DISCUSSION PAPER SERIES

DP17559
(v. 2)

UP AND AWAY? INFLATION AND DEBT CONSOLIDATION IN HISTORICAL PERSPECTIVE

Rui Esteves and Barry Eichengreen

ECONOMIC HISTORY AND INTERNATIONAL MACROECONOMICS AND FINANCE

CEPR

ISSN 0265-8003

UP AND AWAY? INFLATION AND DEBT CONSOLIDATION IN HISTORICAL PERSPECTIVE

Rui Esteves and Barry Eichengreen

Discussion Paper DP17559
First Published 03 October 2022
This Revision 24 October 2022

Centre for Economic Policy Research
33 Great Sutton Street, London EC1V 0DX, UK
Tel: +44 (0)20 7183 8801
www.cepr.org

UP AND AWAY? INFLATION AND DEBT CONSOLIDATION IN HISTORICAL PERSPECTIVE

Abstract

The Global Financial Crisis and the COVID-19 pandemic bequeathed large increases in global public debt. At some point governments may seek to bring down these elevated debt-to-GDP ratios, including by inflating (by raising nominal GDP). We assemble a panel of debt consolidation episodes spanning 220 years and 183 nations. The evidence confirms that moderate inflation has been instrumental in facilitating large consolidations in the past. In fact, the frequency of successful debt consolidations was lower in periods of relatively high inflation. On the contrary, the largest concentration of debt consolidations coincided with periods of relatively low and stable inflation in the context of credible monetary policies and sound fiscal policies.

JEL Classification: H12, H62, H63, N10

Keywords: N/A

Rui Esteves - rui.esteves@graduateinstitute.ch
Geneva Graduate Institute and CEPR

Barry Eichengreen - eichengr@berkeley.edu
Department of Economics, University of California Berkeley and CEPR

Acknowledgements
Dante Gaviano provided excellent research assistance. The authors thank Fernando Gonçalves for helpful comments, Seán Kenny for sharing data and gratefully acknowledge the financial support of the Banco de España.

1. Introduction

Public debts have soared in the wake of the Global Financial Crisis and the COVID-19 pandemic. On both occasions, gross debt levels rose by about 15 percent of world GDP.[1] At some point, governments will seek to pivot toward debt consolidation. They will attempt to reduce debt-to-GDP ratios in order to prevent debt service costs from crowding out other public programs. They will take steps to enhance and restore their capacity to borrow in order to meet the next emergency.

This is not the first time that governments have emerged from a war, financial crisis or pandemic saddled with heavy debts. This fact, together with current circumstances, has directed attention to the question of how governments have approached the challenge of debt consolidation in the past.

Attempts to answer it typically build on the familiar equation summarizing the dynamics of the debt-to-GDP ratio:

$$\Delta b = d + (r - g)b_{t-1} + sfa \quad (1)$$

where b is debt as a share of GDP and Δb is its corresponding change. The right-hand side has three components. First, the primary budget deficit (the deficit net of interest payments) relative to GDP, denoted d. Second, the difference between the real interest rate on debt obligations r and the real growth rate of GDP g. Third, irregular debt market operations (debt defaults and restructurings, conversions, assumption by the public sector of private debt, and other off-budget spending). These are denoted *sfa* for stock-flow adjustment.[2]

Readers may criticize this formulation as Hamlet without the prince, the prince being inflation, which appears nowhere in equation (1).[3] Certain governments have relied on inflation to reduce and sometimes even liquidate heavy debts, Weimar Germany being the textbook example. Similarly, there is discussion currently of whether inflation will be part of the response to current debt problems (see e.g. Goodhart and Pradhan 2020), though few would credit the likelihood of Weimar-like scenarios in the advanced countries.

Still, the current situation gives reason for focusing on the role of inflation in debt consolidation. In this paper, we therefore analyze the role of inflation in debt consolidations over the last 220 years. We build a database of historical debt consolidation episodes and apply an accounting framework to distinguish the role of inflation. We identify as many as 283 debt

[1] This according to figures from the IMF's Fiscal Affairs Department: https://blogs.imf.org/2021/12/15/global-debt-reaches-a-record-226-trillion/ Whereas this debt took two years to accumulate during the GFC (2008-09), the percentage increase occurred over just one year after the start of the COVID pandemic. The contraction of world GDP in this year to the tune of -2.6 percent contributed to inflate the debt-to-GDP ratio, but gross debt stocks also increased by 13 percent.

[2] They are so signified because they are the additional flow of new debt needed to make total flows (on the right-hand side) to add up to the observed change in the debt stock (on the left).

[3] In a sense, inflation is implicit in equation (1). One reason the real interest rate r may be low, thereby working to reduce the debt, is that inflation is high while the nominal interest rate is not. But r can also vary for other reasons, as it has over time (Schmelzing 2020), thus disguising the role of inflation. The standard decomposition of debt dynamics, as in equation 1, thus has the effect of directing attention away from its effects.

consolidation episodes for which we have the data needed to apply our accounting framework.[4] This is, to our knowledge, the first attempt to build a historical database of debt consolidation episodes for a comprehensive panel of countries spanning this period. It is similarly the first attempt to apply a framework explicitly distinguishing the role of inflation to a large debt-consolidation dataset.[5]

We do not find a uniformly strong positive association between inflation and the frequency of debt consolidation. To the contrary, the peaks in debt consolidation frequency we identify are in the late 19th and early 20th centuries and during the Great Moderation (from the mid-1980s to the Global Financial Crisis). These were periods of relatively low and stable inflation, credible monetary policies and sound fiscal policies, not runaway inflation. When we distinguish countries by per capita income, we detect few consolidations in low-income countries prior to the 1990s, a period when many such countries experienced chronic inflation. More frequent adjustment is evident in all categories of countries in the subsequent period, an era we refer to as the "Great Consolidation." Again, this calls attention to the importance of monetary and fiscal stability in debt consolidation.

To be sure, the debt consolidations we identify have tended to occur in periods of rising (generally, gradually rising) prices.[6] We show that inflation accounted for a larger fraction of observed debt consolidation in the inflationary post-World War II period 1945-82 than in other earlier or later periods. But, not infrequently, interest payments on the debt rose sufficiently to more than offset any positive contribution of inflation to debt reduction. Inflation contributed positively on net – in other words, once this interest rate response is taken into account – in no more than half the large debt consolidations. Understanding why inflation contributed positively in these cases but not others directs attention to such factors as debt maturity, financial regulation, and expectations, as we show.

In Section 2, we demonstrate how equation (1) can be modified to make explicit the role of inflation. Section 3 then introduces our database and definition of debt consolidation. Section 4 describes the historical prevalence of debt consolidations from 1800 to 2019, computing the contribution of inflation and other factors. In Section 5 we examine the role of these same factors in a number of case studies highlighted in our list of prominent consolidations.

Our paper is related to several literatures. First, there is work on the historical emergence of public debt. This focuses on development of the political and economic institutions needed in order for governments to issue and pay off sovereign obligations. North and Weingast (1989) is the most widely cited contribution, but the associated literature is large; see Stasavage (2003, 2011) and Dincecco 2009, 2011) for examples. Our own work (Eichengreen, El-Ganainy, Esteves and Mitchener 2021) focuses mainly on economic determinants of debt dynamics, such as financial development, commercial relations, and economic growth.

[4] "As many as" because the number of consolidations depends on the specifics of the algorithm used to identify them, as we explain below.

[5] There have been previous attempts to distinguish the role of inflation in individual country cases. Two examples are Hernández de Cos et al. (2016) for Spain and Wickens (2022) for the UK, which we discuss further below.

[6] In part, this reflects the fact that we have data for only a subset of countries for the deflationary portions of the 19th century (and that there were a relatively small number of countries, by subsequent standards, in that century). We return to these points below.

Second, there is the literature on debt crises and debt reductions occasioned by default. This work traces back to early post-mortems on the debt crises and debt restructurings of the 1930s (Mintz 1951, Borchard 1951). A second wave of historical work was prompted by the Latin American debt crisis of the 1980s (Fishlow 1985, Eichengreen and Portes 1986, Jorgensen and Sachs 1989, Lindert and Morton 1989). Recent studies (epitomized by Reinhart and Rogoff 2009 and Reinhart and Sbrancia 2015 and surveyed by Mitchener and Trebesch 2022) have assembled and analyzed still larger data sets on historical debts and defaults.

Third, there is an econometric literature on the determinants of successful debt consolidations in OECD countries (see e.g. Alesina and Perotti 1997, Lambertini and Tavares 2005, Ahrend et al. 2006, Guichard et al. 2007, Barrios et al. 2010, Molnár 2012). This literature seeks to identify, using econometric methods, determinants of the start of fiscal adjustments, of the length of such adjustments, and of why some such adjustments succeed. These studies uniformly focus on recent years, however, and do not highlight the role of inflation (perhaps because inflation did not play a major role in the OECD in this period).[7] The closest article to our own, by Bernardini et al. (2021), covers advanced economies since World War II. The authors discuss the contribution of inflation for debt consolidations but only informally. They find it to be significant only in the immediate postwar years.

We now turn to a framework that explicitly distinguishes the role of inflation in debt consolidation.

2. Accounting for Inflation

We start in continuous time for ease of exposition. Denote the debt-to-GDP ratio $b = \frac{B}{PY}$, where *Y* is real GDP and *P* the GDP price level.

Taking the partial derivative with respect to time:

$$\dot{b} \equiv \frac{\partial b}{\partial t} = \cdots = d + (i - \pi - g)b \tag{2}$$

where *d* is the primary deficit/GDP and *g* is the *real* GDP growth rate.[8] This is a variant of equation (1) above, where we have expressed the real interest rate as the difference between the nominal rate i and inflation π.[9]

We can rewrite (2) as:

$$\dot{b} = d + (r + \pi - \pi - g)b = d + (r - g)b \tag{3}$$

This simplification assumes that the interest on the outstanding debt adjusts immediately to contemporaneous inflation. In practice, however, this is the case only in three situations:

[7] There is also a very small literature on debt consolidation in emerging markets: see Chugunov and Pasichnyi (2018) and Pahula (2021).

[8] Here we have dropped the stock-flow adjustment for simplicity (and since it can be calculated as a residual when we do the empirical analysis).

[9] Note however that equation (2) does not separate the interest rate burden ib into real and nominal components.

- Debt is inflation-indexed
- The government issues only one-period bonds, so that the inherited debt stock is refunded each period
- Bondholders have perfect foresight such that the inflation expectations reflected in primary yields equal realized inflation.

None of these conditions applied for most of the 19th and 20th centuries, when information was incomplete, there were few inflation-linked bonds, and the average maturity of funded debt was long. To be sure, in certain nations and periods (e.g. around wars for example), short-term floating debt was large as a share of total debt, rendering effective debt service more sensitive to inflation.[10] Apart from these periods, however, the interest rate on the bulk of the debt stock reflected *past* inflation expectations. Consequently, even expected inflation would reduce the real burden of debt.

Letting ϕ be the fraction of the debt stock refunded each period (making $1/\phi$ the average maturity), (3) can be amended to read:

$$\dot{b} = d + \phi(r - g)b + (1 - \phi)(i - \pi - g)b \quad (4)$$

For the fraction of the debt stock refunded each period, the issue then is how accurately bondholders forecast inflation. The historical literature points to uncertainty about the appropriate model for analyzing the economy and therefore questions the ability of contemporaries to forecast inflation.[11] Yet, despite this, some authors substitute *ex post* inflation for inflation expectations. Others assume that expectations were mean reverting and use smoothed *ex post* inflation to proxy for expectations.[12]

As for measuring the nominal *effective* interest rate, governmental fiscal accounts generally report debt service outlays separately. These are a direct measure of the effective cost of legacy debt stock. This allows us to avoid making assumptions about ϕ or inflation

[10] *The Economist* has highlighted how maturities are a concern for many of today's debt management offices—including in advanced nations. Not only are median maturities shorter than average ones, but the vast amounts of central bank reserves issued since 2008 as a counterpart of Quantitative Easing (QE) will become a burden for the consolidated government sector as policy rates rise with current inflation levels. Whereas QE, by swapping long-term bonds for short-term reserves, has been a net contributor to the budget of many governments, the rise in short-term rates now threatens to make it a burden (https://www.economist.com/finance-and-economics/2022/07/12/how-higher-interest-rates-will-squeeze-government-budgets).

[11] See for example Barsky and DeLong (1991) on the gold-standard era and Cecchetti (1992) and Hamilton (1992) on the interwar period.

[12] Mehrotra (2017) does this for the 19th century because of the strong nominal anchor of the gold standard. He uses a three-year moving average of past inflation. A related issue is what the relevant price level was for bondholders. In the formulae above, π is the GDP deflator, which was clearly not available to contemporaries. But even if it were, the relevant consumption basket of the representative bondholder would not include the capital goods or some of the exported goods whose prices figure in that deflator. Some authors therefore prefer using the CPI to deflate the nominal interest rate, resulting in the following decomposition: $\dot{b} = d + (r + \pi_{CPI} - \pi_Y - g)b$. Unlike in (3), inflation no longer cancels, but there is little gain in adding a term that depends exclusively on the different time behavior of the two inflation measures which, apart from some localized events, would be very small on average. Note that the same argument justifies ruling out using smoothed inflation measures as proxies for inflation expectations (as mentioned above), because if we use the deflator for inflating both real interest rates and real output then the term π_{CPI} will just be a moving average of π_Y. Since we do our debt decompositions over long periods, when we cumulate everything the sum of the yearly deviations of inflation from its moving average should approach zero.

expectations.[13] Because we use a dynamic budget constraint, this direct measure of the interest rate incorporates any effect of the change in the composition of the debt stock on the overall nominal interest burden.[14]

Since we must implement any decomposition in discrete time, we should avoid introducing large biases by substituting linearized versions of exact expressions.[15] We start by expressing the change in annual debt ratios in the standard way:[16]

$$b_t - b_{t-1} = \frac{B_t}{P_t Y_t} - \frac{B_{t-1}}{P_{t-1} Y_{t-1}} = \frac{(1+i_t)B_{t-1} + D_t}{P_{t-1}(1+\pi_t)Y_{t-1}(1+g_t)} - \frac{B_{t-1}}{P_{t-1}Y_{t-1}} =$$

$$= \frac{D_t + (1+i_t)B_{t-1} - B_{t-1}(1+\pi_t)(1+g_t)}{P_{t-1}(1+\pi_t)Y_{t-1}(1+g_t)} =$$

$$= d_t + \frac{(1+i_t)B_{t-1} - B_{t-1}(1+\pi_t)(1+g_t)}{P_{t-1}(1+\pi_t)Y_{t-1}(1+g_t)} =$$

$$= d_t + \frac{[(1+i_t) - (1+\pi_t)(1+g_t)]B_{t-1}}{P_{t-1}(1+\pi_t)Y_{t-1}(1+g_t)} =$$

$$= d_t + \frac{[(i_t - g_t) - \pi_t(1+g_t)]b_{t-1}}{(1+\pi_t)(1+g_t)} \quad (5)$$

Separating terms:

$$b_t - b_{t-1} = d_t + \frac{[(i_t - g_t) - \pi_t(1+g_t)]b_{t-1}}{(1+\pi_t)(1+g_t)} =$$

$$= d_t + \frac{i_t}{1+\gamma_t} b_{t-1} - \frac{g_t}{1+\gamma_t} b_{t-1} - \frac{\pi_t}{1+\pi_t} b_{t-1} \quad (6)$$

where γ_t stands for the nominal growth rate of GDP. This version isolates a term that depends only on contemporaneous inflation and can be used to gauge the contribution of inflation to debt consolidation. Adding the stock-flow adjustment, we can express the decomposition as:

$$b_t - b_{t-1} = d_t + \frac{i_t}{1+\gamma_t} b_{t-1} - \frac{g_t}{1+\gamma_t} b_{t-1} - \frac{\pi_t}{1+\pi_t} b_{t-1} + sfa_t \quad (7)$$

While a large *sfa* is common during debt surges, it can also occur in consolidation episodes (see the discussion in Abbas et al. 2011 and Weber 2012).

[13] Alternatively, one could use the yield on a benchmark issue as the marginal cost of refunding in a given year, deflating it with the GDP deflator for the relevant debt share ϕ.

[14] For instance, new debt issues floated with yields above or below the interest rate on the legacy debt stock will be captured by the budgetary measure of interest costs that we use.

[15] This is important since the stock-flow adjustment, as a residual, will pick up spurious variation introduced by approximations.

[16] Variables in capital letters are in levels; variables in small caps are ratios or rates.

Some may object that equation (7) does not completely isolate the effect of inflation, since the denominators in the first and second fractions also contain the level of inflation. This can be obviated with the approximation $\pi_t g_t \approx 0$, in which case (7) becomes:

$$b_t - b_{t-1} = d_t + \frac{i_t}{1+\gamma_t} b_{t-1} - \frac{g_t}{1+\gamma_t} b_{t-1} - \frac{\pi_t}{1+\gamma_t} b_{t-1} + sfa_t \quad (8)$$

In this decomposition, the relative size of the three middle terms is not affected by the level of inflation. Moreover, the difference between the two decompositions will only be significant when inflation or real growth are relatively large. Some authors have used yet another approximation $\frac{1+i_t}{(1+\pi_t)(1+g_t)} \approx 1 + i_t - \pi_t - g_t$ to obtain a still simpler expression:[17]

$$b_t - b_{t-1} = d_t + i_t b_{t-1} - g_t b_{t-1} - \pi_t b_{t-1} + sfa_t \quad (9)$$

While this approximation is relatively accurate for small values of the three rate variables, it can lead to erroneous conclusions when the rate variables are large, and in any case it is less exact than (8).

