The Coming Great Repression? New Measures and a Century of Evidence*

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May 29, 2026

Abstract

Financial repression—the use of regulation to create captive markets for government liabilities at below-market interest rates—has been used by governments throughout history, yet few systematic measures of its prevalence exist. To fill this gap, we introduce three quantity-based indicators grounded in a structural portfolio choice model, exploiting the differential response of banks' sovereign holdings to regulatory pressure relative to non-captive investors. A narrow fiscal indicator captures direct pressure on banks to hold government bonds; a monetary indicator extends the perimeter to bank reserves; and a consolidated measure combines both. Applying these measures to 18 advanced economies since 1920, we document that financial repression has been a persistent feature of modern history. While its prevalence declined after the end of the Bretton Woods era, our indicators point to a marked rise in repression since the Global Financial Crisis. Moreover, our measures correlate with higher debt burdens, restricted capital mobility, and crowding out of private investment and credit. Embedding our indicators in a debt decomposition framework, we show that repression was a major contributor to debt reduction after World War II and generated substantial fiscal savings in the post-2008 period. With our indicators already at peacetime highs and the conditions historically associated with elevated repression present today, our evidence points to financial repression as an increasingly likely channel of sovereign debt reduction going forward.

Keywords: financial repression; sovereign debt dynamics; captive markets; banks' sovereign holdings
JEL classification: E63; E58; H63; N10; N20

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Contents

Glossary of Acronyms

AE	Advanced Economy
AR(n)	Auto-regressive by order n
BIS	Bank for International Settlements
CBDC	Central Bank Digital Currency
FR	Financial Repression
GFC	Global Financial Crisis (2007–2009)
GDP	Gross Domestic Product
GMD	Global Macro Database (Müller-Plantenberg *et al.*, 2024)
JST	Jordà–Schularick–Taylor Macrohistory Database (Jordà *et al.*, 2017)
LCR	Liquidity Coverage Ratio
PFIMH	Public Finances in Modern History (Mauro *et al.*, 2015)
QE	Quantitative Easing
UIP	Uncovered Interest Rate Parity
WID	World Inequality Database
WWI	World War I (1914–1918)
WWII	World War II (1939–1945)

1. Introduction

Fiscal outlooks in many advanced economies have become increasingly challenging, with public debt at historically high peacetime levels.[1] Standard approaches to restoring fiscal space, such as fiscal consolidation and growth-enhancing reforms, remain central to countries' debt-reduction strategies, yet they can be slow to deliver results and politically difficult to sustain: fiscal consolidation can have limited effects on debt ratios if not well-timed (International Monetary Fund, 2023a), while polarization can hamper the formation of enabling political coalitions in support of fiscal adjustment (Alesina *et al.*, 1998; Cottarelli *et al.*, 2017). Structural reforms face related constraints, as they can impose near-term costs on concentrated interests while generating diffuse benefits only gradually over time horizons that often extend beyond typical political cycles (Campos *et al.*, 2025; Furceri *et al.*, 2024).

Historically, advanced economies have resorted to less orthodox channels to reduce debt burdens. One such channel is *surprise inflation*, which reduces the real value of nominal claims on the government when inflation exceeds what was originally priced into nominal securities at issuance (Eichengreen and Esteves, 2022; Hilscher *et al.*, 2021).[2] A second channel operates through *debt monetization*, which involves central bank financing of government deficits through the issuance of non-interest-bearing liabilities, such as currency or bank reserves, thereby relaxing the government's intertemporal budget con-

[1] Drivers of this debt buildup include rising entitlements spending associated with aging societies, resilience building, and rising geopolitical tensions, among others. See, for example, (Gopinath, 2024), (International Monetary Fund, 2023b), (Gaspar, 2024).

[2] Surprise inflation erodes the real debt burden because sovereign bonds are typically issued at fixed nominal rates: when realized inflation exceeds what bondholders anticipated, the real return on their holdings falls below the contracted rate, transferring real resources from creditors to the government. This channel can be self-limiting, however, as bondholders learn to anticipate inflationary finance, in turn demanding higher nominal yields to compensate for the higher inflation risk premium, raising the government's borrowing costs and progressively eroding the scope for debt liquidation through inflation surprises (Barro and Gordon, 1983).

straint (Feldberg and Lawson, 2020).[3] A third channel is *financial repression*, which refers to regulatory policies that compress sovereign borrowing costs below market levels by inducing financial institutions to absorb government debt as captive buyers.

Repression has historically operated through interest rate ceilings and prudential regulations requiring domestic institutions to hold government bonds, often reinforced by capital account restrictions that limit savers' ability to seek higher returns abroad. Financial repression can also operate through the monetary arm of the state, by mandating below-market remuneration on central bank reserves and exploiting the state's monopoly over currency issuance and interbank settlement to generate seigniorage beyond what competitive markets would permit. By compressing sovereign borrowing costs and ensuring a captive creditor base, financial repression acts as an implicit tax on domestic savers, and one that is less visible than overt fiscal tightening and therefore potentially more politically durable (Reinhart and Sbrancia, 2015).[4]

While the literatures on surprise inflation, debt monetization, and fiscal dominance are relatively well developed, systematic historical evidence on the use and impact of financial repression remains limited.[5] This reflects two distinct challenges. First, measuring financial repression requires detailed historical data on the composition and cost of

[3]By issuing liabilities that pay no interest, the government implicitly taxes private sector holders of money balances, extracting real resources through seigniorage—the inflation tax on monetary holdings (Sargent and Wallace, 1981; Reis, 2016). This channel can be effective as long as the public is willing to absorb additional money balances at stable prices; once money demand is met, further issuance could generate inflation rather than real revenue, linking monetization to the surprise inflation channel described above. Moreover, it is important to distinguish between classical monetization from post-2008 quantitative easing, in which central bank asset purchases were financed by issuing *interest-bearing* reserves rather than non-interest-bearing currency. Because reserves carry market-related remuneration, QE does not necessarily generate seigniorage in the traditional sense: its fiscal implications operate through the consolidated balance sheet of the state rather than through the inflation tax (Feldberg and Lawson, 2020; Reis, 2025).

[4]Academic and policy interest in financial repression has grown in recent years. It has attracted renewed attention as stablecoins and digital assets challenge traditional mechanisms for maintaining captive markets (Brunnermeier and Niepelt, 2023). Financial repression has also been identified as a tool governments have used to depress consumption and mobilize national savings, with implications for global external imbalances when deployed at scale (International Monetary Fund, 2026).

[5]On surprise inflation, see Hall and Sargent (2011), Eichengreen and Esteves (2022), and Hilscher *et al.* (2021). On monetization, see Bassetto and Sargent (2020) and Feldberg and Lawson (2020). On fiscal dominance, see Sargent and Wallace (1981) and Leeper (1991). Fiscal dominance, where the scale of government indebtedness constrains monetary policy, forcing the central bank to accommodate fiscal deficits through low interest rates or outright monetization, represents a related but distinct channel through which debt dynamics and monetary outcomes interact (Sargent and Wallace, 1981; Leeper, 1991). Financial repression, by contrast, works through direct regulatory pressure on financial intermediaries, compelling them to absorb public liabilities at below-market returns irrespective of the monetary policy stance.

government debt not readily available in standard sources, especially in the decades following World War II, when such policies were widespread in advanced economies (Reinhart and Sbrancia, 2015). Second, estimating the impact of financial repression requires constructing a credible counterfactual for government bond yields absent repression, which is an inherently unobservable variable (Acalin and Ball, 2024). As a result, existing studies tend to focus on individual country episodes or specific instruments, making it difficult to quantify the magnitude and persistence of financial repression in a systematic and comparable way across countries and time.

We address these challenges by developing new theory, data, and evidence. In so doing, we contribute to the literature on financial repression in three ways:

First, we develop a theoretically-grounded framework for measuring financial repression based on sectoral holdings of public sector liabilities. Our identification exploits the fact that financial repression operates through regulatory pressure targeting domestic financial institutions, disproportionately shifting their demand toward public liabilities relative to other investor groups. We formalize this in a portfolio-demand model in which repression enters as a demand shifter for regulated institutions—hereafter "banks"—making them willing to hold more public liabilities at a given yield than market incentives alone would imply. Because households face no such regulatory pressure, their portfolio behavior provides a clean benchmark for return-driven allocation. The gap between bank and household holdings, after controlling for relative returns, identifies the repression wedge. We propose three complementary indicators differing in the perimeter of public sector liabilities considered: a narrow fiscal measure based on government bond holdings, a monetary measure based on central bank reserves, and a consolidated measure spanning both arms of the state, allowing us to distinguish repression operating through sovereign debt from repression operating through central bank liabilities.[6]

Second, we construct a new historical dataset consolidating multiple sources on general government debt, central bank liabilities, and the sectoral composition of their hold-

[6]In this framework, "moral suasion" directed at households (for example, patriotic marketing campaigns to buy war bonds) is conceptually distinct from repression, because it does not operate through regulation of intermediaries. Capital account restrictions are often deployed alongside repression, but are treated here as complementary policies that affect outside options for savers rather than as direct shifters of bank demand for public liabilities.

ings. We then apply our theoretical measures to this dataset covering 18 advanced economies since 1920. We show that financial repression peaked during World War II and the subsequent Bretton Woods era while remaining subdued during the most of the post-1971 modern era, rising again since the global financial crisis. We find that financial repression is most pervasive when government debt and interest expenditures are high, and is also associated with higher primary balances, suggesting governments turn to repression when their fiscal effort via traditional tools has been maximized. Repression tends to coincide with low short- and long-term interest rates, depressed government bond yields relative to private asset returns. It also correlates with private credit growth, lower loan-to-deposit ratios, and reduced investment, which are broadly consistent with the notion that repression crowds out private capital. Finally, using newly collected post-WWII data on reserve and portfolio requirements, we show that the indicators line up systematically with these *de jure* policy instruments, validating the indicators as measures of the policies that drive financial repression.

Third, the model allows us to derive counterfactual sovereign borrowing costs absent financial repression and then quantify the contribution of repression to debt dynamics during historical episodes. To do so, we derive a model-implied counterfactual interest rate on government debt and embed the resulting yield wedge in a unified debt-decomposition framework alongside primary balances, interest–growth differentials, inflation surprises, central bank purchases, and debt restructuring. Applying this framework to the United Kingdom, United States, and Japan, we find that in the United Kingdom, it was the single largest deleveraging channel in the postwar decade, accounting for more of the observed debt reduction than either surprise inflation or fiscal consolidation. The contribution in the United States followed a similar pattern but was smaller in magnitude, with surprise inflation playing a relatively larger role in the immediate postwar years. In Japan, where debt has risen persistently since the 1990s, financial repression contributed a modest but consistent offset to debt accumulation, with the monetary repression channel becoming increasingly prominent following the Bank of Japan's balance sheet expansion after 2013. In the post-2008 period, repression offset debt accumulation across all three countries, consistent with the expansion of central bank balance sheets

at below-market remuneration. Across all episodes, estimated fiscal savings from financial repression are larger in magnitude than seigniorage revenues from either currency issuance or unremunerated reserve requirements.

Related Literature. Our paper contributes to three related strands of literature: the measurement and historical correlates of financial repression, studies of debt monetization and monetary financing, and the decomposition of public debt dynamics.

The literature on financial repression dates back to McKinnon (1970) and Shaw (1973), who define financial repression as policies that constrain financial intermediation and implicitly tax savings. Subsequent work often adopts a narrower usage, focusing on policies that lower the effective cost of domestic funding to governments. Measurement remains challenging because the relevant counterfactual interest rate absent repression is unobserved. Giovannini and de Melo (1990) address this challenge by exploiting the wedge between the government's external borrowing cost (less directly shaped by domestic repression) and its domestic cost of funds to infer the implicit revenue from repression, an approach that is less applicable when external borrowing is limited or when cross-border markets are segmented (for example, due to capital controls or heterogenous investor bases). A seminal contribution by Reinhart and Sbrancia (2015) quantifies the fiscal savings from repression by comparing the ex-post real return on government debt to fixed counterfactual real interest rates, showing that this channel accounted for a substantial share of postwar debt reduction across advanced economies. More recently, Jeanne (2025) provides a complementary theoretical framework, modeling financial repression as an optimal last-resort policy when fiscal consolidation is delayed by political frictions, and showing that repression tends to emerge when government debt exceeds 100 to 120 percent of GDP. In addition, single-country studies leverage richer institutional detail to construct tighter interest rate counterfactuals, including Acalin and Ball (2024) for the postwar United States and Lehner *et al.* (2025), who construct tax- and option-adjusted corporate-Treasury yield spreads for the United States since 1860 to provide a consistent historical estimate of the government's funding advantage. We contribute to this literature by developing quantity-based indicators that exploit differential sectoral absorption of government liabilities and map these quantity shifts into an explicit repression

wedge, enabling systematic comparisons across countries and time.

Our work also relates to the literature on debt monetization and monetary financing. In this literature, "monetization" is typically understood as relaxing the government resource constraint through the issuance of currency or other non-interest-bearing central bank liabilities, rather than simply central bank purchases of government bonds (Feldberg and Lawson, 2020). This perspective connects to classic arguments about the fiscal constraints on monetary outcomes and the seigniorage implications of central bank balance sheets (Sargent and Wallace, 1981; Reis, 2016). That literature focuses primarily on the fiscal dividend from issuing non-interest-bearing liabilities; our monetary repression indicator captures a related but distinct mechanism, namely the below-market remuneration of interest-bearing reserves, which generates an implicit fiscal transfer that typical seigniorage accounting does not capture (Reis, 2025; Payne and Szőke, 2025). Our consolidated measure therefore allows us to separate and quantify debt-reduction channels operating via suppressed sovereign yields from those operating via below-market returns on central bank liabilities within a unified framework.

Finally, we contribute to the broader literature on sovereign debt reduction and the decomposition of public debt dynamics. This literature studies the multiple channels underpinning debt reductions, including inflation and its historical role in consolidations (Eichengreen and Esteves, 2022), interest–growth dynamics and the associated "debt revenue" from issuing safe/liquid public debt (Reis, 2022), the conditions under which fiscal consolidations durably reduce debt ratios (International Monetary Fund, 2023a), financial repression and debt liquidation through persistently low or negative real returns (Reinhart and Sbrancia, 2015), and debt monetization (Feldberg and Lawson, 2020). More synthetic historical accounts stress that high-debt episodes can be long-lived and that countries draw on a menu of orthodox and heterodox tools depending on institutions and debt composition (Reinhart *et al.*, 2012; Kose *et al.*, 2022). We add to this literature by embedding our repression measures in debt-decomposition frameworks that quantify the contribution of financial repression alongside fiscal adjustment and inflation-related channels.

The rest of this paper proceeds as follows. Section 2. defines fiscal and monetary re-

pression, describes the data used in the paper, and provides stylized facts to motivate the paper's theoretical framework. Section 3. introduces the paper's theoretical model, describes how we measure fiscal and monetary repression, and compares our measures to other existing measures of financial repression. Section 4. presents the paper's results and shows both the use of financial repression over time and the correlates of financial repression at the country level. Section 5. explains the role of financial repression in sovereign debt dynamics, situating financial repression within the broader drivers of debt accumulation and reduction over time. Section 6. concludes.

