

NBER WORKING PAPER SERIES

DEBT OVERHANGS: PAST AND PRESENT

Carmen M. Reinhart
Vincent R. Reinhart
Kenneth S. Rogoff

Working Paper 18015
<http://www.nber.org/papers/w18015>

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
April 2012

This paper was prepared for the Journal of Economic Perspectives. The views expressed herein are those of the authors and do not necessarily reflect the views of the National Bureau of Economic Research or the institutions that they are affiliated with.

NBER working papers are circulated for discussion and comment purposes. They have not been peer-reviewed or been subject to the review by the NBER Board of Directors that accompanies official NBER publications.

© 2012 by Carmen M. Reinhart, Vincent R. Reinhart, and Kenneth S. Rogoff. All rights reserved. Short sections of text, not to exceed two paragraphs, may be quoted without explicit permission provided that full credit, including © notice, is given to the source.

Debt Overhangs: Past and Present

Carmen M. Reinhart, Vincent R. Reinhart, and Kenneth S. Rogoff

NBER Working Paper No. 18015

April 2012

JEL No. E44,E62,E63,F30,F41,H6,H63,N1

ABSTRACT

We identify the major public debt overhang episodes in the advanced economies since the early 1800s, characterized by public debt to GDP levels exceeding 90% for at least five years. Consistent with Reinhart and Rogoff (2010) and other more recent research, we find that public debt overhang episodes are associated with growth over one percent lower than during other periods. Perhaps the most striking new finding here is the duration of the average debt overhang episode. Among the 26 episodes we identify, 20 lasted more than a decade. Five of the six shorter episodes were immediately after World Wars I and II. Across all 26 cases, the average duration in years is about 23 years. The long duration belies the view that the correlation is caused mainly by debt buildups during business cycle recessions. The long duration also implies that cumulative shortfall in output from debt overhang is potentially massive. We find that growth effects are significant even in the many episodes where debtor countries were able to secure continual access to capital markets at relatively low real interest rates. That is, growth-reducing effects of high public debt are apparently not transmitted exclusively through high real interest rates.

Carmen M. Reinhart
Peterson Institute for International Economics
1750 Massachusetts Avenue, NW
Washington, DC 20036-1903
and CEPR
and also NBER
creinhart@piie.com

Vincent R. Reinhart
Morgan Stanley
New York, NY
vincent.reinhart@morganstanley.com

Kenneth S. Rogoff
Thomas D Cabot Professor of Public Policy
Economics Department
Harvard University
Littauer Center 216
Cambridge, MA 02138-3001
and NBER
krogoff@harvard.edu

I. Introduction

Among the legacies of the recent financial crisis across the advanced economies is a historically high and rising level of public indebtedness. The central policy debate across Europe, Japan, and the United States now centers on how fast to stabilize soaring public debt/income ratios given that post-crisis growth remains fragile. Those concerned about the tentative nature of economic expansion argue that the risks from elevated rich-country government indebtedness are wildly overblown, except of course for impecunious borrowers in the Eurozone periphery such as Greece. After all, market real interest rates for the very largest economies are extraordinarily low. If markets are not yet worried about long-term insolvency risks, why should policymakers? Shouldn't government tolerate even bigger deficits to counterbalance post-crisis private sector deleveraging?¹

The counter to such cyclical concerns is worry about the secular consequences of high debt loads on economic performance. In this paper, we use recently developed long-dated cross-country historical data on public debt levels to examine the long-term growth consequences of prolonged periods of exceptionally high public debt, defined here to be debt over 90% of GDP.² In the event, the cumulative effects can be quite dramatic. Over the twenty-six public debt overhang episodes we consider, encompassing the preponderance of such episodes in advanced economies since 1800, growth averages 1.2% less than in other periods. That is, debt levels above 90% are associated with an average growth rate of 2.3% (median 2.1%) versus 3.5% in lower debt periods. Notably, the average duration of debt overhang episodes was 23 years, implying a massive cumulative

¹ Reinhart and Reinhart (2010) employ private debt data to examine deleveraging cycles around financial crises.

² Long-dated cross-country public debt data have recently been developed by Reinhart and Rogoff (2009).

output loss. Indeed, by the end of the median episode, the level of output is nearly a quarter below that predicted by the trend in lower-debt periods. This long duration also suggests the association of debt and growth is not just a cyclical phenomenon.

Our work is not the first to use the new debt data to document the association between high debt and low growth. Reinhart and Rogoff (2010) show periods where debt is over 90% of GDP are associated with roughly 1% lower growth while at lower debt thresholds, the correlation with growth is small. Kumar and Woo (2010) and Cecchetti, Mohanty, and Zampolli (2011) also find statistical support of a similarly sized effect.

In this paper, we go beyond regressions and aggregative statistics to look at more detailed evidence on each of the individual twenty-six episodes. Previous studies of high public debt episodes have focused on the very small number of cases where debt data is readily available, including mainly the post-World-War-II United States and United Kingdom and contemporary Japan. Our historical approach allows us to more easily discriminate between cases where high debt resulted from wars and cases where high debt resulted from peacetime buildups and/or financial crises.

Importantly, this paper provides the first systematic evidence on the association between high public debt and real interest rates. Contrary to popular perception, we find that in 11 of the 26 debt overhang cases, real interest rates were either lower or about the same as during the lower debt/GDP years. Those waiting for financial markets to send the warning signal through higher interest rates that government policy will be detrimental to economic performance may be waiting a long time.

The remainder of the paper is organized as follows. The next section provides a brief tour of the evolution of the concept of debt overhangs in the literature; an appendix that discusses the findings of individual papers complements this review. We next

present a snapshot of the various dimensions of the ongoing public and private debt overhang in the advanced economies in both historical context and relative to developments in emerging market economies. The topic of debt overhangs will be relevant for policy discussions in the years ahead. The core analysis of the paper documenting the features of the 26 debt overhang episodes we identify is presented in Section III. We then examine links between debt, growth, and interest rates, and return to summarize our evidence in the concluding section.

II. Preamble: Varieties of Debt Overhangs

Although our focus here is on public debt overhangs, it would be folly to ignore the other debt burdens present today. These include private debt, external debt (including both government and private debt owed to foreigners), and the actuarial debt implicit in underfunded, or simply unfunded, old age pension and medical care programs. Each of these forms of debt produces distortions that will, in general, slow growth.

High public debt, for example, can slow growth whether the adjustment comes through higher distorting taxes or through lower government investment. The problem is compounded if high debt elevates uncertainty about default. Such uncertainty, in turn, raises interest rates (compounding the problem of distorting taxes) and further discourages investment activity. Highly indebted consumers will cut back on expenditures, potentially impacting growth through weaker aggregate demand. If financial repression, or restrictions on finance designed to lower the real borrowing cost of the government, is used to deal with a massive public debt overhang problem, as Reinhart and Sbrancia (2010) argue was very important after World War II, the resulting distortions will also impede growth. External debt creates a particularly acute overhang

problem because the country generally has a much narrower range of tools for reducing the debt, since typically neither inflation nor financial repression is feasible.

In general, the interaction between the different types of debt overhang is extremely complex and poorly understood. (An annotated bibliography on the literature on various relevant forms of debt overhang is presented in Appendix I.) For example, private debt often becomes partly absorbed into public balance sheets during major financial crises, as for example occurred in Ireland after the recent financial crisis when the government took on massive quantities of bank debt. We take the topic up of multiple debt overhangs in more detail in a companion paper, Reinhart, Reinhart and Rogoff (2012).

