

Up and Away? Inflation and Debt Consolidation in Historical Perspective

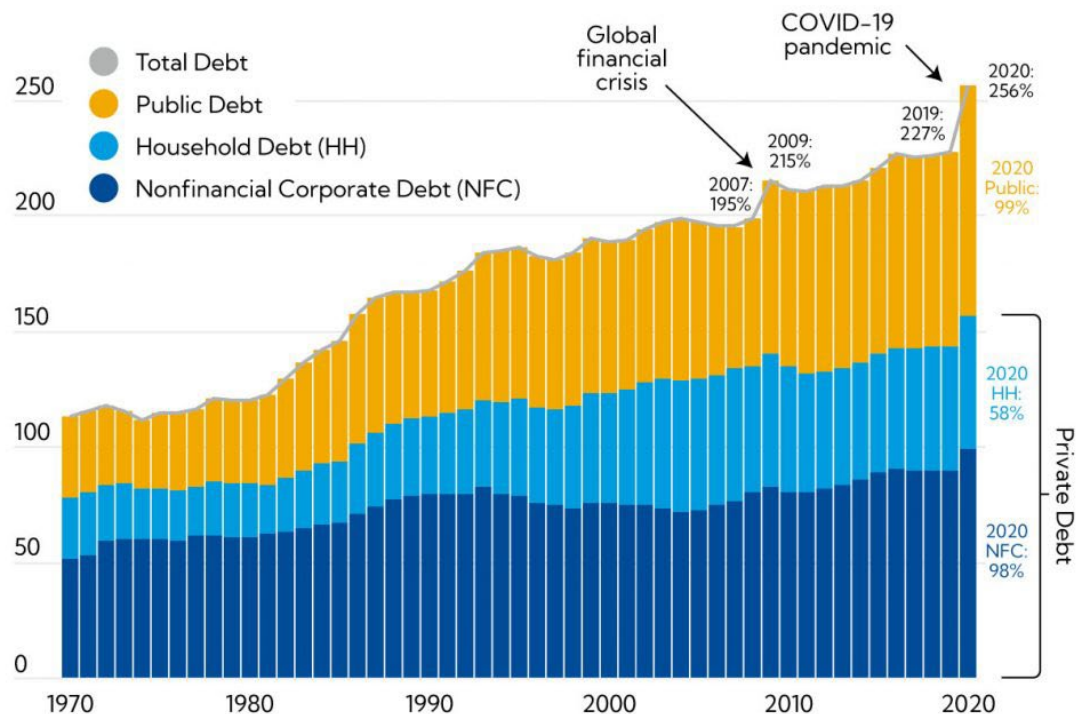
Barry Eichengreen and Rui Esteves

VIII Banco de España
Economic History Seminar
Madrid, 20 October 2022

Debt is at historic highs, and inflation is going up

Historic highs

In 2020, global debt experienced the largest surge in 50 years.
(debt as a percent of GDP)



Sources: IMF Global Debt Database and IMF staff calculations.
Note: The estimated ratios of global debt to GDP are weighted by each country's GDP in US dollars.

IMF



On the one hand we have...

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The Stabilizing Effect of Inflation

Oct 6, 2022 | DANIEL GROS

With inflation spiking and governments' debt ratios soaring, one might conclude that a financial crisis is imminent. But, with many governments' debts being inflated away and real interest rates still negative, that scenario remains unlikely today.

B RUSSELS – Central banks are busy tightening monetary policy as quickly as they can. Even the usually careful European Central Bank just increased its key interest rate by an unprecedented 75 basis points, matching an earlier move by the US Federal Reserve. Financial markets have reacted to these actions as one would expect, with stock markets and long-term-bond prices both tumbling. But none of this means that a financial crisis is imminent.

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Inflation and the Real Value of Debt: A Double-edged Sword

August 01, 2022

By [Christopher J. Neely](#)



Partly because of the effects of the COVID-19 pandemic, inflation and record deficit spending have been in the news lately. And as the first figure shows, the U.S. debt-to-GDP ratio is at unprecedented levels and the U.S. inflation rate is higher than it has been in decades. This blog post explains the relation between nominal debt and inflation, using government debt as an example.¹

While a surprising burst of inflation immediately reduces the real value of a borrower's debt burden—transferring wealth from lenders to borrowers—it is also likely to raise future borrowing costs because investors will then expect higher inflation and demand higher nominal yields on debt to compensate them for the expected loss of purchasing power and the associated uncertainty.

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Inflation Eases Global Public Debt, but Risks Remain

By TOM FAIRLESS

Rampant inflation is helping reduce the weight of the world's public debt relative to its economic output, a boon for governments that economists warn could easily backfire if inflation stays unchecked.

Some highly indebted European countries—including Greece, Portugal and the U.K.—are on track to erase the additional debt raised to combat the Covid-19 pandemic as a share of gross domestic product over the next year or two, taking their debt-to-GDP ratios below 2019 levels, according to data from the International Monetary Fund.

The reason is that inflation, coupled with brisk economic growth, is turbocharging economic output measured in dollars, euros or pounds. While government borrowing costs are also rising, they remain relatively low, meaning public debt as a share of GDP—the main yardstick by which economists measure the sustainability of a country's public debt—is falling in many places.

In the U.S., public debt declined to about 123% of GDP at the end of last year from 136%

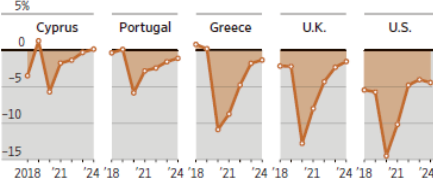
points lower as a share of GDP next year than the IMF had forecast in October 2020, the data show.

"Unexpected inflation, combined with low nominal rates, does wonders for debt dynamics," said Olivier Blanchard, a former IMF chief economist and now senior fellow at the Peterson Institute for International Economics in Washington. "But the policy lesson should not be to rely on that mechanism." Mr. Blanchard was prominent among economists arguing before the pandemic that governments could handle higher debt loads.

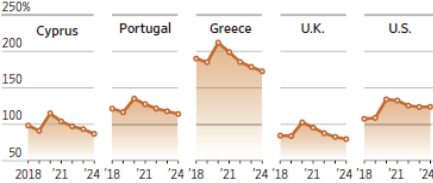
It is historically rare for bouts of higher inflation to help reduce public debt relative to output. Bondholders who fund governments' borrowing normally demand higher interest rates to compensate for rising prices, which adds to the debt burden. The U.S. inflated away public debt after World War II and in the 1970s. Other governments have failed to do so, often triggering spirals of rising interest rates and hyperinflation.

In a 2014 paper, Ricardo Reis, a professor at the London School of Economics, and

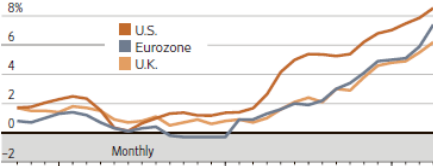
Government budget deficit as a percentage of GDP*



Gross public debt as a percentage of GDP*



Inflation, annual rate



investors might start to demand much higher interest rates. Such an increased servicing cost could in turn raise the debt burden on governments.

"It is true that inflation surprises contribute to lower debt ratios, but in a regime of permanently high and volatile inflation, the attractiveness of sovereign bonds is undermined, making it harder to sustain elevated levels of debt," Vitor Gaspar, director of the IMF's fiscal affairs department, wrote recently in its fiscal monitor.

Meanwhile, the demands on the public purse are rising after a succession of geopolitical shocks including Russia's war in Ukraine and as governments invest heavily in the shift toward cleaner energy and digital technology. Advanced economies are expected to increase annual public investment by 0.5 percentage point of GDP in the medium term relative to prepandemic forecasts, the IMF said in April.

For now, though, governments are reaping the benefits of high inflation.

Last year higher-than-expected inflation reduced public debt-to-GDP ratios by 1.8

185% of GDP this year, down from 212% of GDP in 2020, according to IMF data.

The decrease reflects the difference between Greece's high nominal growth rate and low borrowing costs as a result of its bailout during the eurozone debt crisis, said Yannis Stourmaras, a European Central Bank policy maker and governor of Greece's central bank.

For Cyprus and Portugal, which also received international bailouts during Europe's debt crisis, the story is similar.

In Portugal, government debt is expected to fall comfortably below its 2019 level as a share of GDP by 2024, according to IMF data. Cyprus's public debt is expected to decline to 87% of GDP in 2024, which would be the lowest level since 2012, the year before the nation's international bailout.

In the U.K., government debt is expected to drop to about 83% of GDP next year, below the 2019 level and down from a peak of 103% of GDP in 2020, according to the IMF.

A spokesperson said the U.K. government is committed to reducing public debt in the midst of rising interest rates and recently unveiled tighter

Europe's wrong-type-of-inflation problem

Italy ...



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14

A handy thing about inflation is that it improves government finances, though not reliably. Deflating public debt with higher prices only works when it's the right type of inflation, and that's not what Europe has got.

Wall Street Journal, May 1st 2022

Finance & economics | When maturity misleads

How higher interest rates will squeeze government budgets

Rising borrowing costs will hit taxpayers sooner than you think

The Economist, July 16th 2022

Our aims and preview of results

- Create a consistent dataset of debt consolidations over 220 years (1800-2019) and 183 nations
 - Many cases of successful debt consolidations over history underappreciated, compared to extensive literature on sovereign default
- Develop a framework for decomposing episodes of debt consolidation into the contributions of fiscal effort, economic growth, interest rates *and inflation*

Findings

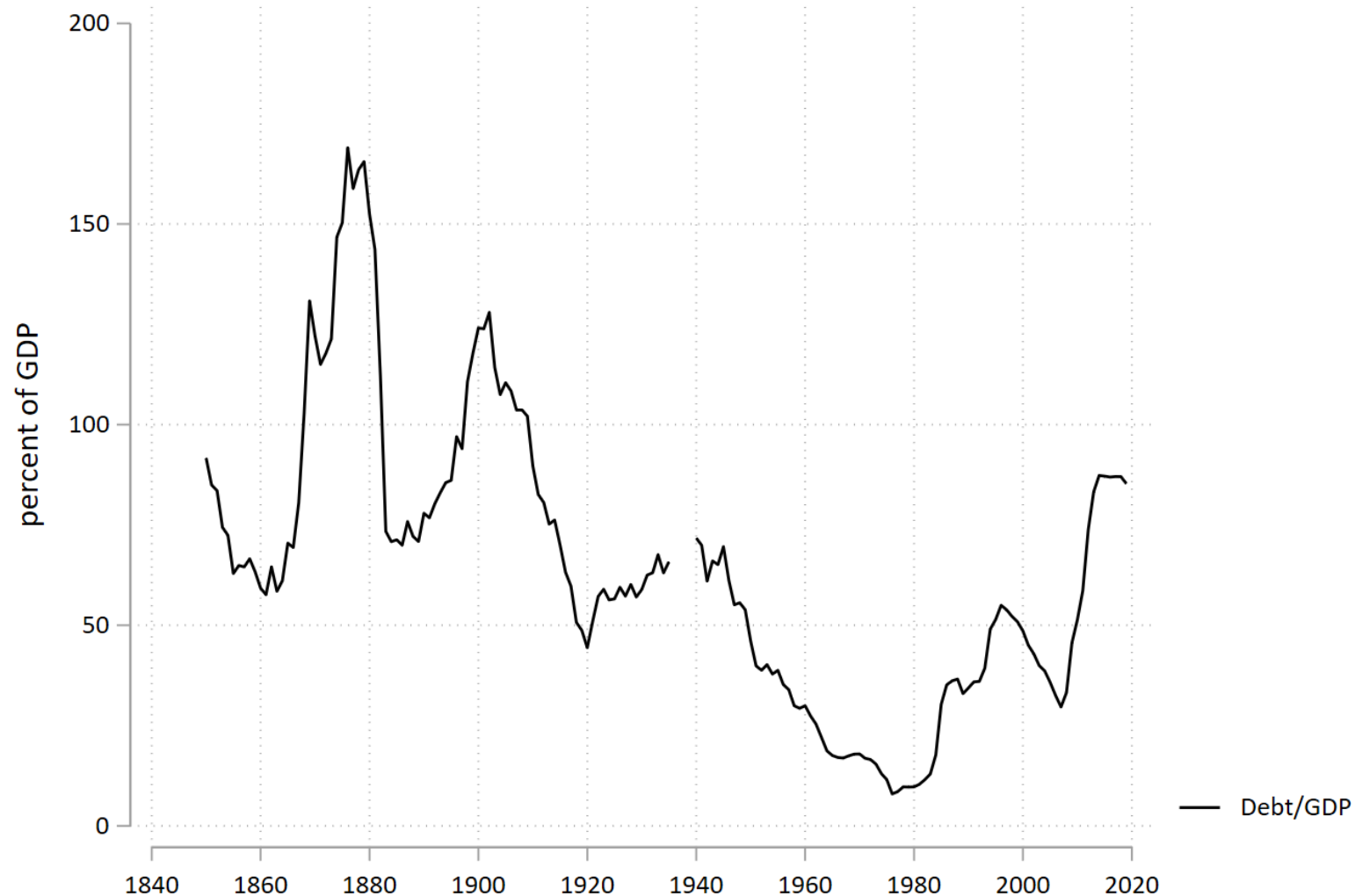
- Consolidations *are* more frequent in periods of rising prices
- But *not* during runaway inflations (World Wars and the 1970s) – more is not necessarily better, in other words.
 - A debt-consolidation/inflation “Laffer curve”?
- More important is the association between debt consolidations, macro stability and policy credibility

