacle to the efficient allocation of resources over time and across states of nature.

5. How to reduce debt over time? - mostly for sovereigns, but with lessons for other sectors

To guide our discussion of the various ways to bring down sovereign debt (or indeed the debt of any economic agent), an accounting identity is useful:¹⁴

$$\begin{aligned}\Delta d &= (r - g)d - s \\ &= (i - \pi - g)d - s\end{aligned}\tag{1}$$

Here d is the net debt-to-GDP ratio, i is the one-period (strictly the instantaneous) nominal interest rate, g is the growth rate of real GDP, r is the ex-post (actual or realized) one-period real interest rate, π is the actual rate of inflation and s is the primary (non-interest) surplus as a share of GDP. To get from the first

¹⁴ The identities hold only in continuous time. For discrete periods, slightly messier expressions exist.

identity in equation (1) to the second, we use the fact that the ex-post real interest rate equals the nominal interest rate minus the actual rate of inflation ($r = i - \pi$). Equation (1) says that the change in the net debt-to-GDP ratio is given by the primary surplus (as % of GDP) and a 'snowball' factor that depends on the difference between the real interest rate and the growth rate of real GDP.

Now let \tilde{r} be the *ex-ante* or expected real interest rate. The nominal interest rate equals the ex-ante real interest rate plus the expected rate of inflation, π^e , that is, $i = \tilde{r} + \pi^e$. It follows that:

$$\Delta d \equiv (\tilde{r} + \pi^e - \pi - g)d - s \quad (2)$$

From equations (1) and (2) we can see that there are five distinct ways to deleverage (strictly to engage in net deleveraging), that is, to reduce d . When we list these five modalities, we are strictly keeping all else constant, even if this may make no sense in practice because there are other economic relationships linking the variables in equations (1) and (2). The five ways to deleverage are:

- I. **Practice fiscal austerity** (increase s by increasing the numerator of s , tax revenues minus non-interest public spending in the case of the public sector).

This approach – fiscal pain through cuts in public spending or tax increases – is painful and unpopular. This is partly because, even holding constant the level of economic activity (GDP and employment), public spending cuts deprive the beneficiaries of public spending of some of the benefits they receive, whether in cash or in kind, and because tax increases reduce disposable income or wealth. In addition, since the real world is Keynesian, at least in the short run, fiscal tightening almost always depresses economic activity. The expansionary contractionary fiscal policy paradigm of Giavazzi and Pagano (1996) and Alesina and Ardagna (2010) is a theoretical curiosity. The announcement effects, today, of a credible commitment to future fiscal austerity may be expansionary (because it lowers long-term interest rates), but when the pre-announced fiscal tightening occurs, it will almost surely depress aggregate demand and economic activity. There is also no empirical evidence of a Keynesian 'Laffer curve' where tax increases or cuts in public spending reduce economic activity to such an extent that the tax base shrinks to the point that the deficit increases despite the fiscal tightening (see Cottarelli and Jaramillo(2012)), although excessive and misdirected fiscal zeal can do lasting damage to potential output, by depressing capital formation and through hysteresis in the unemployment rate.

- II. **Reduce the effective nominal interest rate on the public debt, i .**

This can be done (a) by influencing the market equilibrium interest rate (say through QE or other large-scale asset purchases of sovereign debt or private debt), (b) by ensuring the funding of the sovereign by the private sector (typically in the primary markets) at a cost below the market equilibrium interest rate, that is, through financial repression, or (c) by getting access to sovereign funding at below-market interest rates from external official entities, as Greece, Portugal and Ireland do through their access to the concessional and conditional funding of the IMF, the Greek Loan Facility, the EFSF and soon also the ESM. Holding constant the actual inflation rate, π , this is equivalent to lowering the ex-post real interest rate, r . In the post-World War II sovereign debt deleveraging in the US and the UK, as well as in many other countries, this has been an important mechanism for deleveraging (see Sheets (2012, 2011)). Reinhart and Sbrana (2011) found that between 1945 and 1980 financial repression, working through a reduction in the real rate of interest on public debt, was a major contributor to the reduction in public debt seen in many countries.

- III. **Pursue policies that raise the actual rate of inflation, π .**

From equation (1), this will work provided these policies don't raise the nominal interest rate, i , don't lower the growth rate of real GDP, g , and don't raise the primary deficit, $-s$ too much. The most obvious problem is raising inflation without raising the nominal interest rate. Consider equation (2). If the equilibrium or ex-ante real interest rate \tilde{r} is not affected by the inflation-raising policy (this is sometimes referred to as the Fisher hypothesis), then higher actual inflation lowers the debt to GDP ratio only if and to the extent to which it is unanticipated (if π rises by more than π^e). If anticipated inflation rises as much as actual inflation, the nominal interest rate will rise one-for-one with the

expected and actual inflation rate and there is no deleveraging. Financial repression can come to the rescue here too, of course. If the authorities stop the nominal interest rate on the public debt from rising with expected inflation, there is a de-facto reduction in the ex-ante real interest rate \tilde{r} and deleveraging will occur regardless of whether the inflation is anticipated or not.

Unanticipated inflation (or anticipated inflation combined with financial repression that keeps nominal yields from rising in line with anticipated inflation) can always be used to inflate away the real burden of servicing a given outstanding stock of (public) debt that is denominated in domestic currency (but not of course, inflation-linked debt or foreign-currency-denominated debt).

Temporary inflation can solve a fiscal unsustainability problem when the proximate cause of the fiscal unsustainability is a very large stock of debt and when the real value of the flow (primary) deficit does not present a material problem. Italy fits that category. If the general government debt burden is more modest but the (primary) general government deficit is large – which was the situation in Ireland and Spain in early 2008 before bad private assets began their migration to the public sector balance sheet – a short sharp burst of inflation cannot solve the fiscal unsustainability problem by itself. If both the public debt burden and the public sector primary deficit are large in real terms and as a share of GDP, as is the case in the US and in Japan, inflation can only provide relief on the stock component of the fiscal unsustainability conundrum. The bulk of the real flow primary deficit will have to be eliminated some other way.