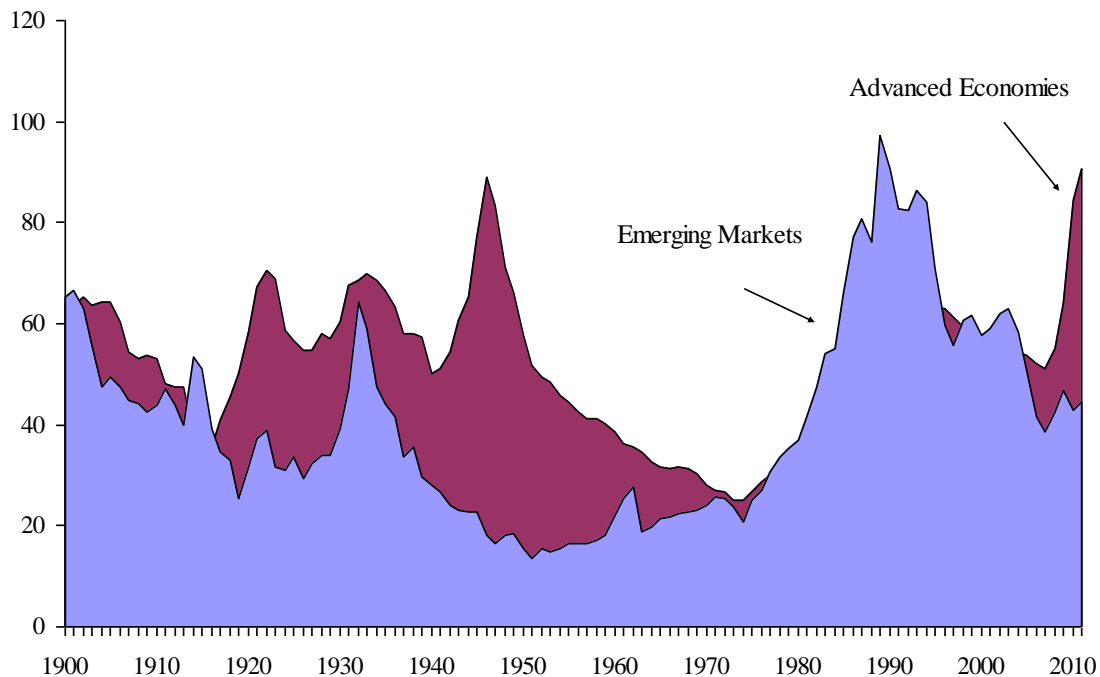
We limit ourselves here to presenting a snapshot of the various dimensions of the ongoing public and private debt overhang in the advanced economies, placed in historical context.

2.1. Public debt

Figure 1 presents average gross central government debt as a percent of GDP for 70 countries aggregated into advanced and emerging market economies subgroups from 1900 to 2011. The simple arithmetic averages presented for the two groups illustrate the scale of the debt build-up in recent years among the wealthy economies. As noted in the previous section, Reinhart and Rogoff (2009) place the threshold at which public debt is associated with lower contemporaneous growth at about 90 percent for both advanced and emerging economies; other studies with alternative methodologies and samples have yielded estimates in that ballpark (Appendix Table 1). The fact that the 22 advanced-

economy average for 2011 shown in Figure 1 is just above the 90 percent benchmark already anticipates that numerous countries are experiencing a “public” debt overhang.³

FIGURE 1. Gross Central Government Debt as a Percent of GDP: Advanced and Emerging Market Economies, 1860-2011 (unweighted averages)



Sources: Reinhart and Rogoff (2010) and sources cited therein.

2.2. External debts: Public and Private

Figure 2 traces the trajectory of gross public and private external debt/GDP since 1970 for advanced and emerging market economies. The overlap and interaction is particularly acute when it comes to external debt. As Reinhart and Rogoff (2009 and

³ It would be desirable to have long-dated measures of general government debt that include states and municipalities. However, for long dated historical data, the Reinhart-Rogoff (2009) database only contains central government debt. There is also the issue of net debt versus gross debt, with the main different being government debt held by government-run old age support trust funds. This distinction has become much more important recently as the trust funds have massively expanded. Again, net debt data is not available on a long-dated cross country basis. However, per our arguments in the conclusions, the fact that net public debt today tends to be significantly lower than gross public debt would do little to reverse our conclusions since by and large the trust funds are woefully underfunded, and implicit tax liabilities in most pension systems are hugely positive. These trust funds are hardly sources of future revenues to offset gross government deficits.

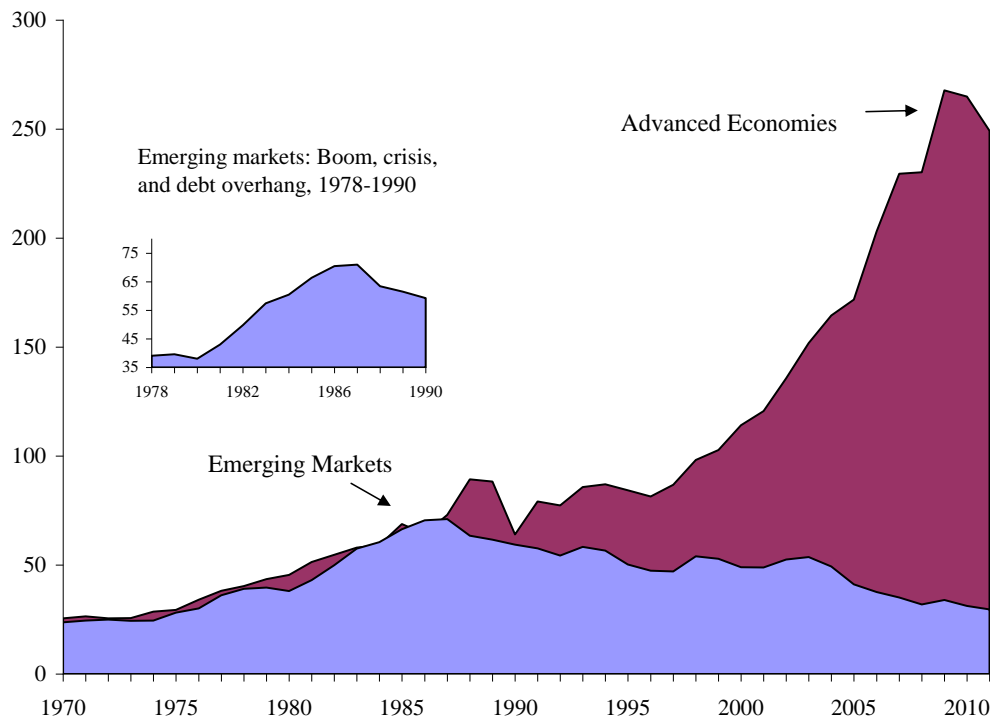
2011) note, the record strongly indicated that private external debts are often absorbed by the sovereign in a debt crisis.

Led by European countries, the surge in external debts since the early 2000s is unprecedented in history and dwarfs the late 1970s - early 1980s lending boom to emerging markets (shown in the inset to Figure 2).⁴ Reinhart and Rogoff (2010) suggested a 60 percent threshold for emerging markets but did not have the comparable data to conduct a parallel exercise for the advanced economies.⁵ We do this in a companion paper (Reinhart, Reinhart and Rogoff, 2012) and find that the threshold for advanced country external debt is roughly the same as for public debt—that is, 90 percent of GDP. For Europe as a whole, public and private external debts are already more than double the 90 percent threshold and constitute a considerable source of uncertainty.

⁴ Of course, this is partly because we (and others including the IMF) label debt across euro-zone countries as external. This is clearly the best first approximation given the weakness of euro-wide institutions, but as euro institutions are still stronger than many international counterparts, it may also be regarded as an exaggeration.

⁵ Reinhart, Rogoff, and Savastano (2003) stress that for countries with a particularly poor credit history the external debt threshold may be lower than the common 60 percent for the emerging markets as a whole.

