Financial Repression in the XXIst Century*

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Abstract

Large stocks of public and external debt tempt policymakers to extract resources from their creditors. This article characterizes three broad forms of financial repression that serve this purpose. The first consists of direct taxation of the financial sector through levies on financial transactions, banks' income, or pension-fund assets. The second is a sudden and sufficiently persistent devaluation of the currency. The third raises the demand for the non-monetary services provided by different types of government liabilities while keeping their supply scarce, thereby creating yield discounts. Reviewing historical experience, including recent years, the article concludes that each of these revenue sources can occasionally be large, but that policies designed to exploit them often fail. Financial repression is an alluring but ultimately illusory temptation: yielding to it typically generates substantial efficiency losses while producing only limited revenue.

JEL codes: E44, E60, F30, F41, G10, H20, H60
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1 The twin debt problem and a tempting solution

There is a *twin debt problem* in the world in 2025.

The first twin is public debt. By the end of 2025, world public debt as a share of GDP will be 95.1%, compared to 83.8% in 2019. In almost every major economy, the debt-to-GDP ratio is higher than before the pandemic—by 12.6 percentage points in the United States and by an average 15.0 percentage points in emerging economies. Looking ahead to 2030, with most economies projected to continue running a deficit and with the comfort of interest rates below growth rates now gone, the IMF forecasts world debt-to-GDP to rise to 99.6% of GDP and, in some adverse scenarios, to exceed 116% as early as 2027, levels not seen since the 1940s.[1]

The second twin is external debt. The decline in the United State's net international investment position—from -11.2% of GDP at the start of the century to -71.6% in 2024—has been well documented and is accelerating, as the current account deficit remains large and the returns paid to foreigners have risen. For every debtor there is a creditor, so on the other side of the US's negative balance are the positive balances of Canada, China, or Germany. Yet behind this netting out lie large gross liabilities: for the nine largest economies in the world (the G7 plus China and India), gross external liabilities are 173.0% of GDP, with debt instruments alone accounting for 81.6%.[2]

Figure 1 illustrates the problem by showing the north-east movement common to almost every country in the space of these two debts since the start of the current international monetary system. Just as the twin deficits problem captured the attention of both academic and policymakers in the 1980s, so is the twin debt problem in the 2020s.

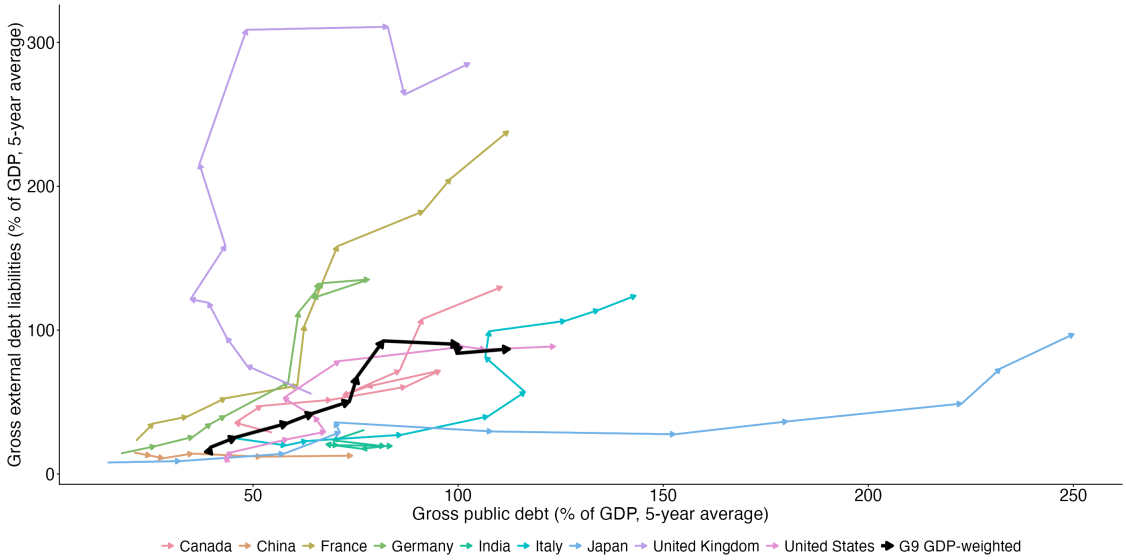
Paying down the twin debts naturally leads to thoughts on taxing international transactions. Tariffs can both raise public revenue, narrowing the public deficit, and also reduce consumption of imports, closing the external deficit. In turn, protectionism or industrial policy can, in principle, raise national savings by reducing the inflow of foreign goods and/or keeping domestic investment high, even if they do not bring revenue directly. However, neither of these are likely to be enough to eliminate the twin debts. Total imports of goods as a share of GDP in the G9 average only 15%, and it would take decades for flows of trade and savings to revert the paths in figure 1.

Consider instead what could be achieved by taxing the country's creditors, as opposed to producers, consumers, or trading partners. With UK gross external liabilities of 533%

[1] All estimates in this paragraph are from the Fiscal Monitor (IMF, 2025*a*).

[2] The numbers in this paragraph come from Lane and Milesi-Ferretti (2018) and IMF (2025*b*).

Figure 1: The twin debt problem



Note: Each dot stands for the 5-year average of gross public debt and gross external debt over GDP for each of the large 9 countries in non-overlapping 5-year intervals between 1973 and 2023. In thicker black is the GDP-weighted average for the G9. Arrows denote the movement over time.

of GDP, and Japan's gross public debt of 235% of GDP, somehow erasing even a small portion of these stocks of debt would have an immediate impact. Stocks exceed flows, after all, and these are stocks of assets valued at market prices and at exchange rates that can shift abruptly. Even looking only at financial flows, US interest payments on the public debt were 3.0% of GDP in 2024 (almost half of a total deficit of 6.4%) and five-sixths of the fall in France's net investment position in 2024 was due to changes in the value of its assets and liabilities. With such large claims both across borders and between the private and public sectors, somehow convincing creditors to accept less would swiftly and decisively address the twin debt problem.

Tempting as it may be, this solution relies on many "somehows." How can a policymaker make them real? The answer is *financial repression*: policies that reduce the twin debts—they loosen the budget constraints in terms of the required surpluses to service the debt—by transferring resources from holders of public or external debt to the domestic government or economy. This is the topic of this article. It will provide a minimal conceptual framework to frame this broad class of policies, discuss empirical estimates of

their historical size in the past, and evaluate their potential today. The conclusion from this study is that, while tempting, financial repression is likely to disappoint. It will not systematically and persistently generate large revenues.

Beyond the temptation it poses to indebted nations, three additional reasons justify studying financial repression today. First, there are different types of outstanding financial claims. Second, there are new economic theories of how these policies generate revenues and new empirical estimates of their size. Third, countries today face a policy menu that differs from that of the Bretton Woods era (1944-71), when these policies were heavily used.

The article is divided into five sections. Section 2 defines financial repression conceptually and shows that it consists of three components. It also argues why zero is a useful—even if unrealistic—benchmark for its revenues and links this approach to the prior literature. Section 3 discusses the simplest expression of financial repression—direct taxation—while section 4 discusses the most studied—unexpected inflation. Section 5 examines the special features of different types of government debt and their associated convenience yields. Section 6 brings together the previous discussion by quantifying the revenue from each components in the United States, evaluating theit potential to be larger, and noting their associated distortions. Section 7 then reviews a few recent, current, and prospective financial repression policies in light of the framework in this article. Finally, section 8 concludes with some speculation on the implications of financial repression for the international monetary system.