2. Motivation

2.1. Varieties of Financial Repression

Financial repression describes a suite of policies that share a common balance-sheet mechanism: they induce financial intermediaries to hold government liabilities at administered or below-market returns, thereby transferring resources from the private sector to the state. We organize the concept around the two implementation channels that map directly into the empirical indicators developed below. The organizing distinction is the perimeter of the public sector liability being placed onto regulated intermediaries. In some episodes, repression operates primarily through the fiscal authority's liabilities, by compelling financial institutions to absorb sovereign debt on favorable terms for the state. In other episodes, repression operates through the monetary authority's liabilities, by expanding and/or mandating holdings of central bank liabilities at returns below market alternatives.[7]

We use the term *fiscal repression* to refer to policy interventions in which regulated intermediaries absorb an unusually large share of government bonds relative to other investors, compressing the sovereign's borrowing costs. Historically, this channel has often been implemented through combinations of portfolio and liquidity requirements, regulatory advantages to use bonds as collateral, restrictions on private credit growth, and

[7]Table 1 summarizes how this taxonomy maps into our narrow and broad indicators, as introduced in Section 3.

interest rate ceilings, making government bonds the dominant "safe" or required asset on banks' balance sheets. Several instruments can be used for fiscal repression:

- *Liquidity regulation* can effectively compel banks to hold large quantities of high-quality liquid assets, which in practice are often government securities (Bonner, 2016).[8]

- *Capital regulation* can tilt portfolios toward domestic sovereign exposures through preferential treatment of sovereign securities from a regulatory capital perspective, such as favorable risk weights (Becker and Ivashina, 2018).[9]

- *Collateral eligibility* rules confer liquidity premia on sovereign bonds by restricting which assets qualify in central bank operations or secured funding markets (Krishnamurthy and Vissing-Jorgensen, 2012).[10]

These instruments differ in legal form and stated rationale, but they share a common balance-sheet implication: by increasing regulated intermediaries' relative demand for government bonds, they compress sovereign borrowing costs and generate an implicit fiscal transfer from savers to the state.

We use the term *monetary repression* to refer to policies that induce investors to hold central bank liabilities, normally commercial bank reserves, at administered remuneration below the return on close market substitutes. This channel matters because standard discussions of financial repression focus on the impact of repression on government bond yields, while a substantial share of the public sector's favorable financing can occur through the remuneration policy and regulatory treatment of central bank liabilities.[11]

[8] A modern example is the liquidity coverage ratio standard under the Basel III framework (Basel Committee on Banking Supervision, 2013).

[9] Under the Basel III standardized approach, domestic sovereign debt carries a zero risk weight, giving banks a regulatory incentive to hold it relative to private assets (Basel Committee on Banking Supervision, 2010).

[10] Informal pressure on financial institutions to absorb sovereign debt has also been documented as a complement to these formal requirements, particularly during the European sovereign debt crisis (Ongena *et al.*, 2019).

[11] Under consolidation of the fiscal and monetary arms of the state, central bank liabilities, including currency in circulation and commercial bank reserves, form part of the consolidated public sector's obligations to the non-government sector. Below-market remuneration on these liabilities therefore constitutes an implicit fiscal transfer to the state analogous to the compression of sovereign borrowing costs through fiscal repression. The consolidated liability measure $L_t \equiv B_t^{pub} + C_t + R_t$ formalizes this in Section 5. and Annex A.43..

Several instruments can be used for monetary repression:

- *Seigniorage on currency* arises from the state's monopoly on cash issuance: legal tender laws require private agents to hold a zero-interest liability as a means of payment, extracting a real transfer equal to the inflation tax on monetary holdings (Reis, 2025).

- *Reserve requirements* are the traditional instrument of monetary repression applied to commercial banks. When banks are required to hold non-remunerated or below-market reserves, the wedge between the administered remuneration rate and the free-market rate acts as an implicit tax on financial intermediation, with the central bank's monopoly over interbank settlement ensuring structural demand for these liabilities (Humphrey and Keleher, 1982).

- *Quantitative easing* in the post-2008 era illustrates a modern form of monetary repression: large-scale asset purchases swapped government bonds for reserves remunerated at policy-determined rates, with the consolidated public sector setting the return on a growing share of commercial bank assets (Reis, 2025; Payne and Szőke, 2025).

Across all of these instruments, the balance-sheet logic is the same: a larger share of intermediaries' assets becomes a claim on the public sector whose return is set administratively, generating an implicit transfer to the state that market-based portfolio allocation would not produce.

In practice, fiscal and monetary repression rarely occur in isolation. Governments facing elevated debt burdens and limited political room for consolidation have historically drawn on both arms of the state simultaneously, combining bond-holding mandates on commercial banks with reserve requirements and below-market remuneration on central bank liabilities. The postwar Bretton Woods era exemplifies this pattern, as governments across advanced economies deployed liquidity and portfolio requirements alongside administered reserve remuneration within a framework of restricted capital mobility that made both channels binding simultaneously (Reinhart and Sbrancia, 2015).

A final methodological point concerns the distinction between the *intent* of a policy and its *repressive outcome*. Many instruments associated with repression are adopted on prudential, operational, or monetary-policy grounds. For example, liquidity regulation is motivated by improving financial institutions' resilience to runs and funding stress; reserve requirements have historically served monetary policy implementation objectives; and quantitative easing was implemented as a tool of macroeconomic stabilization. We do not equate these stated motivations with deliberate attempts to generate debt liquidation. What matters for debt dynamics, however, is the outcome: whether the prevailing policy environment induces regulated intermediaries to absorb public liabilities on terms that would not arise under market-based portfolio choice. This observation motivates our outcome-based approach. Rather than coding individual regulations or inferring intent, our empirical measures focus on balance-sheet quantities—how much of the public sector's liabilities are absorbed by regulated intermediaries relative to other investors—and on how these quantity shifts map into an implied wedge in effective borrowing costs, as developed in Section 3.

2.2. Data

The purpose of our study is to develop novel measures of financial repression and examine how they perform over a century across a sample of 18 advanced economies. To do so, we combine several data sources.

The primary challenge is constructing for each country and year consistent measures of the sectoral composition of government debt holdings alongside the balance sheet aggregates needed to compute portfolio shares. The former tells us *who* holds government debt, be they commercial banks, the central bank, households, or nonresidents, while the latter tells us how large each sector's total asset base is, so that holdings can be expressed as portfolio shares rather than raw nominal quantities. Both are required to construct our repression indicators, yet they are drawn from sources that were designed independently, cover different country samples and time spans, and apply different accounting conventions, making harmonization across 18 countries and over a century the central data challenge of the paper.

Table 1: Varieties of Financial Repression

	Measure 1 *(fiscal repression)*	**Measure 2** *(monetary repression)*	**Measure 3** *(fiscal + monetary repression)*
Public sector perimeter	General government	Central bank	General government + central bank
Relevant liability	Government bonds held by commercial banks	Commercial bank reserves	Government bonds and commercial bank reserves
Policy instruments	Liquidity requirements; capital requirements; portfolio requirements; collateral eligibility rules;	Reserve requirements; remuneration policies; legal tender laws	All of the above, combined with QE
Quantitative repression indicator	Government bonds as share of commercial bank assets (B^b/A^b)	Commercial bank reserves created through central bank purchases of government bonds (B^{CB}/A^b)	Government bonds held directly and indirectly as share of commercial bank assets ($(B^b + B^{CB})/(A^b)$)
Primary historical episode	World Wars (bond mandates)	Bretton Woods era	Post-GFC

Notes: B^b, B^{CB} = commercial bank and central bank holdings of government bonds. The wedge between the narrow and consolidated measures isolates repression operating through the monetary arm of the state. See Section 6. for derivations.

Two further requirements shape our dataset construction. First, our variables must span the wartime episodes in which financial repression was most pronounced and the post-Bretton Woods era in which it gradually receded, as well as the post-global financial crisis period in which our indicators suggest it has begun to rise again. Second, our identification strategy exploits cross-country as well as time-series variation, so measurement error that varies systematically across countries would contaminate our estimates. The harmonized dataset described below is designed to meet both requirements.

We restrict our analysis to 18 advanced economies covered by the Jordà–Schularick–Taylor (JST) database (Jordà *et al.*, 2017), spanning 1870 to 2020: Australia, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, and United States. The JST database provides short- and long-term interest rates, returns on risky assets including equities and housing, and commercial bank balance sheet aggregates, all measured and defined consistently across countries and years—making it the natural backbone of our dataset. We supplement JST with the Public Finances in Modern History (PFIMH) series (Mauro *et al.*, 2015), which together provide annual observations on government expenditures, revenues, the nominal stock of public debt, and nominal and real GDP dating back to 1880. Data on the sectoral composition of government debt holdings—the share held by commercial banks, the central bank, households, and nonresidents—come from Abbas *et al.* (2011) and Arslanalp and Tsuda (2014), extended to 2020. Data on central bank assets are drawn from the Bank for International Settlements, and data on currency in circulation are from Finaeon. Wherever macro-fiscal aggregates are missing from JST or PFIMH, we draw on the Global Macro Database (Müller-Plantenberg *et al.*, 2024) to fill gaps.

Data on national wealth used to construct household total asset holdings come from the World Inequality Database (WID) (Piketty and Zucman, 2014), which provides long-run estimates of household net wealth as a share of national income across countries. The historical wealth-to-output series is taken directly from WID through 1979 where available, while later observations are harmonized as net market-value national wealth divided by average GDP, and the combined series is then mapped to JST country codes

before merging into the master panel.

Data on sovereign debt restructurings and haircuts are drawn from Graf von Luckner *et al.* (2024). These data provide episode-level estimates of the nominal haircut imposed on creditors in each restructuring event, which we use to construct the h_t term in the debt decomposition of Section 5. It covers 329 distressed restructuring events with external private creditors worldwide over 1823–2024. We assign the NPV haircut, face-value haircut, and nominal amount of debt restructured to the restructuring year, and compute the annual haircut term as the NPV haircut times debt restructured, converted into local currency and scaled by GDP.

Our two financial repression indicators are based on the portfolio shares of government liabilities held by domestic financial institutions relative to non-captive investors. Constructing these shares requires building balance sheet aggregates for commercial banks, households, and the consolidated public sector from the underlying source data. In addition to these quantity-based portfolio shares, the full repression indicator developed in Section 3. requires estimates of expected returns on government bonds and private assets to control for return-driven portfolio rebalancing. Expected returns on government bonds are constructed from nominal bond yields from JST combined with expected inflation, estimated using a country-specific auto regressive model.[12] Expected returns on private assets are proxied by dividend yields for equities and rental yields for housing, both from JST, combined with expected capital gains constructed analogously. Full details on balance sheet construction and return estimation are provided in Annex A.2 A summary of the underlying data sources used in constructing our composite dataset is provided in Table 2.

[12]Specifically, inflation expectations are constructed from annual GDP-deflator inflation using a country-specific rolling AR(1) model estimated on data available up to year t-1, with forecasts generated from 1900 onward; surprise inflation is the resulting forecast error. For Germany, the 1921–1924 hyperinflation years are excluded from AR(1) estimation, and the 1925 forecast is re-initialized using the median German inflation rate over 1900–1920 before standard AR(1) dynamics resume.

Table 2: Data Sources Used to Construct Composite Dataset

Dataset	**Data Drawn**	**Coverage**
Abbas *et al.* (2011)	Sectoral shares of government debt: commercial banks, central bank, households, nonresidents	18 AEs, 1880–2011
Arslanalp and Tsuda (2014)	Sectoral shares of government debt, extended to 2020	24 AEs, 2004–2020
Bank for International Settlements	Central bank total assets	18 AEs, 1950–2020
Finaeon	Currency in circulation	18 AEs, 1920–2020
Müller-Plantenberg *et al.* (2024)	Gap-filling macro-fiscal aggregates	170+ countries, 1800–2020
Graf von Luckner *et al.* (2024)	Sovereign debt restructuring episodes; NPV and face-value haircuts	Worldwide, 1823–2024
Jordà *et al.* (2017)	Interest rates; equity and housing returns; bank balance sheets; nominal GDP	18 AEs, 1870–2020
Mauro *et al.* (2015)	Government expenditures, revenues, public debt stock, GDP	17 AEs, 1880–2011
Piketty and Zucman (2014)	National wealth; household net wealth as share of national income	18 AEs, 1900–2020

Notes: AEs = Advanced Economies. Coverage dates are approximate for BIS and Finaeon. The paper's analytical sample is restricted to 18 advanced economies over 1920–2020.

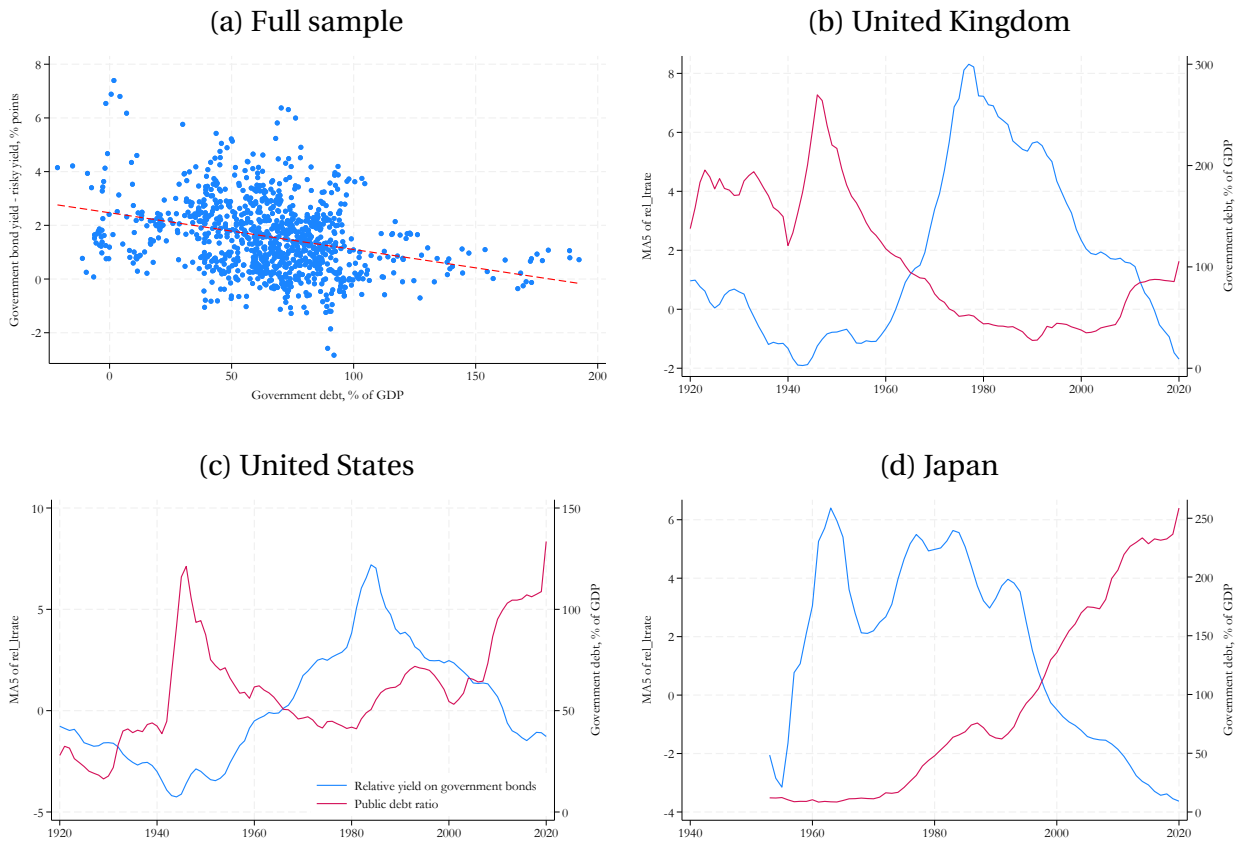
2.3. Stylized Facts

This section documents three sets of stylized facts that motivate the theoretical framework developed in Section 3.. We report these facts using binned scatterplots that control for country and year fixed effects. Taken together, the facts establish that investors are not compensated for higher sovereign debt burdens, that commercial banks absorb disproportionately large shares of government debt precisely when market incentives would not predict such behavior, and that this absorption comes at the expense of private sector investment. This pattern is consistent with regulatory-driven rather than market-driven portfolio choice.