To illustrate the impact of using these approximations, we report in Table 1 the result of applying the three formulae to a case of debt consolidation with low average inflation, the UK in 1969-78, and another with higher inflation, France in 1947-56. We chose these two episodes because they are similar along many dimensions; in particular, cumulative debt consolidation is -33 percent of GDP in both cases. But annualized inflation averaged 19.4 percent in France, as opposed to 11.1 percent in Britain.

In both cases, expression (8) understates the contribution of inflation to debt consolidation, whereas expression (9) overstates it. But discrepancies are larger in the case of (9), and especially at higher levels of inflation. While (9) overstates the contribution of inflation by 22 percent of GDP in the British case, it does so to the tune of 76 percent in the French case. Since expressions (8) and (9) approximate the identity (7), this overstatement has to be onset by a spuriously large *sfa*, opposite in sign.[18]

Because of these potential biases, we use expression (7) to decompose our panel of debt consolidations. Before we apply the expression to our panel of debt decompositions, it is important to recognize that the formulae derived here can only be interpreted in an accounting sense. Equations (7)-(9) are not structural, since in most macroeconomic models the five variables related through the government budget constraint are endogenous. For instance, inflation and real growth are related through the Phillips curve in situations where the economy is out of medium-run equilibrium. Excessive debt overhangs may dampen growth through a number of mechanisms. And fiscal policy, through primary deficits, could conceivably spearhead debt consolidations by stimulating real growth.[19] Though our decomposition results are informative

[17] See Hernandéz de Cos et al. (2016) and Wickens (2022).

[18] Where in fact there were no debt conversions or off-balance-sheet operations of this magnitude. In the case of the UK, the sizable SFA term is associated with the steep depreciation of sterling after the end of the Bretton Woods system that revalued British debt in foreign currency.

[19] Bernardi et al. (2021) find no evidence of this 'denominator approach' to debt consolidation in their study of developed economies since World War II.

about how inflation has helped countries to live down their debts, they do not causally identify the role of inflation in debt consolidations.

3. A Panel of Debt Consolidations

In this section we describe our panel of historical debt consolidation episodes, before putting the data and aforementioned formulae to work.

We include all countries and periods starting in 1800 for which fiscal and macro data are available. We started with two IMF databases for the debt-to-GDP ratio: the *Public Finances in Modern History* database (Mauro et al. 2015) for 1800-1950 and the *Global Debt Database* (Mbaye et al. 2018) for 1950-2019. Since historical debt series are mainly reported for the central government, we collected information for the more recent period at the same administrative level. For countries and periods not covered by the two IMF datasets or where the datasets only report the debt of the general government, we utilized other sources listed in Data Appendix.

A similar issue arises when assembling the data on the primary balance and the nominal interest paid on the debt stock. Since the 1960s, the IMF started collecting information of the fiscal accounts of the general government. To be consistent with the debt series of the central government, we had to collect fiscal data from other sources. In some cases, IMF datasets report the two sides of the dynamic budget constraint inconsistently, i.e. listing debt-to-GDP ratios of the general government and the primary balance and interest service of the central government (or the reverse). In these cases, we reverted to the IMF's *Government Finance Statistics*, which provide fiscal series for both general and central governments.

The IMF's *World Economic Outlook* database and the World Bank's *World Development Indicators* provided the majority of information on consumer price inflation and real GDP for the modern period; we supplemented this information with historical sources. This paper does not deal with debt consolidations forced on the government's creditors on terms favorable to the government. Because we use a retrospective accounting exercise to decompose the debt dynamics, these cases would show up as spurious jumps in interest rates and stock-flow adjustments. Consequently, we excluded all cases of default and bilateral and multilateral restructurings and moratoria, such as the Hoover Moratorium, Brady Plan conversions, the Heavily Indebted Poor Country Initiative (HIPC) of the 1990s, and the Multilateral Debt Relief Initiative (MDRI) of the 2000s. Defaults were compiled from Reinhart and Rogoff (2009) and Asonuma and Trebesch (2016). Debt relief episodes were coded using Horn, Reinhart and Trebesch (2022) and IMF sources.

We consider periods where the debt-to-GDP ratio fell by at least x percent over y years, varying the values of x and y, since there is no consensus about how large and extended a decline in the debt ratio must be in order to constitute a meaningful consolidation. As shown in Table 2, we consider six variants, from consolidations of any length, including as short as one year, to consolidation episodes lasting at least ten years, characterized by reductions in debt ratios ranging from at least 10 to 25 percent. In the first variant, we consider all periods when debt fell by at

least 10 percent of GDP; this is most flexible definition, in that it allows for both very intense consolidation over short periods and longer episodes of slower debt reduction.[20]

Since large but short consolidations are exceptional and difficult to engineer politically, researchers have focused on longer episodes of sustained consolidation (Eichengreen and Panizza 2016; Eichengreen, El-Ganainy, Esteves and Mitchener 2021). The next five variants impose duration criteria of five to ten years to consolidation episodes, as well as a minimum rate of consolidation, ranging from one percent of GDP per annum (Variant 5) to 3 percent per annum (Variant 2).[21]

In episodes of relatively long minimum duration, it is unreasonable to expect the debt-to-GDP ratio to fall each and every year. Governments may need a respite to deal with emergencies or with an unexpected fall in nominal GDP. To allow for these hiccups, we follow the two-step filtering algorithm of Abbas et al. (2011). In the first step, we assemble a preliminary list of all debt decreases of at least *x* percentage points of GDP over a given period, allowing one-year increases of up to 6 percent of GDP or consecutive two-year cumulative increases of 6 percent of GDP to qualify as part of an episode. (In effect, these are allowable hiccups.) In the second step, we trim this list by limiting the size of allowable hiccups to one-tenth of the episode's cumulative debt decrease. Thus, a 6 percent of GDP increase over a two-year period is allowable only if the debt decline over the entire episode exceeded 60 percent of GDP. Finally, we trimmed the list further by not allowing for hiccups in episodes spanning less than 5 years in the case of Variant 1.

4. Analysis of Debt Consolidations

In this section we describe the evolution and main characteristics of the debt consolidation episodes identified by our filtering algorithm.

4.1 Debt Consolidations over Time

In Table 3 we list the total number of episodes, so filtered, for each of the six variants over 220 years, along with statistics of the average size and duration of these episodes.

More demanding criteria (Variants 4 and 6) naturally produce fewer episodes. This is also why our algorithm identifies so many episodes when we impose no minimum duration (Variant 1). A histogram of the duration of consolidation episodes identified according to Variant 1 fleshes out this intuition. Figure 1 plots this histogram for the long nineteenth century (through 1913), the interwar years, from the end of World War II to the Latin American debt crisis, and the subsequent period. In all four eras, the histogram is skewed to the right, with the vast majority of

[20] Bernardini et al. (2021) use a variation of this definition considering all debt reductions of at least 25 percent of GDP over any duration.

[21] This effectively imposes a minimum duration for each episode, but not a maximum, as our definition allows for consecutive episodes. For instance, a consolidation over 16 years would count as two consecutive episodes under Variant 3. Eichengreen and Panizza (2016) employed the same five variants with minimum durations, but we depart from them in that we do not require each episode to fit with regular divisions of time. For instance, we do not require that each ten-year episode overlap with a decade. In Variants 4 through 6, we allow each episode to start in any year, rather than at the start of a decade.

episodes lasting fewer than 15 years, apart from some exceptionally long consolidations in the third period (1945-82).[22]

Table 3 shows summary statistics for the duration and size of debt consolidations. The post-WWII period stands out both in terms of average duration and magnitude of debt consolidations.[23] Figure 2 is then a histogram of consolidation episodes (Variant 1) by year. The relatively large number of episodes in recent decades is partly driven by the increase in number of sovereign nations, especially after World War II. Figure 3 therefore normalizes these frequencies by the number of sovereign nations.[24] Consolidation frequency is especially high after wars (the Napoleonic wars and World Wars I and II) but also in periods of relative macroeconomic stability (such as the turn of the 20th century and the Great Moderation between the early 1990s and the Global Financial Crisis). In the fourteen consecutive years from 1994 to 2008, more than a fifth of all nations seemingly capitalized on relative macroeconomic stability to consolidate their debts.

Figure 3 suggests a complex association between global inflation and the frequency of debt consolidation.[25] That association is clearly negative during wartime and in the inflationary 1970s. This is unsurprising given the fiscal origins of high inflation in wartime (Sargent 1982) and the abundant availability of credit to sovereigns in the 1970s (a decade of petrodollar recycling). Figure 3 shows that countries undergoing consolidations did not experience higher inflation than their peers. With the notable exception of the interwar years, the opposite was more often the case. These facts do not depend on which variant we use to identify consolidation episodes. Figure 4 confirms this for Variant 6 (consolidations of at least 15 percent of GDP over 10 years), for example.[26]

To analyze whether the association between debt consolidations and inflation varies by development stage, we split the sample into high, medium and low per capita income countries. We use PPP figures from Bolt et al. (2018) to divide countries into income terciles.[27] Figure 5 shows the result, where for reference we also plot the number of nations covered in the Bolt et al. (2018) dataset.[28] Evidently, lower income nations are less likely to consolidate. Despite this, debt consolidation in low- and middle-income became more frequent from the 1970s until 2007, despite lower inflation starting the 1990s. As observed previously, the stagflation of the 1970s was not the best setting for high-income countries to consolidate their debts; inflation, in other

[22] We discuss some of these exceptions in Section 5 below.
[23] The cells for average and maximum duration are empty for Variants 2-6 because these variants impose a uniform duration of each episode.
[24] We include not only formally independent nations but also fiscally autonomous territories such as British self-governing colonies for which we have historical fiscal and macro data with which to identify and decompose their debt consolidation episodes. We used the time series of independent nations prepared by Mitchell and Hensel (2007), which varies between 15 at the start of the 19th century and 196 in 2019. However, we only have debt and fiscal data for 184 of these.
[25] In the Figure, we plot the median inflation in our country sample because the average is dominated by individual episodes of hyperinflation.
[26] Median inflation of countries undergoing consolidations before World War I was zero, though average inflation stood at -0.16 percent.
[27] Such that this classification was not too sensitive to large but temporary recessions, we took the ten-years moving average of per capita GDP as the base for the ordering of countries.
[28] This dataset has a discontinuity after World War II because of the greater availability of data and the disaggregation of colonial empires in the postwar years.

words, is no panacea for debt sustainability. To the contrary, high-income countries consolidated their debts more successfully in the context of the "Great Moderation" from the late 1980s to the Global Financial Crisis.

Our series for debt consolidations can be compared with the incidence and frequency of other less orthodox approaches to debt reduction: namely, default and debt relief.[29] Unlike debt relief and outright default, debt consolidations often start from sustainable debt levels. Even so, history shows that countries were able to maintain sustainable debts in the face of systemic shocks by enhancing their fiscal space in favorable periods (Eichengreen et al. 2021). It is therefore important to document under what circumstances countries were able to consolidate their debts.

In Figures 6 and 7 we juxtapose debt consolidations (according to, respectively, Variant 1 and more demanding Variant 6) with defaults and debt relief episodes. We see the familiar clustering of default episodes around systemic financial crises in the 1830s, 1870s, 1930s and the 1980s. Debt relief is concentrated in recent decades, reflecting the HIPC initiative of the 1990s and the MDRI in the 2000s. In contrast, conventional consolidations tend to occur after wars or in periods of relative macroeconomic stability, such as the turn of the 20th century and the Great Moderation, as noted. This is not by chance: a credible monetary anchor (the classical gold standard in the first period and inflation targeting in the second) meant that inflation expectations reacted less to occasional bouts of inflation. Since nominal interest rates tracked those stable expectations, this created the room for moderate inflation surprises to help consolidate debt levels.

4.2 Decomposing Consolidations

We were able to assemble the variables needed for implementing our decomposition for 75 percent of Variant 1 episodes and 85 percent of Variant 6 episodes. Table 4 compares the population of episodes and the decomposition-ready subsample. The subsample matches the population well in terms of the average magnitude of debt consolidations, though it misses some outliers.[30]

Table 5 lists the 30 largest Variant 6 consolidations (10 years for a minimum of 15 percent of GDP). Consistent with patterns identified in the previous section, the majority (17 out of 30) of these large consolidation episodes occurred in the four most recent decades. Just 8 occurred in the immediate post-World War II period, 2 in the interwar years, and 3 before World War I. Strikingly, only in Argentina in 1898-1907 did inflation work against debt consolidation. In all other 29 Variant 6 cases, inflation contributed to debt reduction.

Inflation can only contribute to debt reduction if debt rollover is moderate (average maturity of the debt is high) and/or nominal yields on new bond issues do not compensate fully for accelerating inflation.[31] The extent to which inflation was negated by rising yields can be seen by adding the sixth and eight columns of Table 5. In 16 cases, the sum of the two columns is negative, meaning that nominal interest rates reacted sufficiently rapidly to prevent inflation from

[29] Little has been written about the relative frequency of these three forms of debt reduction.
[30] In the case of Variant 1, the subsample also has a lower average duration than the population.
[31] In a world of one-year bonds or fully indexed debt, in contrast, inflation cannot materially influence the debt-to-GDP ratio.

eroding the debt. In the other 14 cases, in contrast, nominal interest rates did not fully compensate investors. Similarly, by adding the sixth, seventh and eight columns of Table 5, we get the contribution of the interest rate-growth differential $r - g$, which was positive in all consolidation episodes bar seven.

A somewhat more positive perspective on the contribution of inflation to debt consolidation is in Tables 6 and 7. Table 6 shows the fraction of observed consolidations accounted for by inflation, taking unweighted averages across episodes. It shows that the contribution, in an accounting sense, was greatest in the relatively inflationary post-World War II period 1945-82, followed in turn by the Great Moderation period, the interwar years, and the pre-1913 period.[32] Note however that the standard deviation of the contribution of inflation is also greatest for the post-World War II period.

Table 7 shows that the real interest rate contributed positively to debt consolidation in 1945-82 and 1983-2019 (in other words, that the interest rate was less than the inflation rate) when Variant 1 is considered, but not for Variant 6. Variant 1, recall, captures consolidations of any length and is dominated, in practice, by short, sharp consolidations. A number of these short, sharp consolidations were associated with bursts of inflation that did not elicit an immediate interest cost response, whether because of adaptive expectations, long-maturity debt or financial regulation. Variant 6, in contrast, is made up of extended, gradual consolidations. The extended nature of these episodes provided time for expectations, regulation and debt maturities to adjust, such that interest costs rose along with inflation, keeping the real interest rate positive and its contribution to debt consolidation negative in these episodes.

Why inflation contributed positively in some episodes but not in others requires one to examine individual cases, as we do now.

5. Case Studies

In this section we consider a series of paired case studies as a way of highlighting circumstances in which inflation played a role in debt consolidation. Looking at individual cases treats each episode as idiosyncratic and lends itself to viewing that case in isolation. Regression analysis allows for broad-based comparisons but forces one to focus on easily measurable and broadly available country characteristics. Pairing national experiences is a convenient way of highlighting similarities and differences across countries.

5.1 The United States and France, 1947-56

High-inflation episodes are the most dramatic instances where inflation worked to reduce and, in most cases, effectively eliminate an inheritance of public debt. But owing to the chaotic nature of such environments, the data needed for systematic analysis is often missing.[33] In addition, (almost) no one today anticipates that advanced and middle-income countries with

[32] This ranking is the same regardless of which variant of the algorithm identifies consolidations.
[33] Thus, were reliable data available for, inter alia, post-World War I Germany and Austria, Israel and Bulgaria probably would not be ranked first and second on these dimensions.

heavy debts will resort to hyperinflation. Cases where moderate rates of inflation combined with tight regulation over extended periods are therefore more relevant.

The best known such episode in the advanced economies is almost certainly the period after World War II. Reinhart and Sbrancia (2015) focused on the effects on the public finances of negative real interest rates in this period. However, when analyzing the impact of real interest rates they do not separate the effects of nominal interest rates and inflation, which makes it hard to distinguish the effect of the latter.

When we consider major consolidations (declines in the debt/GDP ratio of at least 15 percentage points) over extended periods (lasting at least 10 years), two immediate post-World War II cases falling within the category of 30 large debt consolidations (in any period) are the United States and France, both 1947-56.[34] The U.S. did not rely entirely on "financial repression" (inflation, negative real interest rates) to bring down its debt ratio. In fact, primary budget surpluses were responsible, in an accounting sense, for approximately 40 percent of the 66 percentage point decline in the debt-to-GDP ratio over the period. (What was true for the United States was also true on average for the advanced countries as a group, as we noted in Eichengreen et al. 2021). The contribution of primary surpluses is evident from the gray portion of the bars in Figure 8, which consistently point in a negative direction; that is, they contribute negatively to the debt ratio. Similarly, GDP growth accounted for another 40 percent of the observed debt reduction, especially after 1947; this is the blue segment of the bars. This leaves a bit less than a quarter (24 percentage points) to be accounted for by real interest rates (a 50 percent contribution of inflation net of a 26 percent subtraction due to nominal interest costs).

