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 default when fiscal policy is constrained. We present a model showing that optimal financial repression unfolds in two stages: an early stage where the banking sector purchases government debt, followed by a late stage in which the government extracts quasi-fiscal revenue from the banking sector. Our model's predictions are compared against data on government debt in advanced economies, suggesting that early-stage financial repression begins once government debt surpasses 100% of GDP. Moreover, we find that the banking sector finances its government debt purchases by expanding deposits rather than curtailing lending, allowing significant flexibility before financial repression is utilized to generate quasi-fiscal revenue.

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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 (Reinhart and Sbrancia, 2015; Acalin and Ball, 2023). The current fiscal deadlock observed in several advanced economies has raised concerns that financial repression could make a comeback. This paper examines the possible forms that financial repression could take. We develop a model that captures key aspects of this issue—fiscal policy faces a deadlock, and financial repression can be used to prevent a government default. We then assess the model's predictions against data on government debt from advanced economies.

In our model, the government borrows from the banking sector (which consolidates the central bank and depository institutions) and non-bank investors. The government can default on non-bank investors but does not default on banks. Fiscal policy is initially in a deadlock: the government's debt is on an unsustainable trajectory unless a fiscal adjustment is implemented. The government controls the amount of debt that banks purchase and can extract quasi-fiscal revenue from the banking sector. The government uses financial repression optimally to prevent a default.

The model predicts how financial repression unfolds in such an environment. We show that financial repression involves two stages. In the first stage, the banking sector purchases a larger fraction of government debt when this debt exceeds a certain threshold. However, banks' capacity to absorb government debt is limited. Once this limit is reached, the government must extract quasi-fiscal revenue from the banking sector to stabilize its debt (late-stage financial repression). Financial repression should be used to generate revenue as a last resort because it is more distortionary than conventional taxation.

In our baseline model, the welfare cost of financial repression comes from the increased opportunity cost of holding bank deposits. We also extend the model to consider the additional cost of crowding out bank lending to the private sector. We show that as banks accumulate government debt, they have an incentive to expand their balance sheets by issuing more deposits rather than reducing their lending.

We then apply our model to analyze data on government debt from advanced economies. First, we examine patterns in the accumulation of government debt by banks since the 1990s using the database of Arslanalp and Tsuda (2014). Consistent with our model, we find that banks hold a larger share of government debt when it exceeds a threshold. Specifically, the data suggest that banks accumulate nearly 100% of any increase in government debt once it surpasses 100% of GDP. This pattern is remarkably consistent across countries though some, like Japan, reached this threshold earlier than others. If one interprets the data through the lens of our model, all major advanced economies, with the exception of Germany, already entered early-stage financial repression.

Finally, we examine the effects of increases in government debt on banks' balance sheets, focusing on the impact on deposit issuance and loans. We find that when government debt exceeds 100% of GDP, increases in government debt are associated with increases in bank deposits that are at least as large. Increases in government debt are not associated with decreases in bank lending. This suggests that the banking sector finances its purchases of government debt by expanding deposits rather than reducing lending to non-government borrowers.

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 that is in an active fiscal policy regimes and could switch 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. There is a large literature on how unsustainable debt dynamics have been resolved in the past (Mauro et al., 2015), with several authors specifically studying the role of financial repression. Reinhart and Sbrancia (2015) and Acalin and Ball (2023) describe financial repression as involving extensive distortions that lower the ex-ante real interest rate on government debt (what I call here late-stage financial repression). Chien, Cole and Lustig (2023) argue that large-scale government debt purchases by the Japanese central bank constituted a form of financial repression.

The theoretical literature on financial repression is less developed. Chari, Dovis and Kehoe (2020) present a model where the government is less likely to default on banks than on other creditors because of the high costs associated with a banking crisis (Bocola, 2016). Forcing banks to purchase government is costly, though, because it crowds out financing for profitable private investment projects.

Like Chari, Dovis and Kehoe (2020) I assume that the government does not default on banks. This assumption leads to a threshold above which the government can no longer sell its debt to non-bank creditors, resulting in the accumulation of debt in the banking sector (early-stage financial repression). Unlike these authors, the cost of late-stage financial repression arises, in my model, from the increased opportunity cost of holding bank deposits. An extension of my baseline model shows that bank purchases of government debt can crowd out private investment, but banks may mitigate this by issuing more deposits.

The welfare cost of financial repression, in my model, is analogous to the welfare cost of inflation in models of the optimal inflation rate where the government chooses between various distortionary taxes (Schmitt-Grohé and Uribe, 2010; Lucas, 2000).

This literature generally finds that the optimal rate of inflation is equal or close to zero, consistent with my finding that financial repression should only be a last resort. A key difference between my model and this literature is that I assume fiscal inertia prevents the government from choosing less distortionary forms of taxation over financial repression most of the time.

My model is mostly real, and inflation plays a relatively minor role. I assume that bank deposits yield a real interest rate determined by the banking sector's budget constraint. Financial repression is thus not necessarily associated with inflation unless the zero lower bound on the nominal interest rate is binding. Furthermore, I assume that government debt is real, precluding the channels at work in the fiscal theory of the price level (Cochrane, 2023).

This paper is related to the literature on central bank backstops of government debt motivated by the 2010 euro debt crisis. Several papers have documented the purchase of government debt by domestic banks during this crisis (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, my analysis does not rely on the presence of multiple equilibria.

Finally, this paper is closely related to the companion paper from which it is derived (Jeanne, 2024). The two papers have different focuses. In my other paper the amount of debt purchased by the banking sector is exogenous and I focus on the trade-offs between financial repression and default. In contrast, this paper investigates the anatomy of optimal financial repression, emphasizing the use of two instruments to avoid default.

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 assumptions

We consider a continuous-time economy with three sectors: households, banks and the government. The relationships between the three sectors' balance sheets are shown in Figure 1. Households and banks hold government debt in addition to real assets. The banks' liabilities (deposits) are held by households. In normal times the government revenue comes from a tax on households but when there is financial repression, the government extracts quasi-fiscal revenue from the banking sector.

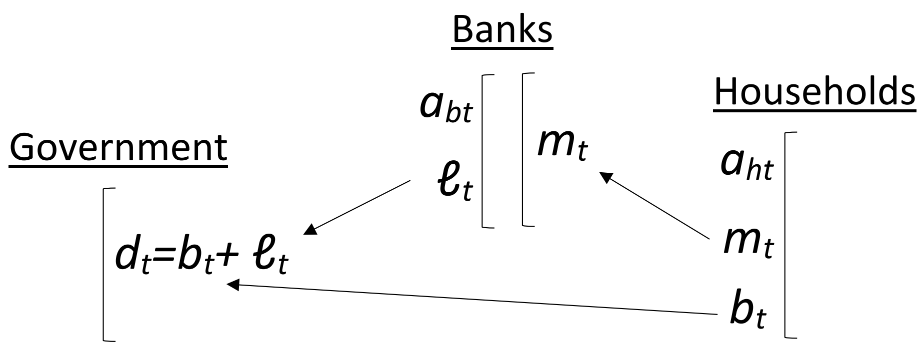

Figure 1: Sectoral balance sheets

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 is the fiscal revenue levied on households, and θ_t is the quasi-fiscal revenue extracted from the banking sector through financial repression. The revenue from financial repression is non-negative, $\theta_t \geq 0$, i.e., the government does not subsidize banks. We consider equilibria without default risk and r is the riskless interest rate.