Stylized Fact 1. *Higher sovereign debt burdens are associated with lower, not higher, relative returns on government bonds.*

Across countries and over time, higher public debt burdens are associated with *lower* relative returns on government bonds—the opposite of what standard risk premium models would predict (Figure 1a). The relationship is not merely flat: the full-sample binscatter reveals a clearly negative slope, with relative returns compressing precisely as debt burdens rise. The country panels make the pattern concrete. In the United Kingdom, relative yields on government bonds fell sharply negative—reaching approximately -4 percent per annum—at the exact moment public debt peaked near 250 percent of GDP in the late 1940s (Figure 1b). A similar dynamic played out in the United States, where relative yields dropped to around -3 percent at the postwar debt peak (Figure 1c). Japan provides a modern analogue: as public debt has risen toward 250 percent of GDP since the 1990s, relative returns on government bonds have again collapsed into deeply negative territory (Figure 1d). The consistency of this pattern across episodes and countries is difficult to reconcile with market-driven portfolio allocation alone, and is instead consistent with a mechanism that systematically compresses sovereign borrowing costs relative to private asset returns precisely when fiscal pressures are greatest.

Figure 1: Government Bond Yields Relative to Private Assets and Public Debt Burdens

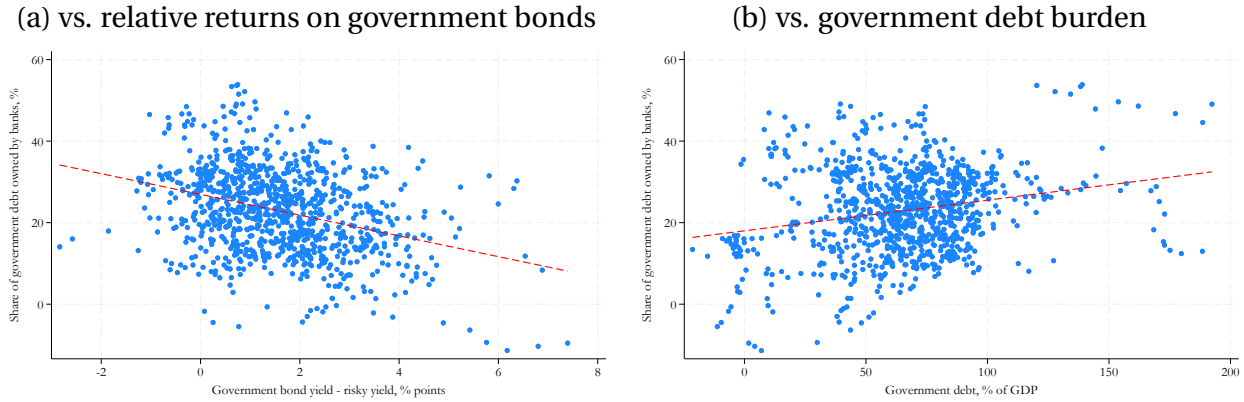


Notes: Panel (a) shows a binned scatterplot of the relative return on government bonds against the government debt-to-GDP ratio, controlling for country and year fixed effects, across all 18 advanced economies from 1920 to 2020. The relative return is defined as the government bond yield minus an equally-weighted average of equity dividend yields and housing rental yields. All return series are drawn from the JST database (Jordà *et al.*, 2017). The dashed line in panel (a) shows the fitted regression. Panels (b)–(d) show time series for the United Kingdom, United States, and Japan respectively. The blue line (left axis) plots the relative return on government bonds in percent per annum; the red line (right axis) plots the government debt-to-GDP ratio.

Stylized Fact 2. *Commercial banks hold a disproportionately large share of government debt precisely when returns on sovereign bonds are lowest and debt burdens are highest.*

This fact concerns the composition of buyers of government debt. Panel (a) of Figure 2 shows that the share of government debt held by commercial banks is systematically higher when relative returns on government bonds are lower—the opposite of what voluntary, return-maximizing portfolio allocation would imply. In a frictionless market, rational investors would shift away from government bonds toward higher-yielding private assets as the relative return on sovereign debt falls; the fact that banks do the opposite suggests their demand may be shaped by regulatory constraints rather than purely by price signals. Panel (b) reinforces this: bank holdings shares are also higher when government debt burdens are elevated, suggesting that banks absorb a disproportionate share of sovereign financing precisely when the government's need for captive demand is greatest. Taken together, the two panels document a pattern inconsistent with market-driven portfolio choice: banks load up on government debt when it offers the worst relative returns and when fiscal pressures are most acute, providing prima facie evidence that regulatory pressure is compelling intermediaries to act as captive buyers of sovereign debt.

Figure 2: Commercial Bank Holdings of Government Debt

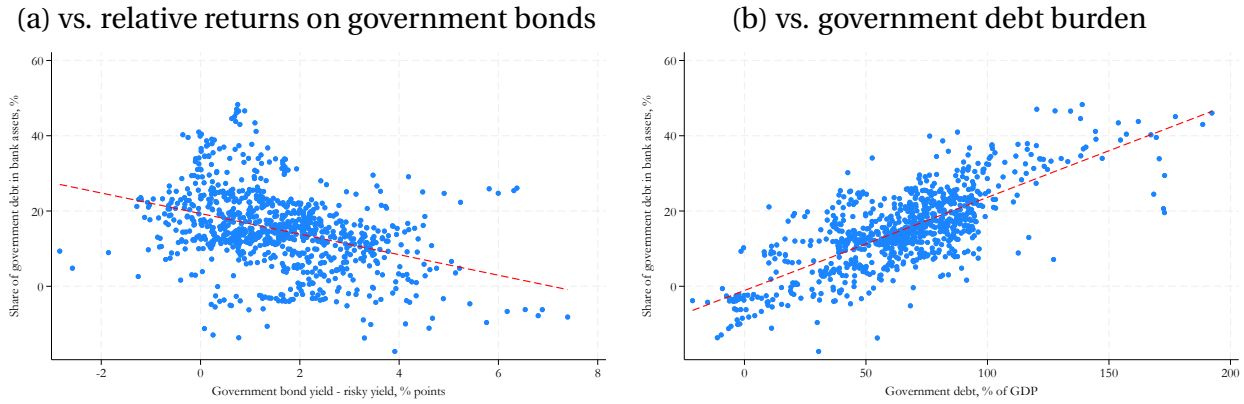


Notes: Both panels show binned scatterplots controlling for country and year fixed effects across all 18 advanced economies from 1920 to 2020. The y-axis in both panels is the share of total government debt held by commercial banks, in percent. In panel (a), the x-axis is the relative return on government bonds, defined as the government bond yield minus an equally-weighted average of equity dividend yields and housing rental yields. In panel (b), the x-axis is the government debt-to-GDP ratio. Dashed lines show fitted regressions. All series are drawn from the JST database (Jordà *et al.*, 2017) and Abbas *et al.* (2011).

Stylized Fact 3. *Government securities account for a larger share of commercial bank assets when debt burdens are higher and sovereign bond returns are lower relative to private assets.*

This fact focuses on the portfolio choice of banks. Panel (a) of Figure 3 shows a negative relationship between the share of government securities in bank assets and the relative return on government bonds: as sovereign debt becomes less attractive relative to private assets, banks nonetheless allocate a larger share of their portfolios toward it. Panel (b) shows the mirror image on the fiscal side: the government debt share of bank assets rises steeply with the overall debt burden, with the slope among the steepest of the three stylized facts. Crucially, this shift in portfolio composition does not reflect balance sheet expansion: banks are not simply growing their assets to accommodate more government debt. Rather, they expand their sovereign exposure at the expense of lending to the private sector.This substitution from private to public assets is the balance-sheet signature of financial repression and provides the core empirical motivation for the quantity-based measurement framework developed in Section 3..

Figure 3: Government Securities as a Share of Commercial Bank Assets



Notes: Both panels show binned scatterplots controlling for country and year fixed effects across all 18 advanced economies from 1920 to 2020. The y-axis in both panels is the share of government securities in total commercial bank assets, in percent. In panel (a), the x-axis is the relative return on government bonds, defined as the government bond yield minus an equally-weighted average of equity dividend yields and housing rental yields. In panel (b), the x-axis is the government debt-to-GDP ratio. Dashed lines show fitted regressions. All series are drawn from the JST database (Jordà *et al.*, 2017) and Abbas *et al.* (2011).

In sum, sovereign debt burdens are associated with compressed rather than elevated relative returns (stylized fact 1); commercial banks absorb disproportionately large shares

of government debt precisely when those returns are lowest (stylized fact 2); and this absorption comes at the direct expense of private sector lending (stylized fact 3). Taken together, these findings point toward regulatory pressure that systematically changes financial intermediaries' demand for public liabilities away from what market incentives alone would imply. Quantifying this distortion and tracing its contribution to debt dynamics across countries and time requires a structural framework that can distinguish regulation-induced demand shifts from return-driven portfolio rebalancing. We develop such a framework in the next section.

3. Theoretical Framework

This section develops the theoretical framework that underpins our measures of financial repression. The stylized facts documented in Section 2. establish that commercial banks hold disproportionately large shares of government debt precisely when sovereign returns are lowest and fiscal pressures are greatest, which is inconsistent with market-driven portfolio allocation. To translate this observation into a quantitative measure of financial repression, we develop a structural model that distinguishes between regulatory-induced demand shifts from return-driven portfolio rebalancing, and that maps quantity-based evidence on sectoral holdings into an implied wedge in effective government borrowing costs.

We proceed in three steps. Section 3.1. presents a portfolio demand model in which banks and households choose between government bonds and private assets subject to Fréchet-distributed taste shocks. Financial repression enters as a policy-induced demand shifter for banks, making them willing to hold more public liabilities at a given yield than market incentives alone would imply. Section 3.2. uses the model's log-odds representation to derive three complementary repression indicators that differ in the perimeter of public sector liabilities considered: a narrow fiscal measure based on government bond holdings, a monetary measure based on central bank reserves, and a consolidated measure that combines both arms of the state.

3.1. Modeling Financial Repression

Setup. There are four types of agents: households (h), banks (b), non-financial corporations (c), and the government (g). The government finances its expenditures by issuing nominal bonds B, which are held by banks (B^b) and households (B^h). Household assets include deposits D in banks, government bonds B^h, and claims on corporations' private assets I^h. Bank assets include loans to corporations L^c and government bonds B^b; bank liabilities are deposits D . For simplicity, we abstract from central bank reserves in the baseline model, returning to this channel in Section 3.2.. Corporations' assets are physical capital K, and their liabilities consist of bank loans and household equity claims.

Demand. Banks and households choose between government bonds and private corporate assets. There is no default risk, so portfolio choices depend on gross expected returns $R_j^e = 1 + r_j^e$ and non-pecuniary taste. A continuum of agents of type $i \in \{b, h\}$ (indexed by ω) have idiosyncratic taste shifters given by

$$\zeta_j^i(\omega) = \tilde{\zeta}_j^i(\omega) \cdot \bar{T}_j^i \cdot \tilde{T}_j^i, \tag{1}$$

where $\tilde{\zeta}_j^i(\omega)$ is drawn from a Fréchet distribution with shape parameter $\theta^i > 0$ and unit scale. The parameter θ^i governs the elasticity of substitution between government bonds and private assets for investor type i. $\bar{T}_j^i$ is a time-invariant shifter capturing structural differences in demand for asset j by type i. $\tilde{T}_j^i$ is a time-varying shifter driven by government regulation, and it is this term that we associate with financial repression. We normalize $\tilde{T}_j^i = 1$ for $j = c$, so that repression operates only on demand for public liabilities. Crucially, we allow $\tilde{T}_g^b \neq 1$ for banks while imposing $\tilde{T}_g^h = 1$ for households, reflecting the fact that regulatory pressure operates through financial intermediaries rather than through households directly. It is this asymmetry between captive and non-captive investors that identifies financial repression in the data.

Portfolio shares. Under the Fréchet specification, the demand for government bonds from investor type i takes the logistic form

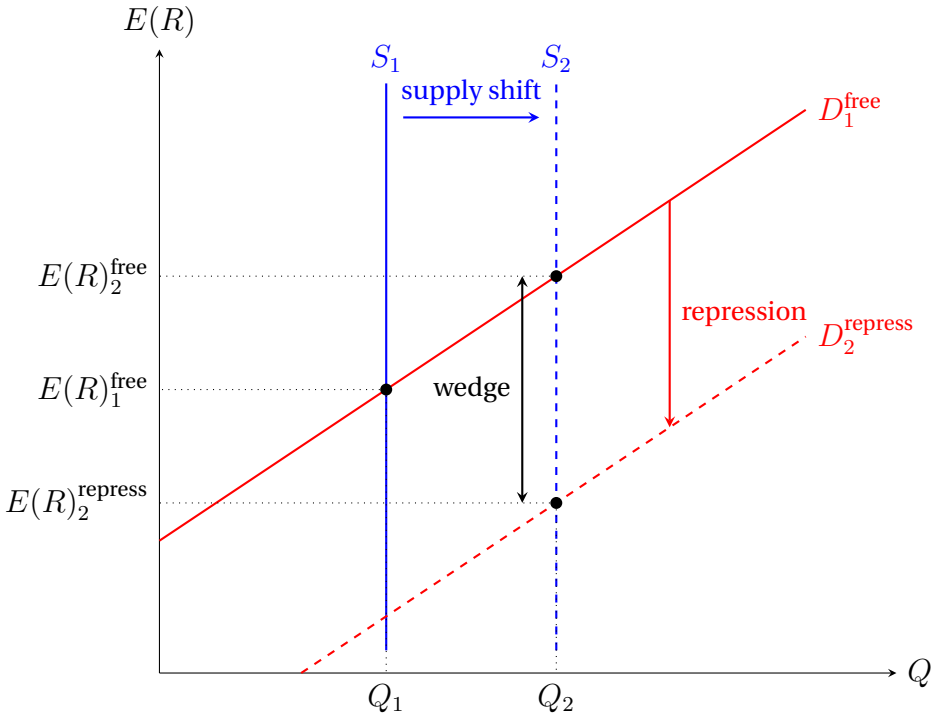
$$s_g^i = \frac{\left(\bar{T}_g^i \cdot \tilde{T}_g^i \cdot R_g^e\right)^{\theta^i}}{\left(\bar{T}_g^i \cdot \tilde{T}_g^i \cdot R_g^e\right)^{\theta^i} + \left(\bar{T}_c^i \cdot R_c^e\right)^{\theta^i}} \tag{2}$$

where $s_g^i \in (0,1)$ is the share of government bonds in total assets of investor i, with the private asset share given by $s_c^i = 1 - s_g^i$. Portfolio shares are increasing in relative expected returns and in the demand shifters $\bar{T}_g^i$ and $\tilde{T}_g^i$. The key implication for our purposes is that an increase in the regulatory demand shifter $\tilde{T}_g^b$—reflecting financial repression—raises banks' portfolio share s_g^b holding returns and household behavior fixed. Conversely, household portfolio shares s_g^h are unaffected by regulation and thus provide a return-driven benchmark against which banks' excess demand for government bonds can be measured. As shown in the next section, it is the gap between s_g^b and s_g^h, after controlling for differences in returns and structural preferences, that identifies the repression wedge $\tilde{T}_g^b$.