First task is to define/classify debt consolidation
(Obviously, no single definition will do – we look at 6)

Table 2: Six Variants of Debt Consolidation

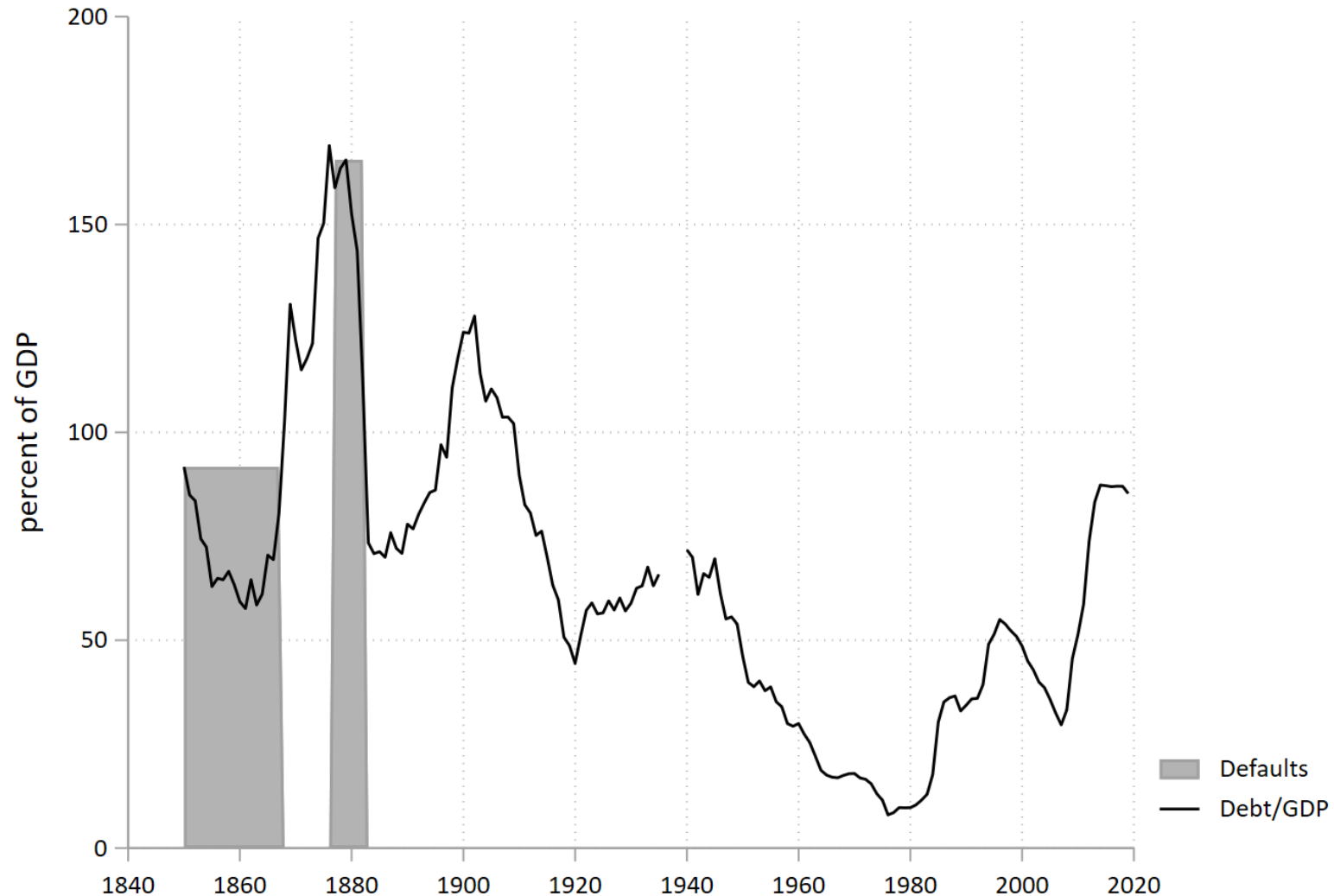
Variant	Definition
1	Any duration, at least 10 percent GDP
2	5 years, at least 15 percent GDP
3	8 years, at least 20 percent GDP
4	10 years, at least 25 percent GDP
5	10 years, at least 10 percent GDP
6	10 years, at least 15 percent GDP

Applying these definitions to Spanish Debt/GDP, 1850-2019

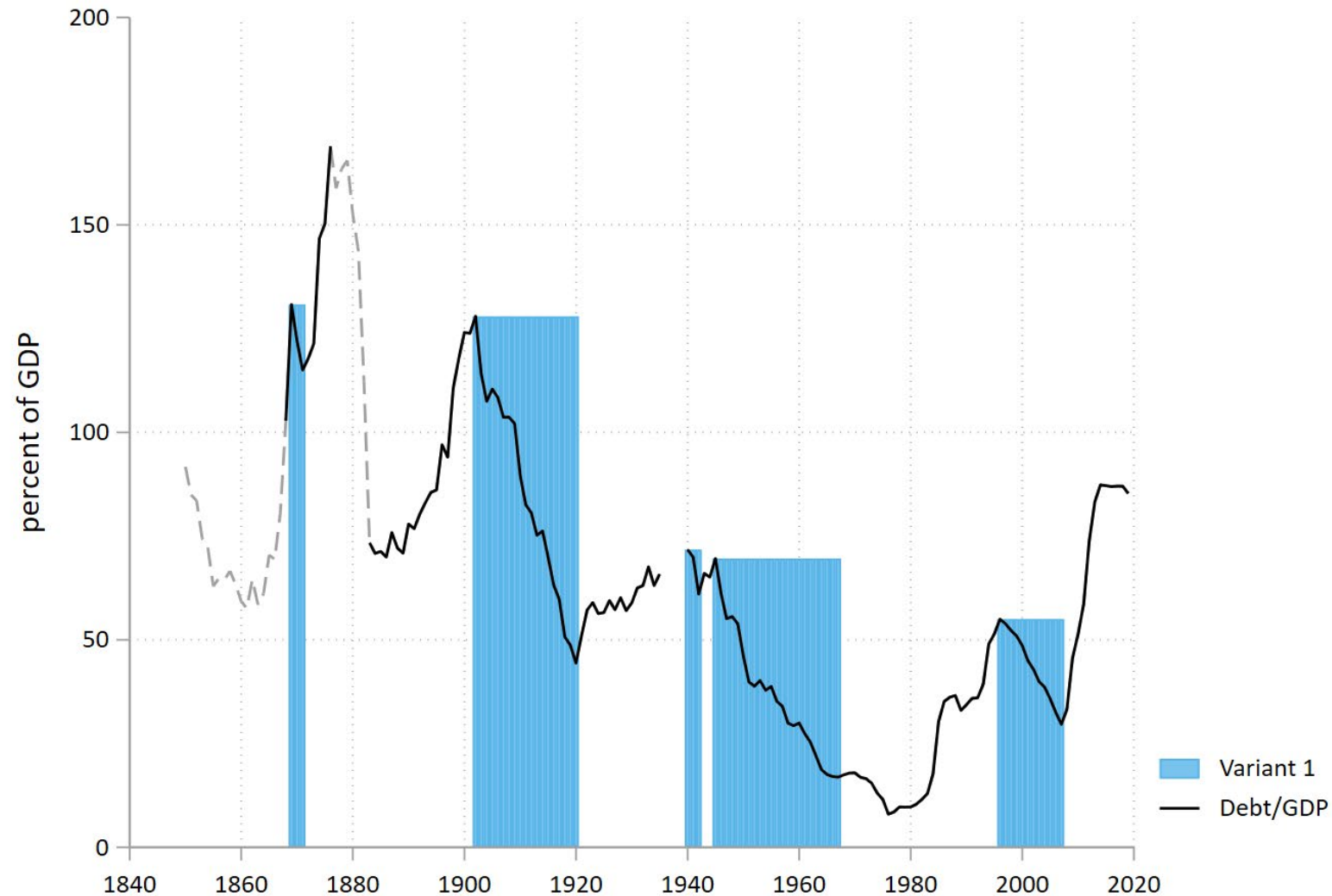


Spanish Debt/GDP, 1850-2019

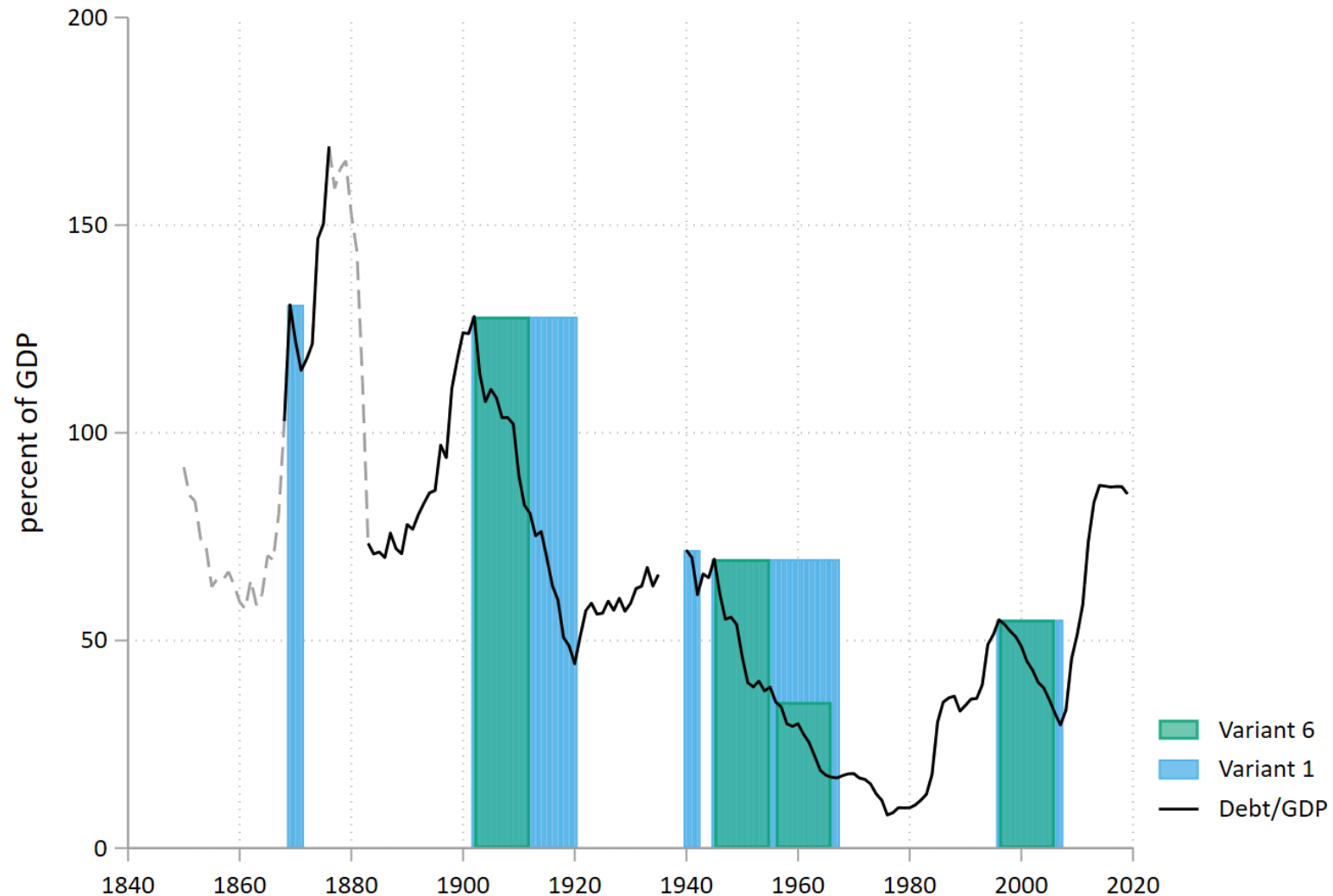
(Here are the defaults)



