Sovereign Debt Crisis
Module 1: What is Sovereign Debt?

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Roadmap

A. **Why sovereign debt matters** & macro framework

- Sovereign debt in the economy
- The Government Budget Constraint & the Intertemporal Budget Constraint
- Sargent-Wallace: the nexus of fiscal & monetary policy
- Debt dynamics

B. **Properties of sovereign debt**

- Instruments, maturity, yields, ownership
- Prevalence in the global financial system

C. **Historical perspective**

- Sovereign debt crises through history
- Decomposing debt dynamics
- Risk and return on sovereign bonds

D. **Historical vignette**: The French Assignat

Part A

Why Sovereign Debt Matters
& Macro Framework

Why is sovereign debt interesting?

Sovereign debt sits at the intersection of multiple roles

- → **Safe asset & benchmark**: risk-free rate anchor, collateral in repo markets
- → **Bank holdings**: banks hold govt bonds for regulatory/liquidity purposes; govts can engineer captive demand
- → **Saving vehicle**: households, pension funds, insurance companies
- → **Nexus of government policy**: fiscal and monetary policy are linked through the government budget constraint
- → **A long history of sovereign debt debacles**: default, restructuring, inflation — recurring patterns across centuries

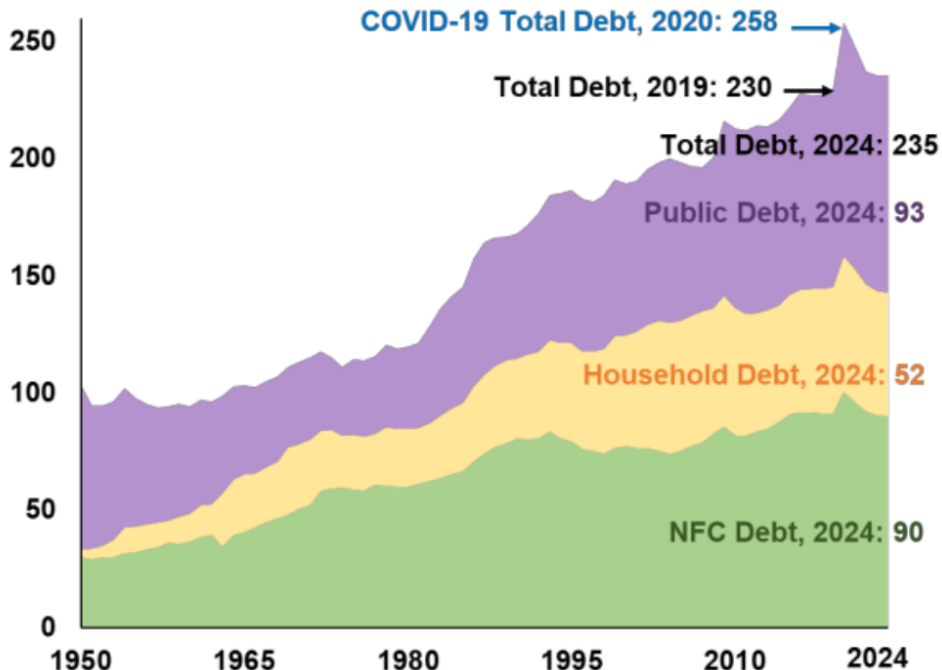
⇒ **Properties**, e.g. who holds the debt, maturity, currency denomination — shape crisis dynamics and political economy

The current landscape

Global public debt = 93% of GDP (2024)

- → Sovereign + corporate bond debt exceeded $100 trillion globally
- → Governments borrow ∼$10T/year more than pre-COVID
- → Interest payments now exceed defense spending in the OECD

Figure 1. Global Public and Private Debt Evolution *(Percent of GDP)*



The Government Budget Constraint (GBC)

Starting point: the consolidated government budget constraint

$$P_t G_t + (1 + R_t) B_{t-1} + M_{t-1} = T_t + B_t + M_t$$

- $\rightarrow$ G_t: real government spending; T_t: tax revenues
- $\rightarrow$ B_t: nominal bonds outstanding; R_t: nominal interest rate
- $\rightarrow$ M_t: monetary base (high-powered money)
- $\rightarrow$ LHS: uses of funds (spending + debt service + redeem old money)
- $\rightarrow$ RHS: sources of funds (taxes + new bonds + new money)

The GBC reveals the fiscal–monetary nexus

Rearranging:

$$\underbrace{P_t G_t - T_t}_{\text{Primary deficit}} = \underbrace{(M_t - M_{t-1})}_{\text{Seigniorage}} + \underbrace{B_t - (1 + R_t) B_{t-1}}_{\text{Net bond issuance}}$$

$\rightarrow$ The fiscal deficit must be financed by **printing money** or **issuing debt**

$\Rightarrow$ **Sovereign debt is the intertemporal link** between fiscal and monetary policy

The Intertemporal Budget Constraint (IBC)

Forward-iterating the GBC:

$$(1+R_t)\,B_{t-1} = \sum_{s=0}^{\infty} \beta^s \Big[\underbrace{(T_{t+s} - P_{t+s}G_{t+s})}_{\text{future primary surpluses}} + \underbrace{(M_{t+s} - M_{t+s-1})}_{\text{future seigniorage}} \Big]$$

where $\beta = \frac{1}{1+R}$ is the discount factor.

- $\rightarrow$ Today's debt must be "backed" by the present value of all future primary surpluses + seigniorage
- $\rightarrow$ If the fiscal path $\{T_{t+s} - P_{t+s}G_{t+s}\}$ is *fixed*, then the monetary path $\{M_{t+s}\}$ is **pinned down**

Sargent & Wallace (1981): Unpleasant Monetarist Arithmetic

Core insight from the IBC

Who adjusts — fiscal or monetary authority — determines inflation outcomes

Two coordination schemes:

1. **Monetary dominance**
   - CB independently sets the path of $\{M_t\}$
   - Fiscal authority adjusts $\{T_t - P_t G_t\}$ to satisfy the IBC
   - $\Rightarrow$ CB *can* permanently control inflation

2. **Fiscal dominance**
   - Fiscal authority independently sets the deficit path
   - CB must accommodate: the IBC pins down seigniorage
   - $\Rightarrow$ CB *cannot* permanently control inflation

The "unpleasant" result

Proposition (Sargent & Wallace, 1981)

If $R > n$ (real interest rate $>$ growth rate) and the fiscal authority dominates:

Tighter money today $\Rightarrow$ higher inflation tomorrow

The arithmetic:

- $\rightarrow$ CB holds down money growth $\Rightarrow$ must sell more bonds to finance the deficit
- $\rightarrow$ If $R > n$: bond stock grows faster than the economy
- $\rightarrow$ Public's demand for bonds has a limit (relative to GDP)
- $\rightarrow$ The IBC must hold $\Rightarrow$ eventually, bonds must be monetized $\Rightarrow$ **inflation**

$\Rightarrow$ Sovereign debt *levels* and *dynamics* are the nexus connecting monetary policy, fiscal policy, and macroeconomic outcomes

Debt dynamics: how does D/Y evolve?

From the GBC, the debt-to-GDP ratio evolves as:

$$\Delta\left(\frac{D}{Y}\right) \approx \underbrace{(r-g)}_{\text{snowball}} \cdot \frac{D}{Y} - \underbrace{s}_{\text{primary surplus}} + \underbrace{\text{SFA}}_{\text{stock-flow adj.}}$$

$\rightarrow$ r: effective real interest rate on debt

$\rightarrow$ g: real GDP growth rate

$\rightarrow$ s: primary fiscal surplus (revenues $-$ non-interest spending)

$\rightarrow$ Inflation (π) reduces real value of nominal debt $\Rightarrow$ embedded in r

$\Rightarrow$ Four channels to reduce D/Y: **growth**, **primary surpluses**, **inflation**, **default**

Part B

Properties of Sovereign Debt

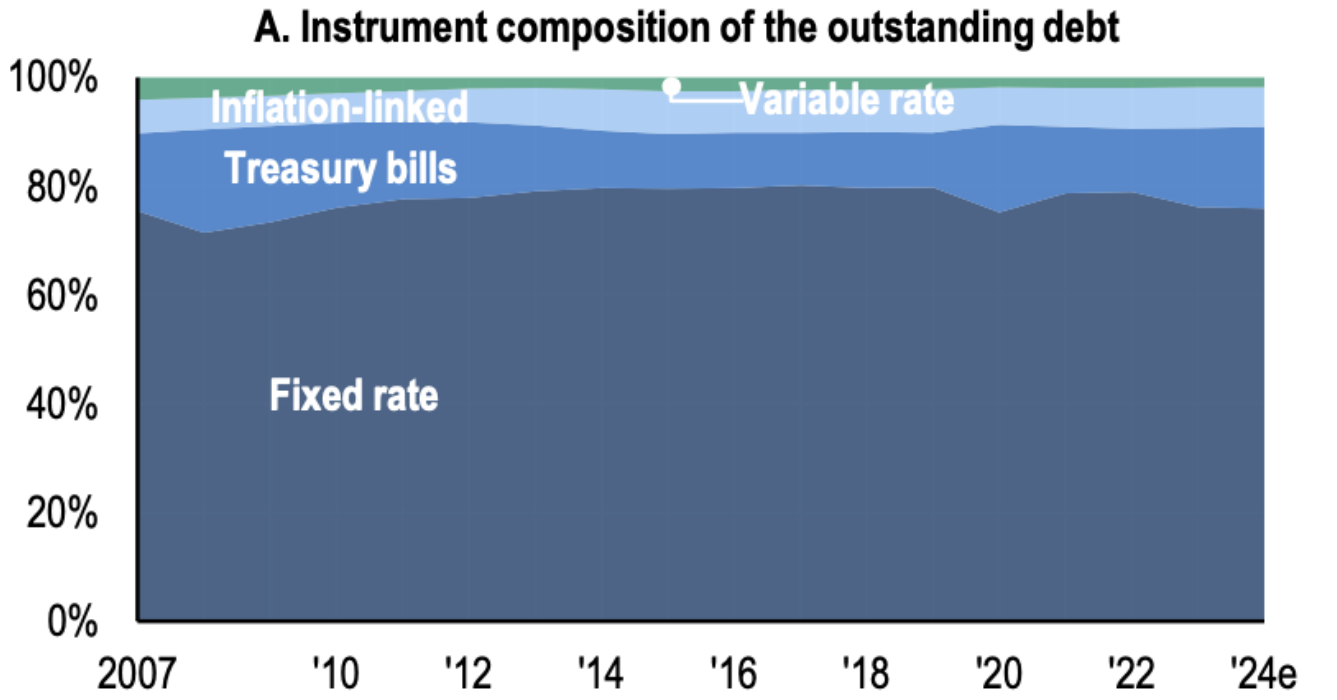
Key properties of sovereign bonds

What characterizes a sovereign bond?

