

Historical Patterns and Dynamics of Public Debt—Evidence From a New Database

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This paper introduces the first truly comprehensive database on gross government-debt-to-GDP ratios, covering nearly the entire IMF membership (178 countries) and spanning an exceptionally long time period (going back to 1880 for most advanced and some emerging economies). The paper then uses the database to document the evolution of public debt ratios in advanced, emerging, and low-income economies, and relate them to contemporaneous developments in growth, commodity prices, and debt relief, respectively. Finally, the paper identifies 129 large debt increases and decreases observed in 19 advanced economies over 1880–2007 and decomposes them into contributions from the primary balance, the interest-growth differential, and the stock-flow adjustment term (a composite of valuation effects and “below-the-line” fiscal operations). The analysis suggests a pattern of asymmetric contributions: the primary balance plays a key role in debt reductions, except during the post-WWII period (when the growth-interest differential was extremely favorable); while debt surges were often associated with large stock-flow adjustments, likely reflecting assumption of implicit liabilities and exchange rate changes and, for the cases of debt reduction, debt default. [JEL H6, N1, F3] IMF Economic Review (2011) 59, 717–742. doi:10.1057/imfer.2011.24

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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 data sets 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 databases published by the IMF; and the Global Development Finance (GDF) data set 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, 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 178 countries and starts from 1880 for most G7 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, the United Nations, and the IFS. For the most recent years, data are linked to the IMF's World Economic Outlook (WEO) database, facilitating regular updates in the future. The definitions of debt and income variables are documented, along with the time and country coverage of the underlying data sets. The HPDD is available publically in electronic format on the Fiscal Monitor Webpage of IMF.ORG.²

We then use the database to document the evolution of public debt ratios in advanced, emerging, and low-income economies, and relate them to contemporaneous developments in growth, commodity prices, and debt relief, respectively. Finally, we identify 129 large debt increases and decreases observed in 19 advanced economies over 1880–2007 and decompose them into contributions from the primary balance, the interest-growth differential, and a stock-flow adjustment term. The analysis suggests a pattern of asymmetric contributions: the primary balance plays a key role in debt reductions, except during the post-WWII period (when the interest-growth differential

¹Data start prior to 1880 for the United States (1791), Sweden (1800), the Netherlands (1814), the United Kingdom (1830), Portugal (1852), New Zealand (1860), Italy (1861), Canada (1870), and Japan (1875).

²See www.imf.org/external/ns/cs.aspx?id=262; Also see Supplementary Information accompanies the paper on *IMF Economic Review* website (<http://www.palgrave.com/imfer>).

was extremely favorable); while debt surges were associated with notably large stock-flow adjustments. We do not isolate the causes of these stock-flow adjustments, which likely reflect the effect of exchange rate changes or absorbing implicit liabilities (for example, from banking crises or other off-budget operations).

Formally, the paper is organized as follows. The next section surveys existing data sources on public debt. Section II describes the data sets and sources used in compiling the HPDD and the methodology for assembling information from these sources. Section III provides summary statistics and assesses broad public debt trends by various country groupings. Section IV analyzes the main drivers of large debt increases and decreases in 19 advanced economies. Section V 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.

I. 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 data set. 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, data sets 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 (R&R) (2010) analyzed historical episodes of debt cycles and financial crises for 70 countries, by building a historical public debt series along with data on external debt. While the database spans an exceptionally long time period by often resorting to unexplored data sources such as the League of

Nations, the authors occasionally employed interpolations and other data transformations to build continuous data series, for instance by using exports as a proxy for underlying nominal GDP data.³ In addition, the longest historical series in some cases cover either the ratio of debt-to-exports (for example, China and India), and/or the ratio of external-debt-to-export (for example, Brazil), which raises issues of comparability. Finally, the sources provided in the R&R online database refer to overlapping periods for both debt and GDP series, rather than specifying the underlying sources for each data point. This makes it harder to discern how each observation was constructed.

Two other papers focus specifically on building sovereign debt data sets. 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 and others (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 updated annually (in September) through links to the IMF WEO database and supplemented with additional information, where available, to fill gaps.⁴ Keeping the database alive to reflect most recent updates and the latest available data is one of its main advantages relative to existing databases.

II. 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.

³This was the case in a number of advanced economies (for example, Canada and Japan), and emerging economies (for example, Indonesia, Mexico, Russia, South Africa, and Turkey).

⁴The IMF Statistics Department and the World Bank launched an online Public Sector Debt Statistics Database based on the forthcoming Public Sector Debt Statistics Guide for Compilers and Users (see 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 (for example, by term, currency of denomination, and residency).

Data Sources

The data set constitutes an unbalanced panel of 178 countries over the period 1791–2009.⁵ In constructing the data set, 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 compiled by researchers and international organizations.

The HPDD aims to cover public debt at the general government level.⁶ 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. Although we have made use of the best debt data available, public debt data at the general government level were lacking for many countries, particularly in the earlier periods and for LICs.⁷ Debt data for the central government were used as an alternative. This is a common approximation in many IMF publications.⁸ Table (1) of the Supplementary Appendix provides the details on the public sector scope used in the debt data collected.⁹

Public debt data for the earliest period were compiled from official government publications for several G7 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 (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 economies 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

⁵Data on public debt are not available for a handful of countries, including Afghanistan, Iraq, Kiribati, Kosovo, Timor-Leste, and Somalia.

⁶General government includes the central government plus any applicable local or state governments, and in some cases such items as public corporations and social security funds. See IMF (2001).

⁷Given the difficulties in some countries of compiling data for other levels of government, it is only recently that general government data started to be collected systematically for an increasing number of countries (see IMF, 1986).

⁸Other authors have also reported central government debt data when general government debt data were not available or were hard to ascertain. For example, most of the public debt data in R&R (2010) database are at the central government level.

⁹The components of general government, for each country in the WEO database, can be found on the following website: www.imf.org/external/pubs/ft/weo/2011/01/weodata/index.aspx. In addition, the periodical publication “Government Finance Statistics” of the IMF provides an institutional appendix with complete definitions of the coverage of general government.