Intuition. Figure 4 illustrates the market equilibrium and the role of financial repression. The vertical supply curves S_1 and S_2 represent two levels of government bond issuance, with S_2 reflecting a higher debt burden. In the absence of repression, the market clears at the intersection of S_1 and D_1^{free}, yielding the equilibrium return $E(R)_1^{\text{free}}$ at quantity Q_1. When the government increases issuance to Q_2, the counterfactual free-market equilibrium would require a higher return $E(R)_2^{\text{free}}$ to attract sufficient voluntary demand. Financial repression disrupts this adjustment: an increase in the regulatory demand shifter $\tilde{T}_g^b$ compels banks to absorb sovereign debt at below-market terms, rotating the effective demand curve downward to D_2^{repress}, so that the market clears at the lower return $E(R)_2^{\text{repress}}$. The wedge between $E(R)_2^{\text{free}}$ and $E(R)_2^{\text{repress}}$ is the repression subsidy—the implicit transfer from captive investors to the sovereign that our measure is designed to quantify and that enters the debt decomposition in Section 5.. Figure 5 illustrates the fiscal dimension of this wedge: the gray shaded area represents the annual interest savings accruing to the government from repression, equal to the stock of publicly-held debt multiplied by the difference between the counterfactual and observed borrowing costs, $d^{pub} \cdot (r^{B,free} - r^B)$. Figure 6 illustrates an alternative scenario in which repression is cal-

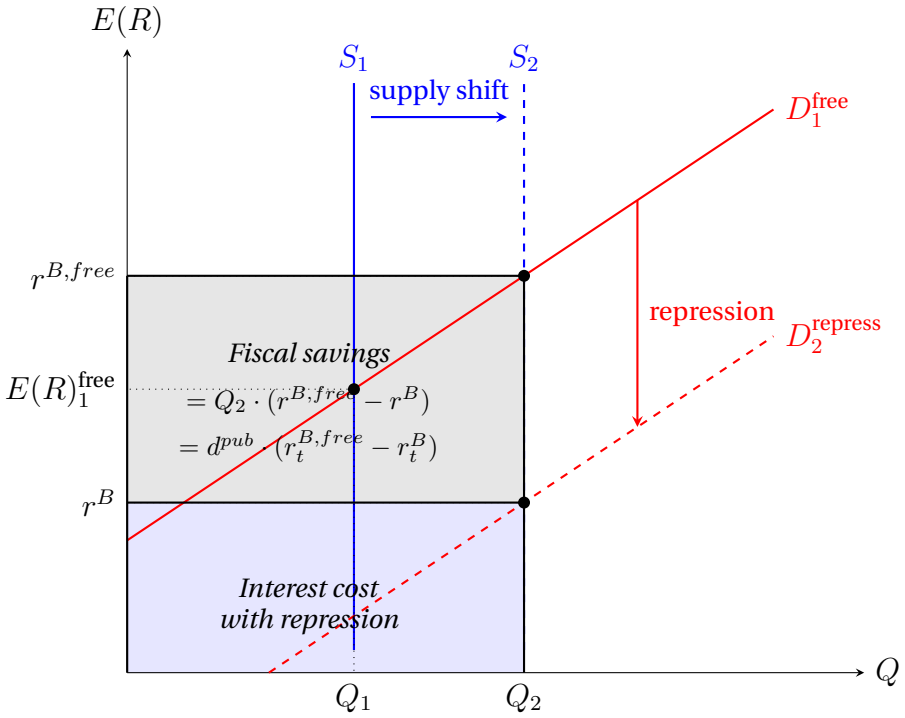
ibrated not to push the rate below the original level but simply to accommodate a larger supply of bonds at the same borrowing cost, yielding a narrower but still positive fiscal saving.

Figure 4: Financial Repression in the Government Bond Market



Notes: The diagram illustrates equilibrium in the government bond market. Vertical lines S_1 and S_2 represent two levels of bond supply, with S_2 reflecting a higher debt burden. D_1^{free} is the free-market demand curve. When supply expands from S_1 to S_2, the counterfactual free-market equilibrium would require a higher return $E(R)_2^{\text{free}}$ to attract sufficient voluntary demand. Financial repression disrupts this adjustment by compelling banks to absorb sovereign debt at below-market terms, shifting effective demand downward to D_2^{repress} and yielding the lower observed return $E(R)_2^{\text{repress}}$. The wedge between $E(R)_2^{\text{free}}$ and $E(R)_2^{\text{repress}}$ is the repression subsidy quantified in Section 3.2.

Figure 5: Fiscal Savings from Financial Repression



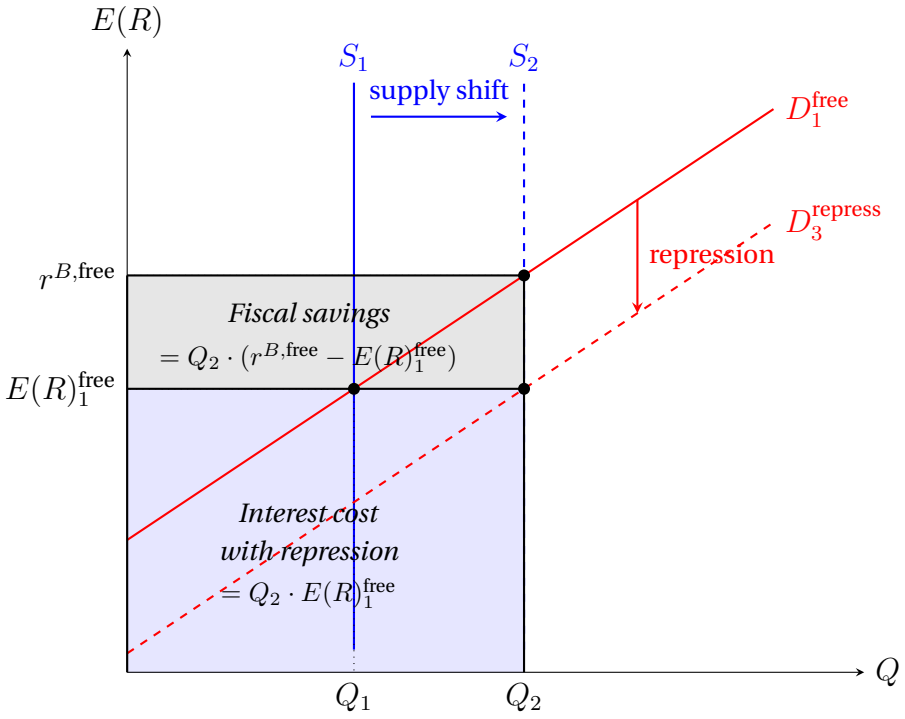
Notes: The diagram extends Figure 4 to illustrate the fiscal savings from financial repression. When the government increases bond supply from S_1 to S_2 and deploys repression to shift effective demand downward to D_2^{repress}, the market clears at the lower return r^B rather than the counterfactual free-market return $r^{B,free}$. The dark shaded (gray) rectangle represents the annual fiscal savings from repression, equal to the stock of publicly-held debt Q_2 multiplied by the repression wedge $(r^{B,free} - r^B)$. In the debt decomposition framework of Section 5., this corresponds to the term $d_{t-1}^{pub} \cdot (r_t^{B,free} - r_t^B)$. The light shaded (blue) rectangle represents the residual interest cost the government still bears under repression. Together the two rectangles sum to the total counterfactual interest expense $Q_2 \cdot r^{B,free}$ that would have prevailed in the absence of repression.

3.2. Measuring Financial Repression

The portfolio share expression in (2) is nonlinear in returns and demand shifters, which makes it difficult to isolate the repression component directly. A natural linearization is the log-odds transformation, which maps portfolio shares to the real line and yields an expression that is linear in the structural parameters. Define the relative demand for government bonds as

$$\ln \tilde{s}_g^i \equiv \ln \frac{s_g^i}{1 - s_g^i}. \tag{3}$$

Figure 6: Fiscal Savings: Accommodating Higher Bond Supply at the Original Interest Rate



Notes: This figure illustrates an alternative fiscal savings scenario in which financial repression is calibrated to hold the sovereign interest rate constant at its original free-market level $E(R)_1^{\text{free}}$ despite a higher volume of bond issuance. When supply expands from S_1 to S_2, the free-market equilibrium without repression would require a higher return $r^{B,\text{free}}$ to attract voluntary demand. Repression instead shifts effective demand downward to D_3^{repress}, so the market clears at Q_2 at the original rate $E(R)_1^{\text{free}}$. The gray shaded rectangle represents the fiscal savings, equal to the additional bond supply multiplied by the difference between the counterfactual and maintained rates, $Q_2 \cdot (r^{B,\text{free}} - E(R)_1^{\text{free}})$. The blue shaded rectangle is the interest cost the government still bears. Compare to Figure 5, where repression pushes the rate below the original level; here, repression is exactly sufficient to accommodate larger supply without any increase in borrowing costs.

Substituting the portfolio share expression (2) into (3), which is linear in relative returns and policy-induced taste shifters under the discrete-choice portfolio problem, changes in financial repression between two periods can be written as (see Annex A.41. for derivation details)

$$\Delta \ln \tilde{T}_g^b \;=\; \Delta \ln \tilde{s}_g^b - \Delta \ln \tilde{s}_g^h - (\theta^b - \theta^h)\left(\Delta r_g^e - \Delta r_c^e\right). \tag{4}$$

The three terms have a clean economic interpretation. The first two terms, $\Delta \ln \tilde{s}_g^b - \Delta \ln \tilde{s}_g^h$, capture changes in the log-odds of banks' government bond holdings relative to households'—the raw quantity signal of repression. The third term, $(\theta^b - \theta^h)(\Delta r_g^e - \Delta r_c^e)$, removes the component of this gap attributable to return-driven portfolio rebalancing, adjusting for any difference in substitution elasticities across investor types. Financial repression is therefore identified as the residual shift in banks' relative demand for government bonds that cannot be explained by changes in relative returns or by household behavior. When elasticities are common across investor types ($\theta^b = \theta^h$), the return-adjustment term drops out and changes in repression are directly reflected in changes in the relative holdings of government bonds by banks and households.[13]

[13]How does financial repression impact deposit rates? For reasonable initial levels of the returns on government bonds and investing in non-financial corporations, financial repression tends to lower deposit rates. For exposition, we assume banks do not make loans to households; we will relax this when we bring the framework to the data. Since banks do not make profits, the deposit rate is the weighted average of the return paid to bondholders and the return on corporate assets:

$$r^D = r^B s^b + r^C(1 - s^b) \quad . \tag{5}$$

Financial repression lowers the deposit rate through two channels. First, since the return on government debt is generally lower than the return on corporate assets ($r^B < r^C$), a regulatory shift toward government bonds lowers the average return on the bank's portfolio. Second, the increased demand for government bonds compresses their yield further. The first-order change in the deposit rate from an increase in $\ln \tilde{T}_g^b$ is

$$\frac{dr^D}{d\ln T} = s^b(r^b - r^c)\frac{\partial \ln s^b}{\partial \ln T} + s^b \frac{\partial r^b}{\partial \ln T} \quad , \tag{6}$$

which is negative when $r^b < r^c$, since $\frac{\partial \ln s^b}{\partial \ln T} > 0$ and $\frac{\partial r^b}{\partial \ln T} < 0$ follow directly from the demand for government bonds.

3.2.1. Constructing the Financial Repression Indicators

Fiscal repression. The fiscal repression indicator measures the share of government bonds in commercial bank assets relative to the household benchmark. Formally, let $s_g^{b,F} = B^b/A^b$ denote the share of government bonds in bank assets and $s_g^h = B^h/A^h$ denote the corresponding household share. The fiscal repression indicator is

$$FR^F = \ln s_g^{b,F} - \ln s_g^h \quad , \tag{7}$$

expressed in log form relative to the household benchmark. A higher value of FR^F indicates that banks hold a disproportionately large share of government bonds relative to what household portfolio behavior would predict, consistent with regulatory pressure on the fiscal authority's liabilities.

Monetary repression. The monetary repression indicator extends the perimeter of public sector claims to include commercial bank reserves held at the central bank. Let $s_g^{b,M} = B^{CB}/A^b$ denote the share of central bank reserves in bank assets created through central bank purchases of government bonds, where B^{CB} are government bonds held by the central bank. The monetary repression indicator is

$$FR^M = \ln s_g^{b,M} - \ln s_g^h \quad , \tag{8}$$

expressed relative to the household benchmark.

Fiscal and monetary repression. The consolidated indicator combines both channels. Let $s_g^{b,FM} = (B^b + B^{CB})/(A^b)$ denote the share of government bonds held directly or indirectly as a share of commercial bank assets. The consolidated repression indicator is

$$FR^{FM} = \ln s_g^{b,FM} - \ln s_g^h \quad , \tag{9}$$

again expressed relative to the household benchmark.

4. Estimates and Correlates of Financial Repression

This section presents our estimates of the new financial repression indicators and relates them to macroeconomic and financial indicators across countries and time.

4.1. The Use of Financial Repression Over Time

Our financial repression indicators exhibit clear temporal patterns since 1920 (Figure 7a). The cross-country average across the three measures suggests that repression has been a persistent feature of modern financial systems. Its use increased markedly during the interwar period, peaking around World War II, consistent with wartime financing needs and heightened state intervention. Repression remained widespread through the postwar decades until the 1980s. While its prevalence declined thereafter amid financial liberalization, the indicators point to a renewed increase following the global financial crisis, rising sharply in its aftermath.

Averaging repression indicators across relevant historical periods reveals a clear association between financial repression and the degree of capital mobility in the international monetary system. Repression was more prevalent under regimes characterized by restricted capital flows, including the Bretton Woods system and periods when capital mobility was broadly suspended, such as during World War II. By contrast, repression was less pronounced during episodes of greater financial openness, including the the Interwar Gold Standard (1920–1929), and the post-Bretton Woods era following 1971. These cross-period differences are illustrated in Figure 7b.

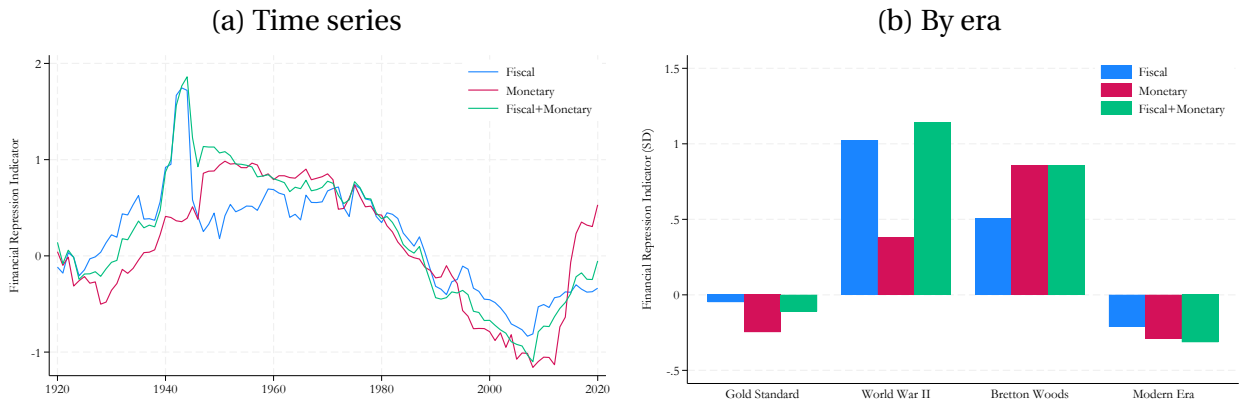
4.2. Correlates of Financial Repression

We test what macroeconomic characteristics are associated with our repression measures. To this end, we consider the following regression:

$$FR_{i,t} = \beta X_{i,t} + \alpha_i + \alpha_t + \epsilon_{i,t} \tag{10}$$

where $X_{i,t}$ are different macroeconomic variables, and α_i and α_t are country and year

Figure 7: The use of financial repression over time



Notes: Gold Standard: 1920-1929; World War II: 1939-1945; Bretton Woods: 1946-1970; modern era: 1971 onwards. The years following the collapse of the Gold Standard before WWII (1930 to 1938) are not shown.

fixed effects. We express $FR_{i,t}$, as well as most right hand side variables, in standard deviations. We cluster standard errors by year.[14] The complete set of regression outputs are available in subsection A.3.

