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Banks and the Marginal Propensity to Lend in General Equilibrium

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Banks and the Marginal Propensity to Lend in General Equilibrium *

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Abstract

This paper examines the role of the marginal propensity to lend (MPL) out of deposit shocks in the transmission of monetary policy within a general equilibrium framework. To this end, I extend a standard New Keynesian DSGE model by incorporating banks and imperfect substitution between deposits and wholesale funding. Using U.S. bank-level data for calibration, I find that increasing financial frictions—raising the aggregate MPL by 66%—amplifies the responses of bank lending and investment to monetary shocks by 11% and 16%, respectively. Moreover, when the sensitivity of the marginal cost of funds also rises, loan pass-through increases by 20%, further amplifying lending and investment responses by 31% and 54%, respectively. Finally, higher MPLs amplify the production response to monetary shocks only in the medium run, through their impact on investment.

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1 Introduction

Imperfect substitution between deposits and wholesale funding exposes bank lending to idiosyncratic deposit shocks. This is important because it provides a role for deposits in the transmission of monetary policy to macroeconomic aggregates. The marginal propensity to lend (MPL) measures the exposure of bank lending to deposit shocks. This paper studies the role of the marginal propensity to lend in the transmission of monetary policy in a general equilibrium model with a representative bank.

In the model, banks provide loans using deposits and wholesale funding and face frictions in substituting deposits with wholesale funding. Then, banks cannot fully compensate for a decline in deposits with an increase in wholesale funding, which exposes their supply of loans to changes in deposits. Banks collect deposits from patient households and demand wholesale funding from impatient households. Patient households cannot provide wholesale funding to banks and have a discount factor that is higher than that of impatient households. Intermediate goods producers borrow funds from banks to invest in capital and produce output using capital and labor from patient households.

In partial equilibrium, a higher degree of financial frictions increases MPLs, reduces the response of deposits to monetary shocks, and increases the pass-through from the policy rate to the lending rate. In general equilibrium, at steady state, the interest rate on deposits and the policy rate are given by the discount factor of patient and impatient households. Then, the marginal cost of wholesale funding does not change with the degree of financial frictions, which dampens the role of frictions in the transmission of monetary policy. This occurs because the loan rate pass-through depends on the marginal cost of wholesale funding. If the marginal cost does not change, the loan pass-through is (almost) unchanged. If we keep the demand for wholesale funding constant, then higher frictions increase the MPLs and loan pass-through, which amplifies the transmission of monetary policy to macroeconomic aggregates.

In general equilibrium, higher frictions increase the aggregate MPL and also reduce the response of deposits to monetary shocks. Higher MPLs amplify the transmission of monetary policy. However, the lower exposure of deposits to monetary shocks dampens the transmission of monetary policy. This occurs because higher frictions increase the exposure of banks to deposit changes. Banks try to reduce the exposure of their deposits to aggregate shocks by decreasing their demand for wholesale funding, which dampens the response of deposits and lending to monetary shocks. Then, economies with high MPLs and a similar response of deposits to monetary shocks experience a larger decline in macroeconomic aggregates after a contractionary monetary shock. This paper evaluates the impact of higher MPLs alone by increasing the degree of frictions and keeping the demand for wholesale funding unchanged at steady state. The results are compared with an economy that has higher frictions and a baseline economy calibrated to the U.S.

Related literature. This paper contributes to the literature studying financial intermediaries in macroeconomic models (Gertler and Karadi, 2011; Gertler and Kiyotaki, 2010; Bianchi and Bigio, 2022; Begenau, 2020; Jamilov and Monacelli, 2023; Jamilov, 2021; Bellifemine et al., 2022; Brunnermeier and Sannikov, 2016; Balloch and Koby, 2019; Polo, 2021; Whited et al., 2022; Ulate, 2021; Wang, 2018). Relative to these papers, I explore the role of deposits in the transmission of monetary policy. Moreover, I quantify the impact of higher aggregate MPLs in the context of the U.S. economy.

This paper also contributes to the literature that studies the bank lending channel (Drechsler et al., 2017; Kashyap and Stein, 1995, 2000; Kishan and Opiela, 2000; Williams, 2020; Stein, 1998). Relative to these papers, I study the deposits channel in a general equilibrium model and explore the implications of increasing the importance of deposits for the transmission of monetary policy.

Outline. The remainder of this paper proceeds as follows. Section 2 presents the model. Section 3 presents the calibration and results. Section 4 concludes.