2 Financial repression and its three components

By an accounting identity, the increase in the net liabilities of an economic agent is equal to the deficit in its net income plus the net payouts from servicing those liabilities. By an economic constraint, creditors require full payment and refuse to participate in Ponzi schemes. Combining accounting and economics yields the resource constraint facing any debtor:

$$\text{Debt} = EPV\left(\text{net income}\right) + \text{fall in market value of the debt} + EPV\left(\text{discounts on debt returns}\right).$$

where EPV denotes for expected present value computed using the interest rate that the creditors apply when ruling outPonzi schemes. The appendix derives this expression

formally.

2.1 The government's public debt constraint

When the debtor is the government, debt refers to the public liabilities of all branches of the state, including the central bank.

The net-income term corresponds to the primary surpluses of the government agencies. This is the conventional term in analyses of debt sustainability. When the government collects revenues in excess of its outlays, it retires some of its debt.

The market-value term captures the capital gains or losses imposed on the creditors. Sovereign default is the most studied form of these gains to the government. More commonly, because governments issue most of their debt in units of the national currency, unexpected inflation erodes the real value of the debt.

The third term arises when creditors accept a discounted return because the debt provides them with a service. The textbook example is physical currency. Many agents hold it to make payments or because they value the anonymity in this particular store of value. They accept a zero nominal return even though they demand a positive return on other assets. This discount is usually called seignorage, but similar discounts exist for other government liabilities as well. Their sum is sometimes called convenience yields, debt revenues, the present value of wedges, or—less etymologically fortunate—debt seignorage.

2.2 The country's external debt constraint

From the country's perspective, debt refers to its net international liabilities, the negative of its net international investment position.

The net-income term is the trade balance plus net unilateral transfers from abroad, whether remittances, aid, sanctions, or the earnings of nationals working overseas.

The market-value term can be large and volatile for countries. Both assets and liabilities include large amounts of equity, whose value fluctuates. Moreover, as there are creditors in many countries, movements in exchange rates are significant, and they are frequent and large. An unexpected depreciation of the domestic currency raises this term.

The discounts term, analogous to the public debt case, measures the premia the country earns on its assets and the discounts it enjoys on its liabilities. The classic case is the U.S. exorbitant privilege. Because foreign bonds pay a higher yield than U.S. treasuries,

this term was positive in the 2000s even though foreigners held more Treasuries than Americans held foreign bonds. Moreover, because Americans held more foreign equities, while foreigners preferred U.S government bonds, this term included a large equity premium. The United States borrowed cheaply because of the dominance of the USD and U.S. Treasuries in global financial markets, earning a risk premium by acting ad the world's insurer, holding risky assets and issuing safe liabilities.

2.3 What is financial repression?

Financial repression is a set of government policies acting over its creditors that, by raising the right-hand side of the debt equation, allows the government to sustain more public or external debt with the same net income— or, equivalently, to have less net income to support a given level of debt.

The three terms on the right-hand side identify three classes of policies. Taxes on the financial sector raise the net-income term. Surprise inflation or depreciation raises the devaluation term. Regulations compelling agents to hold government bonds make those bonds scarcer and raise the discounts term. Some policies affect both public and external debt; others only one of them.

An alternative way to distinguish the three types of financial repression is on the nature of the channel: the first collects direct taxes on the flow of resources earned by creditors; the second changes the value of the stock they hold; the third creates a flow proportional to the stock with the discount on the debt given in exchange for a service tied to the the quantity of debt held.

While conceptually distinct, these components are not independent. Consider an *ad valorem* tax on the returns paid to public-debt holders. This raises government net income through tax revenues. But if bondholders react to the lower after-tax return by shifting savings elsewhere, the pre-tax equilibrium interest rate rises and the discount on the public debt falls. An example for external debt is to imagine that the service provided to foreigners by domestic-currency assets suddenly permanently rises. This increases the exorbitant privilege, but it may also trigger an exchange-rate appreciation, which would lower the devaluation term.

2.4 Zero on average, and yet large all the time

In both examples above, the impact of the two policy shocks could be zero. With frictionless financial markets and creditors with perfect foresight, pre-tax market interest rates and exchange rates adjust exactly to offset the direct impact of the policies, leading the budget constraint unchanged. Zero is an important benchmark, not just for the impact of shocks, but also for the average effect of financial repression policies over time. This benchmark applies for each of the three terms separately.

Starting with net income, a natural baseline is a competitive financial sector. In that case, any attempt to tax financial institutions is passed through to lower deposit rates, higher lending rates, or both. No resources are extracted from the financial sector itself.

Turning to devaluation, what generates resources is an unexpected change in asset prices. Under the common assumption that exchange rates and other prices follow random walks, the devaluation term averages to zero. People are surprised by unexpected inflation all the time, but on average they are not fools: once they begin to expect higher inflation, the associated devaluation becomes zero on average.

Finally, for the discounts term, investors seek to arbitrage systematic return differentials across assets. Even when asset markets are segmented, persistent differentials induce incumbent investors to enter new markets or attract new investors who arbitrage across them. Over time, these forces erode discounts. Likewise, financial innovation will create new private assets that substitute for the service flows of government liabilities, pushing discounts toward zero.

Of course, with imperfect competition, limits to information or attention, or persistent market segmentation, it may take many years for the average of these resource streams to converge to zero. For a few years—or even more than a decade—they can remain persistently positive. The data bear this out. The realized net return on the U.S. net international investment position should be zero on average, yet it was persistently negative between 2001 and 2011 for the United States, before switching sign and remaining positive since then (Gourinchas and Rey, 2014, Gourinchas, 2023). The realized return on public debt systematically fell relative to the return on the private capital stock for two decades before the pandemic Reis (2022*a*,*b*). For these temporary but long period, the extra resources accruing to the country and the government were sizable and meaningful. *Prima facie*, there is a case for financial repression policies, which manipulates these terms, to potentially have a large impact.

2.5 Financial repression in the past

Historically, financial repression policies were common during the Bretton Woods era (1944-71) and the decade that followed, when countries addressed the large public debt stocks inherited from World War II through strict controls on international capital flows, constraints on the domestic flow and allocation of credit, and persistent inflation. These policies left many countries with unresolved debt problems that erupted into financial crises in the 1980s, prompting waves of financial liberalization. After the global financial crisis of 2008-11, financial repression made a modest but growing comeback. It has become more popular, and more politically acceptable, due to the rise of populist calls for taxing the rich and the financial sector, the perceived success of paying for the pandemic fiscal stimulus with a bout of inflation in 2021-24, and the decades of high discounts on the public debt that allowed health and pension spending to expand without increasing the government's total interest payments.

I use the term financial repression to describe policies that loosen the public or external debt constraint by transferring resources from debt holders to the government or countries. The original use of the term by McKinnon (1970), Shaw (1973) was much broader: it encompassed a wide array of policies restricting the activities of financial intermediaries, misallocating credit, and taxing savings. Their emphasis was not on debt sustainability, but on how these policies affected economic activity. The measures from this tradition compare observed interest rates to their (unobservable) free-market levels. My definition is narrower and focussed on the public and external debt constraints. It excludes policies such as caps and floors on private lending rates, barriers to entry in the financial sector, government control of banks, and sector-specific lending quotas. For the measurement of these broader policies, see Calice, Kalan and Masetti (2020).

Other authors have used the term financial repression more narrowly, applying it only to the discounts term. This literature originates with Giovannini and de Melo (1993), who defined repression as "an artificially low cost of domestic funding to governments." Seminal work by Carmen Reinhart and coauthors (Reinhart, Reinhart and Rogoff, 2015, Reinhart and Sbrancia, 2015, Kose et al., 2022) measures this term across many types of government debt, countries, and long historical periods, subject to the difficulty that the benchmark rate for discounts is unknown, leading them to adopt a zero benchmark that interprets repression as negative real returns on government debt. Lehner et al. (2025), by focussing solely on the US, can offer more precise measures of discounts and link them to specific policies.

