Historical Patterns of Public Debt – Evidence From a New Database

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Abstract

The paper discusses the evolution of debt-to-GDP ratios across country groups for several decades, and episodes of debt spikes and reversals using the first truly comprehensive database on gross government debt-to-GDP ratios, covering nearly the entire IMF membership (174 countries) and spanning an exceptionally long time period. The database was constructed by bringing together a number of other datasets and information from original sources. The database is also used to document the negative correlation between debt and growth. An analysis of large debt changes in 19 advanced economies suggests a pattern of asymmetric contributions from the primary balance, interest-growth differential and stock-flow adjustment. The primary balance plays the dominant role in debt reductions, except during the post-WWII period when the interest-growth differential was notably favorable. Debt surges were associated with curiously large stock-flow adjustments, indicating, perhaps, governments' propensity to hide deficits during periods of fiscal stress.

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I. INTRODUCTION

In the wake of the global financial crisis, there has been strong, renewed interest in the behavior of public debt, especially in advanced economies. However, empirical work on debt cycles and debt sustainability has been constrained in the past by lack of public debt datasets covering long time periods and a wide group of countries. The most widely used sources of cross-country public debt data are the International Financial Statistics (IFS) and Government Finance Statistics (GFS) databases published by the IMF; and the Global Development Finance (GDF) dataset of the World Bank. Other regional and institutional bodies, such as the Organization for Economic Cooperation and Development (OECD) and the UN Economic Commission for Latin America (ECLAC), also compile and make available sovereign debt data for various groups of countries. These sources, however, do not reach far back in time. In addition, although researchers have collected data on public debt, these databases were often limited to a small set of countries, did not cover a long time horizon, or were not subsequently updated.

This paper describes the compilation of the first truly comprehensive historical public debt database (HPDD) covering gross government debt-to-GDP ratios for nearly the entire country membership of the IMF and spanning a long time period. The HPDD covers 174 countries and starts from 1880 for most G-7 countries and a few other advanced and emerging economies, and from 1920 for additional advanced and emerging economies.[1] For low-income countries (LICs), data coverage generally starts in 1970. The HPDD was compiled by bringing together a number of other databases of individual researchers or institutional bodies, as well as information from official government publications and publications of the League of Nations and the United Nations. For the most recent years, data are linked to the IMF's World Economic Outlook (WEO) database, facilitating regular updates going forward. The definitions of debt and income variables are documented, along with the time and country coverage of the underlying datasets. The HPDD is available publically in electronic format on the Fiscal Monitor Webpage of IMF.ORG.[2]

The paper discusses the evolution of debt-to-GDP ratios across country groups for several decades, and episodes of debt spikes and reversals. The database is also used to document the negative correlation between debt and growth. The paper examines large debt changes in 14 European and 5 non-European advanced economies and finds that debt surges are often associated with large stock-flow adjustments while major debt reduction episodes are primarily explained by primary surpluses (with the exception of the 1945-1970 period).

The paper is organized as follows. The next section surveys existing data sources on public debt. Section III describes the datasets and sources used in compiling the HPDD and the methodology for assembling information from these sources. Section IV provides summary

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[1] Data start prior to 1880 for the United States (1791), the United Kingdom (1830), New Zealand (1860), Italy (1861), Canada (1867), and Japan (1870).
[2] See http://www.imf.org/external/ns/cs.aspx?id=262.

statistics and assesses broad public debt trends by various country groupings. Section V analyzes the main drivers of large debt increases and decreases in 19 advanced economies. Section VI discusses the way forward, in terms of expanding time and country coverage in the HPDD, as well as providing additional information on debt composition, and possibly, other fiscal indicators.

II. REVIEW OF EXISTING DATA SOURCES

Obtaining comprehensive data and information on public debt is challenging. Data availability is limited along the dimensions of time, country coverage, and debt completeness. For example, data on *external* public debt for developing countries are generally available from the GDF dataset. However, the GDF does not cover advanced economies, and separates public and private components of external debt only for long-term debt. Similarly, the IFS database starts in 1970, but data are available for just a handful of countries in the early years. As noted, datasets of regional or institutional bodies cover public debt for subsets of countries and also typically start in more recent periods.

A number of researchers have compiled public sector debt data, either as an end goal or to address specific research questions. For example, to investigate the impact of domestic debt on growth, Abbas and Christensen (2010) collected data on 144 LICs and emerging economies for 1970–2007. They relied mainly on IFS data and focused on banking sector claims on central governments. Flandreau and Zumer (2004) analyzed the "first era of globalization" (1880–1913) and its evolution by collecting public debt-to-GDP data for 15 European countries and two Latin American countries, relying on a variety of data sources. Jaimovich and Panizza (2010) collected central government debt information for 100 countries, covering a diverse set of advanced, emerging, transition, and sub-Saharan African countries over the period 1970–2005. They relied on a range of sources and definitions with the goal of analyzing the residual term in debt dynamics not explained by overall deficits. Another notable contribution is Missale (2000), which covers 18 advanced economies during 1960–96. Finally, Reinhart and Rogoff (2009) analyzed episodes of debt cycles and financial crises for 70 countries spanning an exceptionally long time period, occasionally employing interpolations and other data transformations to build continuous data series. These series are available in "chartbook" form in Reinhart and Rogoff (2010).

Two other papers focus specifically on building sovereign debt datasets. Jeanne and Guscina (2006) collected data on emerging economy public debt, with details on the jurisdiction of issuance, maturity, currency, and indexation. The data cover 19 emerging economies during 1980–2002 and were compiled mainly from official publications, supplemented by information from questionnaires to country authorities and IMF data. Cowan, Levy-Yeyati, Panizza, and Sturzenegger (2006) constructed a database to highlight trends in the level and composition of public debt in the Americas, while analyzing debt dollarization. Their data cover 29 countries in the region, and for comparison, three economies from outside; the time coverage is 1980–2005.

The HPDD extends this body of work by compiling the widest available public debt data, in terms of countries covered and the time period, while preserving the data series as they were collected from original sources. The HPDD provides detailed documentation on coverage and sources, and the database is made available in electronic format. Finally, the HPDD will be regularly updated through links to the IMF WEO database and supplemented with additional information, where available, to fill gaps.[3]

III. DATA SOURCES AND METHODOLOGY

This section describes the data sources used in compiling the HPDD and the methodology employed to construct continuous series, including the approach used to link country series from different databases and the treatment of breaks when transitioning from one series to another.

A. Data Sources

The dataset constitutes an unbalanced panel of 174 countries over the period 1791-2009.[4] In constructing the dataset, we relied on various sources for series on debt, GDP, and debt-to-GDP ratios. These included statistical handbooks—for example, of the League of Nations and the United Nations—official government publications, and databases complied by researchers and international organizations.

The HPDD aims to cover public debt at the general government level.[5] The distinction between general and central government coverage, however, was difficult to ascertain further back in time, especially in relation to the treatment of extrabudgetary funds. Therefore, and given the lack of public debt data at the general government level for many countries, particularly in the earlier periods, debt data for the central government were used as an alternative.

Public debt data for the earliest period were compiled from official government publications for several G-7 countries, including for the United States (from 1791), the United Kingdom (from 1830), Italy (from 1861), Canada (from 1867), and Japan (from 1870). Data for other countries were also available during 1880-1913 from Flandreau and Zumer (2004). Government publications were used for other advanced economies, including New Zealand

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[3] The IMF Statistics Department and the World Bank will launch an online Public Sector Debt Statistics Database in December 2010 based on the forthcoming Public Sector Debt Statistics Guide (see http://www.tffs.org/PSDStoc.htm). The database will facilitate timely, quarterly dissemination of contemporary debt data for the public sector, with countries participating voluntarily and encouraged to provide a detailed breakdown of debt information (e.g., by term, currency of denomination, and residency).

[4] Data on public debt are not available for a handful of countries, including Afghanistan, Iraq, Kiribati, Kosovo, Timor-Leste, and Somalia.

[5] The general government sector consists of all government units and all nonmarket nonprofit institutions that are controlled and mainly financed by government units, comprising the central, state, and local governments. The general government sector does not include public corporations or quasi-corporations.

(from 1860) and the Netherlands (from 1914). In the period after 1914 through 1970, debt data were generally drawn from the League of Nations and/or the United Nations statistical handbooks. Besides Flandreau and Zumer (2004), other researcher databases were used, notably, Missale (2000), for some advanced countries during 1960–96, and Abbas and Christensen (2010), for a large number of developing and emerging economies after 1970. Other sources to fill gaps were Jaimovich and Panizza (2010), Cowen et al. (2006), and Fouad et al. (2007), the last of which covers 19 Middle Eastern and Central Asian countries during 1990–2005. The remaining data sources include the OECD (from 1980) and the IMF WEO from the mid-1990s, with the exception of a few emerging economies and LICs, for which WEO public debt data are only available from the mid-2000s. Figure 1 provides a breakdown of the share of all annual country observations obtained from these various sources.

Figure 1. Distribution of HPDD Debt-to-GDP Observations by Data Source
(Share in total data-points)
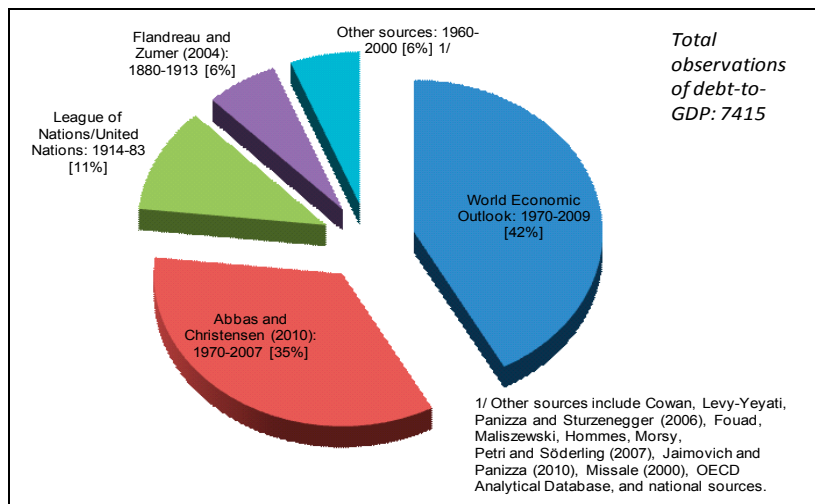
Source: HPDD.

For most countries, data on GDP were not available before 1914, and therefore, proxy variables, such as Gross National Product (GNP) or Net National Product (NNP), were used for computing debt ratios in the earlier years. From 1914 through 1980, GDP data for most countries were mainly sourced from Mitchell (2003).[6] Government publications were also used for collecting GDP data for some countries, including Canada, Italy, Japan, the Netherlands, New Zealand, the United Kingdom, and the United States. For some Latin American countries, GDP data were taken from the Oxford Latin American Economic History database, which covers 1900–2000. GDP data were also drawn from the OECD for some member countries beginning in 1960. Starting from the mid-1990s, GDP data for almost all countries were taken from the IMF WEO.

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[6] For the United States, GNP data were available from Mitchell (2003) from 1791 through 1900.

A detailed description of the various databases and sources employed in constructing the HPDD, including country coverage, period coverage, variables and definitions, is provided in Appendix Table 1. Appendix Table 2 documents the data sources used, over different time horizons, for each country.

B.   Methodology

In most cases, the independence date for each country (reported in Appendix Table 2) provided the relevant benchmark for our data collection efforts. In some cases, such as Finland, Dominica, Grenada, Papua New Guinea, New Zealand, Norway, Slovakia, and Zimbabwe, debt data were available for a few years in advance of independence years and appeared consistent with the trend in later years. These data were retained. Similarly, data were also available and included for Austria-Hungary (reported under Austria) and Czechoslovakia (reported under Czech Republic).