2 The Model

This section develops a general equilibrium model with a representative bank that faces frictions to substitute deposits with wholesale funding to study the role of the marginal propensity to consume in the transmission of monetary policy. The core framework is a standard New Keynesian DSGE model developed by Christiano et al. (2005) and Smets and Wouters (2007). To this, I add banks that collect deposits from patient households, demand wholesale funding from impatient households subject to a quadratic cost, and provide loans to firms that produce intermediate goods. There are six types of agents: impatient households, patient households, banks, intermediate goods producers, capital producers, and retailers. In addition, there is a Central Bank that conducts monetary policy.

Financial frictions expose bank lending to idiosyncratic deposit shocks, which amplify the impact of monetary policy on macroeconomic aggregates.

2.1 Banks

There is a continuum of banks, indexed by j. Banks invest in liquid assets B subject to a liquidity constraint $B_j \geq \bar{B}$, supply loans L_j, collect deposits D_j and use wholesale funding F_j subject to a quadratic cost $\frac{\phi}{2P}F_j^2$, where P is the price level so that the spread on wholesale funding is linearly increasing in the real amount borrowed. They earn interest rates i, i^l on liquid assets and loans, respectively, and pay an interest rate i^d on deposits. The bank balance sheet of bank j is given by

$$B_j + L_j = D_j + F_j \tag{1}$$
$$B_j \geq \bar{B}$$

Similar to Ulate (2021), depositors and borrowers have CES preferences across banks. Each bank faces an upward-sloping deposit demand and a downward-sloping loan demand.

$$\log L_j = -\varepsilon^l \Big(\log\big(1 + i_j^l\big) - \log\big(1 + i^l\big)\Big) + \log L \tag{2}$$
$$\log D_j = \varepsilon^d \Big(\log\big(1 + i_j^d\big) - \log\big(1 + i^d\big)\Big) + \log D \tag{3}$$

Banks choose the amount of liquid assets, loans, deposits, and wholesale funding to maximize their net income.

$$\max_{B_j, L_j, D_j, F_j} iB_j + i^l_j L_j - i^d_j D_j - iF_j - \frac{\phi^f_j}{2P} F^2_j \tag{4}$$
$$\text{s.t.} \quad (1) - (3)$$

Banks set lending and deposit rates as a mark-up and a mark-down, respectively, on the policy rate and its marginal cost of wholesale funding.

$$1 + i^l_j = \left(\frac{\varepsilon^l}{\varepsilon^l - 1}\right)\left(1 + i + \phi^f_j \frac{F_j}{P}\right) \tag{5}$$
$$1 + i^d_j = \left(\frac{\varepsilon^d}{1 + \varepsilon^d}\right)\left(1 + i + \phi^f_j \frac{F_j}{P}\right) \tag{6}$$

Notice that if banks can substitute deposits with wholesale funding without cost, $\phi^f_j = 0$, lending decisions are independent of deposit decisions, which implies that idiosyncratic deposit shocks do not affect bank lending. Then, in the absence of frictions, there is no role for deposits in the monetary transmission to bank lending.

2.2 Patient Households

There is a continuum of patient households of measure one. Each household supplies labor n_t, saves in deposits D_t, and consumes c_t subject to habit formation with parameter h, similar to Christiano et al. (2005) and Smets and Wouters (2007). This type of household cannot save in government bonds nor by lending funds to banks in the form of wholesale funding. Preferences are given by

$$\mathrm{E}_0 \sum_{t=0}^{\infty} \beta^t \left(\frac{(c_t - hc_{t-1})^{1-\sigma} - 1}{1-\sigma} - \chi \frac{n_t^{1+\frac{1}{\eta}}}{1+\frac{1}{\eta}} \right) \tag{7}$$

with $0 < \beta < 1$, $0 < h < 1$, and $\sigma, \chi, \eta > 0$. They earn an interest rate i^d on deposits, W_t is the nominal wage, Π_t are net payouts to the household from ownership of financial and non-financial firms, and T_t are nominal lump-sum taxes. Then, the budget constraint of this type of household is given by

$$P_t c_t + D_t = W_t n_t + \Pi_t - T_t + (1 + i^d_{t-1}) D_{t-1} \tag{8}$$

The marginal utility of consumption is ϱ_t, and the optimality conditions for consumption and labor are given by

$$\varrho_t = (c_t - hc_{t-1})^{-\sigma} - \beta h \mathrm{E}_t (c_t - hc_{t-1})^{-\sigma} \tag{9}$$

$$1 = \mathrm{E}_t \Big(\beta \frac{\varrho_{t+1}}{\varrho_t} (1 + i^d_t) \frac{P_t}{P_{t+1}} \Big) \tag{10}$$

