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# GROWTH IN A TIME OF DEBT

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## ABSTRACT

We study economic growth and inflation at different levels of government and external debt. Our analysis is based on new data on forty-four countries spanning about two hundred years. The dataset incorporates over 3,700 annual observations covering a wide range of political systems, institutions, exchange rate arrangements, and historic circumstances. Our main findings are: First, the relationship between government debt and real GDP growth is weak for debt/GDP ratios below a threshold of 90 percent of GDP. Above 90 percent, median growth rates fall by one percent, and average growth falls considerably more. We find that the threshold for public debt is similar in advanced and emerging economies. Second, emerging markets face lower thresholds for external debt (public and private)—which is usually denominated in a foreign currency. When external debt reaches 60 percent of GDP, annual growth declines by about two percent; for higher levels, growth rates are roughly cut in half. Third, there is no apparent contemporaneous link between inflation and public debt levels for the advanced countries as a group (some countries, such as the United States, have experienced higher inflation when debt/GDP is high.) The story is entirely different for emerging markets, where inflation rises sharply as debt increases.



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## I. Introduction

In this paper, we exploit a new multi-country historical data set on central government debt as well as more recent data on external (public and private) debt to search for a systematic relationship between debt levels, growth and inflation. [1] Our main result is that whereas the link between growth and debt seems relatively weak at "normal" debt levels, median growth rates for countries with public debt over 90 percent of GDP are roughly one percent lower than otherwise; average (mean) growth rates are several percent lower. Surprisingly, the relationship between public debt and growth is remarkably similar across emerging markets and advanced economies. Emerging markets do face a much more binding threshold for total gross external debt (public and private)—which is almost exclusively denominated in a foreign currency. We find that no systematic relationship between high debt levels and inflation for advanced economies as a group (albeit with individual country exceptions including the United States). By contrast, inflation rates are markedly higher in emerging market countries with higher public debt levels.

Our topic would seem to be a timely one. Government debt has been soaring in the wake of the recent global financial maelstrom, especially in the epi-center countries. This might have been expected. Using a benchmark of 14 earlier severe post-World-War II financial crises, we demonstrated (one year ago) that central government debt rises, on average, by about 86 percent within three years after the crisis.[2]

[1] In this paper "public debt" refers to gross central government debt. "Domestic public debt" is government debt issued under domestic legal jurisdiction. Public debt does not include debts carrying a government guarantee. Total gross external debt includes the external debts of **all** branches of government as well as private debt that is issued by domestic private entities under a foreign jurisdiction.

[2] Reinhart and Rogoff (2009a, b) demonstrate that the aftermath of a deep financial crisis typically involves a protracted period of macroeconomic adjustment, particularly in employment and housing prices.

Outsized deficits and epic bank bailouts may be useful in fighting a downturn, but what is the long run macroeconomic impact or higher levels of government debt, especially against the backdrop of graying populations and rising social insurance costs?

Our approach here is decidedly empirical, taking advantage of a broad new historical data set on public debt (in particular, central government debt), first presented in Reinhart and Rogoff (2008, 2009b). Prior to this data set, it was exceedingly difficult to get more than two or three decades of public debt data even for many rich countries, and virtually impossible for most emerging markets.[3] Our results incorporate data on forty-four countries spanning about two hundred years. Taken together, the data incorporate over 3,700 annual observations covering a wide range of political systems, institutions, exchange rate and monetary arrangements, and historic circumstances.

We also employ more recent data on external debt, including both debt owed by governments and by private entities. For emerging markets, we find that there exists a significantly more severe threshold for total gross external debt (public and private) -- which tends to be almost exclusively denominated in a foreign currency -- than for total public debt.(the domestically-issued component of which is largely denominated in home currency.) When gross external debt reaches 60 percent of GDP, annual growth declines by about two percent; for levels of external debt in excess of 90 percent of GDP, growth rates are roughly cut in half. We are not in a position to calculate separate total external debt thresholds (as opposed to public debt thresholds) for advanced countries. The available time series is too recent, beginning only in early 2000s as a byproduct of the International Monetary Fund efforts and creation of the Special

[3] For other related efforts on developing cross country public debt data bases, including Reinhart, Rogoff and Savasatano (2003) and Jeanne and Guscina (2006), see the discussion in Reinhart and Rogoff (2009b).

Data Dissemination Standard (SDDS). We do note, however, that external debt levels in advanced countries now average about 200 percent of GDP, with external debt levels being particularly high across Europe.

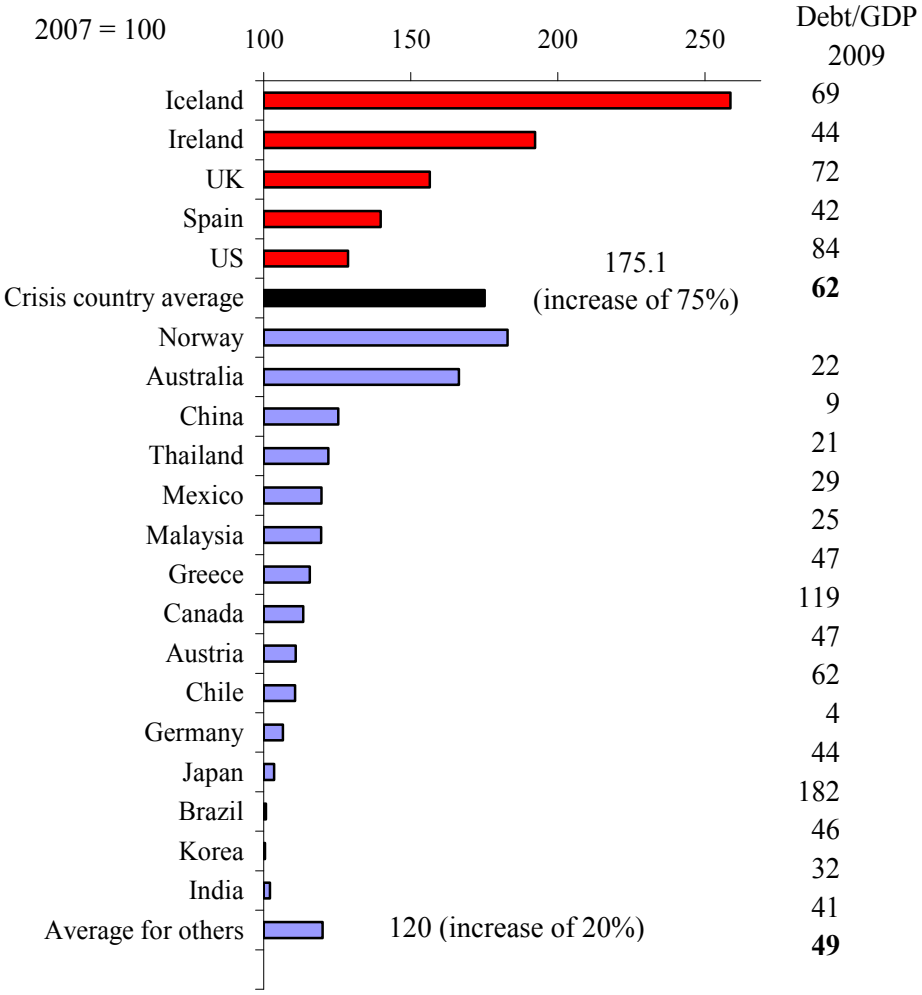
The focus of this paper is on the longer term macroeconomic implications of much higher public and external debt. The final section, however, discusses the role of private domestic debt examining the historical experience of the United States. We highlight episodes of private sector deleveraging of debts, normal after a systemic financial crisis; not surprisingly, such episodes are associated with very slow growth and deflation.