Debt pressures. We first relate the financial repression indicators to variables that reflect fiscal sustainability pressures. The estimated coefficients β are plotted in Figure 8. Financial repression is most pervasive when government debt burdens are high and when interest expenses are elevated. A one standard deviation greater government debt to GDP ratio or interest expenditures to GDP ratio is associated with 0.2 to 0.4 standard deviations higher indicators of financial repression. Countries where the primary balance is higher also score significantly higher on the financial repression indicators, suggesting financial repression is used as a policy tool when countries have maximized their fiscal effort.

Interest rates and asset returns. Low interest rates, both on short and long term bonds, predict significantly greater use of financial repression. Government bond yields are lower relative to yields on private assets (equity and housing) in countries that engage in more financial repression. The effective interest rate on government debt is also decreasing in

[14] For the right hand side variable, we winsorize at the 1st and 99th percentiles to ensure outliers don't drive the results.

the use of financial repression.

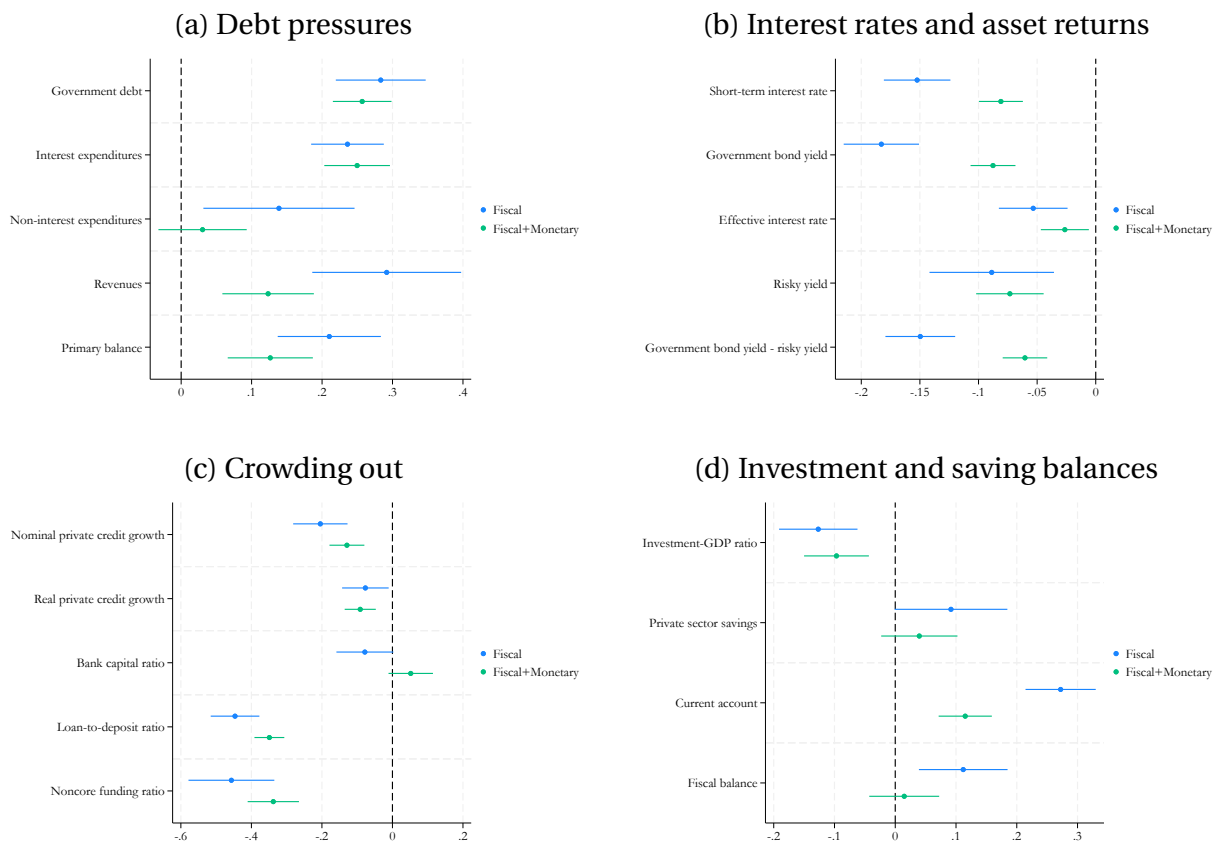
Crowding out of private investment. Our estimates suggest financial repression correlates with symptoms of crowding out of private capital. In countries with one standard deviation slower nominal or real private credit growth, the financial repression indicators are 0.1 to 0.2 standard deviations higher. Financial repression is also significantly higher in countries with lower loan-to-deposit ratios, suggesting bank deposits are used to a greater extent to fund government liabilities relative to loans to the private sector. At the same time, bank capital ratios do not predict financial repression, indicating that banks do not use more leverage when our financial repression indicators are higher.

Investment as a share of GDP is also significantly lower when the use of financial repression is higher. A one standard deviation lower investment to GDP ratio is associated with a 0.1 to 0.2 standard deviations higher financial repression indicators.

Relation to de jure policies. To assess to what extent our financial repression indicators reflect financial repression policies, we collect historical data on the use of reserve requirements (i.e. hold a minimum share of assets in cash reserves at the central bank) and portfolio requirements (i.e. hold a minimum share of assets in government bonds) for commercial banks. Our series cover France, Germany, Japan, and the United States for the post-World War II period.

We plot the relationships between the financial repression indicators and policies in Figure 9. Our indicator of monetary repression is higher in countries with larger reserve requirements. A 10 percentage point higher reserve requirement is associated with an almost one standard deviation higher score for the monetary repression indicator. In addition, the total share of assets required to be held as public sector liabilities (i.e. the sum of the reserve requirement and the portfolio requirement) is strongly correlated with our fiscal-monetary repression indicator. Countries where the total asset requirement is 10 percentage point higher score about 0.7 standard deviations higher on the fiscal-monetary repression indicator. These findings suggest that our indicators, though constructed from data on holdings of government liabilities, capture meaningful variation in

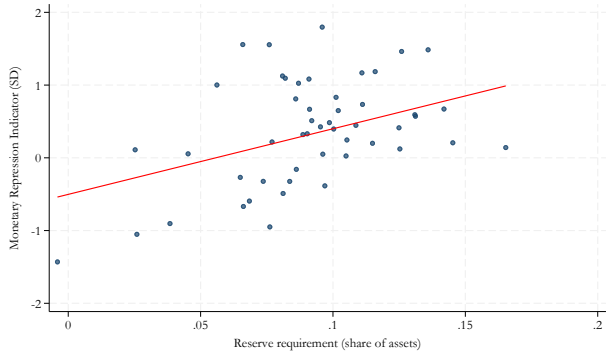
Figure 8: Associations with financial repression indicators



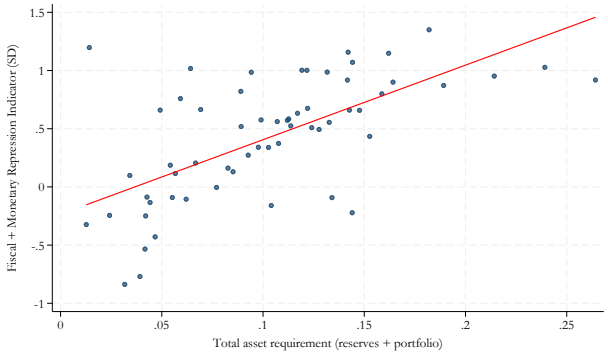
the *de jure* policies that drive financial repression.

Figure 9: Associations with financial repression policies

(a) Reserve requirements and monetary repression



(b) Total asset requirements and fiscal-monetary repression



Notes: Sample restricted to the post-World War II period before the introduction of Basel requirements (1945-2007) for France, Germany, Japan, and the United States. The relationships are conditional on country fixed effects.

5. Financial Repression in Sovereign Debt Dynamics

Having measured financial repression across 18 advanced economies since 1920, we now turn to its role in debt dynamics. The central question is how much repression contributed to observed changes in sovereign debt ratios, relative to other channels through which governments reduce debt burdens.[15]

We address this question using a debt decomposition framework. At the core of our analysis is the government's law of motion of debt, which is an identity linking the change in the debt-to-GDP ratio to the interest-growth differential, the primary balance, inflation surprises, central bank purchases, and residual stock-flow adjustments. By construction, these channels sum to the observed change in the debt ratio. We extend the standard framework by embedding our model-implied repression wedge as a distinct channel of debt dynamics, replacing the observed sovereign interest rate with the counterfactual free-market rate recovered from the portfolio-demand model in Section 3. Financial repression can therefore be isolated as a separate contributor to debt dynamics rather than absorbed into the interest-growth differential as is done in traditional decompositions.[16]

The results show that debt reduction episodes are rarely driven by a single channel. Fiscal consolidation, inflation surprises, and financial repression have historically operated in combination, with their relative contributions varying across countries and time. Quantifying how much of a given debt reduction was attributable to repression rather than to orthodox fiscal adjustment clarifies what governments actually relied on in the past and, by implication, what they might reach for again.

5.1. Debt Decomposition Framework

Publicly-held government debt is defined as total sovereign debt net of central bank holdings, $B_t^{pub} = B_t - B_t^{cb}$. Tracking this measure rather than gross debt is important because central bank purchases of government bonds represent an intra-state transaction: they

[15] For a broad historical treatment of the menu of debt reduction strategies available to sovereigns, including fiscal adjustment, inflation, default, and financial repression, see Dalio (2025).

[16] Full derivations are provided in the annex: Annex A.1 provides the notation key; Annex A.2 details the data construction; Annex A.42. covers the publicly-held debt decomposition from first principles; and Annex A.41. derives the financial repression measure.

shift debt from the publicly-held to the central bank balance sheet without changing the consolidated obligation of the state to private creditors. The decomposition below therefore attributes central bank purchases as a distinct channel, leaving the publicly-held debt stock as the relevant object for measuring the burden borne by private investors.

We start by presenting estimates of the contribution of financial repression to changes in the government debt to GDP ratio. Define expected inflation as $\pi_t^e \equiv E_{t-1}\pi_t$ and $r_t^{B,free} \equiv i_t^{B,free} - \pi_t^e$ as the real interest rate that would prevail absent financial repression. The change in the government debt to GDP ratio Δd_t can be written as

$$\Delta d_t = \frac{1}{1+g_t^Y}\Big[(r_t^{B,free} - g_t) - (\pi_t - \pi_t^e) + (r_t^B - r_t^{B,free})\Big] d_{t-1}^{pub} - pb_t - cb_t - h_t + sf_t \quad . \quad (11)$$

The first bracketed term $\frac{(r_t^{B,free}-g_t)d_{t-1}^{pub}}{1+g_t^Y}$ captures the real interest–growth differential without financial repression, the second term $\frac{(\pi_t-\pi_t^e)d_{t-1}^{pub}}{1+g_t^Y}$ captures surprise inflation, and the third term $\frac{(r_t^B-r_t^{B,free})d_{t-1}^{pub}}{1+g_t^Y}$ captures financial repression. The remaining terms capture the contributions of the primary balance pb_t, haircuts from restructurings h_t, and the stock-flow adjustment sf_t to changes in the debt ratio.

The key innovation relative to standard debt decompositions is the treatment of the interest rate. In conventional frameworks, the observed sovereign borrowing cost enters the interest-growth differential directly, leaving any repression-induced compression of yields invisible. Here, the interest-growth differential is computed at the counterfactual free-market rate $r_t^{B,free}$, and the gap between the observed and counterfactual rates enters as a separate repression term. Financial repression reduces the debt ratio when $r_t^B < r_t^{B,free}$, that is, when regulatory pressure has compressed sovereign borrowing costs below what market-based portfolio allocation would imply. Summing equation (11) over a sequence of years gives the cumulative contribution of each channel to the change in the debt ratio over an episode, as derived in Annex A.42.

5.2. Measuring the Financial Repression Wedge

A key input to the debt-decomposition exercise is the counterfactual free-market real interest rate $r_t^{B,free}$, which is the rate that would have prevailed in the absence of financial repression. We recover this rate from the portfolio-demand model in Section 3.. We solve for the adjustment in expected relative returns that would be required to offset the observed policy-induced shift in banks' demand for government bonds and restore market clearing, holding aggregate asset supplies relative to GDP fixed.

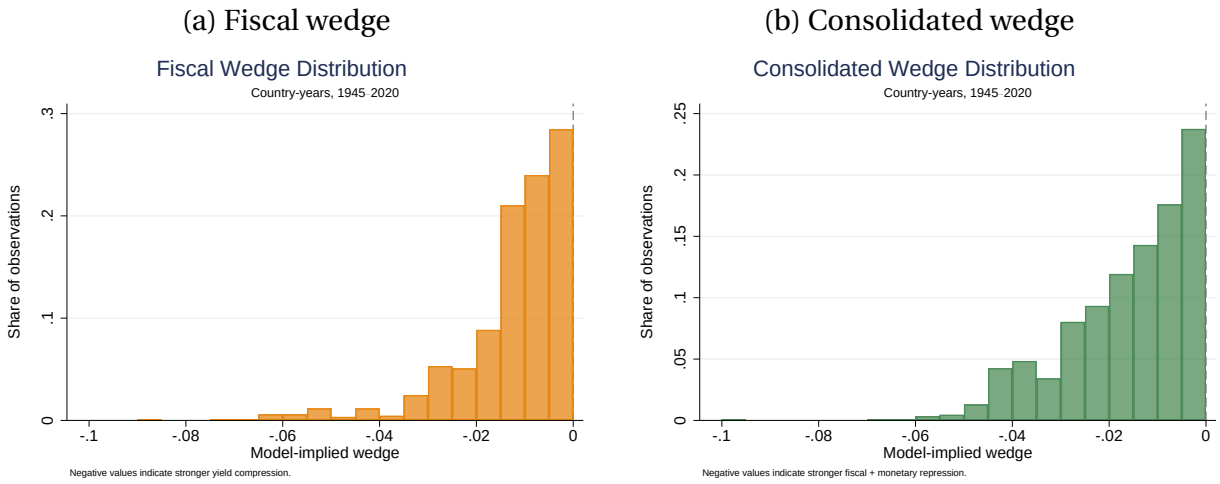
Formally, let $\bar{A}^b$ and $\bar{A}^h$ denote total assets of banks and households relative to GDP. Market clearing in the government bond market requires that the change in aggregate excess demand equals zero:

$$\Delta D^b \equiv \Delta s_g^b \bar{A}^b + \Delta s_g^h \bar{A}^h = 0 \tag{12}$$

where Δs_g^b and Δs_g^h are the changes in government bond portfolio shares in the counterfactual equilibrium relative to the observed allocation. The counterfactual equilibrium interest rate is then computed by finding the change in expected relative returns that eliminates the excess demand created by repression when the supply of government bonds is held fixed. The key mechanism is that repression pushes banks toward holding more government bonds. With quantities fixed, the only way to clear the market is through a price adjustment, captured here as a decline in the expected relative return on government bonds. We therefore back out the return change that reduces desired holdings sufficiently—through both banks' and households' portfolio responses—so that aggregate excess demand is driven to zero. We implement this approach through a numerical iterative procedure, with details summarized in Annex A.5.

Figure 10 shows the distribution of the estimated repression wedges for the fiscal and consolidated measures across our sample of 18 countries over the sample period. The estimates indicate that financial repression has historically been associated with sizable interest-rate compression, with a median wedge of about 1.5-2 percentage points. It is worth highlighting that these estimates should be interpreted as lower bounds. In our framework, the level of repression is identified only up to a scale (and normalization): for

Figure 10: Distribution of Financial Repression Wedges



Notes: Histograms show the distribution of model-implied repression wedges across country-year observations from 1945 to 2020. Italy is excluded from the baseline sample. More negative values indicate stronger repression.

each country, we normalize the period with the lowest value of the repression indicator to represent "no repression", and measure repression in other periods as deviations from this benchmark. As a result, any residual repression in the baseline period would not be captured, mechanically biasing the estimated wedges downward.