(2010), Cowan and others (2006), and Fouad and others (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.

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).¹⁰ 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.

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

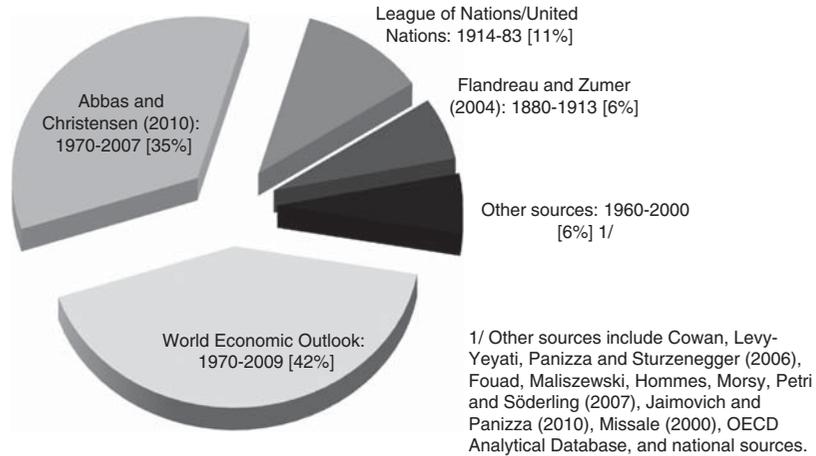
Methodology

As Figure 1 shows, the two main data sources used have been WEO and Abbas and Christensen (2010) (AC). The prevalent use of the AC database is explained by several factors. First, among the alternative databases, AC provided the widest and longest data coverage for low- and middle-income countries.¹¹ Their database covers total public debt data for 93 LICs and emerging markets over 1975–2004. Second, the data sources in AC were transparently documented and consistently used over time. Abbas and Christensen extract their domestic debt data from the IFS monetary survey by including commercial banks’ gross claims on central government plus central bank liquidity paper. This was complemented by external debt data

¹⁰For the United States, GNP data were available from Mitchell (2003) from 1791 through 1900.

¹¹For example, Jaimovich and Panizza cover 89 countries over the period 1991–2005, and seven extra countries for the period 1993–2005, with incomplete coverage going back in some cases to 1970.

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



Total observations of debt-to-GDP: 7433

Source: HPDD.

from GDF.¹² Other databases such as Jaimovich and Panizza (2010) (JP) do not explicitly document sources over time and do not use these sources consistently throughout the period covered.¹³

Finally, for each country, we have privileged the use of the same data source when the source provided the longest time series for the country. Given that AC's coverage started in 1970, and that most LICs and some middle-income countries got their independence in the mid and late 1960s (see Table 2 of the Supplementary Appendix), we have preferred the use of AC's database as it provided the longest time series for most countries in these two groups.

In the same spirit, we have preferred to use the WEO database whenever WEO coverage began given that this data source is comprehensive in

¹²AC do not capture debt exchanged in markets and held by other participants than commercial banks and the central bank. However, given that the size of financial markets was at best small in most of low- and middle-income countries covered and that the AC database is mainly used up to 2000, before WEO coverage starts, this shortcoming is likely inconsequential.

¹³JP report on page 21 that when they exhausted the data sources from international organizations, they resorted to other official websites (Central Banks, Ministries of Finance, and Debt Management Offices) and sources (Eurostat, publications and reports by investment banks, and documents from the IMF). However, no more information is provided on how these sources were integrated into the database construction and for which countries these sources were relied upon.

its coverage and is reported by IMF country teams with an intimate understanding of the country's data characteristics.

The data set 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, and these have been clearly highlighted in the HPDD.¹⁴

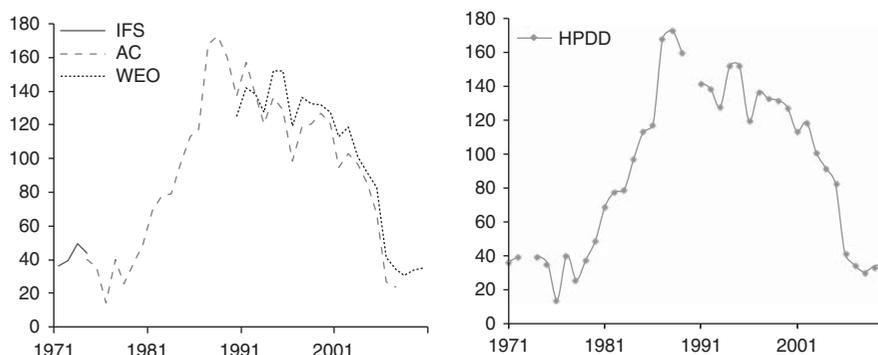
It is important to note that when different data sources overlapped, they rarely displayed large discrepancies. Thus, we were rarely confronted with conflicting information. The lack of contradictory information in the case of LICs is typically due to the fact that many of the available data sets use the same underlying sources (most often either IFS or GDF). It is also important to note that we have not used different databases to fill in gaps in some data sets.

Figure 2 displays the example of Madagascar to illustrate our data compilation approach and how various data sources were merged by moving from one data set to another. The left-hand-side graph shows the available data sources for Madagascar starting in 1971, made up of IFS for 1971–74, AC for 1974–2007 and WEO for 1991–2010. Notice that the data series do not depart from each other significantly and display similar trends. The graph on the right-hand side displays the ensuing debt-to-GDP series in our database which shows two breaks: one in 1973 and the other in 1990. The first break was implemented to mark the transition from IFS to AC. This was necessary since these two data sets did not have the same level of debt in 1974, the first year of overlap, with a discrepancy of 4 percentage points. The second break was implemented to mark the transition from AC to WEO in 1990. Since the WEO database is in most cases our best choice data series, we have relied on it as early as possible. The break was implemented because of the large discrepancy between AC and WEO in 1990 (the difference was 12 percentage points).

In most cases, the independence date for each country 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). As a rule, we have continued the data series on the largest country, in terms of GDP, that resulted from the breakdown. This explains for example why we have reported debt data for the U.S.S.R. under Russia.