$$\chi n_t^{\frac{1}{\eta}} = \varrho_t \frac{W_t}{P_t} \tag{11}$$

2.3 Impatient Households

There is a continuum of impatient households of measure one. They have a lower discount factor, i.e. $\beta_u < \beta$, and save by lending funds to banks in the form of wholesale funding $F_{u,t}$ and by lending funds to the government in the form of bonds $B_{u,t}$. In both cases, they earn an interest rate i_t, which is the nominal rate on bonds issued by the government and it is set by the Central Bank. This type of household supplies labor $n_{u,t}$, and consumes $c_{u,t}$. Preferences are given by

$$\mathrm{E}_0 \sum_{t=0}^{\infty} \beta_u^t \left(\frac{(c_{u,t})^{1-\sigma_u} - 1}{1-\sigma_u} - \chi \frac{n_{u,t}^{1+\frac{1}{\eta}}}{1+\frac{1}{\eta}} \right) \tag{12}$$

with $0 < \beta_u < 1$, and $\sigma_u, \chi, \eta > 0$. They earn an interest rate i on bonds and wholesale funding, and W_t is the nominal wage. Then, the budget constraint of this type of household is given by

$$P_t c_{u,t} + F_{u,t} + B_{u,t} = W_t n_{u,t} + (1 + i_{t-1})(B_{u,t-1} + F_{u,t-1}) \tag{13}$$

The optimality conditions for consumption and labor are the following:

$$1 = \mathrm{E}_t \Big(\beta_u \Big(\frac{c_{u,t}}{c_{u,t+1}} \Big)^{\sigma_u} (1 + i_t) \frac{P_t}{P_{t+1}} \Big) \tag{14}$$

$$\chi n_{u,t}^{\frac{1}{\eta}} = \frac{W_t}{P_t} \Big(\frac{1}{c_{u,t}} \Big)^{\sigma_u} \tag{15}$$

2.4 Intermediate goods firms

On the production side of the economy, competitive nonfinancial firms produce intermediate goods, which are sold to retail firms. At the end of period $t-1$, an intermediate goods producer borrows funds from banks to invest in capital k_t and use labor $n_t + n_{u,t}$ and capital to produce output y_t^m. The production function is given by

$$y_t^m = a_t k_t^{\alpha} (n_t + n_{u,t})^{1-\alpha} \tag{16}$$

where a_t denotes total factor productivity. Let P_t^m be the price of intermediate goods output. Then, the firm chooses labor to maximize nominal profits

$$\Pi_t^m = P_t^m y_t^m - W_t(n_t + n_{u,t}) - Z_t k_t \tag{17}$$

where firms pay a dividend of Z_t to each unit of capital borrowed from banks. The optimality condition for labor is

$$(1-\alpha)\frac{P_t^m}{P_t}\frac{y_t^m}{n_t + n_{u,t}} = \frac{W_t}{P_t} \tag{18}$$

The dividend Z_t is such that nominal profits are equal to zero.

$$Z_t = P_t^m \alpha \frac{y_t^m}{k_t} \tag{19}$$

Then, similar to Gertler and Karadi (2011) and Ulate (2021), the nominal return on loans for banks is

$$1 + i_t^l = \frac{P_t}{P_{t-1}} \frac{\frac{Q_t}{P_t}(1-\delta) + \frac{P_t^m}{P_t}\alpha\frac{y_t^m}{k_t}}{\frac{Q_{t-1}}{P_{t-1}}} \tag{20}$$

2.5 Capital producing firms

Capital producers are competitive and buy capital from intermediate goods producers and build new capital. There are flow adjustment costs $f(.)$ to produce new capital. The value of a unit of new capital is Q_t. Let I_t be investment, then the evolution of capital is

$$k_{t+1} = (1-\delta)k_{t-1} + I_t \tag{21}$$

Discounted real profits from capital producers are given by

$$\mathrm{E}_t \sum_{\tau=t}^{\infty} \beta^{\tau-t} \Lambda_{t,\tau} \left[\left(\frac{Q_\tau}{P_\tau} - 1 \right) I_\tau - f\left(\frac{I_\tau}{I_{\tau-1}} \right) I_\tau \right] \tag{22}$$

where $\Lambda_{t,\tau}$ is the patient household's stochastic discount factor between periods t and τ. Following Christiano et al. (2005) and Gertler and Karadi (2011), the adjustment cost function satisfies $f(1) = f'(1) = 0$ and $f''(1) > 0$. Then, the optimal condition for investment is given by

$$\frac{Q_t}{P_t} = 1 + f\Big(\frac{I_t}{I_{t-1}}\Big) + f'\Big(\frac{I_t}{I_{t-1}}\Big)\Big(\frac{I_t}{I_{t-1}}\Big) - \mathrm{E}_t \beta \frac{\varrho_{t+1}}{\varrho_t} f'\Big(\frac{I_{t+1}}{I_t}\Big)\Big(\frac{I_{t+1}}{I_t}\Big)^2 \tag{23}$$