An even narrower strand focuses on the instruments used for repression rather than the outcomes. This literature emphasizes regulations and moral suasion that encourage private banks to hold government bonds at discount returns Becker and Ivashina (2017), Chari, Dovis and Kehoe (2020), Kliem et al. (2024). Bridging tools and outcomes, Mauro and Zhou (2021) relates changes in indicators of financial reform to differences between interest rates in emerging markets and advanced economies.

Finally, this article will not cover all dimensions of financial repression. First, the distortions caused by many forms of financial repression have been well studied, including reserve requirements, liquidity ratios for banks, and unexpected inflation. My focus on the revenues these policies raise in light of the twin-debt problem. Second, financial repression is not inherently bad or always to be avoided. Just as Pigouvian taxes may be desirable, financial regulations can correct market failures. Third, I do not provide a normative ranking of policies or an optimal sequence to implement them (Jeanne, 2025); instead, I focus on a key input to such rankings: the relative size of revenues. Fourth and finally, I abstract from a major contributor to the devaluation term—outright default—because it already occupies a vast separate literature.

3 Net income from direct taxation

The government can tax its creditors directly or tax the intermediaries they use to hold its debt.

Taxing the income or value added of the financial sector provides a direct source of revenue. In the United States, such taxes raised on average 0.09% of GDP between 2000 and 2024, with a peak of 0.15% in 2006. Given that the financial sector's total value added amounted to only 7.6% of GDP in 2024, it is doubtful that significantly more revenue could be extracted from this source.

A second option is to tax financial flows. Transaction taxes on cross-border capital movements (often termed Tobin taxes) are popular in academic discussions but have rarely been implemented comprehensively. A notable exception was Brazil's 2009 introduction of a 2% tax on equity and fixed-income inflows, later extended to derivatives in 2011 and raised to 6% in 2012. In that year, tax revenues from capital inflows were 0.05% of GDP. Brazil also levied several domestic taxes on financial transactions and financial-sector activity, but together these amounted to only 0.72% of GDP in 2012. These figures overstate the net revenue, since pre-tax returns on domestic debt likely rose in re-

sponse to the taxes. Moreover, enforcement proved difficult, and the taxes' effectiveness in curbing external indebtedness was, at best, mixed (Chamon and Garcia, 2016). Brazil repealed the cross-border capital taxes by mid-2013.

A third option to raise net income is a one-off tax on the stocks of assets and debts held or managed by financial intermediaries. In 2011, Ireland responded to its twin-debt crisis—triggered by the failure of major domestic banks—by imposing a levy on pension-fund assets of 0.6% for three years, raised to 0.75% in 2014 and lowered to 0.15% in 2015. At its peak, this levy generated roughly 0.5% of GDP in revenue in 2014. It was unpopular and was abandoned soon after.

Taken together, these experiences suggest that it is difficult to raise more than one percentage point of GDP, and only for a few years, through direct taxation of creditors. These taxes are hard to enforce, as intermediaries quickly design new financial claims that avoid transaction levies, and pension-asset taxes often face legal challenges as retroactive expropriation. They distort credit allocation, place domestic intermediaries at a competitive disadvantage relative to foreign institutions, and hinder the country's ability to attract new foreign capital. The first form of financial repression is therefore limited in scale and costly in side effects.

4 Devaluation

Within the devaluation channels, the most pervasive is inflation. Inflation devalues most types of government debt, since they are typically denominated in the national currency. Because inflation is usually accompanied by currency depreciation, it also erodes the real value of the country's external liabilities, relaxing the external-debt constraint as well.

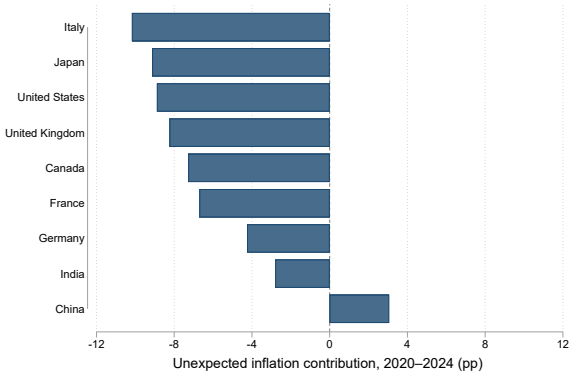
4.1 The size of devaluation of the public debt

Devaluing the debt by inflating it way has a long and distinguished history. At the start of this century, the spread of independent central banks with explicit inflation targets seemed to relegate this tool to the past. The years following the pandemic showed otherwise.

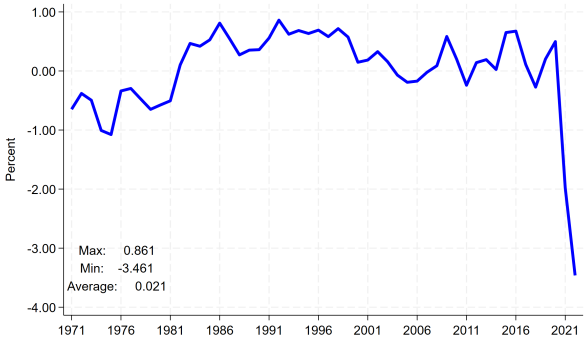
Between the beginning of 2021 and the end of 2024, U.S. inflation exceeded its target by a cumulative total of more than 10 percentage points. Cumulative inflation in the euro area was only slightly lower. The left panel of Figure 2 uses the IMF's 2019 WEO staff

Figure 2: Devaluing the public debt through unexpected inflation

(a) Recent cross-country devaluation



(b) Historical US devaluation



Notes: The values in the left panel are calculated as follows, following Reis (2025). I start with the forecasts for the primary surplus, interest rates, and inflation from the October 2019 issue of the World Economic Outlook. I use these terms to calculate the evolution of the debt if each element was as forecasted, but inflation was equal to the realized values. Comparing this value with the actual public debt in 2024 gives the rise in debt due to the unexpected inflation. The right-side panel replicates Acalin and Ball (2025) by using median expected inflation from the survey of professional forecasters and actual realized inflation to calculate the impact of differences between the two on the value of the public debt fomr one year to the other, taking into account the maturity of outstanding government bonds.

forecasts of debt and inflation to compute the size of the debt devaluation due to the unexpected inflation of these years. A substantial share of the pandemic-related increase in public debt was inflated away, with 10.2% of GDP for Italy at the top.

The right panel shows the annual devaluation of U.S. public debt due to unexpected inflation from 1971 to 2021. Remarkably, a decade of frequent devaluations in the 1970s was followed by 19 consecutive years, beginning in 1983, during which the debt revalued: lower-than-expected inflation transferred resources from the government to its creditors. Over the full 50-year period, the average devaluation term was close to zero.

The data therefore offer a dual message. On the one hand, the devaluation channel of financial repression can be large and persistent, generating revenues exceeding 10% of GDP. On the other hand, such episodes have historically been followed by many years of negative revenues.

4.2 Determinants of devaluation

In theory, the size of the devaluation channel is determined by three factors (Hilscher, Raviv and Reis, 2022, Reis, 2019*a*).

The first is the composition of the debt, across both indexation clauses and maturities.

Since the 1970s, many advanced economies have issued inflation-indexed government debt. In the United Kingdom in 2024, indexed bonds accounted for one quarter of all outstanding government bonds. These debt instruments cannot be inflated away.

The maturity structure of privately-held public debt has also changed substantially in recent decades. Large-scale quantitative easing programs shifted long-maturity bonds from private portfolios to central-bank balance sheets, replacing them with overnight deposits of zero duration. In some countries, including the United States, this shift was reinforced by reduced Treasury issuance of longer-term bonds. As a result, the distribution of maturities held by the private sector is now closer to a hyperbolic than an exponential function. The correct measure of how much higher inflation would devalue the debt is therefore the Fisher–Weil duration of this portfolio, which is both lower than average maturity as well as low by historical standards.