The dataset was compiled without recourse to extrapolation, interpolation, or auxiliary regressions. Given the range of sources used, differences in coverage and definitions arose. In many cases, transitions from one source to another were smooth. However, in other instances, there were either step differences between series or differences in the implied direction of the underlying debt ratio. In such situations, breaks were implemented in the HPDD. These are clearly highlighted in the dataset.[7]

To facilitate comparison of various country groups over time, medians and PPP GDP-weighted averages were computed. We did not use simple averages, as they may result in indicators that are biased by outliers; some countries had episodes when debt ratios reached triple-or even four-digit levels. The construction of a PPP GDP series, going back more than 100 years, involved two datasets: (i) the IMF WEO database on PPP GDP which goes back about 30 years but has continuous coverage for all 174 countries; and (ii) the Maddison (2010) dataset on real GDP (based on international Geary-Khamis dollars) for about 140 countries over a long time period, but with gaps, and ending in 2008. In the HPDD, we used the Maddison series for 140 countries, and filled in the remaining countries from the WEO database through 2008. We estimated the 2009 data using growth rates from the WEO PPP GDP series.

IV.   DESCRIPTIVE STATISTICS AND PUBLIC DEBT TRENDS

The HPDD builds on the aforementioned data sources to provide exceptional country coverage, especially after 1970 (Figure 2).[8] At the start of the 1880–2009 period, debt ratios

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[7] A total of 81 breaks were implemented in 58 countries, with a maximum of four breaks per country for only a couple of countries. The majority of breaks were applied to minimize step differences in the debt ratio series when transitioning from one data source to another.
[8] Regions are grouped according to the five IMF regional departments: Western Hemisphere Department (WHD), European Department (EUR), African Department (AFR), Asia and Pacific Department (APD), and

(continued)

could be identified for about 20 countries, mainly in Europe. The sample size rises significantly in 1970, when Abbas and Christensen (2010) and the IMF WEO bring in several Latin American LICs and most post-colonial states in Africa, Asia and the Middle East.[9] Another wave of new countries, in Central and Eastern Europe and Central Asia, comes on board in the 1990s, following the breakup of the Soviet Union and Yugoslavia.

Figure 2. Number of Countries with Identified Public Debt-to-GDP Data, by Decade[1/]
(In number of countries, by region)
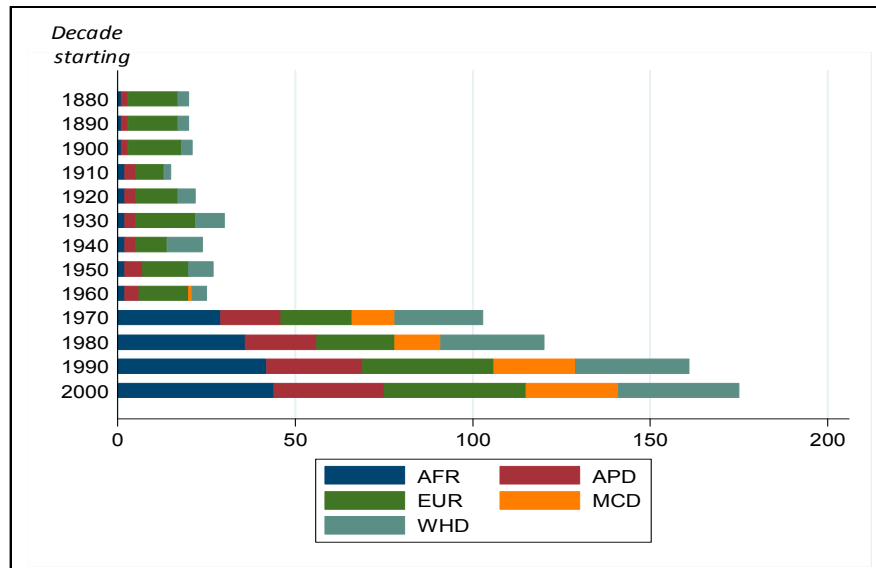
1/ Countries were included in a particular decade if they had 5 or more years of debt-to-GDP data in that decade.
Source: HPDD.

The HPDD facilitates a range of notable comparisons, both across time and country groups. This includes a comparison of the Great Depression of 1929–32 with the current period marked by the global financial crisis. Presenting debt data in two heat maps indicates that the implications of the current crisis for public debt appear to be graver, in spite of a less dramatic growth impact at present as compared with the Great Depression (Figure 3). This reflects—at least in part—a much weaker starting point at the outset of the current episode— debt ratios were 20 percentage points of GDP higher, on average, in advanced G-20 countries in 2007 (PPPGDP-weighted average) than in 1928—and a more significant impact of crisis-related factors that were broadly similar across the two periods, namely a sharp drop in

revenues (due in both cases to the collapse in activity, asset prices, and financial sector profits) and the provision of stimulus and financial sector support.[10]

**Figure 3. A Tale of Two Crises: The Great Depression (1932)
and the Global Financial Crisis (2009)**
(color-coding represents debt-to-GDP ratios)[11]
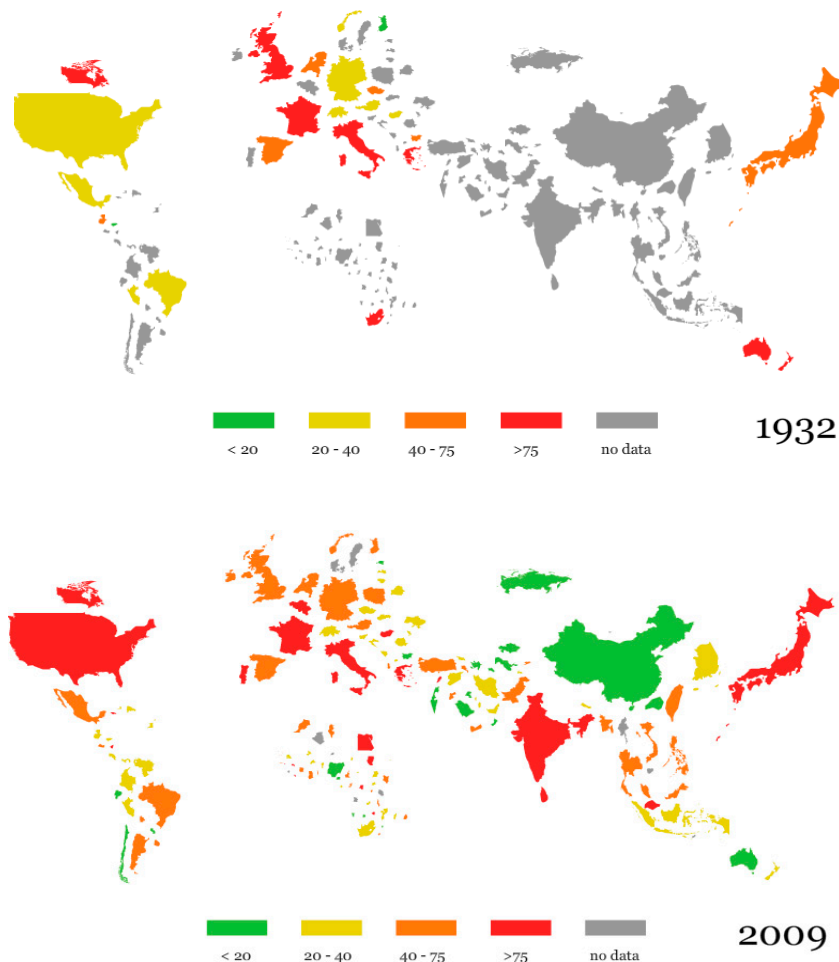
Source: HPDD; country sizes are proportional to their 2009 GDP level (in PPP terms).

Debt levels in the advanced economies now covered by the G-20 group averaged 55 percent of GDP over 1880–2009, although episodes of much higher debt ratios have been common. During the first era of financial globalization (1880-1913), debt ratios in both G-20 advanced and emerging economies (for which data are available) trended down (Figure 4). In advanced economies decreased debt ratios decreased from 45 percent of GDP in 1880 to 29 percent of GDP in 1913. The gold standard that prevailed during this period was associated with unprecedented private capital inflows and trade flows, which spurred growth while lowering public debt ratios. Debt reached its lowest ratio ever—23 percent of GDP in advanced economies—in 1914, when World War I began. But debt then began to climb. World War I

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[10] The G-20 advanced countries are Australia, Canada, France, Germany, Italy, Japan, Korea, the United Kingdom, and the United States.
[11] Country size in Figure 3 is scaled according to 2009 PPP GDP.

(1914–18) and the fiscal crises that ensued produced a debt spike in advanced economies. Reductions in debt through the 1920s were followed by two further spikes linked to the Great Depression (early 1930s) and World War II (1941–45). During the Great Depression, the debt ratio peaked at 80 percent of GDP in 1932 following several episodes of banking and currency crises. The end of the Great Depression in the mid- to late 1930s was accompanied by debt reduction, but the start of World War II put an end to the deleveraging. With many countries borrowing extensively to finance war expenses, advanced economy indebtedness rose to the highest level recorded in the database: almost 150 percent of GDP in 1946. By 1960, however, the advanced G-20 economy average debt ratio declined to 50 percent of GDP, due to rapid growth and inflation. Average advanced G-20 economy debt ratios trended down further through the early 1970s; however, debt began to accumulate starting in the mid-1970s, with the end of the Bretton Woods system of exchange rates and two oil price shocks. This upward trend continued until the current global financial crisis.

Figure 4. Debt-to-GDP Ratios Across Country Groups, 1880–2009
(Group PPPGDP-weighted average, in percent of GDP)
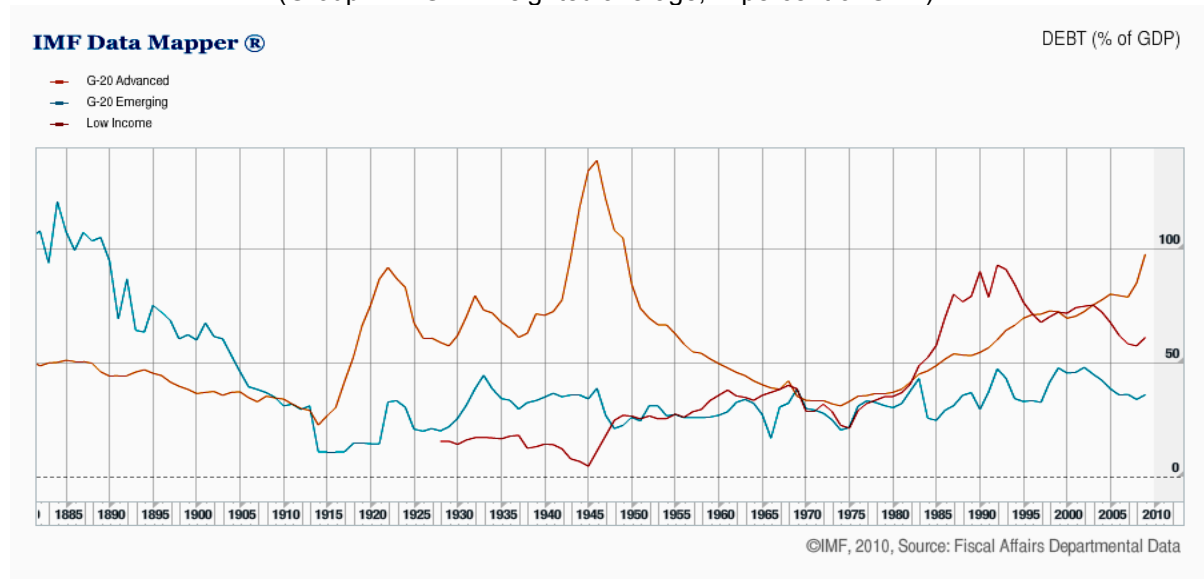
Source: HPDD.

Emerging countries and LICs exhibited lower average debt ratios over the same period, although they were more volatile. The average debt level for non-advanced economies was 44 percent of GDP during 1880–2009, 11 percentage points of GDP lower than the average for advanced economies, but with a standard deviation of 24.4 percentage points of GDP, as opposed to 19.9 percentage points for advanced economies.[12] Volatility has been particularly pronounced in G-20 emerging economies, occasionally connected with crises (e.g., in Latin America in the early 1980s and in Asia in the late 1990s).[13] For LICs, the pattern has been one of a sharp debt buildup through the 1980s and a reduction over the past 15 years, including in the context of the Highly Indebted Poor Country (HIPC) and Multilateral Debt

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[12] As such, the coefficient of variation for advanced economies was 0.36 as opposed to 0.55 for the rest.

[13] The G-20 emerging countries are Argentina, Brazil, China, India, Indonesia, Mexico, Russia, Saudi Arabia, South Africa, and Turkey.