2.6 Retail firms

Following Gertler and Karadi (2011) and Ulate (2021), there is a continuum of retail firms of measure one. They use one unit of intermediate goods and transform them into one unit of a differentiated variety of retail good without an additional cost. Final output Y_t is a CES aggregate of retail goods.

$$y_t = \left(\int_0^1 y_t(s)^{\frac{\theta-1}{\theta}} ds \right)^{\frac{\theta}{\theta-1}} \tag{24}$$

where $y_t(s)$ is output by retailer s. The demand for a variety and the price index are given by

$$y_t(s) = \left(\frac{P_t(s)}{P_t}\right)^{-\theta} y_t \tag{25}$$

$$P_t = \left(\int_0^1 P_t(s)^{1-\theta} ds\right)^{\frac{1}{1-\theta}} \tag{26}$$

Each firm can adjust its price with probability $1-\gamma$. Then, the pricing problem of each firm s is to choose the optimal reset price $P_t^*(s)$ to solve:

$$\max \mathrm{E}_t \sum_{\tau=0}^{\infty} \gamma^\tau \beta^\tau \Lambda_{t,t+\tau} \frac{P_t}{P_{t+\tau}} \left[P_t^*(s) - P_{t+\tau}^m\right] y_{t+\tau}(s) \tag{27}$$

The optimal reset price is given by the following system of equations

$$\theta \Gamma_t^1 = (\theta - 1)\Gamma_t^2 \tag{28}$$

$$\Gamma_t^1 = \varrho_t \frac{P_t^m}{P_t} y_t + \gamma\beta \mathrm{E}_t \Big(\frac{P_t}{P_{t+1}}\Big)^{-\theta} \Gamma_{t+1}^1 \tag{29}$$

$$\Gamma_t^2 = \varrho_t \frac{P_t^*}{P_t} y_t + \gamma\beta \mathrm{E}_t \frac{P_t^*}{P_{t+1}^*} \Big(\frac{P_t}{P_{t+1}}\Big)^{-\theta} \Gamma_{t+1}^2 \tag{30}$$

The evolution of the aggregate price in the economy is given by

$$1 = (1-\gamma)\Big(\frac{P_t^*}{P_t}\Big)^{1-\theta} + \gamma\Big(\frac{P_{t-1}}{P_t}\Big)^{1-\theta} \tag{31}$$

The relation between the final output and intermediate output is

$$y_t^m = y_t v_t^p \tag{32}$$

The dispersion of prices is given by

$$v_t^p = \gamma\left(\frac{P_{t-1}}{P_t}\right)^{-\theta} v_{t-1}^p + (1-\gamma)\left(\frac{P_t^*}{P_t}\right)^{-\theta} \tag{33}$$

2.7 Monetary Policy

The Central Bank sets the interest rate on government bonds i_t and follows a Taylor Rule with interest rate smoothing.

$$i_t = (1-\rho_i)(\bar{i} + \psi_\pi \pi_t) + \rho_i i_{t-1} + \varepsilon_t^{mp} \tag{34}$$

where $\bar{i}$ is the steady state nominal interest rate, $\rho_i \in [0,1]$, and ε_t^{mp} is a monetary policy shock.

2.8 Resource Constraint

Output is divided between consumption, investment, adjustment costs to capital, and the quadratic cost to use wholesale funding. Then, the aggregate economy resource constraint is given by

$$y_t = c_t + c_{u,t} + I_t + f\left(\frac{I_t}{I_{t-1}}\right) I_t + \frac{\phi}{2}\left(\frac{F_{t-1}}{P_{t-1}}\right)^2 \frac{1}{1+\pi_t} \tag{35}$$

In equilibrium, total loans are equal to the total value of capital in the economy.

$$L_t = Q_t k_{t+1} \tag{36}$$

Also, the wholesale market clears, and $B_{u,t} = 0$.

$$F_t = F_{u,t} \tag{37}$$

3 Model Results

In this section, I calibrate the model and study the role of MPLs in the transmission of monetary policy to macroeconomic aggregates.