Households. The economy is populated by a mass 1 of identical infinitely-lived households. The utility of the representative household is given by

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

where c_t is the consumption flow at time t and $u\left(m_t\right)$ is the utility of real money balances (bank deposits). The quasi-linearity of utility implies that the riskless real interest rate is equal to r. We assume that the utility of real money balances is a power function,

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

with $\nu > 1$.

The representative household's total financial wealth is $w_t = m_t + b_t + a_{ht}$. Households maximize their utility subject to the budget constraint

$$c_t + \tau_t + \dot{w}_t + (r - r_{mt})m_t = y_t + rw_t, \tag{4}$$

where y_t is household income, τ_t is a tax that is paid to the government, r_{mt} is the real return on deposits and $(r - r_{mt})m_t$ is the opportunity cost of holding money.

Banking sector and financial repression. The central bank is consolidated with the rest of the banking system. The banking sector issues deposits m to households, holds real assets a_{bt} and lends ℓ_t to the government. We assume that the banking sector maintains a zero level of equity, implying

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

The banks' real assets yield r and banks do not distribute profits. Thus, the budget constraint of the banking sector is,

$$\kappa + \theta_t = (r - r_{mt})\, m_t, \tag{6}$$

where κ is a fixed cost of operation. Because θ_t is non-negative the fixed cost κ implies a strictly positive opportunity cost of holding deposits.[1]

Financial repression policy consists in setting the level of two variables: the quasi-fiscal revenue θ_t and the banking sector's holdings of government debt ℓ_t. There are different ways that the government can set θ_t and ℓ_t in the real world. For example, the government could have the central bank buy its debt and issue reserves to depository institutions. Reducing the interest rate paid on reserves then produces central bank revenue that can be paid to the government. Alternatively, the government could pay an interest rate r_b lower than r to banks, in which case $\theta_t = (r - r_{bt})\ell_t$. The method by which the government sets ℓ_t and θ_t is a matter of model interpretation and does not matter for the equilibrium.[2]

The level of θ_t determines the interest rate on bank deposits through the banks' budget constraint (6). To see this, observe that the marginal utility of real money balances is equal to the opportunity cost of holding them, $u'(m_t) = r - r_{mt}$, which

[1] A negative θ_t could pay for the banking sector's fixed cost of operation and make it possible to implement the Friedman rule.

[2] Conceivably, the government could levy θ as a tax on banks. However, we shall argue that taxes that must be approved through the legislative process are not as easy to change as financial repression policies.

with (3) and (6) implies

$$r_{mt} = r - \mu^{-1/(\nu-1)} (\kappa + \theta_t)^{\nu/(\nu-1)}, \quad (7)$$

$$m_t = \left(\frac{\kappa + \theta_t}{\mu}\right)^{-1/(\nu-1)}. \quad (8)$$

Since $\nu > 1$ this equation implies that r_{mt} and m_t are decreasing functions of θ_t. Increasing financial repression revenue reduces the banks' resources available to pay a return on deposits and so the demand for deposits.

Equations (3) and (8 then imply that the utility of real money balances decreases linearly with the revenue from financial repression,

$$u(m_t) = -\frac{\theta_t + \kappa}{\nu - 1}. \quad (9)$$

Financial repression raises the opportunity cost of holding deposits and so decreases their utility for depositors.

Financial repression may have to be associated with inflation. The real interest rate on deposits is equal to the nominal interest rate minus the inflation rate

$$r_{mt} = i_{mt} - \pi_t.$$

If there is a zero lower bound on the nominal interest rate, the rate of inflation has to be positive to make r_{mt} negative. We assume that the government has a zero inflation target from which deviates only to produce quasi-fiscal revenue from financial repression. This implies,

$$\pi_t = \max(0, -r_{mt}),$$

where r_{mt} is given by (7).

Fiscal policy vs. financial repression. The government has access to fiscal revenue τ_t and financial repression revenue θ_t. Several difference between these two sources of revenue matter for the analysis.

First, fiscal policy exhibits inertia. The government cannot change τ_t whenever it wants, whereas financial repression can be changed at any time.

We assume that fiscal policy is initially in an active regime as defined by Leeper (1991). In this regime the tax rate is equal to a function of debt $\tau_a(d_t)$ that is too low to keep government debt on a sustainable path. This is not essential for our results but it will be convenient to assume that the government maintains a constant deficit δ in the active regime, i.e.

$$\tau_a(d) = g + rd - \delta \quad (10)$$

With a constant flow probability ϕ fiscal policy switches to a passive regime in which the present discounted value of future tax revenue is sufficient to repay the government debt d_t. The transition from the active regime to the passive regime is a fiscal adjustment. The government does not use financial repression after a fiscal adjustment.

These assumptions capture the idea that fiscal policy may be difficult to change quickly for reasons that have been discussed in the political economy literature (and are left outside of the model) to explain inefficient delays in fiscal adjustment. Fiscal deadlock has been explained for example by wars of attrition between political parties (Alesina and Drazen, 1991). By contrast, financial repression policies can be used at short notice because they rely on financial regulation and safety net policies that are delegated to agencies like the central bank that do not explicit legislative approval for their actions. One reason for this delegation is that preserving financial stability may require a rapid response to incipient financial instability.

The second important difference between fiscal policy and financial repression is that they entail different costs. To capture the idea that taxation is costly, we assume that output is decreasing with the level of fiscal revenue,

$$y_t = \overline{y} - \gamma_\tau \tau_t, \tag{11}$$

where γ_τ is a positive coefficient. This variable can be endogenized by linearizing a model where the government taxes output produced with labor (see e.g. Jeanne, 2024).[3]

The welfare cost of taxation and financial repression can then be put together 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), household consumption can be written as output plus the return on real assets net of government expenditures and banks' operating cost, $c_t = y_t + ra - g - \kappa$, which with (9) and (11) gives the following expression for the households' flow utility,

$$c_t + u(m_t) = \bar{c} - (\gamma_\tau \tau_t + \gamma_\theta \theta_t),$$

where $\gamma_\theta \equiv 1/(\nu - 1)$ and $\bar{c} \equiv \bar{y} + ra - g - \nu\kappa/(\nu - 1)$ is the consumption level if output is undistorted by taxes or financial repression.