IV. Raise the growth rate of real GDP, g .

This, of course, is everyone's favourite deleveraging option because it is effectively painless, especially if it means raising output by reducing economic slack and involuntarily idleness of resources rather than by raising potential output along with actual output, which will in general require sacrificing valued leisure and/or private or public consumption to boost capital expenditure. Raising the level and/or growth rate of real GDP increases the real resources available for public debt service without the need for fiscal austerity – cuts in public spending or tax increases. Some of the writings of the 'growth instead of austerity' school make it look as though the governments of the EA member states, the UK and other countries engaged in fiscal austerity either don't recognize that fiscal austerity hurts output and employment in the short and medium run or somehow forgot to push the 'growth button'. The problem with this view is that unlike fiscal austerity, which is a policy (or rather a set of two broad categories of policies: public spending cuts and tax increases), growth is not a policy. Growth is an outcome that a country enjoys if it has (1) the right policies, (2), the right institutions and culture, (3) the right initial conditions, (4) the right external environment, (5) a bit of luck and (6) affordable funding for the sovereign and other systemically important institutions.

V. Write down the debt or mutualise it.

The final deleveraging option is default (restructuring) or mutualisation – effectively making the debt (or part of it) jointly and severally guaranteed by a wider community.

Debt default or debt restructuring takes two canonical forms from an economic perspective. The first is equitisation: part or all of the debt is turned into equity. This option is rarely applied even in part to sovereign debt, although it is common in the financial sector and the corporate non-financial sector. The second is a write-down. Repudiation is a 100% write down. From an economic perspective, what matters is the net present discounted value (NPV) of a write-down relative to the value of servicing the debt in full according to the letter of the debt contract. Whether the restructuring is voluntary or coercive and the details of the restructuring (maturity extension, lower interest payments, write down of face value or notional value of the debt) is of interest to lawyers, credit rating agencies, the ISDA Determinations Committees and politicians who don't understand the difference between face value and NPV and/or hope that their voters don't understand the difference either, but is of secondary economic significance.

6. When is Deleveraging Most Harmful?

The most damaging forms of deleveraging, from the point of view of their short-to-medium run impact on aggregate demand, output and employment, as well as possible long-run or even permanent effects on

potential output, occur when the *ex-ante* desire to increase saving rises sharply and when the coordination of decisions on saving, investment and on sales and purchases of financial instruments are poorly coordinated by markets and governments. These circumstances generally are more likely to arise,

- **if the state is among the sectors that need to deleverage.** As discussed before, the government is often tasked with stabilizing the economy when the non-financial private sector deleverages. If, however, the government is preoccupied with its own debt burden, it is often constrained in its ability to support the private economy. It is also less effective as a focal point for coordinating private sector decisions. Furthermore, as noted earlier, the state is also usually the ultimate source of financial support for the banking sector. Weak banking sectors can exacerbate the harm done by NFS or government deleveraging. Finally, debt restructuring for sovereigns, while far from rare in a historical context, is often done inefficiently, as timely and orderly debt restructuring is often impeded by the lack of clear (contractual and/or statutory) procedures and by partisan political considerations;
- **if the banking sector is in poor shape.** Weak banking sectors strengthen precautionary saving motives of households and non-financial corporates, and often lead to liquidity hoarding behaviour by banks themselves. What is more, as discussed above, the risks of disorderly and contagious bank deleveraging and bank runs (encouraged by the 'sequential service constraint' on bank deposits when it is feared available reserves are insufficient to meet likely deposit withdrawals) are larger than for other sectors, not only owing to the banking sector's higher leverage, but also because of the lack of clear and efficient procedures for bank debt restructuring in many countries – even though both excessive banking sector leverage and a lack of orderly resolution regimes for banks could be solved through collective action;
- **if more/larger sectors are attempting to deleverage at the same time.** Coordination becomes more complex and finding a sector that is willing to reduce its financial surplus, while others are attempting to raise theirs, more difficult;
- **if the objective is to increase net wealth/reduce net debt** rather than to bring down gross balance sheet size or levels of debt, i.e. if there is a desire to increase active net financial deleveraging (a larger planned sectoral financial surplus) or to increase active net deleveraging (a higher planned sectoral saving rate). The capital adequacy ratio of an agent/sector can be raised and its leverage ratio reduced without this requiring either active net deleveraging ('saving') or active net financial deleveraging: the agent or sector does not have to raise its saving or reduce its investment. All that is required is that assets and liabilities be reduced by the same amount. This is true even if there are no capital gains or losses. The coordination problem is not eliminated – distressed asset sales to pay off maturing debt can set in motion damaging feedback loops between lack of market liquidity and lack of funding liquidity – but is in principle simpler than when saving and investment decisions have to be coordinated as well.

7. How much deleveraging has taken place?

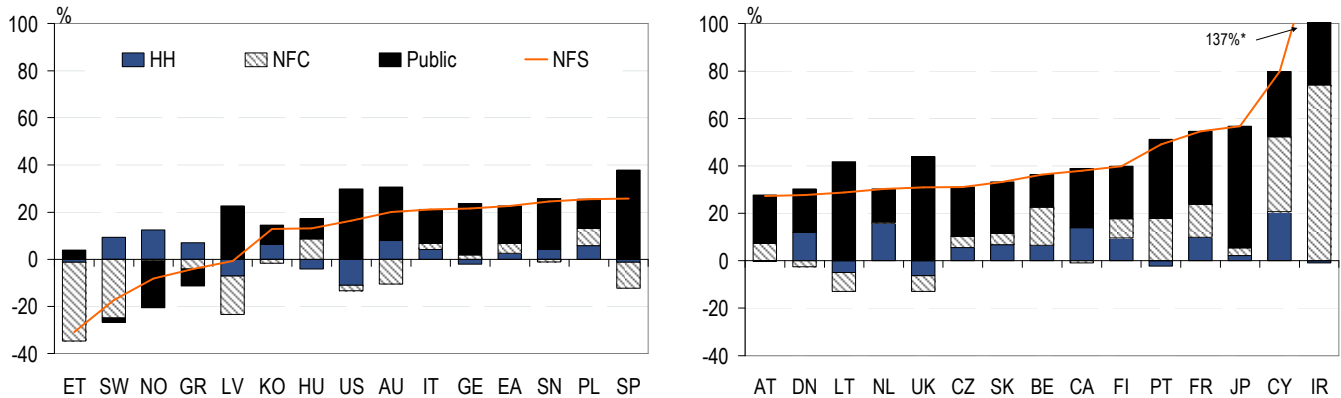
The leverage party has mostly stopped. Growth in debt and credit have fallen in most developed markets, sometimes precipitously. In the period 1995-2006, gross non-financial sector debt grew by 9.3%pa in nominal terms, on average, but nominal NFS debt growth fell to 3.8%pa between 2008 and Q2 2012.¹⁵ The fall in real credit growth is somewhat smaller on average than the drop in nominal credit growth rates, as inflation rates have also fallen in many countries recently (relative to pre-2006 growth rates), but real credit growth still fell in the post-2008 period relative to the pre-crisis trend in all but 4 countries in the sample (Belgium, Canada, Czech Republic and Japan). With very few (and small) exceptions, the most recent data do not indicate any pickup in the rate of NFS credit growth