¹⁴A total of 111 breaks were implemented in 68 countries, with a maximum of five breaks per country for only one country. The majority of breaks were applied to minimize step differences in the debt ratio series when transitioning from one data source to another.

Figure 2. Illustration of Data Merging for Madagascar (Debt/GDP)



III. Descriptive Statistics and Public Debt Trends

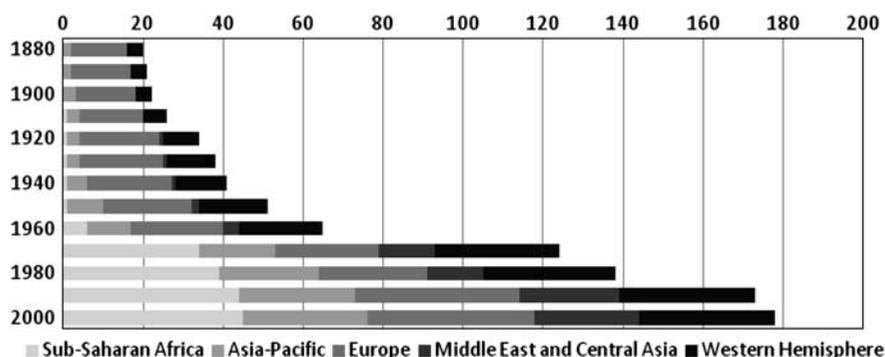
The HPDD builds on the aforementioned data sources to provide exceptional country coverage, especially after 1970 (Figure 3).¹⁵ At the start of the 1880–2009 period, debt ratios could be identified for about 20 countries, mainly in Europe. The sample size rises significantly in 1970, when Abbas and Christensen (2010) and the IMF WEO bring in several Latin American LICs and most postcolonial states in Africa, Asia and the Middle East.¹⁶ 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.

The HPDD facilitates a range of notable comparisons, both across time and country groups. To enable such comparisons, 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 data sets: (i) the IMF WEO database on PPP GDP which goes back about 30 years but has continuous coverage for all 178 countries; and

¹⁵Regions 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 Middle-East and Central Asia Department (MCD). Please refer to the IMF website (www.imf.org) for details on country groupings by department.

¹⁶There were 118 independent countries prior to 1970 in our data set. However, for some of these countries, large data gaps exist. For example, the start date of data for China is 1984. For Russia, aside from the pre-WW1 coverage (1885–1913), data were available from 1992 onward, after the end of the Soviet period. Other countries with notable gaps in the post-1970 period include Brazil, Hungary, Romania, and Saudi Arabia.

Figure 3. Number of Countries with Identified Public Debt-to-GDP Data by Decade (Number of countries by region)



Source: HPDD.

(ii) the Maddison (2010) data set 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.

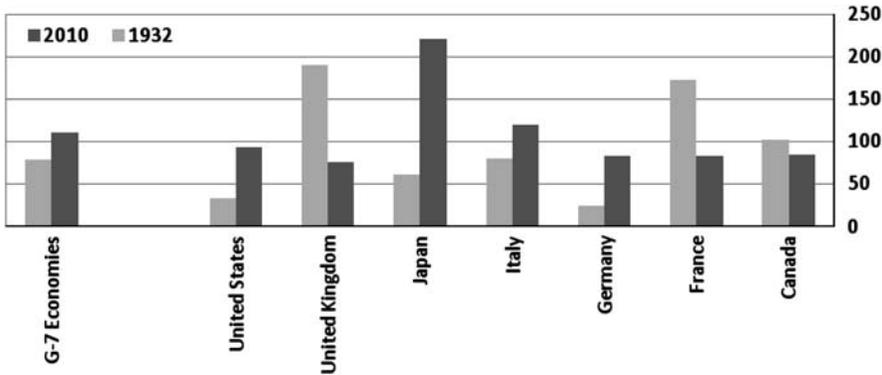
One interesting comparison includes comparing the Great Depression of 1929–32 with the current period marked by the global financial crisis (Figure 4). It is interesting to see that the implications of the current crisis for public debt appear to be graver, despite a much less dramatic growth decline than witnessed during the Great Depression (Figure 4).¹⁷ This reflects—at least in part—a much weaker starting point at the outset of the current episode—debt ratios were 24 percentage points of GDP higher, on average, in advanced G7 countries in 2007 (PPPGDP-weighted) 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.¹⁸

Debt levels in the advanced economies now covered by the G20 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 G20 advanced and emerging economies

¹⁷Fiscal balances during the Great Depression (1928–32) deteriorated by about 4 percentage points of GDP, on average, in the G7 advanced economies (PPPGDP-weighted), compared to a deterioration of about 6 ½ percentage points of GDP during the Great Recession (2007–10).

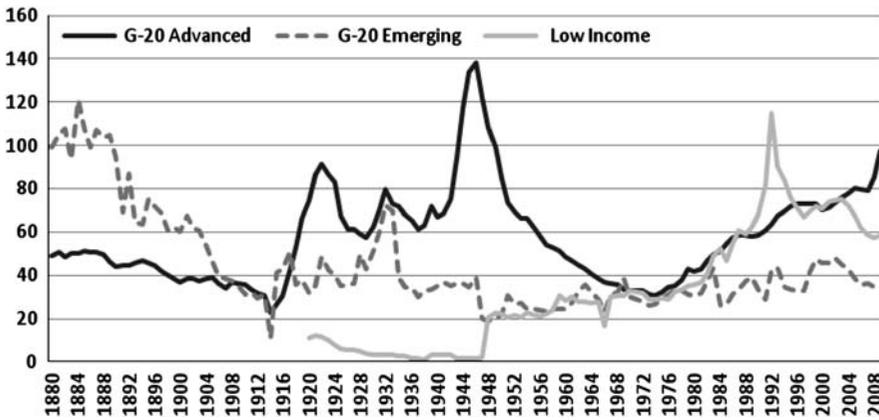
¹⁸The G7 advanced economies are Canada, France, Germany, Italy, Japan, the United Kingdom, and the United States.

Figure 4. A Tale of Two Crises: The Great Depression (1932) and the Global Financial Crisis (2010)
(Debt-to-GDP ratios in G7 economies)



Source: HPDD. Average is PPPGDP-weighted.