Spanish Debt/GDP, 1850-2019, Variant 1 (5/10)



Spanish Debt/GDP, 1850-2019, Variant 6 (10/15)



Spanish Debt/GDP, 1850-2019 (various)

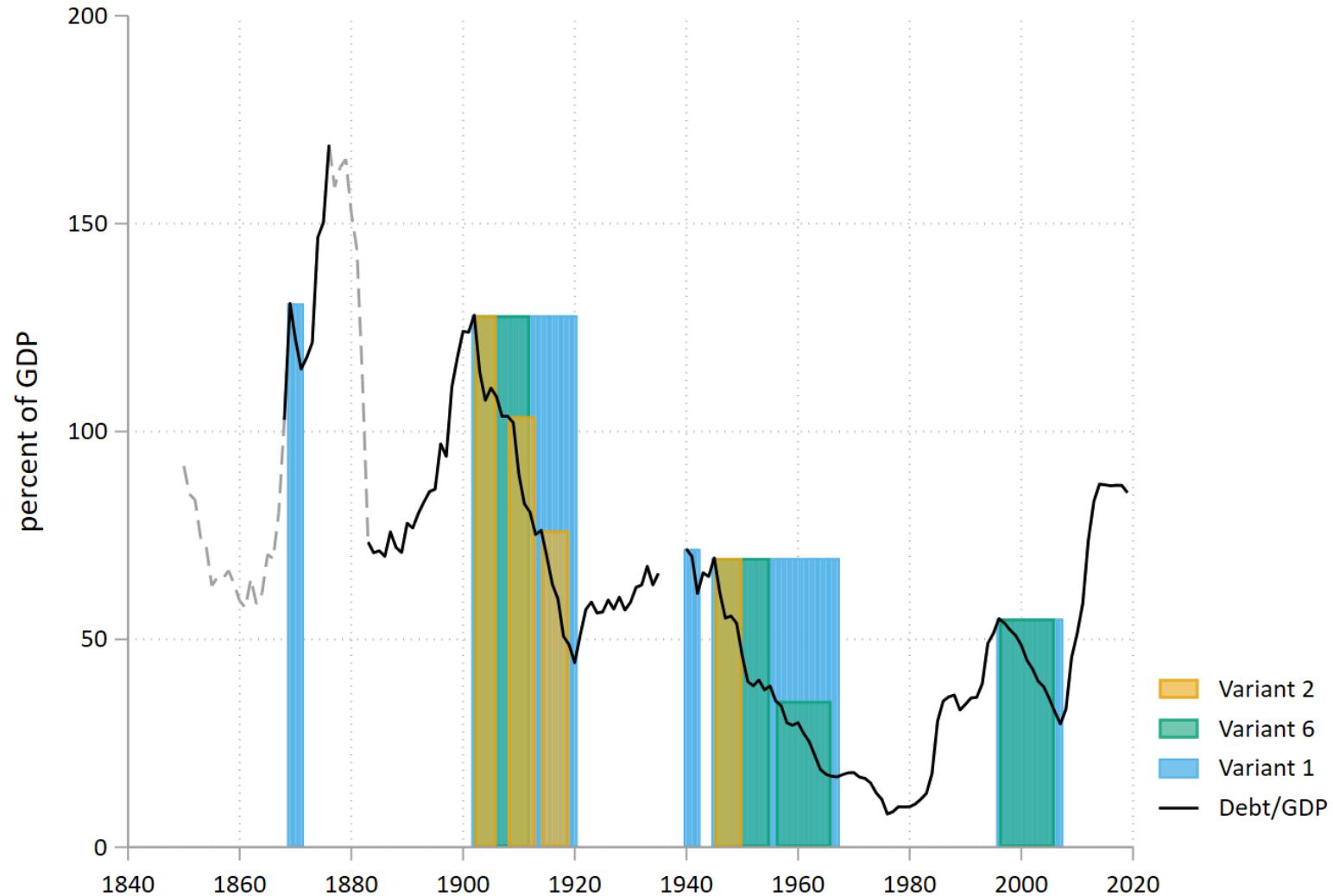
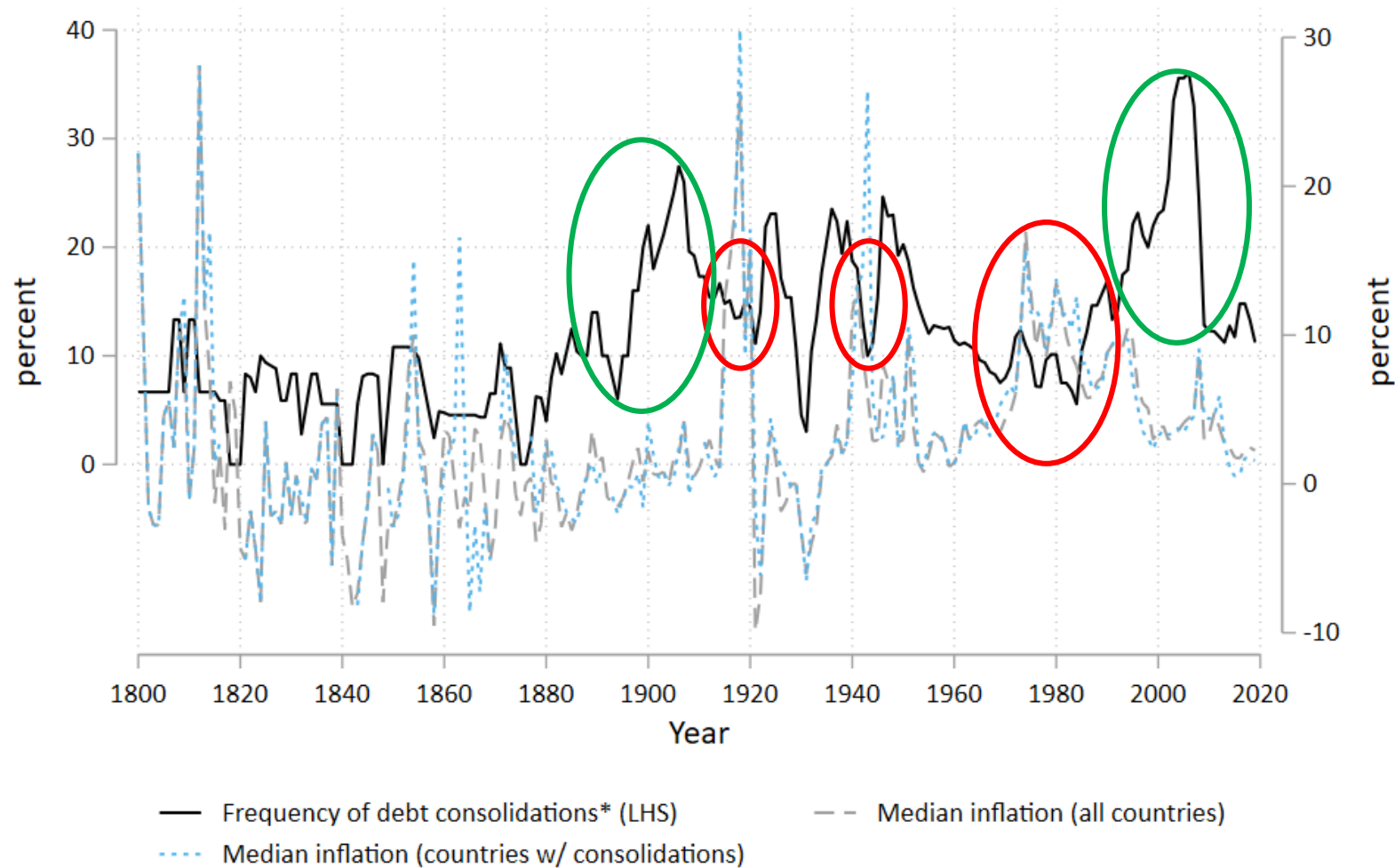


Table 3: Summary Statistics of Debt Consolidations, Alternative Variants, 1800-2019

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

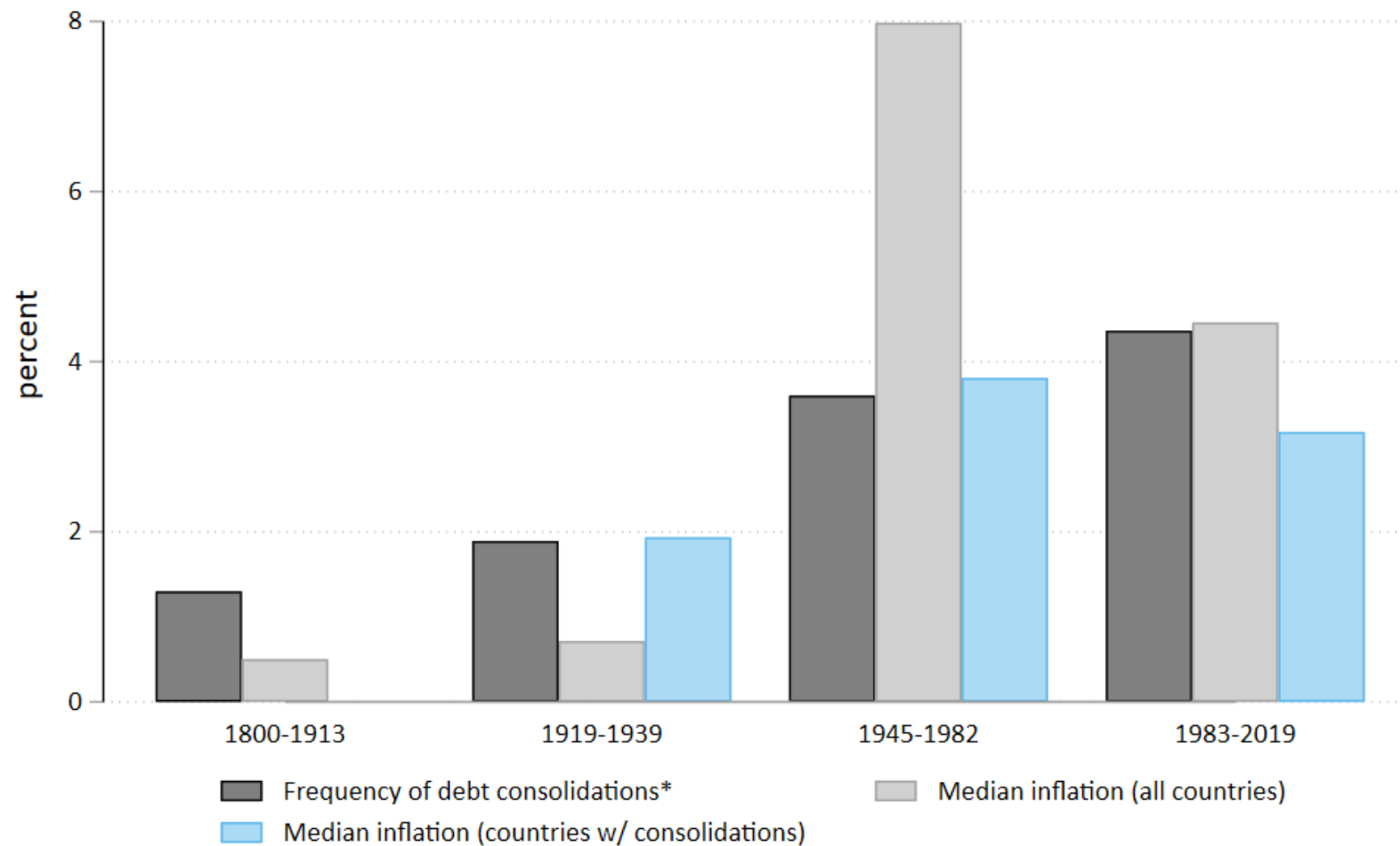
Note: the sum of episodes per period does not add up to the total number of episodes because of debt consolidations occurring during the two World Wars (1914-19 and 1939-45).