The pace of deleveraging, in what follows mostly measured by the change in the stock of debt relative to GDP, has been very uneven across countries in recent years. Substantial deleveraging has taken place in some countries and sectors. Ten countries (Italy, Poland, Netherlands, Czech Republic, Slovakia, Belgium, Finland, France, Japan and Cyprus) have not seen any decrease at all in the NFS gross debt

¹⁵ In both cases these values are GDP-weighted growth rates in local currency.

to GDP ratio by Q2 2012. In many countries, gross debt as a share of GDP has increased further since 2008, mostly through increases in the public debt ratio, while the private debt ratio has fallen more often (Figure 18). Thus, in 14 out of 28 countries the latest data indicate a reduction in gross debt-to-GDP ratios of NFCs relative to 2008 and in 11 countries for HHs, while only three countries had decreases in public debt – one of which is Greece as a result of its debt restructuring. Public debt ratios peaked only very recently in some countries and were in fact still rising in almost half of our sample (in 13 out of 28 countries).

Figure 18. Selected Countries – NFS gross debt/GDP ratio, Change 2008 – 2012Q2 (% of GDP)



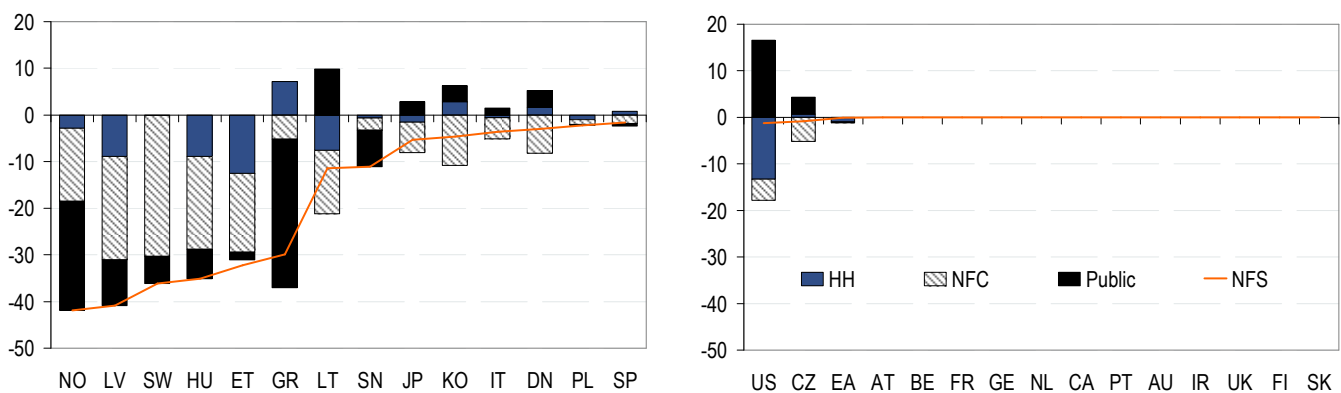
Note: Total non-financial sector gross debt equals the sum of households (HH), non-financial corporations (NFC) and general government (public) gross debt. All values are expressed on a non-consolidated basis except for Australia and Portugal. For Italy, the Netherlands, and Ireland latest data correspond to 2012Q1, while for the EA and Cyprus correspond to 2011* In Ireland, HH gross debt to GDP ratio declined by 1pts, NFC debt/GDP increased by 74pts, while GG gross debt/GDP increased by 64pts.

Source: OECD, Eurostat, National Sources and Citi Research

However, the most recent data suggest that private debt ratios at least have peaked in most countries – in all but two (Belgium and Portugal) for NFCs, and in all but four (Belgium, Canada, Slovakia and Czech Republic) for households, even though in many cases the peaks were very recent. Across countries, gross deleveraging in recent years seems to have been a ‘Nordic’ phenomenon. In the Baltic and Scandinavian countries gross debt ratios have fallen strongly from their respective recent (post-2006) peaks (Figure 19

). In many other countries, including the UK, Ireland, Portugal or France, NFS gross debt ratios have not fallen at all. In some countries, including the US and Spain, the aggregate amount of deleveraging has been rather small, but as noted, more substantial private sector deleveraging has been met with increases in public debt.

Figure 19. Selected Countries – Non-Financial Sector gross debt/GDP ratio, peak – 2012Q2



Note: Peak corresponds to maximum since 2006 for NFS gross debt. All values are expressed on a non-consolidated basis except for Australia and Portugal. For Italy, the Netherlands, and Ireland latest data correspond to 2012Q1, while for the EA and Cyprus correspond to 2011

Source: OECD, Eurostat, National Sources and Citi Research

Where it occurred, deleveraging seems to have been driven by differential economic growth or default rather than variations in credit growth, i.e. the countries with the largest debt reductions were not generally the ones with the largest reductions in (nominal or real) credit growth. As noted above, nominal and real credit growth has fallen quite substantially in many countries, and particularly so in highly leveraged economies. Growth rates in debt-to-GDP ratios have also fallen quite substantially. But the fact that real and nominal GDP growth have been very weak in recent years has made the job of deleveraging much harder – the average yearly rate of nominal GDP growth between 2008 and 2011 was a whopping 5.5ppts lower than for 2000-08, while nominal debt growth fell by 4.7ppts.