- → **Maturity**: short-term bills vs. long-term bonds; average residual maturity shapes rollover risk and pass-through of rate changes
- → **Yield**: reflects monetary policy stance, inflation expectations, default risk, term premia, and liquidity
- → **Ownership**: domestic vs. foreign holders; central banks, commercial banks, households, pension funds — who bears the risk?
- → **Currency denomination**: local vs. foreign currency debt — determines whether the government can "inflate away" the debt
- → **Instrument type**: fixed-rate, floating-rate, inflation-linked, bills

⇒ The following slides illustrate each of these dimensions with recent data

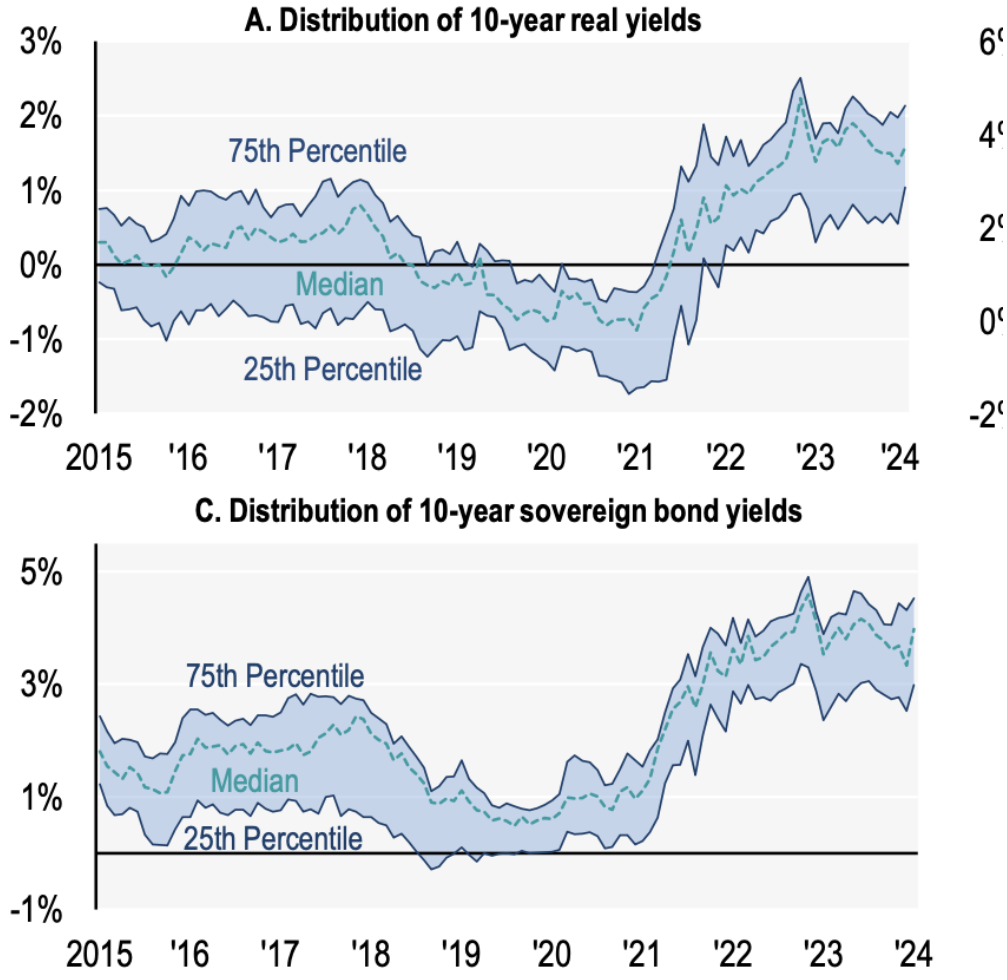
Maturity structure and instruments



Source: OECD Global Debt Report (2025), Figure 1.4

$\Rightarrow$ Fixed-rate nominal bonds dominate OECD sovereign issuance

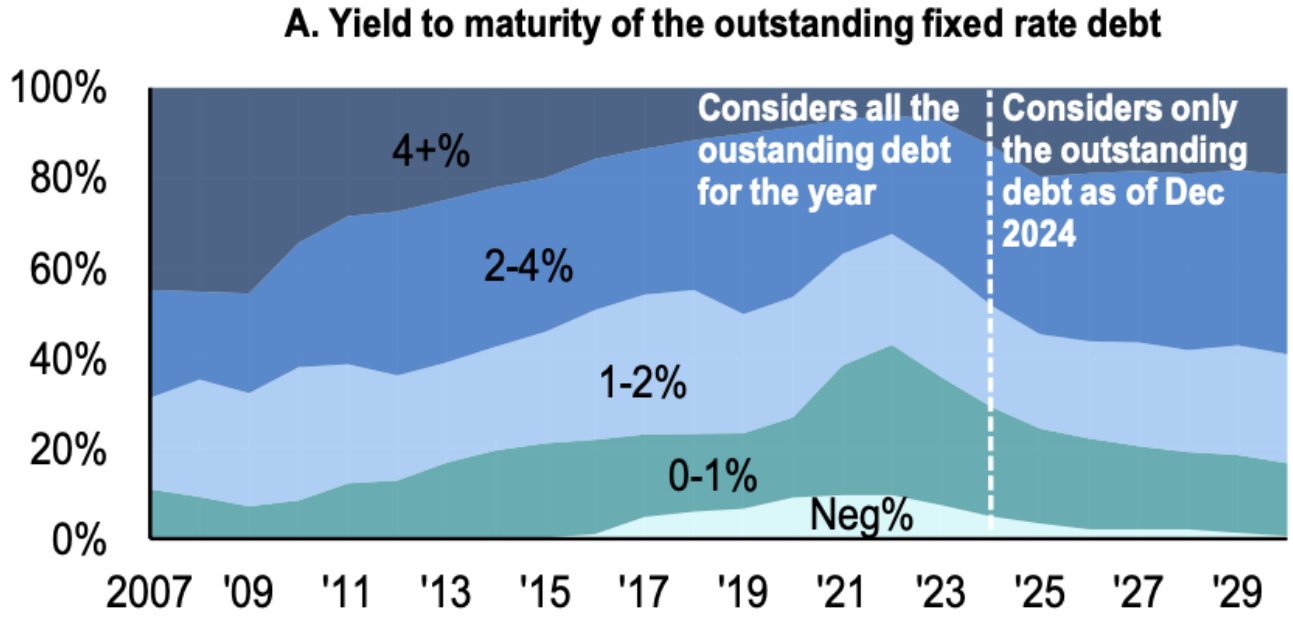
Yields: the post-pandemic regime shift



Source: OECD Global Debt Report (2025), Figure 1.8

$\Rightarrow$ Sovereign yields have returned to pre-GFC levels — the zero-rate era is over

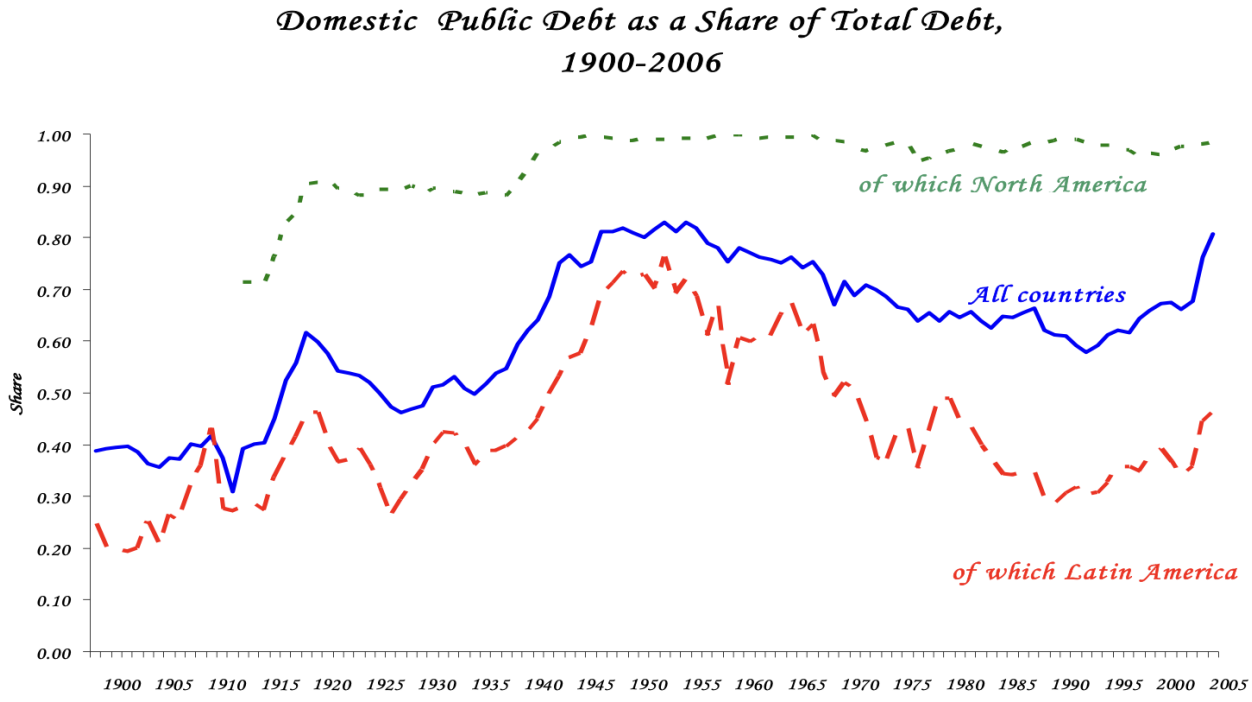
Yields, maturity profile, and interest payments