The two forms of government revenues have welfare costs captured by parameters γ_τ and γ_θ. We assume that financial repression has a larger welfare cost than taxation,

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

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

This implies that when given the choice, a welfare-maximizing government always chooses to raise revenue through conventional taxation rather than financial repression. As shown in Jeanne (2024) this condition is satisfied for plausible calibrations of the model.

Default. We consider equilibria in which the government never defaults, so that the government can roll over its debt at the riskless interest rate r. However, the government's option to default sets constraints on the equilibrium level of debt.

More specifically, 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.

Importantly, the government does not default on banks. Equivalently the government bails out banks with a transfer that covers any loss they have suffered in a default. Like in Chari, Dovis and Kehoe (2020) this could be because of the large macroeconomic cost of a banking crisis.

3 Optimal Financial Repression

The equilibrium before a fiscal adjustment can be defined in two equivalent ways. In the Ramsey solution, one looks for the policy path $(\ell_{at}, \theta_{at})_{t\geq 0}$ that maximizes welfare. Alternatively, one can define policy as a function of the state, $\ell_a(d)$ and $\theta_a(d)$, and solve for the optimal policy rules. In both cases, households maximize their utility and markets clear given government policies. The assumption that the government can commit to its policies is inessential. The equilibrium is the same under commitment and discretion.

Given the government budget constraint (1) and the policy rule (10), the dynamics of government debt are governed by

$$\dot{d}_{at} = \delta - \theta_{at}, \tag{12}$$

before a fiscal adjustment.

We look for policies that satisfy desirable properties. First, what conditions should the policy $(\ell_{at}, \theta_{at})_{t\geq 0}$ satisfy to prevent a default? Second, what is the default-preventing financial repression policy that maximizes welfare?[4] We study these questions in section 3.1 and 3.2 respectively. Section 3.3 presents an extension of the model.

[4]Another question is whether financial repression is preferable to a default. That question is analyzed in Jeanne (2024).

3.1 Default-preventing financial repression

We proceed backwards, starting with the passive fiscal regime after a fiscal adjustment. Welfare is then given by the present discounted value of potential consumption minus the distortionary cost of the taxation required to finance the government expenditure and repay the debt,

$$V_p(d) = \frac{\overline{c} - \gamma_\tau g}{r} - \gamma_\tau d, \tag{13}$$

(see the appendix for a derivation). Because fiscal policy switches to a passive regime after a default, welfare under default is given by

$$V_d(\ell) = V_p(\underline{b} + \ell) - \gamma_d, \tag{14}$$

where γ_d is the cost of default. Welfare under default decreases with ℓ because the government does not default on bank debt.

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

$$U_t = V_p(d_t) - (\gamma_\theta - \gamma_\tau) \int_t^{+\infty} \theta_s e^{-(r+\phi)(s-t)} ds, \tag{15}$$

where d_t and θ_t are the paths followed by debt and financial repression revenue before the fiscal adjustment (we omit the subscript a to alleviate notations). The government does not default if and only if $U_t \geq V_d(\ell_t)$, which, using (13) and (14) implies

$$\gamma_\tau (d_t - \ell_t - \underline{b}) + (\gamma_\theta - \gamma_\tau) \int_t^{+\infty} \theta_s e^{-(r+\phi)(s-t)} ds \leq \gamma_d. \tag{16}$$

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

Equation (16) implies that default can be prevented only if debt d_t is not too high. This is stated in the following proposition.

Proposition 1 *There exists a default-preventing financial repression policy iff government debt is lower than a threshold d^* given by*

$$d^* = \underline{b} + \frac{\gamma_d}{\gamma_\tau} - \left(\frac{\gamma_\theta}{\gamma_\tau} - 1\right) \frac{\delta}{r + \phi} + m(\delta). \tag{17}$$

Proof. See appendix. ■

If government debt exceeds d^*, the cost of the financial repression and taxation required to repay the debt exceeds the cost of default. At the threshold, the government is indifferent between defaulting and paying the cost of financial repression. The financial repression revenue must be equal to the deficit δ in order to stabilize the debt at d^*.

The expression for the threshold d^* can be interpreted as follows. The first term, $\underline{b} + \gamma_d/\gamma_\tau$, is the debt threshold above which the government defaults rather than implementing the fiscal adjustment. The second term, $-\left(\frac{\gamma_\theta}{\gamma_\tau} - 1\right)\frac{\delta}{r+\phi}$, reflects the cost of financial repression. The last term, $m(\delta)$ is the level of deposits if $\theta = \delta$, where function $m(\cdot)$ is defined by (8). It is also the banking sector's government debt purchasing capacity. The banking sector purchases as much government debt as possible in order to minimize the temptation to default on non-bank debt b.

The maximum government debt d^* depends on the model parameters in an intuitive way. It is increasing in the cost of default γ_d and in the flow probability of a fiscal adjustment ϕ (which reduces the expected cost of financial repression). It is decreasing in the the flow cost of financial repression γ_θ and the fiscal deficit δ.

3.2 The two stages of financial repression

Among all the financial repression policies that prevent default, which is the one that maximizes welfare? As stated in the following proposition, it is optimal to extract quasi-fiscal revenue from financial repression only as a last resort, i.e., when debt has reached the threshold d^*. Before that the government should wait and hope for a fiscal adjustment. The government is not completely passive before debt reaches the threshold d^*, though, because it must ensure that the banking sector purchases a sufficient quantity of government debt.

Proposition 2 *The welfare-maximizing financial repression policy depends on the debt level as follows. There is a threshold $\hat{d}$ lower than d^* such that:*

(i) if d is lower than $\hat{d}$, then there is no financial repression, i.e., $\theta = 0$ and ℓ is indeterminate;

(ii) if d is between $\hat{d}$ and d^*, then the banking sector purchases a minimum level of government debt but does not provide quasi-fiscal revenue to the government, i.e., $\theta = 0$ and $\ell \geq \underline{\ell}(d)$ where $\underline{\ell}(\cdot)$ is an increasing function;

(iii) if $d = d^*$, then the banking sector holds only government debt and provides enough quasi-fiscal revenue to the government to stabilize the debt level at d^*, i.e., $\theta = \delta$ and $\ell = m(\delta)$.

Proof. See appendix. ■

Financial repression should be used to produce fiscal revenue only in last resort. This is because financial repression is more distortionary than conventional taxation ($\gamma_\theta > \gamma_\tau$). Using financial repression to slow down debt accumulation early is inefficient. This strict ranking makes the model quite different from second-best public finance models in which all forms of taxation should be used at the margin. The only reason to use financial repression revenue in this model is that it can be used at any time. Hence, it should be used as a temporary expedient to stabilize the debt while waiting for a fiscal adjustment.