## II. The Global 2007-2009 Buildup in Public Debt

Figure 1 illustrates the increase in (inflation adjusted) public debt that has occurred since 2007. For the five countries with systemic financial crises (Iceland, Ireland, Spain, the United Kingdom, and the United States), average debt levels are up by about 75 percent, well on track to reach or surpass the three year 86 percent benchmark that Reinhart and Rogoff (2009a,b) find for earlier deep post-war financial crisis. Even in countries that have not experienced a major financial crisis, debt has risen during 2007-2009 by an average of about 20 percent in real terms.[4] This general rise in public indebtedness stands in stark contrast to the 2003-2006 period of public deleveraging in many countries and owes to direct bail-out costs in some countries, the adoption of stimulus packages to deal with the global recession in many countries, and marked declines in government revenues that have hit advanced and emerging market economies alike.

[4] Our focus on gross central government debt owes to the fact that time series of broader measures government are not available for many countries. Of course, the true run-up in debt is significantly larger than stated here, at least on a present value actuarial basis, due to the extensive government guarantees that have been conferred on the financial sector in the crisis countries and elsewhere.

Figure 1. Cumulative Increase in Real Public Debt Since 2007, Selected Countries




*Notes:* Unless otherwise noted these figures are for central government debt deflated by consumer prices.
*Sources:* Prices and nominal GDP from International Monetary Fund, *World Economic Outlook*. For a complete listing of sources for government debt, see Reinhart and Rogoff (2009b).

## III. Debt, Growth, and Inflation

The simplest connection between public debt and growth is suggested by Robert Barro (1979). Assuming taxes ultimately need to be raised to achieve debt sustainability, the distortionary impact imply is likely to lower potential output. As for inflation, an obvious connection stems from the fact that unanticipated high inflation can reduce the real cost of servicing the debt. Of course, the efficacy of the inflation channel is quite sensitive to the maturity structure of the debt. Whereas long-term nominal government debt is extremely vulnerable to inflation, short term debt is far less so. Any government that attempts to inflate away the real value of short term debt will soon find itself paying much higher interest rates when it comes time to refinance.

In principle, the manner in which debt builds up can be important. For example, war debts are arguably less problematic for future growth and inflation than large debts that are accumulated in peace time. Postwar growth tends to be high as war-time allocation of manpower and resources funnels to the civilian economy. Moreover, high war-time government spending, typically the cause of the debt buildup, comes to a natural close as peace returns. In contrast, a peacetime debt explosion often reflects unstable underlying political economy dynamics that can persist for very long periods.

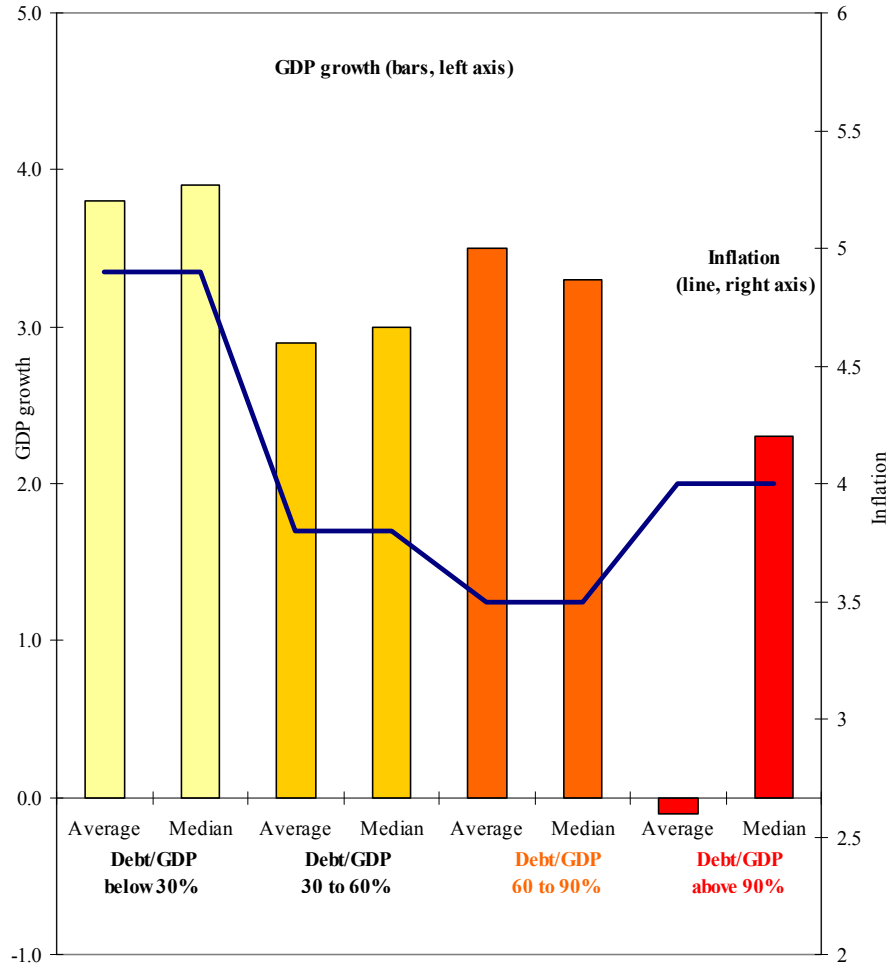
Here we will not attempt to discriminate the genesis of debt buildups, and instead simply look at their connection to average and median growth and inflation outcomes. This may lead us, if anything, to understate the adverse growth implications of debt burdens arising out of the current crisis, which was clearly a peace time event.