FIGURE 2. Gross Total (Public plus Private) External Debt as a Percent of GDP: 22 Advanced and 25 Emerging Market Economies, 1970-2011

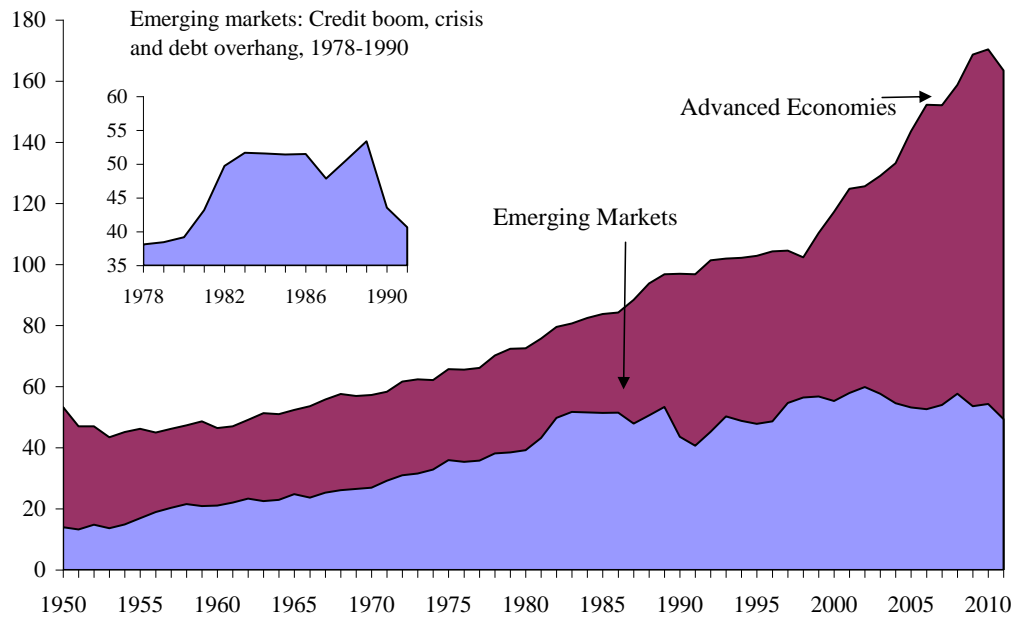


Sources: Lane and Milesi-Ferretti (2010), Reinhart and Rogoff (2009) and sources cited therein, *Quarterly External Debt Statistics*, Washington D.C.: World Bank, Various years. *Global Development Finance*. Washington D.C.: World Bank, Various years.

2. 3. Private Domestic Debt

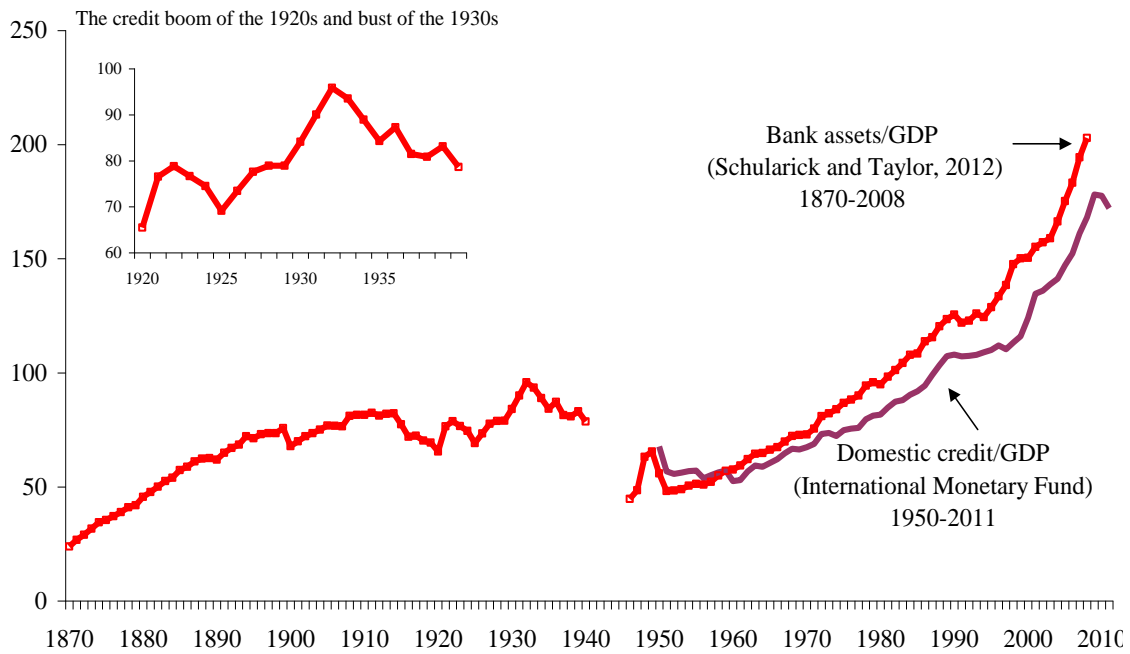
Figure 3 plots private domestic credit (essentially bank loans). Although this is an incomplete measure of private credit, particularly for the United States with its highly sophisticated capital market, this measure is most easily compared across time and countries. Figure 4 compares two alternative approaches to measuring private leverage. By either metric, the pre-crisis surge in domestic credit mimics the pattern discussed earlier for external debt. This should not come as a surprise, as the literature on domestic credit booms (see Mendoza and Terrones, 2011, for example) links these booms to capital inflow surges (borrowing from the rest of the world).

FIGURE 3. Private Domestic Credit as a Percent of GDP: 22 Advanced and 28 Emerging Market Economies, 1950-2011



Sources: *International Financial Statistics*, and *World Economic Outlook*, International Monetary Fund, Washington DC, Various issues and Reinhart (2010) and sources cited therein.

FIGURE 4. Two Measures of Private Leverage: Bank Assets and Domestic Credit as a Percent of GDP for 14 Advanced Economies, 1870-2011



Sources: *International Financial Statistics*, and *World Economic Outlook*, International Monetary Fund, Washington DC, various issues, Reinhart (2010) and sources cited therein and Schularick and Taylor (2012) and sources cited therein.

2. 4. Summary

The scope and magnitude of the debt overhang (public, private, domestic and external) facing the advanced economies as a group is in many dimensions without precedent. As such, it seems likely that our historical estimates of the association between high public debt and slow growth might, if anything, be understated when applied to projections going forward.

IV. Features of Episodes of High Debt

While a more encompassing concept of debt overhangs that incorporates private debt and allows for distinctions between external and domestic debts is the goal, we confine ourselves to identifying public debt overhangs.⁶ We define a public debt overhang as an episode *where the gross public debt/ GDP ratio exceeds 90 percent for five years or more*. We identify 26 public debt overhang episodes in 22 advanced economies since the early 1800s. This tally does **not** yet include the unfolding *post-crisis* cases in Belgium, Iceland, Ireland, Portugal, and the United States, where the beginning of the debt overhang dates to 2008 or later, and does not meet our five-year minimum criterion. Among the ongoing episodes, our sample does include Greece, Italy and Japan, where the beginning of the debt overhang (as defined above) dates back to 1993, 1988, and 1995, respectively.

1. *The episodes*

Tables 1 and 2 list the episodes that fulfilled the criteria on magnitude and duration of our definition of debt overhang. Table 2 also lists four shorter spells of high debt (lasting less than five years) that were largely associated with war or a cyclical downturn during the Depression of the 1930s.