Thus, inflation and financial repression are not the entire story, or even the main story, explaining how the U.S. was able to bring down its debt/GDP ratio after World War II. But it is nonetheless striking that the Fed and Treasury were able to limit interest costs to an average of 2 percent over a decade when inflation was running on average at 5 percent. The Treasury maintained ceilings of 3/5% on 90 day treasury bills, 7/8% on 12 month certificates, and 2.5 percent on long-term bonds, and the Fed supported these policies by purchasing public debt as needed, prior to the Treasury-Fed Accord of 1951. After that, of course, interest rates were market determined, and they rose accordingly.

In a sense, the remarkable aspect of this experience is that Fed monetization of debt did not result in an even higher rate of inflation. Why not is a matter of some contention among economic historians (see the discussion in Eichengreen and Garber 1991). Prohibitions on paying interest on time and savings deposits, together with the fact that foreign government bonds were not paying more attractive rates, may have created a captive domestic market for U.S. treasury bonds. Price controls around the time of the Korean War may have slowed the rate of inflation. Friedman and Schwartz (1963) suggest that the Fed was committed to an implicit price-level target, such that investors expected the central bank to reverse earlier price-level increases – investors, in other words, did not expect inflation to persist.

The French case is contrasting. Substantial budget deficits, reflecting the costs of postwar reconstruction and military commitments in South East Asia, contributed negatively to debt

[34] The two other immediate post-World War II cases on our "top 25" list are Austria (1946-55) and Switzerland (1945-54).

consolidation over the period; the gray portions of the bars in Figure 9 consistently point upward. Primary deficits averaged 6 percent per annum in the years 1946-53, before falling to essentially zero in 1954-55, coincident with French withdrawal from Vietnam. The persistence of these deficits makes France's successful debt consolidation – a fall in the debt/GDP ratio of 33 percentage points over 10 years – all the more striking. Relatively rapid growth in this first part of *les trente glorieuses* certainly helped. French GDP growth averaged almost 11 percent per annum over this period, compared to just 3 percent in the United States.[35] Consequently, GDP growth accounted for a larger fraction of the consolidation in France than in the U.S. (66 percent versus 40 percent of the observed total).

French inflation averaged more than 50 percent in 1947-48. In Figure 9, the green segments of the bars denoting the contribution of inflation point strongly downward in 1947-48. This was a period when the yield on government bonds was a mere 1.1 percent. (This contrast is also evident in Figure 9.) Accordingly, this was the period that saw most of the movement in the debt/GDP ratio, which fell from 64 to 48 percent. From 1949 through 1953, following adoption of the Mayer Stabilization Plan, inflation slowed to the low double digits, and the debt-to-GDP declined more gradually, from 44 to 33 percent. Subsequent to that, inflation fell still further, to the low single digits, in the same neighborhood as interest rates, and the debt burden declined more gradually still, now as a result of ongoing economic growth but also because the interest rate on public debt never quite rose to match the rate of inflation.

This chronology thus points to two different periods of French interest rate controls: that through 1948, when inflation was extreme, and that thereafter, when it was more moderate. The period prior to September 1948 saw extensive central bank purchases of government securities, with immediate inflationary consequences. In September of that year, an accord was reached between the Banque de France and the Treasury, not unlike the 1951 Accord in the United States. The Treasury committed to finance its budget deficit in a noninflationary manner – that is to say, without insisting on new advances from the central bank. To that end, commercial banks were required to hold a specified minimum quantity of government securities (known as the "floor") equal to 95 percent of the amount held by each bank in September 1948. This was justified as an anti-inflationary measure; it was intended to prevent the banks from discounting their existing stocks of bills with the central bank in order to expand loans to the public. In addition, each bank was obliged to devote one fifth of its new loans to government bonds (Monnet 2018, p.151).[36] In France, then, fiscal consolidation proceeded in part by financial repression – by requiring the banks to maintain and even augment their stocks of government bonds.

5.2 Bulgaria 1997-2006 and Hungary 1994-2001

The cases of Bulgaria and Hungary during the transition from plan to market both feature a prominent role for inflation in debt consolidation.[37] In Bulgaria, a burst of inflation that peaked in 1997 sharply eroded the debt burden because that acceleration was not anticipated and

[35] The year 1946 accounts for much (but not all) of the difference, with French GDP moving sharply upward following the conclusion of hostilities and the U.S. experiencing an immediately postwar recession.
[36] In 1956, this 20 percent requirement was raised to 25 percent to offset the observed fall in the share of the banks' liabilities held in Treasury securities from 26 percent in 1948 to 21 percent eight years later. Under the Fifth Republic, starting in 1958, the floor system was then gradually abandoned.
[37] Hungary does not appear in Table 5 because its debt consolidation fell just short of ten years, but it nonetheless provides an informative contrast with Bulgaria.

therefore not fully reflected in increased interest costs. In Hungary, where inflation persisted for much of the period, its impact was offset to a greater extent by increased interest costs, as investors (other than the central bank, which held a significant share of financial claims on the government) responded to this reality.

Bulgaria's progress in stabilizing and liberalizing was hampered by lack of consensus about reform strategy, resulting in stop-go policies. Foreign financial markets were closed to the country, which, possessing only limited foreign exchange reserves, halted interest payments at the outset of the transition. Intergovernmental debts were restructured under the aegis of the Paris Club in 1992. In 1994 the government then bought back outstanding debt at a discount from commercial creditors, converting it into Brady bonds. This reduced in the dollar value of the outstanding foreign debt by approximately 20 percent (Mihov 1999). In addition, the government was burdened by extensive domestic debt bearing high interest rates (Dobrinsky 2000).

Progress on privatization and enterprise restructuring being slow, the banks were encouraged to finance loss-making enterprises by a central bank that acted as a de facto "lender of first resort" (Berlemann and Nenovsky 2011). The inevitable result was a banking crisis lasting from October 1995 to March 1997, as bad loans and liquidity problems precipitated depositor runs. The government had to step in with guarantees, placing 15 commercial banks in receivership and recapitalizing them as necessary, all at considerable fiscal cost.

Direct central bank lending to the government was limited by law, and the Ministry of Finance was supposed to finance itself by issuing bonds. But starting in 1995 much government bond issuance remained unsold, creating a cash shortage for the Ministry. The direct-financing law notwithstanding, the Ministry applied to the central bank for advances. In late 1996, it asked the central bank for a credit equal to nearly 60 percent of the then outstanding monetary base. Realizing the inflationary implications, the public stepped up its run on the banks, shifting into foreign currency deposits when possible. Inflation accelerated from 61 percent in 1995 to 125 percent in 1996 and then to more than 1,000 percent in 1997. As can be seen from Figure 10, this sharp spike in inflation, not fully anticipated by investors, sharply eroded the real value of the debt and went some way toward neutralizing the burden of bank recapitalization.

As is often the case, financial disaster set the stage for reform. Elections in April 1997 brought in a new center-right coalition, which installed a currency board with a peg to the Deutschemark. It shifted the consolidated general government budget deficit from 11 percent of GDP in 1996 to 2 percent in 1997. By the end of the 1996-7 hyperinflation, the debt ratio had fallen from 113 of GDP to just 65 percent – this despite a post-stabilization recession (with GDP falling by 14 percent in 1997 alone) and massive off-budget expenditures associated with recapitalizing the banks (some 85 per cent of GDP), both of which are evident in Figure 10 for 1997.

In contrast to Bulgaria, where inflation spiked to more than 1,000 percent in 1997, inflation in Hungary never once exceeded 28 percent on an annualized basis between 1994 and 2001. Hungary commenced its reforms earlier than other transition economies; consequently, it had less of a problem of repressed inflation in the 1990s. But double-digit inflation persisted, averaging 17 percent over the consolidation period. Superficially, that it persisted meant that it

ultimately did even more than in Bulgaria to erode the real value of the debt. At the same time, this persistence also gave investors – and the interest rate – more time to react.

Inflation in Hungary was driven by twin deficits on the budget and balance of payments and by the government's recourse to the central bank credit to finance them. The rise in oil prices and collapse of Eastern European trade led first to recession and an acceleration in inflation in the early 1990s. In 1992 the government adopted a demanding new bankruptcy law that provided powerful impetus for enterprise restructuring, but whose corollary effects were a sharp fall in production by insolvent enterprises and a decline in tax receipts, creating pressure for money financing. In response, the authorities raised reserve requirements and restricted the growth of domestic credit, which caused inflation to fall to half of the levels of mid-1991 but resulted in continuing economic stagnation.

Only in 1994 did real GDP begin growing again, helped in part by exceptional election-year government spending and lax monetary policy. The consolidated government budget remained in deficit, partly due to higher interest costs. Once the 1994 election had passed, fiscal adjustment could get underway. Taxes were raised, the civil service was downsized, and subsidies and transfers were reduced. In addition, new mechanisms were set up in the finance ministry to monitor and control public spending. Meanwhile, significant privatization receipts augmented the government's coffers. The full effects were felt in 1996, when the consolidated budget deficit fell to a low of 3.1 percent of GDP. The primary budget balance swung from deficit in 1994 to balance in 1995 and then substantial surplus in 1996 and 1997, with effects that are evident in Figure 11. Barabas, Mamecz and Nemenyi (1998) attribute half of the improvement in the primary balance to higher privatization receipts, the other half to budgetary reform and consolidation. But these results were less than immediate; in the meantime, the fiscal gap was filled in part by money printing: M2 rose by an annual average rate of 17 percent between 1994 and 1996 (Suranyi and Vincze 1998).[38]

There exist conflicting estimates of what happened to the public debt over the period. First, there is a considerable gap between the gross and net debt of the government, since the government possessed land and structures yet to be privatized. Consistent with data for other countries, the IMF series used here measure gross debt. Second, the central bank was in charge of foreign borrowing on behalf of the government; it kept the resulting debt on its own balance sheet. Barabas, Mamecz and Nemenyi (1998) consolidate debt on the government's fiscal accounts with debt on the central bank's balance sheet and show the debt/GDP ratio as falling from 90 percent in 1993 to 65 percent in 1997; the IMF series used here shows this as falling from 87 percent to 63 percent over the same period.

Importantly, the National Bank of Hungary on-lent the borrowed funds to the government in domestic currency at below-market interest rates. Thus, when inflation accelerated and the forint depreciated, the government did not incur additional interest costs or see an increase in the real value of this portion of the debt; instead, all that happened was that the denominator of the debt/GDP rose with inflation. The central bank absorbed the losses, which were kept on its

[38] Working against fiscal consolidation in this period were increases in off-budget liabilities (bonds issued for housing finance reform, bank restructuring and to fund miscellaneous guarantees); this shows up in the stock-flow adjustment.

books as claims on the government with no maturity and a zero interest rate.[39] In effect, this portion of the government's liabilities was "paid off" out of the central bank's seigniorage earnings. This can be thought of as a form of financial repression, where the institution forced to hold below-market-rate claims on the government is the central bank rather than the commercial banking system. It affected only the debt of the government to the central bank and not also other claims (such as the short-term floating-rate securities issued on the developing domestic market in the mid-1990s), which is why interest costs rose more and the contribution of inflation to debt consolidation was less than in Bulgaria.

5.3 Brazil 1888-1894 and Canada, 1896-1905

Our algorithm identifies only a small handful of large, extended debt consolidations (declines in the debt/GDP ratio of at least 15 percentage points over ten or more years) prior to World War I. It finds little contribution from inflation in this period. That inflation contributed little is unsurprising, given the relative stability of price levels under specie standards (compared, at least, to what came after).

That there are only five such consolidations in the entire data set – Spain 1903-12, Argentina 1898-1907, Great Britain 1859-68, the USA 1880-1889, and Canada 1896-1905 – is more surprising. If we apply a weaker criterion, and consider uninterrupted 15 percentage point declines in the debt/GDP ratio of any length, we can add a number of additional cases. Many of these debt-consolidation episodes are driven by primary surpluses; few are driven by bursts of inflation. We considered a number of these cases in Eichengreen et al. (2021): Great Britain in various episodes between the end of the Napoleonic Wars and outbreak of the Great War, the United States after its Civil War, and France from the 1890s to World War I. In all these instances, debt reduction was accomplished by running primary surpluses. In Britain, this reflected the Victorian philosophy of sound finance (more on this below). In the U.S., it was a function of opposition in the South and elsewhere to an expansive federal government. In France, there was the perceived imperative of restoring fiscal capacity in advance of another war. And in all three cases the absence of major military conflicts. Exceptional cases where inflation loomed large in the decomposition over shorter periods include Spain in 1851-55, Italy in 1872-74 and 1903-07, and Brazil in 1888-91 and 1892-94.

Of our baseline cases, Brazil and Canada provide an interesting comparison. Canada reduced its debt/GDP ratio from 44 percent to 24 percent between 1895 and 1905 mainly by running primary surpluses (which were responsible for half of observed debt reduction in an accounting sense) and by growing its economy (which expanded robustly starting in 1897). The growth and primary surpluses are both evident in Figure 12, which confirms that, of the two, growth played the more important role. In addition, there was a modest contribution from inflation, which averaged slightly more than one percent per annum over the period, reflecting global gold discoveries putting upward pressure on price levels worldwide. Interest rates on the debt did not rise commensurately, as highlighted in Eichengreen (1982), reflecting the long tenor of the governments bonds and perhaps also belief on the part of investors, impressed by Canada's adherence to the gold standard, that inflation would not persist.

[39] This practice was finally eliminated by the Budget Act of 1997, which eliminated the non-interest bearing domestic government debt held by the central bank, replacing it with foreign-currency denominated loans (OECD 1997).

Although Brazil's debt reduction in the late 1880s and early 1890s preceded discovery-related inflation in the gold standard countries, Brazil was off the gold standard for much of this period. Like many other countries, Brazil had seen ongoing controversy between the advocates of a sound metal-backed currency and a more inflationary paper alternative (Fritsch and Franco, 2000). This controversy came to a head with the abolition of slavery in 1888, which created additional monetary transactions in the countryside and threatened deflation and liquidity crises around harvest time. This led the Brazilian Parliament to establish a bank of issue (the Banco Nacional do Brasil) in 1889, and to authorize it to expand the money supply by more than three times.[40] Then in 1890 the new Republican finance minister, Rui Barbosa, no fan of the gold standard, created a system of regional banks of issue authorized to further expand the money supply. These banks were required to back their notes with government bonds; as Calomiris and Haber (2014) put it, "Barbosa had essentially authorized the banks to more than double the money supply." And double it did, between 1890 and 1891. As Fritsch and Franco describe, "The exchange rate experienced a sharp nominal fall and…inflation followed this with only a short lag…"

In the first period of debt consolidation (1887-91), inflation appears to account for a large share of the observed debt reduction. But interest rates in the high single digits almost completely offset this advantage. This is evident in Figure 13 for 1889 and 1890. As a result, there was little contribution to debt reduction from the real interest rate. This would make it seem as if the option of inflating away debt was not available to a country with Brazil's checkered gold-standard history and for which much of the debt was denominated in foreign currency. Moreover, a large conversion of external debt in 1889, though reducing interest payments (4 ½ percent and 5 percent bonds were converted into 4 percents), also increased the debt stock, as the old bonds were exchanged for the new ones at a generous rate, slowing debt retirement. The resulting stock-flow adjustment (SFA) slowed down the rate of debt consolidation. Subsequently, the government achieved an extraordinary debt reduction by requiring banks to back their note issue with domestic government bonds, while reducing their coupon first from 5 to 2 percent and then to zero. In the second subperiod (1892-94), inflation was even higher, while the effective interest rate on the debt was somewhat lower (6 versus 7 ½ percent). Using Treasury funds to buy bonds trading at a discount, the government raised the market value of its external debt, which explains the positive contributions of the SFA terms to the debt consolidation (Schulz 2008).

This, then, might be seen as debt consolidation achieved through the classic combination of inflation and financial repression. But more than inflation was involved in this case. In addition, to avoid bankrupting the banks and antagonizing the bankers, the government granted them free land, tax exemptions for companies they founded, and relief from having to pay duties on imported inputs. In effect, it sold off public assets, namely land (in effect, trading this for reduced interest payments on government bonds), and mortgaged other public assets (future revenue streams) as a way of reducing current interest payments and slowing the accumulation of

[40] Calomiris and Haber (2014) describe this as an agreement between the monarchy and the former slave-owners to provide long-term, low interest loans to the latter as a way of cementing their support. Readers familiar with U.S. monetary history will note the parallels with seasonal stringency around the time of the North American harvest (Kemmerer 1910) and calls for the creation of a central bank to provide an "elastic currency."

additional gross debt. Only the rapid growth of the Brazilian economy in this period of strong commodity prices prevented the debt problem from reemerging.