### *A. Evidence from Advanced Countries*

Figure 2 presents a summary of inflation and GDP growth across varying levels of debt for twenty advanced countries over the period 1946-2009. This group includes Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, the United Kingdom, and the United States. The annual observations are grouped into four categories, according to the ratio of debt-to GDP during that particular year as follows: years when debt to GDP levels were below 30 percent (low debt); years where debt/GDP was 30 to 60 percent (medium debt); 60 to 90 percent (high); and above 90 percent (very high). [5] The bars in Figure 2 show average and median GDP growth for each of the four debt categories. Note that of the 1186 annual observations, there are a significant number in each category, including 96 above 90 percent. (Recent observations in that top bracket come from Belgium, Greece, Italy, and Japan.) From the figure, it is evident that there is no obvious link between debt and growth until public debt reaches a threshold of 90 percent. The observations with debt to GDP over 90 percent have median growth roughly 1 percent lower than the lower debt burden groups and mean levels of growth almost 4 percent lower. The line in Figure 2 plots the median inflation for the different

[5] The four "buckets" encompassing low, medium-low, medium-high, and high debt levels are based on our interpretation of much of the literature and policy discussion on what is considered low, high etc debt levels. It parallels the World Bank country groupings according to four income groups. Sensitivity analysis involving a different set of debt cutroffs merits exploration as do country-specific debt thresholds along the broad lines discussed in Reinhart, Rogoff, and Savastano (2003).

Figure 2. Government Debt, Growth, and Inflation: Selected Advanced Economies, 1946-2009

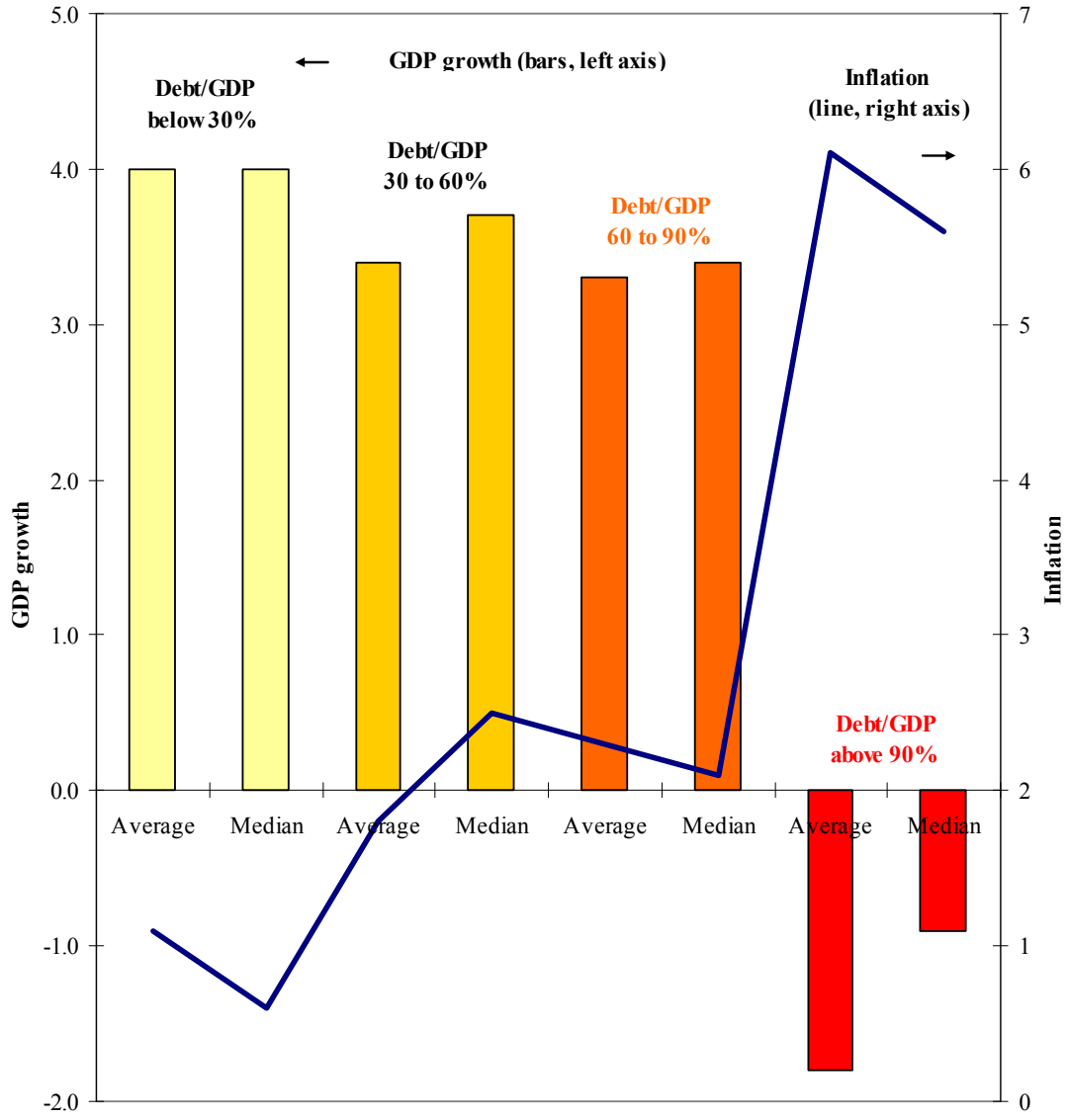



*Notes:* Central government debt includes domestic and external public debts. The 20 advanced economies included are Australia. Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, the United Kingdom, and the United States. The number of observations for the four debt groups are: 443 for debt/GDP below 30%; 442 for debt/GDP 30 to 60%; 199 observations for debt/GDP 60 to 90%; and 96 for debt/GDP above 90%. There are 1,180 observations.
*Sources:* International Monetary Fund, *World Economic Outlook*, OECD, World Bank, *Global Development Finance,* and Reinhart and Rogoff (2009b) and sources cited therein.

debt groupings—which makes plain that there is no apparent pattern of **simultaneous** rising inflation and debt. [6] There are exceptions to this inflation result, as Figure 3 makes plain for the Unites States, where debt levels over 90% of GDP are linked to significantly elevated inflation. Figure 3 spans 1791-2009, but the pattern for the post-war period taken alone is very similar.

[6] See Appendix Tables 1 and 2 for 1946-2009 summary statistics on growth and inflation, respectively, for advanced economies and emerging markets.

Figure 3. United States Central (Federal) Government Debt, Growth, and Inflation: 1790-2009




*Notes:* Central government debt is gross debt. The number of observations for the four debt groups are: 129 for debt/GDP below 30%; 59 for debt/GDP 30 to 60%; 23 observations for debt/GDP 60 to 90%; and 5 for debt/GDP above 90%, for a total of 216 observations.
*Sources:* International Monetary Fund, *World Economic Outlook*, OECD, World Bank, *Global Development Finance,* ), US Treasury Direct, Reinhart and Rogoff (2009) and sources cited therein.