378 debt consolidations (Variant 1, big & small)



*Any duration with debt consolidation $\geq 10\%$ GDP

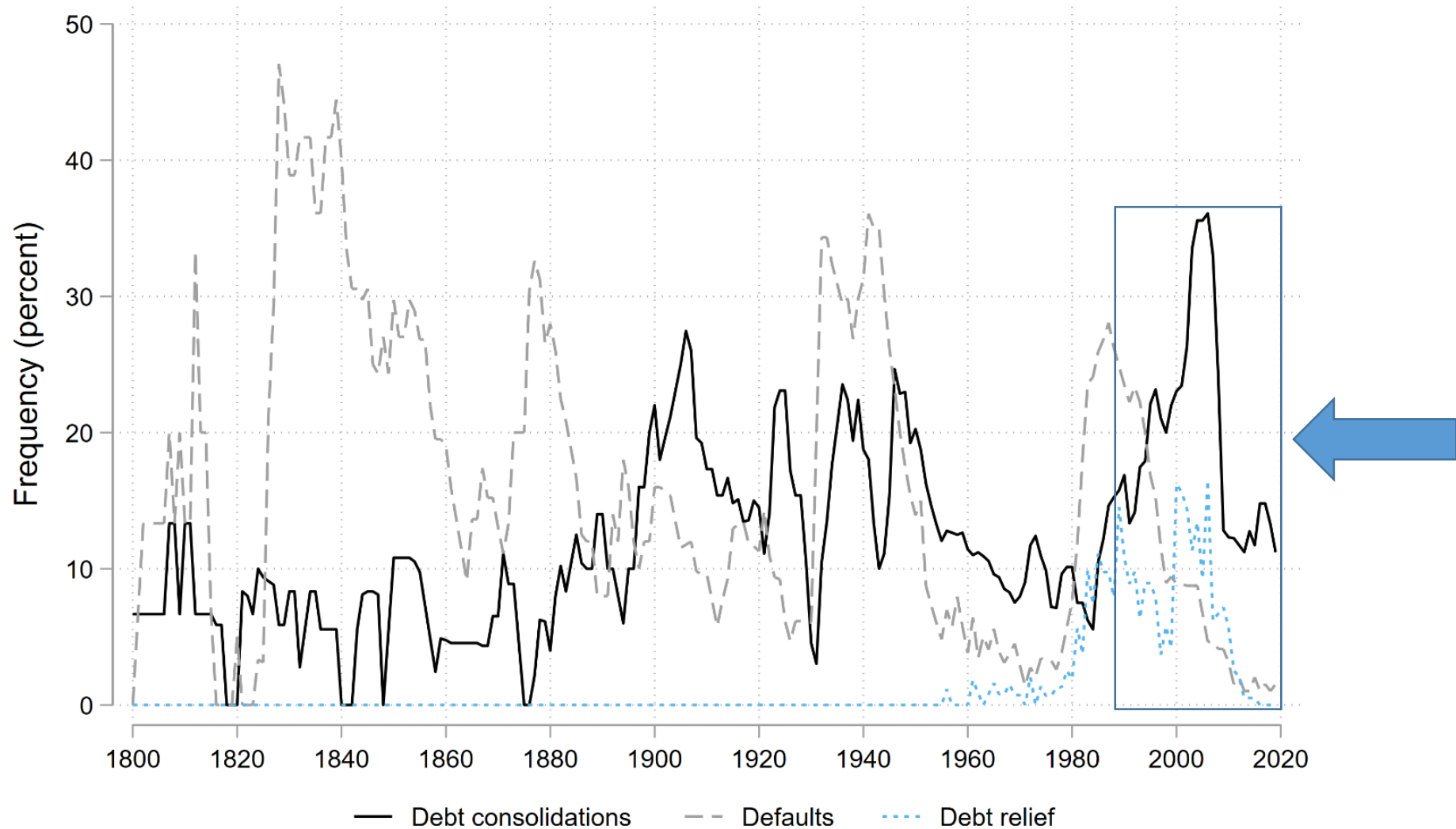
No obvious relation with inflation (Variant 6)



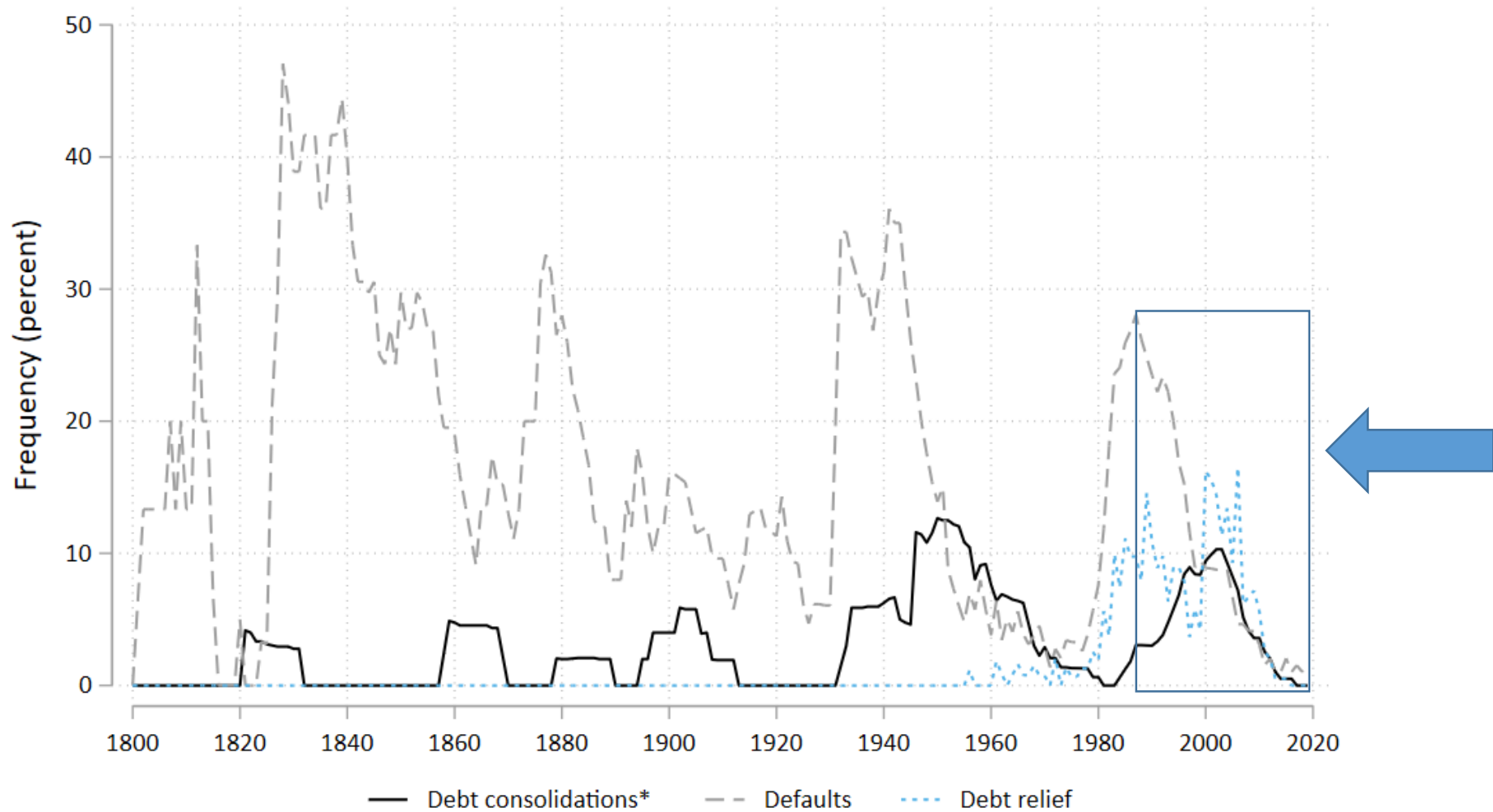
*10yrs with debt consolidation \geq 15%GDP

A 'Great Consolidation' (Variant 1)

(All country groupings/all lines – this name and period may come as a surprise!)



Same: Variant 6



*10yrs with debt consolidation $\geq 15\%$ GDP

- Over to Rui...

Hamlet without the Prince: the role of inflation

- IMF-approved decomposition (Abbas et al. 2011):

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

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

$$\Delta b = d + (i - \gamma)b_{t-1} + sfa$$

- Very restrictive assumptions:
 - 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

Rollover and relevant inflation measures

$$\Delta b = d + \phi(r - g)b + (1 - \phi)(i - \pi - g)b + sfa$$

- Where ϕ is the fraction of the debt stock refunded each period (making $1/\phi$ the average maturity)

$$\Delta b = d + (r + \pi_{CPI} - \pi_Y - g)b + sfa$$

Our approach

- Simplify, by taking i directly from budgetary figures
 - No need for assumptions about rollover or inflation expectations (hard to observe in practice)
- Derive a new decomposition that isolates the contribution of inflation:

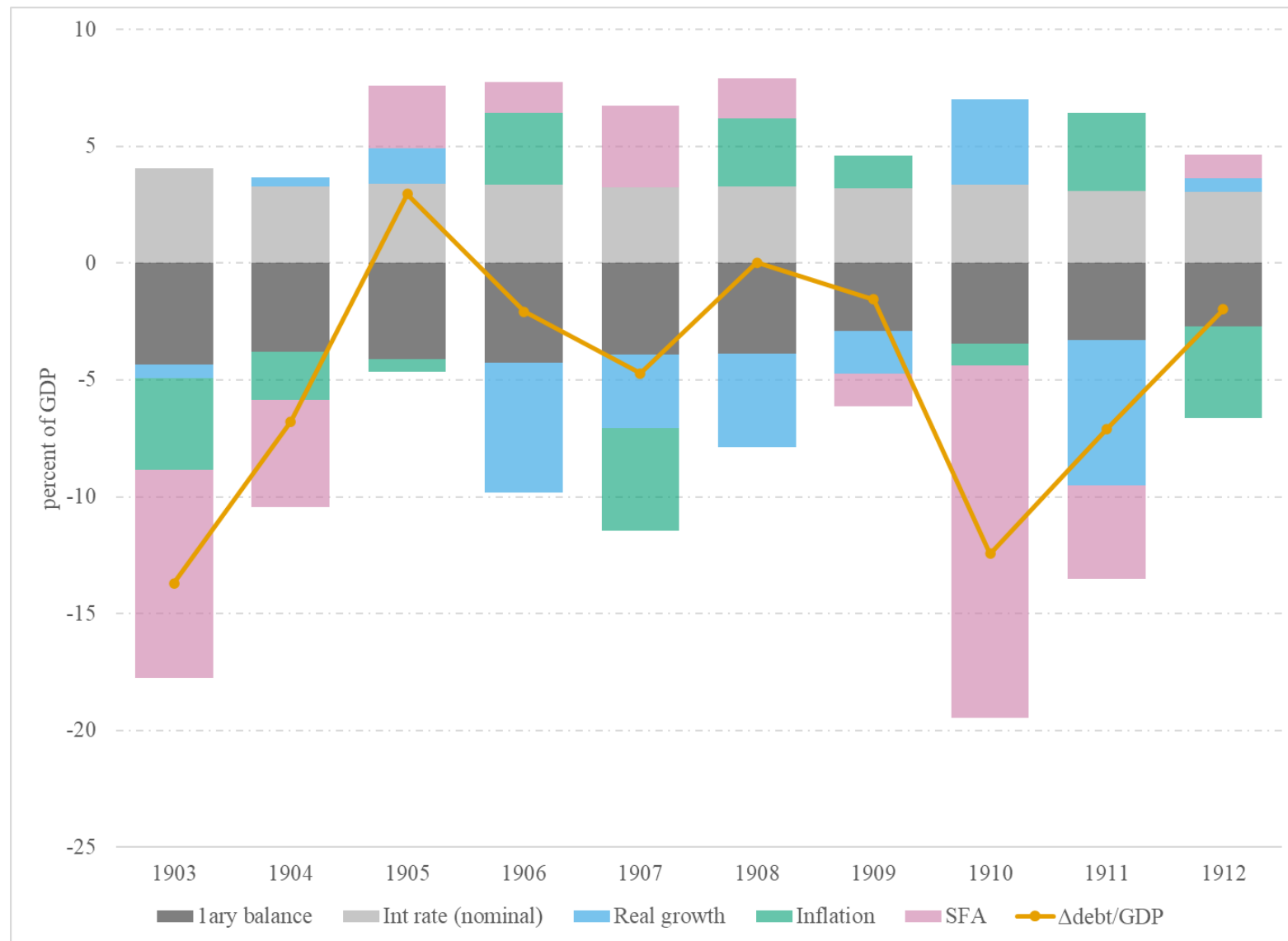
$$\Delta b_t = d_t + \frac{i_t}{1 + \gamma_t} b_{t-1} - \frac{g_t}{1 + \gamma_t} b_{t-1} - \frac{\pi_t}{1 + \pi_t} b_{t-1} + sfa_t$$

- This is an *exact* decomposition (others previously have used approximations)

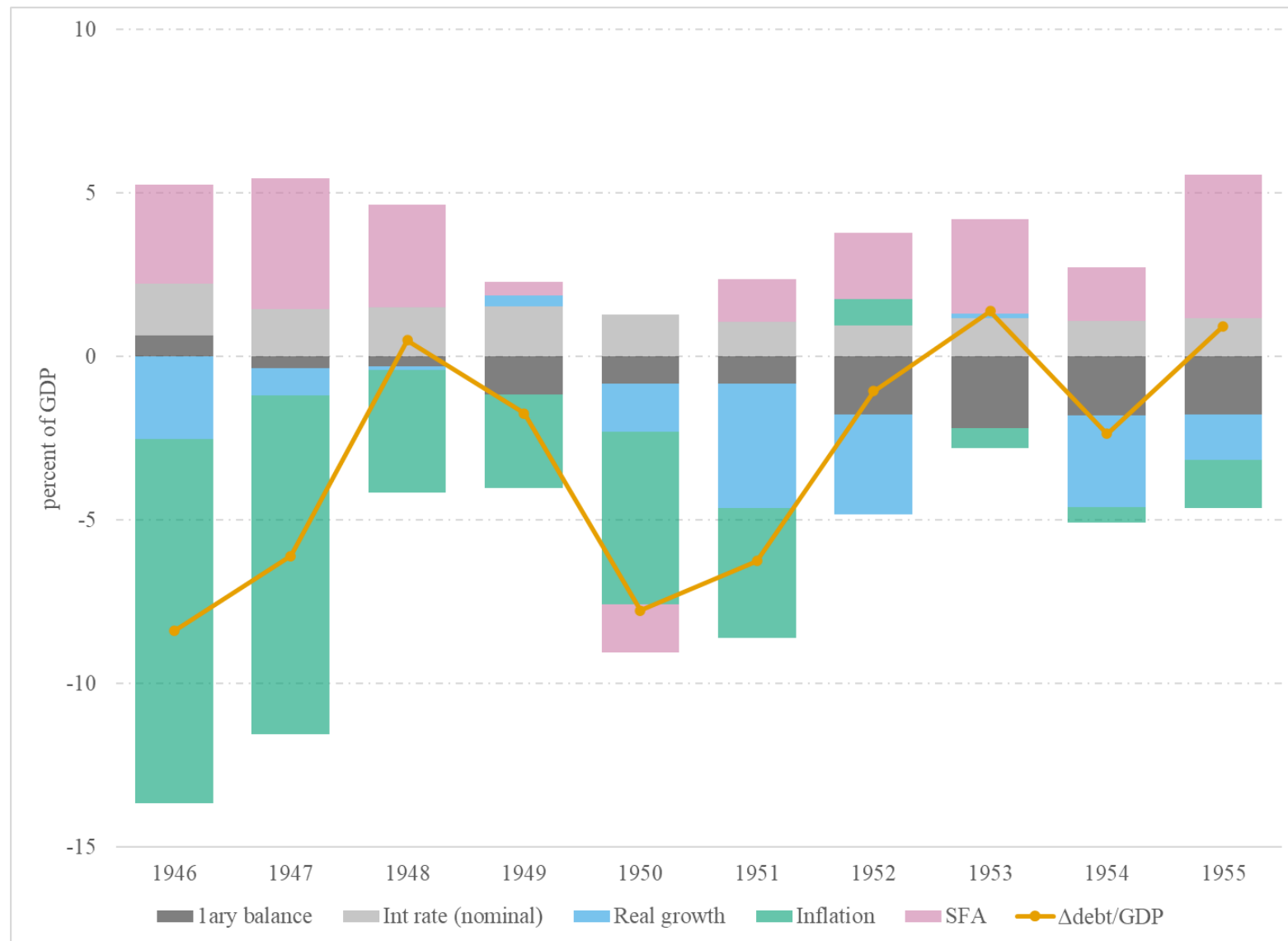
Table 4: Total Number of Debt Consolidation Episodes, 1800-2019

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

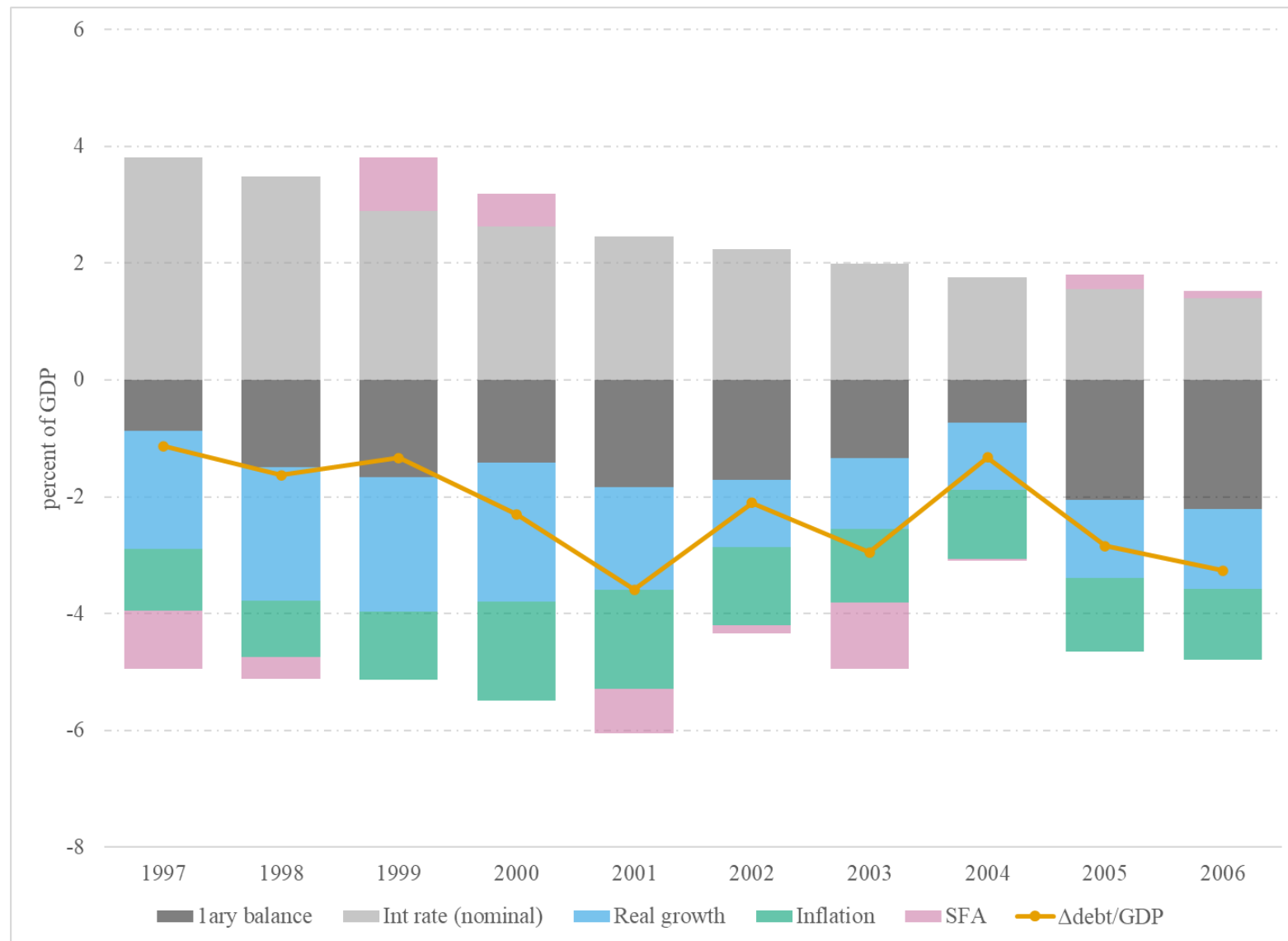
Country	Start	End	Δ Debt (% GDP)	lary balance	Int. rate (nominal)	Real growth	Inflation	SFA
Spain	1902	1912	-47.4	77.4	-70.4	32.1	10.7	50.3



Country	Start	End	Δ Debt (% GDP)	lary balance	Int. rate (nominal)	Real growth	Inflation	SFA
Spain	1945	1955	-30.8	33.6	-41.5	50.4	126.9	-69.3



Country	Start	End	Δ Debt (% GDP)	lary balance	Int. rate (nominal)	Real growth	Inflation	SFA
Spain	1996	2006	-22.5	68.3	-107.8	75.5	57.1	6.9



Three Spanish consolidations

- First consolidation episode after Fernández Villaverde 1900 debt restructuring
 - Mostly driven by primary fiscal surpluses (thanks to tax increases) with limited role for inflation (consolidation of floating debt to Banco de España, 1903 attempt to adopt the gold standard)
 - Also some contribution from real growth after 1905 and from some operations below the line (forced conversion of foreign debt held by residents into domestic and the conversion of other debts into 4% domestic perpetual bonds)
- Second episode accounted for by inflationary tax (fiscal dominance over monetary policy)
 - Enabled by financial repression: purchase of public debt by state-owned banks; regulation requiring commercial and savings banks to hold public debt and tax incentives for individuals to buy bonds
 - Contrarian effect from SFA: large issuance of debt outside government budget (“deuda finalista”, “cédulas para inversiones”)
- Third episode mostly explained by fiscal effort and real growth (pre-GFC), though steady, moderate inflation also helped

Inflation contribution for 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

Inflation vs. nominal interest rates

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

- Back to Barry...