Relief Initiatives (MDRI). For sub-Saharan Africa, heat maps for 1994 and 2009 illustrate
this story (Figure 5).

Figure 5. Debt-to-GDP Ratios in Sub-Saharan Africa, 1994 and 2009
(in percent of GDP)

1994 – Debt Overhang   2009 – Post-HIPC Relief
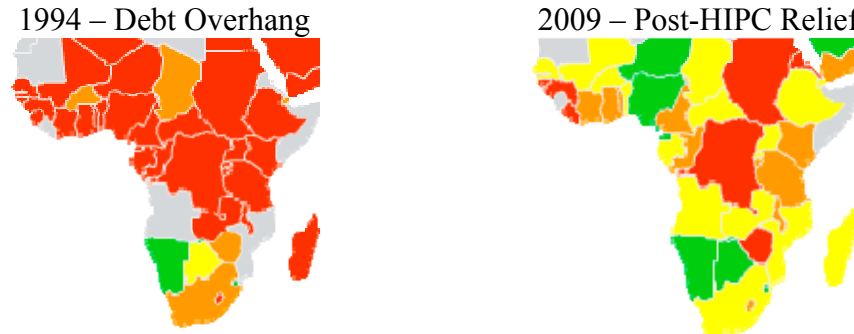
Note: Red represents public debt >75 percent of GDP; orange 40-75 percent; yellow 20-40 percent; and green <20 percent.

Source: HPDD.

For oil producers, debt ratios were inversely correlated with oil prices over 1965–2009
(Figure 6). This link would have been more muted if fiscal surpluses and deficits mostly
translated into savings buildups and drawdowns rather than gross debt reduction or increases.

Figure 6. Commodity Prices and Public Debt, the Case of Oil Producers
(Debt ratios in percent of GDP, oil prices in $/bbl)
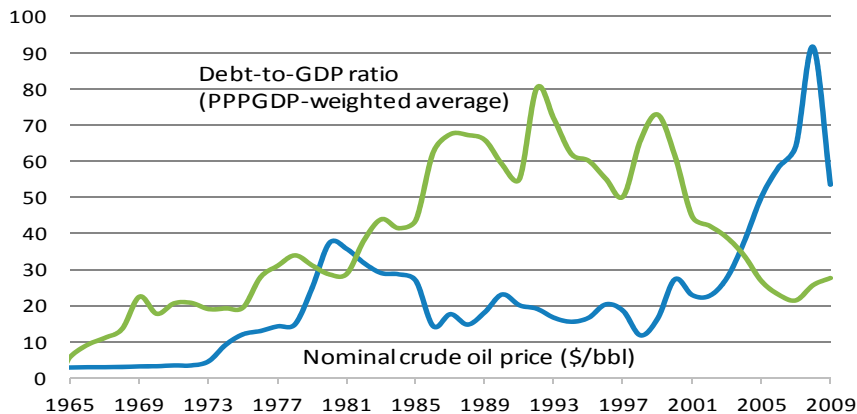
Oil producers include: Norway, Bolivia, Ecuador, Mexico, Venezuela, Trinidad and Tobago, Bahrain, Iran, Kuwait, Oman, Qatar, Saudi Arabia, Syria, United Arab Emirates, Yemen, Brunei Dar-us-Salaam, Indonesia, Vietnam, Algeria, Angola, Cameroon, Chad, Republic of Congo, Equatorial Guinea, Gabon, Nigeria, Sudan, Azerbaijan, Kazakhstan and the Russian Federation.

Source: HPDD; and crude oil price data is from
http://inflationdata.com/inflation/inflation_rate/historical_oil_prices_table.asp

Finally, the HPDD sheds light on one of the leading issues of the day: the relationship
between debt and growth. Separating countries into fast-, medium-, or slow–paced growers
over 1885–2009, we find an intuitive pattern.[14] Fast growers consistently registered low debt

[14] To categorize countries by speed of economic growth, we computed the average PPP GDP growth rate for
each country over the 1880–2009 period. This cross-section of average growth rates was then used to split

(continued)

ratios, while slow growers carried the highest debts for much of the sample period (Figure 7, upper panel). Further light is shed on the debt-growth relationship by a bubble chart that compares debt ratios and (total) PPP GDP (Figure 7, lower panel). If debt and growth are inversely related, the bubble movements should follow one of two directions: north-west (rising debt and falling income) or south-east (rising incomes and falling debt). We find that this pattern— captured by the black arrows— generally applies for advanced, emerging and low income countries. There is, however, one notable exception: advanced economies experienced rising incomes from 1970–2007 despite rising public debt ratios. It is not clear whether this represented a structural break from the expected pattern, or rather an anomaly that has now been "corrected" by the crisis.

We conclude this section with a few "interesting facts" emerging from the HPDD and showcasing the richness of the database. The largest single-year debt ratio increases (in percentage points) for the G-20 advanced countries occurred in two years associated with World War I and II—by 22 percentage points of GDP in 1944 and by 14 percentage points in 1919—and also in 2009, when public debt rose by 13 percentage points of GDP. The largest single-year declines occurred in 1969 (-7 percentage points) and 2000 (-3 percentage points). Further, based on a subsample of 34 countries for which debt data were identified for more than 50 years of coverage during 1880–2009, the country with the lowest median ratio was Finland (15 percent of GDP). The only country that did not breach a debt level of 60 percent of GDP was Colombia, which registered an average debt ratio of 25 percent of GDP, with a maximum of 47 percent of GDP.

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countries into three terciles: fast growth countries (with average growth rates ≥ 4 percent), and slow growth countries (with average growth rates ≤ 3 percent). Countries with medium growth refer to those with average growth rates in between the two thresholds.

Figure 7. Fast Growers Maintained Low Public Debts
(PPP-GDP weighted average debt-to-GDP ratios by country groups)

IMF Data Mapper ®

DEBT (% of GDP)

- Non-Oil Fast
- Non-Oil Medium
- Non-Oil Slow

©IMF, 2010, Source: Fiscal Affairs Departmental Data
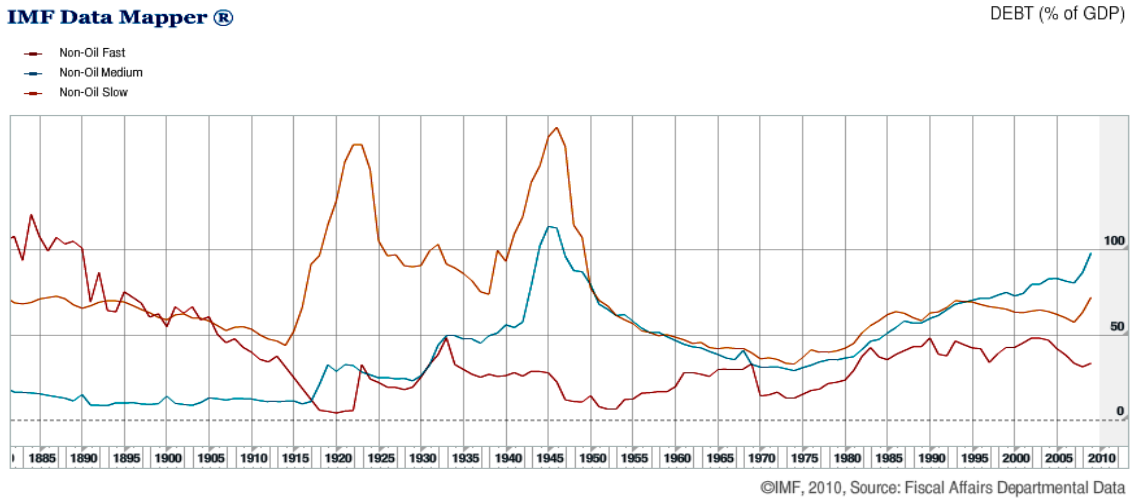
PUBLIC DEBT
(percent of GDP, PPPGDP-weighted)

Was the contemporaneous increase in debt levels and incomes since 1970 in advanced economies anomalous?

Low Income

G-20 Advanced

G-20 Emerging

PPPGDP
(millions of 1990 international Geary-Khamis dollars)
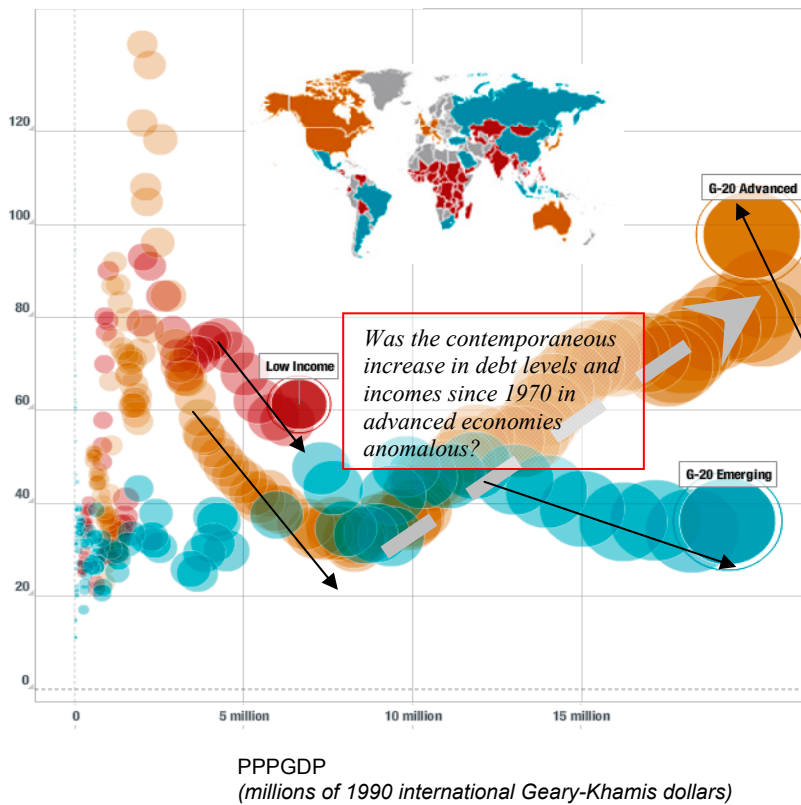
Source: debt ratios are from HPDD; Maddison (2010) and WEO were used for PPPGDP.

V. ANALYSIS OF LARGE DEBT REDUCTIONS AND BUILD-UPS IN ADVANCED ECONOMIES

To put the recent increase in debt ratios in advanced countries, on the back of the global financial crisis, in historical context, we document in this section some major episodes of debt declines and increases in 19 advanced economies, of which 14 are European countries, over the period 1880-2007.[15] We decompose changes in the debt-to-GDP ratio into contributions from the primary balance, the growth-interest differential (often referred to as the automatic debt dynamics), and a stock-flow adjustment residual reflecting, currency valuation effects operating on foreign currency debt, and other below-the-line fiscal operations such as expenditures recorded as investments, assumption of debts of non-governmental entities, debt restructuring or default, privatization and drawdown and buildup of government deposits. For the purposes of this exercise, it was necessary to extend the historical data collection to include series on interest payments and primary balances. The data sources and coverage are provided in Appendix Table 3.

A. Major Episodes of Debt Ratio Changes

Section IV discussed the evolution of debt ratios for the advanced economies as a *group* with Figure 4 showcasing the cycles of debt accumulation and decumulation that characterized the period from 1880 to 2009. For the analysis in this section, we isolate *individual* country episodes in which the debt ratio fell or increased by at least 10 percentage points of GDP. Consistent with the spirit of this paper, we focused on large sustained changes in sovereign indebtedness, ignoring intermediate interruptions that were short or small in relation to the duration and size of the episode identified.[16] Following this criterion, and filtering out episodes suffering large data gaps, we identify a total of 66 episodes of debt declines and 63 episodes of debt increases, as documented in Appendix Tables 4 and 5.

The debt declines were distributed roughly evenly among the pre-1914 era, the Bretton-Woods years (1945-1970), and the post-1970 period. Debt surges, intuitively, bunched around recessions (34 episodes, excluding the 17 debt increases witnessed since 2007), the two world wars (10 episodes); and the 1880s (10 episodes), a period of sudden stops, financial/debt crises associated with the beginning of the first era of financial globalization.[17] 13 large, but unsynchronized debt increases were witnessed over the last four decades, consistent with the group pattern documented in section IV. In one-third of the debt increase

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[15] The countries covered are: Australia, Austria, Belgium, Canada, Finland, France, Germany, Greece, Ireland, Italy, Japan, Netherlands, New Zealand, Portugal, Spain, Sweden, Switzerland, the United Kingdom, and the United States.