The other instrument of financial repression—government debt purchase by the banking sector—should be used earlier. As shown by Figure 2 financial repression comes in two stages. The early stage starts when debt d_t reaches $\hat{d}$. Then banks must start to purchase government debt because the non-bank sector is no longer willing to hold the whole stock. The government does not interfere with the market equilibrium beyond requesting that banks purchase a minimum level of government debt. The late stage starts when debt reaches d^* and the banking sector has exhausted its buying capacity. At that point the total government debt is stabilized by extracting quasi-fiscal revenue from the banking sector.

The level of coercion required to get the banks to purchase government debt is not very high. If the government left the level of ℓ_t to be determined by market forces in a decentralized equilibrium with many banks, it would be indeterminate. Each bank would be indifferent about the composition of its assets as long as they yield the same default-free return r. There would be a continuum of equilibria in which banks purchase different levels of government debt. All the government needs to do, in the early stage of financial repression, is to ask banks to pick one particular portfolio in a set of portfolios between which they are indifferent.

3.3 Lending restriction vs. deposit expansion

In the baseline model, the banking sector has a constant level of deposits (until the last stage of financial repression) and finances its purchases of government debt by selling other assets. This is not costly because assets are equally productive whether they are held by banks or households. One way in which financial repression could be costly, though, is by restricting banks' ability to finance assets in which they have a comparative advantage, e.g., loans to small and medium enterprises.

To capture this idea, we now assume that banks' assets yield a return $ra_b + f(a_b)$ where $f(a_b)$ is an extra return that exist only if the assets are held by banks. Function

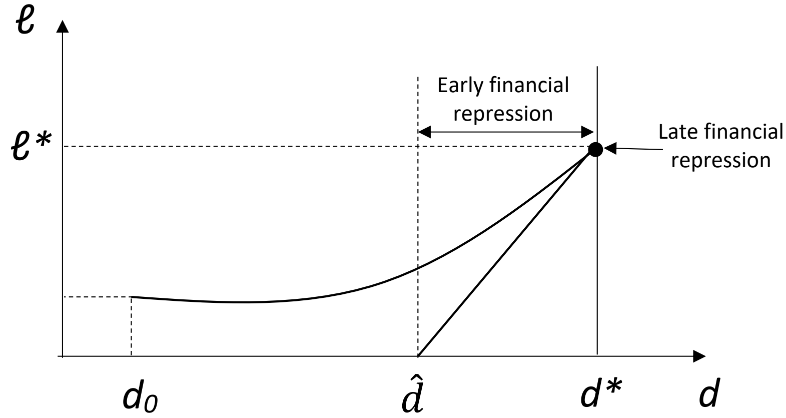

Figure 2: The early and late stages of financial repression

$f(\cdot)$ is increasing, concave and satisfies $f(0) = 0$. Furthermore we assume that this function reaches a maximum and stops increasing for a finite level of assets $\underline{a}_b$. That is, the assets in excess of $\underline{a}_b$ do not yield an extra return for banks.

For simplicity, we assume that $f(a_b)$ is distributed as dividends to the bank shareholders (households). Thus, as long as banks hold more than $\underline{a}_b$, government debt purchases have no impact on banks' dividends or welfare. But reducing a_b below $\underline{a}_b$ entails a deadweight loss. There is an amount $\underline{a}_b$ of "illiquid" assets that should be held by banks.

Conceivably, banks could finance their government debt purchases by issuing more deposits rather than selling assets. This is not possible in the baseline model because there is one type of deposits m whose level is maximized when $\theta = 0$. We now relax this assumption by assuming instead that banks can offer deposits of different types $i = 1, ..., n$. The total quantity of deposits is $m = \sum_i m_i$ and the utility from deposits is

$$u\left(\sum_i \omega_i m_i\right),$$

where $\omega_1 = 1 > \omega_2 > ... > \omega_n$. That is, the transaction services offered by deposits of type i decrease with i. The baseline model corresponds to the special case where there is one type of deposits ($n = 1$).

The banking sector's budget constraint (6) can now be written

$$\begin{aligned}\kappa+\theta_t &= \sum_i (r-r_{mi})m_i,\\ &= \sum_i \omega_i(r-r_{m1})m_i,\\ &= u'\left(\sum_i \omega_i m_i\right)\sum_i \omega_i m_i,\\ &= -(\nu-1)u\left(\sum_i \omega_i m_i\right). \end{aligned} \tag{18}$$

The second line is derived by noting that, because the linearity in the deposit aggregator, the opportunity cost of holding type-i deposits must be proportional to ω_i, i.e., $r-r_{mi}=\omega_i(r-r_{m1})$ for all i in equilibrium. The third line uses the first-order condition for holding type-1 deposits, $u'\left(\sum_i \omega_i m_i\right)=r-r_{m1}$. Finally the last line uses the fact that the utility for deposits is a power function given by (3).

Equation (18) shows that the utility of deposits is still given by equation (9). Hence welfare remains the same linear decreasing function of the quasi-fiscal revenue from financial repression as in the baseline model.

The difference with the baseline model is that the quantity of deposits m_t is no longer given by (8). The level of θ_t uniquely determines the level of deposit services $\sum_i \omega_i m_{it}$ but $m_t=\sum_i m_{it}$ depends on the types of deposits that are used to provide those services. We have $m_t=m(\theta_t)$, as defined by (8), if banks issue only type-1 deposits (as in the baseline model) but the level of deposits could be higher if banks supply deposits that offer less transaction services per unit. The maximum level of m_t is reached when all the deposits are of type n. In general, m_t can be chosen anywhere between $m(\theta_t)$ and $m(\theta_t)/\omega_n$,

$$m(\theta_t)\le m_t\le \frac{m(\theta_t)}{\omega_n}, \tag{19}$$

where function $m(\cdot)$ is given by (8).

Given that m_t is now a free variable subject to (19), we define the financial repression policies as a triplet of paths $(\ell_{at}, m_{at}, \theta_{at})_{t\ge0}$. It is easy to see that the government optimally delays raising θ as long as possible by having banks issue more low-utility deposits and buy more government debt. The total quantity of deposits, thus, expands during the early stage of financial repression. The debt threshold d^* where late-stage financial repression kicks is given by equation (17) with $m(\delta)$ replaced by $m(\delta)/\omega_n$.

Our results are summarized in the following proposition.

Proposition 3 *Assume that banks hold illiquid assets and can issue deposits that yield different levels of transaction services per unit of deposit. Then during the early stage of financial repression, banks should finance government debt purchases by expanding their deposits rather than by selling illiquid assets. The level of bank deposits is $m(\delta)/\omega_n$ in the late stage of financial repression.*

Proof. See appendix. ■

It is not efficient to sell illiquid bank assets early because this reduces welfare without changing the dynamics of government debt. It is preferable to finance the debt purchase by issuing deposits because this has no welfare cost.