5.4 Britain 1859-68, 1947-78

Our final case is a pair of pairs, the four British cases that show up in our 10-year, 15-percentage-points-of-GDP data set. The mid-19th century case (1859-68) saw a 33-percentage-point-of-GDP decline in the debt, due mainly to primary surpluses but also to respectable economic growth (brought to an end in 1866-7 by the Overend Gurney crisis). While modest increases in the price level, notably in 1866-7, aided the process of debt reduction, that contribution was swamped by the effect of an effective interest rate on the debt of 3.7 percent (Figure 14).

This was the period of Gladstonian finance: Gladstone was Chancellor from 1859 to 1866, both preceded and followed, for short periods, by Disraeli. Gladstone elaborated a fiscal philosophy emphasizing budget surpluses, low taxes, and limited government expenditure (Maloney 1998, MacDonald 2003). Gladstonian liberalism stressed limited government involvement in the economy, allowing receipts to be deployed not for social programs, or for that matter military spending, but in substantial part for debt reduction. Subsequently, Gladstone's party moved in the direction of social liberalism, with the creation of old age pensions and a nascent unemployment insurance system under the Liberal Government of 1906-1914. But these were very different from Gladstone's own views. They were separated in time from his tenure as chancellor by fully half a century.

This emphasis on debt retirement was supported by the prevailing system of political representation. Prior to the reform of 1867, the extent of the franchise was limited to men of property, many of whom were investors in land but also in bonds. The 1867 reform, which extended the franchise to workingmen in towns and cities, doubled the size of the electorate. Although the 1868 election nonetheless returned Gladstone as prime minister, he was subject to more intense pressure to increase spending and reduce taxes on tea, tobacco and spirits. It is no coincidence, from a political economy standpoint, that our algorithm indicates that the period of debt consolidation terminated in 1867.

In sum, this first British consolidation episode was supported by a combination of political and economic factors, and it came to an end with political and economic changes (the Reform Act and Overend-Gurney, respectively).

The immediate post-World War II (1946-55) consolidation episode is the largest in our sample of sustained debt consolidations, with the debt ratio falling from 269 percent to 128 percent of GDP in a decade (Figure 15). The primary balance contributed positively to this debt reduction: large deficits in 1946-47 were followed by consistent, substantial surpluses thereafter. Despite this being a period of Labour Governments (the Conservatives returned to power in October 1951), pressing reconstruction needs and an expanding welfare state (the National Health Service Act was passed in 1946, National Insurance in 1946, and National Assistance in 1948), the UK was still able to run primary surpluses. That unemployment fell from its customary double digits in the 1920s and 1930s to less than 2 percent helped; this reduced outlays for unemployment benefit, which had constituted a significant and politically contentious drain on the budget between the wars. Further adjustments to the budget occurred under pressure:

financial interests and politicians were concerned to preserve London's position as an international financial center and therefore wished to avoid additional devaluations of sterling that might jeopardize that status.

But the largest contribution in this period came from inflation, which was responsible for more than 80 percent of the observed debt consolidation in an accounting sense. Interest costs offset less than a third of this. Comprehensive exchange controls bottled up savings at home, while regulation compelled the banks to hold government debt (Allen 2014).[41] This was not unlike the contemporaneous situation in France. It was financial repression once again.

The final two 10-year consolidation episodes (1958-67 and 1969-78) were cut from the same cloth. The extent of consolidation was less (41 and 33 percentage points of GDP, respectively), while the contribution of primary budget surpluses was in fact greater. Despite much criticism of British fiscal policy, the only primary budget deficits in this 20 year period were in 1963 (following a year of unusually slow growth, leading the government to cut first indirect and then direct axes), 1967 (a year of devaluation and financial turbulence), 1973 (the first OPEC oil shock) and 1975 (the post-OPEC-shock recession). Growth contributed importantly to consolidation in 1959-67, and somewhat less so in 1969-78, by which time Britain had acquired its sick-man-of-Europe sobriquet.

In addition, there was again a role for inflation, as in 1947-56. As a share of the observed decline in the debt/GDP ratio, the contribution of inflation was higher in 1969-78 than in any of the other three British consolidation episodes. This is not surprising, since inflation was higher in this period than in any of the other three. (CPI inflation reached 16 percent in 1974 and 24 percent in 1975.) But the contribution to debt consolidation was largely neutralized (entirely in the 1958-67 period) by the rise in interest rates. This was the result of relaxing the most severe exchange controls (although they were only finally removed in 1979) and of the gradual liberalization of banking regulation.

The long postwar decline in the British debt ratio, from more than 250 percent of GDP in 1946 to just 42 percent three decades later, has been much remarked upon (see for example Crafts 2014). But the period when financial repression played a major part was essentially limited to the first postwar decade. After that, fiscal discipline and economic growth, not virtues that feature prominently in the literature on the British economy in the third quarter of the 20th century, were in fact responsible.

6. Conclusion

In this paper, we reexamine the relationship of inflation to debt consolidation, deriving an accounting formula that isolates the role of inflation. Previous literature has either used decompositions that net out inflation, thereby eliminating it as a factor (Abbas et al. 2011), or else use approximations that create large biases. We then assemble a comprehensive panel of debt

[41] Allen mentions regulations requiring the banks to hold a ratio of liquid assets to deposits of 30 percent and the classification of Treasury bills as liquid assets for these purposes; a serial funding operation in 1951 requiring the banks to exchange Treasury bills for bonds; and the Special Deposits Scheme introduced in 1958 requiring banks to acquire additional government debt.

consolidations in history. Our data cover not only the better-known debt consolidations of advanced nations but also successful consolidations in emerging markets and developing economies.

Our analysis reveals important patterns not noticed previously. While consolidations tend to follow large wars (the Napoleonic War and two World Wars being prominent examples), these consolidations are not always driven by the inflationary consequences of the wartime monetary overhangs. The contribution of inflation to debt consolidation was largest in the post-World War II years 1945-82, followed by the Great Moderation, the interwar period and the pre-1913 era. Evidently, a stable monetary anchor under the classical gold standard and the deflationary dynamics of the interwar years did not provide a basis for eroding the debt stock through inflation. Instead, primary budget surpluses and economic growth were more important for bringing down debt ratios.

Second, we find only a weak correlation between global inflation and the frequency of debt consolidations. Thus, the most recent period of widespread inflation, the 1970s, coincided with one of the lowest counts of debt consolidations.[42] Equally striking are the peaks in debt consolidation at the turn of the 20th century and the period between the early 1990s and the Global Financial Crisis of 2008 (the period we refer to as "the Great Consolidation"). Though separated by fully a century, these two periods had in common sound monetary and fiscal policies. One result of this mix was low but steady inflation, which created conditions for governments to consolidate their debts. This is especially evident during the Great Consolidation, when consolidations peaked in all categories of countries, including low-income countries that only very rarely figured in consolidations before the 1990s. In this period, conventional debt consolidations outstripped other more radical ways of reducing debt burdens such as default.[43]

Third, even in episodes where inflation accounted for a significant fraction of observed debt consolidation, interest payments on new debt often rose fast enough to offset all or part of its contribution. This points to the importance of financial factors that condition the role of inflation, such as debt maturity, financial regulation or repression, monetary rules, and inflation expectations. In addition, there is a role for political economy, operating through the democratic accountability of governments, type of political regime, political ideology, and the autonomy of policy makers. Our case studies illustrate the importance of these factors.

In 1919, Maynard Keynes wrote that "By a continuing process of inflation, governments can confiscate, secretly and unobserved, an important part of the wealth of their citizens…As the inflation proceeds and the real value of the currency fluctuates … all permanent relations between debtors and creditors, which form the ultimate foundation of capitalism, become so utterly disordered as to be almost meaningless" (Keynes 1978: 148-49).[44] Keynes was worried about the inflationary consequences of the monetization of military expenditures in the late stages of World War I. Even though some of the most emblematic debt extinctions through inflation followed the Great War, most famously of all the German hyperinflation of 1923, it is not the

[42] Inflation, of course, is endogenous to other macro variables, in this case to stagflation fought with expansive fiscal policy facilitated by petrodollar recycling and pliant central bankers.
[43] To the best of our knowledge, we are the first to document such a fact, which shows how underappreciated the topic of debt consolidation is compared with default or concessionary debt cancelation.
[44] In the same passage, Keynes credited Lenin with the idea that inflation was the best way to destroy capitalism.

case that the bulk of the war debts was inflated away. Evidently, compelling narratives based on a small handful of notorious case studies can get ahead of facts.

References

Abbas, S.M., Nazim Belhocine, Asmaa El Ganainy and Mark Horton (2011), "Historical Patterns and Dynamics of Public Debt – Evidence from a New Database," *IMF Economic Review* 59, pp.717-742.

Ahrend, Roger, Pietro Catte and Robert Price (2006), "Interactions between Monetary and Fiscal Policy: How Monetary Conditions Affect Fiscal Consolidation," OECD Economics Department Working Paper no.521.

Alesina, Alberto and Roberto Perotti (1997), "Fiscal Adjustments in OECD Countries: Composition and Macroeconomic Effects," NBER Working Paper no.5730.

Allen, William (2014), *Monetary Policy and Financial Repression in Britain 1951-59*, Amsterdam: Springer.

Asonuma, Tamon and Christoph Trebesch (2016), "Sovereign Debt Restructurings: Preemptive or Post-Default," *Journal of European Economic Association* 14, pp.175-214.

Barabas, Gyula, Istvan Hamecz and Judit Nemenyi (1998), "Fiscal Consolidation, Public Debt Containment and Disinflation," National Bank of Hungary Economics and Research Department Working Paper no.1998/5.

Barrios, Salvador, Sven Langedijk and Lucio Pench (2010), "EU Fiscal Consolidation after the Financial Crisis: Lessons from Past Experiences," paper presented at the 12th Banca d'Italia Public Finance Workshop, Perugia, 25-27 March.

Barsky, Robert and Bradford DeLong (1991), "Forecasting Pre-World War I Inflation: The Fisher Effect and the Gold Standard," *Quarterly Journal of Economics* 106, pp.815-836.

Berlemann, Michael and Nikolay Nenovsky (2011), "Lending of First Versus Lending of Last Resort: The Bulgarian Financial Crisis of 1996-1997," Dresden Discussion Paper in Economics No. 11/03.

Bernardini, Sofia, Carlo Cottarelli, Giampaolo Galli and Carlo Valdes (2021), "Reducing Public Debt: The Experience of Advanced Economies Over the Last 70 Years" *Journal of Insurance and Financial Management* 4(5): 118-174.Bolt, Jutta, Robert Inklaar, Herman de Jong, and Jan Luiten van Zanden (2018), "Rebasing 'Maddison': New Income Comparisons and the Shape of Long-run Economic Development." Maddison Project Working Paper 10.

Borchard, Edwin (1951), *State Insolvency and Foreign Bondholders, Volume 1: General Principles*, New Haven: Yale University Press.

Calomiris, Charles and Stephen Haber (2014), *Fragile by Design: The Political Origins of Banking Crises and Scarce Credit*, Princeton: Princeton University Press.

Cecchetti, Stephen (1992), "Prices during the Great Depression: Was the Deflation of 1930-32 Really Unanticipated?" *American Economic Review* 82, pp.141-156.

Chugunov, Igor and Mykola Pasichnyi (2018), "Fiscal Stimuli and Consolidation in Emerging Market Economies," *Business Perspectives* 15, pp.113-122.

Crafts, Nicholas (2014), "Reducing High Public Debt Ratios: Lessons from UK Experience," CAGE Research Center Working Paper no.199.

Cruces, Juan and Christoph Trebesch (2013), "Sovereign Defaults: The Price of Haircuts," *American Economic Journal: Macroeconomics* 5, pp.85-117.

Dincecco, Mark (2009), "Fiscal Centralization, Limited Government, and Public Revenues in Europe, 1650-1913," *Journal of Economic History* 69: 48-103.

Dincecco, Mark (2011), *Political Transformations and Public Finances: Europe, 1650-1913*, New York: Cambridge University Press.

Dobrinsky, Rumen (2000), "The Transition Crisis in Bulgaria," *Cambridge Journal of Economics* 24, pp.581-602.

Eichengreen, Barry (1982), "The Proximate Determinants of Domestic Investment in Victorian Britain," *Journal of Economic History* 42, pp.87-95.

Eichengreen, Barry, Asma El-Ganainy, Rui Esteves and Kris James Mitchener (2021), *In Defense of Public Debt*, New York: Oxford University Press.

Eichengreen, Barry and Peter Garber (1991), "Before the Accord: U.S. Monetary-Financial Policy 1945-1951," in R. Glenn Hubbard ed., *Financial Markets and Financial Crises*, Chicago: University of Chicago Press, pp.175-206.

Eichengreen, Barry and Ugo Panizza (2016), "A Surplus of Ambition: Can Europe Rely on Large Primary Surpluses to Solve its Debt Problem?" *Economic Policy* 31, pp.5-49.

Eichengreen, Barry and Richard Portes (1986), "Debt and Default in the 1930s: Causes and Consequences," *European Economic Review* 30, pp.641-647.

European Central Bank (2015), "The Fiscal Impact of Financial Sector Support during the Crisis," *Economic Bulletin* 6: 74-87.

Fishlow, Albert (1985), "Lessons from the Past: Capital Markets during the 19th Century and the Interwar Period," *International Organization* 39, pp.383-439.

Friedman, Milton and Anna Schwartz (1963), *A Monetary History of the United States, 1867-1960*, Princeton: Princeton University Press.

Fritsch, Winston and Gustavo Franco (2000), "Aspects of the Brazilian Experience with the Gold Standard" in Pablo Martín Aceña and Jaime Reis, eds., *Monetary Standards in the Periphery : Paper Silver and Gold 1854-1933*, New York N.Y: St. Martin's Press, pp. 152-73.

Goodhart, Charles and Manoj Pradhan (2020), *The Great Demographic Reversal*, Zurich: Springer Nature.

Guichard, Stephanie, Mike Kennedy, Eckhard Wurzel and Christophe Andre (2007), "What Promotes Fiscal Consolidation: OECD Country Experiences," OECD Economics Department Working Paper no.553.

Hamilton, James (992), "Was the Deflation During the Great Depression Anticipated? Evidence from the Commodity Futures Market," *American Economic Review* 82, pp.157-178.

Hernández de Cos, Pablo, Samuel Hurtado, Francisco Martí and Javier Pérez (2016), "Public Finances and Inflation: the Case of Spain," Banco de España: Documentos Ocasionales no. 1606.

Horn, Sebastian, Carmen Reinhart and Christoph Trebesch (2022), "Hidden Defaults," Kiel Institute Working Paper no. 2208.

Houben, Aerdt (1995), "Commercial Bank Debt Restructuring: The Experience of Bulgaria," IMF Policy Discussion Paper no.95/6.

Jorgensen, Erika and Jeffrey Sachs (1989), "Default and Renegotiation of Latin American Foreign Bonds in the Interwar Period," in Barry Eichengreen and Peter Lindert eds., *The International Debt Crisis in Historical Perspective*, Cambridge, Mass.: MIT Press, pp.48-85.

Kemmerer, Edwin (1910), *Seasonal Variations in the Relative Demand for Money and Capital in the United States: A Statistical Study*, Washington, D.C.: U.S. Monetary Commission.

Keynes, J. M. (1978). *The Economic Consequences of the Peace*. Vol. 2 of Johnson, E. and D. Moggridge, eds., *The Collected Writings of John Maynard Keynes*, London: Royal Economic Society.

Kiss, Gabor and Gyorgy Szapary (2000), "Fiscal Adjustment and the Transition Process: Hungary, 1990-1999," *Post-Soviet Geography and Economics* 41, pp.233-264.

Lambertini, Luisa and Jose Tavares (2005), "Exchange Rates and Fiscal Adjustments: Evidence from the OECD and Implications for the EMU," *Contributions to Macroeconomics* 5, pp.1-24.

Lindert, Peter and Peter Morton (1989), "How Sovereign Debt has Worked," in Jeffrey Sachs ed., *Developing Country Debt and Economic Performance: The International Financial System*, Chicago: University of Chicago Press, pp.39-106.

MacDonald, J. (2003), *A Free Nation Deep in Debt: The Financial Roots of Democracy*, New York: Farrar, Straus and Giroux.

Maloney, J. (1998), "Gladstone and Sound Victorian Finance" in Maloney, J., ed. *Debt and Deficits. An Historical Perspective*, Cheltenham: Edward Elgar, pp.154-189.

Maurer, Henri and Patrick Grussenmeyer (2015), "Financial Assistance Measures in the Euro Area from 2008 to 2013: Statistical Framework and Fiscal Impact," Statistics Paper Series no. 7, Frankfurt: European Central Bank.

Mauro, Paolo, Rafael Romeu, Ariel Binder and Asad Zaman (2015), "A Modern History of Fiscal Prudence and Profligacy," *Journal of Monetary Economics* 76, pp.55-70.

Mbaye, Samba, Marialuz Moreno Badia and Kyungla Chae (2018), "Global Debt Database: Methodology and Sources," IMF Working Paper 2018/111.

Mehrotra, Neil (2017), "Debt Sustainability in a Low Interest Rate World," Hutchins Center Working Paper (2 June).