[16] Specifically, episodes of debt decreases were obtained from a two-step procedure. In the first step, a preliminary list of all debt decreases of 10 percentage points of GDP or more was extracted such that one-year increases of up to 3 percent of GDP or two-year (consecutive) cumulative increases of 6 percent of GDP were allowed to pass through as part of an episode (thus, deemed an allowable "hiccup"). In the second step, this preliminary list was trimmed by limiting the allowable "hiccups" to one-tenth of the episode's cumulative debt decrease. Thus, a 6 percent of GDP increase over a two year period was only allowed if the debt decrease over the entire episode exceeded 60 percent of GDP. Attention was also paid to episode duration, and no hiccups accommodated for episodes spanning less than 5 years. The combination of these steps effectively extracted the largest sustained debt decreases in the data, as can be easily established through a visual examination of the individual country debt trajectories. Episodes of debt increases were extracted in a similar way.

[17] See Bordo (2006) for further details.

episodes, the initial debt level was 60 percent of GDP or higher, while in half of the declines, the initial debt level was 80 percent of GDP or more. Interestingly, these thresholds mirror closely the 2007 and 2010 median levels of debt in advanced economies.

Given the focus on high public debts, fiscal sustainability and the need for large and durable debt reductions in several European Union (EU) countries, we take a closer look at episodes from this group. We find that the largest debt ratio declines in our sample occurred in the United Kingdom (223 percentage points, 1946-1975), Greece (92 percentage points, 1902-1907), Spain (89 percentage points, 1880-1884), and Ireland (69 percentage points, 1993-2006). The fastest reductions were in Spain (22 percentage points per year), Greece (18 percentage points per year) and the United Kingdom (8 percentage points per year).

The largest debt ratio increases were witnessed in the Netherlands (179 percentage points, 1929-1946), Greece (170 percentage points, 1886-1900), the United Kingdom (149 percentage points, 1940-1946), Belgium (95 percentage points, 1974-1993), and Italy (95 percentage points, 1963-1994). The fastest of these increases occurred in the United Kingdom (25 percentage points per year), Greece (12 percentage points per year) and Netherlands (11 percentage points per year). These magnitudes are multiples of the Great Recession-induced surges since 2007 with the exception, perhaps, of the EU peripheral economies, where the current debt increase is also quite large and rapid. The median debt increase has been about 5 percentage points of GDP higher and 1 percentage point of GDP/per year faster than the median debt decline. Inter alia, it points to the difficulty of unwinding large public debts, irrespective of how swiftly they were created. The ensuing discussion on sources of debt increases and declines explains the reasons for this asymmetry.

B. Sources of Changes in Debt Ratios

The starting point to analyze the components of debt increases and declines is the well-known equation for decomposing debt changes (for instance, see Escolano (2010)):

$$d_t - d_{t-1} = \frac{i_t - \gamma_t}{1 + \gamma_t} d_{t-1} + p_t + sfa_t. \tag{1}$$

Equation (1) states that, the change in the debt-to-GDP ratio ($d_t - d_{t-1}$) is the sum of three terms: (i) the product of the lagged debt ratio and the differential between the effective interest rate on debt (i_t) and the nominal GDP growth rate (γ_t); (ii) the primary deficit (p_t); and (iii) a residual stock-flow adjustment term (sfa_t) capturing valuation effects and "below-the-line" fiscal operations, including errors and omissions.

Next, we divide the identified episodes into different sub-samples based on the following criteria: (i) timing of the episodes (e.g., coincidence with periods of recession), (ii) regional grouping (EU vs. non-EU), (iii) start level of the debt ratio, (iv) size, (v) speed, and (vi) duration of observed debt increases/decreases.[18] For size, we use a threshold of 20 percentage

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[18] To characterize episodes as having occurred n the context of a global recessionary environment, a list of "global recession-years" was identified: years in which either the UK or the US (the two largest economies

points for the cumulative change in the debt-to-GDP ratio; for speed, fast (slow) episodes feature an average debt-to-GDP change of more (less) than 5 percentage points per year; for duration, episodes spanning 5 or more (less) years were deemed long (short). The results of the decomposition exercise, organized by these sub-samples, are shown in Tables 1 and 2.

Debt Ratio Declines

As can be gleaned from Table 1, the debt declines in our sample averaged about 38 percentage points of GDP, accounted for by the primary balance and the growth-interest differential components in roughly equal amounts. Further decomposition of the growth-interest component shows that nominal growth was about twice the size of the interest rate, highlighting the major role growth played in lowering debt levels. These findings are particularly relevant during 1945-70 and tend to support recent conclusions by Reinhart and Rogoff (2011) that financial repression and moderate inflation during this period permitted the liquidation (or soft default) of substantial amounts of government debt in advanced economies.

While we did not conduct an equivalent analysis of hard defaults, some of these are implicit in the large stock-flow adjustments (unexplained debt reductions) for episodes in the inter-war period. Harder to pick are partial defaults such as the U.S.'s abrogation of gold clauses in the early 1930s, which "prevented" a 25 percent of GDP increase in debt that would otherwise have occurred. Italy's partial default in the late 1920s was picked up but insufficient data on the requisite flows prevented its inclusion in the final list. Given these complications and noting the sensitive nature of the topic, we have not included a formal treatment of outright debt restructuring in this (version of the) paper.

The size of the debt reductions witnessed in European countries was 36 percent of GDP, broadly similar to non-EU countries. However, the composition was notably different with Europe relying much less than the non-EU countries on the growth-interest differential and much more on primary surpluses. This may partly reflect the fact that most non-EU countries in our sample experiences convergence to European prosperity levels over this period, and thus benefitted from higher growth rates.

It is also interesting that the composition of the 17 debt reductions observed during 1880-1914, the first era of financial globalization, is quite similar to those witnessed in the financially-liberalized decades post-1970. In both cases the debt ratio reductions coincided with large strong primary surpluses and strong growth.[19] That conventional fiscal adjustment and growth have led the way in periods of global financial integration is intuitive as well consistent with previous studies (such as IMF, 2010). It is also important, looking ahead, for insofar as reverting to financial repression policies akin to the post-WWII years proves difficult, and rapid growth prospects remain limited, highly-indebted advanced economies will find themselves facing a fairly stark choice between large fiscal adjustment or default.

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since the late 1800s) or both, contracted. A debt increase was then defined as a "recession-episode" if more than one-third of its duration overlapped with these recession-years.

[19] Despite high growth, the relatively high interest rates prevailing during 1880-1914 suppressed the contribution of the growth-interest "differential" component in that period.

Table 1. Decomposition of 66 Large Debt Ratio Reductions over Different Sub-Samples (averages, in percent of GDP)

	Sub-Sample	Starting debt	Ending debt	Debt reduction	Primary surplus	γ - i term	γ	-i	SFA residual (unexplained decrease)
Size	Big (42): Dd >= 20% of GDP	105.4	54.8	50.6	22.3	24.7	52.9	-28.2	3.6
	Small (24): Dd < 20% of GDP	78.4	63.7	14.7	8.0	3.6	20.1	-16.5	3.1
Speed	Fast (17): Dd >= 5% of GDP/yr.	153.1	92.5	60.6	18.1	30.2	50.6	-20.4	12.4
	Slow (49): Dd < 5% of GDP/yr.	75.6	46.0	29.6	16.8	12.4	37.6	-25.2	0.3
Duration	Long (55): >= 5 yrs.	87.8	48.1	39.7	18.8	20.1	46.7	-26.6	0.9
	Short (11): < 5 yrs.	134.3	107.5	26.8	9.0	1.6	12.2	-10.6	16.2
Start level	High (33): >= 80% of GDP	135.6	84.0	51.6	22.5	22.5	51.5	-29.1	6.6
	Low (33): < 80% of GDP	55.5	32.0	23.6	11.7	11.6	30.4	-18.9	0.3
Period	Start yr. before 1914 (17)	104.3	68.4	35.9	19.0	5.9	27.4	-21.6	11.0
	Start yr. between 1945-1970 (17)	84.8	34.8	50.1	12.7	47.4	70.4	-23.0	-10.1
	Start yr. after 1970 (19)	72.0	44.8	27.3	23.4	0.4	33.1	-32.7	3.5
Region	EU (46)	100.4	64.3	36.1	18.5	11.7	36.7	-25.0	5.9
	Non-EU (20)	84.5	43.4	41.0	14.0	29.2	50.9	-21.7	-2.2
	Overall average	96	58	37.6	17.1	17.0	41.0	-24.0	3.4
	Overall median	81	46	26.2	15.0	11.7	33.2	-21.5	-0.5

Debt Ratio Increases

As shown in Table 2 below, episodes of large debt ratio increases have averaged about 60 percentage points over the entire sample. Studying the episodes across various periods we find that, prior to 1914 and after 1980, the increase averaged between 35-40 percent of GDP, of which more than half of the increase is accounted for by primary deficits. Post-1980 debt surges were characterized by a small residual term and a relatively large contribution from the interest-growth differential. On the other hand, a major part of the debt surges witnessed during 1914 to 1945, especially the very large increases surrounding WWI and WWII, remains unexplained, as reflected in the sizable stock-flow adjustment residuals.

**Table 2. Decomposition of 63 Large Debt Ratio Increases for Different Sub-Samples
(averages, in percent of GDP)**

	Sub-Sample	Starting debt	Ending debt	Debt increase	Primary deficit	i - γ term	i	- γ	SFA residual (unexplained increase)
Size	Big (44): Dd >= 20% of GDP	48.8	107.6	58.8	19.1	5.7	35.9	-30.3	34.0
Size	Small (19): Dd < 20% of GDP	60.2	73.2	13.0	1.6	4.3	12.1	-7.8	7.0
Speed	Fast (27): Dd >= 5% of GDP/yr.	67.6	131.8	64.2	12.7	12.6	23.2	-10.6	38.9
Speed	Slow (36): Dd < 5% of GDP/yr.	40.7	71.4	30.6	14.8	-0.2	32.9	-33.1	16.1
Duration	Long (48): >= 5 yrs.	46.9	98.9	51.9	18.2	2.5	34.7	-32.2	31.2
Duration	Short (15): < 5 yrs.	69.2	92.1	22.9	-0.1	14.2	9.7	4.5	8.7
Start level	High (22): >= 60% of GDP	92.3	130.8	38.5	8.4	9.3	16.6	-7.3	20.8
Start level	Low (41): < 60% of GDP	30.7	79.3	48.6	16.8	3.1	35.3	-32.2	28.6
Period	Start yr. before 1914 (16)	73.5	109.4	35.9	20.7	4.0	44.3	-40.3	11.3
Period	Start yr. between 1945-1980 (17)	62.1	122.3	60.1	25.5	0.5	10.9	-10.4	30.8
Period	Start yr. after 1980 (13)	38.8	80.1	41.3	20.5	4.5	44.4	-39.9	16.3
Recession	Previous (34)	40.2	86.5	46.2	18.3	6.2	39.3	-33.1	21.7
Recession	Current - 2007-2013 (17) 1/	63.1	94.1	31.1	14.3	9.7	17.9	-8.3	7.0
Region	EU (46)	52.4	92.0	39.6	10.1	9.0	30.4	-21.4	20.5
Region	Non-EU (17)	51.7	111.4	59.7	24.1	-4.8	24.3	-29.1	40.5
	Overall average	52	97	45.0	13.9	5.3	28.7	-23.5	25.9
	Overall median	45	84	30.5	6.3	6.9	17.1	-10.2	17.3

1/ The increases in debt, and the decomposition thereof, through 2013 are based on the IMF April 2011 WEO projections. These 17
episodes (19 countries in our sample less the two countries, Sweden and Switzerland, whose debts were projected to fall) are not
part of the 63 episodes otherwise identified over the period 1880-2007.