Table 1 provides detail on the growth experience for individual countries, but over a much longer period, typically one to two centuries. Interestingly, introducing the longer time series yields remarkably similar conclusions. Over the past two centuries, debt in excess of 90 percent has typically been associated with mean growth of 1.7 percent versus 3.7 percent when debt is low (under 30 percent of GDP), and compared with growth rates of over 3 percent for the two middle categories (debt between 30 and 90 percent of GDP). Of course, there is considerable variation across the countries, with some countries such as Australia and New Zealand experiencing no growth deterioration at very high debt levels. It is noteworthy, however, that those high-growth high-debt observations are clustered in the years following World War II.

Table 1. Real GDP Growth as the Level of Government Debt Varies:
Selected Advanced Economies, 1790-2009
(annual percent change)

| Country | Period | Central (Federal) government debt/ GDP | | | |
|---|---|---|---|---|---|
| | | Below 30 percent | 30 to 60 percent | 60 to 90 percent | 90 percent and above |
| Australia | 1902-2009 | 3.1 | 4.1 | 2.3 | 4.6 |
| Austria | 1880-2009 | 4.3 | 3.0 | 2.3 | n.a. |
| Belgium | 1835-2009 | 3.0 | 2.6 | 2.1 | 3.3 |
| Canada | 1925-2009 | 2.0 | 4.5 | 3.0 | 2.2 |
| Denmark | 1880-2009 | 3.1 | 1.7 | 2.4 | n.a. |
| Finland | 1913-2009 | 3.2 | 3.0 | 4.3 | 1.9 |
| France | 1880-2009 | 4.9 | 2.7 | 2.8 | 2.3 |
| Germany | 1880-2009 | 3.6 | 0.9 | n.a. | n.a. |
| Greece | 1884-2009 | 4.0 | ***0.3*** | ***4.8*** | 2.5 |
| Ireland | 1949-2009 | 4.4 | 4.5 | 4.0 | 2.4 |
| Italy | 1880-2009 | ***5.4*** | ***4.9*** | 1.9 | 0.7 |
| Japan | 1885-2009 | 4.9 | 3.7 | 3.9 | 0.7 |
| Netherlands | 1880-2009 | 4.0 | 2.8 | 2.4 | 2.0 |
| New Zealand | 1932-2009 | 2.5 | 2.9 | 3.9 | **3.6** |
| Norway | 1880-2009 | 2.9 | 4.4 | n.a. | n.a. |
| Portugal | 1851-2009 | 4.8 | 2.5 | 1.4 | n.a. |
| Spain | 1850-2009 | ***1.6*** | 3.3 | ***1.3*** | 2.2 |
| Sweden | 1880-2009 | 2.9 | 2.9 | 2.7 | n.a. |
| United Kingdom | 1830-2009 | 2.5 | 2.2 | 2.1 | 1.8 |
| United States | 1790-2009 | 4.0 | 3.4 | 3.3 | ***-1.8*** |
| Average | | **3.7** | **3.0** | **3.4** | **1.7** |
| Median | | **3.9** | **3.1** | **2.8** | **1.9** |
| Number of observations = **2,317** | | 866 | 654 | 445 | 352 |

*Notes:* An n.a. denotes no observations were recorded for that particular debt range. There are missing observations, most notably during World War I and II years; further details are provided in the data appendices to Reinhart and Rogoff (2009) and are available from the authors. Minimum and maximum values for each debt range are shown in ***bolded italics.***
*Sources:* There are many sources, among the more prominent are: International Monetary Fund, *World Economic Outlook*, OECD, World Bank, *Global Development Finance.* Extensive other sources are cited Reinhart and Rogoff (2009).

### *B. Evidence from Emerging Market Countries*

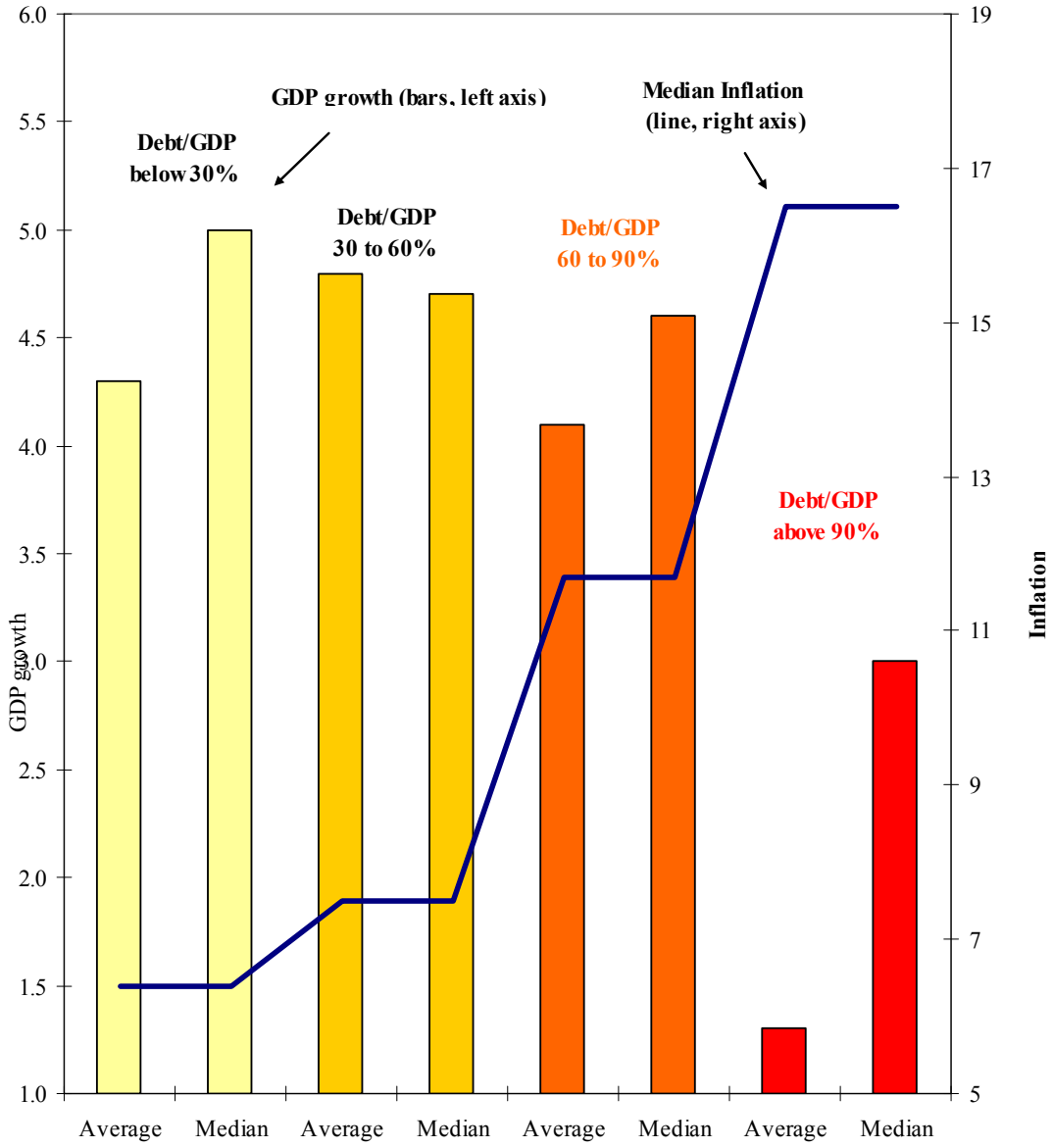
We next perform the same debt ratio exercise for 24 emerging market economies for the periods 1946-2009 and 1900-2009, using comparable central government debt data as we used for the advanced economies. [7] Perhaps surprisingly, the results illustrated in Figure 4 and Table 2 for emerging markets largely repeat the results in Figure 2 and Table 1. For 1900-2009, for