Mihov, Ilian (1999), "The Economic Transition in Bulgaria," Unpublished manuscript, INSEAD.

Mintz, Ilse (1951), *Deterioration in the Quality of Foreign Bonds Issued in the United States 1920-1930,* New York: National Bureau of Economic Research.

Mitchell, S. and P. Hensel (2007), "International Institutions and Compliance with Agreements," *American Journal of Political Science* 51, pp. 721–37.

Michener, Kris and Christoph Trebesch (2022), "Sovereign Debt in the 21st Century," NBER Working Paper no.28598.

Moghadam, Reza (1998), "Debt Dynamics in Hungary," in *Hungary: Selected Issues*, Washington, D.C.: IMF, pp.18-26.

Molnar, Margit (2012), "Fiscal Consolidation: What Factors Determine the Success of Consolidation Efforts?" *OECD Economic Studies* 2012, pp.123-149.

Monnet, Eric (2018), *Controlling Credit: Central Banking and the Planned Economy in Postwar France, 1948-1973,* Cambridge: Cambridge University Press.

North, Douglass and Barry Weingast (1989), "Constitutions and Commitment: Evolution of the Institutions Governing Public Choice in Seventeenth-Century England," *Journal of Economic History* 49, pp.803-832.

OECD (1997), *OECD Economic Surveys: Hungary*, Paris: OECD.

Pahula, Hildebrando (2021), "Essays on Debt Relief and Fiscal Consolidation in Developing Countries," Ph.D. thesis, Coventry University.

Reinhart, Carmen and Kenneth Rogoff (2009), *This Time is Different: Eight Centuries of Financial Folly*, Princeton: Princeton University Press.

Reinhart, Carmen and M. Belen Sbrancia (2015), "The Liquidation of Government Debt," *Economic Policy* 30, pp.291-333.

Sargent, Thomas (1982), "The Ends of Four Big Inflations," in Robert Hall ed., *Inflation: Causes and Effects,* Chicago: University of Chicago Press, pp.41-98.

Schmelzing, Paul (2020), "Eight Centuries of Global Real Interest Rates, R-G, and the 'Suprasecular' Decline, 1311-2018," Bank of England Staff Working Paper no.845.

Schulz, John. 2008. *The Financial Crisis of Abolition*. New Haven: Yale University Press.

Stasavage, David (2003), *Public Debt and the Birth of the Democratic State: France and Great Britain, 1688-1789*, Cambridge: Cambridge University Press.

Stasavage, David (2011), *States of Credit: Size, Power, and the Development of European Polities,* Princeton: Princeton University Press.

Suranyi, Gyorgy and Janos Vincze (1998), "Inflation in Hungary 1990-97)," in Carlo Cotarelli and Gyorgy Szapary eds, *Moderate Inflation: The Experience of Transition Economies*, Washington, D.C.: International Monetary Fund.

Weber, Anke (2012), "Stock-Flow Adjustments and Fiscal Transparency: A Cross-Country Comparison," IMF Working Paper no. 12/49ba.

Wickens, Michael (2022), "How might the UK's Debt-GDP ratio be reduced? Evidence from the Last 120 years," CEPR Discussion Paper no. 17172.

Data Appendix

In this Appendix, we document the sources of the five variables used to identify debt consolidation episodes and to decompose them into the separate contributions of primary balances, nominal interest rates on the existing debt stock, real growth and inflation.

Debt-to-GDP ratio

The majority of debt-to-GDP data comes from two IMF databases: the *Public Finances in Modern History* database (Mauro et al. 2015) for the period 1800-1950 and the *Global Debt Database* (Mbaye et al. 2018) for 1950-2019. Historical debt series are almost exclusively reported at the central government level, whereas more recent databases (from 1960) collect debt levels at the general government level. To construct consistent debt ratio series, we made sure that all post-1960 data were reported at the central government level.

For a few countries, we could not rely entirely on the IMF datasets. In the case of the UK, the IMF only reports general government debt levels between 1938 and 1990 and so we collected the central government data from the Bank of England's dataset "A millennium of macroeconomic data for the UK."[45] In the case of Israel between 1983 and 1995, we used the data provided by the Bank of Israel but with GDP evaluated at end of year prices.[46] Without this correction, the debt-to-GDP ratio, as reported in the IMF databases, is artificially large. We also used different sources for prewar debt data for eight nations that was not included in the *Public Finances in Modern History* database. These were Bulgaria 1888-1913 and Romania 1888-1904 and 1911-13 (Lazaretou and Scheiber 2014), Canada 1867-69 (Leacy 1983), Germany 1850-1879 (Hoffman 1965), France 1850-75 (several volumes of the *The Statesman's Year-book*), Mexico 1895-1910 (Weller 2011), Switzerland 1880-98 (Flandreau and Zumer 2004) and Uruguay 1880-95 (several volumes of the *Anuario estadístico*).

Primary Balances

The main source for primary budget balances is the *Public Finances in Modern History* database (Mauro et al. 2015). However, on numerous occasions where this source only reported data at the general government level, we had to replace it with data from another IMF database, the *Government Finance Statistics* (IMF 2020), which provides equivalent data at the central government level, which is the one adopted in the paper. For some countries and periods, the central government primary deficits were not covered in either database, so we resorted to the following sources. Armenia 1997-2001 (IMF 2002b) and 2002 (IMF 2004). Australia 1963-1991 (Foster 1996). Belgium 1970-75 (Banque Nationale de Belgique 1986). Botswana 1975-80 (Botswana 1983) and 1981-83 (Botswana 1986). Cape Verde 1988-90 (IMF 1995a), 1997-2001 (IMF 2003a). The Central African Republic 2019 (IMF 2022a). Dominica 1995-97 (IMF 2022a). Eritrea 2012-18 (IMF 2022a). Grenada 1990-99 (IMF 2022a). Guyana 2010-14 (IMF 2022a). Ireland 1960-71 (FitzGerald and Kenny 2018-19). Iraq 2009-19 (IMF 2022a). Japan 1991 (Japan 2021). Laos 1993-97 (IMF 1998) and 1997-2000 (IMF 2002a). Lebanon 1990-94 and 2005-15 (IMF 2022a). Libya 1990-2009 (IMF 2022a). Sri Lanka 1989 (Central Bank of Sri Lanka 1989).

[45] Available at https://www.bankofengland.co.uk/statistics/research-datasets
[46] Available at https://www.boi.org.il/en/DataAndStatistics/Lists/BoiTablesAndGraphs/f_3_e.xlsx

Mali 1970-1995 (World Bank 2012-13). Myanmar 1990 (Taylor 1991) and 1991-93 (IMF 1995b). Malawi 1994-97 (World Bank 2012-13). Solomon Islands 1991-96 (IMF 1996) and 1997-99 (IMF 2022a). El Salvador 1985-89 (MOXLAD). São Tomé e Príncipe 1996-98 (IMF 2000) and 2019 (IMF 2022a). Seychelles 2019 (IMF 2022a). South Sudan 2015-19 (IMF 2022a). Syria 1971-75 (Shaked and Dishon 1977). Switzerland 1970-71 (SSESH 2022). Tonga 1990-92 (IMF 1995c) and 1995-99 (IMF 2001). Trinidad and Tobago 1993-98 (IMF 2022a). Tunisia 1970-71 (World Bank 1974). Tuvalu 2012-19 (IMF 2016). USA 1960-71 (USA 2022). Samoa 1994-97 (IMF 1999), 1997-2001 (IMF 2003c), 2001-05 (IMF 2007), 2005-06 (IMF 2010) and 2006-09 (IMF 2012 and Samoa 2013). Zimbabwe 1994-99 (World Bank 2012-13).

Nominal Interest Charge on Public Debt

As with primary balances, the majority of the data comes from the IMF's *Public Finances in Modern History* and *Government Finance Statistics*, with the following exceptions. Armenia 1997-2001 (IMF 2002b) and 2002 (IMF 2004). Australia 1963-1991 (Foster 1996). Belgium 1970-75 (Banque Nationale de Belgique 1986), 1981-83 (Botswana 1986) and 1985-90 (ISI 2022). Cape Verde 1988-90 (IMF 1995a), 1997-2001 (IMF 2003a). The Central African Republic 2019 (IMF 2022a). Dominica 1995-97 (IMF 2022a). Eritrea 2012-18 (IMF 2022a). Grenada 1990-99 (IMF 2022a). Guyana 2010-14 (IMF 2022a). Ireland 1960-71 (FitzGerald and Kenny 2018-19). Iraq 2009-19 (IMF 2022a). Italy 1994 (IMF 2022a). Jamaica 2019 (IMF 2022a). Japan 1991 (Japan 2021). Kuwait 2012-13 (IMF 2022a). Laos 1993-97 (IMF 1998) and 1997-2000 (IMF 2002a). Lebanon 1990-94 and 2005-15 (IMF 2022a). Libya 1990-2009 (IMF 2022a). Mali 1970-1995 (World Bank 2012-13). Myanmar 1990 (Taylor 1991) and 1991-93 (IMF 1995b). Malawi 1994-97 (World Bank 2012-13). Solomon Islands 1991-96 (IMF 1996) and 1997-99 (IMF 2022a). El Salvador 1985-89 (MOXLAD). São Tomé e Príncipe 1996-98 (IMF 2000) and 2019 (IMF 2022a). Seychelles 2019 (IMF 2022a). South Sudan 2015-19 (IMF 2022a). Syria 1971-75 (Shaked and Dishon 1977). Switzerland 1970-71 (SSESH 2022). Turkmenistan 1998-2009 (IMF 2022b and World Bank 2022a). Tonga 1990-92 (IMF 1995c) and 1995-99 (IMF 2001). Trinidad and Tobago 1993-98 (IMF 2022a). Tunisia 1970-71 (World Bank 1974). Tuvalu 2012-19 (IMF 2022b). USA 1960-71 (USA 2022). Samoa 1994-97 (IMF 1999), 1997-2001 (IMF 2003c), 2001-05 (IMF 2007), 2005-06 (IMF 2010) and 2006-09 (IMF 2012 and Samoa 2013). Zimbabwe 1994-99 (World Bank 2012-13).

Real GDP Growth

The bulk of the information on real GDP growth rates comes from two IMF databases: the *World Economic Outlook* (IMF 2022b) and the *Public Finances in Modern History* database (Mauro et al. 2015). The following exceptions apply. Afghanistan 2002 (IMF 2006). Australia 1899 (Wamplew 1987). Belgium 1846-46 and 1859 (Smits et al. 2009). Iceland 1917-20, 1923-25, 1936-45 (Jónsson and Magnússon 1997). Liberia 2000 (IMF 2003b). Malta 1971-78 (World Bank 2022b). Myanmar 1990-93 and 1998 (World Bank 2022b). The Netherlands 1815-17 and 1825 (Smits et al. 2009). New Zealand 1960 (Feenstra et al. 2015). Russia 1890-99, 1901-07 (Gregory 1983). Spain 1850 (Álvarez-Nogal et al. 2020). South Africa 1925-28, 1930-39, 1944-50 (Fourie and van Zanden 2013). Sweden 1800 (Edvinsson et al. 2014). United Kingdom 1807-

11, 1820-1830, 1891 and 1893 from the Bank of England's dataset "A millennium of macroeconomic data for the UK." Zimbabwe 1994-98 (World Bank 2012-13).

CPI Inflation

We constructed a consistent CPI inflation series by working backwards from the present, i.e. we started with contemporary databases, namely, Ha, Kose and Ohnsorge (2021) and IMF (2022b). For the historical period, we relied on two large datasets compiled by Jordà, Schularick and Taylor (2017) and de Zwart (2011). For observations missing in the former databases, we used the following sources. For Argentina, Austria, Brazil and Russia 1881-1913 (Flandreau and Zumer 2004). Argentina 1914 (MOXLAD). Austria 1851-80 (Mitchell 2003c). Belgium 1851-70 (Mitchell 2003c). Bulgaria 1934-44 (Lazaretou and Scheiber 2014). Chile, Mexico 1881-1913 (Díaz et al. 2016). China 1881-1913 (Mitchell 2003a). Colombia 1881-99, 1902-13 (Williamson 1999). Germany, Denmark, Italy, the Netherlands, Norway, Spain, Sweden and the United Kingdom 1851-70 (Mitchell 2003c). Greece 1881-1913 (Kostelenos 2007). Honduras 1935 and 1939 (MOXLAD). New Zealand 1904, 1908, 1925, 1930-32, 1941-46 (Reinhart and Rogoff 2011). Peru 1884-1913 (Quiroz 1993). Portugal 1851-70 (Valério 2001). Serbia 1881-1913 (Williamson 2000). South Africa 1930, 1921 and 1939 (Mitchell 2003c). Turkey 1881-1913 (Pamuk 2001). Uruguay 1881-1913 (Williamson 1999). United States 1826 and 1851-70 (Sutch and Carter 2006).

Appendix References

Álvarez-Nogal, Carlos, Leandro Prados de la Escosura and Carlos Santiago-Caballero (2020), "Growth Recurring in Preindustrial Spain: Half a Millennium Perspective," University Carlos III de Madrid: Working Papers in Economic History 2020-01.

Banque Nationale de Belgique (1986), *Statistiques économiques belges 1970-1980*, Brussels.

Botswana (1983), *National Accounts of Botswana 1980/81*, Gabarone: Central Statistics Office.

Botswana (1986), *National Accounts of Botswana 1983/84*, Gabarone: Central Statistics Office.

Central Bank of Sri Lanka (1989), *Annual Report*, Colombo.

de Zwart, Pim (2011), "Working Paper Clio Infra: Inflation" available at https://clio-infra.eu/docs/Inflation.docx

Díaz, José, Rolf Luders and Gert Wagner (2016), *Chile 1810-2010, La república en cifras*, Santiago: Ediciones UC.

Edvinsson, Rodney, Tor Jacobson and Daniel Waldenström (2014), *Historical Monetary and Financial Statistics for Sweden*. Volume II: *House Prices, Stock Returns, National Accounts, and the Riksbank Balance Sheet, 1620–2012*, Stockholm: Ekerlids Förlag.

FitzGerald, John and Seán Kenny (2018-19), "Managing a Century of Debt," *Dublin: Statistical and Social Inquiry Society of Ireland,* 48: 1-40.

Feenstra, Robert C., Robert Inklaar and Marcel P. Timmer (2015), "The Next Generation of the Penn World Table," *American Economic Review,* 105(10): 3150-82.

Flandreau, Marc and Frédéric Zumer (2004), *Making of Global Finance, 1880-1913*. Paris: OECD.

Foster, R. A. (1996), "Australian Economic Statistics 1949-50 to 1994-95," Reserve Bank of Australia: Occasional Paper No. 8.

Fourie, Johan and Jan Luiten van Zanden (2013), "GDP in the Dutch Cape Colony: The National Accounts of a Slave-Based Society," *South African Journal of Economics,* 81: 467-90.

Gregory, Paul (1983), *Russian National Income, 1885–1913,* Cambridge: Cambridge University Press.

Ha, Jongrim, M. Ayhan Kose and Franziska Ohnsorge (2021), "One-Stop Source: A Global Database of Inflation;" World Bank: Policy Research Working Paper No. 9737.

Hoffmann, W. (1965), *Das Wachstum der deutschen Wirtschaft seit der Mitte des 19. Jahrhunderts,* Berlin: Springer.

IMF (1995a), "Cape Verde—Background Issues and Statistical Update," IMF Staff Country Report No. 95/9.

IMF (1995b), "Myanmar: Recent Economic Developments," IMF Staff Country Report No. 95/126.

IMF (1995c), "Tonga–Recent Economic Developments," IMF Staff Country Report No. 95/67.

IMF (1996), "Solomon Islands–Recent Economic Developments," IMF Staff Country Report No. 96/74.

IMF (1998), "Lao People's Democratic Republic: Recent Economic Developments," IMF Staff Country Report No. 98/77.

IMF (1999), "Samoa: Statistical Appendix," IMF Staff Country Report No. 99/28.

IMF (2000), "São Tomé e Príncipe: Recent Economic Developments and Selected Issues," IMF Staff Country Report No. 00/69.

IMF (2001), "Tonga: Recent Economic Developments," IMF Staff Country Report No. 01/02.

IMF (2002a), "Lao People's Democratic Republic: Selected Issues and Statistical Appendix," IMF Country Report No. 02/61.

IMF (2002b), "Republic of Armenia: Statistical Annex," IMF Country Report No. 02/225.

IMF (2003a), "Cape Verde: Statistical Appendix," IMF Country Report No. 03/153.

IMF (2003b), "Liberia: 2002 Article IV Consultation, Overdue Financial Obligations to the Fund—Review Following Declaration of Ineligibility, and Decision on Suspension of Voting and Related Rights—Staff Report; Staff Statement; Public Information Notice and Press Release on the Executive Board Discussion; and Statement by the Executive Director for Liberia," IMF Country Report No. 03/274.

IMF (2003c), "Samoa: Selected Issues and Statistical Appendix," IMF Country Report No. 03/196.

IMF (2004), "Republic of Armenia: 2004 Article IV Consultation, Sixth Review under the Poverty Reduction and Growth Facility, and Request for Waiver of Performance Criteria—Staff Report; Staff Statement; and Public Information Notice and Press Release on the Executive Board Discussion," IMF Country Report No. 04/410.