To which extent is it possible to delay the distortionary costs of financial repression by issuing bank deposits? In the extended model, the government debt threshold d^* is given by (17) with $m(\delta)$ replaced by $\frac{m(\delta)}{\omega_n} - a_b^*$, where $a_b^* < \underline{a}_b$ is the level of illiquid assets held by banks in the late stage of financial repression (see the proof of Proposition in the appendix). The debt threshold is increased by the fact that banks can raise their levels of deposits ($\frac{m(\delta)}{\omega_n} > m(\delta)$) but it is decreased by the fact that banks keep a certain level of illiquid assets $a_b^* > 0$.

The banking sector's government debt purchasing capacity certainly expands if ω_n is low enough. An interesting special case arises when ω_n goes to zero, i.e., when banks can issue debt that yields no transaction services. Equation (19) then implies that bank liabilities can go to infinity and the late stage of financial repression is never reached. The intuition is that if the government never defaults on banks, it can commit not to default on its debt simply by having banks intermediate between households and itself. However, the banks' government debt purchasing capacity remains limited if one introduces the possibility for the government to default on banks at a higher output cost than defaulting just on households. The upper limit on government debt in this case is derived in the appendix.

4 Data

The theoretical framework yields a scenario for the transition to financial repression. First, the banking sector buys government debt (early-stage financial repression). When its purchasing capacity is exhausted the level of government debt is stabilized by extracting quasi-fiscal revenue from the banking sector (late-stage financial repression). We now look at the data to see whether and how such a scenario can be quantified. The objective is to take a first step towards the quantification of the model, not to test the model against alternatives.

4.1 Government debt purchases

The model predicts that when government debt exceeds a certain threshold a larger fraction of it gets 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). Their database reports the general government debt to GDP ratio as well as the component of this debt that is held by domestic banks (the central bank and commercial banks), that is variables d and ℓ in the model. The data are available for more than twenty advanced economies between 1989 and 2023.

Figure 3 plots ℓ (on the vertical axis) against d (on the horizontal axis) for 23 countries between 1989 and 2023.[5] Figure 4 shows the same information for the G7 economies.

Several observations stand out. First, a larger fraction of government debt increments starts to accumulate in the domestic banking sector when this debt exceeds a threshold of about 100%. This is true whether we look at the full sample or only the G7 countries.

To confirm this impression more formally, we run a threshold regression of bank-held government debt ℓ on total government debt d (both as shares of GDP). In this type of regression there is set of coefficients when d is below the threshold and another set of coefficients beyond the threshold. The threshold is estimated to minimize the sum of squared residuals. The results are reported in Table 1.

The first column reports the results when the regression is run with pooled data for 23 countries. The debt threshold is estimated to be about 110% of GDP. The share of a government debt increment that is accumulated by the domestic banking sector increases from 26% to 99% when debt crosses the threshold. That is, one fourth of an increase in government debt is accumulated by the domestic banking sector if debt is below 110% of GDP, but the debt increase is almost entirely absorbed by the banking sector above this threshold.

The second column of Table 1 shows that the results are similar if one restricts the sample to the G7 countries. The debt threshold increases by about 10% of GDP but it remains true that a debt increase is almost entirely absorbed by the banking sector above the threshold.

[5] Each point corresponds to a country-year pair. 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.

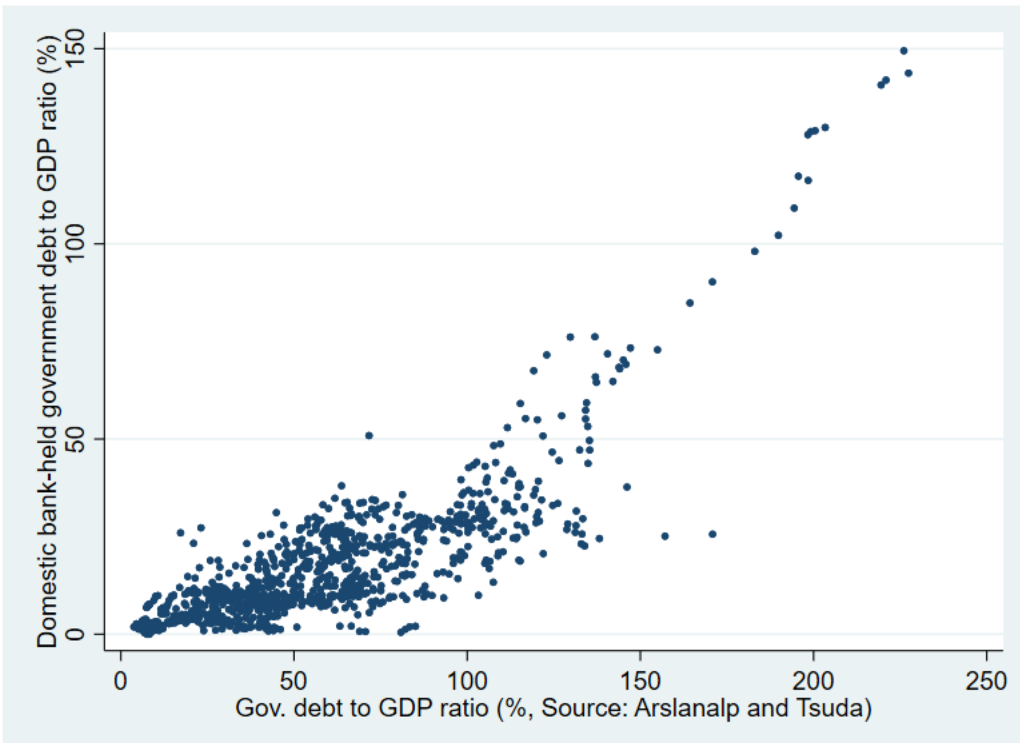

Figure 3: Source: Aslanalp and Tsuda and author's calculations.

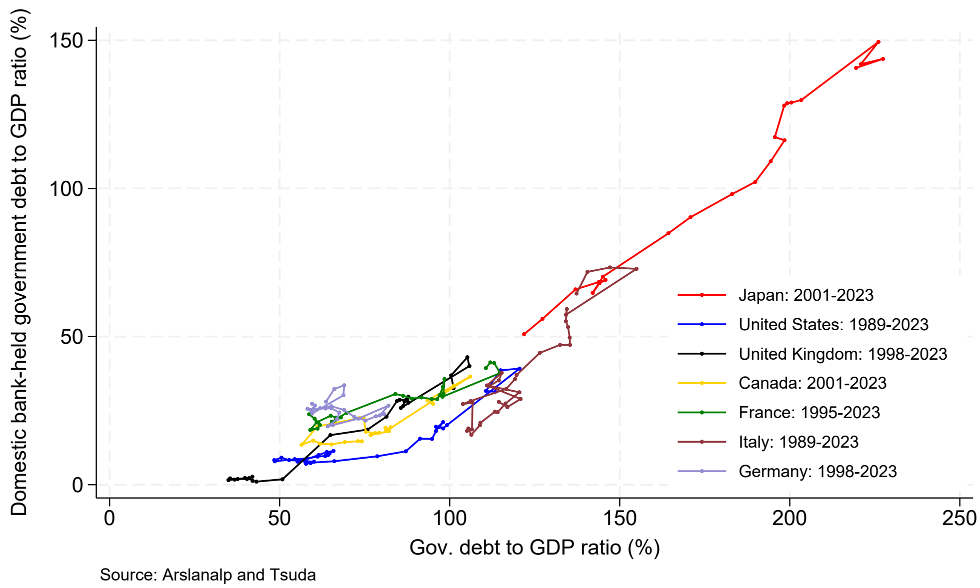

Figure 4: Source: Aslanalp and Tsuda and author's calculations.