Comparison to other wedge approaches. Our model-implied wedge is time-varying and identified from observed sectoral portfolio allocations, delivering a country-by-country, year-by-year measure of the interest-rate distortion consistent with market clearing. This contrasts with Reinhart and Sbrancia (2015), who quantify the liquidation effect by comparing the ex-post real contractual interest rate to fixed counterfactual real rates (1, 2, and 3 percent) over 1945–1980. By tying the wedge directly to observed changes in the intensity of repression (through banks' induced demand shifts) and allowing equilibrium returns to adjust endogenously, our approach avoids imposing a common counterfactual rate across countries or episodes and instead produces wedges that vary with country-specific balance sheets and portfolio responses. Relatedly, Acalin and Ball (2024) also recover interest-rate distortions through counterfactual exercises that remove policy-induced and inflation-surprise components of borrowing costs; our contribution is to dis-

cipline the counterfactual using a portfolio-demand model that maps repression-induced demand shifts into the return adjustment required to restore market clearing.

Robustness. The magnitude of the repression wedge depends on the assumed substitution elasticity θ. A higher value of θ implies that investors are more sensitive to relative returns, so a given shift in portfolio shares requires a smaller adjustment in rates to restore market clearing, and the implied wedge is correspondingly smaller. We will report robustness checks that vary θ across a range of plausible values, and separately allow the elasticity to differ between banks and non-bank investors.

5.3. Results

5.3.1. Debt Decompositions: United Kingdom, United States, and Japan

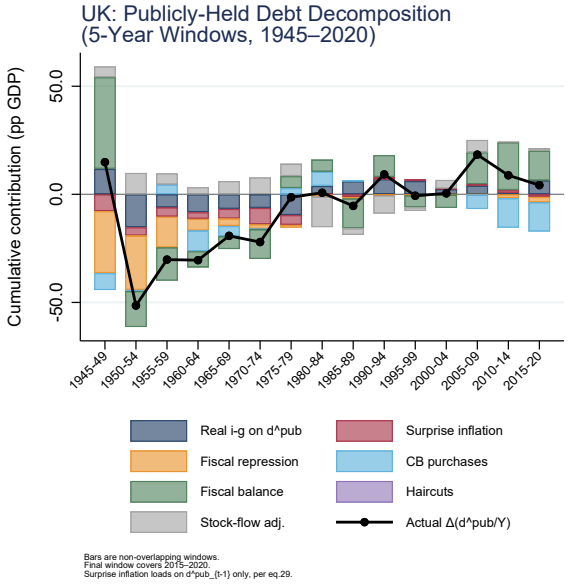
Figures 11, 12, and 13 present the debt decompositions for the United Kingdom, the United States, and Japan respectively. Each figure shows cumulative five-year contributions from each channel, with the black line tracking the actual change in the publicly-held debt-to-GDP ratio. The right-hand panels show the corresponding consolidated liability decomposition, which includes seigniorage and monetary operations as additional channels.

United Kingdom The postwar United Kingdom provides the starkest illustration of financial repression as a debt reduction channel. In the decade following World War II, publicly-held debt fell by roughly 65 percentage points of GDP. Financial repression accounts for approximately 48 percentage points of this decline, making it the single largest contributor to debt reduction in the immediate postwar window, ahead of both surprise inflation and fiscal consolidation. The repression contribution was particularly concentrated in the 1945-1950 and 1950-1954 windows, coinciding with the Bretton Woods era of administered interest rates, liquidity requirements, and restricted capital mobility. The consolidated balance sheet decomposition shows an even larger total contribution once seigniorage and reserve-based channels are included, consistent with the UK deploying

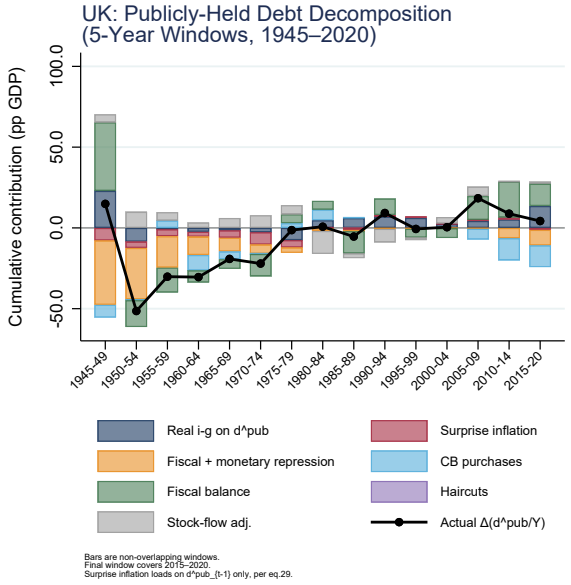
both fiscal and monetary arms of the state simultaneously during this period. In the post-2008 period, the repression contribution remains positive but is smaller in magnitude, with fiscal deterioration the dominant driver of rising debt.

Figure 11: Debt Decomposition: United Kingdom

(a) Publicly-held debt (1945–2020)
Fiscal Repression



(b) Publicly-held debt (1945–2020)
Fiscal and Monetary Repression

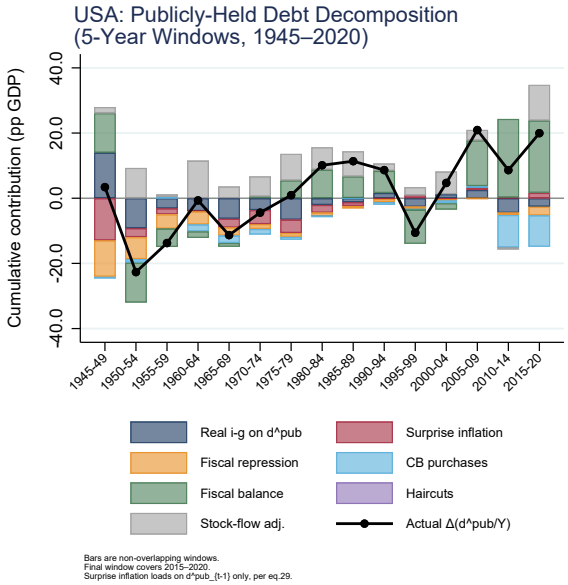


Notes: Each bar shows the cumulative sum of annual contributions within non-overlapping five-year windows. The black line tracks the actual change in the publicly-held debt-to-GDP ratio. Financial repression is measured as $d_{t-1}^{pub} \cdot (r_t^{B,free} - r_t^B)$, where $r_t^{B,free}$ is the model-implied counterfactual free-market rate.

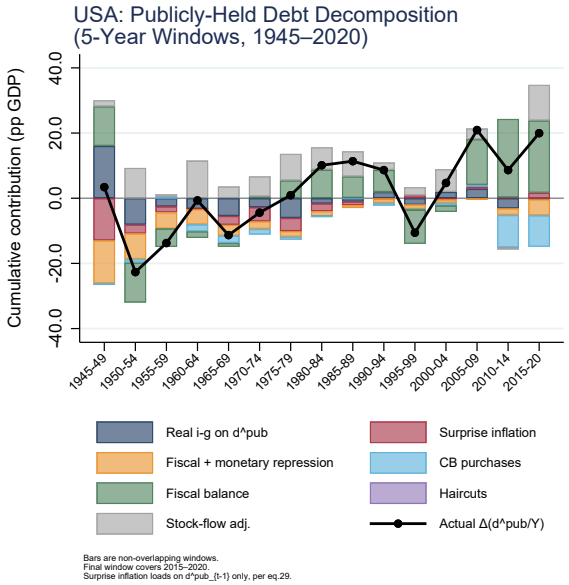
United States Financial repression also contributed to postwar debt reduction in the United States, though with smaller magnitude than in the United Kingdom. In the first postwar decade, repression accounted for approximately 16 percentage points of the 41 percentage points of GDP observed debt reduction, with surprise inflation the dominant channel in the earliest windows. The contribution of repression diminished progressively through the 1950s and 1960s as capital mobility increased and the Bretton Woods constraints loosened. In the post-2008 period, debt has risen substantially, driven primarily by rising primary deficits; financial repression contributes a modest offset, consistent with the post-QE expansion of reserve holdings at below-market remuneration.

Figure 12: Debt Decomposition: United States

(a) Publicly-held debt (1945–2020)
Fiscal Repression



(b) Publicly-held debt (1945–2020)
Fiscal and Monetary Repression



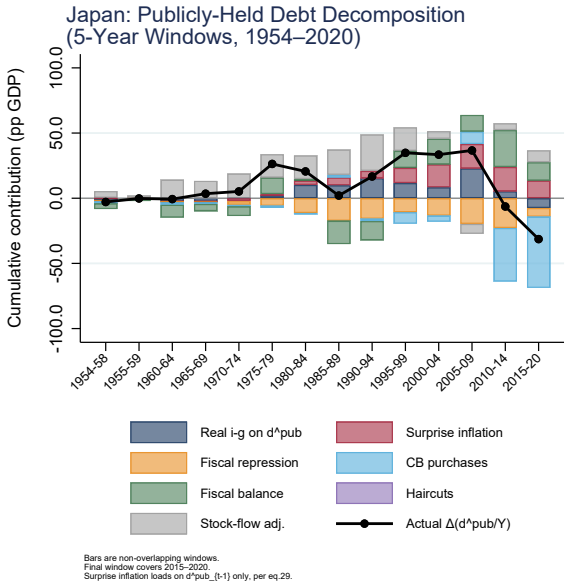
Notes: See notes to Figure 11.

Japan Japan's experience differs markedly from the postwar Western cases. Rather than a sharp debt reduction episode, Japan has experienced sustained debt accumulation since the early 1990s, with the actual debt ratio rising throughout most of the sample. In this context, the relevant question is not how much repression reduced debt but how much it constrained the pace of debt accumulation. Financial repression contributes a modest but persistent offset to debt accumulation in most five-year windows, with the contribution concentrated in the post-2013 period following the Bank of Japan's quantitative easing program. The consolidated decomposition shows seigniorage and monetary operations as meaningfully larger contributors in the post-QE period than in the publicly-held decomposition, reflecting the scale of the BoJ's balance sheet expansion.

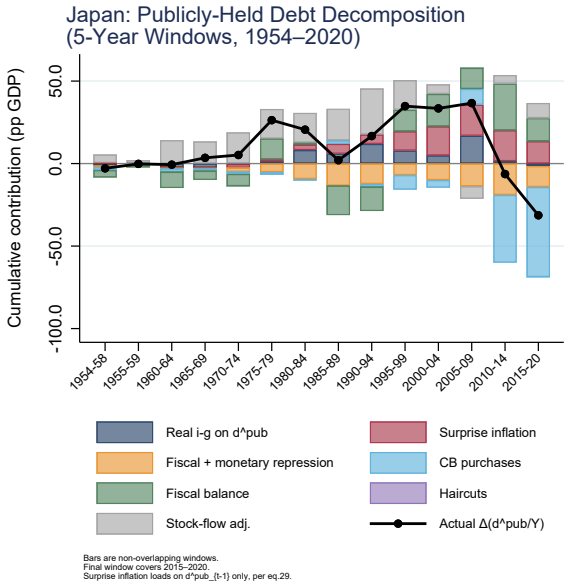
Across the three countries, financial repression was most significant as a debt reduction channel in the United Kingdom in the immediate postwar decade, with meaningful but smaller contributions in the United States over the same period. The post-2008 evidence points to a renewed and rising repression contribution across all three countries,

Figure 13: Debt Decomposition: Japan

(a) Publicly-held debt (1954–2020)
Fiscal Repression



(b) Publicly-held debt (1954–2020)
Fiscal and Monetary Repression



Notes: See notes to Figure 11.

consistent with the sharp increase in our indicators documented in Section 4.. Differences in results may reflect the distinct institutional and macroeconomic circumstances of each country and each episode. The United Kingdom's outsized repression contribution in the postwar decade could reflect the combination of a high inherited debt stock, capital controls, and a comprehensive set of administered interest rate ceilings and portfolio requirements that left banks with few alternatives to sovereign debt (Howson, 1993; Reinhart and Sbrancia, 2015). The smaller but still significant US contribution reflects a similar policy environment under Bretton Woods, but with a less binding regulatory perimeter and a larger role for the inflation surprise channel given the scale of wartime money creation (Hall and Sargent, 2011; Acalin and Ball, 2024). Japan's post-2013 experience is qualitatively different: the relevant mechanism is not a postwar fiscal emergency but the Bank of Japan's explicit policy of yield curve control and large-scale asset purchases, which suppressed sovereign borrowing costs through the monetary rather than the fiscal channel, with banks accumulating reserves rather than bonds as the primary public sector claim

on their balance sheets (Bank of Japan, 2016; Reis, 2025). The post-2008 rise in repression across all three countries points to a common underlying dynamic: as orthodox fiscal space narrowed and central bank balance sheets expanded, the consolidated public sector's claim on the financial system grew, with remuneration policy on reserves emerging as the primary instrument of monetary repression in the current environment (Payne and Szőke, 2025; Reis, 2025).

5.3.2. Fiscal Savings in Historical Episodes

The annual fiscal saving from financial repression is the product of the repression wedge and the stock of publicly-held debt, $d_{t-1}^{pub} \cdot (r_t^{B,free} - r_t^B)$, as illustrated in Figure 5. Cumulating over an episode gives the total fiscal saving as a share of GDP. Table 3 reports these estimates for key historical episodes alongside the Reinhart-Sbrancia liquidation effect as a benchmark. Our model-implied wedge produces results broadly consistent with but more precisely identified than the Reinhart-Sbrancia approach, which assumes a fixed counterfactual rate of one to three percent rather than recovering a time-varying wedge from observed portfolio behavior.

Comparison to seigniorage revenue. We compare the estimated fiscal savings from financial repression to seigniorage revenues that can be directly calculated using data on central bank liabilities, short-term interest rates, and reserve requirements. We construct two measures of seigniorage. The first measure $S_{i,t}^1$ reflects traditional seigniorage on cash:

$$S_{i,t}^1 = i_{i,t} \cdot c_{i,t} \tag{13}$$

where $i_{i,t}$ is the short-term interest rate and $c_{i,t}$ is cash in circulation as a percent of GDP.

The second measure $S_{i,t}^2$ is seigniorage on unremunerated commercial bank reserves:

$$S_{i,t}^2 = i_{i,t} \cdot \eta_{i,t} \cdot R_{i,t} \tag{14}$$

where $\eta_{i,t}$ is the reserve requirement for unremunerated reserves and $A_{i,t}^b$ is commercial bank assets as a percent of GDP.

Table 3: Cumulative Debt Dynamics: Selected Episodes

	United Kingdom	**United States**	**Japan**	**18 AE average**
	1945–1955	*1945–1955*	*2013–2020*	*2008–2020*
Debt decomposition contributions (pp GDP)				
Financial repression	52.5	16.6	10.5	17
Surprise inflation	20.3	15.2	-13.5	-9.7
Primary balance	3.9	20.9	-17.5	-10.7
Benchmarks and comparisons (pp GDP)				
Reinhart-Sbrancia benchmark	60.6	21.9	35.5	12.9
Seigniorage on cash (S^1)	1.5	1.8	0.0	0.2
Seigniorage on reserves (S^2)	NA	2.4	0.0	0.0

Notes: All entries are cumulative contributions over the episode in percentage points of GDP. Financial repression is computed as the cumulative sum of $d_{t-1}^{pub} \cdot (r_t^{B,free} - r_t^B)$, where $r_t^{B,free}$ is the model-implied counterfactual free-market rate. Surprise inflation is the cumulative sum of $(\pi_t - \pi_t^e) \cdot d_{t-1}^{pub}/(1 + g_t^Y)$. The primary balance contribution is the cumulative sum of pb_t. The Reinhart-Sbrancia benchmark uses a fixed counterfactual real rate of 2 percent over each episode. Seigniorage on cash is $S^1 = i_t \cdot c_t$ and seigniorage on unremunerated reserves is $S^2 = i_t \cdot \eta_t \cdot R_t$, where η_t is the reserve requirement for unremunerated reserves.