8. How much more deleveraging is to come?

Likely and desirable levels of sectoral debt are likely to be lower than prior to 2007. Economic theory, however, provides little guidance on optimal levels of debt and leverage. In the absence of fundamentally-based criteria for debt sustainability, focal points can be useful benchmarks:

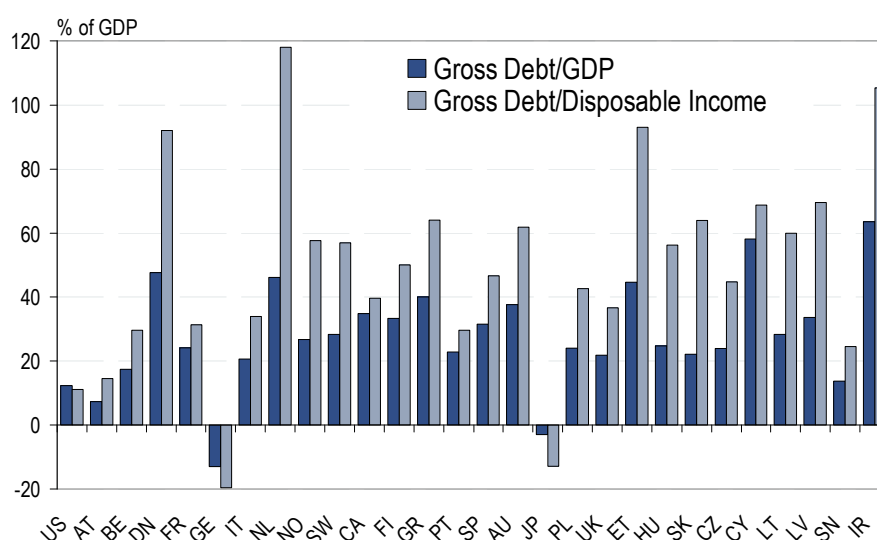
- For public debt, the Maastricht Treaty of the EU provides one such focal point with a threshold of 60% for general government gross debt-to-GDP ratios
- Cecchetti et al (2011) find that on average debt is associated with lower GDP growth when gross debt-to-GDP ratios exceed 85% for the public sector (close to the Reinhart and Rogoff (2009) threshold of 90% of GDP), 90% for the non-financial corporate sector and 85% of GDP for HHs (even though the threshold was not statistically significant in the case of HHs).

Debt levels experienced during a period for which there is general agreement that financial excesses were absent may also provide useful benchmarks.

8.1 Households are likely to require plenty of additional deleveraging

Figure 20 highlights the difference between HH gross debt levels (relative to GDP and disposable income) today and in 2001. On (an unweighted) average, HHs would need to reduce their gross debt by around 30ppts of GDP to get back to 2001 levels, not a small order given that debt only fell by around 1.5ppts of GDP on average in the two and a half years since the end of 2009. While the magnitudes differ, the picture painted by ratios of HH gross debt relative to HH disposable income is very similar.

Figure 20. Selected Countries – HH Change in Gross Indebtedness required to return to 2001 levels



Note: HH refers to households. Values correspond to the difference between HH gross debt divided by GDP or disposable income at the latest available date and in 2001.

Source: OECD, Eurostat, National Sources, and Citi Research

If we distinguish the countries in our sample according to the pressures for households to deleverage, we observe the following regularities.

First, there are countries with unambiguously large and likely long-lived deleveraging pressures for HHs. This group includes countries that have had very large increases in gross debt over the past decade, substantial increases in most measures of net debt and recent (or likely future) substantial reductions in net worth (financial and non-financial). Levels of gross and net debt are also often relatively high in these countries, and the degree of deleveraging achieved in recent years has been modest. Among the countries in this group are Cyprus, Greece, Ireland, Spain, and Portugal, where HH gross debt relative to GDP are 58ppts of GDP, 40ppts, 63ppts, 32ppts and 23ppts, respectively, higher than in 2001 and where house prices have fallen in recent years (generally leading to falls in HH net worth, including non-financial assets where data are available), even though in Portugal by rather little to date.¹⁶ The latest available data indicate that HH nominal gross debt is falling at an annual rate of around 2.5% in Spain, 4-4.5% in Portugal and Ireland, and 7% in Greece but is still increasing in Cyprus. Assuming that deleveraging continues at this pace, bringing gross debt back to their 2001 levels would under our assumptions for nominal GDP growth take around or above another decade in these five countries.¹⁷

Second, there are countries with more moderate, but still deleveraging pressures, at least in the medium-term. This group includes countries with relatively large increases in HH gross debt (and usually high levels of gross debt) but where HH net worth (often reflecting a combination of financial and non-financial wealth) has remained relatively robust. This group of countries includes Australia, Canada, Denmark, Korea, Norway, Sweden, the Netherlands, and the UK. In our view, the large increases (and often high levels) of gross indebtedness and the fact that house prices are often high in these countries suggests that at least some gross deleveraging will likely be necessary in coming years in these countries. In some, such as Denmark, house prices have already fallen substantially, which has led to some pressures to reduce debt. In most other countries (except the UK), deleveraging has not yet started in earnest.

The group of countries with moderate deleveraging pressures on HHs also includes countries such as Belgium, France (where increases in gross debt have been sizable but smaller, and where HH net worth has also held up) and Italy (where HH gross debt is low, but has also risen quite a bit in the past decade, and where HH net worth has suffered) – where deleveraging has also not yet started. This group also includes the US (where HH deleveraging has gone quite a long way, but HH net worth has fallen), and a number of Eastern European countries (where HH debt and house prices have fallen after sizable prior increases, but where levels of debt remain low).

In the group of countries with moderate deleveraging pressures the time horizon over which the deleveraging will play out is difficult to pin down – precisely, because there is no significant deleveraging process in place by now, with some exceptions

Third, there is a small and select circle of countries with very modest increases in HH gross debt and no need for net deleveraging, either. This select circle includes Austria, Germany and Japan, and maybe Switzerland. Germany and Japan are in fact the only countries among the 30 countries in our sample, where gross debt-to-GDP ratios for HHs at the latest available date (usually Q2 2012) were below those in 2001.

