From Fiscal Deadlock to Financial Repression: Anatomy of a Fall*

Olivier Jeanne**
Johns Hopkins University
NBER, CEPR and PIIE

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Abstract

Financial repression can be used to avoid a government default when fiscal policy is constrained. We present a model showing that optimal financial repression progresses through successive stages with increasing levels of distortion. In the early stage, banks purchase government debt; in the later stage, the government extracts quasi-fiscal revenue from the banking sector. Data from advanced economies suggest that the initial stage of financial repression begins when government debt exceeds 100% to 120% of GDP.

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**Olivier Jeanne, Johns Hopkins University, ojeanne@jhu.edu

1 Introduction

Financial repression has historically been used to stabilize or reduce high levels of government debt. The fiscal deadlock currently observed in several advanced economies has raised concerns about the potential resurgence of financial repression (Reinhart and Sbrancia, 2015). This paper studies the possible forms that financial repression might take, starting with a model and then analyzing data on government debt in advanced economies.

We define financial repression as any policy by which the government uses the banking sector to avoid default.[1] This definition covers a wide range of policies. For example, Acalin and Ball (2023) describe how post-World War II banking regulations helped advanced economies reduce the heavy debt burdens inherited from the war. More recently, some authors have argued that large-scale central bank purchases of government debt over the past 15 years may represent an early form of financial repression (see Chien, Cole and Lustig, 2023, for the case of Japan). One aim of this paper is to integrate these different views into a common framework.

We distinguish between two forms of financial repression: *balance-sheet* repression, which forces banks to hold government debt, and *quasi-fiscal* repression, which extracts revenue from the banking sector. Our framework predicts a pecking order, with financial repression beginning in the balance-sheet form and later shifting to the quasi-fiscal form.

In our analysis, balance-sheet repression arises from selective default: the government is less likely to default on banks than on non-bank investors. This implies that banks must become the marginal buyers of debt when it exceeds a certain level. This policy distorts both the size and composition of banks' balance sheets. When these distortions become too costly, governments turn to quasi-fiscal repression. This can be achieved, for instance, by lowering the interest rate on bank reserves or requiring banks to accept below-market interest rates—policies that resemble the extensive banking regulations and interest rate controls commonly observed before the 1970s.

More formally, our model considers a government whose debt is on an unsustainable trajectory, a situation that can be resolved through fiscal adjustment, financial repression, or default. While fiscal adjustment is the preferred solution, it is delayed by political or institutional deadlock. Financial repression provides a temporary

[1] The concept originated with Shaw (1973) and McKinnon (1973), who described policies in developing economies that mobilized domestic savings for state-led investment. Giovannini and de Melo (1993) measured the revenue from such policies in emerging markets during the 1970s and 1980s. Our focus is instead on the use of financial repression to prevent government default in advanced economies.

bridge to the fiscal adjustment.

We solve for the optimal financial repression policy as a Ramsey problem. Our first contribution is to show that financial repression unfolds sequentially. We drive explicit formulas for the debt thresholds at which the government switches between the different forms of financial repression. A second contribution is to account for two margins of adjustment when banks purchase government debt—crowding out lending to the private sector versus expanding banks' liabilities. The marginal costs of the two margins are equalized in the optimal policy.

Calibrating the model could, in principle, quantify the debt thresholds that trigger the different stages of financial repression. However, this is challenging because key elements of the model, such as the costs of distorting the banking sector's balance sheet or the default cost, are difficult to measure. Instead, we try and infer from observed policies which version of the model align most closely with the data. This leads to the following observations.

First, we find that consistent with our model, the allocation of government debt between bank and non-bank creditors changes as the level of debt increases. In advanced economies, the banking sector accumulates nearly all increases in government debt once this debt exceeds a threshold of $100 - 120\%$ of GDP. This pattern is remarkably consistent across countries although some, like Japan, reached this threshold earlier than others. Interpreted through the lens of our model, this fact suggests that all G7 economies, with the exception of Germany, may already be in the early stage of balance-sheet financial repression.

Second, governments behave as if the distortionary costs of balance-sheet repression were moderate, at least compared with the alternatives. In the data, banks' government debt purchases have been financed by deposit expansion rather than by crowding out lending to the real sector. Moreover, no country, including Japan, with government debt exceeding 200% of GDP, has resorted yet to quasi-fiscal financial repression. This might suggest that countries such as the U.S. have considerable leeway to remain in balance-sheet financial repression. This form of financial repression is not without costs, but it can serve as an effective bridge to fiscal adjustment, avoiding the more severe consequences of default.

However, alternative interpretations may temper this optimism. In Japan, for example, the banking sector's expansion may have been facilitated by prolonged liquidity trap conditions that lowered the cost of absorbing large amounts of government debt. If and when these conditions end, the costs of maintaining such policies could rise sharply.

Literature. The building blocks of the model are familiar from the literature on the interaction between fiscal and monetary policy, as well as on government default. We consider an economy operating under an active fiscal policy regime that could potentially transition to a passive regime in the sense of Leeper (1991). The government defaults to avoid the distortionary costs of domestic taxation, as in Pouzo and Presno (2022).

The paper contributes to the literature on financial repression. A large body of research examines how unsustainable debt dynamics have been resolved historically (Mauro et al., 2015), with several papers specifically studying the role of financial repression. As mentioned above, the term "financial repression" has been applied to a range of policies in that literature.

Some models assume, as we do, that financial repression crowds out bank lending to the private sector (Chari, Dovis and Kehoe, 2020; Broner et al., 2014). We add to this mechanism another margin of adjustment, the expansion of banks' liabilities. We find that this margin is indeed more relevant than crowding out in the data. This is in contrast with the empirical literature that found some evidence of crowding out associated with government debt purchases, such as Becker and Ivashina (2018) during the euro area debt crisis. However, the crowding out effect found by Becker and Ivashina is a relatively short-run phenomenon, and limited to periods of financial stress. We look instead at the impact of government debt purchases over ten-year periods and in normal times.

The assumption that the government does not default on banks due to the high costs associated with a banking crisis is not new. Models in which the government does not default because of the adverse consequences from default to the domestic financial sector include Acharya and Rajan (2013), Broner et al. (2014), Gennaioli, Martin and Rossi (2014), Bocola (2016) and Chari, Dovis and Kehoe (2020). In Chari et al's model of financial repression, the accumulation of debt in the banking sector allows the government to borrow more by increasing the ex-post cost of default.

The welfare cost of quasi-fiscal financial repression, in our model, is analogous to the welfare cost of inflation in models of the optimal inflation rate where the government chooses among various distortionary taxes (Schmitt-Grohé and Uribe, 2010; Lucas, 2000). This literature generally concludes that the optimal rate of inflation is zero or close to zero, consistent with our finding that quasi-fiscal financial repression should only be a last resort. A key difference between our model and this literature is our assumption that fiscal inertia may prevent the government from choosing less distortionary forms of taxation over financial repression.

Our model is real, and inflation plays a relatively minor role. We assume that bank deposits yield a real interest rate determined by the banking sector's budget constraint. Financial repression is thus associated with inflation if the zero lower bound on the nominal interest rate is binding. Additionally, we assume government debt is real, excluding the channels central to the fiscal theory of the price level (Cochrane, 2023).

This paper is related to the literature on central bank backstops of government debt, particularly in the context of the euro debt crisis. Several papers document the role of domestic banks in purchasing government debt during this period (Becker and Ivashina, 2018; Ongena, Popov and Van Horen, 2019). On the theoretical side, an important theme in the euro debt crisis literature is the role of central banks in preventing self-fulfilling government debt crises (Aguiar et al., 2015; Corsetti and Dedola, 2016; Lorenzoni and Werning, 2019; Bacchetta, Perazzi and van Wincoop, 2018). Unlike this literature, our analysis does not rely on the existence of multiple equilibria.

Finally, this paper is closely related to a companion paper (Jeanne, 2025), which focuses instead on the trade-offs between financial repression and default. In contrast, this paper investigates the anatomy of optimal financial repression when different instruments are used to avoid default. The equilibria considered in this paper are default-free.