The first column of Tables 1 and 2 lists the country. As noted, our analysis covers 22 advanced economies. Of these, nine countries have no episodes that meet our criteria of a public debt overhang: Austria, Denmark, Finland, Germany, Iceland (not until 2009), Norway, Portugal (not until 2010), Sweden, and Switzerland.⁷ The remaining 13 countries record one or more debt overhang episodes as shown in Tables 1 and 2. The

⁶ See Reinhart and Rogoff (2010) and Reinhart, Reinhart and Rogoff (2012).

⁷ The fact that many countries do not have any history of public debt/GDP above 90 percent helps explain the finding in Reinhart and Rogoff (2010) that less than 10 percent of the post-WWII annual observations of public debt/GDP for all advanced economies are above the 90 percent cutoff.

first row for each country gives the sample coverage (in the second column), which is determined by data availability and varies by country. The next six columns provide averages for real GDP growth, real (inflation adjusted) short term interest rates and real long term interest rates. For each of these three variables, we provide the averages for debt/GDP below and above 90 percent. Details on the interest rate and other data used are provided in the Data Appendix. Column (9) provides a calculation of the share of years in the total sample (shown for each country in column 2) where debt/GDP was above 90 percent. For example, since 1848 (when the public debt data is available), Greece sets the record, with 56 percent of the observations of debt/GDP ratios above 90 percent. The last column provides commentary on the debt overhang episodes, which are listed separately in the rows below the country aggregates.

Table 1 is devoted to episodes lasting more than 10 years. For each country, there is also a cross reference to Table 2 if the country had other debt overhangs in the 5-9 year range. The next-to-last column lists the duration (in years) of each individual episode. The comment entries direct particular attention to whether the debt buildup was associated with a war or with some other event, such as any variation of a financial crisis (banking, inflation, exchange rate, and debt) and also economic depression. Where possible, we indicate peak levels of debt and interest rates and whether there were other related events or arrangements in financial markets, such as a debt conversion or financial repression.⁸

⁸ Financial repression includes directed lending to the government by captive domestic audiences (such as pension funds or domestic banks), explicit or implicit caps on interest rates, regulation of cross-border capital movements, and a tighter connection between government and banks, either explicitly through public ownership of some of the banks or through heavy “moral suasion”. It is often associated with relatively high reserve requirements (or liquidity requirements), securities transaction taxes, prohibition of gold purchases (as in the US from 1933 to 1974), or the placement of significant amounts of government debt that is nonmarketable. In principle, “macroprudential regulation” need not be the same as financial repression, but in practice, one can often be a prelude to the other.

Table 1. Features of Public Debt Overhang Episodes (10 years or longer):
Advanced Economies, 1800-2011

Country	Sample <i>debt overhang episode</i>	Average real GDP growth		Average real interest rates		Share of		Episode duration (years)	Comments
		below 90%	above 90%	short-term below 90%	short-term above 90%	long-term below 90%	long-term above 90%		
Belgium <i>1982-2005</i> (see Table 4 for 2 episodes lasting less than a decade)	1836-2011	2.5	2.7	2.5	2.4	2.9	3.6	20.5	Growth is 2.2% in 1984-2005; lower than the post WWI high-debt boom episode (Table 4). Short and long real interest rates average 3.3 and 4.5%, respectively.
France <i>1880-1905</i> <i>1920-1945</i>	1880-2011	3.2	1.9	0.7	2.1	2.1	2.5	28.0	Franco-Prussian War, 1870-1871 legacy of reparations payments to Germany. WWI debt; by 1922 debt is 262%; by early 1930s WWI debt to US is in default.
Greece <i>1848-1883</i> <i>1887-1913</i> <i>1928-1939</i> <i>1993-2012, ongoing</i>	1848-2011	4.7	3.0	-1.8	4.7	-6.0	12.5	56.1	Pre-WWII real long-rates were over 15%. Defaults in 1843-1878 and 1894-1897. Banking crisis in 1931; default 1932-1964 WWII hyperinflation; civil war 1944-1949 Real bond yields ≈ 4% over 1993-2012. episode; 2008 banking crisis-restructuring
Ireland <i>1983-1993</i>	1924-2011	3.4	2.5	-0.6	6.1	2.3	6.5	15.5	Real rates on the long bond peak at 10% in 1986; real short-term rates averaged about 15% during the 1992 ERM crisis.
Italy <i>1881-1904</i> <i>1917-1936</i> <i>1988-2012, ongoing</i> (see Table 4 for an episode lasting less than a decade)	1861-2011	3.9	1.1	0.4	4.1	2.2	4.3	48.0	No external default except WWII, (Table 4). Several severe banking crises (early 1890s, 1921 and 1930). 1920s-domestic debt conversions. Lower rear interest rates than pre-war episodes; Lower reliance on external debt.
Japan <i>1995-2012, ongoing</i>	1872-2011	4.2	0.8	2.1	0.3	2.7	1.4	12.1	1989 equity market crash, severe banking crisis in 1991; large private sector debt "overhang" by any measure since 1980s.
Netherlands <i>1816-1872</i> <i>1886-1898</i> <i>1932-1954</i>	1816-2011	3.3	2.1	2.4	3.1	3.4	4.3	45.6	Napoleonic War debts; 1830s war with Belgium; debt rises to 280% followed by several conversions. Shrunken revenues from Indonesia, added to late 1800s debt build up. The 1930s depression & WWII.
New Zealand <i>1881-1951</i>	1861-2011	4.8	3.1	1.9	2.7	2.1	3.0	48.0	Severe banking crisis in 1893. Debt peaks at 226% in 1932 amid collapsing commodity prices; forcible debt conversion in 1933.
Spain <i>1868-1882</i> <i>1896-1909</i>	1850-2011	2.9	2.1	2.18	2.52	2.39	9.05	18.6	1868-1876, Third Carlist Wars. Real bond yields ≈ 25%. Default in 1877-1882. In 1879 external public debt peaks at 52%. Early 20th century-loss of the last colonies.
United Kingdom <i>1830-1863</i> <i>1917-1964</i> (no real GDP data prior to 1830)	1830-2011	2.1	1.8	2.42	2.57	2.74	3.68	45.3	Debt peaks at 260% in 1819-1821 after Napoleonic Wars. Pre WWII real rates-- short and long average 4.5%. WWI debts to US go into default. Post WWII debt at 248%; financial repression era; short and long rates average -1.12% and 0.54%.
Average number of years across episodes								27.3	

Table 2. Features of Shorter (less than 10 years) Episodes of High Public Debt: Advanced Economies, 1800-2011

Country	Sample	Average real GDP growth		Average real interest rates				Share of years of above	Episode duration (years)	Comments	
		below 90%	above 90%	short-term 90%	above 90%	long-term 90%	above 90%				
Australia	1852-2011	4.0	3.5	1.7	-0.4	3.2	1.6	6.1	Debt rose from 55% in the mid 1920s to ≈ 100% at the height of the depression; 1933 debt conversion; too short a period to define as a debt overhang. Real rates were negative after WWII.		
<i>1931-1934</i>	Too short to define as a debt overhang episode.										
<i>1945-1950</i>											
Austria	1882-1883	Too short to define as a debt overhang episode.								2	
Belgium	1835-2011	2.5	2.7	2.5	2.4	2.9	3.6	20.5	Post-WWI debt peaks at 129% in 1922. Belgium defaults on WWI debt to the US		
<i>1920-1926</i>											
<i>1946-1947</i>	Too short to define as a debt overhang episode.										
Canada	1871-2011	3.6	3.2	0.6	2.4	2.3	4.5	10.6	Debt peaked at 136% in 1946, Real short and long rates averaged 0.39 and 2.69% in that episode. Real bond rates were as high as 9% in the debt overhang of the 1990s.		
<i>1944-1950</i>											
<i>1992-1999</i>											
Finland	1943-1945	Too short to define as a debt overhang episode.								3	
Italy	1861-2011	3.9	1.1	0.4	4.1	2.2	4.3	48.0	In default during 1940-1946; inflation peaks at 344% in 1944 liquidating debts by 1947 debt/GDP is at 25%. For longer episodes, see Table 3.		
<i>1940-1944</i>											
United States	1791-2011	3.6	-1.0	1.75	-4.45	3.72	-2.73	3.2	Federal gross debt peaks at 1.21% in 1946. Deployment; output falls 11% in 1946. Era of financial repression (1946-1980) worldwide under Bretton Woods agreement; negative real interest rates.		
<i>1944-1949</i>											