IMF (2006), "Islamic Republic of Afghanistan: Selected Issues and Statistical Appendix," IMF Country Report No. 06/114.

IMF (2007), "Samoa: Selected Issues and Statistical Appendix," IMF Country Report No. 07/184.

IMF (2010), "Samoa: 2010 Article IV Consultation—Staff Report; Joint World Bank/IMF Debt Sustainability Analysis; Public Information Notice on the Executive Board Discussion; and Statement by the Executive Director for Samoa," IMF Country Report No. 10/214.

IMF (2012), "Samoa: 2012 Article IV Consultation," IMF Country Report No. 12/250.

IMF (2016), "2016 Article IV Consultation—Press Release; Staff Report; and Statement by the Executive Director for Tuvalu," IMF Country Report No. 16/323.

IMF (2020), *Government Finance Statistics* database, available at https://data.imf.org/gfs

IMF (2022a), *Fiscal Monitor* database, available at https://data.imf.org/fm

IMF (2022b), *World Economic Outlook* April 2022 database, available at https://www.imf.org/en/Publications/WEO/weo-database/2022/April

ISI Emerging Markets Group (2022), *CEIC Data* available at https://www.ceicdata.com

Japan (2021), "Japanese Public Finance Fact Sheet," Tokyo: Ministry of Finance, April.

Jónsson, Guðmundur and Magnus S. Magnússon (1997), *Hagskinna. Sögulegar hagtölur um Ísland*, Reykjavik: Hagstofa Íslands.

Jordà, Òscar, Moritz Schularick, and Alan M. Taylor (2017), "Macrofinancial History and the New Business Cycle Facts." in *NBER Macroeconomics Annual 2016*, volume 31, edited by Martin Eichenbaum and Jonathan A. Parker. Chicago: University of Chicago Press.

Kostelenos G. (2007), *Gross Domestic Product 1830-1939, Sources of Economic History of Modern Greece, Quantitative Data and Statistical Series*, Athens: KEPE and Historical Archives of the National Bank of Greece.

Lazaretou, S. and T. Scheiber, coord. (2014), *South-Eastern European Monetary and Economic Statistics from the Nineteenth Century to World War II*, Athens, Sofia, Bucharest, Vienna: Bank of Greece, Bulgarian National Bank, National Bank of Romania, Oesterreichische Nationalbank.

Leacy, F. H., ed. (1983), *Historical Statistics of Canada*, 2nd ed., Ottawa: Statistics Canada.

Mitchell, B. R. (2003a), *International Historical Statistics: Africa, Asia and Oceania 1750-2000*, London: Palgrave Macmillan.

Mitchell, B. R. (2003b), *International Historical Statistics: Europe 1750-2000*, London: Palgrave Macmillan.

MOXLAD – *Montevideo-Oxford Latin American History Data Base*, available at http://moxlad.cienciassociales.edu.uy/en#tabs-graficar

Pamuk, Sevket (2001), *500 Years of Prices and Wages in Istanbul and Other Cities*, Ankara: State Institute of Statistics.

Reinhart, Carmen M., and Kenneth S. Rogoff (2011), "From Financial Crash to Debt Crisis," *American Economic Review*, 101 (5): 1676-1706.

Quiroz, A. (1993), *Domestic and Foreign Finance in Modern Peru, 1850-1950*, Oxford: MacMillan.

Samoa (2013), *Statistical Abstract 2011*, Apia: Samoa Bureau of Statistics.

SSESH – Swiss Society for Economic and Social History (2022), *Historische Statistik der Schweiz* database, available at https://hsso.ch

Shaked, Haim and Daniel Dishon (1977), *Middle East Contemporary Survey*, New York: Holmes & Meier.

Smits, J. P., P.J. Woltjer and D. Ma (2009), "A Dataset on Comparative Historical National Accounts, ca. 1870-1950: A Time-Series Perspective," Groningen Growth and Development Centre Research Memorandum GD-107.

Sutch, R. and S. Carter, eds. (2006), *Historical Statistics of the United States. Millennial Edition*, Cambridge: Cambridge University Press.

Taylor, R. H. (1991), "Myanmar 1990: New Era or Old?" *Southeast Asian Affairs*, pp. 199-219.

The Statesman's Year-book, London: McMillan, several years.

United States of America (2022), *Office of Debt Management – Historical Tables*, Washington D.C.: White House, available at https://www.whitehouse.gov/omb/budget/historical-tables/

Uruguay, *Anuario Estadístico de la Republica Oriental del Uruguay*, Montevideo: Dirección General de Estadística, several years.

Valério, N., ed. (2001), *Estatísticas Históricas Portuguesas*, Lisbon: INE.

Wamplew, Wray (1987), *Australians. Historical Statistics*, Broadway: Fairfax, Syme & Weldon Associates.

Weller, Leonardo (2011), *When Banks Rescued Governments: Debt Crises and Creditor-Sovereign Relations in Brazil and Mexico, 1888-1914*, LSE: unpublished PhD. dissertation.

Williamson, Jeffrey (1999), "Real Wages, Inequality, and Globalization in Latin America before 1940," *Revista de Historia Economica*, 17 (special number): 101-142.

Williamson, Jeffrey (2000), "Real Wages and Factor Prices around the Mediterranean 1500-1940," in S. Pamuk and J. Williamson, eds., *The Mediterranean Response to Globalization Before 1950*, London: Routledge, pp. 45-75.

World Bank (1974), "The Economic Development of Tunisia. Volume V: Annex–Statistical Appendix," Report No. 274a-TUN.

World Bank (2012-13), *African Development Indicators* database, available at https://databank.worldbank.org/source/africa-development-indicators

World Bank (2022a), *International Debt Statistics* database, available at https://databank.worldbank.org/data/source/international-debt-statistics

World Bank (2022b), *World Development Indicators* database, available at https://databank.worldbank.org/source/world-development-indicators

Table 1: Comparison of Decomposition Formulae

Episode	ΔDebt (% GDP)	Formula	Primary balance	Int rate (nominal)	Real growth	Inflation	SFA
UK, 1969-78	-32.8	Eq. (7)	49.7	-114.5	34.1	158.7	-28.0
		Eq. (8)	49.7	-114.5	34.1	155.9	-25.2
		Eq. (9)	49.7	-131.2	38.6	180.4	-37.4
France, 1947-56	-33.1	Eq. (7)	-121.3	-29.9	65.8	184.3	1.2
		Eq. (8)	-121.3	-29.9	65.8	170.9	14.5
		Eq. (9)	-121.3	-36.8	85.7	260.5	-88.0

Notes: the change in debt ratio (Δd) is expressed as percent of GDP. Other values are expressed as the percentages of the overall debt decomposition accounted for each factor. Negative values mean that the factor in question had a contrarian effect over the debt consolidation.

Table 2: Six Variants of Debt Consolidation

Variant	Definition
1	Any duration, at least 10 percent GDP
2	5 years, at least 15 percent GDP
3	8 years, at least 20 percent GDP
4	10 years, at least 25 percent GDP
5	10 years, at least 10 percent GDP
6	10 years, at least 15 percent GDP

Table 3: Summary Statistics of Debt Consolidations, Alternative Variants, 1800-2019

Consolidation Variant	Period	N	Duration (Years)		Size (% GDP)	
			Average	Max	Average	Max
1: Any duration, at least 10 percent GDP	1800-1913	72	7.4	18	-30.8	-96.3
	1919-39	40	7.3	20	-27.6	-107.2
	1945-1982	56	17.0	36	-65.4	-221.0
	1983-2019	199	8.0	24	-41.2	-323.0
	1800-2019	378	9.6	36	-42.6	-323.0
2: 5 years, at least 15 percent GDP	1800-1913	26			-29.2	-91.4
	1919-39	13			-35.8	-101.5
	1945-1982	28			-34.5	-104.6
	1983-2019	78			-32.7	-101.4
	1800-2019	148			-32.5	-104.6
3: 8 years, at least 20 percent GDP	1800-1913	11			-43.3	-87.6
	1919-39	5			-26.1	-33.9
	1945-1982	16			-50.0	-134.3
	1983-2019	39			-47.1	-154.7
	1800-2019	72			-45.5	-154.7
4: 10 years, at least 25 percent GDP	1800-1913	5			-53.8	-96.3
	1919-39	4			-33.5	-38.8
	1945-1982	12			-61.7	-148.0
	1983-2019	24			-49.3	-122.1
	1800-2019	46			-51.9	-148.0
5: 10 years, at least 10 percent GDP	1800-1913	9			-36.8	-96.3
	1919-39	6			-25.7	-38.8
	1945-1982	19			-45.8	-148.0
	1983-2019	29			-43.9	-122.1
	1800-2019	64			-41.9	-148.0
6: 10 years, at least 15 percent GDP	1800-1913	7			-43.7	-96.3
	1919-39	4			-33.5	-38.8
	1945-1982	19			-46.3	-148.0
	1983-2019	28			-45.0	-122.1
	1800-2019	59			-44.5	-148.0

Note: the sum of episodes per period does not add up to the total number of episodes because of debt consolidations occurring during the two World Wars (1914-19 and 1939-45).

Table 4: Total Number of Debt Consolidation Episodes, 1800-2019

Variants	Total episodes		Episodes with data					
	Nr	Obs	Nr	Obs	Duration (Years)		Size (% GDP)	
					Average	Max	Average	Max
1	378	2498	283	1927	5.8	36	-32.0	-265.0
2	148	888	121	726			-30.1	-101.5
3	72	648	55	495			-40.5	-116.0
4	46	506	37	407			-45.9	-130.7
5	64	704	54	594			-37.6	-130.7
6	59	649	50	550			-39.5	-130.7

Table 5: 30 Largest Debt Consolidations (10 years with Debt/ GDP falling by at least 15% of GDP)

Country	Start	End	ΔDebt (% GDP)	1ary balance	Int. rate (nominal)	Real growth	Inflation	SFA
UK	1947	1956	-130.7	19.6	-32.1	25.6	80.7	6.2
Syria	2001	2010	-122.1	-14.5	-6.5	28.1	32.4	60.5
Kuwait	1992	2001	-116.0	69.7	-39.6	96.8	9.0	-35.9
Saudi Arabia	2003	2012	-93.3	157.8	-15.3	24.3	7.1	-73.8
Bulgaria	1997	2006	-87.8	44.1	-37.3	15.6	161.1	-83.4
USA	1947	1956	-65.8	43.8	-26.8	39.3	47.9	-4.2
Malaysia	1988	1997	-65.4	72.1	-63.8	79.7	28.2	-16.1
W. Samoa	1995	2004	-58.0	-7.2	-79.7	43.3	32.0	111.7
Australia	1947	1956	-55.1	30.9	-16.5	44.3	83.7	-42.4
New Zealand	1950	1959	-54.3	33.9	-21.5	69.4	81.0	-62.8
Switzerland	1946	1955	-51.8	39.1	-27.3	43.4	11.9	33.0
Ireland	1996	2005	-48.5	77.2	-44.3	71.4	26.8	-31.1
Spain	1903	1912	-47.4	77.4	-70.4	32.1	10.7	50.3
UK	1958	1967	-41.1	32.5	-82.2	68.5	63.7	17.6
Argentina	1898	1907	-39.2	28.6	-72.0	69.5	-8.3	82.2
Uzbekistan	2002	2011	-38.5	105.7	-8.3	28.3	68.3	-94.0
Comoros	1996	2005	-38.0	-49.7	-24.9	35.7	47.5	91.4
Sweden	1998	2007	-37.7	101.2	-69.4	55.6	18.3	-5.8
Thailand	1987	1996	-36.5	78.5	-38.5	48.3	22.0	-10.4
Turkmenistan	1999	2008	-36.0	94.4	-17.2	50.8	42.8	-70.8
India	1934	1943	-33.4	17.1	-45.9	14.3	92.9	21.5
France	1947	1956	-33.1	-121.3	-29.9	65.8	184.3	1.2
eSwatini	1986	1995	-33.0	49.7	-22.3	55.9	90.9	-74.2
Australia	1933	1942	-32.9	63.6	-77.4	131.0	59.8	-77.0
UK	1969	1978	-32.8	49.7	-114.5	34.1	158.7	-28.0
UK	1859	1868	-32.8	96.1	-100.8	51.0	17.4	36.2
Belgium	1996	2005	-32.8	133.6	-179.7	71.5	56.8	17.8
New Zealand	1993	2002	-32.3	118.9	-90.5	47.6	23.5	0.5
Armenia	1998	2007	-32.3	-84.8	-30.7	90.5	33.0	92.0
Canada	1997	2006	-30.8	138.6	-112.4	53.1	31.1	-10.4

Note: values in the last five columns are expressed as percentages of the total debt consolidation.

Table 6: Summary Statistics of Inflation Contribution to Debt Decompositions

Period	Variant 1				Variant 6			
	Nr	Mean	Median	St dev	Nr	Mean	Median	St dev
1800-2019	283	70.8	49.9	106.3	50	59.1	47.7	46.0
1800-1913	42	30.6	18.0	51.5	5	8.0	10.7	14.3
1919-1939	24	36.8	40.5	45.2	2	76.3	76.3	23.4
1945-1982	31	94.1	80.2	59.1	16	84.3	80.8	46.2
1983-2019	181	79.9	49.0	124.4	26	50.6	34.2	41.5

Table 7: Summary Statistics of Contribution of Real Interest Rates to Debt Decompositions

Period	Variant 1				Variant 6			
	Nr	Mean	Median	St dev	Nr	Mean	Median	St dev
1800-2019	283	17.63	6.80	112.51	50	-64.2	-15.5	215.2
1800-1913	42	-25.48	-32.81	61.09	5	-44.5	-41.5	34.2
1919-1939	24	-15.23	-8.51	63.04	2	14.7	14.7	45.7
1945-1982	31	49.37	40.62	65.02	16	-18.0	33.2	229.0
1983-2019	181	25.33	7.33	129.81	26	-106.2	-45.4	234.3

Figure 1: Histogram of Consolidation Durations (in Years)

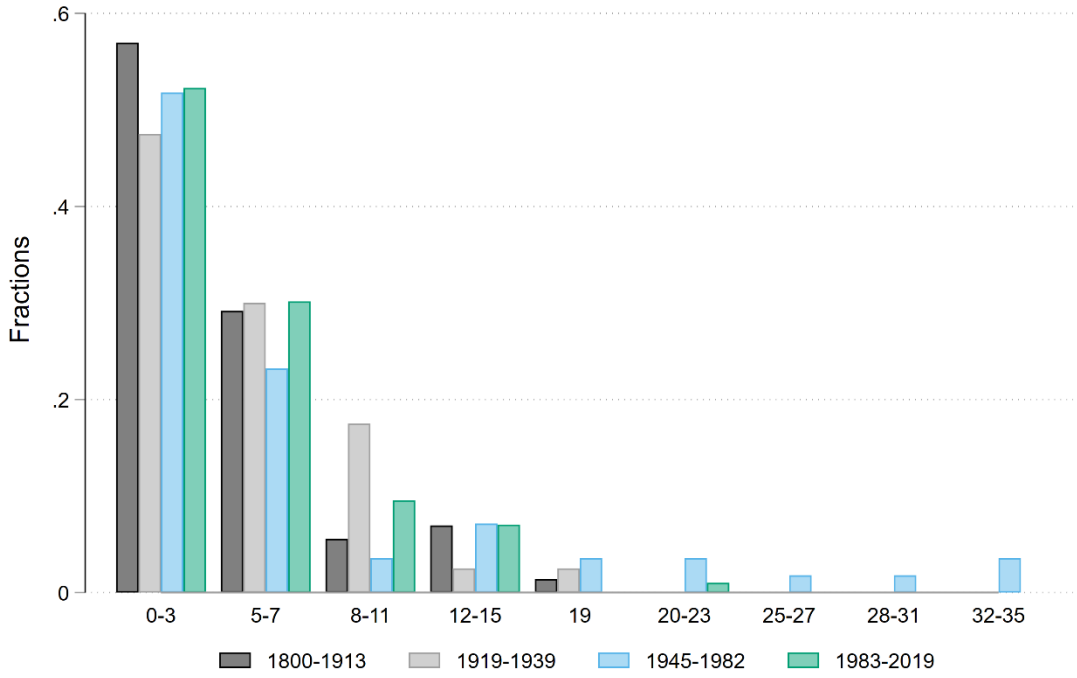

Figure 2: Histogram of Debt Consolidations over Time

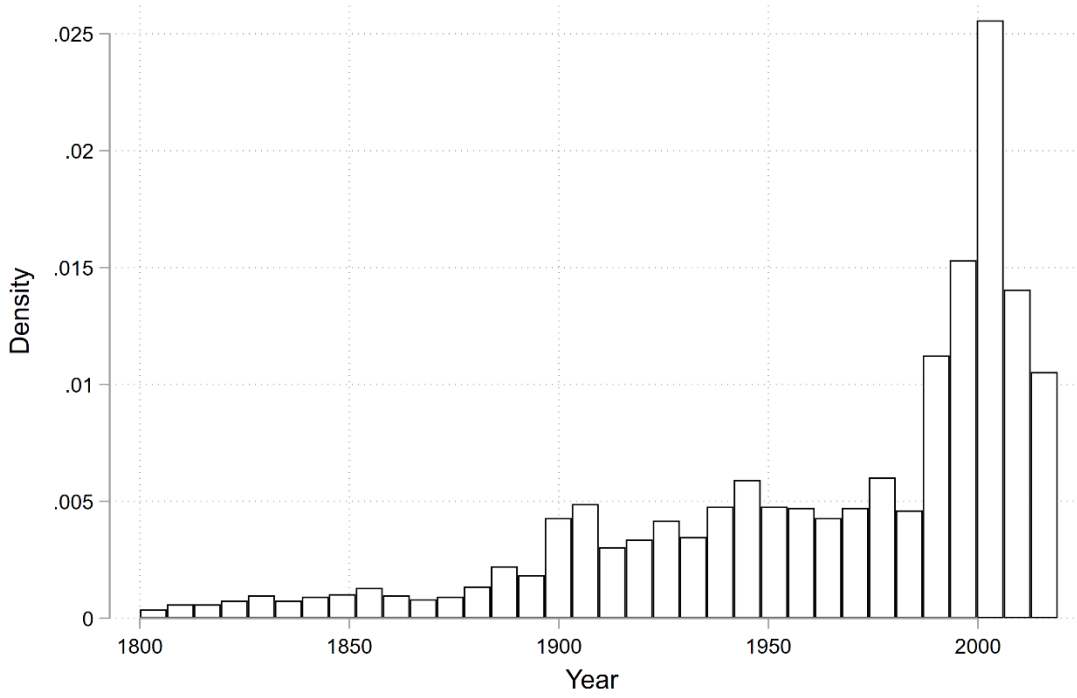

Figure 3: Time Series of Debt Consolidations (Variant 1) and Median Inflation, 1800-2019