Source: OECD Global Debt Report (2025), Figure 1.13

$\Rightarrow$ Long average maturity delays the pass-through of higher yields into interest payments — a "slow burn"

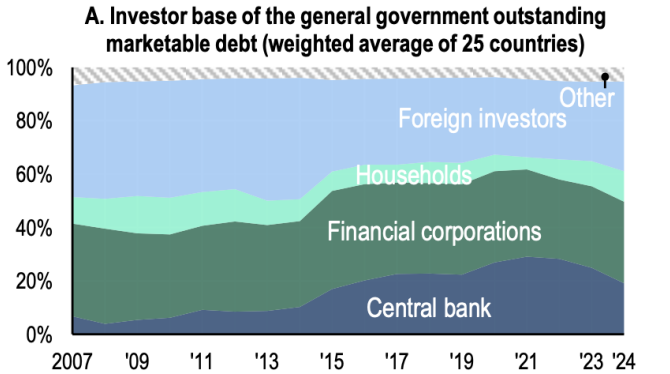
Who holds sovereign debt? Domestic ownership is the norm

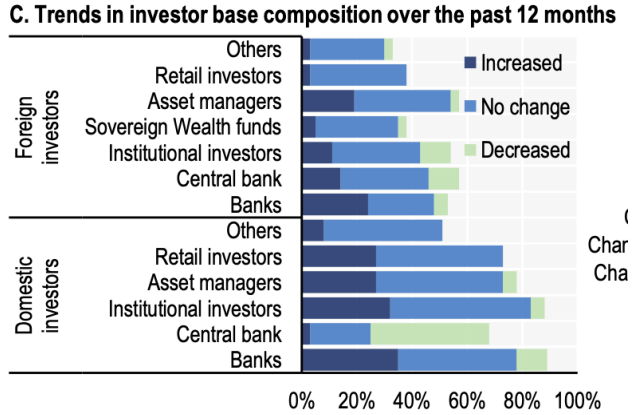


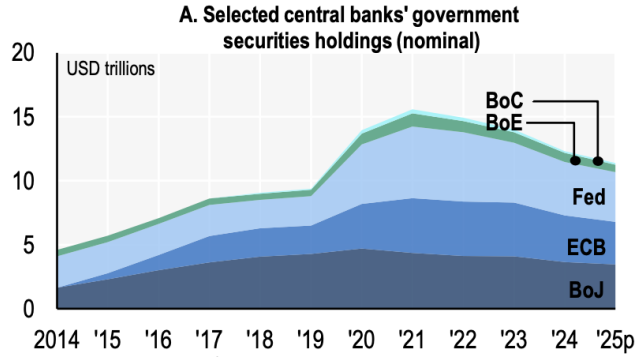
Sources: The League of Nations, the United Nations, and others sources listed in Appendix II.

Source: Reinhart & Rogoff (2008), Figure 4 — Domestic Debt as Share of Total, 1900–2006

Investor base composition







Source: OECD Global Debt Report (2025), Figure 1.18

$\Rightarrow$ Post-QT: central banks (relative) retreating, households and foreign investors absorbing the supply

- $\rightarrow$ Central bank holdings: 29% $\rightarrow$ 19%
- $\rightarrow$ Domestic households: 5% $\rightarrow$ 11%
- $\rightarrow$ Foreign investors: 29% $\rightarrow$ 34%

Sovereign debt in the global financial system

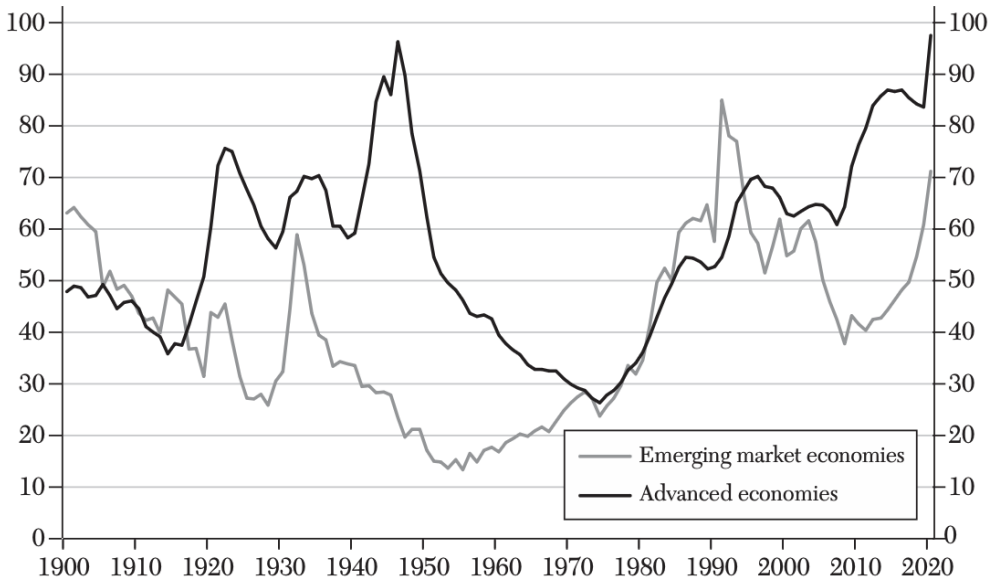


Figure 3. Government Debt to GDP: Advanced versus Emerging Economies, 1900–2020

Source: Mitchener & Trebesch (2023), Figure 3 — Govt Debt/GDP: Advanced vs. Emerging, 1900–2020

$\Rightarrow$ Advanced economy debt/GDP at all-time highs; secular rise since the 1970s

Central banks as holders of last resort

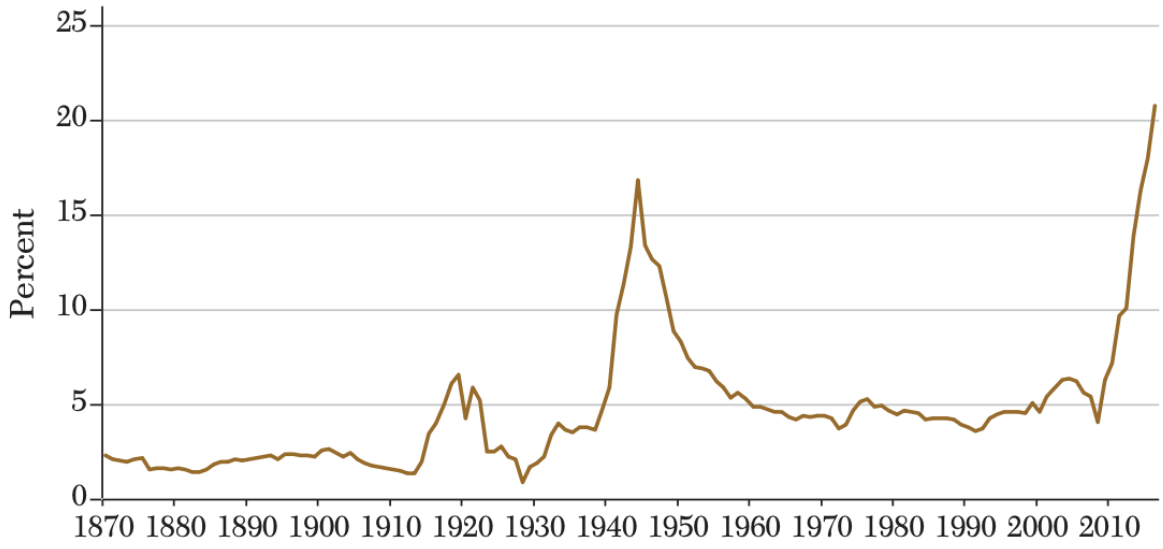
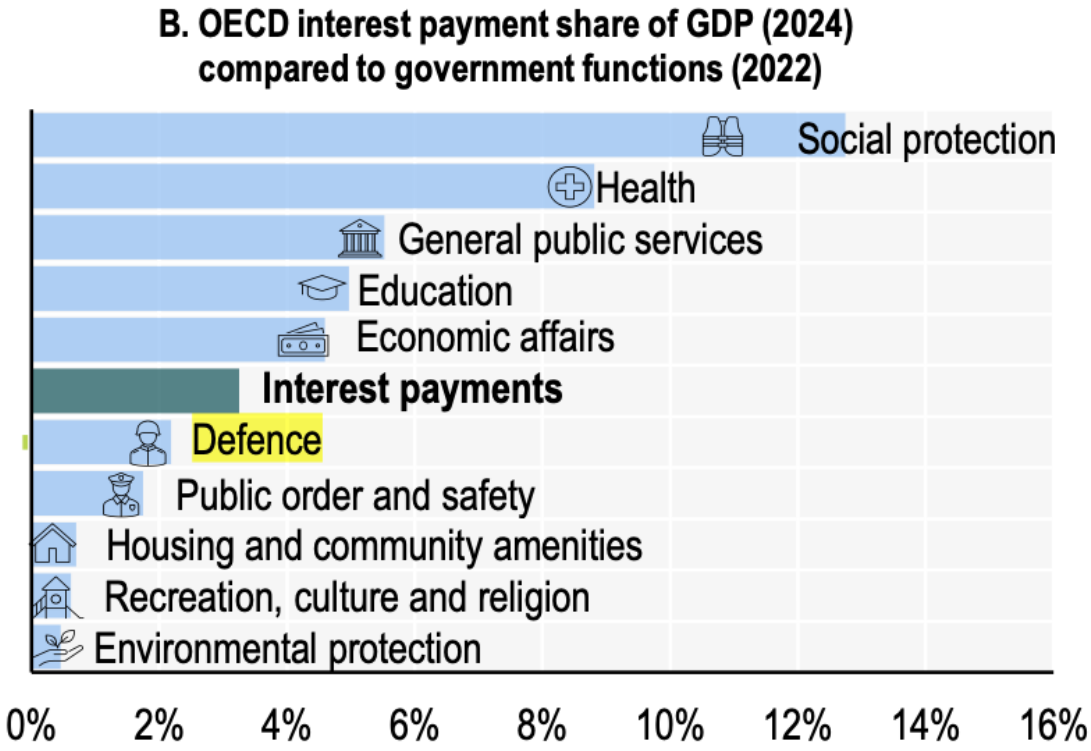