The second factor is the extent to which inflation is unexpected. Expected inflation is already priced into bonds and generates no devaluation. The relevant expectations are those embedded in market prices, such as the swap contracts used to hedge inflation risk.

The third factor concerns the dynamics of inflation once repression policies attempt to raise it. A common rule of thumb states that 1% of unexpected inflation devalues the debt by duration times the debt-to-GDP ratio. This rule assumes that inflation jumps immediately and remains permanently higher. With independent central banks and explicit inflation targets, both assumptions are unlikely to hold. In such an institutional environment, higher inflation would more likely emerge from benign neglect by the central bank in responding to other shocks, but loose policy may take time to pass through to inflation. Once inflation rises, policymakers can justify delaying tightening for a few months (or years) by invoking shocks and tradeoffs, but they will eventually act to bring inflation back toward target. Both the initial delay and the limited persistence reduce the resources that inflation can extract.

In 2025, data on expected inflation suggest that generating a large and persistent inflation surprise has become more difficult. First, research using UK data from 2019–23 shows that long-horizon swap prices tend to overreact when traders' expected inflation rises (Bahaj et al., 2025*b*). Second, U.S. professional forecasts of long-run inflation have become more sensitive to short-run inflation shocks following the post-pandemic inflation surge (Reis, 2025). Third, the cost of insuring against long-horizon inflation tail risks in the euro area, measured using swaption prices, has risen decisively and persistently

since 2002 (Hilscher, Raviv and Reis, 2025).

Taken together, these findings suggest that in 2025 it may be harder to significantly devalue public and external debt through inflation. Creating unexpected inflation is more challenging than it was in 2021; institutionally independent central banks cannot easily justify persistent upside surprises as they could in the 1970s; and the short duration of non-indexed privately held debt limits the extent to which it can be eroded.

5 Services and discounts on the debt

The third set of financial-repression policies consists of those that create a discount on the return that the government or the country pays to its creditors. For such discounts to exist and persist, two conditions must hold.

First, the market for the debt instrument must be partially or temporarily segmented. Segmentation prevents an investor with deep pockets and who does not value the service provided by the asset from arbitraging away differences in returns. Across borders, policy often creates the segmentation directly through capital controls. Within borders, segmentation arises from restrictions on investor mandates, limited equity, constraints on external financing, or the inability to short government liabilities, among other frictions.

Second, the government liability must provide some service to its holder. This benefit is often referred to loosely as a convenience, and it explains why the creditor accepts a lower monetary return. The resulting discount in the required payoff is often called the convenience yield. This section reviews the different sources of convenience and, for each, the measure of the associated yield discount.

5.1 The demand for convenience

Associated with a service from holding a government liability is a demand for it. If enough of this type of debt is held, the demand for it will be satiated and the return will equal a long-run no-service benchmark $\bar{r}_t$. As less of it is held, say b_t^j, then the liability becomes increasingly scarce. By providing a service, the liability can pay a lower monetary return, which is equal to its promised nominal return r_t^b minus the expected loss of real value of the units of the debt π_t. The discount between the benchmark yield and this return is the convenience yield, which is higher the less of the liability is held. The government supplies the liability in the amount $\bar{b}_t^j$. The demand and supply is represented in

Figure 3: Financial repression from debt discount: measurement and policies

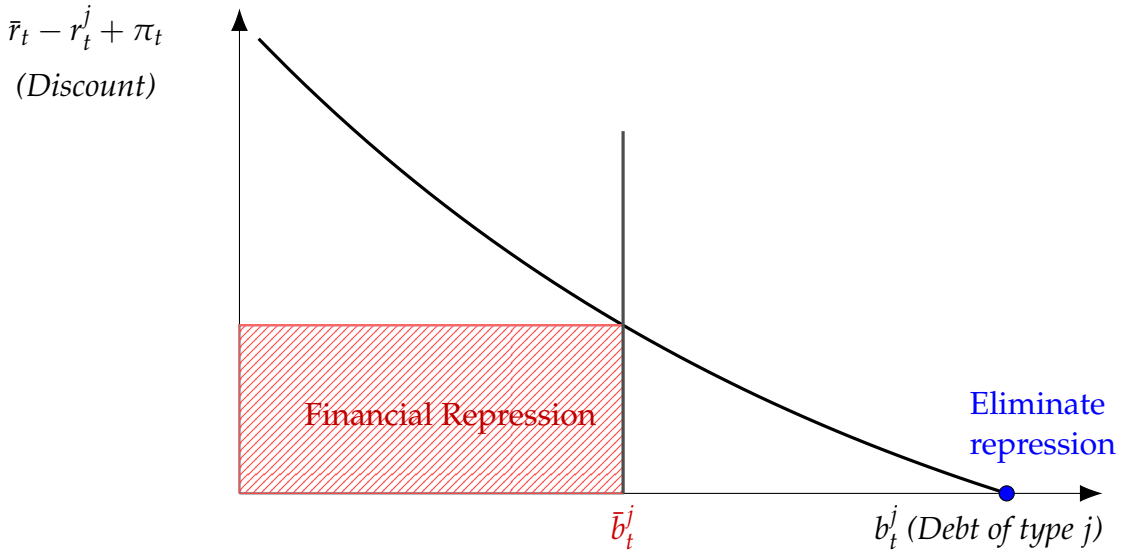


figure 3.

The financial repression associated with discounts corresponds to the area in red. Repression policies reduce the surplus received by lenders by creating surplus for the borrower. They do so either by shifting the vertical supply of debt—issuing more or less of liability type i—or by shifting demand through financial-regulatory policies or changes in the characteristics of the debt.

It is important to note that measuring the convenience yield on a liability does not reveal whether it provides a service, nor the magnitude of that service. If the government issues enough of a given debt instrument, the marginal convenience it provides can fall to zero even while the total surplus generated remains large. Currency offers a useful example. The nominal interest rate provides a direct measure of the discount. Under the Friedman rule, the marginal benefit of an additional unit of currency is driven to zero, yet the total consumer surplus from holding cash can be substantial.

Measuring that total surplus is difficult because it requires estimating the entire demand curve. Measuring financial repression, however, is easier: it requires only measuring the convenience yield, measuring the quantity of the liability, and multiplying the two. The reason this constitutes repression is that the government can always issue more of this type of debt. It does not even need to run budget deficits to do so, since it can use the proceeds to acquire private assets. Issuing additional financial claims has a marginal

cost of zero, and by increasing the supply the government could push the discount to zero. Likewise, if financial regulations have artificially boosted demand for the service provided by the liability, the government could remove these regulations, shifting the demand curve left and again eliminating the discount. If the government chooses not to use either lever, it is repressing the economy by keeping the supply of this type of public debt artificially scarce.

5.2 Measuring financial repression for classes of debt

Each type of government debt may give its own unique service. I discuss a few broad groups, where each mainly provides one particular service: currency, deposits of banks at the central bank, longer-term ($>$ 10 years) debt held by private domestic investors, shorter-term debt held by private domestic investors, and public debt held by foreigners. This separates between the liabilities of the central bank and the Treasury, the maturity of the bonds held by the private sector, and those held domestically or externally. Figure 4 shows the size of their private holdings for the major economies.

I take the service on short-term government bonds as a baseline shared by all, discussing it last, after discussing the other services associated with each asset. This shared convenience yield is $\bar{r}_t - r_t^b + \pi_t$, while the additional specific one to each liability j relative to government bonds is $r_t^b - r_t^j$. I now discuss the right measure of r^j for each one, which is tightly linked to the service it provides.