8.2 Non-financial corporations

For non-financial corporations, gross debt is on average (unweighted) 26ppts of GDP higher than it was in 2001, but with greater differences between the countries – in Ireland, gross debt levels of NFCs are 165ppts of GDP higher! In a number of countries, NFC gross debt has fallen relative to GDP since 2001 (in at least 5 countries: the Netherlands, Sweden, Japan, Poland, and the Czech Republic). Accounting

¹⁶ Generally, in countries with very long housing booms, even after recent falls in house prices, house price levels are still up from the levels of the later '90s or early '00s, with the level of non-financial asset holdings up by more still, as supply has increased.

¹⁷ Our assumption for nominal GDP growth is based on the average Citi forecasts (IMF for Cyprus) for 2012-2016 for real GDP and CPI inflation. Under these assumptions, returning HH gross debt-to-GDP to its 2001 levels would take 6 years in Portugal, 7 years in Greece, 11 years in Ireland and 13 years in Spain. These assumptions would not suggest any deleveraging in Cyprus but assuming that HH gross debt-to-GDP falls by 3ppts/year, it would take 16 years there.

for currency and deposit accumulation leaves the picture broadly unchanged, but considering narrower measures of net debt (i.e. netting out broader sets of assets) suggest lower increases in indebtedness.

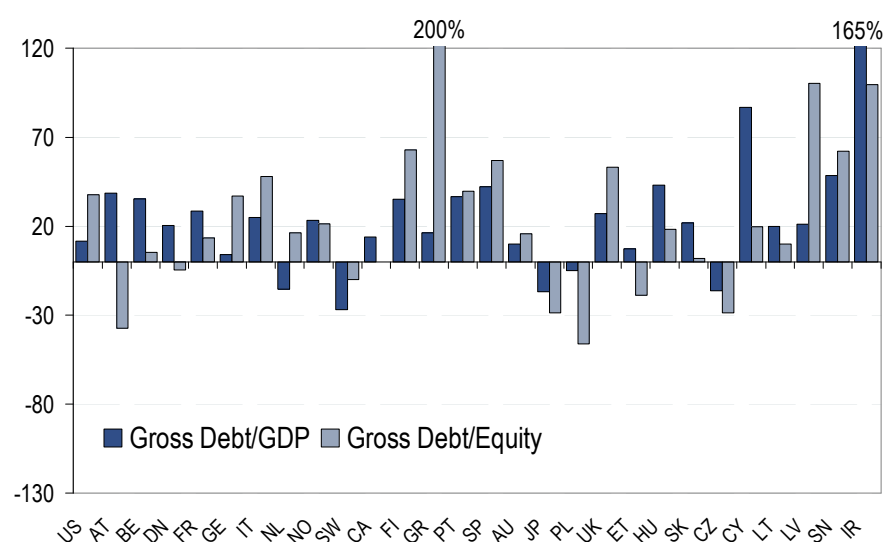
Generally, the list of countries where prior debt increases (and therefore future deleveraging needs) were high is rather similar to that for HHS: Gross NFC debt increased strongly in Cyprus, Ireland, Portugal, and, Spain, but also in Belgium and the UK and a number of countries in Emerging Europe. In few of these countries have levels of gross debt to GDP come down substantially from the peak. However, even in these countries NFC financial net worth is often still substantially higher than it was in 2001, including in Portugal, Spain, and Ireland. This truly highlights the roles of gross debt and access to liquidity in creating acute deleveraging pressures.

In Greece, the levels of gross debt and broad measures of net debt are low in the cross-country comparison, and the increases have been below the cross-country average. But equity has fallen even more steeply, so that debt-to-equity ratios have seen among the largest rises in our sample (Figure 21). In the US, NFC gross debt-to-GDP ratios have recently come down and have registered below average increases in the previous decade.

However, we consider the argument that DM corporates generally have a strong balance sheet position to be overplayed. First, Figure 21 highlights that debt to equity ratios, while very volatile, have risen, not fallen, in many countries since 2001. Second, corporate profit margins are high and are unlikely to rise further in many countries, and could well fall over time, putting pressure on measures of corporate leverage that are based on earnings or profits. Third, in an environment where public sectors are under pressure to consolidate finances, cash-rich corporate balance sheets may offer an opportune source of revenue for fiscal consolidation. A number of countries, including Spain and France, have already raised corporate taxes in recent years against a year-long trend of falling corporate tax rates. Of course, the opposite holds in the few countries that currently have lots of fiscal space – Sweden just decided to lower its corporate tax rate to stimulate a slowing economy.

Taking the Cecchetti et al-suggested value of 88% of GDP as a benchmark, many countries (23) could raise potential GDP growth by achieving a lower level of corporate debt. Only in Australia, the US, Germany, Greece, Slovakia, Poland and Lithuania, did NFCs remain below that threshold, with Irish NFCs at 206ppts above the benchmark.

Figure 21. Selected Countries – Change in leverage required to return to 2001 levels



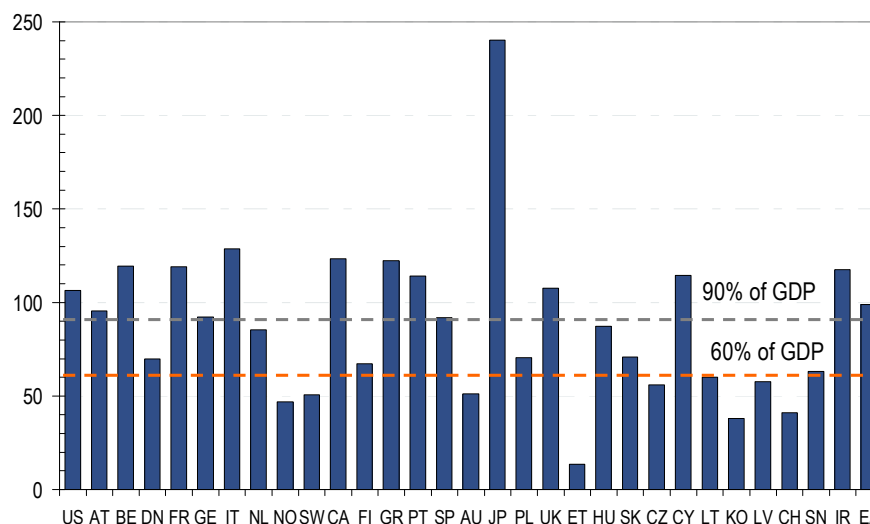
Note: Values correspond to difference between NFC gross debt/GDP and gross debt/equity at the latest available date and 2001.