[7] While we have pre-1900 inflation, real GDP, and public debt data for many emerging markets, nominal GDP data is seldom available.

example, median and average GDP growth hovers around 4-4.5 percent for levels of debt below 90 percent of GDP but median growth falls markedly to 2.9 percent for high debt (above 90 percent); the decline is even greater for the average growth rate, which falls to 1 percent. With much faster population growth than the advanced economies, the implications for per capita GDP growth are in line (or worse) with those shown for advanced economies. The similarities with advanced economies end there, as higher debt levels are associated with significantly higher levels of inflation in emerging markets. Median inflation more than doubles (from less than 7 percent to 16 percent) as debt rises from the low (0 to 30 percent) range to above 90 percent. [8] Fiscal dominance is a plausible interpretation of this pattern.

[8] See Appendix Tables 1 and 2 for 1946-2009 summary statistics on growth and inflation, respectively, for advanced economies and emerging markets.

Figure 4. Public Debt, Growth, and Inflation: Selected Emerging Markets, 1946-2009




*Notes:* External debt includes public and private debts. The 24 emerging market countries included are Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Ecuador, El Salvador, Ghana, India, Indonesia, Kenya, Korea, Malaysia, Mexico, Nigeria, Peru, Philippines, Singapore, South Africa, Sri Lanka, Thailand, Turkey, Uruguay, and Venezuela. The number of observations for the four debt groups are: 502 for debt/GDP below 30%; 385 for debt/GDP 30 to 60%; 145 observations for debt/GDP 60 to 90%; and 110 for debt/GDP above 90%. There are a total of 1142 annual observations.

*Sources:* International Monetary Fund, *World Economic Outlook*, World Bank, *Global Development Finance,* and Reinhart and Rogoff (2009b) and sources cited therein.

Table 2. Real GDP Growth as the Level of Government Debt Varies:
Selected Emerging Market Economies, 1900-2009
(annual percent change)

| Country | Period | Central (Federal) government debt/ GDP | | | |
|---|---|---|---|---|---|
| | | Below 30 percent | 30 to 60 percent | 60 to 90 percent | 90 percent and above |
| Argentina | 1900-2009 | 4.3 | 2.7 | 3.6 | 0.5 |
| Bolivia | 1950-2009 | ***0.7*** | 5.2 | 3.7 | 3.9 |
| Brazil | 1980-2009 | 3.2 | 2.3 | 2.6 | 2.3 |
| Chile | 1900-2009 | 4.0 | ***1.0*** | 7.5 | -4.5 |
| Colombia | 1923-2009 | 4.3 | 3.0 | n.a. | n.a. |
| Costa Rica | 1950-2009 | ***6.9*** | 5.0 | 3.4 | 3.0 |
| Ecuador | 1939-2009 | 5.3 | 5.0 | 3.2. | 1.5 |
| El Salvador | 1939-2009 | 3.6 | 2.6 | n.a. | n.a. |
| Ghana | 1952-2009 | n.a. | 4.6 | 4.7 | 1.9 |
| India | 1950-2009 | 4.2. | 4.9 | n.a. | n.a. |
| Indonesia | 1972-2009 | 6.6 | 6.3 | ***-0.1*** | 3.1 |
| Kenya | 1963-2009 | 6.3 | 4.2 | 2.3 | 1.2 |
| Malaysia | 1955-2009 | 2.0 | 6.2 | 6.9 | ***5.5*** |
| Mexico | 1917-2009 | 4.1 | 3.4 | 1.2. | -0.7 |
| Nigeria | 1990-2009 | 5.4 | ***10.6*** | ***11.2*** | 2.6. |
| Peru | 1917-2009 | 4.3 | 2.9 | 2.7 | n.a. |
| Philippines | 1950-2009 | 5.0 | 3.8 | 5.1 | n.a. |
| Singapore | 1969-2009 | n.a. | 9.5 | 8.2 | 4.0. |
| South Africa | 1950-2009 | 2.0 | 3.5 | n.a. | n.a. |
| Sri Lanka | 1950-2009 | 3.3 | 3.7 | 4.2 | 5.0 |
| Thailand | 1950-2009 | 6.1 | 6.6 | n.a. | n.a. |
| Turkey | 1933-2009 | 5.4 | 3.7 | 3.2 | -6.4 |
| Uruguay | 1935-2009 | 2.1 | 3.1 | 3.2 | 0.0 |
| Venezuela | 1921-2009 | 6.5 | 4.1 | 3.2 | ***-6.5*** |
| Average | | **4.3** | **4.1** | **4.2** | **1.0** |
| Median | | **4.5** | **4.4** | **4.5** | **2.9** |
| Number of observations = **1,397** | | 686 | 450 | 148 | 113 |

*Notes:* An n.a. denotes no observations were recorded for that particular debt range. There are missing observations for some years details are provided in the data appendices to Reinhart and Rogoff (2009) and are available from the authors. Minimum and maximum values for each debt range are shown in ***bolded italics.***