Table 3 shows that estimated fiscal savings from financial repression are substantially larger in magnitude than seigniorage revenues from either channel in every episode. Seigniorage on cash (S^1) and on unremunerated reserves (S^2) together account for at most a few percentage points of GDP, compared with tens of percentage points for financial repression in the postwar cases. The contrast is particularly stark in the United Kingdom, where financial repression generated over 50 percentage points of GDP in cumulative fiscal savings against seigniorage revenues of roughly 1.5 percentage points. This confirms that the implicit tax on savers operating through below-market returns on captive public sector liabilities is a quantitatively far more important fiscal instrument than the inflation tax on monetary holdings.

The comparison to surprise inflation is more nuanced. In the postwar United Kingdom, financial repression was the dominant channel, contributing more than twice the fiscal dividend from inflation surprises. In the United States over the same period, the two channels were roughly comparable in magnitude. In the post-2008 period across all three countries, however, the contrast sharpens: surprise inflation was negative on average, reflecting the low and stable inflation environment, while financial repression remained a meaningful and positive contributor to debt dynamics. This divergence underscores that financial repression and surprise inflation are distinct channels that need not move together, and that the post-GFC rise in repression has occurred in an environment where the inflation channel was largely unavailable.

6. Conclusions

This paper provided systematic, quantity-based measures of financial repression and made three contributions. First, we developed a structural portfolio choice model exploiting the differential portfolio behavior of banks and households to identify three complementary repression indicators spanning the fiscal, monetary, and consolidated perimeters of the state. Second, we constructed a new historical dataset covering 18 advanced economies since 1920 and documented that repression is at peacetime highs in the post-GFC period, rises systematically with debt burdens, is associated with crowding out of

private investment, and is more prevalent under restricted capital mobility. Third, we embedded a model-implied repression wedge in a unified debt-decomposition framework, showing that financial repression was a quantitatively significant contributor to postwar debt reduction, nowhere more so than in the United Kingdom, with both fiscal and monetary channels rising since 2008.

What does our analysis imply for fiscal dynamics in advanced economies going forward? Debt levels today are again elevated. In principle, the standard toolkit for debt reduction remains available: fiscal consolidation, growth-enhancing structural reforms, and debt restructuring. Each channel faces binding constraints in practice, however.[17] In the absence of strong political cohesion and social support for these orthodox channels, governments may choose to pursue unorthodox measures to address high debt levels. Our empirical evidence provides a basis for assessing which channel could be pursued. Historically, financial repression was used during periods resembling today's macroeconomic conditions. [18] Moreover, our indicators already show repression at peacetime highs, suggesting a drift toward repression may already be underway without explicit policy intent. History further shows that repression intensifies sharply under wartime fiscal stress; since we are not yet in such an environment, current peacetime readings imply the floor has risen, meaning any future fiscal shock would push repression from an already elevated base. Taken together, our correlates and decomposition evidence suggest repression is not merely possible but is the historically predicted response to the current configuration of debt, politics, and institutional constraints.

[17] Fiscal consolidation requires strong political cohesion and social support that is increasingly scarce across fragmented advanced economy political systems. Structural reforms impose near-term costs on concentrated interests while generating benefits only gradually over horizons that extend beyond typical political cycles. Debt restructuring carries significant reputational and economic costs for sovereign borrowers, including prolonged exclusion from capital markets and contractionary balance-sheet effects on the domestic financial institutions that hold public debt (Reinhart and Rogoff, 2009; Borensztein and Panizza, 2009) The comparison between sovereign default and financial repression as debt reduction strategies involves important welfare tradeoffs. Default imposes immediate, concentrated losses on creditors and disrupts market access, while repression imposes diffuse, gradual losses on savers through below-market returns on captive holdings. Jeanne (2025) provides a theoretical treatment of this tradeoff, showing that financial repression is more costly for welfare than regular fiscal adjustment but may be less costly than formal default, and that optimal repression emerges as a last-resort policy to backstop government debt when fiscal consolidation is politically constrained.

[18] See also Jeanne (2025)'s theoretical prediction that financial repression tends to emerge as a last-resort policy once debt exceeds approximately 100 to 120 percent of GDP, which is a threshold now exceeded in several major advanced economies.

Our three-indicator framework provides a natural organizing structure for thinking about which instruments of repression are most likely to be deployed. The fiscal channel is the most immediately available: Basel III zero risk weights on sovereign debt and liquidity coverage ratio requirements already create structural captive demand for government bonds without requiring explicit new legislation, and the marginal cost of tightening these is low. The monetary channel is already activated at scale—post-QE reserve accumulation has dramatically expanded the consolidated public sector's claim on the financial system, and remuneration policy on those reserves could be a lever employed by central banks to engage in monetary repression going forward. The rise of novel financial technologies adds a further layer of complexity: central bank digital currencies represent a potential new fiscal-monetary instrument that could extend the captive creditor base beyond the banking system, while stablecoins and decentralized finance offer savers alternative stores of value outside the regulated banking system, potentially undermining traditional repression mechanisms (Reis, 2025). On the capital account dimension, our UIP and capital controls findings suggest repression is more effective when outflows are restricted; history shows governments have gone further by banning alternative stores of value outright, such as when the United States prohibited private gold ownership during the Great Depression, which eliminated the primary exit option for savers seeking to avoid the inflation tax (Dalio, 2025). In this case, restrictions on crypto assets and stablecoins represent a modern analogue to this dynamic. The instruments of repression are thus already partially deployed and could be intensified through incremental regulatory adjustments rather than dramatic new legislation. While these strategies may appear less visible than overt fiscal tightening, they carry significant implications for savers, financial markets, and resource allocation; their durability will ultimately depend on the extent to which these costs become acutely felt and find expression in the political system—a feedback loop that our own crowding-out evidence suggests is not merely theoretical.

Several caveats apply to our analysis. On the methodological side, our repression indicators are quantity-based and capture outcomes rather than intent—we cannot directly observe the regulatory mechanism driving the wedge, only its balance-sheet impact. The household benchmark assumes households are free from regulatory pressure; if this as-

sumption is violated in certain episodes, the repression signal may be overstated. The counterfactual interest rate is model-implied and sensitive to assumptions about substitution elasticities, and the decomposition results should be read as indicative of orders of magnitude rather than precise point estimates. The sample is limited to 18 advanced economies, and the framework may perform differently in emerging markets where financial systems are less developed and data quality is lower. On the economic side, repression is not costless: our correlates document a significant negative association between repression and private credit growth and investment, consistent with crowding out of productive private sector activity. And as bondholders come to anticipate repressive policies, they demand compensation through higher nominal yields or seek alternative stores of value, eroding the fiscal dividend and potentially accelerating the political feedback loop flagged above. These costs have not prevented governments from reaching for repression when fiscal pressures are acute and orthodox alternatives are exhausted, however.

The paper opens several directions for future research. Extending the framework to emerging markets, where repression has historically been more acute and overt, would be a natural and high-value next step. The correlates analysis establishes robust associations but stops short of causal claims; future work exploiting quasi-experimental variation in regulatory changes—such as the introduction of Basel III liquidity requirements or shifts in reserve remuneration policy—could sharpen identification of the repression mechanism. The interaction between financial repression and the emerging digital financial architecture—CBDCs, stablecoins, and tokenized sovereign debt—is largely uncharted territory both theoretically and empirically, and represents perhaps the most consequential open question for the next decade of sovereign finance research. This paper does not quantify welfare losses across household types; a structural welfare analysis disaggregating costs by income, age, and asset holdings would sharpen the policy implications considerably. Finally, the link between financial repression and capital conrols hints at a connection between repression and external imbalances that future work could formalize, connecting the measurement framework developed here to a broader and currently very active policy debate (International Monetary Fund, 2026). Taken together, these extensions would build toward a more complete empirical and theoretical account of financial

repression as a systemic feature of sovereign finance.

Annex

A.1 Glossary of Algebraic Notation

Symbol	Definition
Agents and investor types	
$i \in \{b, h\}$	Investor type: b = commercial banks, h = households
$j \in \{g, c\}$	Asset type: g = government bonds, c = private corporate assets
ω	Index for individual agents within a type
Asset holdings and balance sheet stocks	
B_t	Total (gross) nominal government debt
B_t^b	Government bonds held by commercial banks
B_t^h	Government bonds held by households
B_t^{cb}	Government bonds held by the central bank
B_t^{pub}	Government debt held outside the state: $B_t - B_t^{cb}$
R_t	Interest-bearing central bank reserves
C_t	Currency in circulation
L_t	Consolidated nominal liabilities: $B_t^{pub} + C_t + R_t$
L_t^c	Bank loans to non-financial corporations
D_t	Bank deposits
I_t^h	Household equity claims on corporations
K_t	Corporate physical capital
W_t	National wealth
A_t^b	Total commercial bank assets: $L_t^c + B_t^b + R_t$
A_t^h	Total household assets: $W_t + B_t^h$
A_t^{cb}	Total central bank assets
Portfolio shares and repression indicators	
s_g^i	Share of government bonds in total assets of investor i
s_c^i	Share of private assets in total assets of investor i: $1 - s_g^i$
s_g^h	Household benchmark portfolio share: B^h/A^h
$s_g^{b,F}$	Bank government bond share (fiscal): B^b/A^b
$s_g^{b,M}$	Bank reserve share (monetary): R/A^b
$s_g^{b,FM}$	Consolidated bank public sector share: $(B^b + R)/(A^b)$
$\ln \tilde{s}_g^i$	Log-odds of government bond portfolio share: $\ln[s_g^i/(1 - s_g^i)]$
FR^F	Fiscal repression indicator: $\ln s_g^{b,F} - \ln s_g^h$
FR^M	Monetary repression indicator: $\ln s_g^{b,M} - \ln s_g^h$
FR^{FM}	Consolidated repression indicator: $\ln s_g^{b,FM} - \ln s_g^h$
Demand shifters and portfolio choice parameters	
$\zeta_j^i(\omega)$	Total taste shifter for investor ω of type i toward asset j
$\tilde{\zeta}_j^i(\omega)$	Idiosyncratic taste shock: Fréchet$(\theta^i, 1)$ distributed

Symbol	Definition
$\bar{T}_j^i$	Time-invariant structural demand shifter for asset j by type i
$\tilde{T}_j^i$	Time-varying regulatory demand shifter (financial repression term)
θ^i	Fréchet shape parameter; governs elasticity of substitution for type i
Returns and interest rates	
R_j^e	Gross expected return on asset j: $1 + r_j^e$
r_g^e	Net expected return on government bonds
r_c^e	Net expected return on private corporate assets
r_t^B	Ex-ante real rate on government debt: $i_t^B - \pi_t^e$
$r_t^{B,free}$	Counterfactual real rate on government debt absent repression
r_t^C	Return on corporate assets
r_t^D	Deposit rate
i_t^B	Nominal interest rate on publicly-held government debt
i_t^R	Nominal interest rate on central bank reserves
Macroeconomic aggregates and debt decomposition	
Y_t	Nominal GDP
g_t	Real GDP growth rate
g_t^Y	Nominal GDP growth rate: $(1 + g_t)(1 + \pi_t) - 1$
π_t	Inflation rate (GDP deflator)
π_t^e	Expected inflation formed at $t - 1$: $E_{t-1}\pi_t$
d_t^{pub}	Publicly-held government debt ratio: B_t^{pub}/Y_t
ℓ_t	Consolidated liability ratio: L_t/Y_t
ϱ_t	Reserve ratio: R_t/Y_t
c_t	Currency ratio: C_t/Y_t
pb_t	Primary balance (surplus > 0), scaled by Y_t
cb_t	Net central bank purchases of government debt, scaled by Y_t
h_t	Haircuts from debt restructuring, scaled by Y_t
sf_t	Stock–flow adjustment, scaled by Y_t
no_t	Net central bank operations, scaled by Y_t
FR_t	Financial repression contribution: $(r_t^B - r_t^{B,free})\, d_{t-1}^{pub}$
ζ^i	Share of government debt held by creditor i (data source)

A.2 Data Construction

A.21. Constructing the Balance Sheets

Government debt holdings. Total nominal holdings of government debt B^i for commercial banks ($i = b$) and the central bank ($i = cb$) are constructed as

$$B^i = \zeta^i \cdot d \cdot Y, \tag{A.1}$$

where ζ^i is the share of government debt held by creditor i from Abbas *et al.* (2011), d is the government debt-to-GDP ratio from JST, and Y is nominal GDP from JST. Household nominal holdings of government debt are constructed residually as

$$B^h = d \cdot Y - B^b - B^{cb}. \tag{A.2}$$

Commercial bank reserves. Commercial bank reserves R are approximated as the difference between central bank assets A^{cb} from the Bank for International Settlements and currency in circulation C from Finaeon:

$$R = A^{cb} - C. \tag{A.3}$$

Total commercial bank assets. Total commercial bank assets are approximated as

$$A^b = L^c + B^b + R, \tag{A.4}$$

where L^c denotes total loans to the non-financial private sector from JST.

Household assets. Household assets are constructed as the sum of national wealth W from the World Inequality Database (Piketty and Zucman, 2014) and household holdings of government bonds:

$$A^h = W + B^h. \tag{A.5}$$

A.3 Empirical Results

Table 5: Correlates of Financial Repression - Debt Pressures

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Fiscal Repression	Fiscal+Monetary Repression	Fiscal Repression	Fiscal+Monetary Repression	Fiscal Repression	Fiscal+Monetary Repression	Fiscal Repression	Fiscal+Monetary Repression	Fiscal Repression	Fiscal+Monetary Repression
Government debt	0.283***	0.257***								
	(0.0384)	(0.0251)								
Interest expenditures			0.236***	0.250***						
			(0.0311)	(0.0281)						
Non-interest expenditures					0.139**	0.0304				
					(0.0646)	(0.0377)				
Revenues							0.292***	0.123***		
							(0.0636)	(0.0391)		
Primary balance									0.210***	0.127***
									(0.0441)	(0.0364)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1024	1024	1021	1021	1021	1021	1024	1024	1021	1021
R^2	0.573	0.762	0.552	0.751	0.537	0.730	0.547	0.732	0.548	0.735

Standard errors in parentheses

$^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$

Notes: XXX

Table 6: Correlates of Financial Repression - Interest Rates and Asset Returns

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
	Fiscal Repression	Monetary Repression	Fiscal+Monetary Repression	Fiscal Repression	Monetary Repression	Fiscal+Monetary Repression	Fiscal Repression	Monetary Repression	Fiscal+Monetary Repression	Fiscal Repression	Monetary Repression	Fiscal+Monetary Repression	Fiscal Repression	Monetary Repression	Fiscal+Monetary Repression
Short-term interest rate	-0.152***	0.0308***	-0.0809***												
	(0.0171)	(0.00946)	(0.0113)												
Government bond yield				-0.183***	0.0619***	-0.0876***									
				(0.0194)	(0.0127)	(0.0115)									
Effective interest rate							-0.0533***	0.0200**	-0.0263**						
							(0.0176)	(0.00936)	(0.0123)						
Risky yield										-0.0887***	-0.0249	-0.0732***			
										(0.0320)	(0.0233)	(0.0173)			
Government bond yield - risky yield													-0.150***	0.0640***	-0.0604***
													(0.0179)	(0.0116)	(0.0114)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1024	965	1024	1024	965	1024	1019	960	1019	908	851	908	908	851	908
R^2	0.592	0.743	0.746	0.595	0.748	0.744	0.544	0.745	0.730	0.538	0.764	0.734	0.580	0.773	0.738