Source: OECD, Eurostat, National Sources, and Citi Research

8.3 Public Debt

Figure 22 presents the levels of general government gross liabilities to GDP for our sample of countries in Q2 2012.¹⁸ Of the 30 countries in the sample, 21 were above the 60% of GDP benchmark. Among those that were below 60% of GDP, four (Estonia, Czech Republic, Lithuania, Latvia) are EMs. 14 of the 30 countries were above the 90% of GDP benchmark too, by only a small margin for Spain and Germany (both at 92% of GDP) but with Japan carrying general government liabilities of a staggering 240% of GDP. The US and the UK have both recently crossed even the higher threshold. These numbers are not what one would expect for safe haven countries, a designation used not just for the US but also for the UK these past two years.

Figure 22. Selected Countries – General Government Liabilities (% of GDP), Q2 2012



Note: For Italy, the Netherlands, and Ireland latest data correspond to 2012Q1, while for Cyprus and the EA it correspond to 2011

Source: OECD, Eurostat, National Sources, and Citi Research

What is more, as indicated above, public debt levels and ratios to GDP are still rising in many countries, including the US, Japan and the UK.

Now that the illusion of the existence of risk-free sovereign debt is broken, probably beyond repair, we doubt that private investors will continue to finance or refinance such levels of government debt even in the safe havens, for very much longer at anything near current levels of yields, without much friendly or not-so-friendly encouragement (aka financial repression) by the relevant national authorities (usually a combination of the national/federal treasuries, central banks and regulators/supervisors). Financial repression and/or continued activity by the central bank as the buyer of last resort may for a while still maintain the appearance of easy 'market access' for many of these sovereigns. High levels of private saving and limited capital mobility make the job of financial repression somewhat easier, but many fiscally weak euro area countries do not have either. For private investors to stay or to return voluntarily, sustainably and with confidence, a long and painful period of gradual public debt reduction through fiscal pain is likely to be needed in many countries. In countries where government debt is above 90% of GDP and still rising, the period of fiscal pain needed to bring debt down to sustainable levels is likely to cover most of the rest of this decade, unless sovereign debt restructuring is resorted to. In a number of countries, including Greece, Ireland, and Portugal, and potentially Spain, Italy, Cyprus, and Slovenia,

¹⁸ We use the general government gross liabilities as presented in Flow of Funds Accounts rather than the more commonly used measures for General Government Debt for the following reasons. First, it often paints a more accurate and timely picture of government indebtedness. Conventional measures of general government debt, such as those under the EU's Excessive Deficit Procedure Definition, exclude some items, such as accounts payable, which later transition into recognized items under even the EDP measures, but with a lag. Second, these data are available quarterly for most countries, while the general government debt data can often only be obtained on an annual basis.

sovereign debt restructuring is most likely necessary to restore solvency of the sovereign. In others, a short period of swift and, one hopes, orderly sovereign debt restructuring may be a benign alternative to years of fiscal pain.

9. Conclusion: what lies ahead and what is to be done?

There remains far too much debt in the balance sheets of most advanced economies. Reducing this debt burden to more tolerable levels will take many years unless recourse is had to debt restructuring on a much greater scale than currently contemplated. Higher real growth is neither a policy nor a realistic expectation as a means to deliver painless deleveraging in the excessively indebted advanced economies. As regards the growth of potential output, most of these economies are at or close to the technology frontier and have unfavourable demographics. More open immigration policies could ease the demographic crunch. Even under favourable circumstances, in the absence of excessive leverage, the growth rates of potential output would be modest (see Gordon (2012)). Clearly, many of the most afflicted economies in the EA have deeply distorted and dysfunctional labour markets, closed-shop professions, badly managed and poorly regulated utilities, excessive state ownership of productive resources and a host of other man-made supply-side distortions whose removal could lift potential output significantly. Unfortunately, the reforms are slow in coming and will often require considerable time to be implemented. And even when they have been implemented, the benefit in the form of higher actual output still requires demand to come from somewhere. Animal spirits alone are unlikely to do the job with acceptable speed.

In addition, net deleveraging by sovereigns and banks (in most countries), by households in many countries and by the non-financial corporate sector in some countries, means that these sectors attempt to run financial surpluses without matching increases in planned financial deficits by other sectors, except possibly the central banks. The result is that the paradox of thrift strikes and activity is well below its potential level.

An inflationary solution to the excessive leverage problem is all but impossible in the euro area, highly unlikely in Japan, unlikely in the US and quite unlikely in the UK. The reason for this is the much increased independence of central banks in the advanced economies and their commitment to price stability. Financial repression will play a modest role in the deleveraging process of the DMs. This will occur partly through central bank purchases of sovereign debt in the primary markets (except for the ECB which cannot engage in primary market purchases of sovereign debt because of Article 123 of the Treaty) at yields below those prevailing in the secondary markets.¹⁹ Sovereign and private debtors can also benefit from purchases in the secondary markets that drive down yields there - sovereign bond markets are inefficient and the supply of and demand for sovereign debt influences its yield. Banks and other regulated financial intermediaries will be cajoled by the national authorities to hold more sovereign debt than they would choose to hold voluntarily at yields lower than what they would accept voluntarily, with financial repression sometimes masquerading as prudential probity, as in the case of the LCR and the NSFR. In the absence of at least moderately high inflation (say 5 percent or more per annum), financial repression only has a modest effect on real bond yields, however.