Figure 5. Debt-to-GDP Ratios Across Country Groups, 1880–2009
(Group PPPGDP-weighted average, in percent of GDP)



Source: HPDD. Average is PPPGDP-weighted.

(for which data are available) trended down (Figure 5). In advanced economies 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 (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 G20 economy average debt ratio declined to 50 percent of GDP, due to rapid growth and inflation. Average advanced G20 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.

Emerging economies and LICs exhibited lower average debt ratios over the same period, although they were more volatile. The average debt level for nonadvanced 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.¹⁹ Volatility has been particularly pronounced in G20 emerging economies, occasionally connected with crises (for example, in Latin America in the early 1980s and in Asia in the late 1990s).²⁰ 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 and Multilateral Debt Relief Initiatives. For sub-Saharan African countries, the comparison for 1994 and 2009 illustrates this story (Figure 6).

For oil producers, debt ratios were inversely correlated with oil prices over 1965–2009 (Figure 7). 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.

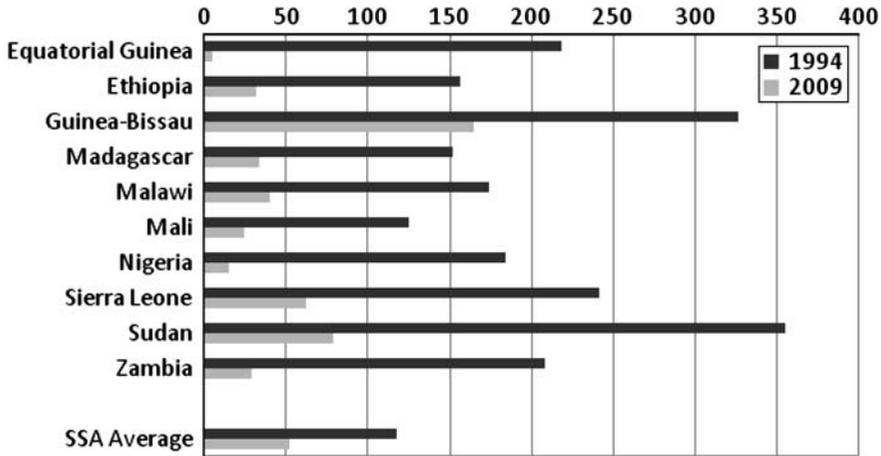
The HPDD also sheds light on one of the leading issues of the day: the relationship between debt and growth. Although it is quite difficult to make any causal statements on this contentious issue, the data set does allow us to identify broad patterns of correlation and isolate any anomalies.²¹ In particular, we find an inverse relationship between debt and growth for three groups of economies, G20 advanced, G20 emerging, and low-income asserting itself over the 1880–2009 period. A notable exception is, however,

¹⁹As such, the coefficient of variation for advanced economies was 0.36 as opposed to 0.55 for the rest.

²⁰The G20 emerging economies are Argentina, Brazil, People's Republic of China, India, Indonesia, Mexico, Russia, Saudi Arabia, South Africa, and Turkey.

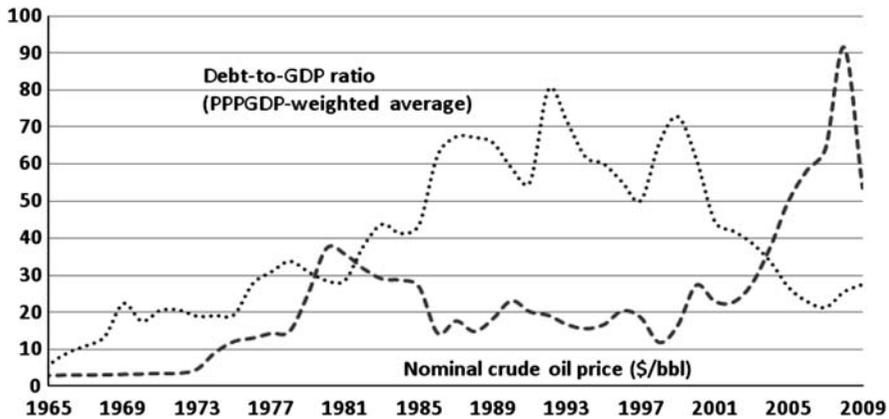
²¹These are illustrated in detail in the IMF Working Paper version of this paper, available at: www.imf.org/external/pubs/cat/longres.aspx?sk=24332.0.

Figure 6. Debt-to-GDP Ratios in Select Sub-Saharan African Countries, 1994 and 2009
(in percent of GDP)



Source: HPDD. The selected 10 countries represent those with the largest declines in the debt-to-GDP ratio.

Figure 7. 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 www.inflationdata.com/inflation/inflation_rate/historical_oil_prices_table.asp.

the debt buildups over 1970–2007 in G20 advanced economies which coincided with a significant increase in incomes. It remains to be seen whether this seminal departure from the historical inverse association represented a

structural break—such as an increase in the size of the public sector—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 G20 advanced economies 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).

IV. Analysis of Large Debt Reductions and Build-Ups in Advanced Economies

To put the ongoing increase in debt ratios in advanced economies in historical context, we document, in this section, major episodes of debt declines and increases in a group of 19 advanced economies, of which 14 are European countries, over the period 1880–2007.²² Specifically, we decompose changes in the debt-to-GDP ratio for these countries 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 nongovernmental entities, debt restructuring or default, privatization or drawdown and buildup of government deposits.²³

There are a number of studies that have sought to explain the sources of public debt changes in both advanced and developing economies. In the absence of long time series data, however, their ambit has been mostly limited to the period starting 1970. For instance, Campos, Jaimovich, and Panizza (2006) look at public debt ratio changes for 117 countries over the period 1972–2003 and find a limited role for both primary deficits and the interest-growth differential, especially in emerging and low-income economies. Instead, they document the existence of very large stock-flow adjustment residuals which they link to balance sheet (valuation) effects and the realization of contingent liabilities. Budina and Fiess (2005) study debt changes in 15 market access countries and document an increasingly important role

²²The countries covered are: Australia, Austria, Belgium, Canada, Finland, France, Germany, Greece, Ireland, Italy, Japan, Kingdom of Netherlands—Netherlands, New Zealand, Portugal, Spain, Sweden, Switzerland, the United Kingdom, and the United States.