5.0

2. Causes and duration

As the commentary in the tables highlights, many debt overhangs are a direct product of costly wars. There are distinct clusterings around World War II and, to a lesser extent, World War I, which then merges with the Depression era debt build up; this shows up as the three nearly consecutive peaks in the advanced economies' aggregate debt ratios shown in Figure 1. Hardly surprising, famously chronic high debt countries, such as Greece and Italy, are tied for first place in the number of debt overhang episodes (each has four episodes and the percent of years with an overhang is 56 and 48 percent, respectively). It is somewhat more surprising that the two previous world powers, the

Netherlands and the United Kingdom, have so few debt overhang episodes (three and two, respectively). This, however, is partly because the episodes that did occur lasted so long. The Napoleonic wars, in particular, left a deep mark on the finances of both of them. In the days before fiat currency, inflation and/or financial repression were not as prevalent as after the end of World War II when it was institutionalized on a global basis under the Bretton Woods system. Thus, the “liquidation” of government debt via a steady stream of negative real interest rates was not as easily accomplished in the days of the gold standard and relatively free international capital mobility as in 1945-1979. This meant that it took a longer time to work down debt ratios in the 19th century.⁹ However, while the “inflation or financial repression tax” was used sparingly by the colonial powers of the 19th century, other forms of “economic repression” were available. In particular, there were substantial transfers from the colonies to finance debts and facilitate debt reduction. During much of the 1800s, the Netherlands, for example, earmarked Indonesian revenues for deficit reduction (Bos, 2007). There were also “usury laws” that were the ancestors to the interest-rate ceilings that accompanied financial repression after World War II (Homer and Sylla, 1996).

The “modern” peacetime episodes in the advanced economies are comprised of Belgium, Canada, Greece, Ireland, Italy and Japan. Of these six, the shortest were Canada and Ireland, lasting 8 and 11 years, respectively. Japan’s mounting public debts had their origins in the systemic banking crisis of 1991 and asset (equity and real estate) collapse that began somewhat earlier.¹⁰

⁹ See Reinhart and Sbrancia (2011).

¹⁰ It can be conjectured that Greece, Ireland, and Italy’s debt build-ups may have been in part connected to their efforts to reduce inflation as a prerequisite for joining the euro, as debt financing supplanted inflation finance.

3. Public debt overhang and slow growth, with and without interest rate drama

Other than higher distorting taxes, the standard textbook connection between public debt and growth emphasizes a risk premia channel. Sufficiently high levels of debt call into question fiscal sustainability and lead to a higher risk premia and its associated higher long term real interest rates. As several recent studies indicate (see Appendix Table 1), the link between debt and growth appears to be nonlinear; similarly the relationship between debt and alternative measures of risk (see Reinhart, Rogoff and Savastano, 2003) is also nonlinear. The impact of sharply higher real interest rates, in turn, has the usual negative implications for investment, consumption of durables and other interest sensitive sectors, such as housing.

As noted in the introduction, for the countries that have one or more episodes of public debt overhangs, real GDP growth averages 3.5 percent per annum over the full period for which debt/GDP is less than 90 percent and data is available.¹¹ The comparable average for all debt overhang episodes is 2.3 percent (or 1.2 percent lower than the lower debt periods). Median growth for the debt overhang episodes is 2.1 percent. Three debt overhangs episodes, however, are associated with higher GDP growth.¹²

Tables 1 and 2 summarize the difference in growth and interest rates for the high and lower debt buckets on a country-by- country basis. Diagram 1 and Figure 4 provide further details on an episode-by-episode basis. Diagram 1 places the individual episodes in the context of a two-by-two matrix. The rows divide the episodes into those debt overhang episodes associated with average growth that is higher than the average growth

¹¹ All figures cited exclude World War I and II years from the calculations. Individual country coverage is detailed in Tables 1 and 2 and the Data Appendix.

¹² One of these, an outright boom, is associated with post-WWI rebuilding in Belgium.

for that country during all years in which debt/GDP was below 90 percent (upper row) and those episodes where the comparable growth differential is negative (bottom row). The columns perform a comparable division for episodes where real interest rates (long bond) were higher (left column) and those where rates were lower. The middle insets represent the cases where there was little differential in interest rates between the high and lower debt periods.

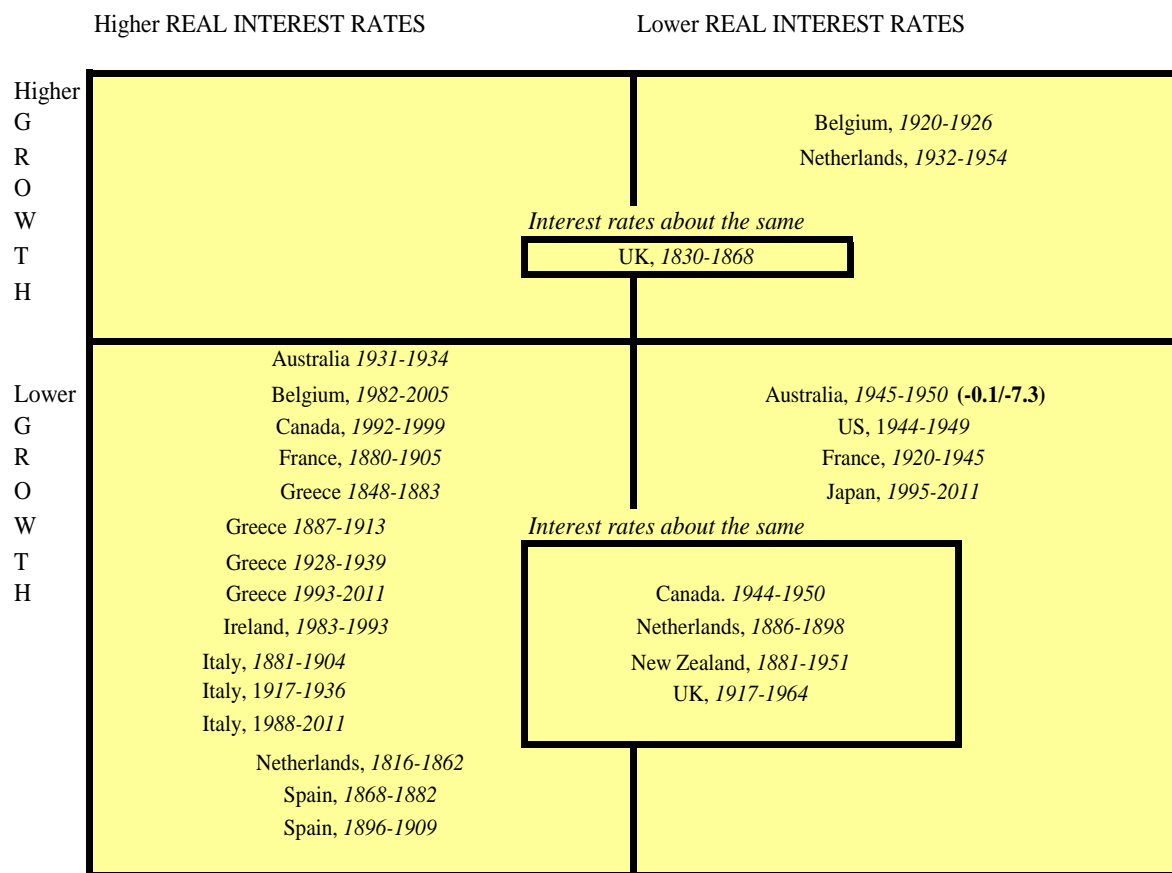
As the textbook risk premia channel predicts, higher real interest rates are more common than not during periods of high debt (15 of 26 episodes). However, as Diagram 1 illustrates, a non-trivial share of the episodes are characterized by both lower growth *and* lower or comparable real interest rates. This is left largely unexplored in textbooks.