While large unexplained debt changes in this deep historical exercise necessarily reflect data quality issues and gaps, they are also likely to indicate some governmental resort to creative accounting in order to hide otherwise exploding fiscal deficits.[20] As noted in Appendix 2 of IMF (2011) in the context of the ongoing debt surge in advanced economies, stress on public finances can quickly translate into "pressures on fiscal transparency." The asymmetric behavior of the stock-flow adjustment residual during debt increases vs. declines seems to lend further support to this thesis, as can be seen from Table 3 below.

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[20] Our experience with collecting data on both fiscal stocks and flows suggests that the latere have, historically, grabbed more public attention than the former. This helps explain why governments would have an incentive to report narrower deficits, even in the face of sharply rising debt stocks.

Table 3. Stock-Flow Adjustment (SFA) Residual

	Debt increase episodes	Debt decrease episodes
Number of occurences of positive SFAs	55	30
Contribution of SFA to change in debt (median ratio over episodes, in percent)	45	29

Source: Appendix Tables 3 and 4.

We conclude this section with some broad patterns on the relative importance of the primary deficit and interest-growth differential in explaining debt dynamics in past episodes of debt changes. Figure 8 scatterplots in the interest-growth differential/primary deficit space all 129 identified episodes: 66 declines shown as empty green circles, and 63 increases shown as filled-in red circles. Intuitively, we find that most of the debt reductions are parked in the bottom left quadrant while most debt accumulations in the top right quadrant. However, the fact that most of the empty circles are to the left of the y-axis, while most of the full circles (representing debt increases) are above the x-axis, nudges us toward the conclusion that the primary balance is relatively more important for debt declines than for debt surges.

The analysis also suggests that automatic debt dynamics account for a larger share of debt increases (and a smaller share fo debt declines) when these start from a high level (60 percent of GDP or more). This snowballing effect would arise mechanically due to the higher burden of interest payments, but may also be compounded by the adverse impact on real interest rates and growth resulting from high public debts as noted in IMF (2011).

**Figure 8. Scatterplot of Interest-Growth Differential and Primary Deficit Contributions
(cumulative contribution over episode; in percentage points of GDP)**
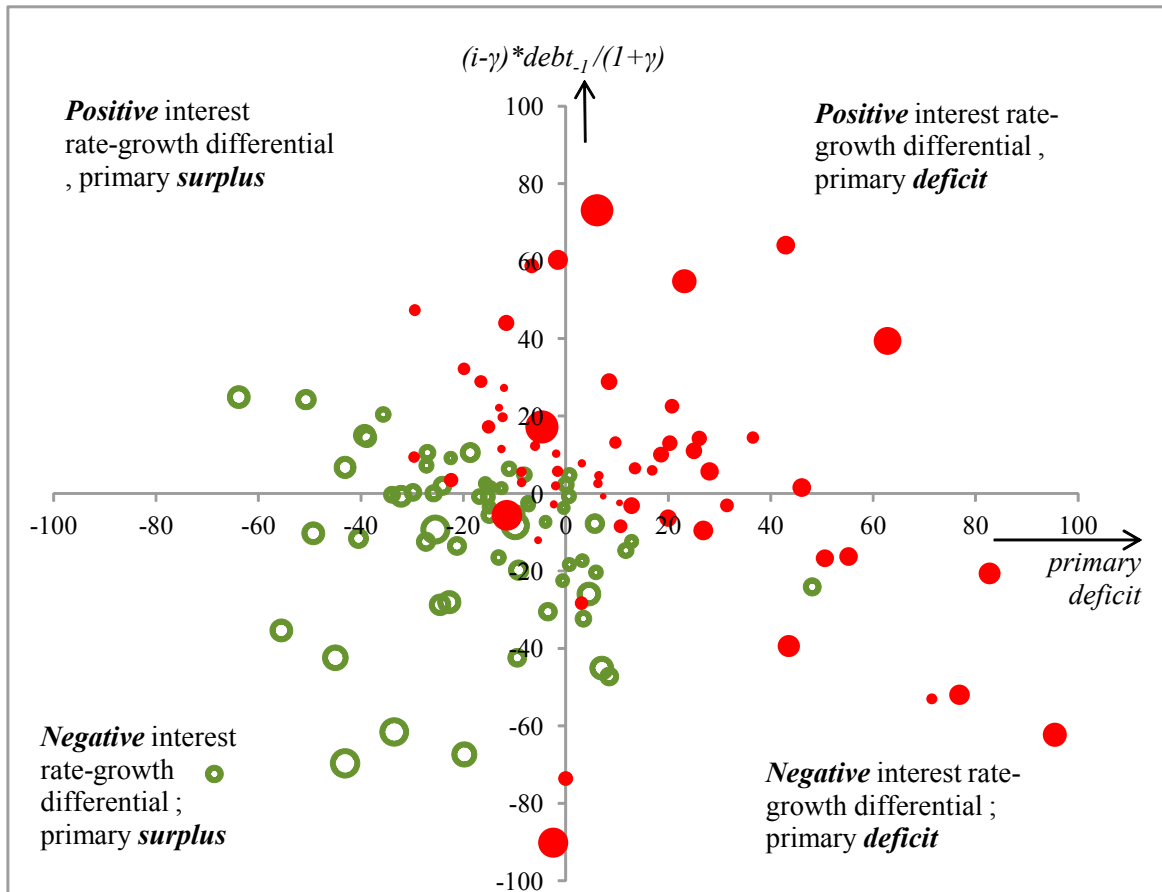
[1] Full (empty) circles indicate episodes of debt increases (decreases); circle size is proportional
to the magnitude of debt ratio change. Debt ratio increases and decreases larger than
100 percent of GDP not shown. r and g denote nominal GDP growth rates and effective interest
rates on debt, respectively.

VI. WAY FORWARD

Looking ahead, the primary aim in relation to the database is to expand the years and
countries covered in the HPDD, as additional sources are identified. Notification of any
omissions or supplementary sources is welcome and would be fully acknowledged.[21]
Moreover, given that in several cases, lack of GDP data inhibited computation of debt-to-
GDP ratios, particularly in the earlier periods (see Table 4), efforts will be made to fill such
gaps through careful extrapolation of the GDP series.

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[21] Suggestions can be sent to the authors (see the email addresses on the cover page of this paper).

Table 4. Candidates for Potential Augmentation of HPDD Coverage

Country	Year of independence	Start date of data in current HPDD	Period for which data on debt, but not GDP, are available
Advanced economies			
Austria	1156	1880	1919-1923
Belgium	1831	1880	1914-1923
Canada	1867	1926	1867-1925
Germany	1871	1880	1914-1924
Greece	1829	1884	1920-1927
Ireland	1921	1929	1923-1928
Portugal	1140	1880	1913-1945
Emerging and advancing economies			
Bulgaria	1878	1924	1914-1923
Bolivia	1825	1970	1914-1949
Chile	1810	1940	1914-1939
Colombia	1810	1936	1923-1935
Costa Rica	1821	1950	1914-1949
Ecuador	1822	1970	1914-1938
Egypt	1922	1954	1929-1950
El Salvador	1821	1939	1924-1938
Guatemala	1821	1923	1914-1922
Nicaragua	1821	1970	1914-1945
Panama	1903	1953	1915-1944
Paraguay	1811	1970	1927-1947
Romania	1881	1914	1928-1941
Uruguay	1825	1970	1914-1948
Venezuela	1811	1970	1914-1949

Source: HPDD.

In addition, attempts will be made to fill in major gaps in the nominal debt series, possibly by utilizing data on fiscal deficits for the interceding years. For instance, relatively large gaps exist for a number of countries during the periods 1913–1939 and 1952–1970, which could be potentially populated using such methods. Finally, it might be possible to split public debt data into domestic and external components.

Appendix Table 1. Description of the Database Sources

Database	Reference	Country Coverage	Period	Headline	Definitions and Comments
Abbas and Christensen	Abbas, S.M. A. and J. E. Christensen (2010). "The Role of Domestic Debt Markets in Economic Growth: An Empirical Investigation for Low-Income Countries and Emerging Markets", IMF Staff Papers.	144 Developing and Emerging Countries	1970-2007	Gross Government Debt/GDP	Refers to central government debt.
Canada - Official Government Publication	Canada Year Book Historical Collection website accessed in July 2010. http://www65.statcan.gc.ca/acyb_r000-eng.htm	Canada	1867-1976	Gross Federal Debt	Consolidated government is the general term used for the consolidation of the data of the federal government, provincial and territorial general governments, local governments and non-autonomous pension plans.
CLYPS	Cowan K., Levy-Yeyati E., Panizza U. and Sturzenegger F. (2006). Sovereign debt in the Americas: new data and stylized facts, RES Working Paper No. 577, Inter-American Development Bank, Research Department, Washington, DC, United States.	Argentina, Bahamas, Belize, Bolivia, Brazil, Canada, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico, New Zealand, Nicaragua, Pakistan, Panama, Paraguay, Peru, South Africa, Trinidad and Tobago, United States, Uruguay, Venezuela (29 Countries).	1980-2005	Gross Public Debt	Total central government gross debt includes total external and domestic debt.
Flandreau and Zumer	Flandreau M. and F. Zumer (2004). The Making of Global Finance 1880-1913. Development Centre Studies, OECD.	Austria, Argentina, Belgium, Brazil, Denmark, France, Germany, Greece, Italy, Netherlands, Norway, Portugal, Russia, Spain, Sweden, Switzerland, U.K. (17 Countries).	1880-1913	Nominal Public Debt / GDP	The debt figures reported combine both short-term and long-term debt of the central government.

Appendix Table 1. Description of the Database Sources (Cont.)

Database	Reference	Country Coverage	Period	Headline	Definitions and Comments
Fouad et al.	Fouad M., W. Maliszewski, M. Hommes, H. Morsy, M. Petri, and L. Söderling (2007). "Public Debt and Fiscal Vulnerability in the Middle East", IMF Working Paper 07/12, IMF.	Middle-Eastern countries (19 countries).	1990-2005	Could refer to either public sector debt, general government debt or central government debt.	Standard GFSM (2001) definitions.
France - Official Government Publication	INSEE - Department Comptes Nationaux	France	1949-1977	Total Central Government Debt	Central government debt
Germany - Official Government Publication	Statistisches Bundesamt Deutschland	Germany	1950-1975	General Government Debt	Credit Market Debt and Loans for strengthening cash resources of public budgets
Italy - Official Government Publication	Bank D'Italia: Francese, Maura, and Angelo Pace. "Questioni Di Economia E Finanza." Banca D'Italia, Occasional Papers 31 (2008).	Italy	1861-2009	Total Consolidated Debt of Public Administrations	Comprises total consolidated gross debt across all sectors of the public administration.
Jaimovich and Panizza	Jaimovich D. and U. Panizza (2010) "Public debt around the world: a new data set of central government debt," Applied Economics Letters, Taylor and Francis Journals, vol. 17(1), pages 19-24.	100 Advanced and Emerging Countries	1970-2005	Gross Public Debt / GDP	Refers to the central government.
Japan - Official Government Publication	Hundred-Year Statistics Book of the Japanese Economy (1966). Bank of Japan and Ministry of Finance Editors.	1914-1964 (UN/MIT); 1965-1976 (UN/OECD); 1977-1992 (MISS/OECD); 1993-2005 (WEO/OECD); 2005-2009 (WEO)	1870-2009	Central Government Debt	Includes bonds, financial bills, and borrowings (including those held in special accounts, some of which are classified as public corporations.)
LON	League of Nations Archives (1927-1931, 1933-1938, 1940-1941, 1943, 1945)	LON Member Countries	1919-1930	Central Government Public Debt	Public debt refers to the amount outstanding at the end of the financial year. The public debt statements of the various countries show some differences in the budget accounts. The statements may refer to total gross liabilities of the government as recorded in the balance sheet of the state, or only to some of these liabilities. Public debt figures were available as gross or net debt. Only gross debt data were collected.

Appendix Table 1. Description of the Database Sources (Cont.)