The paper is structured as follows. Section 2 presents the assumptions of the model. Section 3 characterizes the optimal financial repression policies. Section 4 analyzes the data in light of the model and section 5 concludes.

2 Model

We consider a continuous-time economy with three sectors: households, banks and the government. Figure 1 shows the relationships between these sectors' balance sheets. Both households and banks hold government debt alongside real assets, while households also hold banks' liabilities (deposits).

Government. The government finances an exogenous and constant flow of expenditures by raising taxes and issuing debt. The budget constraint of the government is,

$$g + rd_t = \tau_t + \theta_t + \dot{d}_t, \tag{1}$$

where r is the real interest rate, g is government expenditure, τ_t denotes the fiscal revenue collected from households, θ_t is the quasi-fiscal revenue from financial repression collected from banks, and d_t is total government debt, which comprises debt held by households (b_t) and banks (ℓ_t). We consider equilibria without default risk in which the government borrows at the riskless interest rate r.

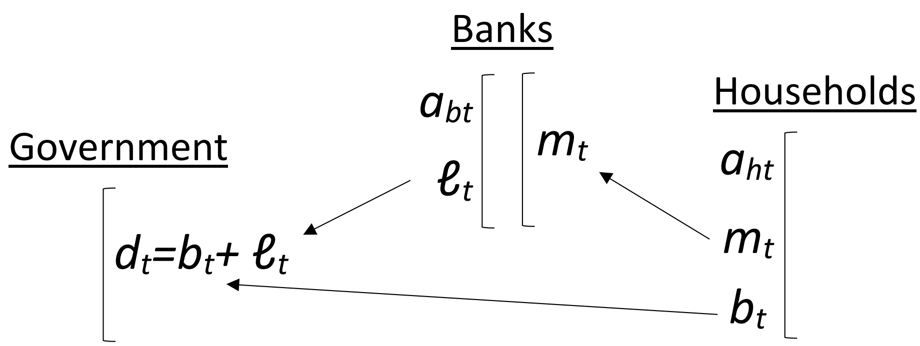

Figure 1: Sectoral balance sheets

Households. The economy is populated by a unitary mass of identical, infinitely-lived households. The utility of the representative household is given by

$$U_0 = E_0 \left\{ \int_0^{+\infty} \left[c_t + u\left(\widetilde{m}_t\right) \right] e^{-rt} dt \right\}, \tag{2}$$

where c_t is consumption and $u\left(\widetilde{m}_t\right)$ is the utility derived from real money balances (bank deposits). The quasi-linear utility implies a risk-free real interest rate r. We assume that $u(\cdot)$ is a power function,

$$u\left(\bullet\right) = \mu \frac{\bullet^{1-\nu}}{1-\nu}, \tag{3}$$

with $\nu > 1$.

Households hold a portfolio of bank deposits of different types $i = 1, \ldots, n$. The transaction utility provided by these deposits is

$$\widetilde{m} = \sum_{i=1}^{n} \omega_i m_i,$$

where m_i represents the quantity of type-i deposits and $\omega_1 = 1 > \omega_2 > ... > \omega_n = 0$. The deposit types differ in the ease with which they can be used to make transactions. Type-1 deposits have the highest transaction utility. Type-n deposits, which yield no transaction utility, are equivalent to debt. Deposit differentiation is introduced to reflect that banks can expand their balance sheets by issuing liabilities that increasingly resemble debt rather than deposits. Without this assumption, government debt purchases by banks would mechanically lead to the crowding out of other assets.

The total financial wealth of the representative household is $w_t = m_t + b_t + a_{ht}$, where $m_t = \sum_i m_{it}$ is total deposits, b_t is government debt, and a_{ht} denotes real assets. Households maximize their utility subject to the budget constraint

$$c_t + \tau_t + \dot{w}_t + \sum_i (r - r_{mit}) m_{it} = y_t + r w_t, \tag{4}$$

where y_t is household income, τ_t is the tax paid to the government, r_{mit} is the real return on type-i deposits, and $(r - r_{mit}) m_{it}$ represents the opportunity cost of holding type-i deposits.

Banking sector. The consolidated banking sector, including the central bank, issues deposits m, holds real assets a_{bt}, and lends $\ell_t \geq 0$ to the government.[2] We assume that the banking sector maintains a zero level of equity,

$$m_t = \ell_t + a_{bt}. \tag{5}$$

The banks' real assets yield $r a_b + \rho(a_b)$, where $\rho(a_b)$ represents additional returns exclusive to banks, reflecting their comparative advantage in certain asset classes, such as loans to small and medium enterprises. Function $\rho(\cdot)$ is increasing, concave and satisfies $\rho(0) = 0$.

The budget constraint of the banking sector is,

$$\kappa(m_t) + \theta_t = \sum_i (r - r_{mit}) m_{it} + \rho(a_{bt}), \tag{6}$$

where the operational costs of banking, $\kappa(m)$, is an increasing and convex function. This cost can also be interpreted as stemming from the risk of a banking crisis—and the associated bailouts—that increases with higher leverage. The right-hand side of (6) reflects the profits from asset-liability spreads and bank-specific returns. For simplicity, we assume that banks do not make profits or pay dividends to households.

Financial repression. Financial repression policies control three variables: the banking sector's holdings of government debt ℓ_t, the total level of deposits m_t, and the quasi-fiscal revenue θ_t.[3]

[2] One could consolidate the central bank with the government. In that case, bank reserves held at the central bank should be viewed as a form of non-defaultable government debt, with demand possibly determined by reserve adequacy regulation.

[3] As we will see, the allocation of deposits across types $(m_i)_{i=1,\cdot,n}$ is indeterminate and irrelevant for welfare. Thus, we do not track this allocation in our definition of financial repression policy.

The specific method by which the government sets ℓ_t, m_t and θ_t is a matter of model interpretation and does not matter for the equilibrium allocations or welfare. In practice, governments set these variables through different mechanisms. For example, central banks may purchase government debt through open market operations or by lending to the government. As seen during the euro debt crisis, private banks may also be encouraged to purchase government debt by the central bank's liquidity provision policies (Crosignani, Faria-e Castro and Fonseca, 2020) or by moral suasion (Becker and Ivashina, 2018; Ongena, Popov and Van Horen, 2019). Increases in bank deposits can be induced by expanding reserves or relaxing banking regulation.

As for the quasi-fiscal revenue θ, it can take the form of central bank profits paid to the government, which may be adjusted by changing the interest rate paid on reserves. Alternatively, governments may pay banks an interest rate r_ℓ lower than r, as discussed by Acalin and Ball (2023) in the context of the US after WWII.[4]

Households maximize their utility (2) subject to their budget constraint (4). Using the first-order condition for the demand for type-i deposits, $\omega_i u'\left(\widetilde{m}_t\right) = r - r_{mit}$, the total cost of deposit holding can be written[5]

$$\sum_i (r - r_{mi}) m_i = u'\left(\widetilde{m}\right)\widetilde{m} = -(\nu - 1) u\left(\widetilde{m}\right).$$

This equation and the banking sector's constraints (5) and (6) imply

$$u\left(\widetilde{m}\right) = -\frac{\kappa(m) - \rho(m - \ell) + \theta}{\nu - 1}. \tag{7}$$

Hence, a financial repression policy (ℓ, m, θ) uniquely determines transaction utility $\widetilde{m}$, as well as the interest rates on the different types of deposits $r_{mi} = r - \omega_i u'\left(\widetilde{m}\right)$. Given m and $\widetilde{m} \leq m$, any deposit portfolio $\left(m_i\right)_{i=1,\cdot,n}$ that satisfies $m = \sum_i m_i$ and $\widetilde{m} = \sum_i \omega_i m_i$ can implement the equilibrium.

Equation (7) shows how financial repression reduces the utility households derive from transaction services. Financial repression limits the resources available to the banking sector, thereby lowering the return on deposits.

The term $\kappa(m) - \rho(m - \ell)$ represents the banking sector's net operating cost, defined as the operating cost minus the bank-specific return on real assets. For

[4] Conceivably, the government could levy θ as a tax on banks. However, this interpretation is not quite consistent with another assumption that we make later, that taxes are more difficult to adjust than financial repression policies.