Private and public austerity will continue to be important mechanisms for deleveraging in the years to come. In the euro area, so will mutualisation of sovereign debt and restructuring of sovereign debt and bank debt. Restructuring of household debt (especially mortgage debt) would be desirable in many countries with excessive gross household debt (e.g. the Netherlands, Denmark, Ireland and Spain) but is for political reasons unlikely on a large scale.

Debt restructuring, for sovereigns in the periphery and for banks in both periphery and core is, in our view, inevitable during the next two or three years. This is likely to start with another sovereign debt restructuring for Greece, regardless of whether it exits the euro (as we expect to happen during 2013 or 2014). Portugal, with its inexorably rising sovereign debt burden, poor growth prospects and growing

¹⁹ It would of course be possible for the ECB to engage in de-facto primary market purchases of sovereign debt by arranging 'back-to-back' purchases of sovereign debt in the primary markets at below-fair yields by commercial banks that then sell on that sovereign debt 'in the secondary market' to the ECB at the same (favourable to the sovereign) price.

austerity fatigue will likely have to restructure its sovereign debt, most likely when its current troika programme terminates, in the second half of 2014. Unless Ireland achieves ample retroactive mutualisation of public debt incurred as a result of its banking sector bail-outs since 2008, it too will have to restructure its sovereign debt.

In Spain, the consolidated sovereign and banking sector (allowing for likely rapidly rising residential mortgage losses and a deep and long recession) is most likely insolvent, in our view, so the operational question is what combination of debt mutualisation through the EA sovereigns or the Eurosystem, bank debt restructuring and sovereign debt restructuring will be used. Cyprus will require bank debt restructuring unless the bad assets of the bank are transferred to the sovereign, in which case Cyprus will require sovereign debt restructuring. Slovenia faces a similar conundrum. Finally Italy, despite its strategic-sovereign-default-inviting combination of a very large public debt and a primary general government surplus (actual and structural), is certainly able to service its sovereign debt in full (following accession to a programme that grants it access to OMT support). One key risk in Italy is that the next elections (no later than April 2013) could produce an anti-euro, nostalgia-for-the-lira, let's-restructure-sovereign-debt-held-by-banks-and-foreigners, populist coalition government.

In addition to, and where possible instead of reducing the size of gross liabilities of sovereigns, banks, and in many cases also households and non-financial corporations through haircuts or write-downs, a change in the *composition* of these liabilities away from debt-type instruments and towards more equity-type instruments is highly desirable. In the case of banks, we would hope that bailing in unsecured creditors would not take the form of haircuts but of a mandatory partial or complete conversion of unsecured debt into equity. For households, the equitisation of existing mortgages, when a non-performing household has negative equity, plus a much greater future issuance of equity-type mortgage products would make sense.

Islamic or joint-equity-type mortgages have much better risk sharing properties than conventional western repayment or interest-only mortgages, whose inflexible debt contract features are most inappropriate for households – typically entities with very limited financial flexibility whose main asset, their human capital, cannot be sold or used as security. With a stylised Islamic mortgage, the seller of a residential home sells it to the bank. When the bank deals with a would-be buyer, the mortgage-equivalent contract consists of two parts. The first is a contract between the bank and the buyer to establish a joint ownership. The buyer commits to buy, typically in a sequence of purchases over time, the share of the bank (which could be 100% initially). At the same time, the bank leases its share to the buyer – effectively a rental contract for the share of the property not (yet) owned by the buyer. As the buyer over time purchases additional fractions of the bank's equity, the stream of rental payments from the buyer to the bank diminishes. If the household cannot make these rental or lease payments, it can be evicted, like any tenant who does not pay the rent.

Finally, sovereigns should not only incur fewer liabilities, their liabilities should be more equity-like. Real GDP growth warrants or a long-term floating rate instrument where the 'interest rate' is some constant plus the growth rate of nominal GDP, are examples. When the government's ability to service its debt is lower, its debt service is likely to be lower also. There are practical problems: inflation and real GDP data can be manipulated by unscrupulous governments. One would hope that an agency like Eurostat in the EU would be able to prevent the opportunistic deliberate manipulation of macroeconomic price and quantity data in the future.

The sequence of crises the advanced economies have inflicted on themselves and on the rest of the world since 2007 is by no means over. Entire new chapters remain to be written. Mr. Micawber's recipe for happiness deserves to be on the wall in every financial kitchen.²⁰

²⁰ Mr Micawber's principle states: "Annual income twenty pounds, annual expenditure nineteen pounds nineteen and six, result happiness. Annual income twenty pounds, annual expenditure twenty pounds ought and six, result misery." From Charles Dickens's novel, *David Copperfield*, 1850.

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Appendix

Figure 23. Country Labels

Country	Abbreviation
Australia	AU
Austria	AT
Belgium	BE
Canada	CA
Cyprus	CY
Czech Republic	CZ
Denmark	DN
Estonia	ET
Finland	FI
France	FR
Germany	GE
Greece	GR
Hungary	HU
Ireland	IR
Italy	IT
Japan	JP
Korea	KO
Latvia	LV
Lithuania	LT
Netherlands	NL
Norway	NO
Poland	PL
Portugal	PT
Slovakia	SK
Slovenia	SN
Spain	SP
Sweden	SW
Switzerland	CH
UK	UK
US	US
Euro Area	EA

Source: Citi Research

Nonfinancial Sector Debt

1) Financial Accounts by Sector:

The time series constructed are taken either from national balance sheet statistics (flow of funds) from the OECD or national sources (usually national central banks) at an annual and quarterly frequency. The 30 countries included in the sample are: Australia, Austria, Belgium, Canada, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Japan, South Korea, Latvia, Lithuania, the Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland, the UK and the US. These countries accounted for 62.3% of world GDP at market exchange rates in 2011.

On average annual data start around 1995, but the data go back to 1950 (US), 1980 (Spain, Canada, Korea, Japan) and 1990 (Germany, Netherlands, Hungary) for some countries, and generally end in 2011. Annual data going back to 1980 were extended/backdated²¹ using data from Cecchetti, Mohanty, and Zampolli (2011) for Austria (for which data from the original source start in 1995), Belgium (1994), France (1994), Germany (1992), Italy (1995), the Netherlands (1999), Sweden (1995), Finland (1995), Greece (1995), Portugal (1995), Australia (1990), and the UK (1987).