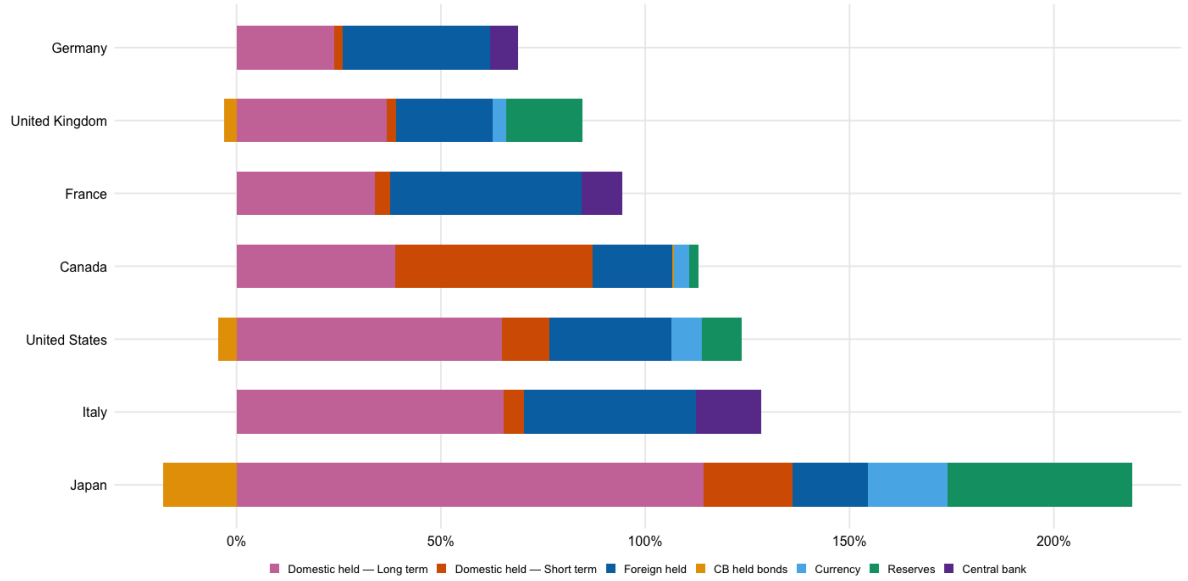
5.2.1 Currency and anonymity services

Physical currency allows people to accumulate savings anonymously and to conduct transactions without relying on digital money. Its service is anonymity.

Currency, however, pays no interest. Households (and illegal enterprises) that hold currency could instead have bank deposits. At the margin, banks can hold deposits at the central bank. Therefore, from the perspective of the revenues earned by the central bank, the relevant discount is the interest rate paid on central-bank deposits.

Friedman (1969) famously argued that this discount should be zero. Achieving this would require a zero interest rate on reserves, which is incompatible with maintaining a positive inflation target. Known proposals for paying interest on physical currency all sacrifice anonymity, since the holder must reveal their identity to collect the interest. Until recently, financial repression on currency was therefore unavoidable. But at least

Figure 4: Components of public liabilities



Note: The bars shows, for each of the seven countries (excluding China and India), the average (2006–2024) composition of the State's liabilities. Starting with general government debt as a percentage of GDP, I first subtract currency and deposits at the central bank, showing the difference between these two and the government bonds they hold as a residual. Where the split between currency and deposits is impossible at the national level (the EA countries) I show the sum of the two. Then, I subtract the foreign held debt, and of the remainder, I split long-term and short-term maturities, either using data on that split from the previous categories, or using the data on the split between maturity fot the general debt.

in principle, a central bank could issue anonymized token accounts and pay interest on them, eliminating this source of repression (Goodfriend, 2016).

5.2.2 Digital money and liquidity

Traditionally, only banks could hold deposits at the central bank. Because all credits in the economy can be legally settled by transfers across these accounts, they constitute the ultimate form of liquidity in a digital economy. And because banks can convert them into currency at the central bank on demand, they also provide maximal liquidity in the anonymous cash-based economy. The service provided by this government liability is therefore liquidity.

When a bank issues a deposit to a household or firm, it must stand ready to meet sudden withdrawals using its own deposits at the central bank. For that reason, banks are willing to accept a lower return on these reserves than on short-term government bonds. The bond would need to be sold at the prevailing market price, while reserves

can be used instantly and one-for-one to satisfy a withdrawal, whether it is a transfer to another bank or a conversion into currency. The discount for this liquidity service is thus the spread between the interest rate on reserves and the short-term interest rate on government bonds (Poole, 1968, Bianchi and Bigio, 2022, Bahaj and Reis, 2024).

The central bank chooses the quantity of deposits it supplies. Issuing enough reserves satiates liquidity demand and drives the discount to zero. Doing so requires a large balance sheet and abundant bank deposits at the central bank. Supplying fewer reserves under-provides liquidity and creates financial repression (Reis, 2016).

5.2.3 Longer-term bonds and duration

A pension or a life insurance contract provides a service to households who want long-lasting payouts that are safe and stable since they are little informed about the multiple risky assets in financial markets. This leads to mandates for the institutional investors to hold matching longer-duration assets with a preference for government bonds. The service provided by long-term government bonds is duration, in the sense of access to a safe stream of income for 20, 30, or more years.

Long-term government bonds are scarce, especially in the US, so much so that institutional investors seek private alternatives through derivatives contracts that offer the same payout as a long-term bond, while the other side of the contract rolls over short-term bonds and bears the associated duration risk (Kashyap et al., 2025). The discount here is the repressed yield in a 30-year Treasury relative to its 10-year (or shorter) equivalent, because the demand for that duration raises the price of the longer-maturity bond.

The government could supply more long-dated bonds, as evidence by the wide variation across countries in how much it does supply. The government also heavily regulates pension funds and insurance companies towards holding long-dated government bonds. By boosting the demand, and restricting supply, the government creates financial repression.

5.2.4 External liabilities and USD denomination

Foreigners demand assets that are denominated in the international currencies that are used in invoicing and payments in global trade. These assets provide a store of value to pay for their imports, they are a precautionary savings against funding crises in buying intermediate inputs on credit, and they provide a hedge for financial crises by tending to

appreciate when consumption is low. The USD is the main provider of this denomination service, but the EUR and the CNY do so to a smaller extent as well.

Domestic nationals, and especially the government, have an advantage in issuing liabilities in that currency since their income streams and consumption are denominated in the currency, so they do not bear exchange rate risk by doing so. At the same time, foreigners can create and supply assets denominated in the domestic currency, and many governments do issue bonds that pay out a promised amount in a foreign currency. The private sector can do so as well, by combining a foreign-currency bond with a futures contract that swaps its future payoff into that foreign currency. The extra cost for the foreigner to do so is the cross-currency basis, or deviation from covered interest parity (CIP). The negative CIP wedges that a international currency benefits relative to most other currencies some or the time measure the discount (Du, Im and Schreger, 2018).

5.2.5 Lending of last resort, capital controls, and currency volatility

There are three further services on external liabilities. They are either harder to pin down, or controversial. I will not quantify them, but still briefly discuss them.

The first arises from the demand for assets denominated in a foreign currency extending beyond government bonds and including also risky and illiquid foreign investments. Investing in them comes hand-in-hand with leverage using short-term foreign funding, which occasionally shrinks, creating a demand for emergency lending in that foreign currency. The service is insurance against funding shocks, and since the central bank can instantly supply the currency, it could satiate its demand. However, central banks choose to charge a cost of this insurance, both for its domestic lending facilities, and in its swap line arrangements with other central banks that lend to foreigners, through a spread charged on lending relative to the interest on deposits. This is the discount, or premium since this is a government asset rather than liability (Bahaj and Reis, 2022*a*). Its financial repression revenues are only significant during rare financial crises, when the balances on the lending facilities rise.

The second service is access to domestic or foreign financial markets, impeded by capital controls that prevent domestic agents from freely hold foreign assets, or foreigners from repatriating earlier investments in the country. The discount is the wedge between returns on domestic and foreign assets in the uncovered interest parity condition. The quantity to which his applies is usually hard to measure. An exception is the case of China, where the controls take the form of scarce offshore money liquidity that must be

used to access foreign assets, so the repression revenues are equal to offshore deposits times the deviations of the offshore-onshore exchange rate from parity (Bahaj and Reis, 2024).