Figure 6. Central Bank Holdings of Governments' Debt (as % of GDP, 1870–2016)

Source: Mitchener & Trebesch (2023), Figure 6 — Central Bank Holdings of Govt Debt (% GDP), 1870–2016

$\Rightarrow$ QE was not unprecedented — central banks have repeatedly absorbed sovereign debt, especially during wars

Interest payments now exceed defense spending



Source: OECD Global Debt Report (2025), Figure 1.12

$\Rightarrow$ The fiscal cost of debt is now larger than a major spending category — and rising

Part C

Historical Perspective

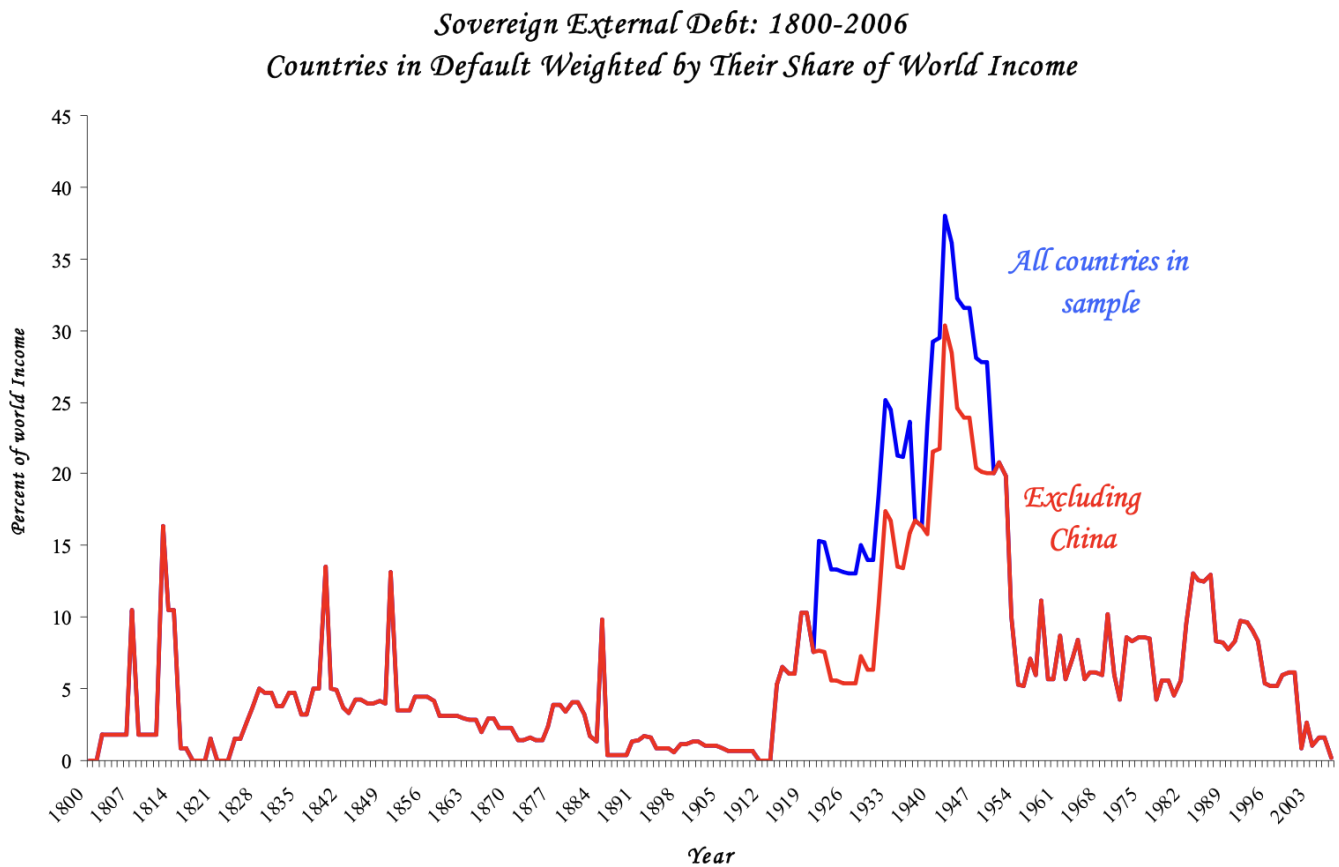
Sovereign debt crises through history

Reinhart & Rogoff (2008): "This Time Is Different"

- → 66 countries, 8 centuries of financial crises data
- → Serial default is a *universal* phenomenon
- → Five default waves: Napoleonic, 1820s–40s, 1870s–90s, 1930s–50s, 1980s–90s
- → Each lull has *invariably* been followed by a new wave

Default waves — GDP-weighted

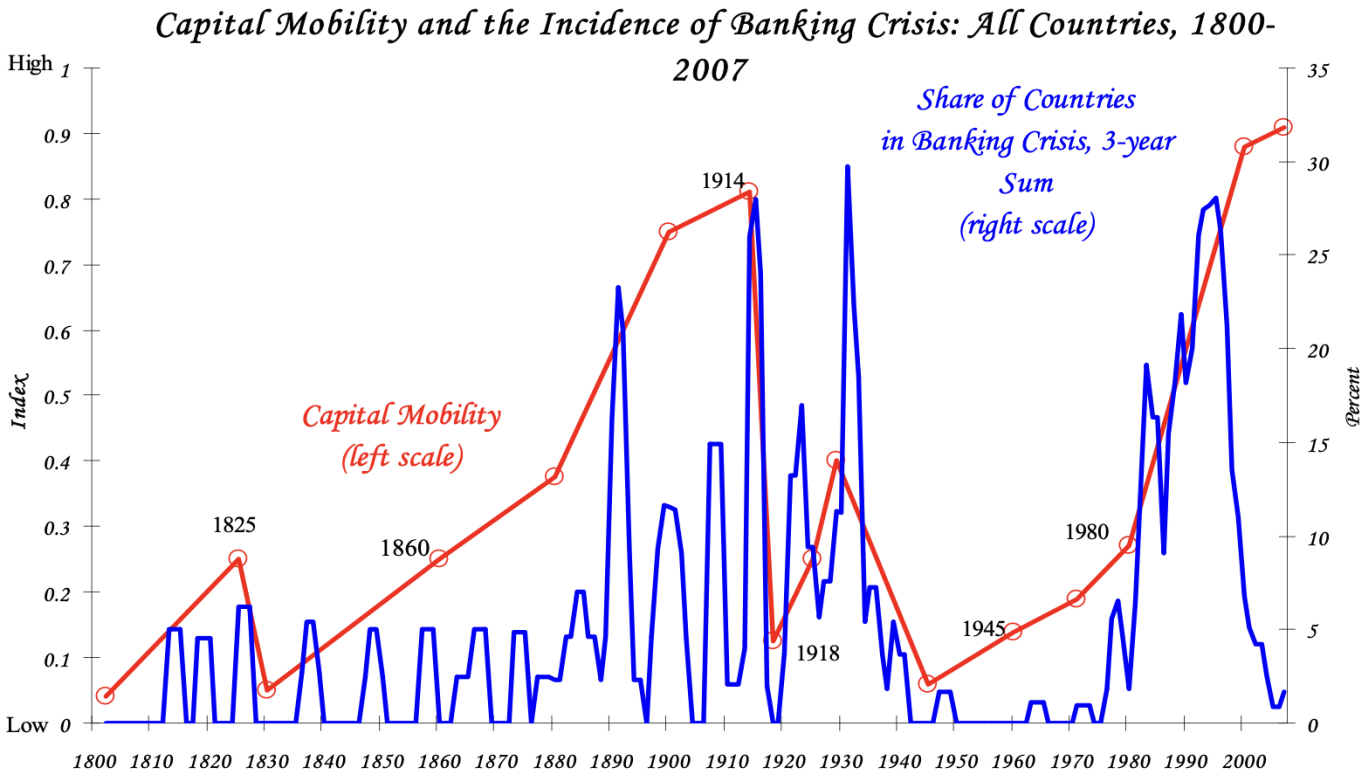
Figure 2



Source: Reinhart & Rogoff (2008), Figure 2 — Countries in Default Weighted by Share of World Income, 1800–2006

→ Weighting by GDP amplifies the 1930s–40s wave (large economies defaulting)

Capital mobility and banking crises



Source: Reinhart & Rogoff (2008), Figure 3 — Capital Mobility and Banking Crises, 1800–2007