²³For 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, coverage, and definition as documented in the original sources, are provided in Table 3 of the Supplementary Appendix. Tables 4 and 5 of the same appendix document the data sources used, over different time horizons, for each country, for the overall balance, and interest payments, respectively.

for prices (interest rates and real exchange rates) over 1990–2003, a period which witnessed rapid financial liberalization and capital flows, but wherein emerging economies continued to suffer from “original sin” (*a la* Eichengreen, Hausmann, and Panizza (2003)), that is the inability to issue long-dated paper in domestic currency at reasonable cost.

Among studies of large debt changes, Easterly (2001) finds real economic growth to be the key driver. Specifically, he argues that the debt crisis in developing economies in the 1980s and 1990s was caused by an unanticipated growth slowdown and a delay in calibrating fiscal policies to that slowdown. More recently, Abbas and others (2010) study large debt reductions in advanced and emerging economies over 1970–2008 and recover the primary balance as the key driver of debt reductions for the former group. For emerging economies, they discriminate the episodes by whether the average inflation rate was above or below 10 percent. For the high-inflation cases, they find that the growth-interest differential accounts for the bulk of the debt reduction, but for low-inflation cases, a roughly equal contribution with the primary balance is observed.

It would be interesting to see how these different components play out in the case of our 19 advanced economies over a longer stretch of time—a study that has not been done before. The exercise can shed light on a number of questions, such as: Does the composition of debt reductions vary across periods of financial integration and repression? How do debt increases during previous global recessions compare with the ongoing round of debt buildups? Are patterns of debt accumulation and decumulation the same across European and non-European countries? What is the role of the stock-flow adjustment in advanced economies where the valuation impact of exchange rate movements is likely to be attenuated due to the absence of original sin?

Major Episodes of Debt Ratio Changes

Section IV discussed the evolution of debt ratios for the advanced economies as a *group* with Figure 5 showcasing the cycles of debt accumulation and decumulation that characterized the period from 1880 to 2007.²⁴ 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/reversals that were small in relation to the duration and size of the episode identified.²⁵ Care was taken to ensure that a break in the series due to a change in the data source was not spuriously picked up as an episode.

²⁴Debt reductions which continued through the global financial crisis years (2008–09), such as in Finland, Sweden and Switzerland, were, however, included.

²⁵Specifically, an “interruption/reversal” was allowed to pass through as part of a single debt increasing or reduction episode as long as it was sized at one-tenth or less of the underlying cumulative change in the debt ratio and if the duration of the underlying episode was at least five years.

Following this criterion, and filtering out episodes suffering large data gaps, we identify a total of 68 episodes of debt declines, including 7 debt defaults, and 60 episodes of debt increases, as documented in Tables 6 and 7 of the Supplementary Appendix.²⁶

The debt declines in our sample are distributed roughly evenly across four periods of interest: the pre-1914 years corresponding to the first era of globalization (11 episodes); the war years from 1914–45 (17); the Bretton-Woods years from 1946–70 (14), and the post-1970 period (19). Debt surges were bunched around 1914–45 (20)—linked to the two world wars and the Great Depression—and the peacetime period of 1970–2007 period (28), consistent with the group pattern documented in Section IV. In one-third of the debt increase episodes, the initial debt level was 60 percent of GDP or higher, while in half of the nondefault declines, the initial debt level was 80 percent of GDP or more. These thresholds mirror closely the 2007 and 2010 median levels of public debt ratios 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, 1946–75), the Netherlands (185 percentage points, 1946–77), Greece (153 percentage points, 1900–13), France (92 percentage points, 1921–26); Spain (89 percentage points, 1880–84), and Ireland (69 percentage points, 1993–2006). The fastest reductions were in Spain (22 percentage points per year), France (18½ percentage points per year), and Greece (12 percentage points per year).

The largest debt ratio increases were witnessed in Greece (169 percentage points, 1886–94 and 78 percentage points, 1979–93). The United Kingdom (146 percentage points, 1940–49), Italy (95 percentage points, 1963–94), Austria (56 percentage points, 1974–96), Switzerland (52 percentage points, 1929–45), and Spain (56 percentage points, 1974–96). The fastest of these occurred in the United Kingdom (25 percentage points per year, 1940–46), Portugal (22 percentage points per year, 1920–21), Greece (21 percentage points per year, 1886–94 and 19 percentage points per year, 1898–1900) France (11 percentage points per year, 1929–32), and Finland (11 percentage

²⁶Footnote 1 to Table 1 lists the hard and soft defaults (sourced from Reinhart and Rogoff, 2009) as well as the debt reduction episodes which they overlapped with or immediately preceded. It is important to caveat the reported results on defaults for three reasons: First, some of the debt “conversions” described as default in Reinhart and Rogoff (2009) were not strictly “involuntary” and could, thus, plausibly be classified as debt management operations (for example, United Kingdom (1888–89, 1932)). Second, there were some partial defaults that were picked up in our debt data but could not be decomposed due to lack of data on fiscal flows, interest rates, and/or growth rates (for example Italy in the late 1920s). Third, some defaults are buried under debt “increase” episodes (for example 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), and are, by definition excluded from our analysis of default-induced debt reductions.

points per year, 1990–94). 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 decrease and debt increase were both sized at around 25 percentage points, while the median speed was about 3½ percentage points of GDP per year.

Sources of Changes in Debt Ratios

We now turn to analyzing the sources of debt decreases and increases, using as starting point the well-known equation for decomposing debt changes (for instance, see Escolano, 2010):

$$d_T - d_0 = \sum_{t=1}^T \frac{i_t - \gamma_t}{1 + \gamma_t} d_{t-1} + \sum_{t=1}^T p_t + \sum_{t=1}^T sfa_t. \quad (1)$$

Equation (1) states that the total episode change in the debt-to-GDP ratio ($d_T - d_0$) is the sum of three components: (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), cumulated over the episode years; (ii) the cumulative primary deficit (p_t); and (iii) a cumulative residual stock-flow adjustment term (sfa_t) capturing valuation effects and “below-the-line” fiscal operations (financial sector recapitalization, privatization and so on), as well as errors and omissions.