Standard errors in parentheses

$^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$

Notes: XXX

Table 7: Correlates of Financial Repression - Interest Rates and Asset Returns

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
	Fiscal Repression	Monetary Repression	Fiscal+Monetary Repression	Fiscal Repression	Monetary Repression	Fiscal+Monetary Repression	Fiscal Repression	Monetary Repression	Fiscal+Monetary Repression	Fiscal Repression	Monetary Repression	Fiscal+Monetary Repression	Fiscal Repression	Monetary Repression	Fiscal+Monetary Repression
Nominal private credit growth	-0.204***	-0.0177	-0.129***												
	(0.0464)	(0.0312)	(0.0298)												
Real private credit growth				-0.0767*	-0.0704**	-0.0913***									
				(0.0398)	(0.0272)	(0.0266)									
Bank capital ratio							-0.0782	0.233***	0.0519						
							(0.0486)	(0.0250)	(0.0380)						
Loan-to-deposit ratio										-0.446***	0.0800***	-0.349***			
										(0.0416)	(0.0268)	(0.0255)			
Noncore funding ratio													-0.457***	0.0442	-0.338***
													(0.0733)	(0.0361)	(0.0438)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1020	961	1020	1020	961	1020	983	926	983	980	923	980	951	894	951
R^2	0.551	0.742	0.736	0.539	0.744	0.734	0.523	0.775	0.726	0.596	0.762	0.770	0.565	0.760	0.751

Standard errors in parentheses

$^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$

Notes: XXX

Table 8: Correlates of Financial Repression - Interest Rates and Asset Returns

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Fiscal Repression	Fiscal+Monetary Repression	Fiscal Repression	Fiscal+Monetary Repression	Fiscal Repression	Fiscal+Monetary Repression	Fiscal Repression	Fiscal+Monetary Repression
Investment-GDP ratio	-0.127***	-0.0967***						
	(0.0389)	(0.0321)						
Private sector savings			0.0917	0.0396				
			(0.0559)	(0.0378)				
Current account					0.272***	0.115***		
					(0.0348)	(0.0264)		
Fiscal balance							0.112**	0.0148
							(0.0439)	(0.0346)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1022	1022	1020	1020	1022	1022	1024	1024
R^2	0.538	0.732	0.537	0.730	0.566	0.735	0.537	0.730

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes: XXX

A.4 Derivations

A.41. Derivation of the Financial Repression Measure

Starting from the portfolio share expression for investor type $i \in \{b, h\}$:

$$s_g^i = \frac{\left(\bar{T}_g^i \tilde{T}_g^i R_g^e\right)^{\theta^i}}{\left(\bar{T}_g^i \tilde{T}_g^i R_g^e\right)^{\theta^i} + \left(\bar{T}_c^i R_c^e\right)^{\theta^i}}. \tag{A.6}$$

Define the log-odds (relative demand) as

$$\ln \tilde{s}_g^i \equiv \ln\left(\frac{s_g^i}{1 - s_g^i}\right). \tag{A.7}$$

Using (A.6), we obtain

$$\ln \tilde{s}_g^i = \theta^i \left[\ln \bar{T}_g^i - \ln \bar{T}_c^i + \ln \tilde{T}_g^i + \ln R_g^e - \ln R_c^e\right]. \tag{A.8}$$

Taking first differences over time eliminates investor-specific constants:

$$\Delta \ln \tilde{s}_g^i = \theta^i \Delta \ln \tilde{T}_g^i + \theta^i \left(\Delta \ln R_g^e - \Delta \ln R_c^e\right). \tag{A.9}$$

Using the approximation $\Delta \ln R_j^e \approx \Delta r_j^e$ for small changes in returns, we can solve (A.9)

for the change in the taste shifter:

$$\Delta \ln \tilde{T}_g^i = \frac{\Delta \ln \tilde{s}_g^i}{\theta^i} - \left(\Delta r_g^e - \Delta r_c^e\right). \tag{A.10}$$

Since households are not subject to financial repression, we assume

$$\Delta \ln \tilde{T}_g^h = 0. \tag{A.11}$$

Subtracting the household expression from the bank expression in (A.10), and using (A.11), yields

$$\Delta \ln \tilde{T}_g^b = \Delta \ln \tilde{s}_g^b - \Delta \ln \tilde{s}_g^h - (\theta^b - \theta^h)\left(\Delta r_g^e - \Delta r_c^e\right). \tag{A.12}$$

This expression provides the change in the policy-induced demand shifter for banks (financial repression), netting out changes in relative bond holdings, differences in substitution elasticities, and changes in relative returns.

A.42. Debt Decomposition (Publicly-Held Government Debt)

Step 1: Define public holdings.

We distinguish total government debt B_t from debt held by the public B_t^{pub}. Central bank holdings B_t^{cb} are tracked separately because they represent monetization:

$$B_t^{pub} = B_t - B_t^{cb}. \tag{A.13}$$

Step 2: Nominal debt accumulation.

Public debt evolves based on interest payments on previous debt and rollovers, minus the primary balance PB_t, net central bank purchases CB_t, and haircuts H_t:

$$B_t^{pub} = (1 + i_t^B)\, B_{t-1}^{pub} - PB_t - CB_t - H_t + SF_t, \tag{A.14}$$

where net central bank purchases are defined as the change in government debt held by the central bank net of interest payments: $CB_t \equiv \Delta B_t^{CB} - i_t^B B_{t-1}^{CB}$.

Step 3: Divide by GDP and adjust for growth and inflation.

Nominal GDP evolves as

$$Y_t = Y_{t-1}(1+g_t)(1+\pi_t) = Y_{t-1}(1+g_t^Y). \tag{A.15}$$

Dividing (A.14) by Y_t and subtracting d_{t-1}^{pub}:

$$\Delta d_t^{pub} = \frac{i_t^B - g_t^Y}{1+g_t^Y}\, d_{t-1}^{pub} - pb_t - cb_t - h_t + sf_t. \tag{A.16}$$

Step 4: Define surprise inflation and financial repression.

Define $\pi_t^e \equiv E_{t-1}\pi_t$ and $r_t^{B,free} \equiv i_t^{B,free} - \pi_t^e$ as the real interest rate that would obtain absent financial repression. Adding and subtracting these terms yields

$$\Delta d_t^{pub} = \frac{1}{1+g_t^Y}\Big[(r_t^{B,free} - g_t) - (\pi_t - \pi_t^e) + (r_t^B - r_t^{B,free})\Big] d_{t-1}^{pub} - pb_t - cb_t - h_t + sf_t, \tag{A.17}$$

where the first bracketed term captures the real interest–growth differential, the second captures surprise inflation, and the third captures financial repression.

Step 5: Cumulative change over T periods.

Summing over a sequence of years gives the cumulative contribution of each channel:

$$d_T^{pub} - d_0^{pub} \approx \underbrace{\sum_{t=1}^{T} \frac{(r_t^{B,free} - g_t)\, d_{t-1}^{pub}}{1+g_t^Y}}_{\text{Real interest–growth effect}} \tag{A.18}$$

$$\underbrace{- \sum_{t=1}^{T} \frac{(\pi_t - \pi_t^e)\, d_{t-1}^{pub}}{1+g_t^Y}}_{\text{Surprise inflation}} \tag{A.19}$$

$$\underbrace{+ \sum_{t=1}^{T} \frac{(r_t^B - r_t^{B,free})\, d_{t-1}^{pub}}{1+g_t^Y}}_{\text{Financial repression}} \tag{A.20}$$

$$- \underbrace{\sum_{t=1}^{T} pb_t}_{\text{Fiscal consolidation}} - \underbrace{\sum_{t=1}^{T} cb_t}_{\text{Central bank purchases}} - \underbrace{\sum_{t=1}^{T} h_t}_{\text{Haircuts}} + \underbrace{\sum_{t=1}^{T} sf_t}_{\text{Stock–flow adjustments}} . \tag{A.21}$$

A.43. Debt Decomposition (Consolidated Balance Sheet)

This section extends the decomposition in Section A.42. by adopting a *consolidated state balance sheet* that combines the fiscal authority and the central bank. All notation follows the unified key above. The objective is to measure the evolution of the state's total nominal liabilities to the non-state sector while netting out intra-state positions, in particular central bank holdings of government debt.

Under consolidation, operations that merely reallocate liabilities within the state (such as central bank purchases of government bonds) do not mechanically change the level of consolidated liabilities. Instead, changes in the consolidated liability ratio reflect fiscal policy, interest–growth differentials, inflation (including surprise inflation), financial repression, and residual stock–flow adjustments.

Step 1: Consolidated liabilities net of intra-state holdings.

Government debt held by the non-public sector is as defined in (A.13). Consolidated nominal liabilities to the non-state sector additionally include currency in circulation C_t

and interest-bearing central bank liabilities R_t:

$$L_t \equiv B_t^{pub} + C_t + R_t. \tag{A.22}$$

Step 2: Nominal law of motion.

Using Equation A.14, the consolidated liability stock evolves according to

$$L_t = (1 + i_t^B)\, B_{t-1}^{pub} - PB_t - CB_t - H_t + SF_t + R_t + C_t. \tag{A.23}$$

The central bank purchases term CB_t can be netted out because purchases reduce B_t by the same amount as they increase R_t. Using $CB_t \equiv \Delta B_t^{CB} - i_t^B B_{t-1}^{CB}$ gives

$$L_t = (1 + i_t^B)B_{t-1} - PB_t - H_t + SF_t + R_t + C_t - B_t^{CB}. \tag{A.24}$$

Step 2.5: Central bank liability dynamics.

Let NO_t define net operations of the central bank as the increase in central bank liabilities net of interest expenditures and purchases of government bonds:

$$NO_t \equiv \Delta R_t + \Delta C_t + i_t^B B_{t-1}^{CB} - i_t^R R_{t-1} - \Delta B_t^{CB}, \tag{A.25}$$

where i_t^R is the effective interest rate on interest-bearing central bank liabilities. Using these definitions gives

$$L_t = (1 + i_t^B)B_{t-1}^{pub} - PB_t - H_t + SF_t + (1 + i_t^R)R_{t-1} + C_{t-1} + NO_t. \tag{A.26}$$

Step 3: Scaling by GDP.

Dividing (A.26) by Y_t and subtracting ℓ_{t-1} yields

$$\Delta\ell_t = \frac{i_t^B - g_t^Y}{1 + g_t^Y}\, d_{t-1}^{pub} - pb_t - h_t + sf_t + \frac{i_t^R - g_t^Y}{1 + g_t^Y}\varrho_{t-1} + \frac{-g_t^Y}{1 + g_t^Y}c_{t-1} + no_t. \tag{A.27}$$

Step 4: Surprise inflation and financial repression.

Rearranging to identify seigniorage terms:

$$\Delta\ell_t = \frac{i_t^B - g_t^Y}{1+g_t^Y}\ell_{t-1} + \frac{-i_t^B}{1+g_t^Y}c_{t-1} + \frac{i_t^R - i_t^B}{1+g_t^Y}\varrho_{t-1} - pb_t - h_t + sf_t + no_t, \tag{A.28}$$

where the second and third terms capture seigniorage from currency and interest-bearing central bank liabilities paying a lower interest rate than government bonds. Using the definitions $r_t^{B,free} \equiv i_t^{B,free} - \pi_t^e$ and $r_t^B \equiv i_t^B - \pi_t^e$, the change in the consolidated liability ratio can be written as

$$\begin{aligned}\Delta\ell_t \approx \frac{1}{1+g_t^Y}\Big[(r_t^{B,free} - g_t) - (\pi_t - \pi_t^e) + (r_t^B - r_t^{B,free})\Big]\ell_{t-1} \\ + \frac{-i_t^B}{1+g_t^Y}c_{t-1} + \frac{i_t^R - i_t^B}{1+g_t^Y}\varrho_{t-1} - pb_t - h_t + sf_t + no_t.\end{aligned} \tag{A.29}$$

Surprise inflation erodes the real value of *all* nominal consolidated liabilities, not just publicly held government bonds as in (A.17).

Step 5: Cumulative change over T periods.

Summing over a sequence of years gives the cumulative contribution of each channel to the change in the consolidated liability ratio:

$$\ell_T - \ell_0 \;\approx\; \underbrace{\sum_{t=1}^{T} \frac{(r_t^{B,free} - g_t)\,\ell_{t-1}}{1+g_t^Y}}_{\text{Real interest–growth effect}} \tag{A.30}$$

$$- \underbrace{\sum_{t=1}^{T} \frac{(\pi_t - \pi_t^e)\,\ell_{t-1}}{1+g_t^Y}}_{\text{Surprise inflation}} \tag{A.31}$$

$$+ \underbrace{\sum_{t=1}^{T} \frac{(r_t^B - r_t^{B,free})\,\ell_{t-1}}{1+g_t^Y}}_{\text{Financial repression}} \tag{A.32}$$

$$+ \underbrace{\sum_{t=1}^{T} \frac{-i_t^B\, c_{t-1} + (i_t^R - i_t^B)\varrho_{t-1}}{1+g_t^Y}}_{\text{Seigniorage}} \tag{A.33}$$

$$- \underbrace{\sum_{t=1}^{T} pb_t}_{\text{Fiscal consolidation}} - \underbrace{\sum_{t=1}^{T} h_t}_{\text{Haircuts}} + \underbrace{\sum_{t=1}^{T} sf_t}_{\text{Stock–flow adjustments}} + \underbrace{\sum_{t=1}^{T} no_t}_{\text{Monetary operations}} . \tag{A.34}$$

Three features distinguish this decomposition from Section A.42.. First, the monetization channel (CB_t) is absent: central bank purchases affect the composition but not the level of consolidated public liabilities. Second, the surprise inflation term now loads on the full consolidated liability stock ℓ_{t-1} rather than on d_{t-1}^{pub} alone. Third, two additional seigniorage terms appear, reflecting the fiscal cost of remunerating reserves at i_t^R and the seigniorage benefit from non-interest-bearing currency; together these capture repression operating through the monetary rather than the fiscal arm of the state.

A.5 Numerical Procedure for Solving for Counterfactual Interest Rates

We solve for the counterfactual interest rates through the following iterative procedure.

1. **Impose the repression shock.** Set the policy-induced preference shifter for banks:

$$\Delta \ln \tilde{T}_g^b = \chi, \qquad \Delta \ln \tilde{T}_g^h = 0.$$

2. **Initialize the return adjustment.** Start from no change in relative returns:

$$\Delta(r_g^e - r_c^e) = 0.$$

3. **Update portfolio log-odds.** For each investor $i \in \{b, h\}$, compute the change in log-odds of holding government bonds:

$$\Delta \ln \tilde{s}_g^i = \Delta \ln T_g^i + \theta^i \, \Delta(r_g^e - r_c^e),$$

   combining the policy shock (banks only) with the price response.

4. **Update portfolio shares.** Construct new log-odds levels,

$$\ln \tilde{s}_g^{i\prime} = \ln \tilde{s}_g^i + \Delta \ln \tilde{s}_g^i,$$

   and map them to portfolio shares using the logistic function:

$$s_g^{i\prime} = \frac{\exp(\ln \tilde{s}_g^{i\prime})}{1 + \exp(\ln \tilde{s}_g^{i\prime})}, \qquad \Delta s_g^i = s_g^{i\prime} - s_g^i.$$

5. **Compute excess demand.** Evaluate the market-clearing residual:

$$\Delta D^b = \Delta s_g^b \, \bar{A}^b + \Delta s_g^h \, \bar{A}^h.$$

6. **Check convergence.** If $|\Delta D^b| < \epsilon$, the equilibrium relative return has been found.

7. **Update returns and iterate.** If $\Delta D^b < 0$, increase $\Delta(r_g^e - r_c^e)$ by δ; if $\Delta D^b > 0$, decrease it by δ. Return to step 3 and repeat until convergence.

The repression wedge for period t is then defined as the value of $\Delta(r_g^e - r_c^e)$ at convergence, which gives the reduction in the sovereign borrowing cost attributable to regulatory pressure on banks' portfolio allocation.

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