[5] The first equality is derived from the first-order condition and $\widetilde{m} = \sum_i \omega_i m_i$. The second equality uses the fact that the utility for deposits is a power function given by (3).

future reference, it will be useful to define the minimum net banking operating cost conditional on the level of bank lending to the government,

$$f(\ell) \equiv \min_{m} \kappa(m) - \rho(m-\ell).$$

This cost is minimized when the marginal benefit of expanding the banking sector is equal to the marginal cost,

$$\kappa'(m) = \rho'(m-\ell). \tag{8}$$

This equation defines the efficient size of the banking sector conditional on ℓ.[6] The cost $f(\ell)$ is an increasing and convex function.[7] It will be assumed that the size of the banking sector is optimized conditional on ℓ in the rest of the paper.

Differentiating (8) and using $a_b = m - \ell$, we obtain the derivative of bank lending to the real sector with respect to its lending to the government, or crowding out ratio,

$$\frac{\partial a_b}{\partial \ell} = -\frac{1}{1-\rho"/\kappa"}. \tag{9}$$

This is the amount by which banks reduce their loan to the real sector when they lend one more dollar to the government. The crowding out ratio is large in absolute value if the rate of increases in the marginal cost of expanding the banking sector's size is large relative to the rate of increase in the marginal cost of reducing bank loans to the real sector.

We assume that the banking sector's net operating cost is strictly positive ($f(0) > 0$) and that the government does not subsidize the banking sector ($\theta_t \geq 0$). A negative θ_t could pay for the banking sector's cost of operation and make it possible to implement the Friedman rule. We rule this out. This implies that there is always a strictly positive opportunity cost of holding deposits and that the banking sector's size is finite.

Fiscal policy vs. financial repression. Several differences between fiscal revenue τ_t and financial repression revenue θ_t are important for the analysis.

[6]The efficient level of m must be larger than the level of $\widetilde{m}$ implied by equation (7). This is necessarily true if the efficient level of m for $\ell = 0$ (satisfying $\kappa'(m^*) = \rho'(m^*)$) is higher than the level of $\widetilde{m}$ implied by equation (7) when $\ell = \theta = 0$, that is if $m^* \geq [\mu/f(0)]^{1/(\nu-1)}$.

[7]If there is a finite level of bank-specific assets α such that $\rho'(a_b) = 0$ for $a_b \geq \alpha$, all the assets in excess of α yield the same return whether they are held by banks or by households. These assets can be interpreted as securities that are traded by banks and non-bank investors in the same markets, such as corporate bonds or securitized loans.

First, fiscal policy exhibits inertia. Unlike financial repression, which can be adjusted at short notice, the government cannot modify τ_t whenever it wishes. Specifically, we assume that fiscal policy initially operates in an active regime as defined by Leeper (1991). In this regime, fiscal revenue is equal to a constant level, τ_a, which is insufficient to maintain government debt on a sustainable trajectory. With a constant probability ϕ, fiscal policy transitions to a passive regime, where the present discounted value of future tax revenue is sufficient to repay government debt d_t. This transition, termed a fiscal adjustment, ensures debt sustainability. The government does not use financial repression after a fiscal adjustment.

These assumptions capture the notion that fiscal policy adjustments are often delayed due to political economy constraints. For example, fiscal deadlock has been attributed to "wars of attrition" between political parties (Alesina and Drazen, 1991). In contrast, financial repression can be implemented quickly because it relies on financial regulation and safety-net policies that are typically delegated to central banks. Central banks can act swiftly and without explicit legislative approval to address emerging financial instability. This delegation ensures that financial stability can be preserved with minimal delay.

The second key distinction between fiscal policy and financial repression lies in their costs. To account for the economic costs of taxation, we assume that output decreases with higher fiscal revenue,

$$y_t = \overline{y} - \gamma_\tau \tau_t, \tag{10}$$

where γ_τ is a positive coefficient. This variable can be endogenized by linearizing a model where the government taxes output produced with labor (**?**).[8]

The welfare cost of taxation and financial repression can then be combined as follows. Assume that the total supply of real assets is constant, $a_{ht} + a_{bt} = a$. Consolidating the budget constraints (1), (4) and (6) and using $w_t = d_t + a$, household consumption can be written as output plus the return on real assets net of government expenditures and the minimized banks' net operating cost, $c_t = y_t + ra - g - f(\ell_t)$, which with (7) and (10) gives the following expression for the households' flow utility,

$$c_t + u\left(\widetilde{m}_t\right) = \bar{c} - \left[f(\ell_t) + \gamma_\tau \tau_t\right] - \gamma_\theta \left[f(\ell_t) + \theta_t\right], \tag{11}$$

where $\bar{c} \equiv \bar{y} + ra - g$ and $\gamma_\theta \equiv 1/\left(\nu - 1\right)$.

Equation (11) summarizes how households' utility is affected by taxation and financial repression policies. The second term on the right-hand side reflects the

[8]The marginal distortionary cost of taxation is strictly positive because the model is linearized around an equilibrium with a strictly positive level of taxation.

impact of fiscal policy and financial repression on output. The third term captures the effect of financial repression on the opportunity cost of deposits.

We assume that raising government revenue has a larger welfare cost if it is done through financial repression than through taxation,

$$\gamma_\theta > \gamma_\tau.$$

As shown in Jeanne (2025), this condition is satisfied under plausible model calibrations. This implies that a welfare-maximizing government, when given the choice between conventional taxation and financial repression, always prefers the former to the latter. Financial repression is used only when fiscal policy is constrained.

Default. We assume that the government may default on its non-bank debt b_t at any time. A defaulting government reduces its non-bank debt to a level $\underline{b}$ and implements a fiscal adjustment. The trade-off involved in a default is that it reduces the burden of taxation but involves an exogenous output cost γ_d. The government defaults opportunistically if this increases welfare.

In contrast, the government never defaults on debt owed to banks. First, the government does not save anything by defaulting on the central bank. Second, the government does not default on deposit banks (or, equivalently, offsets the impact of such defaults with bailouts) because of the significant macroeconomic costs of banking crises, as highlighted in the literature (Chari, Dovis and Kehoe, 2020; Broner et al., 2014).

We focus on equilibria where the government does not default, enabling it to roll over its debt at the risk-free interest rate r. However, the government's option to default imposes constraints on the equilibrium level of debt.

3 Optimal Financial Repression

Financial repression policies consist in pre-fiscal-adjustment paths for bank lending to the government and the quasi-fiscal transfer, $(\ell_t, \theta_t)_{t\geq 0}$. (Recall that m_t is endogenous to ℓ_t through equation (8)). The policy paths are chosen by a social planner whose objectives are to prevent a default and maximize welfare. We look for the Ramsey solution in which the social planner can commit to the paths $(\ell_t, \theta_t)_{t\geq 0}$. The commitment assumption is inessential, however, as the Ramsey solution is time-consistent.

Section 3.1 presents a condition for no default, while section 3.2 characterizes the welfare-maximizing policies.

3.1 No default condition

We proceed backward, starting with the passive fiscal regime that follows a fiscal adjustment. Welfare under this regime is given by the distortion-free welfare level minus the distortionary cost of taxation required to repay the debt,

$$V_p\left(d\right) = \frac{\overline{u}}{r} - \gamma_\tau d, \tag{12}$$

where $\overline{u} \equiv \overline{c} - \gamma_\tau g - (1+\gamma_\theta)f(0)$ represents the distortion-free utility flow (see Appendix A). Since fiscal policy transitions to the passive regime post-default, welfare under default is given by

$$V_d(\ell) = V_p\left(\underline{b} + \ell\right) - \gamma_d, \tag{13}$$

where γ_d is the cost of default.