Furthermore, there is little to suggest a systematic mapping between the largest increases in average interest rates and the largest (negative) differences in growth during the individual debt overhang episodes. The growth and interest rate differentials for each episode are plotted side-by-side in the two bar-chart panels of Figure 4. The left panel plots (in descending order) the episodes by their growth differential; the right panel plots the comparable real interest rate differential. At the top of Figure 4, Belgium's post World War I debt overhang from 1920-1926 is associated with a rebuilding boom that left average growth 3.7 percent above the long-term growth average of 2.5 percent (for all years in which debt/GDP is below 90 percent).¹³ A rare (for Belgium) post-war inflation spike also produced very negative ex-post real interest rates (minus 8 percent). At the other end, average post World War II GDP growth during the 6-year debt overhang (1944-1949) is sharply lower as there was decommissioning of a global war effort and no

¹³ That is to say average GDP growth during 1920-1926 was 6.2 percent.

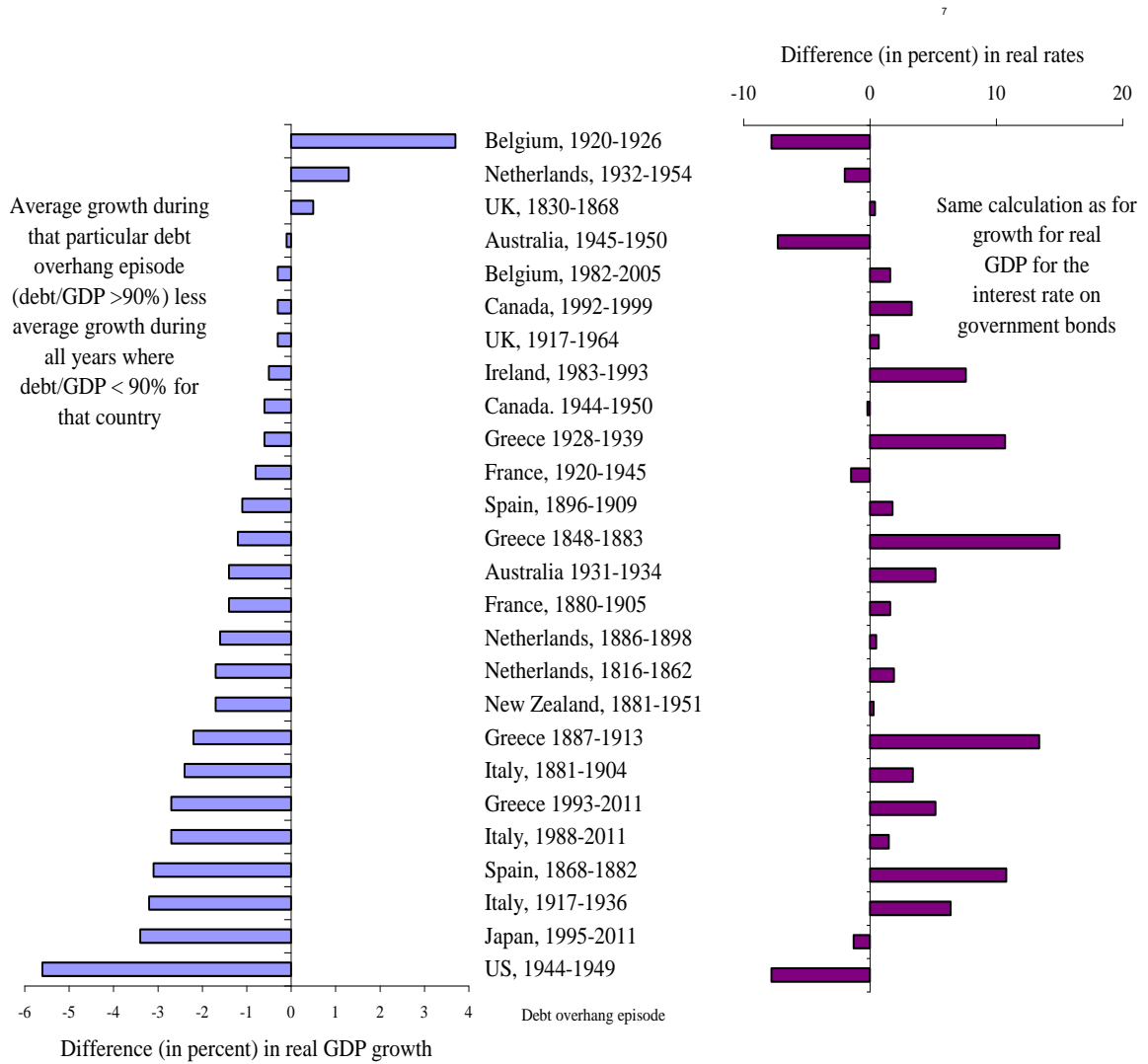
need to rebuild entire cities, as in Europe and Japan. More germane to the current situation are the considerably longer peacetime debt overhangs (Figure 4) that, with the exception of the United Kingdom at the height of its colonial powers, are consistently associated with lower growth (in varying degrees), irrespective of whether real interest rates rose, declined or remained about the same.

Diagram 1. Growth and Real Interest Rate Outcomes for 26 High-Debt Episodes in Advanced Economies, 1800-2011



Sources: Authors' calculations based on data sources listed in the Data Appendix.

Figure 4. Differences in Real GDP Growth (left panel) and Real Interest Rates (right panel) During 26 High-Debt Episodes in Advanced Economies, 1800-2011



Sources: Authors' calculations based on data sources listed in the Data Appendix.

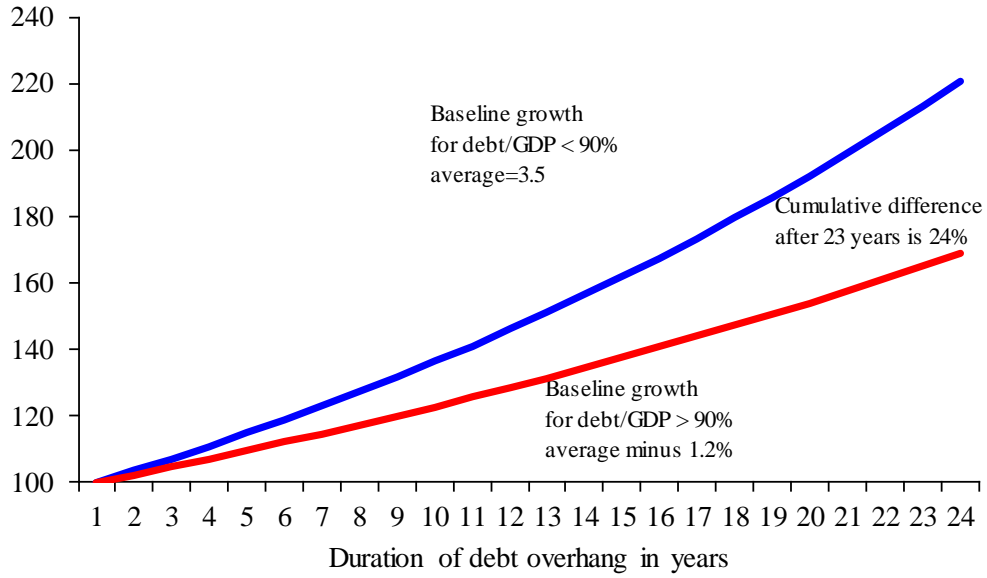
4. The cumulative effects of debt overhangs