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

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

Figure 4 suggests that the results may be to some extent driven by Japan, which had the highest levels of total government debt and bank-held government debt. Between 2001 and 2023 the Japanese government's debt increased from 122% to 220% of GDP and most of this increase was accumulated by the Japanese banking sector. The figure also shows that the experience of the other G7 countries, although less extreme, was consistent with the path followed by Japan. As shown in the third column of Table 1 the results of the threshold regression are similar if we run it for the G7 countries excluding Japan.

The data thus exhibit a pattern that is remarkably consistent across countries, and with the model.

4.2 Crowding out vs. deposit expansion

Our theoretical framework offers differing predictions on how the issuance of government debt impacts banks' balance sheets in the early stage of financial repression. In the baseline model, crowding out occurs as banks purchase government debt by selling other assets. In the model extension in Section 3.3, banks purchase government debt by expanding their deposits. Identifying which model aligns more closely with the data is interesting, as they imply different timelines for when banks' capacity to absorb government debt is exhausted.

We begin by examining Japan, a case that closely mirrors our model conditions: a sustained increase in government debt, largely absorbed by the banking sector. We use currency and deposits in monetary financial institutions as a share of GDP to represent variable m, and proxy ab with bank loans as a share of GDP. We focus on bank loans as they are the bank asset for which crowding out would likely be the costliest, potentially inducing a credit crunch. More details about the data can be found in the appendix.

Figure 5 shows the co-movement of Japanese bank loans and deposits (y-axis) with government debt (x-axis) between 1999 and 2023. During this period, Japanese banks absorbed almost the entirety of the government debt increase amounting to 113% of GDP, while expanding their deposits by 182% of GDP. Although bank loans slightly declined as a share of GDP at the beginning of the period, they eventually increased over the full duration by more than 30% of GDP. Over the whole period, therefore, the Japanese banking sector financed government debt purchases by expanding deposits rather than reducing loans.

Figures 6 and 7 provide a more systematic overview of this evidence. Figure 6 plots the annual change in the ratio of currency and deposits to GDP against the annual change in the government debt-to-GDP ratio across all sample countries, while

Figure 7 does the same for the ratio of bank loans to GDP. Each point represents a country-year observation. We show only observations where government debt exceeds 100% of GDP so that the banking sector is presumably the main purchaser of government debt.

Consistent with Japan's case, the cross-country evidence at the annual frequency shows a positive correlation between increases in government debt and bank deposits. A regression of deposit changes on government debt changes yields a coefficient that is statistically significant at the 1% level and close to 1, indicating that deposit growth generally suffices to finance banks' government debt purchases. Additionally, increases in government debt are associated with rises in bank loans, contrary to the crowding-out effect.

These correlations are not necessarily causal, as both government debt issuance and bank balance sheets are endogenous to the business cycle. A potential confounder is the procyclicality of both the fiscal balance and the demand for bank loans. However this would induce a negative correlation between government debt issuance and bank loans—the opposite of what we observe.

While the evidence is suggestive rather than conclusive, it indicates that banking sectors have generally financed government debt purchases by issuing deposits rather than by crowding out loans. Japan's experience, in particular, highlights the banking sector's substantial capacity to absorb government debt in this manner.

5 Conclusions

This paper contributes to our understanding of financial repression in different ways. At the theoretical level, we analyzed optimal financial repression policies in a model where it can take different, more or less coercive, forms. The model suggests a natural sequence in the deployment of these policies, starting with relatively market-friendly interventions, like central bank purchases of government debt, and escalating to more distortive interventions that extract quasi-fiscal revenue from the banking sector. Additionally, we found that the scope for government debt purchases can be expanded if banks increase their balance sheets by issuing diverse deposit types.

Empirically, our data reveal several stylized facts that support our theoretical framework and inform the selection of realistic model specifications. Notably, banking sectors appear to finance government debt purchases by expanding deposits rather than constricting lending. The Japanese experience provides encouraging evidence, suggesting substantial room for this type of financial policy.

The analysis could be extended in several directions.

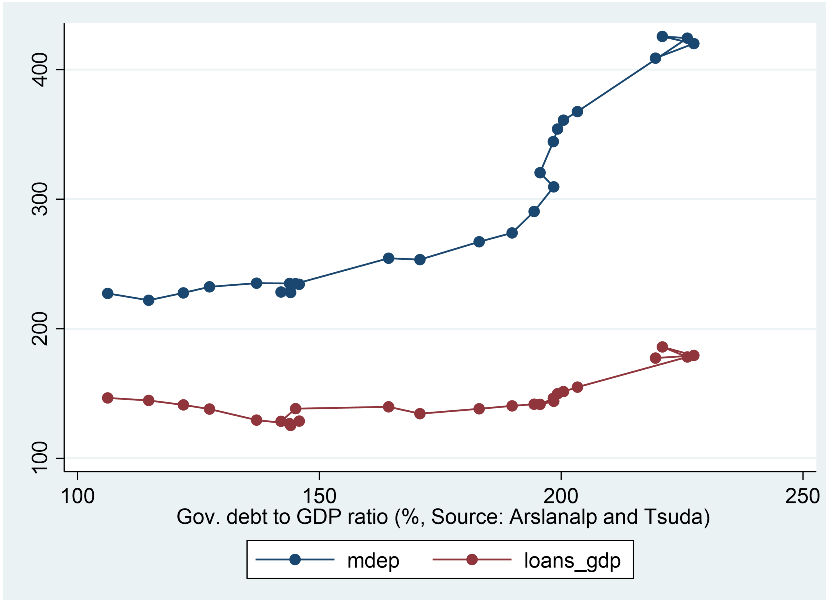

Figure 5: Source: Aslanalp and Tsuda (2014), national sources and author's calculations.