3.1 Calibration

I use data from US banks to calibrate the banking side of the model. The degree of financial frictions ϕ^f is calibrated using an estimate of the average MPL elasticity from Fernández Rojas (2024), which implies a pass-through from changes in wholesale funding to the lending rate of 0.02. Another important parameter is the inverse of the IES for impatient households, which is set to target the aggregate response of wholesale funding to changes in the policy rate, consistent with Drechsler et al. (2017). Given the degree of financial frictions, it is possible to recover deposit and loan demand elasticities using lending and deposit rates. The liquidity requirement is set to match a liquidity to deposits ratio of 45%, consistent with the data. The rest of parameters are from Ulate (2021) and Gertler and Karadi (2011).

Table 1: Calibrated parameters

Parameter	Value	Description	Target or source
ϕ^f	0.0045/4	Sensitivity of MC to w	Response of Δi^l to $\Delta F = 0.02$
ε^l	42*4	Loan demand elasticity	Loan spread=4.4%
ε^d	32*4	Deposit demand elasticity	Deposit spread=1.1%
$\overline{B}$	6.32	Liquidity requirement	Ratio Liquidity/Deposits=0.45
β	0.9925	Discount factor - PH	Deposit spread = 1.1%
β	0.99	Discount factor - IH	Policy rate of 4% annual
σ_u	1/20	Inverse of the I.E.S. - IH	Response of F to i = 5% annual
σ	1	Inverse of the I.E.S. - PH	Ulate (2021)
hh	0.815	Habit parameter	Gertler and Karadi (2011)
χ	3.409	Relative utility weight of labor	Gertler and Karadi (2011)
η	1	Frisch elasticity of labor supply	Ulate (2021)
α	0.333	Capital share	Ulate (2021)
δ	0.025	Depreciation rate	Ulate (2021)
η_I	1.728	Elasticity of q to investment	Ulate (2021)
γ	0.75	Prob. of not changing prices	Ulate (2021)
θ	6	Elasticity of substitution	Ulate (2021)
ψ_π	3.5	Taylor rule - Inflation coefficient	Ulate (2021)
ρ_i	0.8	Taylor rule - Smoothing parameter	Ulate (2021)

3.2 The role of MPLs

In this section, I compare three economies to study the role of MPLs in the transmission of monetary policy to real variables. The first economy is the baseline economy, with parameters calibrated according to Table 1. The second economy faces a high degree of financial frictions, i.e. high ϕ^f, but the rest of the parameters are identical to the baseline economy. The third economy faces a high degree of financial frictions, identical to the second economy but the amount borrowed from wholesale markets is identical to the baseline economy at steady state. In this case, I include a linear component in the cost of wholesale funding, κ, so that the amount borrowed at steady state is identical to the baseline economy. The rest of the parameters are identical to the baseline economy.

A key difference between the second and third economies is the sensitivity of the marginal cost of wholesale funding to changes in the policy rate. Although, at the steady state, the marginal cost of wholesale funding is identical across the three economies, its responsiveness to changes in the policy rate is higher only in the third economy. This differential sensitivity implies that the pass-through from the policy rate to the lending rate remains nearly equivalent in both the baseline and the second economies, while it becomes significantly stronger in the third economy. Lending and deposit rates are given by

$$1 + i^l = \left(\frac{\varepsilon^l}{\varepsilon^l - 1}\right)\left(1 + i + \phi^f \frac{F}{P} + \kappa\right) \tag{38}$$

$$1 + i^d = \left(\frac{\varepsilon^d}{1 + \varepsilon^d}\right)\left(1 + i + \phi^f \frac{F}{P} + \kappa\right) \tag{39}$$

In the baseline economy, the parameters are given by $\phi^f = 0.0011$ and $\kappa = 0$. In the second economy, $\phi^f = 0.0112$ and $\kappa = 0$, whereas in the third economy $\phi^f = 0.0112$ and $\kappa = -0.0489$, where κ is calibrated such that wholesale funding in this economy is identical to the amount borrowed in the baseline economy at the steady state.

In the baseline economy, the marginal propensity to lend (MPL) is 0.56, with an elasticity (MPLe) of 0.68. In contrast, the second economy exhibits an MPL of 0.92 and an elasticity of 1.76, while the third economy maintains the same MPL of 0.92 but with a lower elasticity of 1.14. Figure 1 shows the response of production when the policy rate increases by 1% on impact for the three economies. Financial frictions amplify the transmission of monetary policy over medium-term horizons; however, on impact, the second economy exhibits a lower decline in output. This result stems from the fact that greater frictions reduce the reliance on wholesale funding, keeping the marginal cost of funding, denoted by $\phi_f f$, constant. Consequently, the total cost of wholesale funding is lower at the steady state. When the policy rate increases, inflation declines, raising the real cost of wholesale funding. Nevertheless, this increase is smaller in the second economy, which dampens the decline in consumption and output.