Although it is obvious that a sustained growth shortfall of modest magnitude can have massive cumulative effects, the point is so important that we feel compelled to illustrate it with a simple numerical example. In Figure 5, we consider a 23-year window, which is the average duration of the 26 episodes in our sample. We index base year (year 1) real GDP to equal 100. As the “no debt overhang-debt/GDP below 90 percent” baseline case we apply a constant growth rate of 3.5 percent per annum (the blue line). At the end of 23 years, the real GDP index rose from 100 to 221. The debt overhang path (the red line) applies the 2.3 percent sample average constant annual growth rate over the same horizon. At the end of 23 years the index rose from 100 to 169; real GDP is 24 percent lower than for the baseline. Even assuming a more modest reduction in growth from 3.5 to 3 percent (this exercise is not shown in Figure 5), the level of GDP at the end of 23 years would still be 11 percent lower than otherwise. It is not exactly what T.S. Eliot had in mind when he wrote “*This is the way the world ends, Not with a bang but a whimper*” but the general thrust appears to be applicable to the “debt-without-drama” damages.¹⁴

¹⁴ The Hollow Men (1925).

Figure 5. Real GDP and Debt Overhangs: Basic Calculus of Cumulative Effects

Real GDP
Index (first year =100)



V. Conclusions

The advanced world has entered an era characterized by massive overhang of public and private debt. Public debt to GDP levels in advanced countries as a whole already exceed our critical 90% threshold. Private debt, which in contrast to public debt shows a marked upward trend over the past few decades, remains near pre-crisis levels. The problem is exacerbated by the fact that among advanced countries, a record portion of the debt is owed to external creditors, which in general limits a government's tools for forcing its creditors to absorb losses, either quickly or slowly through financial repression.

We identify 26 episodes of public debt overhang—where debt to GDP ratios exceed 90% of GDP—since 1800.¹⁵ We find that in 23 of these 26 episodes, individual countries experienced lower growth than the average of other years. Across all 26 episodes, growth is lower by an average of 1.2%. If this effect sounds modest, consider that the average duration of debt overhang episodes was 23 years.

In 11 of the 26 high debt overhang episodes, real interest rates were the same or lower than in other periods. Yet growth was similarly impaired, as we illustrated in a side-by-side comparison (Figure 4).

One might argue that financial globalization has made it easier to carry high public debt burdens, but we see no compelling evidence that this is the case for advanced countries as a whole. Moreover, do not undercount the sophistication and interconnection of national markets in the 19th century, half the timespan covered.

We have just noted that in contrast to private debt, there is no marked trend rise in public debt, unless of course one includes contingent liabilities in old age support

¹⁵ The 90% threshold is identified by Reinhart and Rogoff (2010), who point out that a higher threshold would leave relatively few observations. For example, on a yearly basis post World War II, just over 1% of all gross central government debt to GDP ratios among advanced countries have exceeded 120%.

programs. Obviously, it is possible that new developments in technology and globalization will provide such a remarkable reservoir of growth that today's record debt burdens will eventually prove quite manageable. On the other hand, the fact many countries are facing "quadruple debt overhang problems"—public, private, external, and pension—suggests the problem could in fact be worse than in the past, a question we do not tackle here.¹⁶ Nor have we paid attention here to the likely possibility of significant "hidden debts", especially public sector, which Reinhart and Rogoff (2009) find to be a significant factor in many debt crises, and as documented in detail in the Reinhart (2010) chartbook.

Another line of reasoning for dismissing concerns about public debt and growth is the view the causality mostly runs from growth to debt. The multi-decade long duration of past public debt overhang episodes suggests that at very least, the association is not due to recessions at business cycle frequencies. Others dismiss concerns about high debt by citing the immediate period after World War II for the United States and United Kingdom, and pointing to the fact that the United Kingdom had extremely high debt after the Napoleonic Wars. Our analysis, based on these cases and the 23 others we identify, suggests that the long term risks of high debt are real.

Finally, this paper should not be interpreted as a manifesto for rapid public debt deleveraging in an environment of extremely weak growth and high unemployment. However, our read of the evidence certainly casts doubt on the view that soaring government debt is a non-issue simply because markets are presently happy to absorb it.

¹⁶ We take up the question of how debt overhangs interact in Reinhart, Reinhart and Rogoff (2012).

Appendix Table 1. The Recent Literature on Public, Private, and External Debt and Growth

Study	Sample, frequency, country, coverage	Methodology/Comments	Main conclusions
Arkand, Berges, and Panizza (2011) examine whether there is a threshold above which financial development no longer has a positive effect on economic growth.	Cross-section over 1976-2005 comprised of 44 advanced and emerging market economies.	The empirical exercise in the paper involves testing for nonlinear “threshold effects” over which credit to the private sector begins to have a negative impact on growth (5-year averages), after controlling for many of the standard determinants.	A principal result is that finance starts having a negative effect on output growth when credit to the private sector reaches 104 to 110 percent of GDP. The strongest adverse effects are for credit over 160 percent of GDP.
Balassoni, Francese and Page (2011) The link between public debt and growth is examined. The analysis distinguishes between the effects of domestic and external debt.	General government debt for Italy over 1861-2010. Various subperiods are examined.	Endogenous growth model is fitted to the data. Alternative estimation strategies to deal with endogeneity and heteroskedasticity.	There is a strong negative correlation for Italy over the entire sample but the relationship is somewhat weaker since 1985. The stronger negative effect of debt on growth prior to 1914 is importantly connected to the larger role played by external debt.
Cechetti, Mohanti and Zampolli (2011) It is an attempt to define empirically debt thresholds beyond which growth suffers. It studies government debt, corporate debt, and household debt separately.	18 OECD countries (of which none are emerging markets) 1980-2010	Correlations and standard panel growth regressions are used to examine the debt-growth link. Working with 5-year growth averages as a function of predetermined regressors to control for feedback from debt to growth.	The estimated thresholds for government and household debt are at 85 percent of GDP, although it is less precisely estimated for the latter. Corporate thresholds are somewhat higher and close to 90 percent.
Checherita and Rother (2010) Studies effect of gross government debt on per-capita GDP growth for 12 euro area countries.	The 12 countries are: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, and Spain. Sample period: 1970-2010 (though most of the regressions cover the period 1970-2008).	Panel with fixed effects with robust estimation. Main estimation strategy is an equation with per-capita GDP growth as dependent variable. Among the control variables: government debt (level and squared), saving/investment rate, population, fiscal indicators, etc. Controls for possible endogeneity of debt variable via instrumental variables (lagged debt, average debt in euro area)	There is a nonlinear relationship between debt and growth. Most specifications provide evidence of “turning point” at around 90-100% of debt/GDP. Confidence intervals suggest that the negative growth effect of high debt may start already from levels of around 70-80% of GDP They also study different channels by which debt may have an impact on growth.