First, one could assume that government debt yields a utility, like in the literature on the convenience yield of US Treasury debt (see e.g. Krishnamurthy and Vissing-Jorgensen, 2012).[6] Then open market purchases would have a positive fiscal impact by reducing the interest rate on government debt. This would attenuate the dichotomy in our model between the open market interventions that affect ℓ but do not produce revenue for the government, and the interventions increasing the quasi-fiscal revenue θ.

Second, the channels through which financial repression affected the balance sheet of banks were simplistic. In the baseline model we assumed that the government sets all the parameters in the banks' balance sheets, but the reality is that the government affects those balance sheets indirectly through regulation. We need to understand better how financial repression affects the equilibrium of the banking sector as a regulated industry. The variant of the model presented in section 3.3 made a step in the right direction by giving a bigger role to the shareholders of banks, but it remains a far cry from a realistic industrial-organization model of the banking sector. One important question, in this regard, is how it is affected by developments in financial technology.

[6]This is an extension of our model where $u(m)$ is replaced by $u(m, b)$.

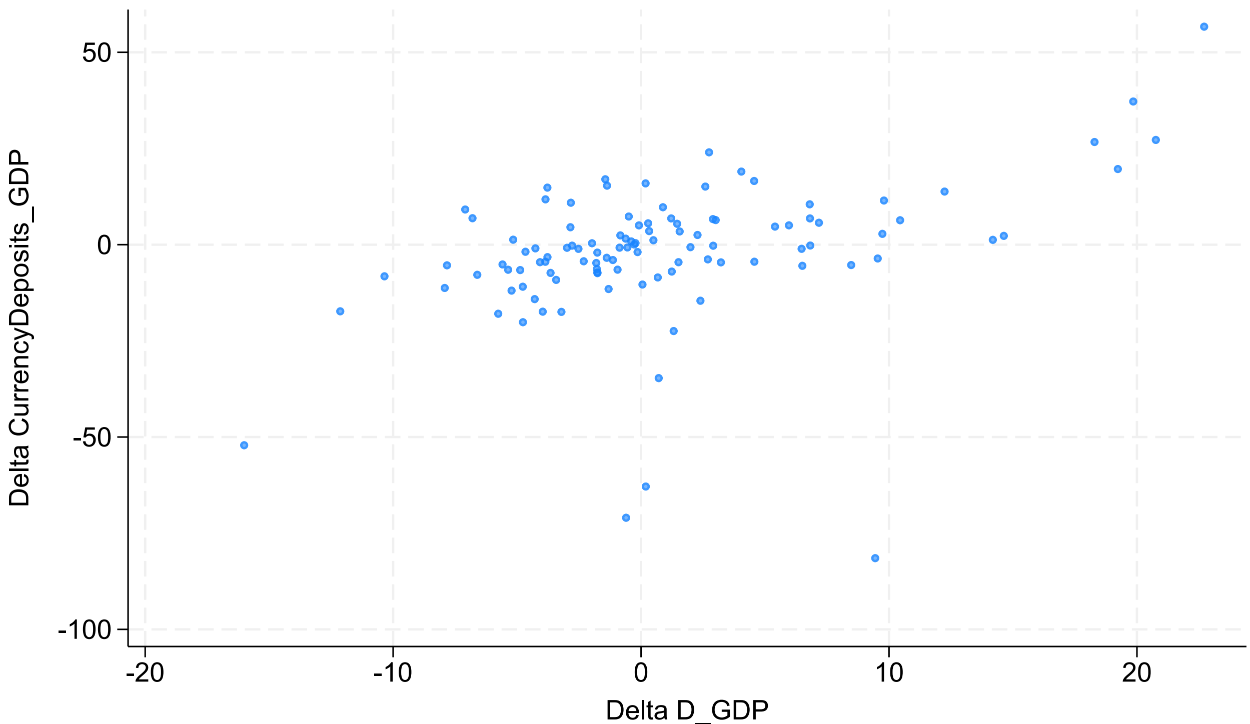

Figure 6: Annual change in currency and deposits (y axis, % of GDP) vs. annual change in government debt (x axis, % of GDP)

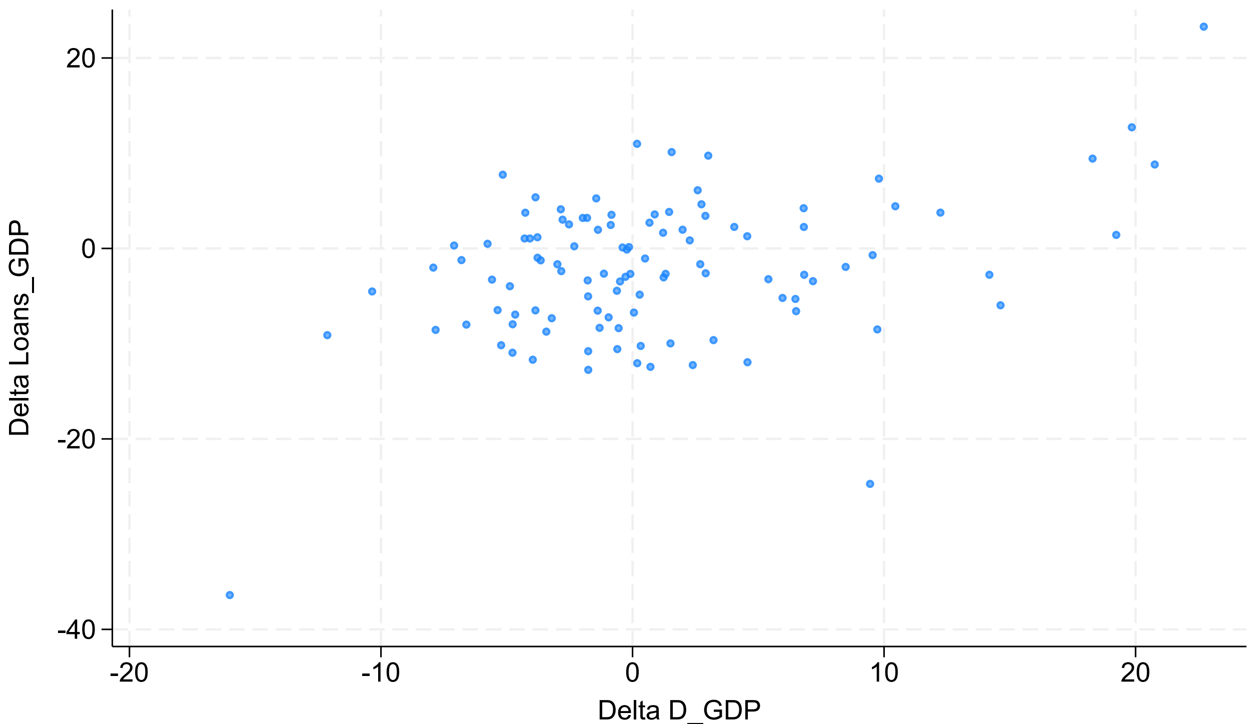

Figure 7: Annual change in bank loans (y axis, % of GDP) vs. annual change in government debt (x axis, % of GDP)

Third, our analysis was set in a closed economy. An open economy would change the analysis in several ways. The government's incentives to default might be stronger if the debt is held by foreigners. Financial repression would affect the exchange rate and could involve other policy instruments like capital controls. The international spillovers of financial repression also need to be taken into account.