Figure 1: Elasticity of Production

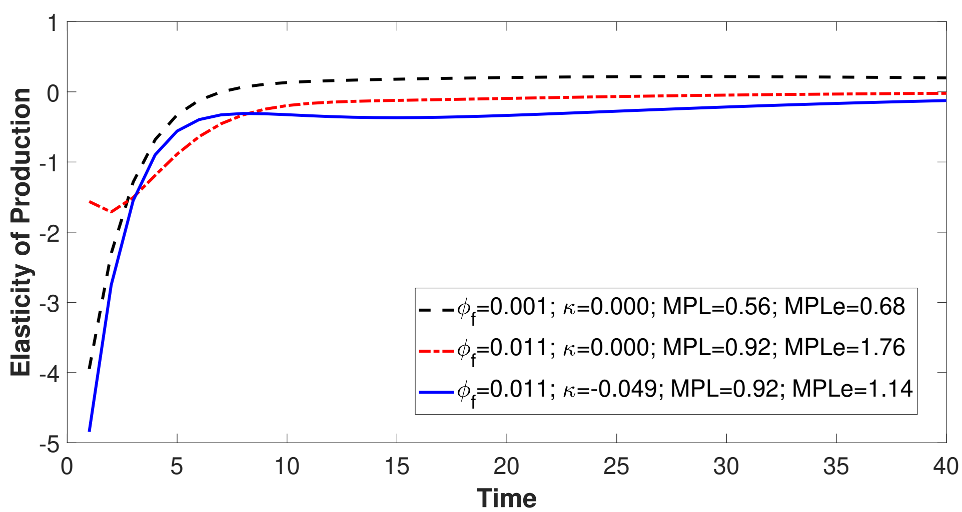
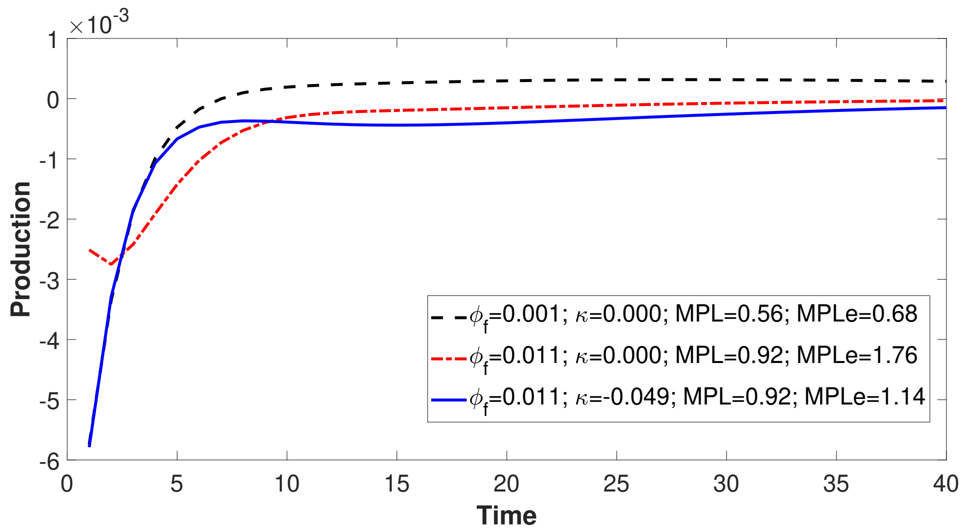


Figure 1 shows that, on impact, the third economy experiences a decline in output that is 23% larger relative to the baseline economy, whereas the second economy exhibits a reduction that is 60% smaller. These results suggest that higher financial frictions do not necessarily amplify the response of output to changes in the policy rate. Rather, the magnitude of this response depends on two key factors: (i) the real cost of wholesale funding—which falls more sharply in the second economy—and (ii) the sensitivity of this cost to policy rate changes, which is greater in the third economy. Consequently, in the short run, economies characterized by higher marginal propensities to lend (MPLs) amplify the production response to changes in the policy rate only when the loan pass-through is sufficiently strong.

Figure 2 illustrates the dynamics of production following a monetary shock that raises the policy rate by 25 basis points. In the short run, higher financial frictions that increase MPLs do not strengthen the transmission of monetary policy to output; their amplification effect emerges only at longer horizons (after five quarters). Moreover, financial frictions that fail to increase the pass-through from the policy rate to the lending rate dampen the short-run impact of monetary policy.