Appendix Table 1. The Recent Literature on Public, Private, and External Debt and Growth (continued)

Study	Sample, frequency, country, coverage	Methodology/Comments	Main conclusions
<p>Kumar and Woo (2010)</p> <p>Evidence on the impact of <i>initial</i> gross public debt on <i>subsequent long-run</i> growth of real per capita GDP. It thus, lends itself to examining the debt overhang hypothesis.</p>	<p>Panel of 38 advanced and emerging market economies with populations over 5 million over 1970-2007.</p>	<p>The approach follows the large literature on endogenous growth models, as such it controls for a variety of the standard determinants of growth. Robustness checks allow for different estimation strategies, subsamples, and varying degrees of parsimoniousness in the regressors. Nonlinearities are examined.</p>	<p>The results suggest an inverse relationship between initial debt and subsequent growth, controlling for other determinants of growth: on average, a 10 percentage point increase in the initial debt-to-GDP ratio is associated with a slowdown in annual real per capita GDP growth of around 0.2 percentage points per year, with the impact being smaller (around 0.15) in advanced economies. There is some evidence of nonlinearity, with only high (above 90 percent of GDP) levels of debt having a significant negative effect on growth.</p>
<p>Patillo, Poirson and Ricci (2011)</p> <p>The focus is on the impact of gross external debt (public plus private) on growth</p>	<p>93 developing countries representing all regions over 1969-1998.</p>	<p>Examines both external debt/GDP as well as external debt/exports. 3-year and 10-year growth averages are used. Robust GMM estimation addresses potential endogeneity. A distinction is made between the average impact of debt and growth and the marginal impact (that is, raising debt further from already high levels).</p>	<p>The estimates support a hump-shaped nonlinear relationship between external debt and growth. The average impact of debt on growth becomes negative at the 35-40 debt/GDP threshold. For external debt/exports the threshold is 160-170 percent.</p>

Appendix Table 1. The Recent Literature on Public, Private, and External Debt and Growth (concluded)

Study	Sample, frequency, country, coverage	Methodology/Comments	Main conclusions
<p>Reinhart and Reinhart (2010)</p> <p>A study of the growth performance in the decade following severe crises associated with private debt overhangs.</p>	<p>The 21-year window around 15 post WWII severe financial crises. Five of these in advanced economies and the remainder in middle-high income emerging markets.</p>	<p>The differences in pre- and post-crises frequency distributions are compared for the level of GDP, growth, unemployment, inflation, private debt, and real estate prices. Advanced and emerging economy episodes are examined both jointly and individually.</p>	<p>Study concludes that private deleveraging is a protracted process that starts 2-3 years after the crisis and lasts about seven years during which GDP growth is lower by about one percent per annum. The magnitude of the deleveraging is comparable to the debt build up prior to the crisis.</p>
<p>Reinhart, Rogoff and Savastano (2003)</p> <p>Thresholds for external debt are influenced by a country's repayment and inflation history.</p>			
<p>Reinhart and Rogoff (2009)</p> <p>The contemporaneous link between gross public debt, growth and inflation is examined. External debt (public plus private) for emerging markets is also studied.</p>	<p>44 countries-20 advanced and 24 emerging. The sample, subject to data availability span as much as 1790-2009 (depending on the country) and covers 3,700 observations. Post- WWII subsample is also analyzed.</p>	<p>Years (observations) are sorted into 4 buckets, those with debt/GDP 0-30 percent; 30-60; 60-90; and above 90 percent. Basic descriptive statistics are reported for each of the four buckets for advanced and emerging economies separately and for full and post WWII samples.</p>	<p>Evidence of nonlinearities is presented. There is no systematic link between public debt and growth for debt/GDP below 90 percent but the contemporaneous relationship is negative for higher levels of debt. External debt for emerging markets has a lower threshold of 60 percent.</p>

References

- Arcand, Jean Louis, Enrico Berkes, and Ugo Panizza, "Too Much Finance," mimeograph, UNCTAD, March 2011.
- Cecchetti, Stephen, M.S. Mohanty, and Fabrizio Zampolli, "The Real Effects of Debt", forthcoming in *Achieving Maximum Long-Run Growth* symposium sponsored by the Federal Reserve Bank of Kansas City, Jackson Hole, Wyoming, 25–27 August 2011.
- Chancellor, Edward and Chris Wu, "Deleveraging Processes," Presentation, (March 2009)
- Balassone, Fabrizio, Maura Francese and Angelo Pace "Public Debt and Growth in Italy," *Quaderni di Storia Economica Banca D'Italia* No. 11, October 2011.
- Bos, Frits (2007), "The Dutch fiscal framework: History, current practice and the role of the CPB" CPB Document Number 150, July.
- Homer, Sidney, and Richard Sylla, (1996), *A History of Interest Rates*, Third Edition, (New Jersey: Rutgers University Press).
- Kaminsky, Graciela, and Carmen M. Reinhart (1999). "The Twin Crisis: The Causes of Banking and Balance of Payments Problems," *American Economic Review*, Vol. 89 No. 3, June, 473-500.
- Krueger, A. O. "Debt, capital flows, and LDC growth," *The American Economic Review*, 1987.
- Krugman, Paul (1988), Financing Versus Forgiving a Debt Overhang," *Journal of Development Economics* 29, pp 253-268
- Kumar, Mohan, and Jaejoon Woo (2010). "Public Debt and Growth," IMF Working Paper WP/10/174 (July).
- Mendoza, E. and M. Terrones (2008), "An Anatomy of Credit Booms: Evidence from Macro Aggregates and Micro Data," NBER Working Paper 14049.
- Mendoza, E. and M. Terrones (2011), "An Anatomy of Credit Booms and their Demise" mimeograph, University of Maryland, November.
- Myers, Stewart (1977), "The Determinants of Corporate Borrowing," *Journal of Financial Economics* 5, pp. 147-75.
- Pattillo, Catherine, Hélène Poirson, and Luca Ricci, 2002, "External Debt and Growth," *Review of Economics and Institutions*, Fall 2011, vol. 2, issue 3, Article 2.

- Philippon, Thomas, “The Evolution of the US Financial Industry from 1860 to 2007: Theory and Evidence,” mimeograph, New York University, 2008.
- Reinhart, Carmen M. (2010), “This Time is Different Chartbook: Country Histories on Debt, Default, and Financial Crises” in *A Decade of Debt*, (with Kenneth S. Rogoff). *Policy Analyses in International Economics 95* (Washington DC: Peterson Institute for International Economics, September 2011).
- Reinhart, Carmen M. and Vincent R. Reinhart “After the Fall,” forthcoming in Federal Reserve Bank of Kansas City Economic Policy Symposium, *Macroeconomic Challenges: The Decade Ahead* at Jackson Hole, Wyoming, on August 26-28, 2010.
- Reinhart, Carmen M., and Kenneth S. Rogoff, (2009) *The Time is Different: Eight Centuries of Financial Folly*. Princeton: Princeton University Press, October.
- Reinhart, Carmen M., and Kenneth S. Rogoff (2010), “Growth in a Time of Debt” *American Economic Review*, (May).
- Reinhart, Carmen M., and Kenneth S. Rogoff (2010), “Debt and Growth Revisited,” Vox EU. August 11.
- Reinhart, Carmen M., and Kenneth S. Rogoff (2010b), “From Financial Crash to Debt Crisis,” NBER Working Paper 15795, March. *American Economic Review*.
- Reinhart, Carmen M., Miguel A. Savastano and Kenneth S. Rogoff, "Debt Intolerance", in William Brainard and George Perry (eds.), *Brookings Papers on Economic Activity 1: 2003*, 1-74.
- Sachs, Jeffrey (1989) “The Debt Overhang of Developing Countries,” in *Debt Stabilization and Development: Essays in Memory of Carlos Diaz Alejandro*, ed. by Guillermo Calvo and others (Oxford, Basil Blackwell).
- Schularick and Alan Taylor (2012) “Credit Booms Gone Bust: Monetary Policy, Leverage Cycles and Financial Crises, 1870–2008” forthcoming in *American Economic Review*.
- Stone, Irving (1999) *The Global Export of Capital from Great Britain, 1865–1914* (New York: St. Martin’s Press).