Next, we divide the identified episodes into different subsamples based on the following criteria: (i) timing of the episodes (for example, coincidence with periods of military conflict, global recessions, or debt default), (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. For size, we use a threshold of 20 percentage 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 subsamples, are reported in Tables 1 and 2.

Debt Ratio Declines

As can be observed from Table 1, the “default” debt declines in our sample averaged about 64 percent of GDP, much larger than nondefault episodes. The primary surplus and growth-interest differential components contributed 6 and 21 percentage points respectively, while the bulk (37 percentage points) of the debt ratio reduction was contained in the stock-flow adjustment. The 61 nondefault episodes (which we focus on from now on) registered an average reduction of 38 percentage points of GDP, which was accounted for by the primary balance and the growth-interest differential components in roughly equal amounts.

Table 1. Decomposition of 68 Large Debt Ratio Reductions Over Different Subsamples
(averages, in percent of GDP)

	No. of Episodes	Starting Debt Ratio	Ending Debt Ratio	Total Decrease	Components				
					Primary Surplus	Growth-Interest Differential ($\gamma-i$)	γ	$-i$	Debt-Reducing Stock-flow Adjustment
Default ¹	7	112.9	48.8	64.1	6.3	21.1	41.4	-20.2	36.7
Nondefault	61	92.6	54.9	37.8	21.5	19.5	46.9	-27.3	-3.2
EU	40	98.0	61.0	36.9	26.6	14.8	45.6	-30.8	-4.5
Non-EU	21	82.4	43.1	39.4	11.7	28.5	49.3	-20.8	-0.9
Startyr <1914	11	88.9	62.3	26.7	18.5	9.3	31.1	-21.7	-1.2
Startyr b/w 1914–1944	14	121.7	87.7	34.0	23.1	12.0	37.5	-25.5	-1.0
Startyr b/w 1945–1970	17	92.3	32.7	59.6	20.7	53.2	78.9	-25.7	-14.2
Startyr > 1970	19	73.6	46.3	27.3	22.7	0.8	34.2	-33.4	3.8
Start debt ratio ≥ 80	28	136.7	79.6	57.1	29.0	37.4	69.9	-32.5	-9.3
Start debt ratio < 80	33	55.2	33.9	21.3	15.1	4.3	27.3	-23.0	1.9
Fast (annual debt decrease ≥ 5 ppt)	16	147.7	84.4	63.4	27.7	47.3	70.2	-22.9	-11.6
Slow (annual debt decrease < 5 ppt)	45	73.0	44.4	28.6	19.3	9.6	38.5	-28.9	-0.3
Long (episode duration ≥ 5 years)	51	88.9	47.4	41.5	24.4	22.2	52.7	-30.5	-5.1
Short (episode duration < 5 years)	10	111.4	92.9	18.5	6.7	5.7	16.9	-11.2	6.1
Big (debt change > 20 ppt)	35	107.4	52.6	54.7	29.8	31.5	65.5	-34.0	-6.6
Small (debt change b/w 10–20 ppt)	26	72.7	57.9	14.9	10.2	3.3	21.7	-18.4	1.3
All Nondefault	61	92.6	54.9	37.8	21.5	19.5	46.9	-27.3	-3.2
All Nondefault (median)	61	76.0	45.3	22.7	15.0	6.6	34.0	-21.6	0.1

¹Includes episodes which either overlapped or immediately followed hard or soft defaults (the latter include forced currency conversions) on central government domestic and/or external debt (as documented in Reinhart and Rogoff, 2009). The episodes are reported as follows in the format of “country (default years/debt decline episode)”: Austria (1940–52/1948–57); the United Kingdom (1888–89/1880–1900); the United Kingdom (1932/1933–1940); Spain (1877–82/1880–84); Spain (1936–39/1940–45); Japan (1946–48/1946–48); and Greece (1894–97/1900–13).

Table 2. Decomposition of 60 Large Debt Ratio Increases for Different Subsamples
(averages, in percent of GDP)

	No. of Episodes	Starting Debt Ratio	Ending Debt Ratio	Total Increase	Components				
					Primary Deficit	Interest-Growth Differential ($i-\gamma$)	i	$-\gamma$	Debt-Increasing Stock-flow Adjustment
EU	44	53.9	90.7	36.7	10.3	9.5	27.7	-19.0	16.9
Non-EU	16	51.7	114.6	62.9	26.8	6.0	26.0	-20.3	30.1
War¹	16	71.4	109.5	38.0	17.2	1.9	17.9	-16.0	18.9
Peacetime	44	46.7	92.5	45.8	13.7	11.0	30.7	-20.6	21.0
Nonrecession	16	39.6	86.4	46.8	18.0	-5.4	38.2	-44.9	34.1
Recession ²	28	50.8	96.0	45.2	11.3	20.4	26.4	-6.7	13.5
<i>Memo: Great Recession³</i>	17	63.1	94.1	31.1	14.3	9.7	17.9	-8.3	7.0
Startyr < 1914	12	77.3	109.9	32.6	-14.3	23.5	18.7	4.8	23.4
Startyr b/w 1914-1945	20	65.5	119.2	53.7	21.5	7.3	10.9	-3.6	24.9
Startyr b/w 1946-1970	5	16.7	54.9	38.2	19.3	-17.3	40.2	-57.5	36.2
Startyr > 1970	23	38.2	80.2	42.0	22.8	7.6	43.2	-37.4	11.6
Start debt ratio ≥ 60	21	97.5	139.5	42.0	8.9	18.1	17.8	-0.3	15.0
Start debt ratio < 60	39	29.6	74.2	44.6	17.8	3.5	32.4	-29.7	23.4
Fast (annual debt increase ≥ 5 ppt)	30	72.3	126.6	54.3	12.5	14.9	20.0	-6.5	27.0
Slow (annual debt increase < 5 ppt)	30	34.4	67.5	33.1	16.8	2.3	34.6	-32.2	13.9
Long (episode duration ≥ 5 years)	44	47.1	97.2	50.1	21.3	5.1	33.3	-29.2	23.8
Short (episode duration < 5 years)	16	70.5	96.6	26.1	-3.5	18.3	10.6	7.6	11.3