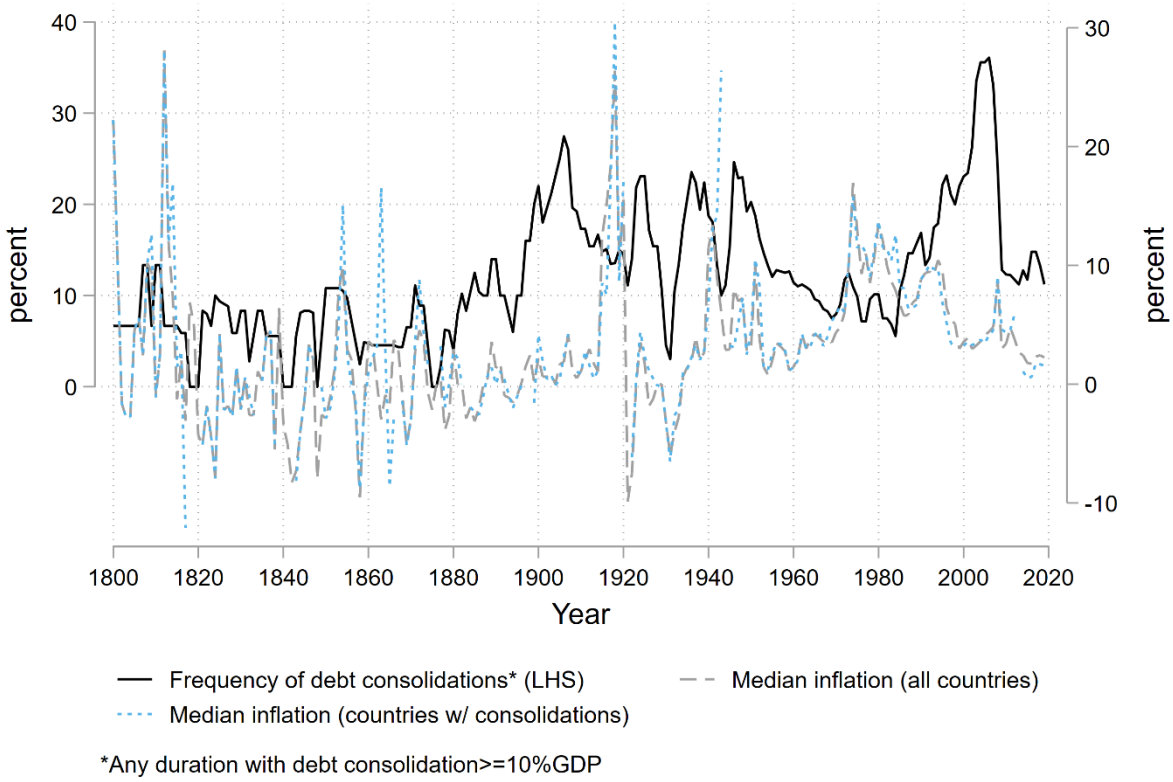

Figure 4: Debt Consolidations (Variant 6) and Inflation by Period

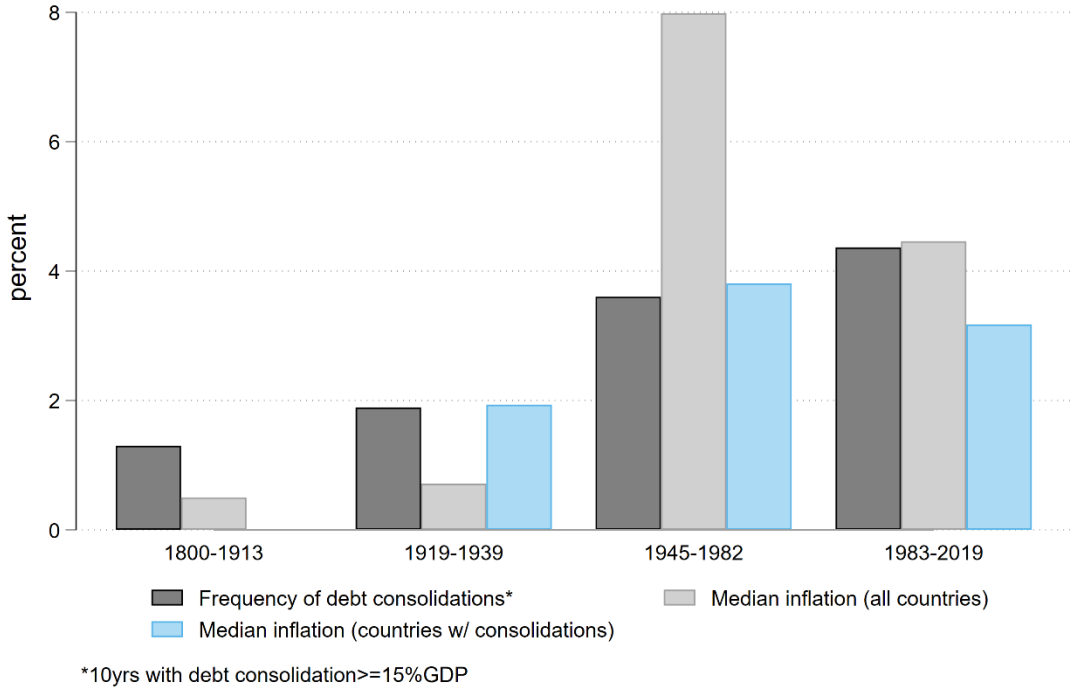

Figure 5: Debt Consolidations (Variant 1) and Inflation by Income Group, 1800-2019

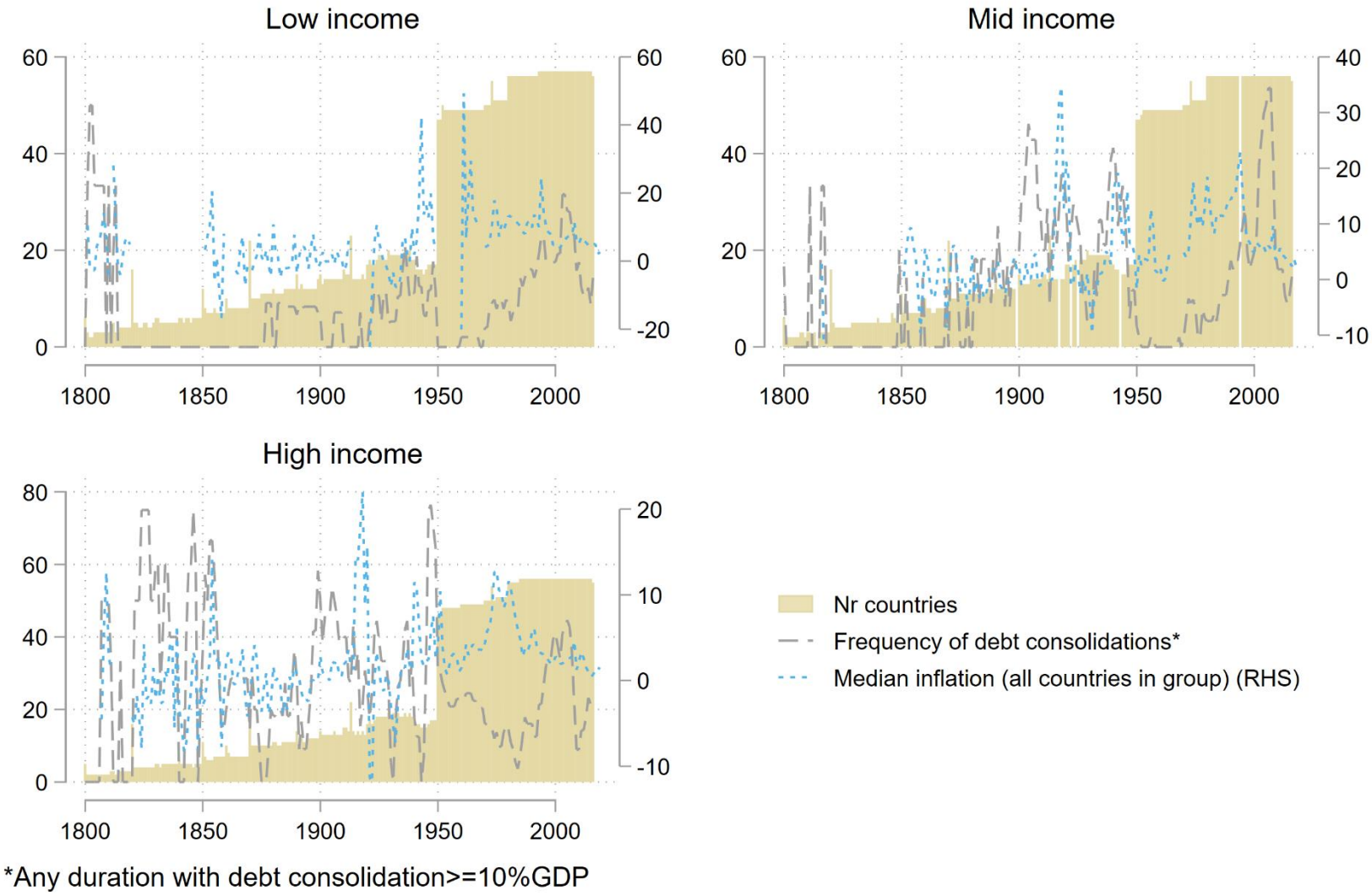

Figure 6: Frequency of Debt Consolidations (Variant 1) vs. Defaults and Debt Relief, 1800-2019

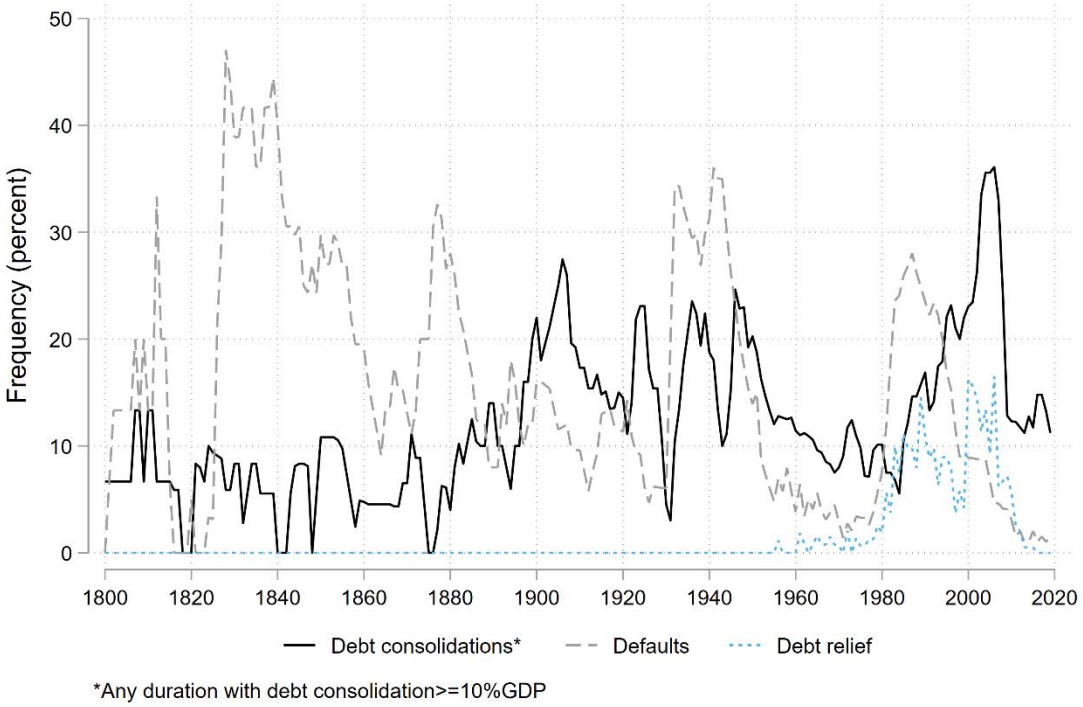

Figure 7: Frequency of Debt Consolidations (Variant 6) vs. Defaults and Debt Relief, 1800-2019