The third service is controversial, but fitting in a lecture partly named after Robert Mundell. In his Nobel lecture, (Mundell, 1999), he argued in favor of an international currency because of the present "dysfunctional volatility of exchange rates". Some models emphasize the limited capacity or willingness of investors to hold this risk creating a wedge in the uncovered interest parity condition that is proportional to exchange-rate volatility (Itskhoki and Mukhin, 2021). Insofar as governments create this excessive volatility through monetary and fiscal policy, and fail to provide an international currency, the exchnage-rate volatility could be seen as a form of financial repression.

5.2.6 Government bonds and pledgeability

Government bonds are the preferred form of collateral in credit relations. Relative to almost all private assets, their payoffs depend less on idiosyncratic characteristics or on hard-to-obtain information, which makes them safer to the eyes of a large common group of creditors. They have deep liquid markets, where the pledged collateral can be sold easily, if and when it is seized. Their pledgeability as collateral is the last service, and it is shared by all the government liabilities discussed so far (Kiyotaki and Moore, 1997, Brunnermeier, Merkel and Sannikov, 2024). On the external debt, US Treasuries stand out among government bonds as the preferred safe collateral in international transactions (Devereux, Engel and Wu, 2023).

Governments not only under-supply liabilities to perform this role, but they especially boost the demand for the service through multiple regulations: liquidity ratios, risk-weighted solvency and capital requirements, exemption for government bonds from leverage limits, eligibility rules for collateral in access to central bank lending, among others. There is a long history of governments requiring banks to hold government bonds that were far from liquid and far from safe even at the expense of crowding out private credit and economic growth (see (Acharya and Steffen, 2015, Becker and Ivashina, 2017) for evidence during the Euro crisis, and (Reis, 2021, Payne and Szoke, 2025) for analytical frameworks).

Measuring the return on government bonds r^b is straightforward, but measuring the benchmark rate $\bar{r}$ is not. The gap between the two enters as a convenience yield for all other debts, so it has attracted a great deal of attention. Two approaches likely provide

bounds on its size.

A narrow approach looks at assets that are almost-surely not segmented from the market for government bonds. Their convenience yield arises solely from the benefit of the service, and not from an absence of arbitrage. One good option is bonds issued by supranational institutions in multiple currencies, which are less pledgeable than domestic government bonds, but are just as safe from default (Dao and Gourinchas, 2025). Another is a basket of corporate bonds with little credit risk (Krishnamurthy and Vissing-Jorgensen, 2012, Lehner et al., 2025).

A broad approach notes that the macro alternative to government bonds is the private capital stock. No matter how the claims on that capital are split, their returns must add up to the returns on private capital, and no matter how different investors are segmented, ultimately the private sector must end up holding all of the capital stock and all of the government bonds. Therefore, the benchmark discount rate $\bar{r}$ must be the marginal product of capital. One option to measure it is to measure the average product of capital in the national accounts, while another is to measure the financial returns on a very broad basket of corporate bonds and loans to measure the marginal return (Reis, 2020). A problem with these measures is that the payoff risk of the market and government bonds is different, so the gap between their returns has compensation for risk that is not financial repression. One approach to control for this is to focus on the changing correlation between bond and stock returns to measure changes in the discount (Pflueger, 2025, Acharya and Laarits, 2023). Another is to model risk premia using returns in different risky assets (van Binsbergen, Diamond and Grotteria, 2022, Jiang et al., 2024, Tella et al., 2023).

6 Quantifying financial repression

Having described the sources of financial repression revenues and how to measure them, I now estimate them for the United States in the recent past and present before discussing their future potential. While the United States is far from being the country for which financial repression is more significant, it is the one for which I can rely on previous literature to separate the size of the different terms.

6.1 Estimates

Table 1 adds up the financial repression revenues from the different terms from the bottom up, averaged over the five years before the pandemic and the five years before 2025.[3] The table delivers four broad lessons.

First, that the dominant financial repression revenues in both periods are the compensation for pledgeability services. This is not because the convenience yield for this service is always higher than for others, but because it multiples all government liabilities.

Second, this source of revenue has fallen significantly according to the broad measure. Not shown in the table is that, for the year 2025, this has gone close to zero as well using the narrow measure. Perhaps this is the result of the increase in the supply of public debt and a steep demand curve for this service. Perhaps it has fallen because geopolitical conflict has made US Treasuries less reliable as international collateral, less liquid given recent frequent crises in their market, or less information-insensitive since inflation remains high and volatile. Whichever is the reason, the service seems to have been eroded.

Third, the revenue from issuing USD-denominated assets generate significant revenues in 2015-19, but this has disappeared in 2021-25. Perhaps this is temporary, but it surely concerning for US public finances (Jiang, Richmond and Zhang, 2025, Jiang et al., 2025).

Fourth, the old-fashioned forms of financial repression—unexpected inflation and seignorage from currency—were insignificant in 2015-19, but made a comeback in 2021-25. The inflation disaster, and the steep hike in policy interest rates, generated an average revenue from financial repression of more than two percentage points per year.

6.2 How large can it be?

Sections 3 and 4 discussed the limits on collecting taxes on the financial sector, and the determinants that put limits on devluaing the debt. As for the discount revenues, their potential size depends on the elasticity of the demand curve for the associated services. As with taxes, there is an elasticity of the tax base to the tax rate, and a Laffer curve

[3]The classic work by Giovannini and de Melo (1993) measures financial repression instead top-down, as the diference between interest payments to domestic holders of government liabilities and counterfactual payments if the average interest paid would have been the one on the externally-held government bonds. A major pitfall of this comparison is that the composition of the types of debt held by domestics and foreigners is usually very different. Reinhart and Sbrancia (2015) carefully work through the debt composition, but for the benchmark rate, they have to resort to rules of thumb like 0, 1 or 2 percent.

Table 1: Assessing the size of US financial repression revenues

			Revenue % GDP	
			2015-19	*2021-25*
Panel I. Direct taxation term				
Income taxes collected over the financial sector			0.089	
				0.086
Panel II. Unexpected inflation term				
Expected inflation	*Actual inflation*	*Debt/GDP (%)*		
1.560	1.554	61.9	-0.023	
2.016	4.938	84.1		*1.955*
Panel III. Discounts term				
Convenience service	*Discount spread*	*Relevant liability*		
Anonymity	IOR rate minus zero	Currency in circulation	0.094	*0.262*
Liquidity	ONRRP rate minus IOR	Bank deposits at the Fed	0.024	*0.014*
Duration	30-10yr spread from preferred habit	Government bonds maturity $\geq$ 10yr	0.014	*0.023*
USD denomination	Treasury covered interest parity	US gross external liabilities	0.399	*-0.062*
Pledgeability	3yr AAA corporate minus treasury rate	Government bonds held by the public	0.438	*0.508*
	Return on capital minus treasury rate	Government bonds held by the public	3.914	*0.260*

Note: Panel I shows the income taxes collected by the financial sector as reported by the BEA. Panel II calculates the devaluation of the debt by using the Weighted Average Next Rate Reset (WANRR) reported by the Office of Debt Management, the 5-year expected inflation from inflation swap rates, the actual inflation during the 5 year (or 4 years and 9 months), and the market vlaue of te privately held debt as calculated by the FRB Dallas. Panel III links the main services provided by different types of public debt to a measure of their discount spread, the subset of public liabilities it applies to, and the resulting share of GDP raised in financial repression revenue over two 5-year periods. For the pledgeability service, I present estimates from two separate approaches.

mapping out the potential revenue.[4].

A rich literature in the last decade has estimated demand curves both for different

[4]For a simple example, say that the demand for a type of government liability has a semi-elasticity η, so $b_t^{j,i} = \beta_t e^{-\eta d_t}$ with d_t being the discount and β_t an intercept. Then the period financial repression is $\beta_t e^{-\eta d_t} d_t$, which peaks at $d_t = 1/\eta$.