→ Striking historical correlation between capital openness and crisis incidence

Defaults in advanced vs. emerging economies

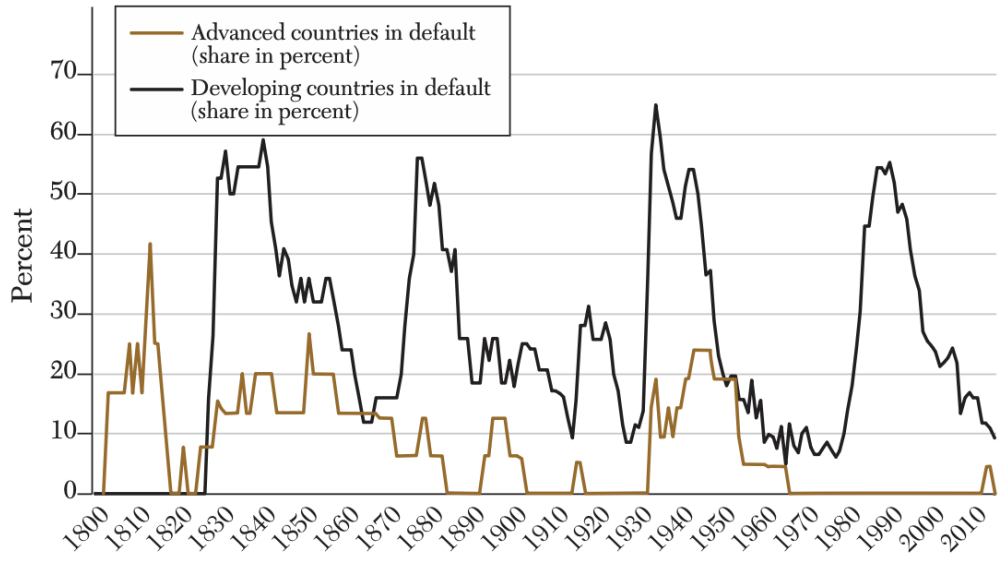
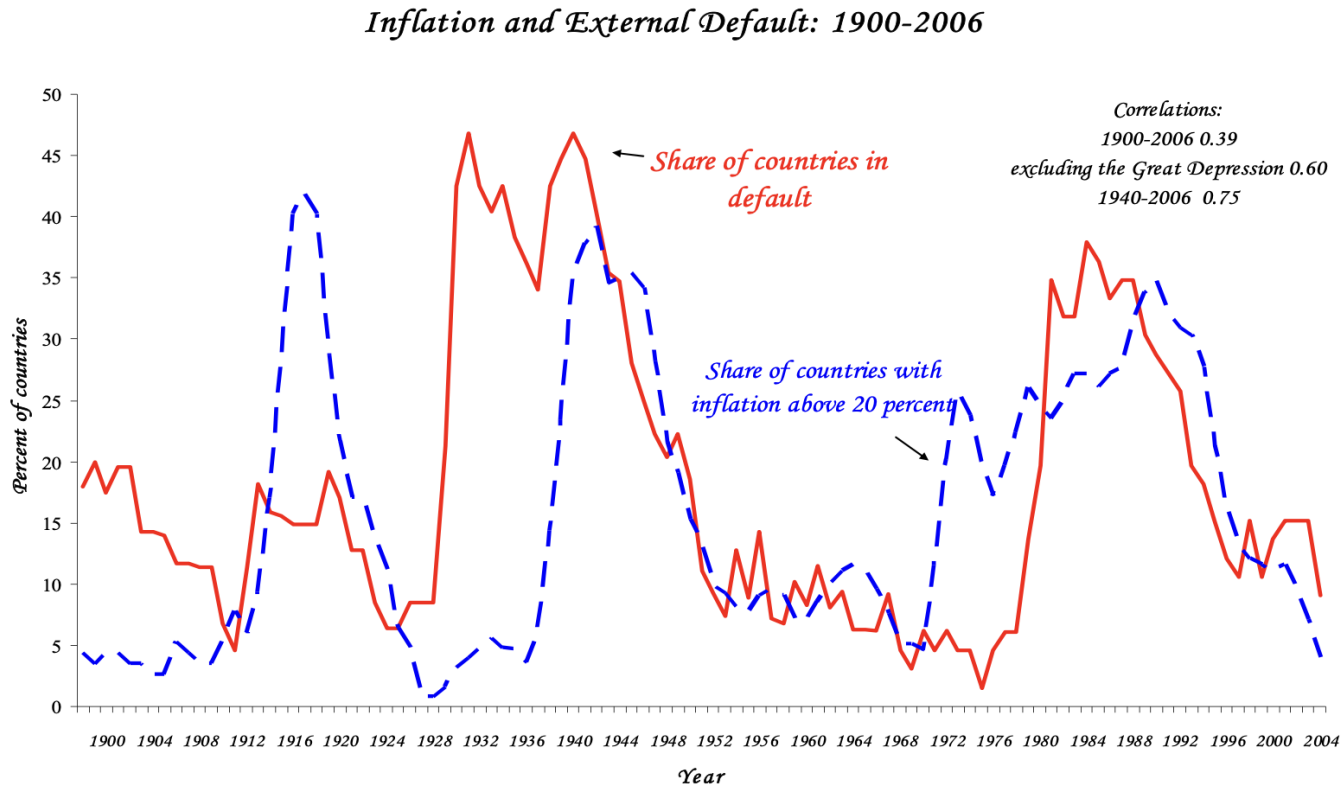


Figure 1. Defaults in Advanced and Emerging Economies, External Private Debt, 1800–2015

Source: Mitchener & Trebesch (2023), Figure 1 — Defaults 1800–2015

$\Rightarrow$ Advanced economies also default — the "emerging market problem" framing is incomplete

Inflation and default go hand-in-hand



Source: Reinhart & Rogoff (2008), Figure 5 — Inflation and External Default, 1900–2006

→ Correlation: 0.39 (1900–2006), **0.75** (1940–2006)

→ Since WWII, inflation and default have moved together

Evolution of crisis types

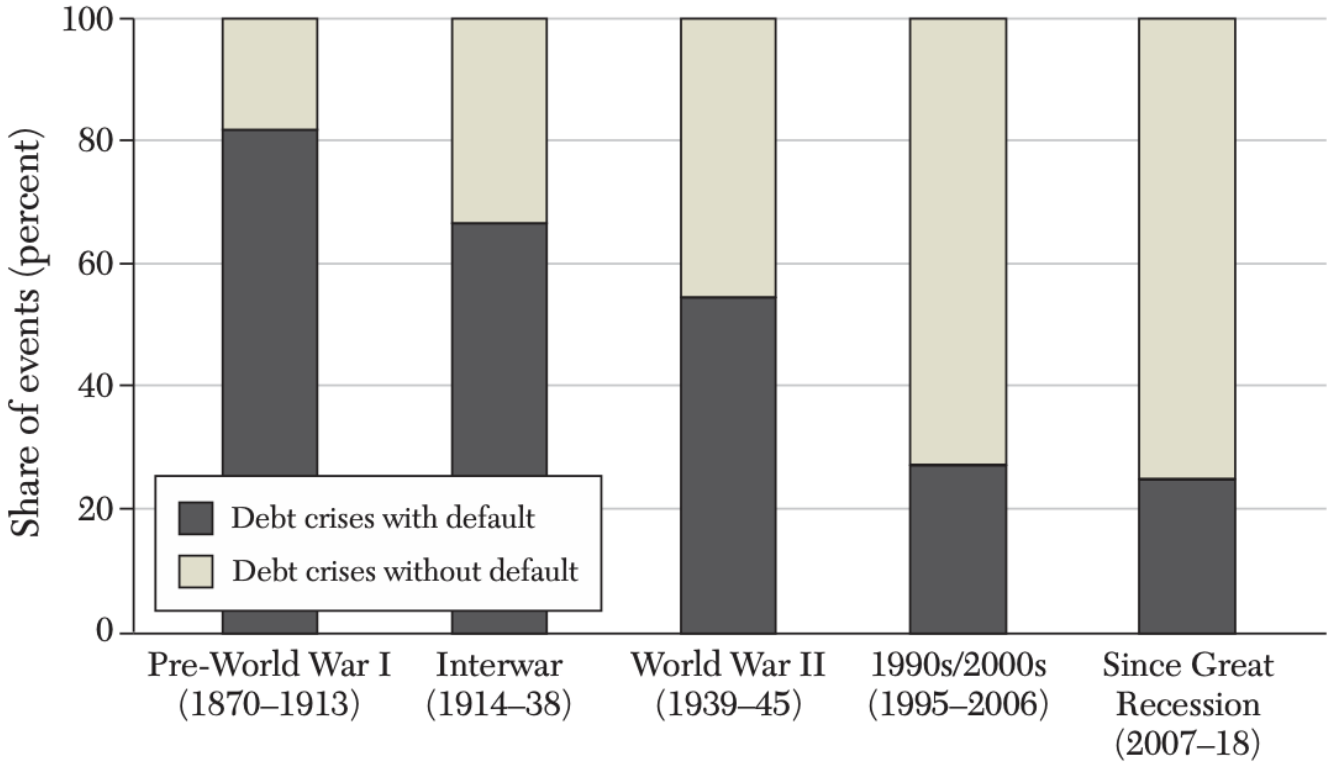


Figure 7. Sovereign Debt Crises With and Without Default (Share of Events in %)

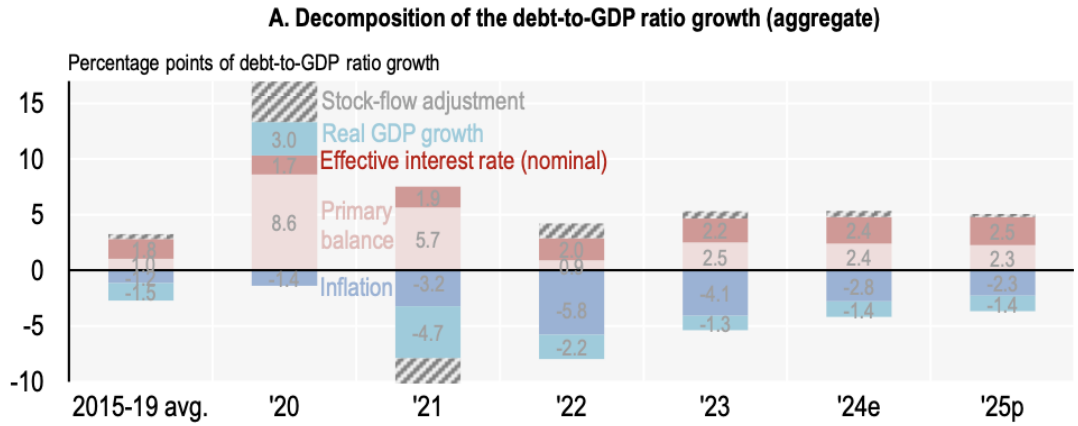
Source: Mitchener & Trebesch (2023), Figure 7 — Crises with and without default