Table 2 (concluded)

	No. of Episodes	Starting Debt Ratio	Ending Debt Ratio	Total Increase	Components				
					Primary Deficit	Interest-Growth Differential ($i-\gamma$)	i	$-\gamma$	Debt-Increasing Stock-flow Adjustment
Big (debt change > 20 ppt)	43	53.3	108.7	55.4	20.0	9.1	33.1	-24.1	26.3
Small (debt change b/w 10–20 ppt)	17	53.4	67.7	14.2	1.3	7.3	12.6	-7.5	5.6
All	60	53.3	97.0	43.7	14.7	8.6	27.3	-19.4	20.4
All (median)	60	43.5	81.3	32.5	7.0	10.2	18.6	-10.2	14.4

¹Periods of war relate to World Wars I and II (1914–18, 1939–45); and other individual wars occurring outside these two periods. The specific debt increase episodes coinciding with the latter were: Belgium (1880–86, Mahdist Sudan War); France (1882–87, Sino-French War, French Occupation of Tunisia); France (1891–95, Second Franco-Dahomean War, Franco-Siamese War); France (1980–98, North and West Africa civil conflicts); Greece (1898–1900, Greco-Turkish War); Italy (1880–84, Mahdist Sudan War); Portugal (1920–29, Portuguese Monarchist Civil War); Portugal (1974–85, Portuguese Colonial War); Spain (1893–96, First Melillan Campaign); Spain (1897–1902, Philippine Revolution); the United Kingdom (1913–23, Turkish War of Independence, Irish War of Independence); the United States (1981–95, Invasion of Panama, Gulf War).

²Recessionary periods include the “Long Depression,” which started in 1873 (effectively 1880 in our sample), and lasted till 1896; the post-WWI recession in Europe and the North America (1919–21); the Great Depression (1929–32); the 1973–75 recession following the oil price shock and the collapse of the Bretton- Woods system of exchange rates; and the 1980–82 and 1990–92 recessions.

³For the “Great Recession”, debt increases are computed over the 2007–13 period, and the decomposition thereof is 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 60 episodes otherwise identified over the period 1880–2007.

Interestingly, the post-World War II debt reductions, which aligned with the Bretton Woods years (1945–70), are associated with a dominant contribution from the growth-interest differential components which accounted for 90 percent of the average debt reduction observed during this period (60 percent of GDP). A closer examination of the real growth rates and real effective interest rates on debt prevailing during these episodes suggests that both high growth (around 4–5 percent p.a.) and *negative* real interest rates drove the favorable growth-interest differential. These findings tend to support recent conclusions by Reinhart and Rogoff (2011) and Reinhart and Sbrancia (2011) that financial repression policies had a role to play during this period, and permitted a sort of “liquidation” (or soft default) of domestic currency government debt in advanced economies.

The size of the debt reductions witnessed in European countries averaged 37 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 experienced convergence to European prosperity levels over this period, and thus benefitted from faster growth.

It is also interesting that the composition of the 11 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 were mainly effected via large primary surpluses: the post-1970s debt reductions, in fact, are accounted for almost entirely by primary surplus improvements. However, insofar as such improvements are boosted by the cycle and easier to implement in the context of strong growth, these results may somewhat understate the true role of growth in debt declines; strong growth was a consistent feature of most debt decline episodes.²⁷ That conventional fiscal adjustment and growth have led the way in periods of global financial integration is intuitive as well as 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 in a financially integrated world, and rapid growth prospects remain limited, highly indebted advanced economies will find themselves facing a fairly stark choice between large fiscal adjustment and default.

Debt Ratio Increases

As shown in Table 2, episodes of large debt ratio increases have averaged about 44 percentage points over the entire sample, with non-European episodes significantly about 20 percentage points larger than the European ones. Studying the episodes across states of nature, we find that although

²⁷Interestingly, the role of the growth-interest *differential* varied across the two periods, mainly on account of the interest component, which was much higher in the post-1970 setting than the pre-1914 one.

Table 3. Stock-Flow Adjustment (SFA) Residual

	Unexplained Debt <i>Increases</i>	Unexplained Debt <i>Decreases</i>
A. Number of episodes in which stock-flow residuals represented:		
<i>During</i>		
61 debt decreases (nondefault)	29	32
60 debt increases	50	10
Total	79	42
B. Median stock-flow residual (as ratio of total debt ratio change):		
<i>During</i>		
Debt decreases (nondefault)	-0.26	0.32
Debt increases	0.54	-0.31

Source: Authors' calculations based on data from HPDD.