In paper: 4 paired case studies

- Prewar: Brazil 1888-94 vs. Canada 1896-1905 (“the odd couple”)
 - We find only a small handful of large, extended debt consolidations (at least 15ppts over 10 or more years) prior to WWI. These are two of them.
 - Canada reduced its debt/GDP ratio from 44% to 24% mainly by running primary surpluses (which were responsible for half of debt consolidation) and growing its economy (which expanded robustly from 1897).
 - Only a modest contribution from inflation (as price levels rose worldwide).
 - Brazil was off the gold standard for much of the period, and the banks were instructed to increase the money supply, partly to enable the government to compensate former slaveholders (slavery abolished in 1888).
 - Inflation contributed, but its contribution was offset by interest rates.
 - In addition, strong economic growth, reflecting rising commodity prices on global markets helped.
 - Also, debt conversions in inter alia 1889, which converted 5%s into 4%s, and bank regulation forcing banks to back their note issuance with 2% bonds (instead of the previous 5%s)..

Real growth in Canada, restructuring in Brazil

Figure 12: Debt Consolidation in Canada, 1896-1905

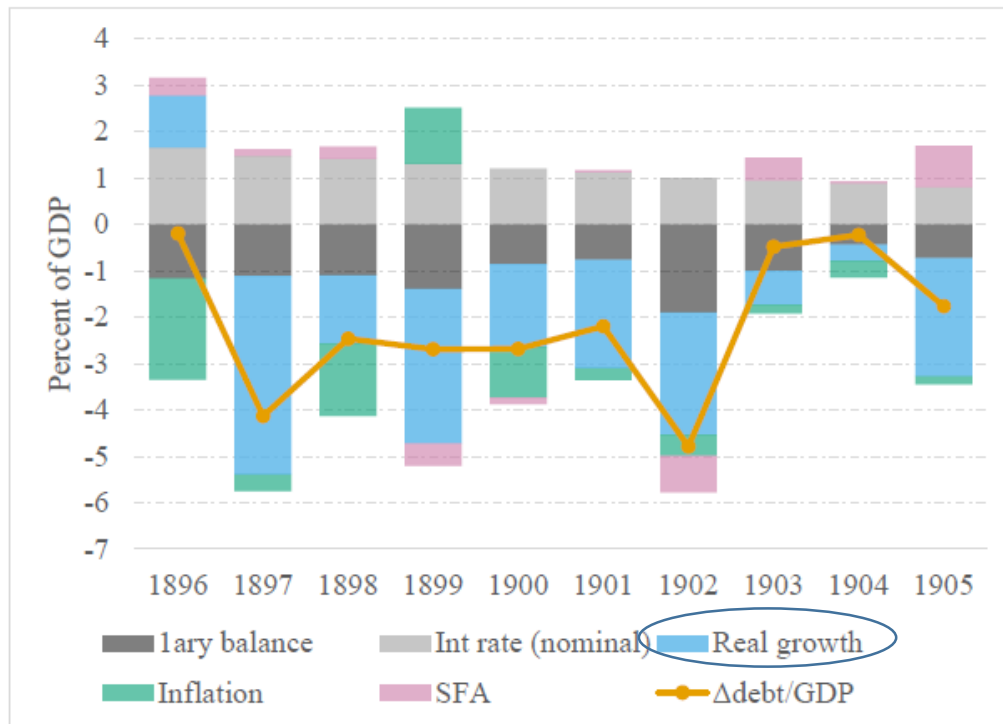
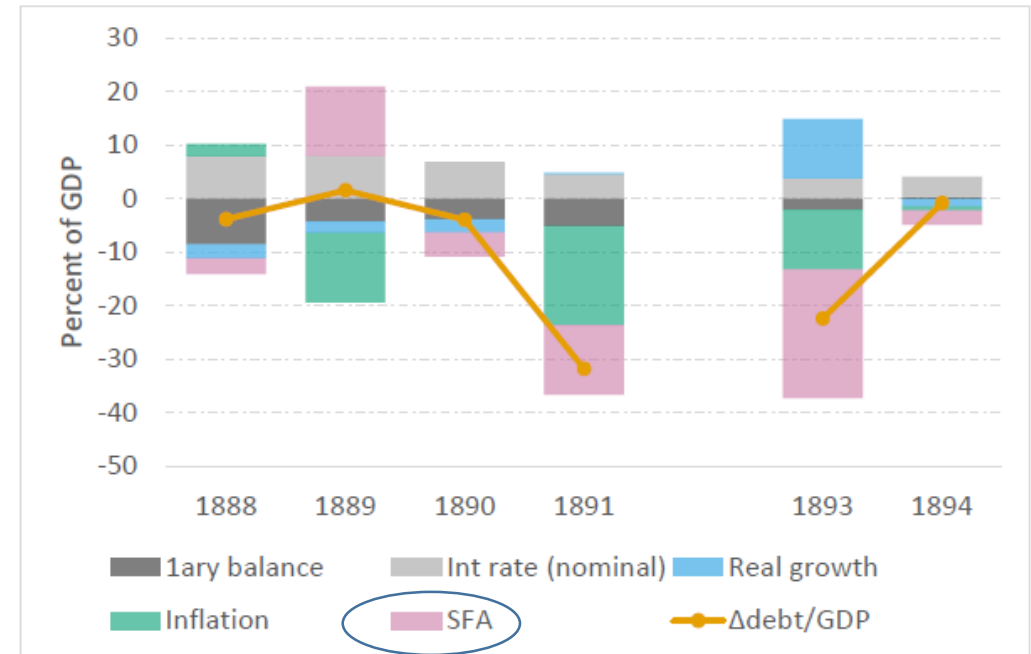


Figure 13: Debt Consolidation in Brazil, 1888-94



In paper: 4 paired case studies

- Postwar: US vs France 1947-56
 - US financial historians often point to inflation and financial repression (Treasury-Fed Accord, Reg Q) as having been important.
 - We show that primary budget surpluses in fact accounted for 40% of the observed consolidation, real growth for another 40%.
 - French case is contrasting; budget deficits rather than surpluses (Vietnam etc.). But growth in this period of postwar reconstruction was even faster than in the US, allowing it to contribute to consolidation.
 - Inflation was high in the late 1940s, so there was some role for it as well, mainly at the outset of the period.

Growth & surpluses in US, inflation in France

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

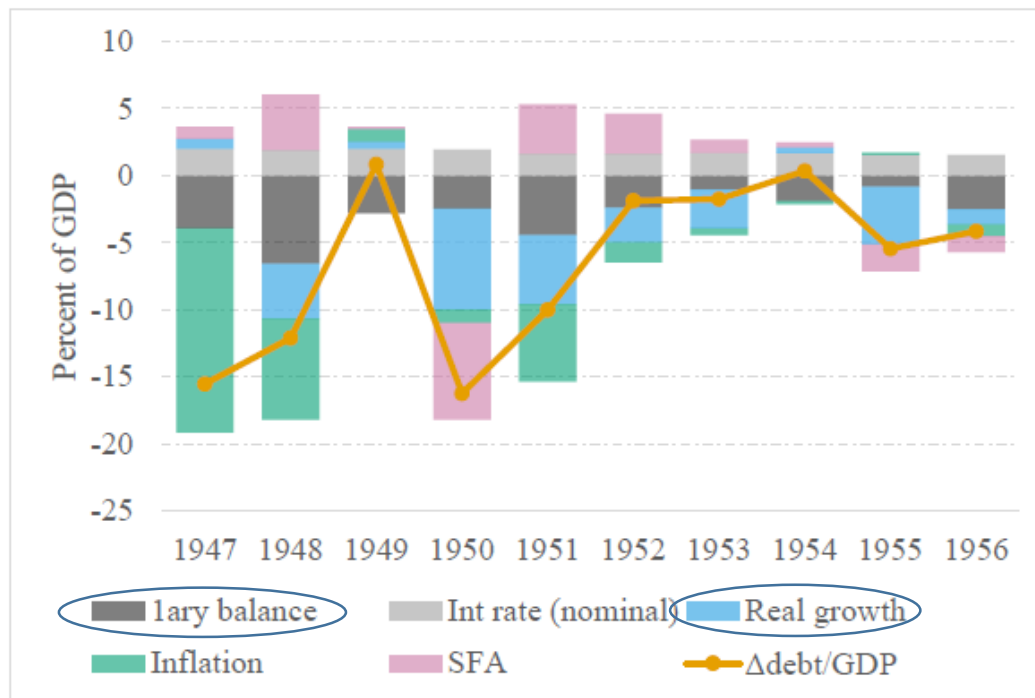
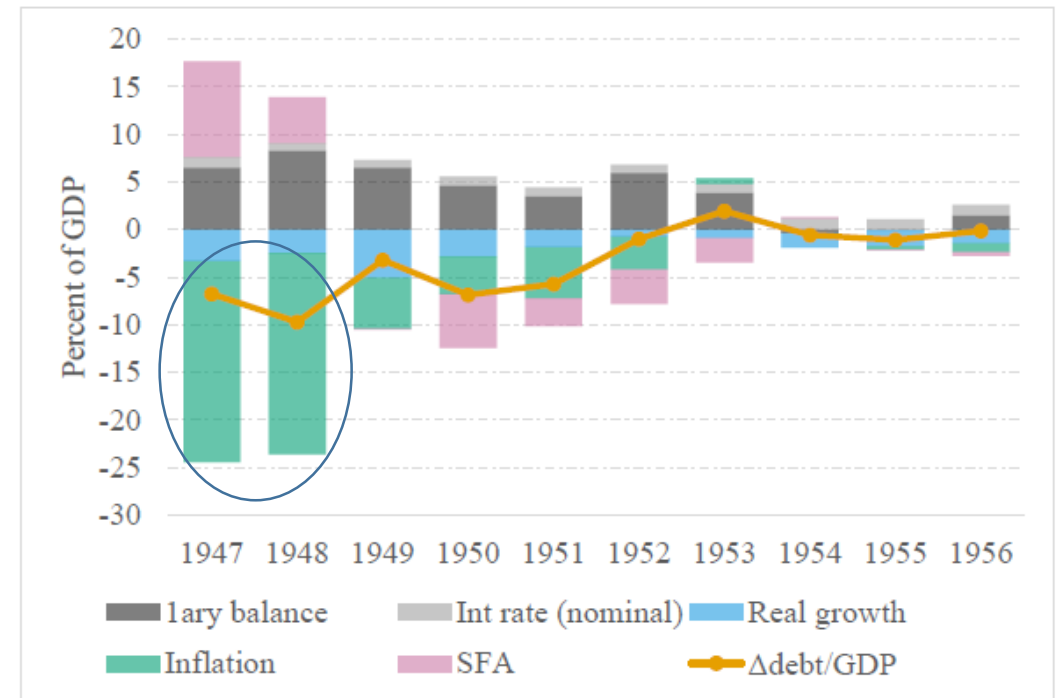


Figure 9: Debt Consolidation in France, 1947-56



In paper: 4 paired case studies

- Transition economies: Bulgaria 1997-2006 vs. Hungary 1994-2001
 - In Bulgaria, there was a burst of inflation in 1996-7, but this acceleration was not anticipated, so it was not neutralized by higher interest rates.
 - Banking crisis starting in late 1995 required a bailout. Government lacked the resources, so it sold bonds directly to the central bank.
 - In Hungary, high inflation persisted for much of the period (averaging 17%), so it came to be anticipated, and its impact was offset to a greater extent by higher interest rates.