→ Pre-WWI: $\sim$ 80% of crises involved outright default

→ Post-1995: only $\sim$ 25% involve default — modern "spread crises" dominate

Decomposition of debt-to-GDP ratios (OECD)

Recall from Part A: $\Delta(D/Y) \approx (r-g) \cdot D/Y - s + \text{SFA}$



Source: OECD Global Debt Report (2025), Figure 1.14

$\Rightarrow$ Each bar decomposes the change in D/Y into contributions from growth, interest, inflation, primary balance

Reading the decomposition

- → **2015–19**: $r \approx 0$, deficits offset by growth $\Rightarrow$ stable debt
- → **2020–21**: massive deficits (COVID) $\Rightarrow$ debt spike
- → **2021–23**: negative real rates $\Rightarrow$ inflation eroded debt despite deficits
- → **2024–25**: positive real rates return + deficits persist $\Rightarrow$ debt rising again

The $r - g$ story (long run)

- → 2010s saw lowest $r - g$ in 150 years (Mitchener & Trebesch, 2023)
- → Debt rose, but fiscal burden *fell* — the "free lunch" era
- → That era may now be ending

The $r - g$ differential: 150-year perspective

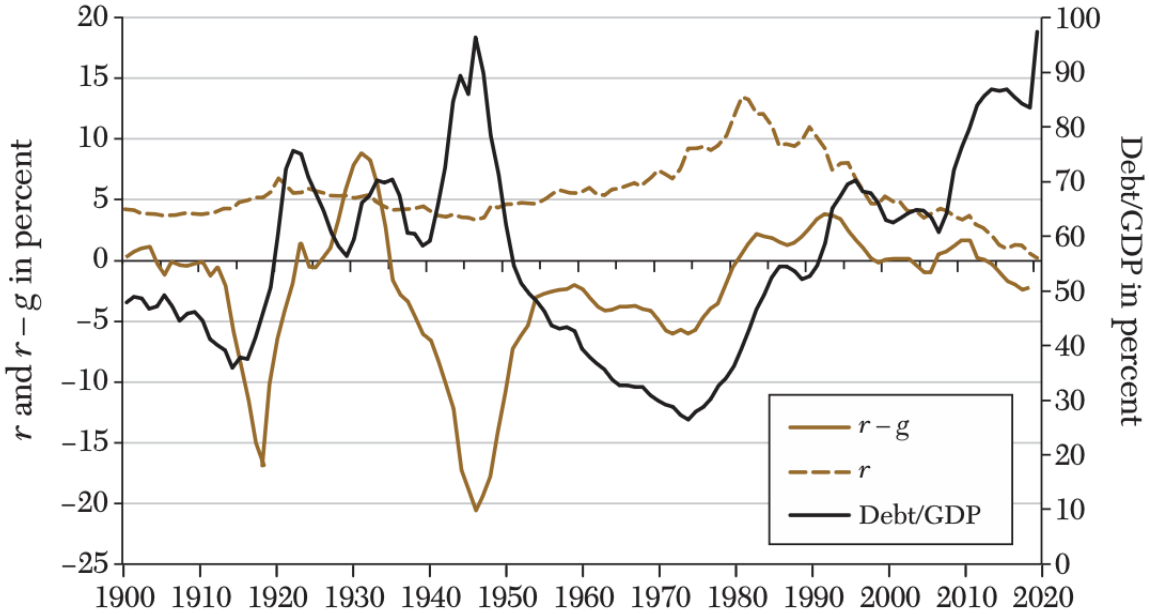


Figure 4. $r - g$ in Advanced Economies, 1900–2020

Source: Mitchener & Trebesch (2023), Figure 4 — Interest rate, $r - g$, and Debt/GDP, 1900–2020

$\Rightarrow$ The 2010s saw the lowest $r - g$ in 150 years — that era is now reverting

Debt servicing costs: the decoupling

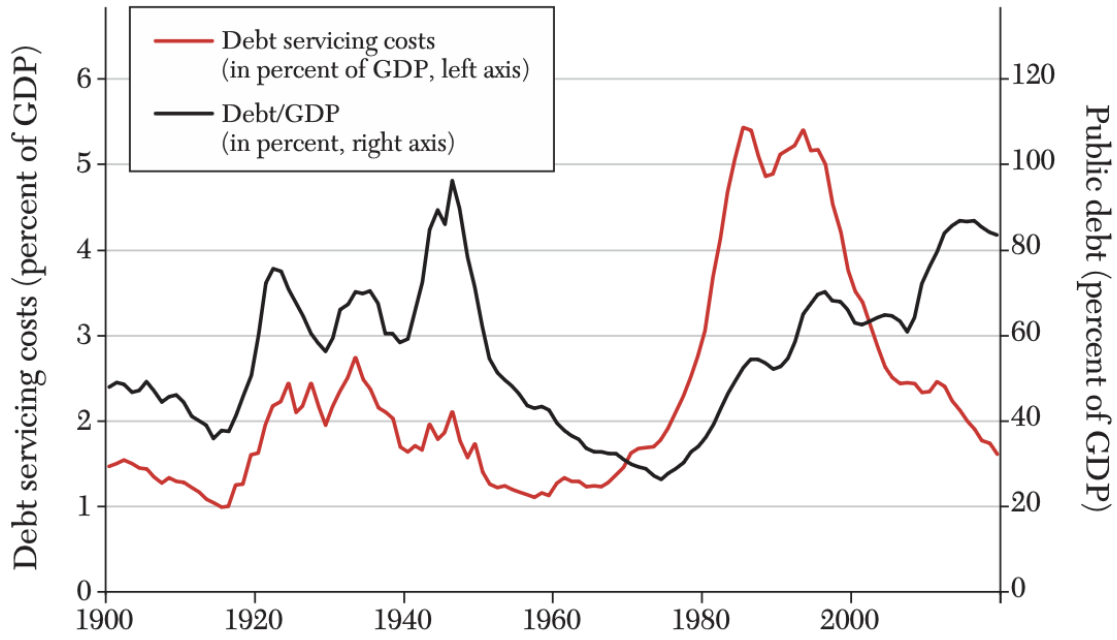


Figure 5. Debt Servicing Costs as a Percent of GDP in Advanced Economies, 1900–2020

Source: Mitchener & Trebesch (2023), Figure 5 — Debt Servicing Costs (% GDP), 1900–2020

$\Rightarrow$ Debt/GDP rose to all-time highs while interest/GDP fell — the "free lunch" era is ending

Risk and return on sovereign bonds

The sovereign bond puzzle

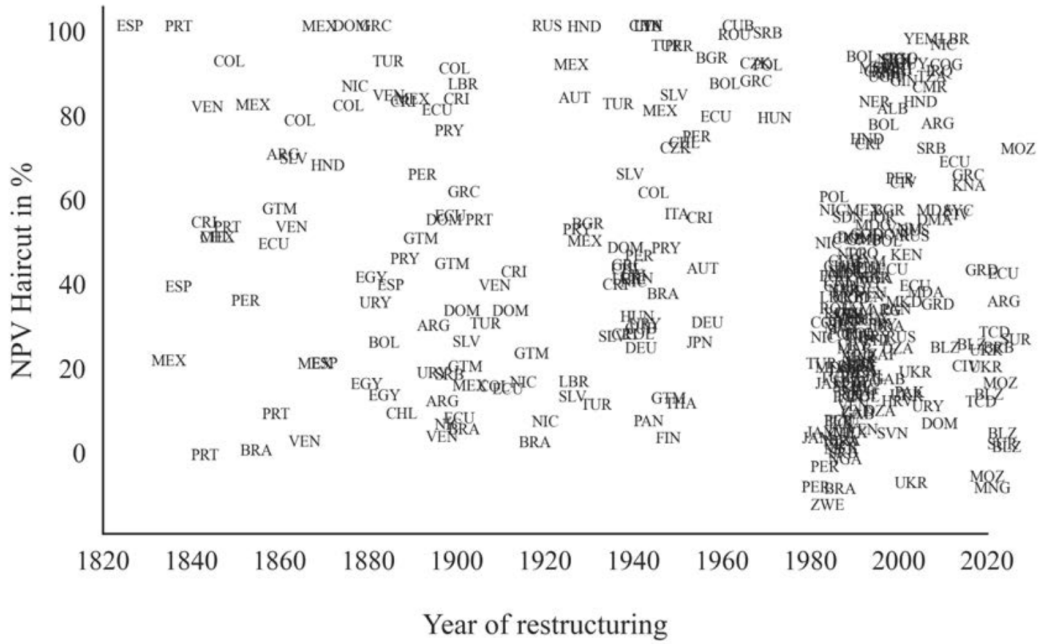
Why do investors hold sovereign bonds when defaults are so common?

- → **Answer**: excess return compensates for risk
- → Real return on external sovereign bonds: **6.8%** (200 years)
- → vs. US Treasuries: 3.3%, UK gilts: 2.4%
- → Excess return: 2–4% annually over 200 years
- → Average haircut in restructurings: $\sim 44\%$
- → Full repudiation: only $\sim 3\%$ of cases
- → Defaults are *partial*, not catastrophic for investors

Source: Meyer, Reinhart & Trebesch (2022), "Sovereign Bonds since Waterloo"

200 years of creditor losses

Figure 1: Individual external debt restructuring episodes with private creditors, 1815-2020



Note: Country-Markers represent the time of the 327 individual debt restructurings.
Sources: Meyer, Reinhart, and Trebesch (2022), Cruces and Trebesch (2013), and Asonuma and Trebesch (2024) and authors' calculations.