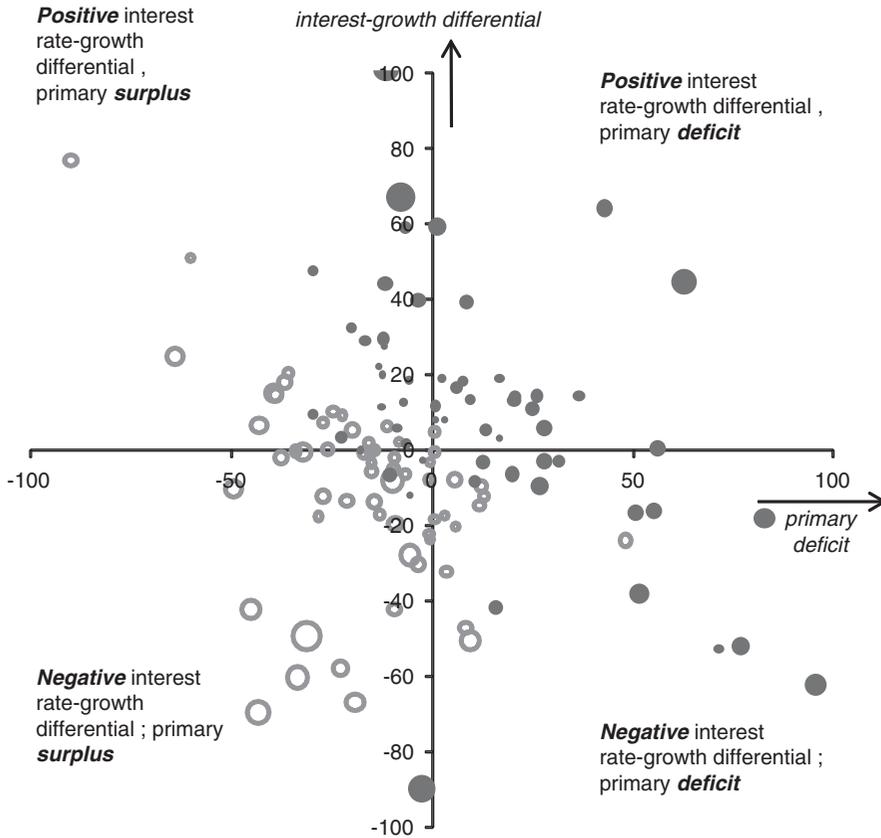
wartime debt increases started from higher debt levels and were associated with larger primary deficits, they were smaller in size than peacetime debt increases. The key driver of this interesting result appears to be the interest-growth differential, which was relatively modest in wartimes (2 percent of GDP), but sizable in peacetimes (11 percent of GDP); during global recessions prior to 2007, it rose to 20 percent of GDP and was 10 percent of GDP during the present slowdown.

Interestingly, debt increases during nonrecessionary periods were slightly larger than those during global recessions despite the former commanding negative interest-growth differentials. The key contributors to these good time debt surges were primary deficits and, especially, stock-flow adjustments, which as explained earlier could capture a number of factors: valuation effects, financial or “below-the-line” transactions (such as bank recapitalization, privatization, and so on), as well as errors and omissions. These adjustments amounted to 34 percent of GDP during these episodes, but were large generally, averaging 20 percent of GDP over all 60 debt increases. We focus on these below.

Table 3 documents the asymmetry of the stock-flow adjustment residual during debt increases vs. declines (Table 3). The stock-flow adjustment component had the interpretation of an unexplained debt increase in 50 of the 60 debt increases, but also in a surprisingly high 29 of 61 nondefault debt *decreases* (panel A). In the subset of episodes when the SFA had an intuitive interpretation (that is, the 50 plus 32 episodes in all), the contribution share of the component was higher during debt increases (0.54) than during debt decreases (0.32). This suggests that not only are unexplained debt increases more common, they are larger than unexplained debt decreases.²⁸ These

²⁸A closer look at the counter-intuitive debt increases (that is, during debt decline episodes) reveals a median size 26 percent of the total debt decrease, roughly similar to the size of the unexplained debt reductions, 32 percent of the debt decrease. This further suggests that the anomalous cases of unexplained debt *increases* during episodes of debt reduction cannot be dismissed as isolated or insignificant.

Figure 8. Scatterplot of Interest-Growth Differential and Primary Deficit Contributions (cumulative contribution over episode; in percentage points of GDP)



PS. 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.

magnitudes are consistent with IMF (2011b) which finds, for a sample of large debt increases in advanced economies over 1980–2010, a stock-flow adjustment contribution of about 13 percent of GDP against an average debt increase of 25 percent of GDP.

We do not, in this paper, attempt to isolate the drivers of these unexplained debt *increases*, which could comprise, inter alia, the effect of exchange rate depreciations or absorbing implicit liabilities, such as through financial sector recapitalizations following banking crises. However, as IMF (2011b) finds, currency valuation changes have, at least over the 1980–2010 period, played a negligible role in driving advanced economy debt dynamics, given these economies traditionally high domestic currency debt share in total debt. It is plausible therefore that the size and relative frequency

indicates cases in which governments absorbed liabilities, while shielding headline fiscal balances from debt-increasing operations. This would be consistent with IMF (2011a and 2011b) which document increases in the size of stock-flow adjustments during the recent crisis-induced debt buildups.

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 128 identified episodes: 68 declines shown as empty green circles, and 60 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 the largest debt increases (red circles) are scattered all over the chart whereas the largest debt declines (green circles) are concentrated in the bottom-left quadrant further confirms the asymmetric decomposition pattern across debt surges and declines. Whereas the former are born under any number of configurations of reported primary deficit and interest-growth differential, the latter have typically relied on an equal mix of favorable interest-growth dynamics and primary balance improvements.

V. Conclusion and Way Forward

This paper has described the compilation of the first truly comprehensive database on gross government-debt-to-GDP ratios, covering nearly the entire IMF membership (178 countries) and spanning an exceptionally long time period. The database was constructed by bringing together a number of other data sets and information from original sources. We also illustrate the analytical potential of the database by (i) documenting the evolution of public debt ratios in advanced, emerging, and low-income economies, and relating them to contemporaneous developments in growth, commodity prices, and debt relief, respectively; and (ii) undertaking a debt decomposition exercise for 129 large debt increases and decreases in 19 advanced economies over 1880–2007.

The latter analysis revealed a pattern of asymmetric contributions by the various components (primary balance, interest-growth differential, and stock-flow adjustment) to debt increases and declines. Whereas the primary balance was found to play a key role in debt reductions, except during the post-WWII period (when the interest-growth differential was extremely favorable); while debt surges were associated with notably large stock-flow adjustments.

Looking ahead, the primary aim in relation to the database is to continue expanding the years and countries covered, as additional sources are identified. Notification of any omissions or supplementary sources is welcome.²⁹ Moreover, given that in several cases, lack of GDP data inhibited computation of

²⁹Suggestions can be sent to the authors (SAbbas@imf.org; NBelhocine@imf.org; AEIganainy@imf.org; MHorton@imf.org).

debt-to-GDP ratios, particularly in the earlier periods, efforts will be made to fill such gaps through careful extrapolation of the GDP series.

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 1913–39 and 1952–70, which could be potentially populated using such methods. Finally, future work will aim to split public debt data into domestic and external.

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