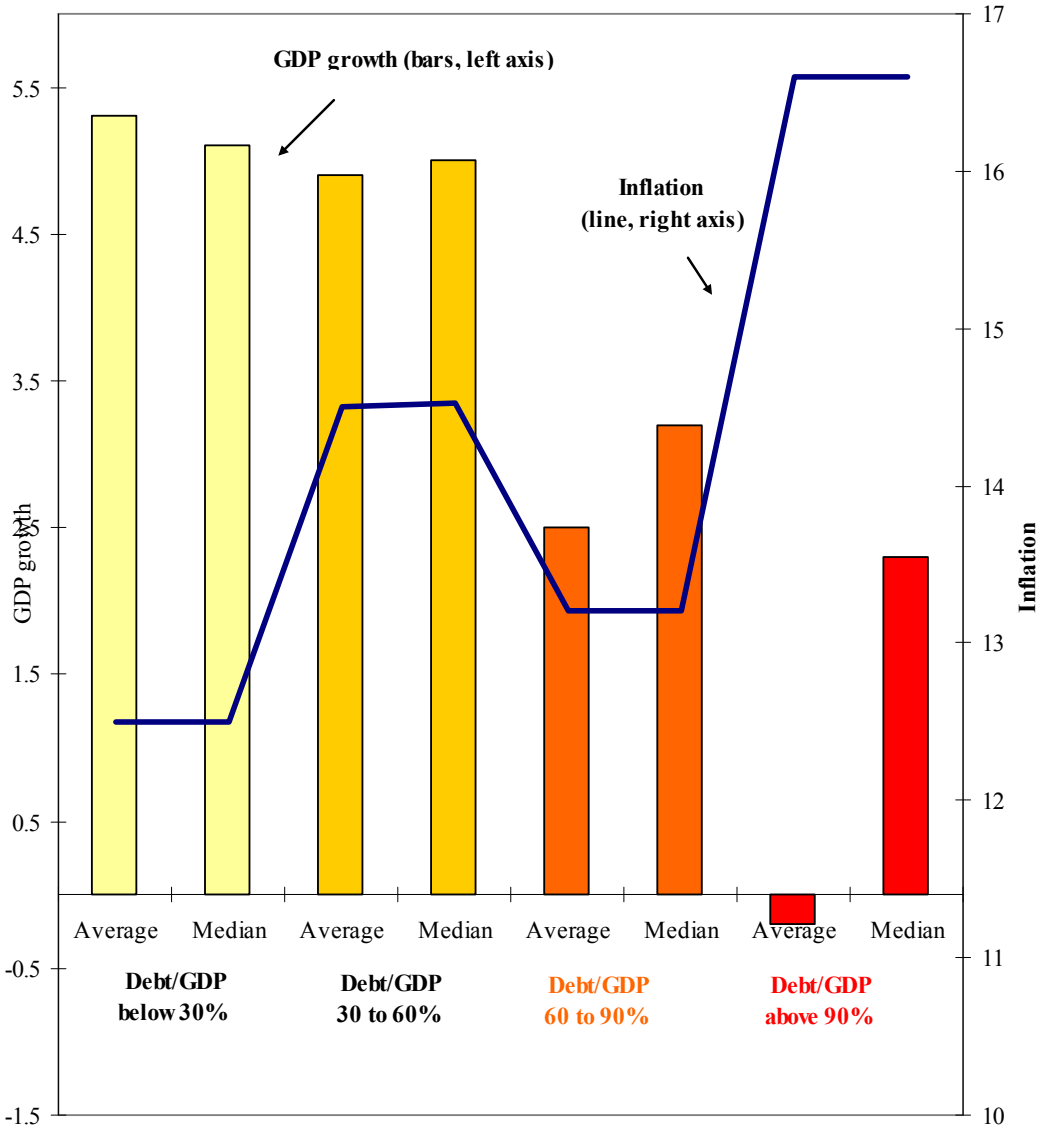
*Sources:* There are many sources, among the more prominent are: International Monetary Fund, *World Economic Outlook*, OECD, World Bank, *Global Development Finance.* Extensive other sources are cited Reinhart and Rogoff (2009).

### *C. External Debts*

Because emerging markets often depend so much on external borrowing, it is interesting to look separately at thresholds for external debt (combined public and private). Combined public and private sector debt is of interest because in the case of crisis, the distinction between public and private often becomes blurred in a maze of bailouts, guarantees, and international hard currency constraints (see Reinhart and Rogoff, 2009b).

In Figure 5, we highlight the connection between for gross external debt as reported by the World Bank and growth and inflation. As one can see, the growth thresholds for external debt are considerably lower than for the thresholds for total public debt. Growth deteriorates markedly at external debt levels over 60 percent, and further still when external debt levels exceed 90 percent, which record outright declines. In light of this, it is more understandable that over one half of all defaults on external debt in emerging markets since 1970 occurred at levels of debt that would have met the Maastricht criteria of 60 percent or less. Inflation becomes significantly higher only for the group of observations with external debt over 90 percent.

Figure 5. External Debt, Growth, and Inflation: Selected Emerging Markets, 1970-2009

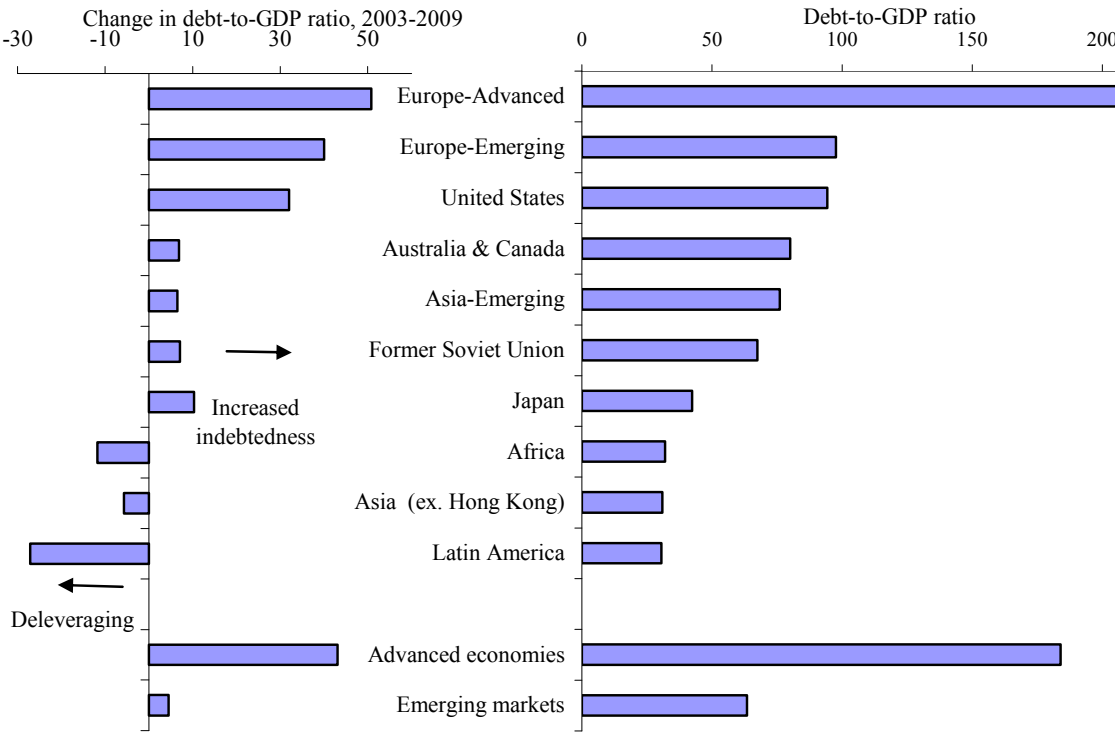



*Notes:* External debt includes public and private debts. The 20 emerging market countries included are Argentina, Bolivia, Brazil, Chile, China, Colombia, Egypt, India, Indonesia, Korea, Malaysia, Mexico, Nigeria, Peru, Philippines, South Africa, Thailand, Turkey, Uruguay, and Venezuela. The number of observations for the four debt groups are: 252 for debt/GDP below 30%; 309 for debt/GDP 30 to 60%; 120 observations for debt/GDP 60 to 90%; and 74 for debt/GDP above 90%. There is a total of 755 annual observations.