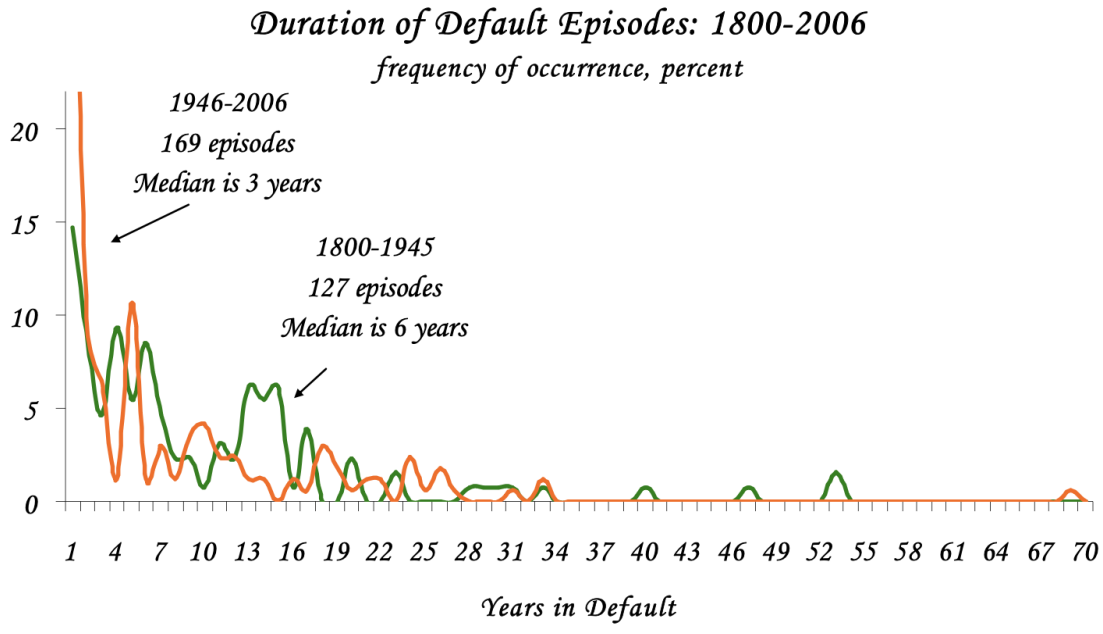
Source: von Luckner, Meyer, Reinhart & Trebesch (2024), Figure 1 — Haircuts 1815–2020

⇒ Haircuts cluster around 40–50% and have been remarkably stable across 200 years

Serial restructurings and duration

Key facts (von Luckner et al., 2024; Reinhart & Rogoff, 2008)

- → Average default spell requires **1.6 restructurings**
- → Interim restructurings: $\sim$ 30% haircut; final: $\sim$ 50%
- → Duration shortening: median 6 years (pre-1945) → 3 years (post-1946)



Part D

Historical Vignette:
The French Assignat (1790–1796)

France 1789: a fiscal crisis

The state of public finances

- → Public debt = 63.3% of GNP (Sargent & Velde, 1995)
- → Tax revenues collapsing: old-regime collection system breaking down
- → Spending obligations unchanged (army, debt service)
- → No access to credit markets

The assignat experiment

- → 1790: paper money backed by confiscated Church lands
- → Initially: "real bills" regime — limited issuance, land backing
- → 1793–94: Terror — price controls, forced acceptance
- → 1795–96: hyperinflation — 45 billion livres issued, value collapses

The Assignat

Source: République Française, 400 livres assignat (1792). Wikimedia Commons.

$\Rightarrow$ Paper money backed by confiscated national lands — initially a debt instrument, it became fiat currency

The pre-revolutionary debt burden: France vs. Britain

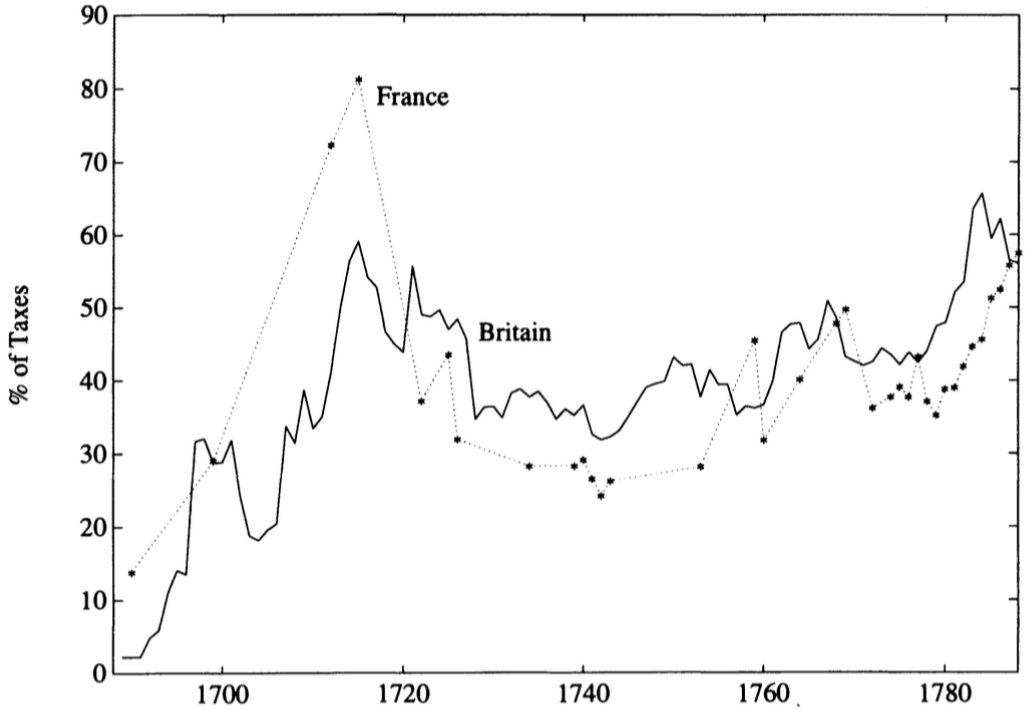


FIG. 1.—Ratio of debt service to taxes, Britain and France, 1688–1788. Sources: for Britain: Mitchell (1988); for France: Weir (1989) and the references listed in n. 8.

Source: Sargent & Velde (JPE 1995), Figure 1 — Ratio of debt service to taxes, Britain & France, 1688–1788

→ France: debt service = 60–80% of tax revenues by 1780s

→ Britain: declining ratio despite rising debt — better fiscal institutions

Assignat issuance and debt liquidation

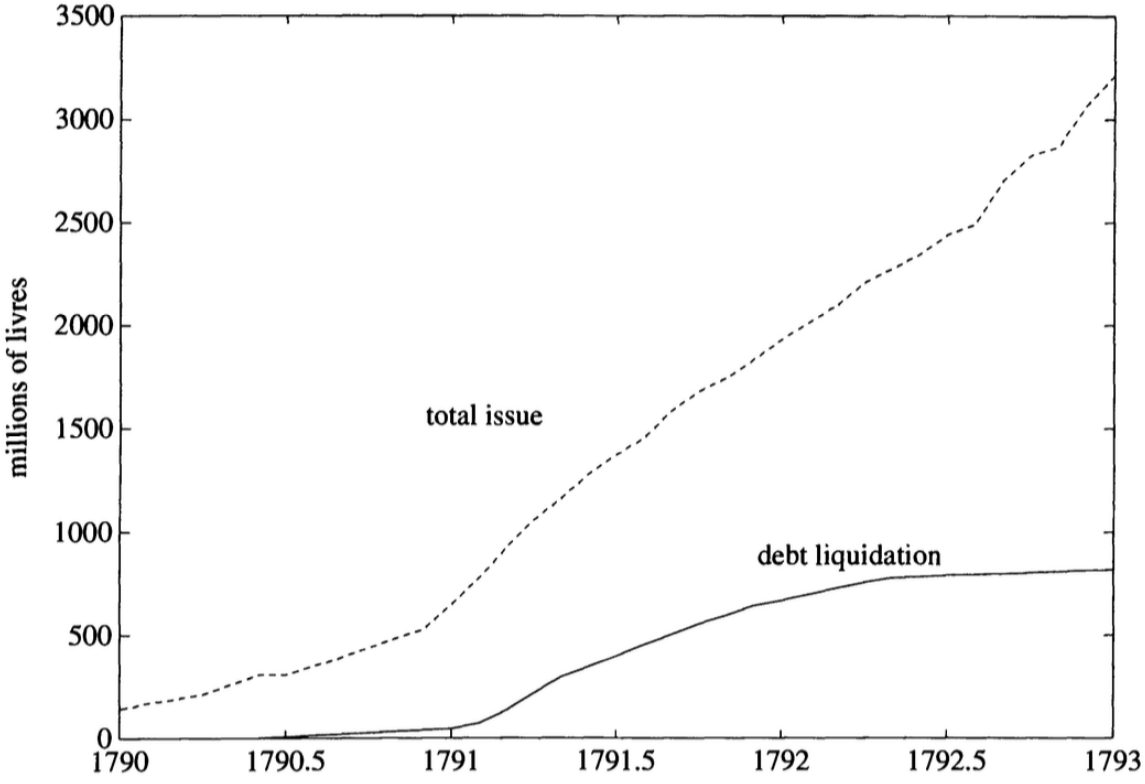


FIG. 6.—Assignats used for debt reimbursement and total issue, 1790–92. Source: Archives Nationales, Paris, AD IX 497bis and 586.