Table 2: The semi-elasticity of the demand curve for different bond-services

Service	**Semi-Elasticity** (per 100bp)	**References in the literature**
Anonymity	0 to 10%	Ball (2001), Lucas (1988), Benati et al. (2021).
Liquidity	50 to ∞%	Hamilton (1997), Smith and Valcarcel (2023), Afonso et al. (2025), Bahaj and Reis (2024), Lopez-Salido and Vissing-Jorgensen (2025).
Duration	175 to 250%	Greenwood and Vayanos (2014), Greenwood and Vissing-Jorgensen (2018).
USD denomination	1 to 20%	Bahaj et al. (2025*a*), Liao and Zhang (2024), Kubitza, Sigaux and Vandeweyer (2024).
Pledgeability	20 to 60%	Krishnamurthy and Vissing-Jorgensen (2012), , Jiang, Richmond and Zhang (2025), Fang, Hardy and Lewis (2025), Payne and Szoke (2025).

Note: This table lists bounds for estimates of the semi-elasticity of the service provided by the government liabilities listed in table 1, and the references to the articles that estimated them.

assets by the same people, and for the same asset by different people, including for government liabilities (Krishnamurthy and Vissing-Jorgensen, 2012, Koijen and Yogo, 2019). Table 2 shows representative estimates from this literature. The elasticities are all well below infinity, indicating room for financial repression. At the same time, they are relatively large. This matches the contrast between the two periods found in table 1: while financial repression revenues can be large, raising them to solve the twin debt problem may turn out to be fruitless.

The table also shows which channels and policies of repression are more promising to raise revenues. Taking the rule of thumb that the discount spread should be higher where the elasticity is lower, there is more potential for financial repression towards foreigners, since it is the demand for USD assets that is less elastic (Choi, Kirpalani and Perez, 2024). On the other side, policies that affect the duration available, including quantitative easing policies or changes in debt issuance, make less of a difference for the repression revenues earned.

7 XXIst century examples of financial repression

Looking into future, this section now applies the framework in this lecture and the channels that it isolated to recent and potential policies for financial repression.

7.1 The 2022 Turkish securities maintenance practice

In June of 2022, the central bank of Turkey announced a new macro-prudential policy. The securities maintenance practice (SMP) required banks to hold long-term government bonds at accounts in the central bank against their loans, their deposits, and their foreign exchange deposits, on top of the standard reserve requirements. The stated objective of the policy was to discourage foreign deposits, but the amount of bonds that have to be pledged per unit of deposit or loan has changed often in response to multiple shocks or changes in policy goals.

In the Fall of 2022, the pledgeability requirement against foreign deposits increased from 3% to 5% as part of a "liralization strategy" while, in February of 2023, loans made to zones affected by an earthquake were exempted from pledging bonds. To assess the financial repression implications of this policy, this article suggested comparing the returns of 5-year government bonds with the returns on 5-year supranational bonds issued in Turkish lira by the IBRD, EBRD, IFC, and EIB (Onen, 2025). Between 2007 and June of 2002, the spread between the two rates was rarely more than 2%; after the policy was introduced, it jumped to above 20%. The discount earned by the Turkish government was substantial, and the resulting repression revenues were significant. At the same time, public debt kept rising as fiscal deficits were high.

The interaction between fiscal and macro-prudential policies depends on whether the country is going through a fiscal or a financial crisis (or neither or both). For instance, facing a financial crisis, the fiscal authority prefers tighter macro prudential policy that reduces the probability of large bailout costs, but facing a fiscal crisis there is an "unpleasant macroprudential arithmetics" whereby looser macroprudential policy can stimulate bank lending and tax collections to avoid a public debt crisis (Reis, 2021).

7.2 The 2023 ECB remuneration of required reserves

Banks have to hold minimum reserves as deposits at the central bank. Until December of 2022, EA banks would receive an interest equal to a lending rate charged by the ECB

(the rate on the main refinancing operations). Because that rate was set by the ECB above the deposit rate, banks earned a higher return on their required than on their voluntary reserves. In December of 2022, it was decided to remunerate all reserves at the same rate.

In July of 2023, it was further decided that minimum reserves would from September onwards receive a 0% remuneration rate. At a time when the deposit rate was 3.5% and the repo rate close to it, and when required reserves were €164 billion, the tools in this lecture suggest that the additional financial repression over the liquidity services of reserves was around €6 billion.

This is a small amount, turning the discussion into whether this repression is desirable. One argument says that, because these reserves are infra-marginal, paying no interest on them does not distort banks' decisions. Another notes that, by lowering the profits of banks, this policy reduced their capacity to lend. Yet a third argument notes that the answer depends on whether market power or other mechanisms drives the gap between the deposit rates that banks pay their customers and the rate on reserves they earn at the central bank (Reis, 2023, Bahaj, Hosseini and Reis, 2024).

7.3 The 2024-25 UK individual savings accounts reforms

Assets under management by UK pension funds has risen steadily for many years as a result of population ageing and a shift from defined benefit to defined contribution plans. By 2024, about 80% of those assets were invested abroad, and the same was true for tax-favored individual savings accounts.

In March of 2024, the UK right-wing government announced plans for a new household savings instrument that would be exempt from income taxes on its returns as long as it was wholly invested in UK bonds or equity. These were never implemented due to a defeat in the next elections. The left-wing government that followed throughout 2025 discussed plans to impose a requirement that existing individual savings account must invest a certain percentage in UK equities.

This financial repression implicitly taxes capital outflows and it raises the demand for national liabilities. Many economies have similar tax-advantaged pension products to which this repression could apply. In the European Union, the Draghi (2025) report points to pension fund investment as a key to develop a EU capital market that invests domestically (Reichardt and Reis, 2025).

7.4 Raising the inflation target and interest rate ceilings

A higher inflation target, as long as communicated and anticipated by creditors, does not affect the valuation channel. It does cause financial repression by raising the interest rate on deposits at the central bank and so increasing the discount paid on the anonymity services of zero-interest-paying currency. Using the estimates in table 1, and the elasticity of 10% from table 2, an extra 1% in the inflation target of the Federal Reserve would raise financial repression revenue of 0.12% of GDP per year.

This number can be much larger if the higher inflation comes with placing ceilings on interest rates of long-term government bonds, as was the case in the US in the 1940s, and in the UK in the 1960s. While not as extreme, monetary policies to control the yield curve, as done in Japan between 2016 and 2024, have similar results. The side effect of these policies, in experience and in theory, is more volatile and less anchored inflation (Reis, 2019*b*).

7.5 The international provision of USD

There is a wide network of cross-border liquidity lines signed by central banks that connects countries accounting for 90% of world GDP (Bahaj and Reis, 2023, Bahaj, Fuchs and Reis, 2024). In a typical USD swap line, the Federal Reserve lends USD to a foreign central bank, receiving in return as guarantee that central bank's currency, to be returned when the USD are repaid. During the 2020 pandemic, the Federal Reserve created the Foreign and International Monetary Authorities (FIMA) repo facility, whereby instead foreign central banks can borrow USD offering US Treasuries as collateral. These arrangement were little used in 2020, but they remain available for future crises.

Imagine now that the Fed cancelled its swap lines replacing them with the FIMA facility. The same central banks could still get USD lending of last resort. The difference is that now they have to beforehand make sure to accumulate US government bonds to pledge at the Fed during a future financial crisis. This action would raise the demand for Treasuries in order to keep the service of lending of last resort. It would be financial repression of foreigners (Bahaj and Reis, 2022*b*).