As shown in the appendix, at any time t before the fiscal adjustment, welfare is equal to the welfare level that would be achieved if the fiscal adjustment were implemented immediately, minus the present discounted value of the expected future costs of financial repression,

$$U_t = V_p(d_t) - \int_t^{+\infty} L_s e^{-(r+\phi)(s-t)} ds, \tag{14}$$

where

$$L_s = (1+\gamma_\theta)\left[f(\ell_s) - f(0)\right] + (\gamma_\theta - \gamma_\tau)\theta_s, \tag{15}$$

represents the utility flow loss from financial repression. This loss is the sum of two components: (1) the loss from distorting banks' balance sheets relative to the efficient benchmark, and (2) the distortionary cost of financial repression relative to conventional taxation.

The government may default on its non-bank debt b_t at any time. It does not default if and only if $U_t \geq V_d(\ell_t)$ for all t. Substituting from equations (12), (13) and (14), this condition can be rewritten

$$\gamma_\tau\left(b_t - \underline{b}\right) + \int_t^{+\infty} L_s e^{-(r+\phi)(s-t)} ds \leq \gamma_d. \tag{16}$$

That is, the government does not default if the distortionary cost of repaying the debt plus the expected cost of financial repression is lower than the cost of default.

Condition (16) is satisfied if the government debt held by non-bank investors, b_t, is not too high. In other words, the non-bank sector has a limited capacity to absorb government debt. To simplify the social planner's problem, we will replace condition (16) by a constant upper bound on b_t,

$$b_t \leq b^*. \tag{17}$$

The upper bound b^* will then be chosen so that (16) is satisfied at all times t.[9] The no-default condition, thus, is that the banking sector must hold government debt in excess of b^*, that is

$$\ell_t \geq d_t - b^*. \tag{18}$$

3.2 Stages of financial repression

The social planner looks for the financial repression policies that prevent default and maximize welfare. Using equation (14), the Ramsey problem can be written

$$\max_{(\ell_t,\theta_t)_{t\geq 0}} U_0 = V_p(d_0) - \int_0^{+\infty} L_t e^{-(r+\phi)t} dt, \tag{19}$$

where L_t is given by (15), subject to

- the government budget constraint (1) with $\tau_t = \tau_a$

$$g + r d_t = \tau_a + \theta_t + \dot{d}_t; \tag{20}$$

- the no-default constraint (18);
- the non-negativity constraints on θ_t and ℓ_t.

The Ramsey problem has one state variable, d_t, and two control variables, ℓ_t and θ_t. We summarize the main properties of the optimal policy below (the details of the derivation can be found in Appendix A). One can show that if the marginal cost of expanding the banks' balance sheet, $f'(0)$, is not too large, there are three stages in the progression of financial repression, determined by how the level of government debt d_t compares with b^* and another higher threshold d^*.

1. No financial repression. If $d_t \leq b^*$, government debt is entirely held by the non-bank sector ($\ell_t = 0$), and the banking sector does not transfer resources to the government ($\theta_t = 0$).

[9] Without this simplification, b_t must be lower than an upper bound b_t^* that is decreasing with time. The Ramsey policy is more complicated to derive but its properties are essentially the same as under our simplifying assumption.

2. Balance-sheet financial repression. If $b^* < d_t < d^*$, banks purchase the government debt in excess of b^* ($\ell_t = d_t - b^*$). There is still no quasi-fiscal revenue from financial repression ($\theta_t = 0$).

3. Quasi-fiscal financial repression. If $d_t = d^*$, the banking sector stabilizes the level of government debt by transferring quasi-fiscal revenue $\theta^* = g - \tau_a + rd^*$ to the government.

The optimal commitment solution takes the same form irrespective of the initial level of government debt. Thus it is time consistent: the social planner has no incentive to deviate from the Ramsey policy at any time.

Figure 2 shows the balance sheet of the banking sector across the successive stages of financial repression. If $d_t < b^*$, government debt is held by the non-bank sector and there is no financial repression. Government debt continues to increase as long as there is no fiscal adjustment.

When government debt reaches b^*, the purchasing capacity of non-bank investors is exhausted and the increments in government debt must be purchased by the banking sector. The banking sector's balance sheet becomes increasingly distorted relative to the efficient benchmark once government debt exceeds b^*. The distortion is optimally allocated between the assets and liabilities of the banking sector by equating the marginal cost of crowding out lending to the real sector and the marginal cost of expanding deposits, as per equation (8).

At some point, it becomes less costly to stabilize the debt with quasi-fiscal revenue from financial repression than to continue expanding the banking sector's size. As shown in Appendix A, this point is reached when bank lending reaches a threshold ℓ^* defined by

$$\phi(\gamma_\theta - \gamma_\tau) = (1 + \gamma_\theta) f'(\ell^*) . \tag{21}$$

The left-hand side represents the benefit of delaying quasi-fiscal financial repression. It is increasing with the flow probability of a fiscal adjustment and the cost differential between financial repression and conventional taxation. Quasi-fiscal financial repression should begin when this benefit equals the marginal cost of further expanding bank lending to the government.

The economy may never reach the point where government debt stabilizes through financial repression. If $(1 + \gamma_\theta)f'(\ell)$ remains below $\phi(\gamma_\theta - \gamma_\tau)$ for all ℓ, the banking sector continues to absorb government debt without limit until there is a fiscal adjustment. This equilibrium does not violate the transversality condition since the fiscal adjustment occurs sooner or later with probability 1.

If there is a level of ℓ that satisfies (21), the government must stabilize its debt level at $d^* = b^* + \ell^*$. Government debt increases until it reaches d^* if a fiscal adjustment does not occur. Debt remains at that level until a fiscal adjustment is implemented, which can occur at any time with flow probability ϕ.

Financial repression, thus, should only be used to generate quasi-fiscal revenue as a *last resort*. It is optimal to wait for a fiscal adjustment rather than using financial repression revenue earlier than necessary. Using financial repression to slow down debt accumulation early is inefficient because it is more distortionary than conventional taxation. This property makes the model different from second-best public finance models in which all forms of taxation should be used at the margin (Lipsey and Lancaster, 1956).

The flow welfare cost of financial repression, L_t, reaches its maximum level, L^*, when government debt reaches d^*. This is also the point where the temptation to default is at its peak. Therefore, the maximum level of non-bank debt consistent with no default, b^*, is obtained if condition (16) with $L_s = L^*$ is binding, that is,

$$b^* = \underline{b} + \frac{\gamma_d}{\gamma_\tau} - \frac{L^*}{\gamma_\tau(r+\phi)}, \tag{22}$$

where $L^* = (1+\gamma_\theta)\left[f(\ell^*) - f(0)\right] + (\gamma_\theta - \gamma_\tau)\left[g - \tau_a + r(b^* + \ell^*)\right]$. These two equations can then be solved for b^*, which concludes the derivation of the equilibrium.

3.3 Welfare

What is the welfare gain of financial repression compared to default? There is a simple answer to this question in the special case where balance-sheet financial repression is costless in equilibrium ($f(\ell) = f(0)$ for $\ell < \ell^*$). Then equation (14) implies

$$U_t = V_{pt} - e^{-(r+\phi)T}\frac{L^*}{r+\phi}, \tag{23}$$

where V_{pt} is welfare under an immediate fiscal adjustment and T is the time that it takes for government debt to reach d^*.