In the context of the euro area, the questions become more complex. The model presented in this paper should be extended to a common currency area with free trade and free capital mobility. It may be desirable, for the sake of incentives or political acceptability, to confine financial repression to the countries that have an unsustainable debt path. However, under conditions of free trade and free capital mobility, there are limits to how financial repression can be confined to a subset of countries.

APPENDIX A. THEORY

Derivation of equations (13) and (15). In the passive regime (after a fiscal adjustment) fiscal policy follows a rule $\tau_t = \tau_p(d_t)$ such that the transversality condition $\lim_{t+\infty} d_t e^{-rt} = 0$ 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 welfare can be written as

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

which is equation (13).

Before the fiscal adjustment welfare satisfies

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

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

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

The third line is obtained by using the budget constraint $\tau_a(d_s) + \theta_s = g + rd_s - \dot{d}_s$, equation (13) and $\dot{V}_{ps} = -\gamma_\tau \dot{d}_s$. The fourth line is obtained by integrating by part the first integral on the r.h.s. of the third line. The fourth line is equation (15).

Proof of Proposition 1. Let us denote by D the set of government debt levels such that it is possible to avoid a default using financial repression. More formally,

d belongs to D if and only if there exist paths $(\ell_{at}, \theta_{at})_{t\geq 0}$ such that condition (16) is satisfied for all d_t if the path $(d_t)_{t\geq 0}$ is determined by (12) and $d_0 = d$. This set is an interval that is bounded from above, implying that it has an upper bound d^* for which the no-default constraint (16) is binding.

We can then derive d^* by making the following two observations. First, if the no-default constraint (16) starts to bind at time t, it must continue to bind at all times $s \geq t$ until the fiscal adjustment. Otherwise it would be possible to decrease θ_s and the no-default constraint would not bind at time t. Hence d_{at} stays equal to d^* after it has reached that level. The government budget constraint (12) then implies that $\theta_{at} = \delta$ when the no-default constraint binds.

The second observation is that if (16) binds, bank lending to the government ℓ_t should be maximized subject to the constraint $\ell_t \leq m_t$. Thus when the no-default constraint is binding condition (16) holds as an equality with $\theta_s = \delta$ and $\ell_t = m(\delta)$ where function $m(\cdot)$ is given by (8). This gives equation (17).

Proof of Proposition 2. The proof that the quasi-fiscal revenue from financial repression is used only when debt reaches the threshold d^* can be found in Jeanne (2024) and is not reproduced here. We have $\theta_t = 0$ for $t < T$ and $\theta_t = \theta^*$ for $t \geq T$, where T is the time at which debt reaches the threshold d^*. Using this property in equation (16) we obtain

$$\gamma_\tau \left(d_t - \ell_t - \underline{b}\right) + \left(\gamma_\theta - \gamma_\tau\right) \frac{\delta}{r+\phi} e^{-(r+\phi)T} \leq \gamma_d. \tag{20}$$

The government budget constraint implies $d^* = d_0 + \delta T$. Using this expression to substitute out T in equation (20) and equation (17) to substitute out γ_d gives

$$\ell_t \geq \underline{\ell}(d_t), \tag{21}$$

where $\underline{\ell}(\cdot)$ is an increasing function given by

$$\underline{\ell}(d) = d - d^* + m(\delta) - \left(\frac{\gamma_\theta}{\gamma_d} - 1\right) \frac{\delta}{r+\phi} \left[1 - \exp\left(-\frac{r+\phi}{\delta}(d^* - d)\right)\right]. \tag{22}$$

Proposition 2 then follows, where $\hat{d}$ is the threshold at which $\underline{\ell}(d)$ starts to be positive.

Proof of Proposition 3.3. In the passive regime, welfare includes the return on illiquid assets so that equation (13) becomes

$$V_p(d) = \frac{\overline{c} + f(\underline{a}_b) - \gamma_\tau g}{r} - \gamma_\tau d.$$

Going through the same steps as for the derivation of equation (15) one can show that welfare before the fiscal adjustment includes the loss of selling illiquid assets and is given by

$$U_t = V_p(d_t) - \int_t^{+\infty} \left[(\gamma_\theta - \gamma_\tau)\, \theta_s + f(\underline{a}_b) - f(a_{bt}) \right] e^{-(r+\phi)(s-t)} ds.$$

Hence the no-default condition (16) becomes

$$\gamma_\tau \left(d_t - \ell_t - \underline{b} \right) + \int_t^{+\infty} \left[(\gamma_\theta - \gamma_\tau)\, \theta_s + f(\underline{a}_b) - f(a_{bt}) \right] e^{-(r+\phi)(s-t)} ds \leq \gamma_d,$$

or, using $\ell_t + a_{bt} = m_t$,

$$\gamma_\tau \left(d_t - m_t + a_{bt} - \underline{b} \right) + \int_t^{+\infty} \left[(\gamma_\theta - \gamma_\tau)\, \theta_s + f(\underline{a}_b) - f(a_{bt}) \right] e^{-(r+\phi)(s-t)} ds \leq \gamma_d.$$

Like in the proof of Proposition 1, the no-default condition is binding for $d_t = d^*$. The threshold d^* is maximized if the condition $m \leq m(\theta)/\omega_n$ is binding, that is if banks issue the maximum quantity of deposits. The path for a_{bt} does not affect the government debt dynamics before the threshold is reached, hence it is inefficient to set a_{bt} below $\underline{a}_b$ in the early stage of financial repression.

Let us assume that the government can default on banks at an output cost $\Gamma_d > \gamma_d$. Then we have the additional no-default condition $U_t \geq V_p(\underline{b}) - \Gamma_d$. If ω_n goes to zero there no longer is a constraint on the size of banks' balance sheet and banks do not sell illiquid assets. In this case the no-default condition becomes

$$\gamma_\tau \left(d_t - \underline{b} \right) + (\gamma_\theta - \gamma_\tau) \int_t^{+\infty} \theta_s e^{-(r+\phi)(s-t)} ds \leq \Gamma_d.$$

This constraint is binding when d_t is equal to the debt threshold d^* and $\theta_s = \delta$. Hence the debt threshold is given by

$$d^* = \underline{b} + \frac{\Gamma_d}{\gamma_\tau} - \left(\frac{\gamma_\theta}{\gamma_\tau} - 1 \right) \frac{\delta}{r + \phi}.$$

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 countries mentioned below. 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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