7.6 Stablecoins and the future of currency

Stablecoins can reduce financial repression. They potentially offer the convenience of digital forms of payment with some of the anonymity of physical currency. If the stablecoin

issuers back the stock of stablecoins with deposits at the central bank and passes through the interest paid, then the financial repression associated with the anonymity of currency would be eliminated. Stablecoins may also make it easy and inexpensive for households in a country to have accounts in units of another country's currency and to use them for domestic payments and store value. With stablecoins, the financial repression tied to exchange rate volatility would be reduced as the world would move closer to a single currency used at home and abroad.

At the same time, if private stablecoins replace domestic state currency, they transfer the financial repression revenues from the government to their issuer. Moreover, regulations over stablecoins can negate their potential, for instance by forbidding them from paying interest.

8 Conclusion

Robert Mundell was a role model in applying fundamental economic principles to policy questions. In this lecture, the principle I explored was the budget constraint facing a country or a government. Conventional debt-sustainability analysis interprets this constraint as requiring that debt not exceed the expected present value of future primary surpluses. I expanded this framework to include three additional terms that I labelled financial repression: net income from taxing debt holders, devaluation of the existing stock of debt, and flow discounts on that stock in exchange for providing a scarce service to its holders. The policy application was to examine these channels of financial repression in the twenty-first century and to assess both their current size and their potential.

In the four decades between the end of World War II and the mid-1980s, financial repression was the global norm. Four decades of respite later, it is returning. This resurgence reflects a combination of high public-debt levels, large and growing global macroeconomic imbalances, the availability of repression tools through the regulatory infrastructure created after the global financial crisis, and the recent surge in inflation. While repression revenues average to zero over sufficiently long horizons, the theory and evidence reviewed here show that they can be substantial for many years at a time.

Although financial repression is tempting for policymakers facing a twin-debt problem, its ability to raise revenues systematically and persistently is illusory. Most channels have clear upper bounds and high elasticities of the implicit tax base with respect to the implicit tax rate. In the 1970s and 1980s, several emerging-market economies confronting

debt crises turned to the printing press. More money seemed an easy solution but it generated little revenue and large distortions. The analysis in this article suggests that financial repression may suffer from similar promises and similar pitfalls. It serves as a warning to policymakers attracted by its temptation.

I conclude with one open question: what would the international monetary and financial system look like in a world of active financial repression? The answer hinges on two challenges.

The first challenge is that, once policymakers deploy financial repression aggressively, economic agents and markets will adapt. The short-run elasticities of demand for the services provided by government liabilities will evolve in the long run, and expectations of future returns will adjust to prevent persistent surprise devaluations. The 1970s witnessed the rapid expansion of the eurodollar market, in part as a reaction to high inflation and strict domestic repression. An analogous expansion of offshore financial markets is plausible today. Studying these markets should be high on the research agenda.

The second challenge concerns the role of international policy institutions such as the IMF. The IMF played a central role in the 1970s and 1980s as countries liberalized their financial systems—sometimes facing crises as a result. Later, the IMF provided intellectual leadership in reassessing the costs and benefits of capital-flow restrictions. In a world of renewed financial repression, the IMF should again have a decisive role: promoting policies that ensure debt sustainability more effectively and with fewer distortions.

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A Appendix: derivation of the debt equation

The appendix uses mathematical notation to ensure nothing was lost in writing down the resource constraint.

Let $b_{t-1}^{j,i}$ be the nominal stock of debt (or negative of the asset) of type j held between time $t-1$ and t by creditor i. There is a set J of such assets, and creditors of type $i \in I$ have access to the sub-set $J^i \subseteq J$. The unit price, or value, of each liability today is q_t^j, while its payoff is d_t^j, so that the realized return to the creditor of holding a unit of the asset then is: $1 + r_t^j = (q_t^j + d_t^j)/q_{t-1}^j$. In turn, the market value of the total net liabilities is $b_t = \sum_{i \in I} \sum_{j \in J^i} q_t^j b_t^{j,i}$, while the total net returns are defined as the scalar r_t given by $1 + r_t = \sum_{i \in I} \sum_{j \in J^i} (1 + r_t^j) q_{t-1}^j b_{t-1}^{j,i} / b_{t-1}$. Finally, let s_t be the resource surplus of the agent with what is left from her income or endowment after what she spends or consumes.

With all this notation out of the way, it is an accounting identity that net liabilities rise by the difference between the resources used in their net payment and the surplus:

$$b_t - b_{t-1} = r_t b_{t-1} - s_t \tag{A.1}$$

It is a step in mathematics to cumulate this equation, connecting liabilities today with liabilities at some far future. Because there are many such futures, we can multiply each by its probability, and sum them all to link liabilities today to the expected sum of future surplus and debt in that future.

At this point, some economics comes to play. Say that the debtor could run a Ponzi scheme on any one of its creditors. That is, it could pay debts due by just selling new debt, and keep on rolling that debt over forever. Then, there would be no constraint on what the debtor could do. It could have large deficits and finance them this way. We could not talk of debt problems.

Take the perspective of these creditors and consider how they value the debt at that far away future. First, they judge the value of the debt in the units that are relevant to them, as opposed to the units in which the debtor issues them. Letting p_t be the exchange rate between the two, or the price level facing the debtor, then they care about the value of b_T^j / p_T. Second, they discount that future payoff at the end of their relationship with the government by some factor $M_{t,T}^j$ in today's units. That discount must be smaller than 1 and converge to zero faster than the growth rate of the surpluses. Otherwise, there again would be no constraint on the government, as future surpluses far away in the future would be infinitely valuable to the creditors.

Letting $\bar{r}_t^j$ be the inverse of the expected value of that discount factor, then: $1 + \bar{r}_T^j = \mathbb{E}_t (M_{t,T}^j)^{-1}$. The no-Ponzi scheme condition is:

$$\lim_{T \to \infty} \mathbb{E}_t \left(M_{t+T}^j (1 + \bar{r}_T^j) b_{t+T}^j / p_{t+T} \right) = 0 \tag{A.2}$$

Since there is a tiny chance that the world might end at any one date, or that a creditor will want to stop lending, then there is an equivalent $M^j_{t,T}$ final discount factor for any date T and for every agent. In "death", they are all the same, even if in life they may assess payoffs differently. Sometimes this is stated as an inequality, because the creditors would be happy to themselves run a Ponzi scheme on the debtor. By writing it as an equality I am appealing to a no-Ponzi condition in that direction as well.

Combining the No-Ponzi economic condition with the budget accounting condition, and letting $M_{t,T}$ and $\bar{r}_T$ be the average rates averaged by each investors' holdings, then, after some steps of algebra, the constraint on the agent's debt is:

$$\begin{aligned}\frac{(1+\bar{r}_t)b_{t-1}}{p_{t-1}} &= \mathbb{E}_t\left(\sum_{l=0}^{\infty} M_{t,t+l}s_{t+l}\right) \\ &+ \sum_{i\in I}\sum_{j\in J^i}\left(1+\bar{r}_t-\frac{(1+r^j_t)p_{t-1}}{p_t}\right)\frac{q^j_{t-1}b^{j,i}_{t-1}}{p_{t-1}} \\ &+ \mathbb{E}_t\left[\sum_{l=0}^{\infty} M_{t,t+l}\sum_{i\in I}\sum_{j\in J^i}\left(1+\bar{r}_{t+l+1}-\frac{(1+r^j_{t+l+1})p_{t+l}}{p_{t+l+1}}\right)\frac{q^j_{t+l}b^{j,i}_{t+l}}{p_{t+l}}\right]\end{aligned} \tag{A.3}$$

This matches the equation in the text where, in words, the first term on the right-hand side is the expected present value of net income, the second term is the valuation effect, and the third term is the expected present value of the discounts. Note finally that the expression for the convenience yield is, after log-linearization around a steady state of zero: $\hat{\bar{r}}_t - \hat{r}^j_t + \pi_t$ where $\pi_t = \ln(p_t/p_{t-1})$.