*Sources:* International Monetary Fund, *World Economic Outlook*, World Bank, *Global Development Finance,* and Reinhart and Rogoff (2009b) and sources cited therein.

As noted in the introduction, there is no comparable long time series on total external debt for advanced countries; the relatively new IMF data set we use begins only in 2003. Although we have no historical benchmarks for the advanced countries, the summary results in Figure 6, based on 2003-2009 gross external debt as a percent of GDP, is indeed disconcerting. The left hand panel of the figure indicates whether there has been an increase in indebtedness to GDP over the 2003-09 period, or a decrease (deleveraging.). The right hand panel gives the ratio of gross external debt to GDP as of the end of the second quarter of 2009. The group averages are based on a total data set of 59 countries.

Figure 6. Gross External Debt as a Percent of GDP: Averages for Selected 59 Countries, 2003-2009
*(in percent)*




Sources: International Monetary Fund, *World Economic Outlook*, World, Bank, Quarterly External Debt Statistics (QUEDS), and authors' calculations.
Notes: Data for 2009 end in the second quarter. The countries participating in QUEDS included in these calculations are listed in what follows by region. *Advanced-Europe:* Austria, Belgium, Denmark, Finland, France, Germany, Greece, Italy, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, (15 countries). If Ireland were included, the averages would be substantially higher for this group. *Emerging Europe*: Bulgaria, Croatia, Czech Republic, Estonia, Latvia, Lithuania, Poland, Romania, Slovak Republic, Slovenia, and Turkey, (11 countries). *Former Soviet Union:* Armenia, Belarus, Georgia, Kazakhstan, Kyrgyz Republic, Moldova, Russia, and the Ukraine (8 countries). *Africa*: Egypt, South Africa, and Tunisia (3 countries). *Asia-Emerging*: Hong Kong, India, Indonesia, Korea, Malaysia, Thailand (6 countries*). Latin America*: Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Ecuador, El Salvador, Mexico, Paraguay, Peru, and Uruguay (12 countries). There are a total of 19 advanced economies and 40 emerging markets.

As the right hand side of the figure illustrates, external debt burdens are particularly high in Europe, with an average external debt to GDP ratio across advanced European economies of over 200 percent, and an average external debt to GDP across emerging European economies roughly 100 percent.[9] Interestingly, the United States' gross debt liabilities are less than half of Europe's as a share of GDP, despite the country's epic sequence of trade balance deficits. Japan, despite having a gross public debt to GDP ratio approaching 200 percent, has much smaller gross external liabilities still, thanks in no small part to Japan's famously strong home bias in bond holdings.

Famously profligate Latin America, by contrast to the advanced economies, now has gross external debt liabilities averaging only around 50 percent of GDP. Moreoever, in contrast to the advanced countries who added an average of 50 percent of GDP to gross external debt during the recent period, Latin American countries actually delivered external debt by over 30 percent of GDP.

Of course, given the lack of sufficient long-dated historical data on advanced economies external debts, it is not possible to know whether they face similar thresholds to emerging markets. It is likely that the thresholds are higher for advanced economies that issue most external debt in their own currency.

## IV. Private Sector Debt, Deleveraging and Growth: An Illustration

Our main focus has been on total public and total external debt, since reliable data on private internal domestic debts are much scarcer across countries and time. We have shown that

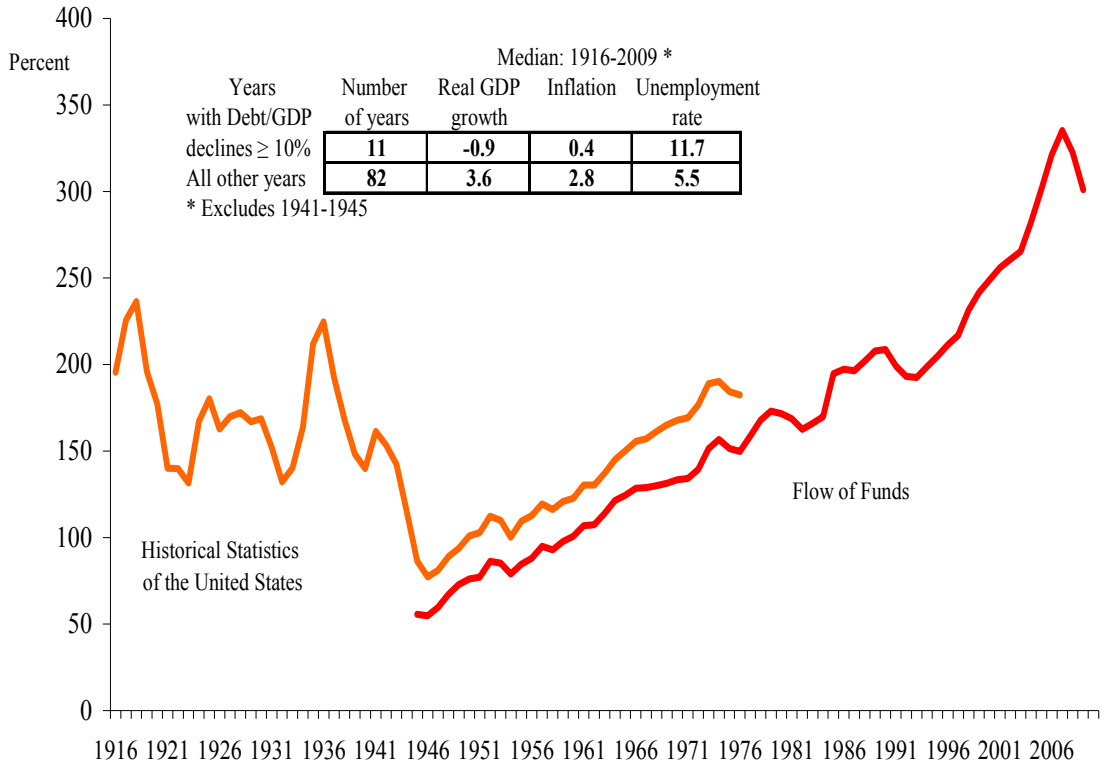
[9] In effect, if Ireland is added to the list, the average for advanced European economies rises to 266 percent!.