If $d_t \geq b^*$, the government reduces its non-bank-held debt by $b^* - \underline{b}$ in a default. Therefore, welfare under default is given by

$$\begin{aligned} V_{dt} &= V_p\left(d_t - (b^* - \underline{b})\right) - \gamma_d, \\ &= V_{pt} + \gamma_\tau(b^* - \underline{b}) - \gamma_d, \\ &= V_{pt} - \frac{L^*}{r+\phi}, \end{aligned}$$

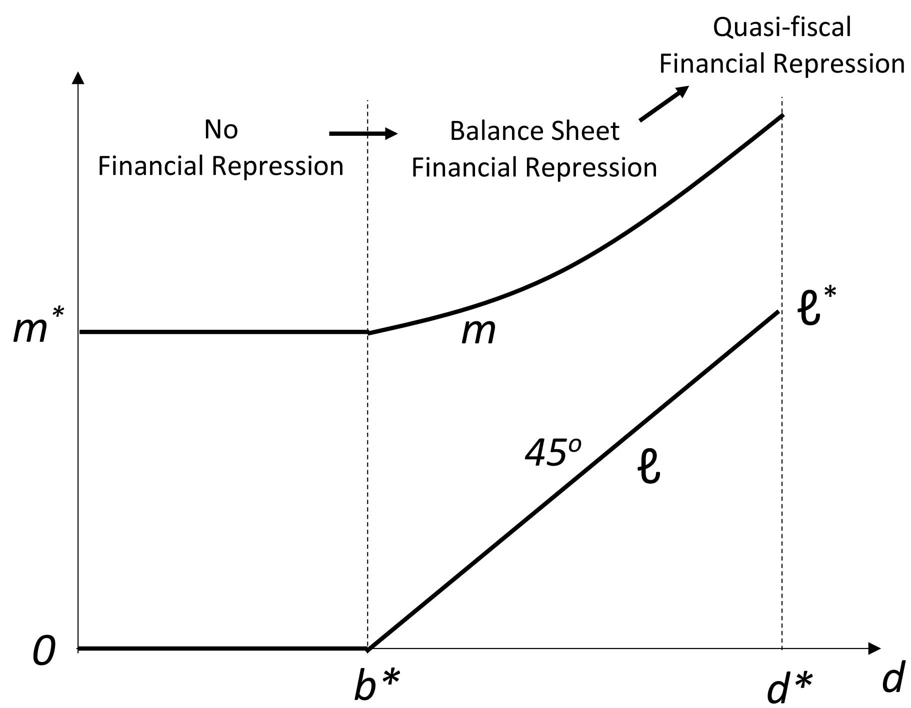

Figure 2: Financial repression and the banking sector's balance sheet

where the last equality is derived from (22). Using this equation to substitute out L^* in (23) gives

$$U_t = \left[1 - e^{-(r+\phi)T}\right] V_{pt} + e^{-(r+\phi)T} V_{dt}. \tag{24}$$

This equation shows that welfare depends on how soon quasi-fiscal financial repression begins. If $T = 0$ (i.e., quasi-fiscal financial repression starts immediately), welfare is the same as under default. The benefit of balance-sheet financial repression is to postpone the quasi-fiscal stage. The longer the delay, the closer welfare is to the level under an immediate fiscal adjustment. We quantify the benefits of financial repression using (24) in section 4.3.

4 Data

We perform an exploratory data analysis to assess the extent to which the model aligns with observed patterns. Significant additional work would be required to fully calibrate the model, which we leave for future research. This analysis is a preliminary exploration, intended only to provide a sense of what insights the data may offer when viewed through the lens of the model. Importantly, the objective is not to rigorously test the model against competing explanations.[10]

4.1 Government debt purchases

The model predicts that when government debt exceeds a certain threshold, a larger fraction of it is accumulated by the banking sector. Is there evidence of this in the data? To investigate this, we use the government debt database of Arslanalp and Tsuda (2014), which provides data on general government debt-to-GDP ratios and the share held by domestic banks (central and commercial). These correspond to the model variables d and ℓ, respectively, covering over twenty advanced economies from 1989 to 2023. Appendix B provides more details on the data.

Figure 3 plots ℓ (vertical axis) against d (horizontal axis) for 23 countries between 1989 and 2023.[11] Figure 4 illustrates the same for G7 economies, tracing each country's trajectory over time.

[10]For example, the hypothesis that central banks purchased government debt as part of monetary quantitative easing policies aimed at lowering long-term interest rates, rather than to avert default.

[11]Each point corresponds to a country-year observation. We exclude Greece because it is the only advanced economy to have defaulted during the time period under consideration. The panel is unbalanced and data start to be available between 1989 and 2012 depending on the countries.

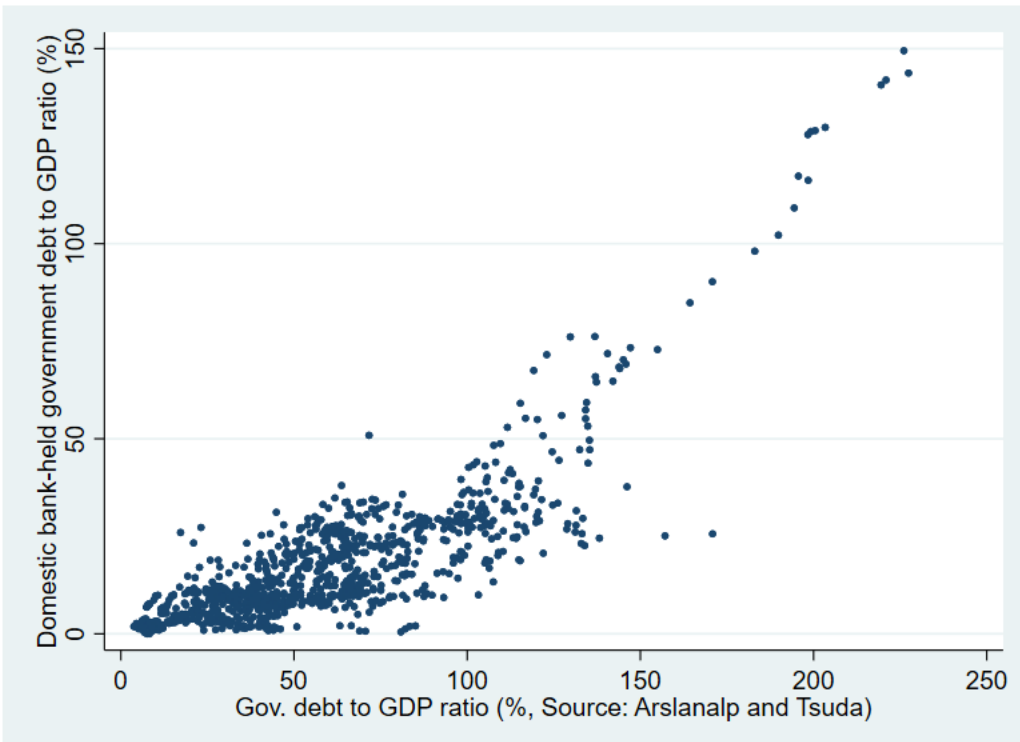

Figure 3: Bank-held government debt (vertical axis) vs. total government debt (horzontal axis) in % of GDP in advanced economies. Source: Arslanalp and Tsuda (2014).

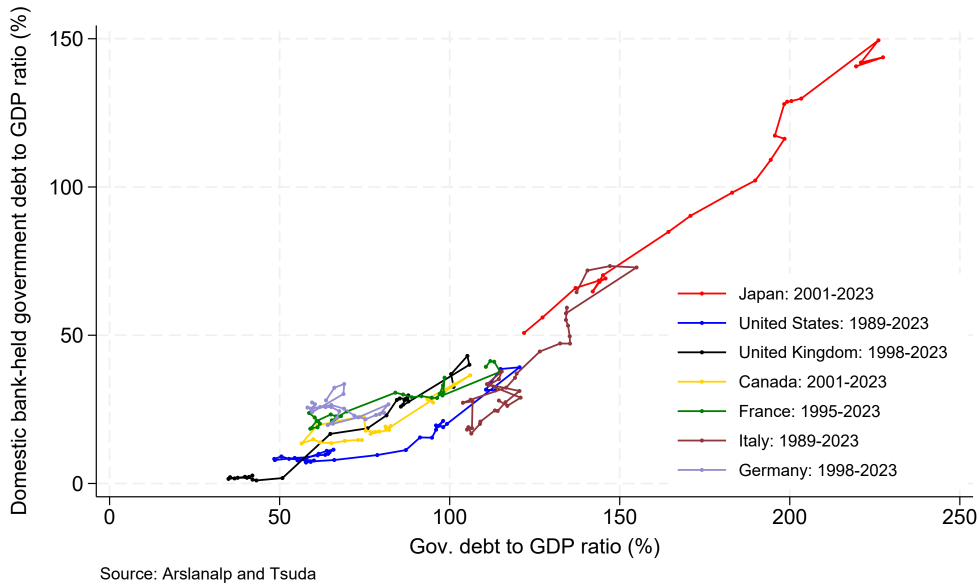

Figure 4: Bank-held government debt (vertical axis) vs. total government debt (horzontal axis) in % of GDP in G7 economies. Source: Arslanalp and Tsuda (2014).