Source: Sargent & Velde (JPE 1995), Figure 6 — Assignats for debt reimbursement and total issue, 1790–92

→ Initially, assignats were issued to retire old-regime debt ("real bills")

→ Gap between total issue and debt liquidation = fiscal deficit financing

Revenue collapse

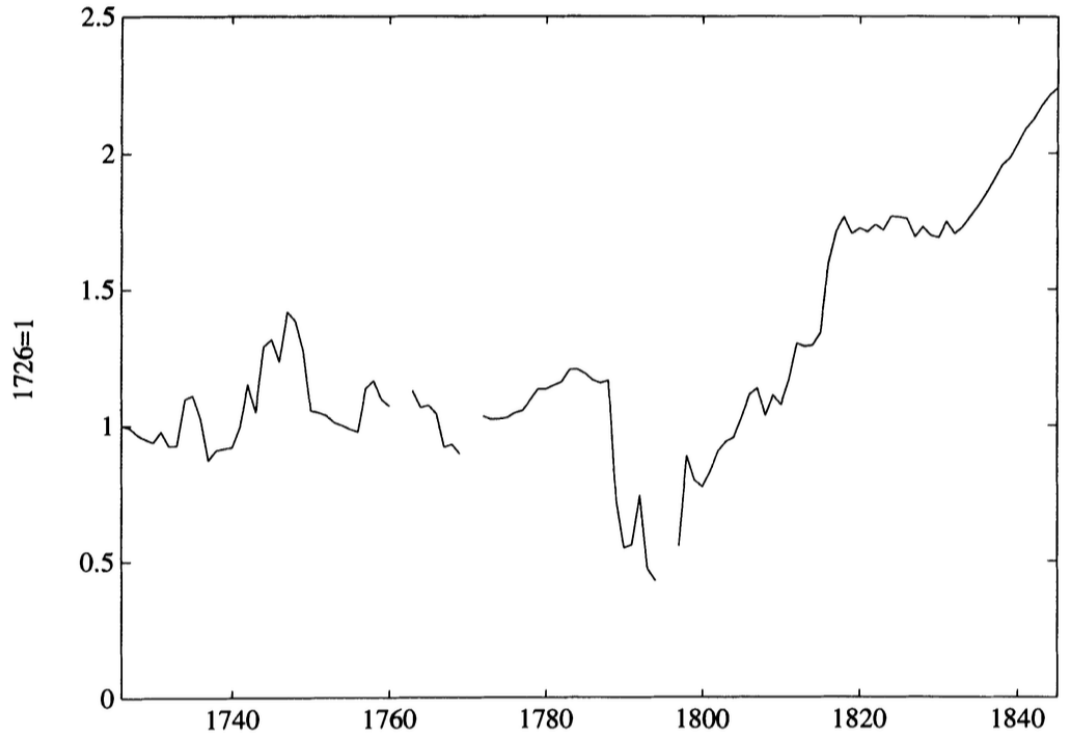


FIG. 5.—Index of real per capita revenues (excluding revenues from currency creation) in France, 1726–1845. Source: the sources listed in n. 8; Nicolas (1882) for the nineteenth century; and Dupâquier (1988) and *Annuaire statistique* (1966) for population estimates; the population for 1795–1815 is adjusted for current boundaries.

Source: Sargent & Velde (JPE 1995), Figure 5 — Real per capita revenues, 1726–1842

$\Rightarrow$ Real tax revenues collapsed during the Revolution and did not recover for two decades

Real assignat balances: three regimes

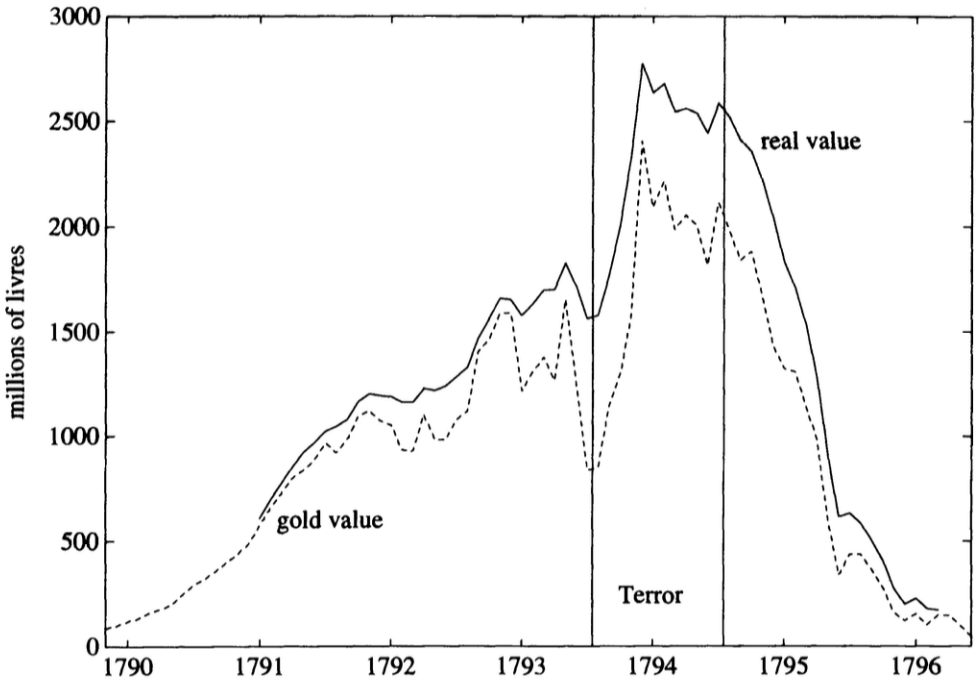


FIG. 8.—Real balances of assignats (in gold and real terms). Sources: Braesch (1934) for 1790–91; reports of the Treasury and the Caisse de l'Extraordinaire for 1791–95 (Paris, Archives Nationales, AD IX 497bis and 586); and Ramel de Nogaret (1801) for 1795–96.

Source: Sargent & Velde (JPE 1995), Figure 8 — Real assignat balances, 1790–1796

$\Rightarrow$ Three regimes visible: real bills (1790–92), Terror (1793–94), hyperinflation collapse (1795–96)

The deficit gap

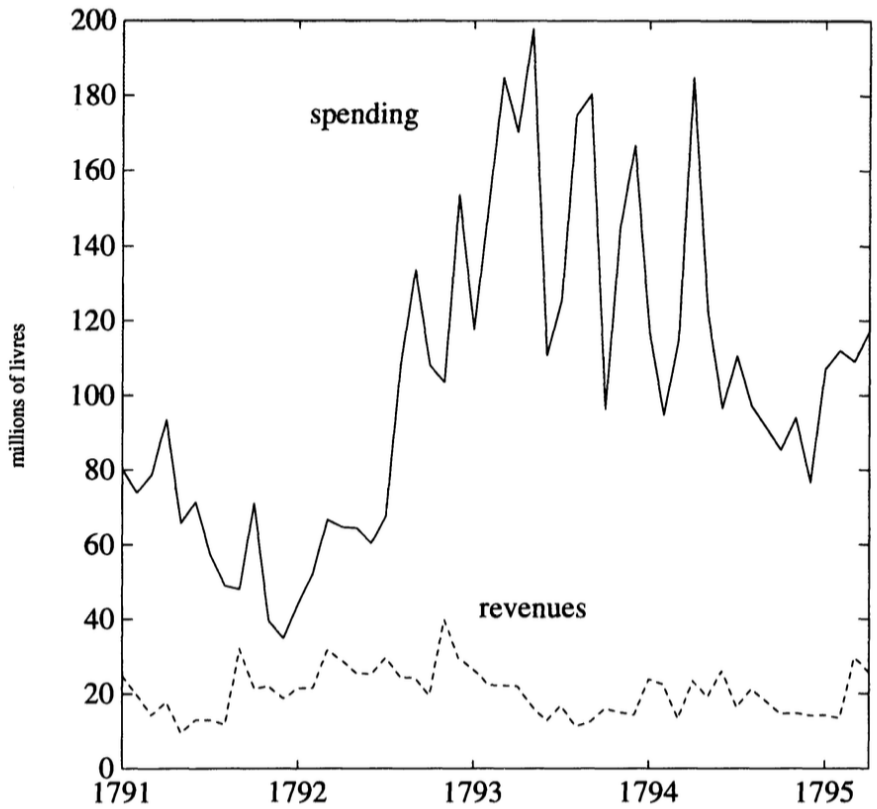


FIG. 11.—Spending and revenues, 1791–95 (real value). Source: Archives Nationales, Paris, AD IX 497bis and 586.

Source: Sargent & Velde (JPE 1995), Figure 11 — Spending vs. revenues, 1791–1795

$\Rightarrow$ The persistent gap between spending and revenues had to be financed by money creation

France vs. Britain: same wars, opposite outcomes

The comparison (Sargent & Velde, 1995; Antipa, 2023)

- → Both countries: similar initial debt levels, 22 years of war
- → Both issued paper currency
- → **Britain**: Bank of England, income tax ($\sim$ 20% of revenues by 1799), credible fiscal institutions $\Rightarrow$ **no hyperinflation**
- → **France**: collapsed tax system, no institutional credibility $\Rightarrow$ hyperinflation

$\Rightarrow$ **Textbook illustration of Sargent-Wallace**:
Fiscal dominance in action — the assignat as case study of how sovereign debt dynamics, unchecked by credible fiscal institutions, lead to monetary collapse

Key takeaways

1. Sovereign debt is **the intertemporal link** connecting fiscal policy, monetary policy, and macroeconomic outcomes
2. Debt dynamics ($\Delta D/Y$) are driven by **four channels**: growth, primary balance, interest rates, inflation
3. Default is **partial** (median haircut $\sim 40\%$), **serial**, and **historically recurrent** — "this time is different" is always wrong
4. The 2010s low-r "free lunch" era may be ending — debt dynamics are turning adverse again
5. Institutions and credibility matter: France vs. Britain, 1790s

References

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