public levels of debt/GDP that push the 90 percent threshold are associated with lower median and average growth; for emerging markets there are even stricter thresholds for external debt while growth thresholds for advanced economies remains an open question due to the fact only very recent data is available.[10]

These observations, however, present only a partial picture of the post-financial crisis landscape, particularly for the years immediately following the crisis. Private debt, in contrast to public debt, tends to shrink sharply for an extended period after a financial crisis. Just as a rapid expansion in private credit fuels the boom phase of the cycle, so does serious deleveraging exacerbate the post-crisis downturn. This pattern is illustrated in Figure 7, which shows the ratio of private debt to GDP for the United States for 1916-2009. As the box in the figure illustrates, periods of sharp deleveraging tend to associated with much lower growth and higher unemployment. The magnitude of the current deleveraging episode in the United States has no counterpart in the post-war period. In varying degrees, the private sector (households and firms) in many other countries (notably both advanced and emerging Europe) are also unwinding the debt built up during the boom years. Thus, private deleveraging may be another legacy of the financial crisis that may dampen growth in the medium term.

[10] It is important to note that post crises increases in public debt do not necessarily push economies in to the vulnerable 90+ debt/GDP range.

Figure 7. United States: Private Debt Outstanding, 1916-2009
(end-of- period stock of debt as a percent of GDP)




Median: 1916-2009 *

| Years with Debt/GDP declines ≥ 10% | Number of years | Real GDP growth | Inflation | Unemployment rate |
|---|---|---|---|---|
| | **11** | **-0.9** | **0.4** | **11.7** |
| All other years | **82** | **3.6** | **2.8** | **5.5** |

* Excludes 1941-1945

*Notes:* Data for 2009 is end-of-June. The years with private debt/GDP annual declines greater than or equal to 10 percent are: 2008 and 2009.
Sources: Historical Statistics of the United States, Flow of Funds, Board of Governors of the Federal Reserve International Monetary Fund, *World Economic Outlook*, OECD, World Bank, *Global Development Finance,* and Reinhart and Rogoff (2009b) and sources cited therein.

## V. Concluding Remarks

The sharp run-up in public sector debt will likely prove one of the most enduring legacies of the 2007-2009 financial crises in the United States and elsewhere. We examine the experience of forty four countries spanning up to two centuries of data on central government debt, inflation and growth. Our main finding is that across both advanced countries and

emerging markets, high debt/GDP levels (90 percent and above) are associated with notably lower growth outcomes. In addition, for emerging markets, there appears to be a more stringent threshold for total external debt/GDP (60 percent), that is also associated with adverse outcomes for growth. Seldom do countries simply "grow" their way out of deep debt burdens.

Why are there thresholds in debt, and why 90 percent? This is an important question that merits further research, but we would speculate that the phenomenon is closely linked to logic underlying our earlier analysis of "debt intolerance" in Reinhart, Rogoff, and Savastano (2003). As we argued in that paper, debt thresholds are importantly country-specific and as such the four broad debt groupings presented here merit further sensitivity analysis. A general result of our "debt intolerance" analysis, however, highlights that as debt levels rise towards historical limits, risk premia begin to rise sharply, facing highly indebted governments with difficult tradeoffs. Even countries that are committed to fully repaying their debts are forced to dramatically tighten fiscal policy in order to appear credible to investors and thereby reduce risk premia. The link between indebtedness and the level and volatility of sovereign risk premia is an obvious topic ripe for revisiting in light of the more comprehensive cross-country data on government debt.

Of course, there are other vulnerabilities associated with debt buildups that depend on the composition of the debt itself. As Reinhart and Rogoff (2009b, ch. 4) emphasize and numerous models suggest, countries that choose to rely excessively on short term borrowing to fund growing debt levels are particularly vulnerable to crises in confidence that can provoke very sudden and "unexpected" financial crises. Similar statements could be made about foreign versus domestic debt, as discussed. At the very minimum, this would suggest that traditional debt management issues should be at the forefront of public policy concerns.

Finally, we note that even aside from high and rising levels of public debt, many advanced countries, particularly in Europe, are presently saddled with extraordinarily high levels of total external debt, debt issued abroad by both the government and private entities. In the case Europe, the advanced country average exceeds 200 percent external debt to GDP. Although we do not have the long-dated time series needed to calculate advanced country external debt thresholds as we do for emerging markets, current high external debt burdens would also seem to be an important vulnerability to monitor.

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Appendix Table 1. Real GDP Growth as the Level of Debt Varies: Summary
(annual percent change)

| Measure | Period | Below 30 percent | 30 to 60 percent | 60 to 90 percent | 90 percent and above |
|---|---|---|---|---|---|
| Central (Federal) government debt/ GDP- | | | | | |
| Advanced economies | | | | | |
| Average | 1946-2009 | 4.1 | 2.8 | 2.8 | -0.1 |
| Median | 1946-2009 | 4.2 | 3.0 | 2.9 | 1.6 |
| Emerging Markets | | | | | |
| Average | 1946-2009 | 4.3 | 4.8 | 4.1 | 1.3 |
| Median | 1946-2009 | 5.0 | 4.7 | 4.6 | 2.9 |
| Total (public plus private) Gross External Debt/GDP | | | | | |
| Average | 1970-2009 | 5.2 | 4.9 | 2.5 | -0.2 |
| Median | 1970-2009 | 5.1 | 5.0 | 3.2 | 2.4 |

Appendix Table 2. Inflation as the Level of Debt Varies: Summary
(annual percent change)

| Measure | Period | Below 30 percent | 30 to 60 percent | 60 to 90 percent | 90 percent and above |
|---|---|---|---|---|---|
| Central (Federal) government debt/ GDP | | | | | |
| Advanced economies | | | | | |
| Average | 1946-2009 | 6.4 | 6.3 | 6.4 | 5.1 |
| Median | 1946-2009 | 5.2 | 3.7 | 3.5 | 3.9 |
| Emerging Markets | | | | | |
| Average | 1946-2009 | 64.8 | 39.4 | 105.9 | 119.6 |
| Median | 1946-2009 | 6.0 | 7.5 | 11.7 | 16.5 |
| Total (public plus private) Gross External Debt/GDP | | | | | |
| Average | 1970-2009 | 10.3 | 17.0 | 37.1 | 23.4 |
| Median | 1970-2009 | 10.9 | 12.1 | 13.2 | 16.6 |