Key patterns emerge. Notably, the banking sector holds a larger share of government debt once total debt exceeds approximately 100% of GDP. This pattern is consistent across the full sample and within G7 countries.

To quantify this observation more precisely, we run a threshold regression of bank-held government debt ℓ on total government debt d (both as shares of GDP), estimating the coefficients based on whether d is above or below a threshold that minimizes the residual sum of squares. Table 1 summarizes the results.

In the pooled sample (column 1), the estimated debt threshold is about 110% of GDP. Below this, banks accumulate about one fourth of debt increases; above, they absorb nearly all new debt. As shown in column 2, similar results hold for G7 countries, with a slightly higher threshold (about 120% of GDP).

Japan's experience is particularly notable. Between 2001 and 2023, its government debt rose from 122% to 220% of GDP, with domestic banks absorbing most of the increase. Other G7 countries exhibited similar patterns but they are less pronounced.

However, our results are not only due to Japan. As shown by Figure 4, Italy too is always above the threshold and has bank-held government debt vary one for one with total government debt. The United States is an example of country that

Table 1: Threshold regression of ℓ on d

	(1) Full sample	(2) G7 countries	(3) G7 excl. Japan
Debt threshold	109.6%	120.9%	106.2%
Debt below threshold			
d	0.260***	0.326***	0.360***
	(24.53)	(14.34)	(11.47)
cons	0.888	-4.364*	-6.584**
	(1.41)	(-2.32)	(-2.79)
Debt above threshold			
d	0.991***	0.984***	1.118***
	(35.52)	(29.80)	(12.78)
cons	-82.15***	-75.35***	-95.88***
	(-20.88)	(-13.62)	(-9.01)
N	920	197	174

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

straddles both regimes. When its debt is lower than 90% of GDP the level of bank-held does not vary much with the total level. When its debt is higher than 100% of GDP bank-held government debt starts to vary one for one with total government debt. Column 3 of Table 1 shows that the results are robust to excluding Japan from the G7 sample. The data exhibit a pattern that is remarkably consistent across countries.

4.2 Crowding out vs. deposit expansion

In our model, banks can accommodate government debt via deposit expansion or reduced lending to the real sector. Identifying which mechanism dominates in the data is important because each implies different timelines for when banks' capacity to absorb government debt might be exhausted.

To investigate this, we analyze correlations between banks' government debt purchases and changes in other balance sheet components using the following variables

$$\begin{aligned} \Delta \ell_t &= \ell_t - \ell_{t-10}, \\ \Delta m_t &= m_t - m_{t-10}, \\ \Delta a_{bt} &= a_{bt} - a_{bt-10}, \end{aligned}$$

where ℓ_t is the ratio of bank-held government debt to GDP, m_t is the ratio of currency and deposits to GDP, and a_{bt} is the ratio of bank loans to GDP. The variables m_t and a_{bt} are sourced from the OECD national balance sheet database and national sources, while ℓ_t comes from the Arslanalp-Tsuda database (see Appendix B for details).

By analyzing changes in these variables over ten-year intervals, we aim to mitigate the impact of short-term business cycle fluctuations. Furthermore, we consider only observations where total government debt exceeds 110% of GDP, so that the economy is presumably in the early-stage financial repression regime in which the banking sector is likely required to absorb additional government debt.

Our primary question is whether banks' purchases of government debt are associated with a reduction in bank loans, as suggested by the crowding-out effect, or with an increase in bank deposits. Figure 5 gives the answer. The left panel plots Δm_t against $\Delta \ell_t$, revealing a statistically significant positive correlation. The line of best fit has a slope greater than one, indicating that as banks' holdings of government debt increase, deposits grow by more than enough to finance this acquisition.

Conversely, the right panel shows no significant correlation between Δa_{bt} and $\Delta \ell_t$, suggesting that increases in bank-held government debt do not crowd out bank loans. A systematic crowding-out effect would imply a negative correlation between these variables.

While these correlations are not necessarily causal and should not be interpreted as definitive evidence against crowding out, they do suggest that banking sectors have generally financed government debt purchases through deposit issuance rather than by reducing loans to the real sector. Japan's experience, in particular, illustrates the significant capacity of the banking sector to absorb government debt through this mechanism. Between 1999 and 2023, Japanese banks absorbed nearly the entire increase in government debt, equivalent to 113% of GDP, while expanding their deposits by 182% of GDP. Although bank loans initially declined as a share of GDP at the beginning of the period, they ultimately increased by more than 30% of GDP over the entire period.

This result is different from those obtained by Becker and Ivashina (2018) for European countries. These authors identify the causal impact of banks' government debt purchases on corporate borrowing by using firm- and bank-level data. They find that between 2010 and 2015, the absorption of government debt by domestic banks led large corporate issuers to switch from bank loans to bond issuance. This effect was statistically significant during times of financial stress in 2010 and 2011,.

Becker and Ivashina's results are based on quarterly regressions. It stands to reason that the crowding out effect is stronger in the short run than in the long run. Banks may have had a hard time expanding their liabilities in the short run when they were perceived by markets as risky during the crisis. The fact that government debt purchases are not associated with reduced lending to the real sector at a ten-year horizon suggests that the crowding out effect is significantly weaker in the long run than in the short run.

4.3 Discussion

Our model of optimal financial repression may not accurately describe the real world. Large-scale purchases of government debt by central banks may be due to reasons other than financial repression. Even if financial repression is at play, it is not necessarily optimal. That being said, and acknowledging the speculative nature of this exercise, it is interesting to consider what the model suggests if we take it at face value for a moment.

First, the evidence in Section 4.1 suggests that the debt threshold above which additional government debt is purchased by the banking sector (variable b^* in the model) is between 100% and 120% of GDP. If this is true, several advanced economies have entered the first stage of financial repression. Japan did so as early as the 1990s, and other countries, such as the U.S. and France, may have entered this regime in recent years.