Quarterly data start as early as 1952 (US), 1964 (Japan), 1975 (Korea), 1980 (Spain), 1987 (UK), 1990 (Canada), 1991 (Germany), and 1993 (Belgium). For all other countries, quarterly data start after 1995.

²¹ By extrapolating the time series, for which the level of the new series and growth rates of the reference series are reflected in the final time series.

The quarterly data generally end in 2012:Q2. Data for Cyprus and Switzerland are not available quarterly and these countries are therefore not included in any analysis that relies on quarterly data. For Ireland the data start in 2001, for Switzerland in 1999, for Slovenia in 2001, and for Latvia in 1998, hence these countries are not included in the comparisons of debt levels between 1995 and today.

The sectors covered are (i) households and non-profit institutions serving households, (ii) nonfinancial corporations, and (iii) general government. Following Cecchetti et. al (2011), debt is defined as the following: gross liabilities for households and general government, and total liabilities less shares and other equities for nonfinancial corporations. For US nonfinancial corporations, "credit market instruments" is used as a measure of gross debt.²²

OECD countries missing in the general analysis include: Chile (data start in 2005), Iceland (no data for the household sector available), Israel (data only for 2010), Luxembourg (data start in 2006), Mexico (data from 1997), New Zealand (no data for the household and non-financial sector), and Turkey (no data for the household and non-financial sector).

For household disposable income (net), we use OECD and Eurostat data that define it as the sum of household final consumption expenditure and saving (minus the change in net equity of households in pension funds). These values are equivalent to the sum of wages and salaries, mixed income, net property income, net current transfers and social benefits other than social transfers in kind, less taxes on income and wealth and social security contributions paid by employees, the self-employed and the unemployed. Due to data availability, values for the UK, Portugal and Spain are taken from respective national sources. For the UK and Portugal, values are for gross disposable income, which do not discount the change in net equity of households in pension funds

2) Other data used in the analysis

Domestic credit to the private sector (IMF): total domestic credit provided by domestic banks to resident private sectors of the economy (e.g. other financial corporations -insurance companies, pension funds, and the like-, nonfinancial corporations, and households). Domestic banks include all deposit-issuing financial institutions operating within the country. They include domestic banks and domestic branches of foreign banks.

Deleveraging Episodes

Identification

Based on our data for NFS gross debt across 86 countries for the period 1960-2006 (constructed as the sum of private sector credit and public sector debt, both provided by the IMF), we identify deleveraging episodes, following McKinsey (2010), episodes where either the ratio of total debt to GDP declined for at least three consecutive years and fell by 10ppts of GDP or more OR an episode in which the total stock of nominal debt declined by 10ppts or more.

These exercise provided 31 deleveraging episodes, of which 18 were preceded by a financial crisis.²³

²² Credit market instruments include the following financial liabilities for nonfinancial corporations: i) commercial papers, ii) municipal securities, iii) corporate bonds, iv) total loans and v) mortgages.

²³ Financial crisis list episodes are from Laeven and Valencia (2008).

Figure 24. Deleveraging Episodes – Overview Table

	Deleveraging		NFS Debt (% of GDP)		Domestic Credit (% GDP)		Public Debt (% of GDP)		Financial Crisis
	start	end	start	end	start	end	start	end	start
Argentina	2003	2009	150.2	72.6	10.8	13.5	139.4	59.0	2001
Bolivia	1998	2008	125.2	72.2	64.1	34.7	61.2	37.5	1994
Chile	1986	1994	227.7	89.1	62.7	48.1	165.0	41.0	1981
Dominican Republic	2004	2008	60.3	46.2	23.4	20.9	36.9	25.3	2003
Ecuador	2000	2008	112.6	47.4	29.9	26.3	82.6	21.1	1998
Finland	1993	1999	135.1	99.0	80.8	53.3	54.2	45.7	1991
Indonesia	1998	2008	125.8	59.8	53.2	26.6	72.5	33.2	1997
Japan	2000	2003	361.3	354.7	219.3	187.6	142.1	167.2	1997
Korea	1998	1999	82.8	91.0	68.6	74.7	14.3	16.3	1997
Malaysia	1998	2008	194.6	143.2	158.5	100.3	36.1	42.8	1997
Mexico	1995	1999	86.0	72.0	29.2	20.4	56.8	51.6	1994
Nicaragua	2002	2008	255.3	113.8	19.6	37.6	235.7	76.2	2000
Norway	1994	1996	106.1	95.3	54.7	58.1	51.4	37.2	1991
Paraguay	1999	2005	69.6	55.6	30.4	17.6	39.2	38.0	1995
Philippines	2004	2007	102.0	76.7	32.2	28.9	69.7	47.8	1997
Sweden	1993	2000	189.8	107.0	111.7	42.3	78.2	64.7	1991
Thailand	1998	2001	206.2	154.1	155.9	96.9	50.3	57.2	1997
Uruguay	2003	2007	142.5	86.4	43.2	23.4	99.3	63.0	2002

Note: The list corresponds to deleveraging episodes that were preceded by a financial crisis

Source: IMF and Citi Research

Estimating Macroeconomics Responses

We estimate responses in macroeconomic variables following a deleveraging episode for real GDP, private consumption, gross capital formation, net exports, the stock of domestic credit to the private sector (from IMF, see above), and public debt.

Responses were approximated by estimating deviations from the pre-recession (pre-deleveraging) trend after the episode, following IMF (2009). This approach consists of comparing the medium-term level of the variable to the level it would have reached following the pre-crisis (pre-deleveraging) trend, with the medium term defined as seven years after the crisis.

First, we estimate a linear trend through the actual (output) series during a seven-year pre-crisis period that ends three years before the onset of the crisis (e.g. between $t-10$ and $t-3$, t being the year of the crisis). This trend is then applied to values from t onwards to construct a (output) series trend (e.g. $GDP_t = GDP_{t-1} \cdot (1 + \text{trend})$), with $GDP_t = \text{GDP trend at } t$). The (output) series is then subtracted from the (output) series trend.