Database	Reference	Country Coverage	Period	Headline	Definitions and Comments
Missale	Missale, Alessandro (2000) Public Debt Management. Oxford: Oxford University Press.	1880 - 1913 (EHNET); 1924-1958 (UN/MIT); 1959-1976 (UN/OECD); 1977-1989 (MISS/OECD); 1990-1996 (OECD); 1997-2005 (WEO/OECD); 2005-2009 (WEO)	1960-1996	Total Government Debt/GDP	Refers to the central government.
Mitchell	B. R. Mitchell (2003) International Historical Statistics: 1750-2000. Basingstoke and New York: Palgrave Macmillan, 4th edn. Several Editions: Africa, Asia and Oceania; Europe; and The Americas.	Argentina, Australia, Austria, Belgium, Brazil, Canada, Chile, China, Colombia, Czech Republic, Denmark, Finland, France, Germany, Greece, Hong Kong, India, Indonesia, Ireland, Israel, Italy, Japan, Kenya, Korea, Malaysia, Mexico, Netherlands, New Zealand, Nigeria, Norway, Pakistan, Peru, Philippines, Portugal, Russia, Saudi Arabia, Singapore, Sout Africa, Spain, Sweden, Switzerland, Thailand, Turkey, United Kingdom, United States (46 Countries).	1870-2000	GDP, GNP, NMP, NNP.	Comprises GDP, CF (capital formation: gross excluding stocks), GNP (gross national product), NMP (net material product), NNP (net national product (i.e. national income)). NMP is calculated for the material production sectors only, and excludes most of the service sectors, which are part of GDP. NNP is the total market value of all final goods and services produced by residents in a country or other polity during a given period (gross national product or GNP) minus depreciation. The main sources used are official, including the United Nations, Yearbooks of National Accounts Statistics and National Income Statistics (Statistics of National Income and Expenditure, International Financial Statistics.) Some national publications were also used.
Netherlands - Official Government Publication - Debt	Dutch State Treasury Agency website accessed in June 2010. http://www.dsta.nl/english/News/Statistical_Information	The Netherlands	1914-1989	Central Government Debt	Includes money market and capital market debt.
Netherlands - Official Government Publication - GDP	Centraal Bureau voor de Statistiek (2001). "Tweehonderd jaar statistiek in tijdreeksen 1800–1999".	The Netherlands	1800–1999	GDP	GDP at market prices.

Appendix Table 1. Description of the Database Sources (Cont.)

Database	Reference	Country Coverage	Period	Headline	Definitions and Comments
New Zealand - Official Government Publication	Statistics New Zealand website on Long Term Data Series (LTDS) accessed in June 2010. http://www.stats.govt.nz/	New Zealand	1860-2000	Central Government Debt and GDP.	Central government debt refers to total consolidated gross central government debt.
OECD	OECD (2009) Central Government Debt - Country Tables 2009. Organization for Economic Cooperation and Development, Paris, France.	OECD Member Countries (30 Countries).	1990-2009	Gross Public Debt (Maastricht Criterion)	General government gross debt according to the convergence criteria set out in the Maastricht Treaty comprises currency, bills and short-term bonds, other short-term loans and other medium- and long term loans and bonds. Debt is consolidated within the general government. Financial liabilities like trade credits extended to the government are not included. Debt is in nominal values. Gross debt according to this criterion does not include trade credits and advances, and government bonds are valued at nominal value.
Oxford Latin American Economic History Database	Oxford Latin American Economic History Database (OxLAD), Latin American Center, Oxford University (2003).	Argentina, Chile, Cuba, El Salvador, Honduras, Panama, Uruguay, Bolivia, Colombia, Dominican Republic, Guatemala, Mexico, Paraguay, Venezuela, Brazil, Costa Rica, Ecuador, Haiti, Nicaragua, Peru (20 Countries).	1990-2000	GDP	Nominal GDP in local currency units.
UN	United Nations Statistical Yearbooks (1948-1949, 1952, 1958, 1965, 1973, 1986).	UN Member Countries	1919 - 1983	Central Government Public Debt	With the exception of the USSR, the budgetary accounts figures refer to central government. Whereas the figures shown for each country are normally comparable - unless there has been a change in the method of accounting - there are constraints on comparability among the figures across countries. This is due to differences (1) in the proportion between public and private activities; (2) in the proportion between the activities of public, central, regional, local and other public bodies; (3) in the methods of accounting. Figures for the estimates and budgetary accounts in some countries are, as a principle, reported on a gross basis; in others they are on a net basis.

Appendix Table 1. Description of the Database Sources (Concl.)

Database	Reference	Country Coverage	Period	Headline	Definitions and Comments
United Kingdom Historical Statistics	B.R.Mitchell, British Historical Statistics Chapter XVI (CUP 1988); and Office for National Statistics of the United Kingdom (ONS), available at: http://www.statistics.gov.uk/default.asp	United Kingdom	1830-1980	General Government Debt	Nominal amount of the Unredeemed Capital of the Public Debt of the United Kingdom at the end of each financial year (1691-1980). All figures of the total national debt refer to the sum of funded and unfunded debt, regardless of whether the financial years are the same for both. All statistics since 1919 exclude the amounts of Funding Loan and Victory Bonds tendered for duties under section 3(3) of the War Loan Act (1919) and held by the National Debt Commissioners. From 1940 the amount of funded debt has changed very little and it is not shown separately from unfunded debt.
United States Historical Statistics	Historical Statistics of the United States (2006) Edited by Susan B. Carter, S. S. Gartner, M. R. Haines, A. L. Olmstead, R. Sutch, G. Wright. Cambridge University Press.	United States	1791-2007	Federal Government Debt	Figures represent gross federal debt outstanding.
WEO Database	World Economic Outlook (2010). International Monetary Fund, April 2010.	IMF Member Countries (187 Countries).	1977-2009	General Government Gross Debt	Gross debt consists of all liabilities that require payment or payments of interest and/or principal by the debtor to the creditor at a date or dates in the future. This includes debt liabilities in the form of SDRs, currency and deposits, debt securities, loans, insurance, pensions and standardized guarantee schemes, and other accounts payable. Thus, all liabilities in the *GFSM 2001* system are debt, except for equity and investment fund shares and financial derivatives and employee stock options. Debt can be valued at current market, nominal, or face values.

Appendix Table 2. Sources of Data on Debt, GDP, and Debt–to–GDP Ratio by Country

Country	Independence	Sources 1/ 2/
Albania	1912	1994-1999 (AC); 2000-2009 (WEO)
Algeria	1962	1970-2007 (AC)
Angola	1975	1995-2004 (AC); 2004-2009 (WEO)
Antigua & Barbuda	1981	1998-2009 (WEO)
Argentina	1816	1884-1913(EHNET) 1934-1962 (UN/OXLAD); 1971-1988 (AC); 1990-1996 (CLYPS); 1997-2009 (WEO)
Armenia	1991	1994-2006 (AC); 2007-2009 (WEO)
Australia	1901	1914-1964 (UN/MIT); 1965-1976 (UN/OECD); 1977-1992 (MISS/OECD); 1993-2005 (WEO/OECD); 2005-2009 (WEO)
Austria	1156	1880 - 1913 (EHNET); 1924-1958 (UN/MIT); 1959-1976 (UN/OECD); 1977-1989 (MISS/OECD); 1990-1996 (OECD); 1997-2005 (WEO/OECD); 2005-2009 (WEO)
Azerbaijan, Rep. of	1991	1993-2000 (AC); 2001-2009 (WEO)
Bahamas, The	1973	1991-2009 (WEO)
Bahrain, Kingdom of	1971	1974-1989 (AC); 1991-2009 (WEO)
Bangladesh	1971	1974-1989 (AC); 1990-2009 (WEO)
Barbados	1966	1970-1995 (AC); 1996-2009 (WEO)
Belarus	1991	1994-2005 (AC); 2006-2009 (WEO)
Belgium	1831	1880-1913 (ENHET); 1924-1969 (UN/MIT); 1970-1988 (JP); 1990-1998 (OECD); 1999-2005 (OECD/WEO); 2006-2009 (WEO)
Belize	1981	1976-1997 (AC); 1998-2009 (WEO)
Benin	1960	1970-2006 (AC); 2008-2009 (WEO)
Bhutan	1949	1993 (WEO); 1994-2000 (AC); 2001-2009 (WEO)
Bolivia	1825	1970-2004 (AC); 2005-2009 (WEO)
Bosnia & Herzegovina	1992	1998-2009 (WEO)
Botswana	1966	1972-2000 (AC); 2001-2009 (WEO)
Brazil	1822	1880-1913 (EHNET); 1923-1951 (UN/OXLAD); 1978-1993 (AC); 1994-2000 (CLYPS); 2001-2009 (WEO)
Brunei Darussalam	1984	2001-2007 (AC)
Bulgaria	1878	1924-1928 (UN/MIT); 1929 -1943 (LON/MIT); 1944-1945 (UN/MIT); 1992-1999 (AC); 2001-2009 (WEO)
Burkina Faso	1960	1976-2001 (AC); 2002-2009 (WEO)
Burundi	1962	1970-1993 (AC); 1994-2009 (WEO)
Cambodia	1953	1996-2009 (WEO)
Cameroon	1960	1970-2002 (AC); 2003-2009 (WEO)
Canada	1867	1926-1949 (Canada Govt); 1950-1978 (Canada Govt/WEO); 1979-2009 (WEO)
Cape Verde	1975	1981-2005 (AC); 2007-2009 (WEO)
Central African Rep.	1960	1970-1999 (AC); 2000-2009 (WEO)
Chad	1960	1970-2004 (AC); 2005-2009 (WEO)
Chile	1810	1940-1947 (UN/OXLAD); 1970-1998 (AC); 2000-2009 (WEO)
China,P.R.: Mainland	221 BC	1984-1999 (WEO)
China,P.R.:Hong Kong	None	2005-2009 (WEO)
Colombia	1810	1936-1946 (UN/OXLAD); 1970-1989 (AC); 1990-1995 (CLYPS); 1997-2009 (WEO)
Comoros	1975	1982-2007 (AC); 2008-2009 (WEO)
Congo, Republic of	1960	1970-1993 (AC); 1994-2009 (WEO)
Costa Rica	1821	1950-1969 (UN/MIT); 1970-1998 (AC); 2000-2009 (WEO)
Côte d'Ivoire	1960	1970-1975 (UN/WEO); 1979-2003 (AC); 2004-2009 (WEO)
Croatia	1991	1994-2004 (AC); 2005-2009 (WEO)
Cyprus	1960	1973-1994 (AC); 1995-2009 (WEO)
Czech Republic	1993	1920-1937(UN/MIT); 1995-2005 (OECD); 2006-2009 (WEO)
Denmark	1849	1880-1913 (EHNET); 1914-1963 (UN/MIT); 1976-1996 (MISS/MIT); 1998-2009 (WEO)

Appendix Table 2. Sources of Data on Debt, GDP, and Debt–to–GDP Ratio by Country (Cont.)