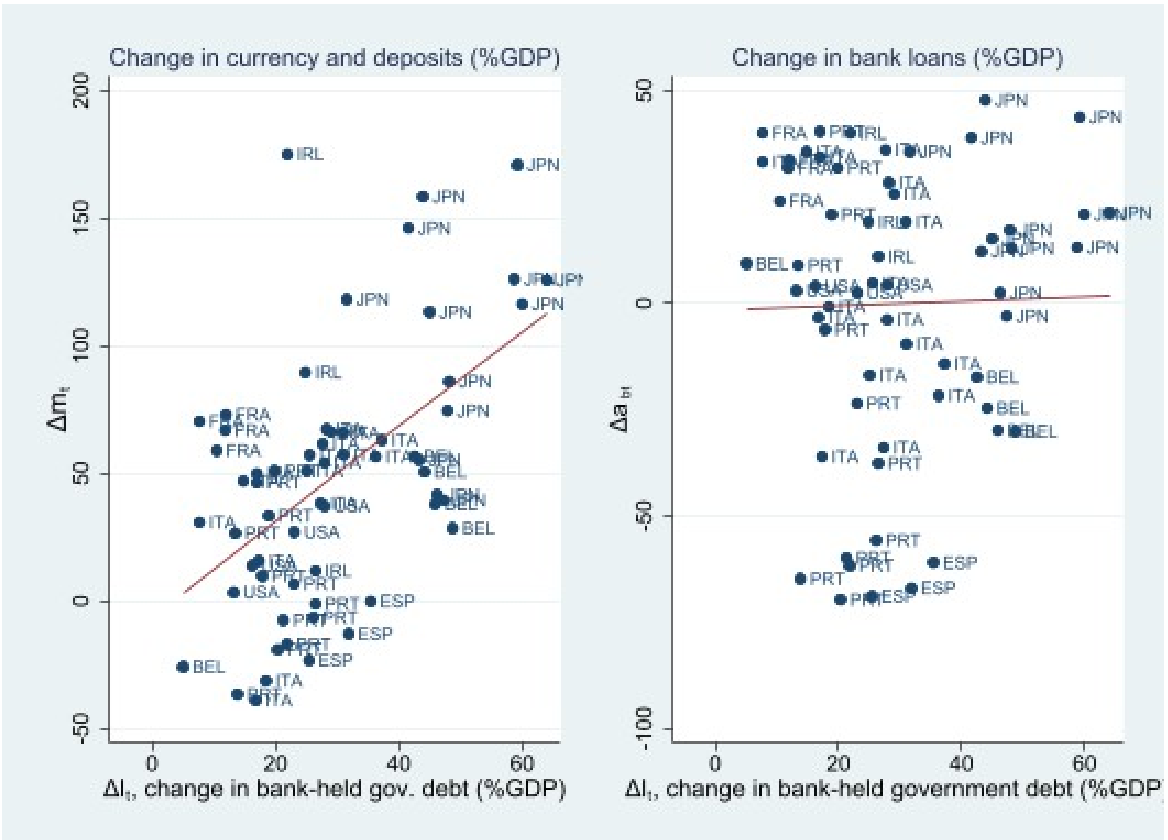

Figure 5: Changes in Currency and deposits (l.h.s.) and in Bank loans (r.h.s.) vs changes in bank-held government debt, all in share of GDP. Sources: Aslanalp and Tsuda (2014), OECD and national sources.

Second, the evidence in Section 4.2 indicates that banks have financed their purchases of government debt mostly by expanding their deposits rather than by restricting their lending to the real sector.

Third, there is little evidence that any advanced economy has entered the final, quasi-fiscal stage of financial repression. Even after the banking regulatory reforms that followed the global financial crisis, regulation remains far from the levels observed after World War II. Advanced economies' banking and financial systems remain liberalized and market-based. Interest rates are market-determined, and most central banks pay interest on reserves. Central banks' profits, and the dividends they pay to their treasuries, have remained very small as a share of GDP, including in Japan.

These facts are consistent with a version of the model where the cost of expanding the banking sector's balance sheet is small compared to the cost of crowding out or the cost of extracting quasi-fiscal revenue from the banking sector. In terms of the model, $f'(\ell)$ is small and ℓ^* is large. This may justify a rather benign view of financial repression. We do not know how much leeway Japan has in further expanding the size of its banking sector, but based on Japan's experience, countries such as the U.S. still have a long way to go. Japan can be used as a benchmark to derive back-of-the-envelope estimates of the welfare impact of financial repression for these countries.

Let us quantify the welfare decomposition (24) for the U.S. If the U.S. government debt-to-GDP ratio continues to increase at the same rate after 2023 as it did on average over the period 2000-2023—2.8 % of GDP per year—it would reach the 2023 Japanese debt level by 2060, or after $T = 37$ years. Assume that quasi-fiscal repression begins in 2060 if no fiscal adjustment is implemented in the U.S. before then. Under the conservative assumptions that the discount rate r is 4%, and the probability of a fiscal adjustment occurring in any given year is $\phi = 5\%$—meaning it takes, on average, 20 years to implement a fiscal adjustment—we calculate $e^{-(r+\phi)T} = 3.4\%$. Equation (24) implies that U.S. welfare in 2023 is a weighted average of welfare under fiscal adjustment and welfare under default, with weights of 96.6% and 3.4%, respectively. This shows that welfare in 2023 is much closer to the level under fiscal adjustment than to the level associated with default.

This simple exercise is not intended to imply that financial repression is without cost. In fact, financial repression is as costly as a default in its final, quasi-fiscal stage. However, it may provide substantial welfare benefits in its early stages by allowing time for a fiscal adjustment to be implemented.

Alternative models may lead to more cautious conclusions about the benefits and costs of financial repression. To illustrate this point, we outline below a variant of the model that features a liquidity trap. The key intuition is that in a liquidity trap, the demand for bank deposits becomes very large, potentially resulting in a banking sector that exceeds the efficient size.[12] Given the expanded size of the banking sector, it becomes relatively inexpensive to make banks purchase government debt. However, this creates challenges at the end of the liquidity trap.

More formally, assume a zero-lower-bound on the nominal return on deposits

$$r_{mit} + \pi_t \geq 0, \tag{25}$$

where π_t denotes the inflation rate. Because the total quantity of deposits exceeds the quantity of type-1 deposits, we have:

$$m_t \geq m_{1t} = u'^{-1}(r - r_{m1t}) \geq u'^{-1}(r + \pi_t) = \left(\frac{\mu}{r + \pi_t}\right)^{1/\nu}. \tag{26}$$

In a liquidity trap, both r and π_t are very low, implying that total deposits m_t are large—possibly much larger than the efficient level. In such a situation, the social planner may find it optimal to require banks to hold large amounts of government debt, provided the marginal cost of crowding out lending to the real economy, $\rho'(m - \ell)$, remains low. Importantly, the expansion of bank balance sheets is driven by the liquidity trap itself, not by a low marginal cost of balance sheet expansion.

A problem arises when the liquidity trap ends because the real interest rate or the inflation rate increase (which is necessary to extract quasi-fiscal revenue from the banking sector). While the end of the liquidity trap creates an opportunity to reduce the banking sector's balance sheet toward its efficient level, this adjustment may be difficult due to the large stock of government debt accumulated by banks during the liquidity trap. The end of the liquidity trap may thus mark the beginning of quasi-fiscal financial repression.

5 Conclusions

This paper contributes to our understanding of financial repression in several ways. At the theoretical level, we presented a model in which financial repression can take various forms, ranging from relatively benign interventions to more coercive and distortive policies that extract quasi-fiscal revenue from the banking sector. The model suggests a natural progression in the deployment of financial repression policies, starting with more market-friendly measures like central bank purchases of government debt and escalating to more distortive interventions.

[12] This possibility was ruled out by assumption in the baseline model—see footnote 6.

Empirically, we found that countries tend to enter the first stage of financial repression when government debt exceeds a threshold of 100% to 120% of GDP. In this stage, banks primarily finance their purchases of government debt by expanding deposits rather than by restricting lending. The Japanese experience further suggests that this initial stage of financial repression can persist for an extended period.

For those concerned about the risks of financial repression, this paper provides a mix of bad and good news. On the downside, countries such as the U.S. may already have entered the early stage of financial repression. On the upside, the distortions associated with this stage appear to have relatively mild costs, especially when compared to the severe forms of repression observed in the past, or to the consequences of a default. However, this conclusion may be biased by the fact that some countries were in a liquidity trap.

Future research could focus on several extensions to this analysis. One direction is to calibrate the model to explore its quantitative implications in more detail. A key challenge for calibration is quantifying the costs associated with expanding the size of the banking sector. Another extension could involve accounting for the utility derived from government debt, as suggested in the literature on the convenience yield of U.S. Treasury debt (see e.g. Krishnamurthy and Vissing-Jorgensen, 2012; Reis, 2021). Incorporating this feature would allow banks' purchases of government debt to have a positive fiscal impact by reducing interest rates, softening the dichotomy in the model between balance-sheet interventions that do not generate revenue and those that increase quasi-fiscal revenue.

The channels through which financial repression affects banks' balance sheets also need to be modeled more realistically. While the baseline model assumes that the government directly sets all balance sheet parameters, in reality, these are influenced indirectly through banking regulation. Further research is needed to understand how financial repression shapes the equilibrium of the banking sector as a regulated industry, particularly in light of advances in financial technology.

Another important extension would involve moving from a closed-economy framework to an open-economy context. Such a shift would introduce additional complexities, including stronger government incentives to default if debt is held by foreign investors, the impact of financial repression on exchange rates, and the potential role of capital controls. Moreover, the international spillovers of financial repression would need to be examined.

In the context of the euro area, the analysis becomes even more intricate. The model would need to take into account the constraints implied by a common currency area with free trade and capital mobility. While it may be desirable to confine financial repression to countries with unsustainable debt paths, free trade and capital mobility impose significant constraints on such segmentation. Addressing these issues would require further refinements to the model.