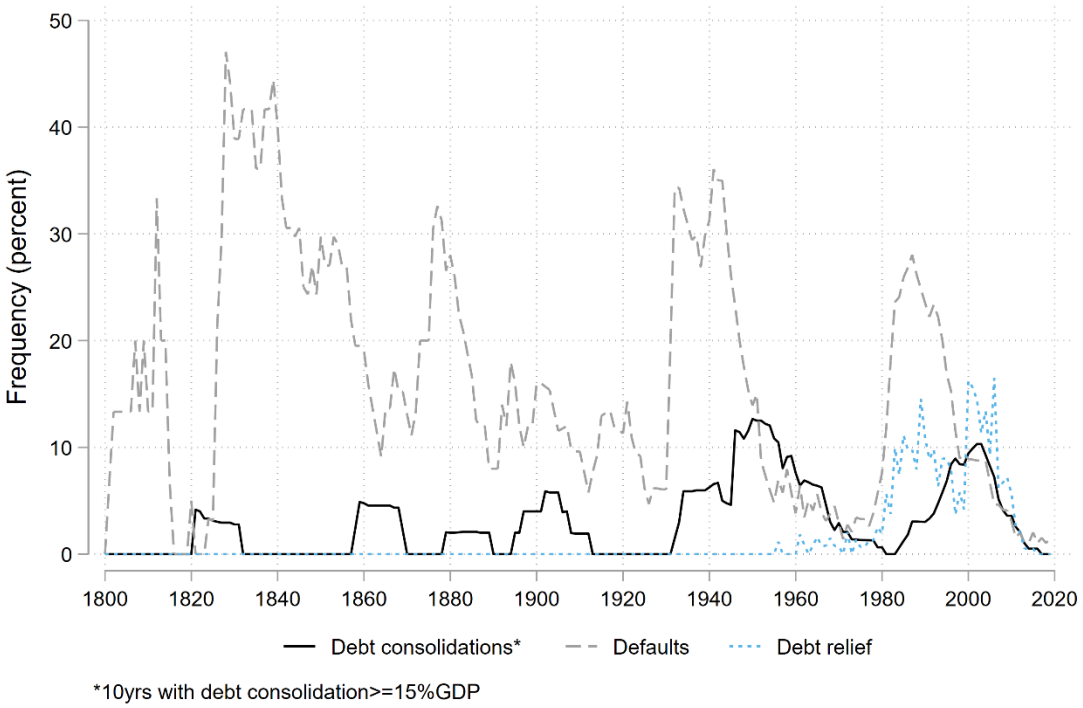

Figure 8: Debt Consolidation in the United States, 1947-56

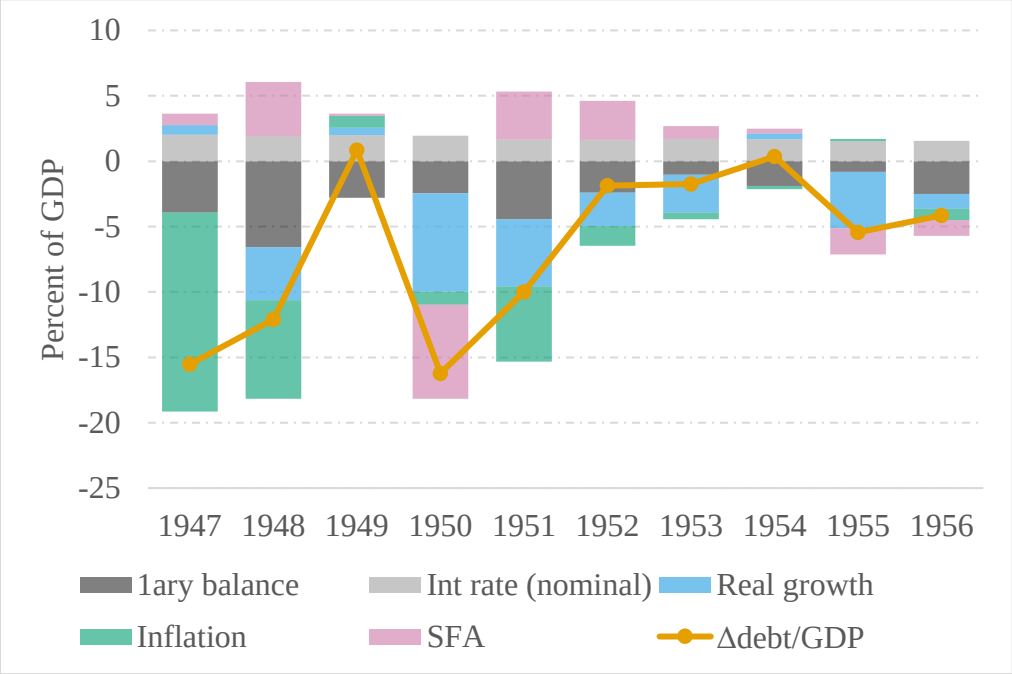

Figure 9: Debt Consolidation in France, 1947-56

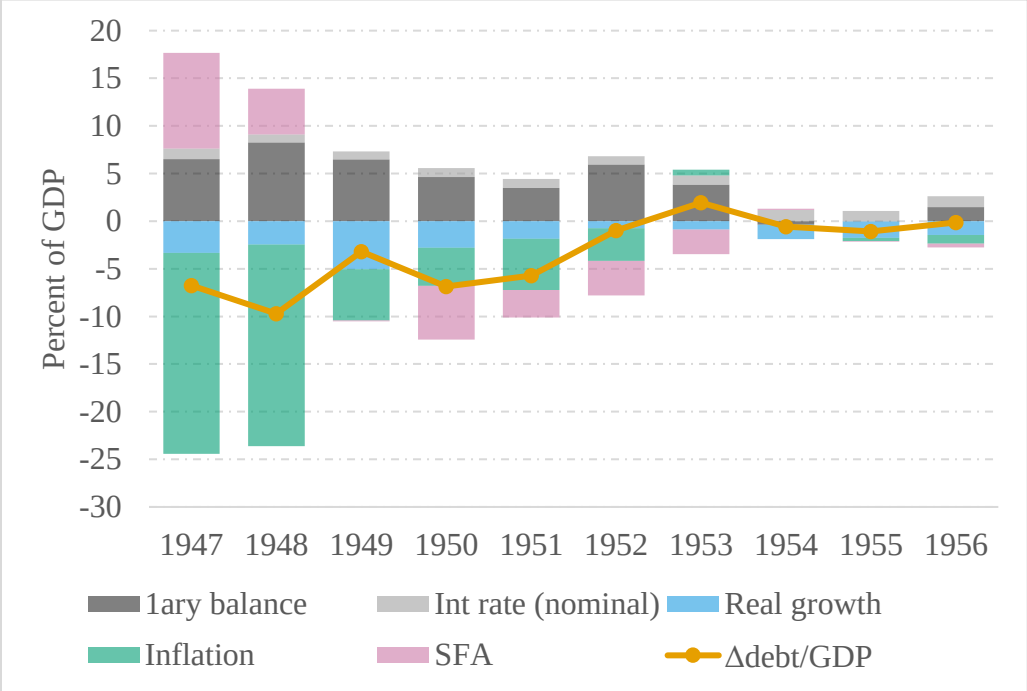

Figure 10: Debt Consolidation in Bulgaria, 1997-2006

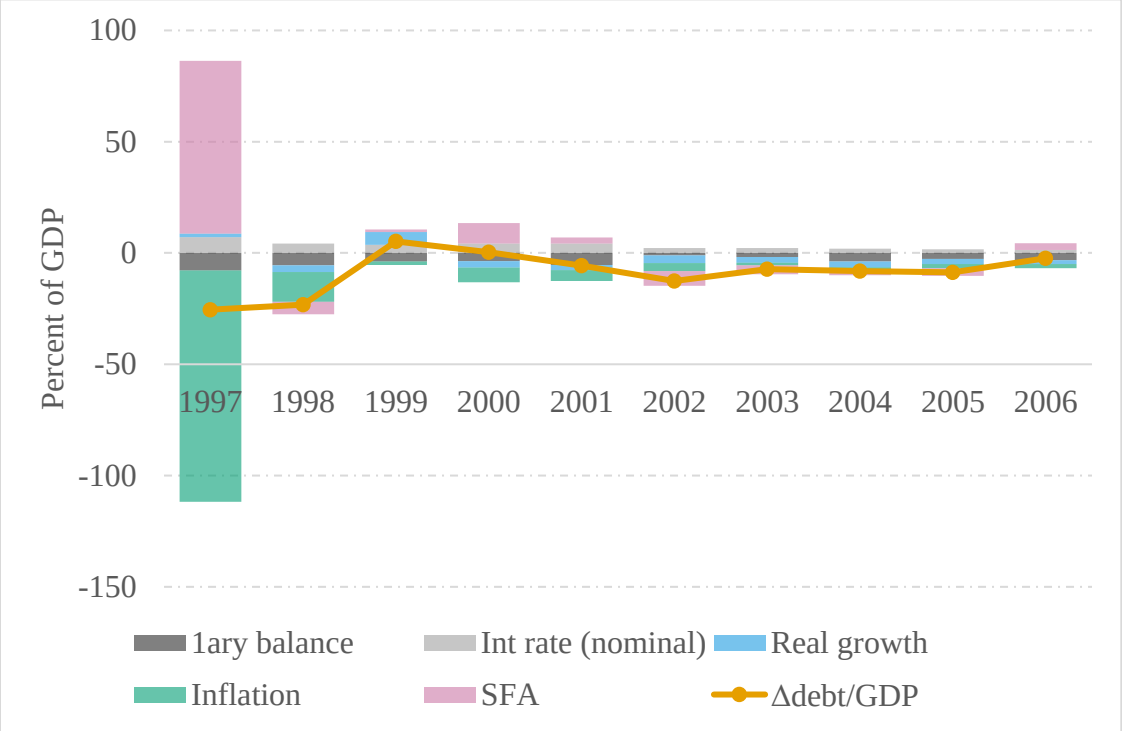

Figure 11: Debt Consolidation in Hungary, 1994-2001

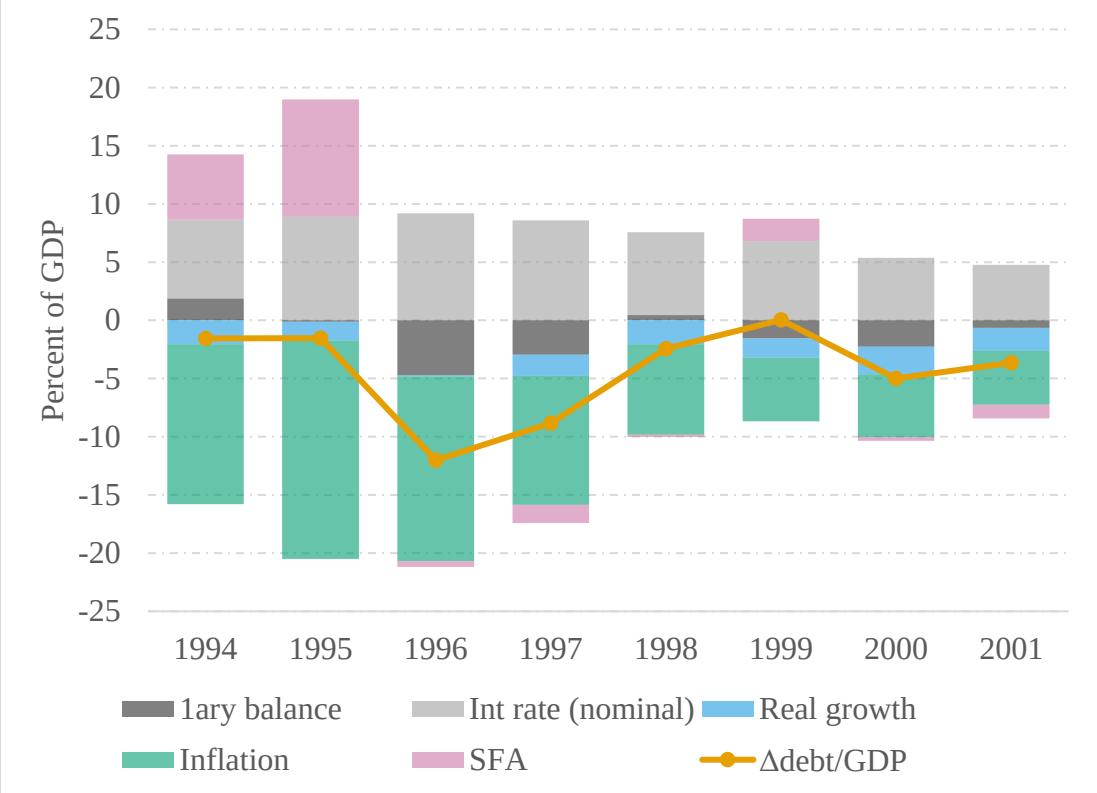

Figure 12: Debt Consolidation in Canada, 1896-1905

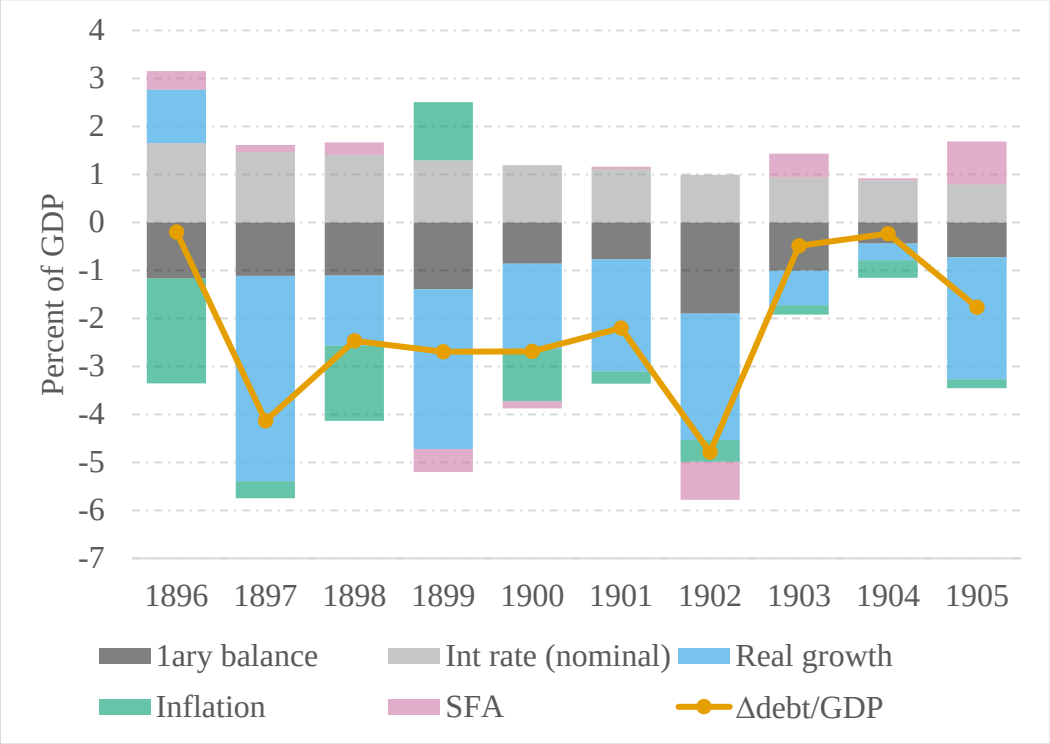

Figure 13: Debt Consolidation in Brazil, 1888-94

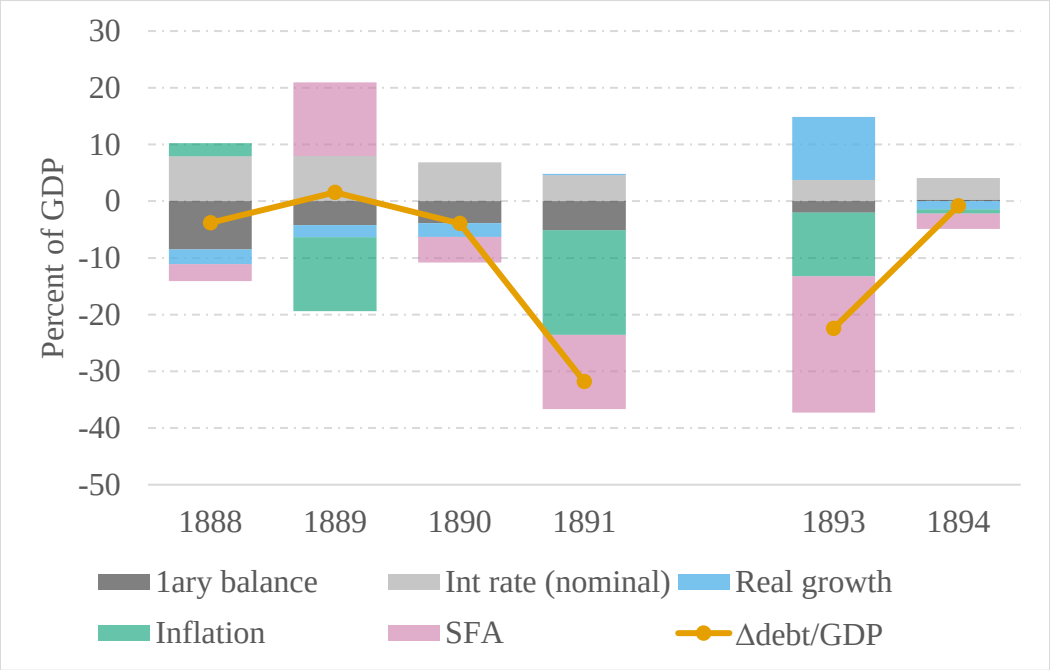

Figure 14: Debt Consolidation in the UK, 1859-68

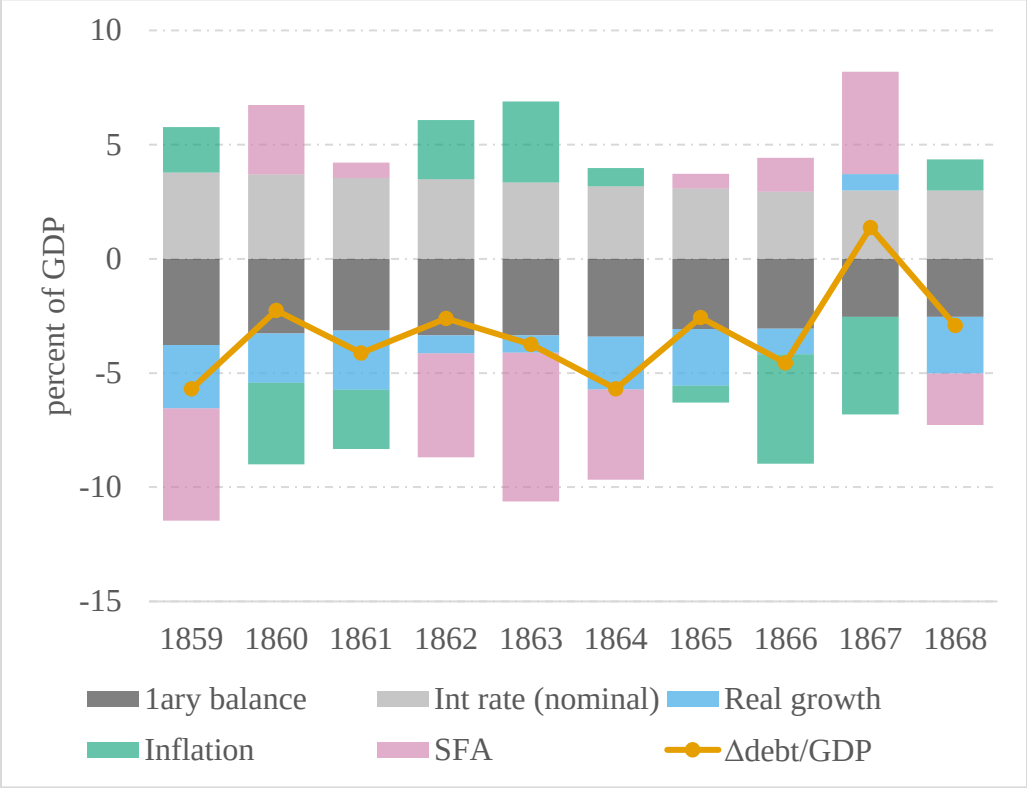

Figure 15: Debt Consolidation in the UK, 1947-56