Figure 2: Production



Financial frictions that increase MPLs amplify the transmission of monetary policy to bank lending. On impact, lending in the second economy declines by

11% more than in the baseline economy, while the third economy experiences a 31% larger contraction. At longer horizons, the reduction in bank lending is substantially greater in economies with a higher pass-through from the policy rate to the lending rate (see Figure 3). This occurs because a higher degree of financial frictions increases the dependence of bank lending on deposits, thereby heightening its exposure to deposit shocks. Consequently, a monetary shock that reduces aggregate deposit demand induces a larger decline in lending in economies more reliant on deposits. Moreover, banks attempt to mitigate their exposure to monetary shocks by adjusting their deposit holdings, which results in a smaller decline in deposits (see Figure 4), partially dampening the transmission to lending.

Figure 3: Bank lending

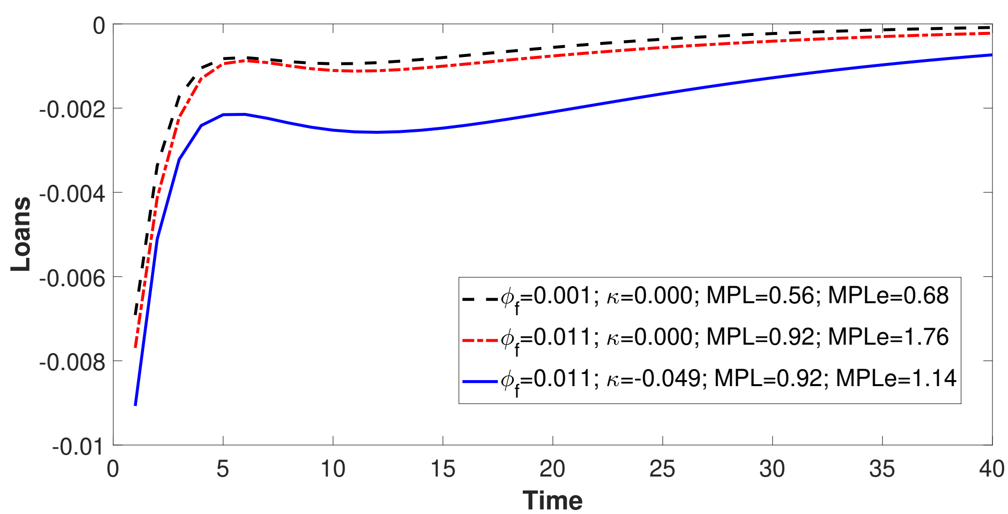
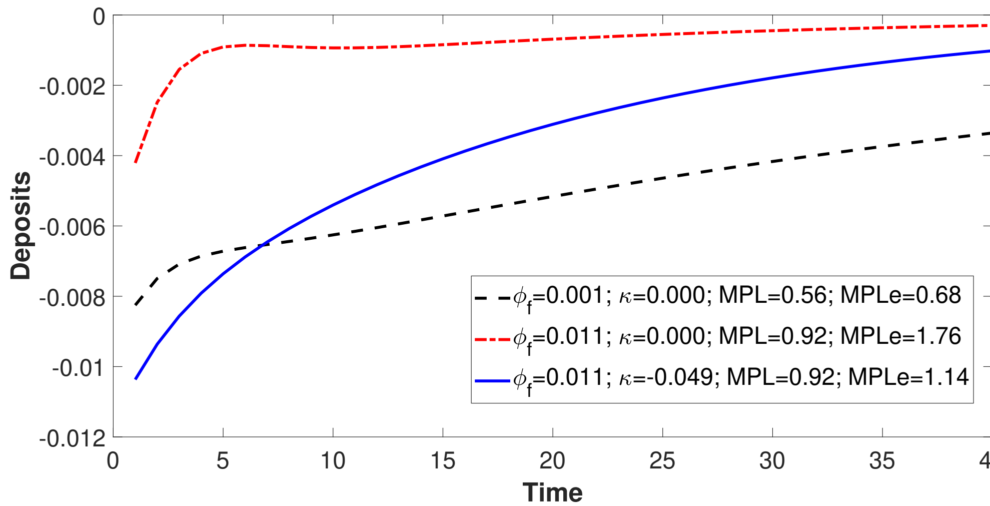


Figure 4: Deposits



Consistent with the dynamics of bank lending, financial frictions also amplify the transmission of monetary policy to real investment (see Figure 5). On impact, the contraction in investment is 16% greater in the second economy and 54% greater in the third. These results suggest that economies with high MPLs exhibit stronger propagation of monetary policy shocks through bank lending, capital accumulation, and investment. Moreover, when the elasticity of marginal cost with respect to financial conditions is higher, the degree of amplification becomes even more pronounced. Consistent with Drechsler et al. (2017), wholesale funding increases following a rise in the policy rate (see Figure 6). However, a higher degree of financial frictions attenuates this response, particularly in the third economy, where the greater sensitivity of marginal cost reduces the demand for wholesale funding. This dampening effect reflects the interaction between funding structure and cost elasticity, which constrains banks' ability to substitute toward wholesale sources under tighter monetary conditions.