Country	Independence	Sources
Djibouti	1977	1993-2003 (AC); 2004-2009 (WEO)
Dominica	1978	1975-1989 (AC); 1990-2009 (WEO)
Dominican Republic	1844	1950-1955 (UN/MIT); 1970-2002 (AC); 2003-2009 (WEO)
Ecuador	1822	1970-2000 (AC); 2001-2009 (WEO)
Egypt	1922	1954-1957 (UN/MIT); 1970-2001 (AC); 2003-2009 (WEO)
El Salvador	1821	1939-1963 (UN/MIT); 1970-1996 (AC); 2000-2009 (WEO)
Equatorial Guinea	1968	1985-1992 (AC); 1993-2009 (WEO)
Eritrea	1993	1995-2002 (AC); 2004-2009 (WEO)
Estonia	1991	1995-2009 (WEO)
Ethiopia	2000 years	1970-1992 (AC); WEO (1993-2009)
Fiji	1970	1970-1988 (AC); 1990-2009 (WEO)
Finland	1917	1914-1946 (UN/MIT); 1961-1978 (UN/OECD); 1981-2009 (WEO)
France	486	1880-1912 (EHNET); 1920-1932 (UN/MIT); 1949-1977 (French Govt./MIT); 1980-2009 (WEO)
Gabon	1965	1970-1999 (AC); 2000-2009 (WEO)
Gambia, The	1965	1976-2001 (AC); 2002-2009 (WEO)
Georgia	1991	1995-2003 (AC); 2004-2009 (WEO)
Germany	1871	1880-1913 (EHNET); 1925-1938 (UN/MIT); 1950-1975 (German Govt./WEO); 1977-2009 (WEO)
Ghana	1957	1970-1989 (AC); 1991-2009 (WEO)
Greece	1829	1884-1913 (EHNET); 1928-1975 (UN/MIT); 1979-2009 (WEO)
Grenada	1974	1970-1995 (AC); 1996-2009 (WEO)
Guatemala	1821	1923-1968 (UN/MIT); 1970-1998 (AC); 2000-2009 (WEO)
Guinea	1958	1990-2009 (WEO)
Guinea-Bissau	1973	1986-2005 (AC); 2006-2009 (WEO)
Guyana	1966	1970-2000 (AC); 2001-2009 (WEO)
Haiti	1804	1953-1956 (UN); 1970-1999 (AC); 2000-2009 (WEO)
Honduras	1821	1928-1945 (LON/MIT); 1970-2004 (AC); 2005-2009 (WEO)
Hungary	1001	1930-1943 (LON/MIT); 1982-1992 (AC); 1995-2009 (WEO)
Iceland	1944	1972-1975 (JP); 1976-1979 (UN/OECD); 1981-2001 (WEO/OECD); 2002-2009 (WEO)
India	1947	1948-1982 (UN/MIT); 1991-2009 (WEO)
Indonesia	1945	1971-1980 (UN/MIT); 1981-1999 (AC); 2000-2009 (WEO)
Iran, I.R. of	1979	1980-1999 (AC); 2000-2009 (WEO)
Ireland	1921	1929-1946 (UN); 1954-1959 (UN/MIT); 1960-1989 (MISS/OECD); 1990-2008 (OECD); 2009 (WEO)
Israel	1948	1970-2002 (AC); 2003-2009 (WEO)
Italy	1861	1861-1993 (Italy Govt); 1994-2009 (WEO)
Jamaica	1962	1970-1994 (AC); 1996-2009 (WEO)
Japan	660 BC	1875-1949 (Japan Govt); 1950-1979 (Japan Govt/WEO); 1980-2009 (WEO)
Jordan	1946	1970-1989 (JP); 1990-2009 (WEO)
Kazakhstan	1991	1993-2001 (AC); 2002-2009 (WEO)
Kenya	1963	1970-1976 (UN/MIT); 1979-1997 (AC); 1998-2009 (WEO)
Korea, Republic of	1945	1970-1996 (AC); 1997-2009 (WEO)
Kuwait	1961	1971-1989 (AC); 1991-2009 (WEO)
Kyrgyz Republic	1991	1995-2005 (AC); 2006-2009 (WEO)
Laos People's Dem.Rep	1949	1989-2002 (AC); 2003-2009 (WEO)
Latvia	1991	1994-2005 (AC); 2006-2009 (WEO)
Lebanon	1943	1970-1987 (AC); 1990-1999 (JP); 2000-2001 (WEO)

Appendix Table 2. Sources of Data on Debt, GDP, and Debt–to–GDP Ratio by Country (Cont.)

Country	Independence	Sources
Lesotho	1966	1974-1990 (AC); 1992-2009 (WEO)
Liberia	1847	1978-1983 (UN); 2000-2005 (AC); 2008-2009 (WEO)
Lithuania	1990	1994-1999 (AC); 2000-2009 (WEO)
Luxembourg	1839	1974-1989 (JP); 1991-1995 (OECD); 1996-2009 (WEO)
Macedonia, FYR	1991	1995-1998 (AC); 2000-2009 (WEO)
Madagascar	1960	1974-1989 (AC); 1991-2009 (WEO)
Malawi	1964	1970-2001 (AC); 2003-2009 (WEO)
Malaysia	1957	1970-1989 (AC); 1991-2009 (WEO)
Maldives	1965	1978-2007 (AC)
Mali	1960	1970-1999 (AC); 2000-2009 (WEO)
Malta	1964	1995-2009 (WEO)
Mauritius	1968	1970-1999 (AC); 2001-2009 (WEO)
Mexico	1810	1914-1968 (UN/OXLAD); 1970-1980 (AC); 1982-1996 (CLYPS); 1997-2009 (WEO)
Moldova	1991	1995-2009 (WEO)
Mongolia	1921	1992-2007 (AC)
Montenegro	2006	2003-2009 (WEO)
Morocco	1956	1970-1997 (AC); 1998-2009 (WEO)
Mozambique	1975	2000-2009 (WEO)
Myanmar	1948	1970-1994 (AC); 1995-2009 (WEO)
Namibia	1990	1993-2009 (WEO)
Nepal	1768	1970-1999 (AC); 2000-2009 (WEO)
Netherlands	1579	1880-1913 (EHNET); 1914-1939 (UN/Netherlands Govt); 1960-1999 (OECD); 2001-2009 (WEO)
New Zealand	1907	1860-1998 (New Zealand Govt); 2000-2009 (WEO)
Nicaragua	1821	1970-2004 (AC); 2005-2009 (WEO)
Niger	1958	1970-1998 (AC); 1999-2009 (WEO)
Nigeria	1960	1970-2001 (AC); 2002-2009 (WEO)
Norway	1905	1880-1913 (EHNET); 1914-1980 (UN/MIT); 1983-1998 (WEO/MIT); 1999-2009 (WEO)
Oman	1650	1973-1990 (AC); 1991-2009 (WEO)
Pakistan	1947	1970-1990 (JP); 1994-2009 (WEO)
Panama	1903	1953-1963 (UN/MIT); 1970-1995 (AC); 1996-2009 (WEO)
Papua New Guinea	1975	1973-2007 (AC)
Paraguay	1811	1970-1998 (AC); 1999-2009 (WEO)
Peru	1821	1918-1945 (UN/OXLAD); 1970-2004 (AC); 2006-2009 (WEO)
Philippines	1946	1970-1989 (AC); 1990-2009 (WEO)
Poland	1918	1986-1994 (AC); 1995-2009 (WEO)
Portugal	1140	1880-1912 (EHNET); 1946-1959 (UN); 1960-1975 (UN/OECD); 1980-1989 (JP); 1991-2005 (WEO/OECD); 2006-2009 (WEO)
Qatar	1971	1990-2009 (WEO)
Romania	1881	1914-1979 (UN/MIT); 1980-1999 (CLYPS); 2001-2009 (WEO)
Russian Federation	1991	1885-1913 (EHNET); 1992-1999 (JP); 2000-2009 (WEO)
Rwanda	1962	1970-1994 (AC); 1995-2009 (WEO)
Samoa	1962	1970-2007 (AC)
São Tomé & Príncipe	1975	1995-2001 (AC); 2002-2009 (WEO)
Saudi Arabia	1932	1991-1998 (FO); 1999-2009 (WEO)
Senegal	1960	1970-1999 (AC); 2001-2009 (WEO)
Serbia, Republic of	2006	2000-2009 (WEO)

Appendix Table 2. Sources of Data on Debt, GDP, and Debt–to–GDP Ratio by Country (Concl.)

Country	Independence	Sources
Seychelles	1976	1980-1999 (AC); 2000-2009 (WEO)
Sierra Leone	1961	1970-2007 (AC)
Singapore	1965	1990-2009 (WEO)
Slovak Republic	1993	1992-2002 (JP); 2003-2004 (OECD); 2005-2009 (WEO)
Slovenia	1991	1993-1994 (JP); 1995-2009 (WEO)
Solomon Islands	1978	1980-2005 (AC); 2006-2009 (WEO)
South Africa	1910	1914-1979 (UN/MIT); 1980-1999 (CLYPS); 2001-2009 (WEO)
Spain	1492	1880-1913 (EHNET); 1918-1981 (UN/MIT); 1982-2009 (WEO)
Sri Lanka	1948	1970-1980 (UN/WEO); 1981-2009 (WEO)
St. Kitts and Nevis	1983	1998-2009 (WEO)
St. Lucia	1979	1981-1989 (AC); 1990-2009 (WEO)
St. Vincent & the Grena	1979	1990-2009 (WEO)
Sudan	1956	1992-2009 (WEO)
Suriname	1975	1990-2009 (WEO)
Swaziland	1968	1970-1989 (AC); 1993-2009 (WEO)
Sweden	1523	1880-1913 (EHNET); 1918-1958 (UN/MIT); 1970-2002 (OECD); 2004-2009 (WEO)
Switzerland	1291	1899-1913 (EHNET); 1929-1956 (UN/MIT); 1971-1981 (OECD); 1983-2009 (WEO)
Syrian Arab Republic	1946	1970-1989 (AC); 1990-2009 (WEO)
Taiwan Prov.of China	None	1997-2009 (WEO)
Tajikistan	1991	1998-2003 (AC); 2004-2009 (WEO)
Tanzania	1964	1970-2005 (AC); 2008-2009 (WEO)
Thailand	1238	1970-1994 (AC); 1996-2009 (WEO)
Togo	1960	1975-2000 (AC); 2001-2009 (WEO)
Tonga	1970	1985-1992 (AC); 1995-2009 (WEO)
Trinidad and Tobago	1962	1980-1997 (JP); 1999-2009 (WEO)
Tunisia	1956	1970-1976 (AC); 1978-2003 (JP); 2004-2009 (WEO)
Turkey	1923	1936-1981 (UN/MIT); 1982-1999 (AC); 2000-2009 (WEO)
Turkmenistan	1991	2000-2009 (WEO)
Uganda	1962	1970-2003 (AC); 2004-2009 (WEO)
United Kingdom	10th century	1830-1978 (UK Govt); 1979-2009 (WEO)
Ukraine	1991	1998-2009 (WEO)
United Arab Emirates	1971	1973-1998 (AC); 1999-2009 (WEO)
Uruguay	1825	1970-2003 (AC); 2004-2009 (WEO)
United States	1776	1791-1997 (US Govt); 1998-2009 (WEO)
Uzbekistan	1991	1998-2009 (WEO)
Vanuatu	1980	1981-2007 (AC)
Venezuela, Rep. Bol.	1811	1970-1991 (AC); 1994-2009 (WEO)
Vietnam	1945	1992-2004 (AC); 2005-2009 (WEO)
Yemen, Republic of	1990	1992-1998 (AC); 1999-2009 (WEO)
Zambia	1964	1970-2003 (AC); 2004-2009 (WEO)
Zimbabwe	1980	1976-1977 (UN/MIT); 1979-2003 (AC); 2005-2009 (WEO)

1/ Where (AC) refers to Abbas and Christensen (2010); (CLYPS) refers to Cowan K. et al. (2006); (EHNET) refers to Flandreau and Zumer (2004), (FO) refers to Fouad et al. (2007); (JP) refers to Jaimovich and Panniza (2010); (LON) refers to League of Nations Statistical Handbooks (Various editions); (MISS) refers to Missale (2000); (MIT) refers to Mitchell (2003); (OECD) refers to the Organization of Economic Co-Operation and Development (2009); WEO refers to the World Economic Outlook (2010); (OXLAD) refers to Oxford Latin American Economic History Database (2003); and (UN) refers to the United Nations Statistical Handbooks (Various editions).

2/ When both debt and GDP series are drawn from the source and/or a debt-to-GDP ratio is directly drawn from a data source, the parenthesis include only that one source. When debt and GDP series are drawn from two different sources, the two sources are cited in the parenthesis with the debt series drawn from the first source, while GDP series is drawn from the second source.