Inflation in Bulgaria, neutralize by interest rate in Hungary

Figure 10: Debt Consolidation in Bulgaria, 1997-2006

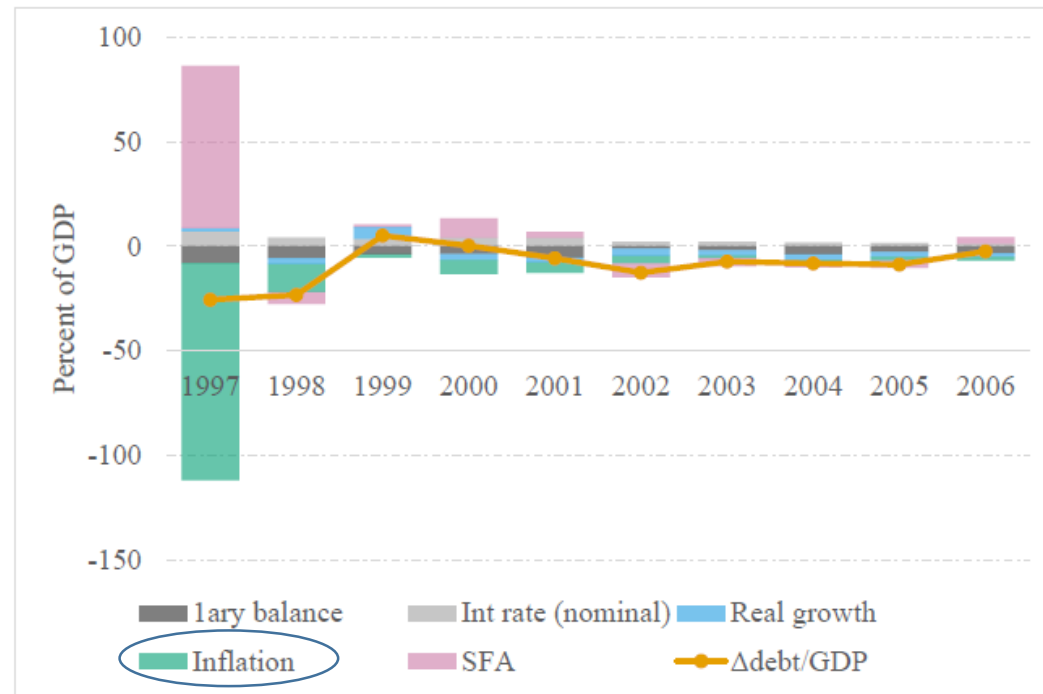
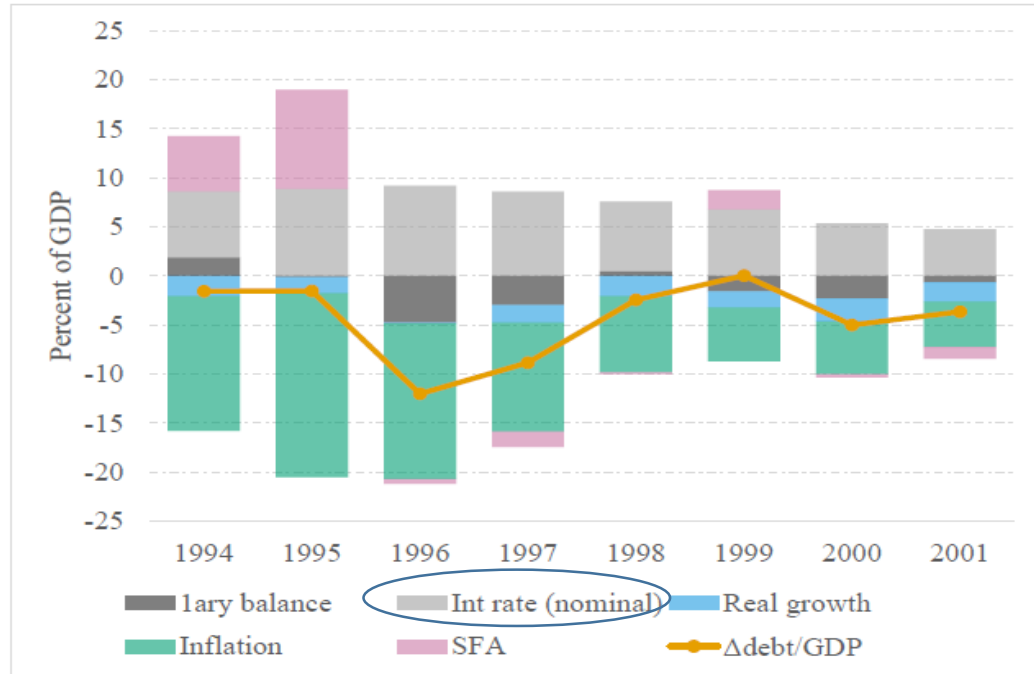


Figure 11: Debt Consolidation in Hungary, 1994-2001



In paper: 4 paired case studies

- UK 1859-68 vs. 1947-78 for fun...
 - First consolidation was achieved by economic growth and primary surpluses (debt consolidation “the old fashioned way”).
 - Second consolidation was more complex. Britain may have been the “sick man of Europe” but still was able to grow its economy, especially in the early part of the period.
 - But here the largest contribution was from inflation. Interest rates did not rise commensurately, because comprehensive exchange controls bottled up savings at home, while regulation required banks to hold government debt.

Figure: Debt Consolidation in the UK, 1859-68

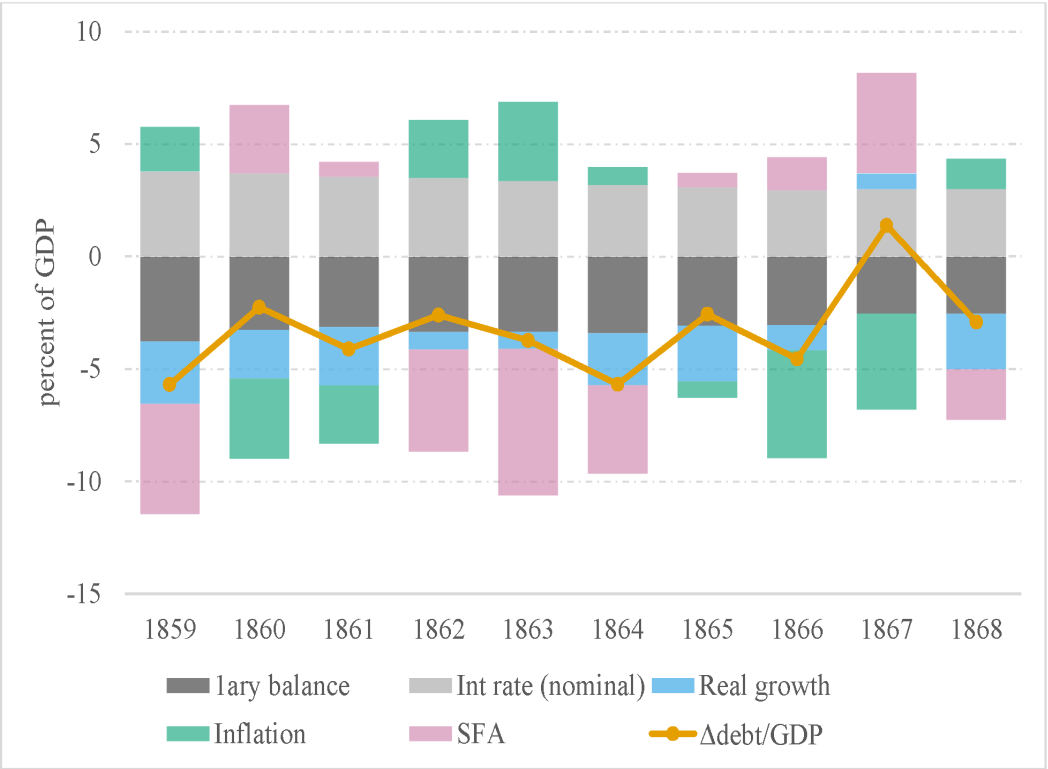
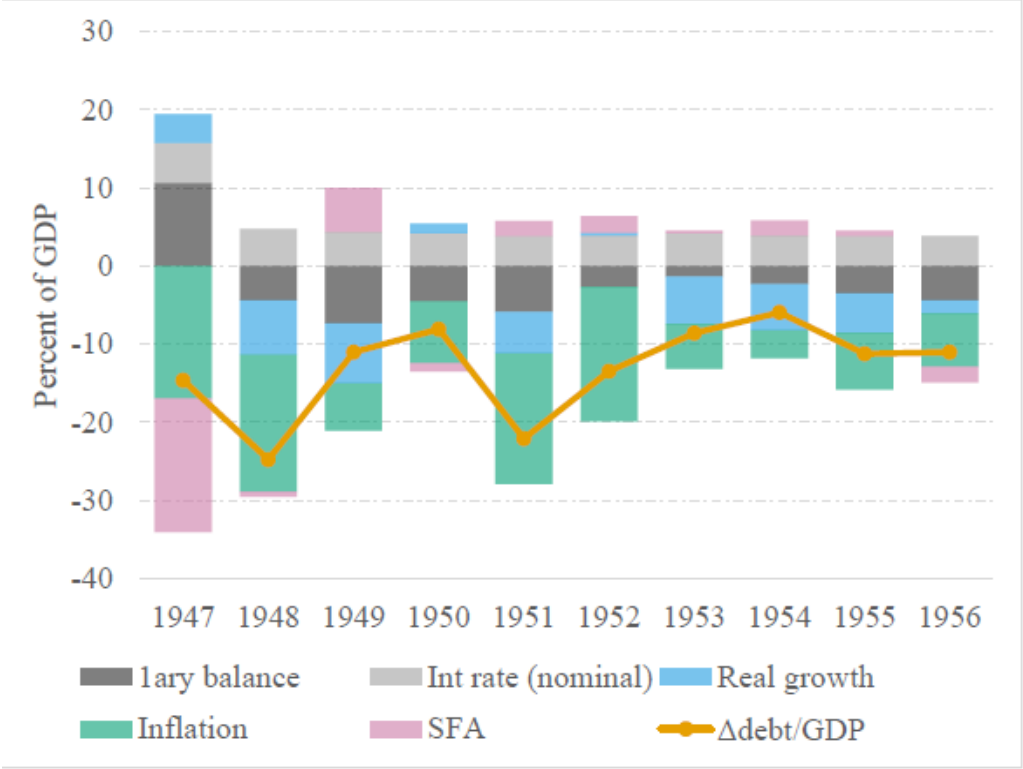


Figure 14: Debt Consolidation in the UK, 1947-56



Conclusions

1. We document patterns of debt consolidation unnoticed to date
 - Consolidations tend to follow large wars (the Napoleonic War and two World), but not always driven by the inflationary consequences of the wartime monetary overhangs.
 - Contribution of inflation to debt consolidation was largest in the post-World War II, followed by the Great Moderation, the interwar period and the pre-1913 era.
2. We find only a weak correlation between the level of global inflation and the frequency of debt consolidations
 - Low during the Great Inflation of the 1970s and High at the turn of the 20th century and the Great Moderation
 - Low but steady inflation in a context of credible monetary policies seem like an ideal setting for inflation to help consolidating debts

Conclusions

3. But these conditions were not always in place. Interest rates on new debt often rose fast enough to offset all or part of the effect of inflation
 - Role of debt maturity, financial regulation or repression, monetary rules, and inflation expectations