APPENDIX A. PROOFS

Derivation of equations (12) and (14). In the passive regime (after a fiscal adjustment) fiscal policy follows a rule $\tau_t = \tau_p(d_t)$ such that the transversality condition $\lim_{t\to+\infty} d_t e^{-rt} = 0$ is satisfied if d_t follows the budget constraint (1) with $\theta_t = 0$. This implies that the PDV of tax revenue is equal to the PDV of government spending plus the initial debt,

$$\int_t^{+\infty} \tau_p(d_s)e^{-r(s-t)}ds = \frac{g}{r} + d_t.$$

Using this equation and (11) with $\theta_t = 0$ and $\ell_t = 0$, welfare can be rewritten as

$$U_t = \int_t^{+\infty} \left[\overline{c} - \gamma_\tau \tau_p(d_s) - (1+\gamma_\theta)f(0)\right] e^{-r(s-t)}ds = \frac{\overline{c} - \gamma_\tau g - (1+\gamma_\theta)f(0)}{r} - \gamma_\tau d_t,$$

which is equation (12).

The representative household's utility flow is given by (11) with $\tau_t = \tau_a$ before the fiscal adjustment. Taking into account that fiscal policy switches to the passive regime with probability ϕ, the valuation equation for pre-adjustment welfare is given by

$$rU_t = \overline{c} - (1+\gamma_\theta)f(\ell_t) - \gamma_\tau\tau_a - \gamma_\theta\theta_t + \phi\left(V_{pt} - U_t\right) + \dot{U}_t,$$

where $V_{pt} = V_p(d_t)$ is welfare if there is a fiscal adjustment at time t. Integrating this equation gives

$$\begin{aligned}
U_t &= \int_t^{+\infty} \left[\overline{c} - (1+\gamma_\theta)f(\ell_s) - \gamma_\tau\tau_a - \gamma_\theta\theta_s + \phi V_{ps}\right] e^{-(r+\phi)(s-t)}ds, \\
&= \int_t^{+\infty} \left[\overline{c} - (1+\gamma_\theta)f(0) - \gamma_\tau\left(\tau_a + \theta_s\right) + \phi V_{ps}\right] e^{-(r+\phi)(s-t)}ds - \int_t^{+\infty} L_s e^{-(r+\phi)(s-t)}ds, \\
&= \int_t^{+\infty} \left[(r+\phi)V_{ps} - \dot{V}_{ps}\right] e^{-(r+\phi)(s-t)}ds - \int_t^{+\infty} L_s e^{-(r+\phi)(s-t)}ds, \\
&= V_{pt} - \int_t^{+\infty} L_s e^{-(r+\phi)(s-t)}ds,
\end{aligned}$$

where L_s is given by (15). The third line is obtained by using the budget constraint $\tau_a + \theta_s = g + rd_s - \dot{d}_s$, equation (12) and $\dot{V}_{ps} = -\gamma_\tau \dot{d}_s$. The fourth line is obtained by integrating by parts. The fourth line is equation (14).

Optimal financial repression. The Hamiltonian for the Ramsey problem is

$$H_t = -L_t + \lambda_t(\theta_t + \tau_a - rd_t - g) + \mu_t\left(\ell_t - d_t + b^*\right) + \nu_t\theta_t + \eta_t\ell_t, \tag{27}$$

where $L_t = (1+\gamma_\theta)\left[f(\ell_t) - f(0)\right] + (\gamma_\theta - \gamma_\tau)\theta_t$, and λ_t, μ_t ν_t and η_t are the shadow costs of the government's budget constraint (20, the no-default constraint (18, and the non-negativity constraint on θ_t and ℓ_t.

The first-order condition for ℓ_t is:

$$\mu_t + \eta_t = (1+\gamma_\theta)f'(\ell_t). \tag{28}$$

The first-order condition for θ_t is:

$$\lambda_t + \nu_t = \gamma_\theta - \gamma_\tau, \tag{29}$$

The equation for the costate variable is:

$$\dot{\lambda}_t = (r+\phi)\lambda_t + \frac{\partial H_t}{\partial d_t} = \phi\lambda_t - \mu_t. \tag{30}$$

Assume $d_t < b^*$ so that the no-default constraint (18) is not binding ($\mu_t = 0$). Then equation (28) implies $\eta_t > 0$ and the constraint $\ell_t \geq 0$ binds. Condition (30) implies that λ_t is strictly increasing, which is consistent with (29) only if ν_t is strictly positive. Hence the constraint $\theta_t \geq 0$ binds.

If $d_t < b^*$, therefore, ℓ_t and θ_t are both equal to zero. There is no financial repression. The level of government debt d_t increases according to the budget constraint (20).

The social planner starts to extract a quasi-fiscal transfer $\theta_t > 0$ from the banking sector only when d_t is sufficiently above b^*. By equation (29), if the constraint $\theta_t \geq 0$ is non-binding the shadow cost λ_t is constant and equal to $\gamma_\theta - \gamma_\tau$. Equations (30) and (28) then imply

$$\phi(\gamma_\theta - \gamma_\tau) = (1+\gamma_\theta)f'(\ell_t). \tag{31}$$

If $(1+\gamma_\theta)f'(0) < \phi(\gamma_\theta - \gamma_\tau)$, equation (31) is satisfied for a strictly positive level of bank lending ℓ^*. If d_t is larger than b^* but smaller than $d^* \equiv b^* + \ell^*$, the social planner does not extract quasi-fiscal revenue from the banking sector and let government debt increase. The social planner makes the banking sector purchase the government debt in excess of b^*. This is the first stage of financial repression.

When ℓ_t reaches ℓ^*, it stays at this level while b_t stays equal to b^*. The total level of debt, thus, is equal to $d^* \equiv b^* + \ell^*$. The government must raise quasi-fiscal revenue from financial repression to keep debt at this level. This is the last stage of financial repression.

The level of quasi-fiscal revenue that stabilizes government debt at d^* is

$$\theta^* = g - \tau_a + rd^*. \tag{32}$$

Using this equation to substitute out θ^* in $L^* = (1+\gamma_\theta)\,[f(\ell^*) - f(0)] + (\gamma_\theta - \gamma_\tau)\theta^*$, and equation (22) with $d^* = b^* + \ell^*$, one can solve for the maximum level of government debt d^*. This completes the characterization of the equilibrium with optimal financial repression.

APPENDIX B. DATA

The data used in section 4.1 come from Arslanalp and Tsuda (2014). The country sample includes Australia, Austria, Belgium, Canada, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Iceland, Ireland, Israel, Italy, Japan, Korea, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, New Zealand, Norway, Portugal, San Marino, Singapore, the Slovak Republic, Slovenia, Spain, Sweden, Switzerland, the United Kingdom and the United States. We exclude Greece because it defaulted.

Arslanalp and Tsuda's database gives the ratio of general government debt to GDP, as well as the amount of debt held by the domestic central bank and the amount held by domestic banks. We sum up the two amounts to compute the ratio of government debt held by the domestic banking sector to GDP.

For section 4.2 we complement the Arslanalp-Tsuda database with data about the balance sheet of the banking sector: currency and deposits on the liability side and loans on the asset side. Relative to the Arslanalp-Tsuda database we lose Cyprus, Iceland, Korea, Malta, New Zealand, San Marino, Singapore and Switzerland.

The data come from the OECD financial Account and Balance Sheets database except for the US, Japan and Canada. We collect Currency and Deposits in the liabilities of Monetary and Financial Institutions (MFIs), and Loans in the assets of the same sector. MFIs include the central bank, deposit taking corporations and money market funds (MMFs). The variables are in local currency and converted into shares of GDP.

We use national sources for the US, Japan, and Canada because the OECD does not provide balance sheet data for these countries.

For the US, we use flow of funds data provided by the Board of Governors of the Federal Reserve System. We sum up Currency and Deposits in the liabilities of the central bank and private depository institutions. We use Loans on the asset side of private depository institutions.

For Japan, we use data from the Bank of Japan and the Cabinet Office. The two datasets contain loans, and currency and deposits for the central bank and depository corporations.

For Canada, we use data from Statistics Canada—National Balance Sheet Accounts. The data on currency and deposits and loans are for the monetary authorities, chartered banks, and money market funds.

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