Appendix Table 3. Data Sources for Interest Payments and Primary Balances

Database	Reference	Country Coverage	Period	Definitions and Comments
Canada - Offical Government Publication	Canada Year Book Historical Collection website accessed in April 2011. http://www65.statcan.gc.ca/acyb_r000-eng.htm	Canada	1867-1976	Revenues refer to the Federal government budgetary revenue by major source. Expenditures refer to the Federal government budgetary expenditure, classified by function.
Flandreau and Zumer	Flandreau M. and F. Zumer (2004). The Making of Global Finance 1880-1913. Development Centre Studies, OECD.	Austria, Argentina, Belgium, Brazil, Denmark, France, Germany, Greece, Italy, Netherlands, Norway, Portugal, Russia, Spain, Sweden, Switzerland, U.K. (17 Countries).	1880-1913	In most cases, the data refers to federal and state level combined. Interest service is defined as the amount paid each year on the public debt account, with amortization generally subtracted.
FAD G-7 Debt Database	Government Debt Database of the IMF Fiscal Affairs Department (2010).	Canada, France, Germany, Italy, Japan, United Kingdom and United States (7 Countries).	1950-2009	GDP at market prices.
Italy - Official Government Publication	Bank D'Italia: Francese, Maura, and Angelo Pace. "Questioni Di Economia E Finanza." Banca D'Italia, Occasional Papers 31 (2008).	Italy	1861-2009	GDP at market prices.
Japan - Official Government Publication	Hundred-Year Statistics Book of the Japanese Economy (1966). Bank of Japan and Ministry of Finance Editors.The National Accounts of Japan, the Economic and Social Research Institute of Cabinet Office, Japan (1955-2009). The History of Public Finance in Meiji and Taisho Periods ("Meiji Taisho Zaisei-shi"), Ministry of Finance.	Japan	1870-2009	General government (1955-2009), Central and local governments (1946-1954), Central Government (1875-1945). Expenditure and revenue are of the net total of the general account and special accounts, excluding a few special accounts that did not allocate for on an annual basis, such as the Extraordinary War Expenditures Special Account. (1875-1945)
LON	League of Nations Archives (1927-1931, 1933-1938, 1940-1941, 1943, 1945)	LON Member Countries	1919-1930	The figures shown represent, for many countries, estimated or actual cash receipts and disbursements, but for some countries they represent, for the receipts, the claims established and, for - the expenditure, the pay warrants issued, liabilities acknowledged, commitments entered into, the total amounts placed by the Treasury at the disposal of the individual services for a given year or even credits which may be utilized in subsequent years.
Mitchell	B. R. Mitchell (2003) International Historical Statistics: 1750-2000. Basingstoke and New York: Palgrave Macmillan, 4th edn. Several Editions: Africa, Asia and Oceania; Europe; and The Americas.	Argentina, Australia, Austria, Belgium, Brazil, Canada, Chile, China, Colombia, Czech Republic, Denmark, Finland, France, Germany, Greece, Hong Kong, India, Indonesia, Ireland, Israel, Italy, Japan, Kenya, Korea, Malaysia, Mexico, Netherlands, New Zealand, Nigeria, Norway, Pakistan, Peru, Philippines, Portugal, Russia, Saudi Arabia, Singapore, Sout Africa, Spain, Sweden, Switzerland, Thailand, Turkey, United Kingdom, United States (46 Countries).	1870-2000	Data refers to the Central Goverment. Comprises GDP, CF (capital formation: gross excluding stocks), GNP (gross national product), NMP (net material product), NNP (net national product (i.e. national income)). NMP is calculated for the material production sectors only, and excludes most of the service sectors, which are part of GDP. NNP is the total market value of all final goods and services produced by residents in a country or other polity during a given period (gross national product or GNP) minus depreciation. Total Revenue, means ordinary revenue exclusive of loan receipts. Whether or not receipts from public enterprises are included varies from country to country. All kinds of central government expenditure have been included. Statistics are from closed accounts. The main sources used are offical, including the United Nations, Yearbooks of National Accounts Statistics and National Income Statistics (Statistics of National Income and Expenditure, International Financial Statistics.) Some national publications were also used.
Netherlands - Official Government Publication	CPB Long run timeseries on Dutch public finance, see Frits Bos, 2008, The Dutch fiscal framework; history, current practice and the role of CPB, CPB Document 150	The Netherlands	1800–1999	The data all refer to the general government according to national accounts and government finance statistics, i.e. including not only central government, but also local government and social security funds. EU-subsidies for agriculture and structural funds are included as expenditure by the Dutch government; in order to arrive at the proper financial balance (EMU-government deficit), it is also recorded as a revenues of the Dutch general government. EU-taxes to Dutch citizens and corporations (e.g. import duties en transfer to EU on VAT-basis) are recorded as revenue of the Dutch government; in order to arrive at the proper financial balance, these are also recorded as expenditure of the Dutch general government. Net expenditure on non-produced assets is a net revenue for Dutch government. It concerns revenue with respect to the sale of land and telecom-frequencies. These are therefore recorded as revenue instead of as negative net expenditure.
New Zealand - Official Government Publication	Statistics New Zealand website on Long Term Data Series (LTDS) accessed in June 2010. http://www.stats.govt.nz/	New Zealand	1860-2000	GDP at market prices.
OECD	OECD (2010) - Country Tables 2010. Organization for Economic Cooperation and Development, Paris, France.	OECD Member Countries (30 Countries).	1960-2010	All OECD data refer to the general government. Gross domestic product is at market prices. Revenues include both tax and non-tax receipts. Tax receipts of the government sector are defined as the sum of direct taxes on household and business sectors, indirect taxes and social security contributions. Non-tax receipts include operating surpluses, property income, user charges and fees, other current and capital transfers received by the general government. Expenditure consist of current outlays plus capital outlays. Current outlays are the sum of current consumption, transfer payments, subsidies and property income paid (including interest paymentsGovernment net lending is general government current tax and non-tax receipts less general government total outlays.
Portugal	Marinheiro, Carlos F., "The sustainability of Portuguese fiscal policy from a historical perspective", Empirica, 33 (2-3), 155-179, June, 2006 (http://dx.doi.org/10.1007/s10663-006-9013-0	Portugal	1852-2010	Until 1972: State (cash basis); 1973 onwards: general government (accrual, ESA)
UN	United Nations Statistical Yearbooks (1948-1949, 1952, 1958, 1965, 1973, 1986).	UN Member Countries	1919 - 1983	With the exception of the USSR, the budgetary accounts figures refer to central government. Whereas the figures shown for each country are normally comparable - unless there has been a change in the method of accounting - there are constraints on comparability among the figures across countries. This is due to differences (1) in the proportion between public and private activities; (2) in the proportion between the activities of public, central, regional, local and other public bodies; (3) in the methods of accounting. Figures for the estimates and budgetary accounts in some countries are, as a principle, reported on a gross basis; in others they are on a net basis.
United Kingdom Historical Statistics	B.R.Mitchell, British Historical Statistics Chapter XVI (CUP 1988); and Office for National Statistics of the United Kingdom (ONS), available at: http://www.statistics.gov.uk/default.asp	United Kingdom	1830-1980	GDP at market prices.
United States Historical Statistics	Historical Statistics of the United States (2006) Edited by Susan B. Carter, S. S. Gartner, M. R. Haines, A. L. Olmstead, R. Sutch, G. Wright. Cambridge University Press.	United States	1791-2007	Data refers to the general government in most cases, and in some instances, the federal government. Except as noted, duplicative transactions between governments are excluded. Also, unless noted, revenues and expenditures are "direct" or "own-source." In other words, the figures do not include revenues from, or expenditures for, intergovernmental grants. General revenues and expenditures exclude utility, liquor store, and insurance trust finances.
WEO Database	World Economic Outlook (2011). International Monetary Fund, April 2011.	IMF Member Countries (187 Countries).	1977-2009	

Appendix Table 4. Episodes of Debt Decreases by Country

Name	Start Year	End Year	Duration	Starting level	Ending level	Decrease
Austria	1892	1899	7	90	78	12
	1901	1909	8	83	61	22
	1948	1957	9	35	8	27
Belgium	1933	1938	5	98	65	34
	1959	1974	15	70	39	31
	1993	2007	14	134	83	51
Finland	1994	2008	14	58	35	23
France	1887	1891	4	117	104	13
	1895	1900	5	114	92	23
	1901	1913	12	98	66	32
	1925	1926	1	197	145	53
	1927	1929	2	157	139	19
	1949	1969	20	44	14	30
Greece	1902	1907	5	209	118	91
	1908	1913	5	122	65	57
Ireland	1959	1961	2	61	44	17
	1966	1973	7	48	35	13
	1993	2006	13	94	25	69
Italy	1897	1913	16	128	77	51
	1994	2004	10	122	104	18
Netherlands	1886	1889	3	100	90	11
	1893	1913	20	99	46	53
	1922	1929	7	60	39	22
	1960	1977	17	77	51	26
	1995	2007	12	76	45	31
Portugal	1891	1895	4	106	94	11
	1897	1909	12	107	70	37
	1964	1974	10	50	25	25
	1995	2000	5	61	50	11
Spain	1880	1884	4	162	73	89
	1902	1913	11	124	77	47
	1940	1945	5	60	22	37
	1996	2007	11	67	36	31
Sweden	1948	1954	6	42	29	13
	1984	1990	6	71	46	24
	1996	2008	12	84	38	47
Switzerland	1944	1956	12	79	23	56
	1977	1989	12	48	31	17
	2003	2009	6	55	39	16
United Kingdom	1880	1914	34	65	27	38
	1923	1925	2	196	177	19
	1926	1929	3	187	171	17
	1933	1939	6	194	150	44
	1946	1975	29	270	47	223
	1981	1991	10	49	31	18
	1997	2002	5	49	37	12
Australia	1932	1942	10	98	62	36
	1946	1964	18	92	28	65
	1966	1977	11	41	22	20
	1994	2007	13	31	9	22
Canada	1933	1937	4	118	88	30
	1945	1957	12	155	59	97
	1961	1969	8	69	55	13
	1971	1976	5	59	44	15
	1996	2007	11	102	67	35
Japan	1887	1898	11	31	19	12
	1946	1964	18	56	4	52
New Zealand	1933	1940	7	247	128	118
	1946	1966	20	148	58	89
	1969	1974	5	63	41	22
	1987	1989	2	76	58	18
	1992	2007	15	65	17	47
United States	1880	1892	12	18	6	11
	1921	1929	8	32	16	16
	1946	1974	28	122	32	90
	1995	2001	6	67	55	12

Appendix Table 5. Episodes of Debt Increases by Country

Name	Start Year 1/	End Year	Duration	Starting level	Ending level	Increase
Austria	1880	1886	6	70	84	15
	1929	1935	6	15	40	25
	1974	1996	22	13	68	56
Belgium	1881	1886	5	32	47	16
	1890	1898	8	42	54	12
	1974	1993	19	39	134	95
Finland	1990	1994	4	14	58	44
France	1882	1887	5	90	117	27
	1891	1895	4	104	114	11
	1929	1932	3	139	173	34
	1980	1998	18	21	59	39
	2006	2009	3	64	78	14
Germany	1880	1894	14	25	47	22
	1973	2005	32	18	68	50
Greece	1886	1900	14	48	218	170
	1960	1963	3	12	23	11
	1965	1972	7	17	27	10
	1979	1996	17	23	102	79
Ireland	1973	1987	14	35	87	52
	1989	1991	2	77	95	17
	2006	2009	3	25	66	41
Italy	1880	1884	4	92	117	26
	1963	1994	31	27	122	95
Netherlands	1880	1886	6	80	100	20
	1929	1946	17	39	218	179
	1977	1993	16	51	96	45
	1987	1993	6	85	96	11
Portugal	1880	1885	5	75	89	14
	1889	1891	2	85	106	21
	1895	1897	2	94	107	13
	1959	1964	5	20	50	30
	1980	1987	7	32	61	30
	2000	2005	5	50	65	14
Spain	1884	1889	5	73	84	11
	1893	1896	3	80	96	16
	1897	1902	5	91	124	32
	1974	1996	22	11	67	56
Sweden	1930	1933	3	18	30	11
	1976	1984	8	26	71	45
	1990	1996	6	46	84	38
Switzerland	1928	1944	16	23	79	56
	1989	1998	9	31	55	24
United Kingdom	1929	1933	4	171	194	23
	1940	1946	6	121	270	149
	1991	1997	6	31	49	18
	2002	2009	7	37	68	31
Australia	1925	1932	7	55	98	43
	1942	1946	4	62	92	30
Canada	1928	1933	5	53	118	65
	1937	1945	8	88	155	68
	1979	1996	17	45	102	56
Japan	1919	1936	17	23	63	41
	1937	1944	7	57	204	147
	1970	1987	17	12	74	62
	1991	2005	14	68	192	124
New Zealand	1908	1933	25	96	247	151
	1940	1946	6	128	148	19
	1974	1987	13	41	76	35
United States	1916	1919	3	3	33	31
	1929	1934	5	16	41	25
	1941	1946	5	45	122	76
	1981	1995	14	32	67	35
	2001	2009	8	55	85	30

1/ Debt increases that started from 2007 onward due to the financial crisis are excluded from this list, with the exception of debt increases that were already in place (defined as debt increases above 5 percent of GDP) by the time the financial crisis struck.

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