Appendix Slides

Number of countries in database

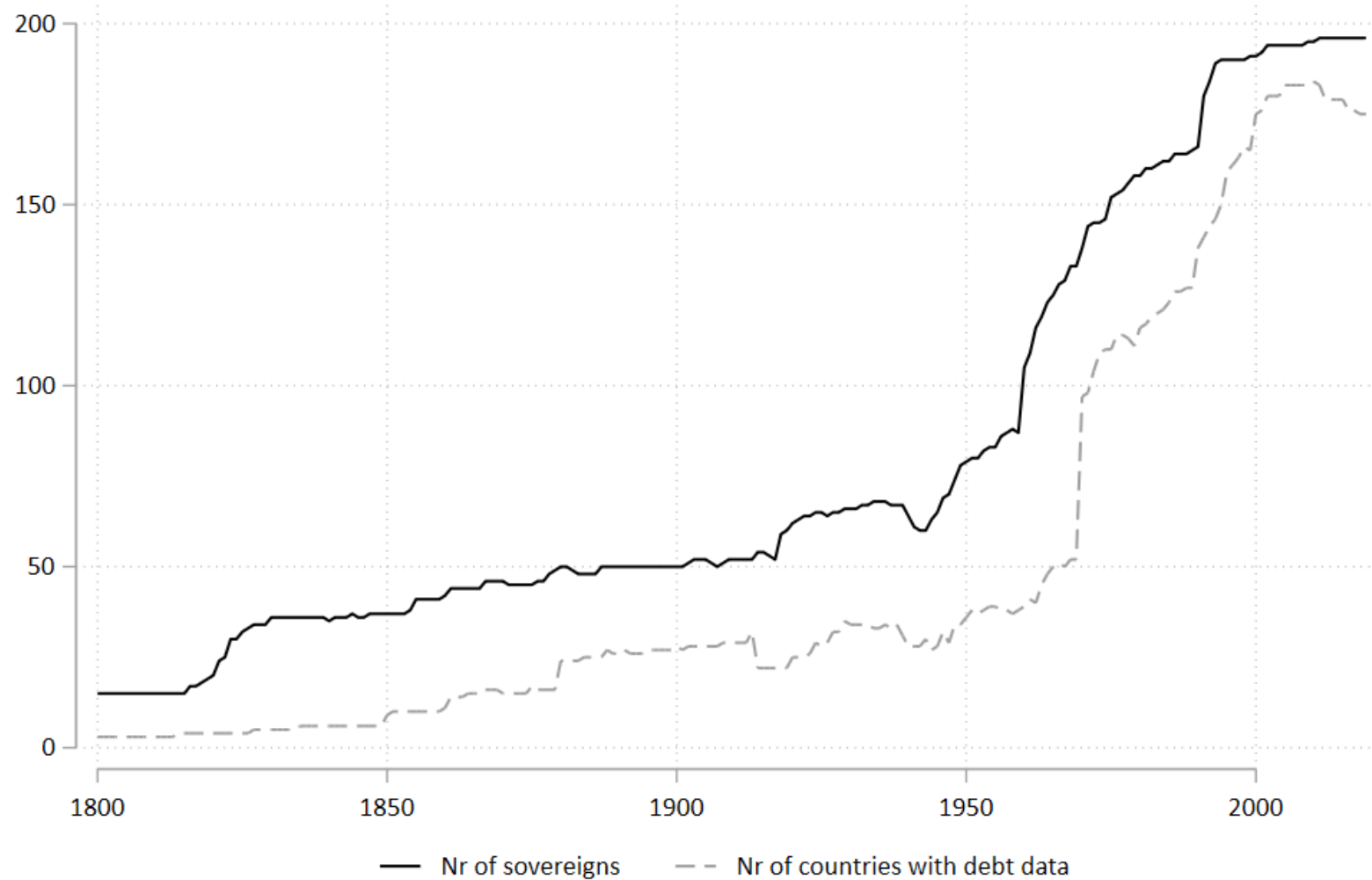
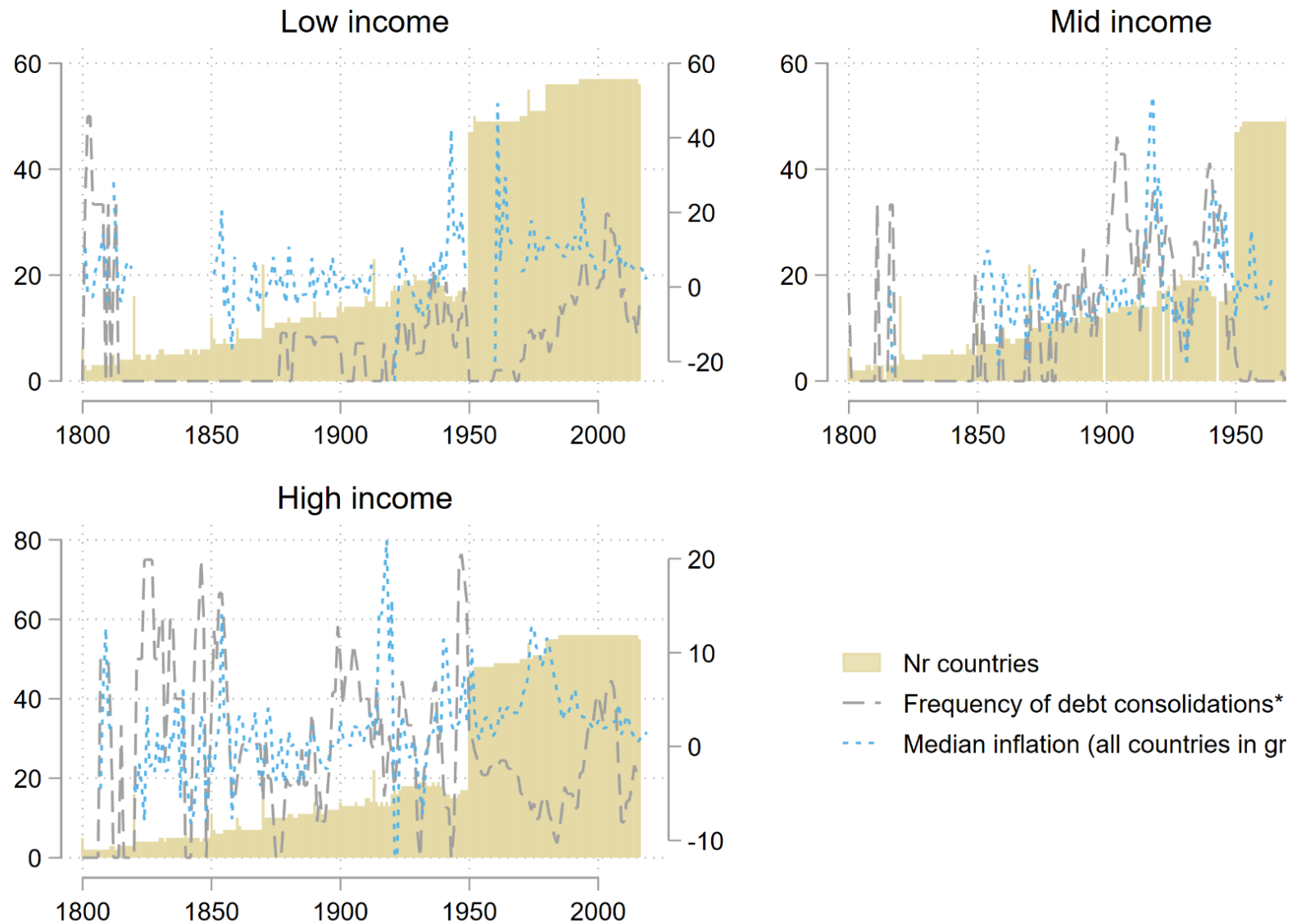
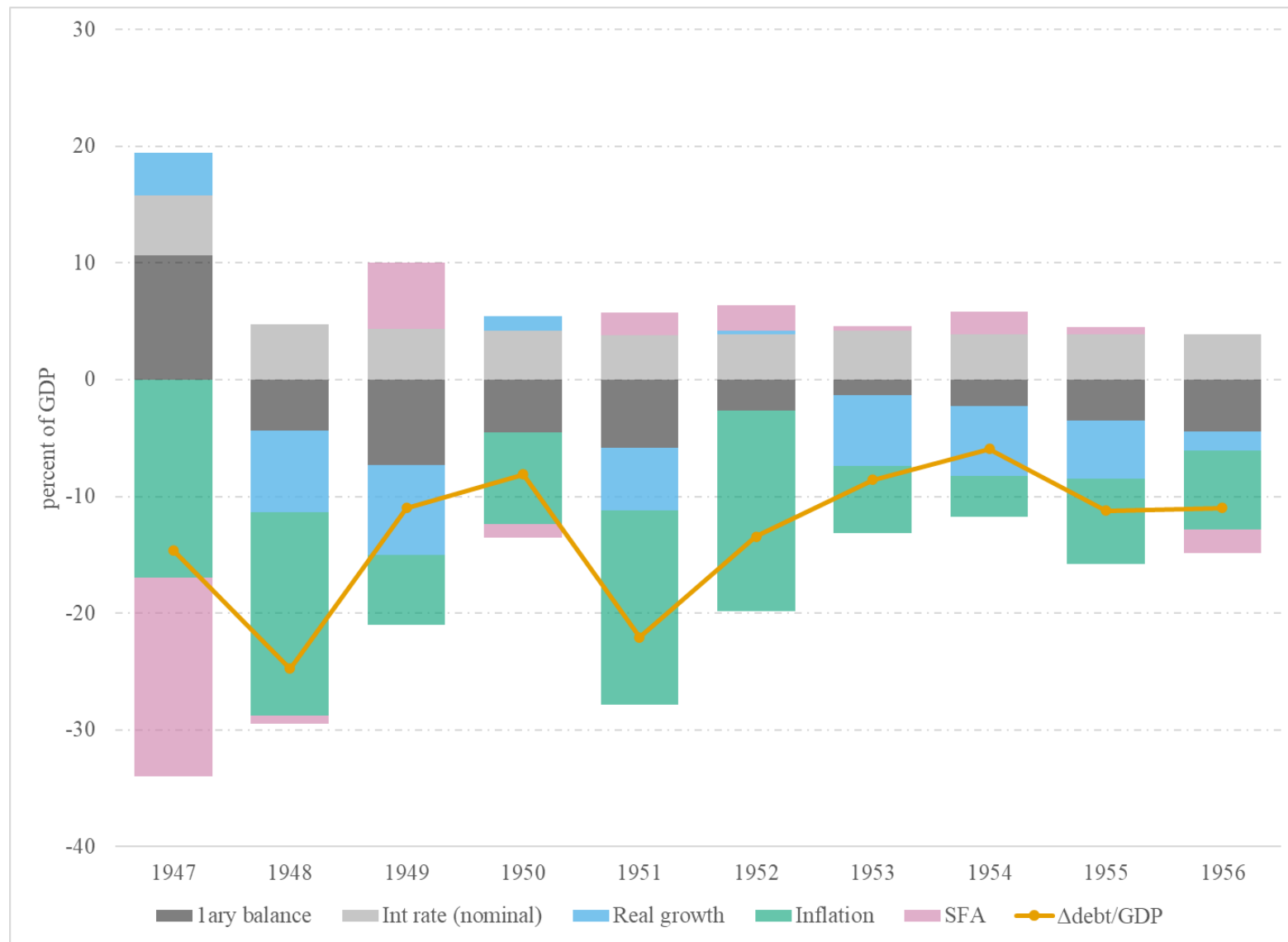


Figure 5: Debt Consolidations (Variant 1) and Inflation by Income Group, 1800-2019



*Any duration with debt consolidation $\geq 10\%$ GDP

Country	Start	End	Δ Debt (% GDP)	lary balance	Int. rate (nominal)	Real growth	Inflation	SFA
UK	1946	1956	-130.7	19.6	-32.1	25.6	80.7	6.2



Country	Start	End	Δ Debt (% GDP)	lary balance	Int. rate (nominal)	Real growth	Inflation	SFA
Spain	1956	1966	-18.1	66.4	-36.4	69.7	102.4	-102.2