Figure 5: Investment

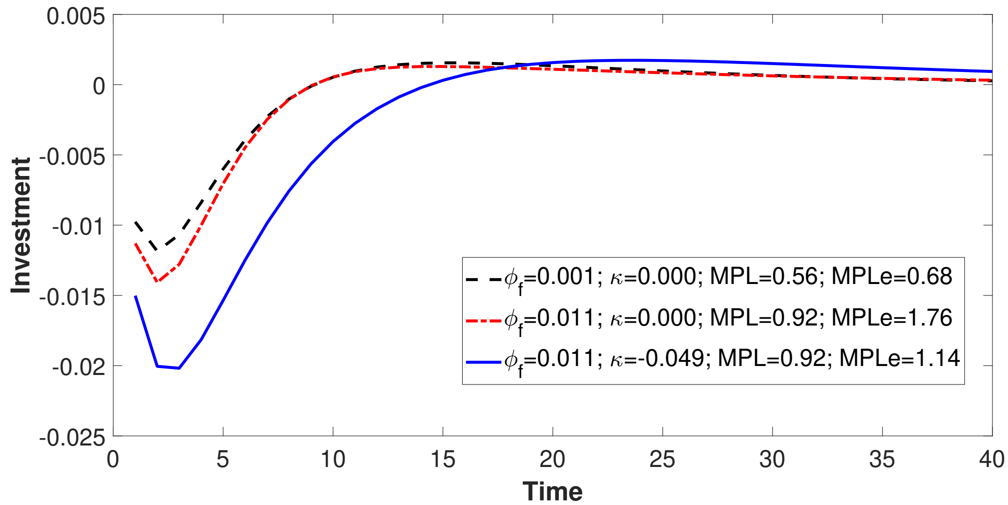


Figure 6: Wholesale funding

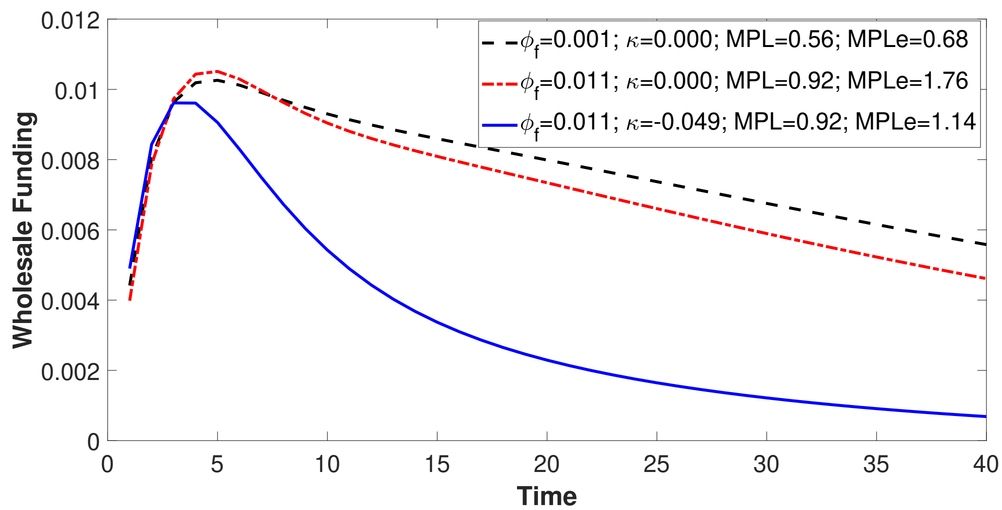


Figure 7 presents the response of the lending rate to a monetary policy shock, normalized by the initial change in the policy rate, which I define as the loan pass-through. The pass-through is nearly identical in the baseline and second economies, but significantly higher in the third. This divergence reflects differences in funding cost structures: in the second economy, higher financial frictions reduce the demand for wholesale funding, leaving both its marginal cost and sensitivity to shocks essentially unchanged relative to the baseline at steady state. In contrast, the third economy exhibits a greater sensitivity of wholesale funding costs to the policy rate, which amplifies the response of the lending rate to changes in the policy rate.

Figure 7: Loan pass-through

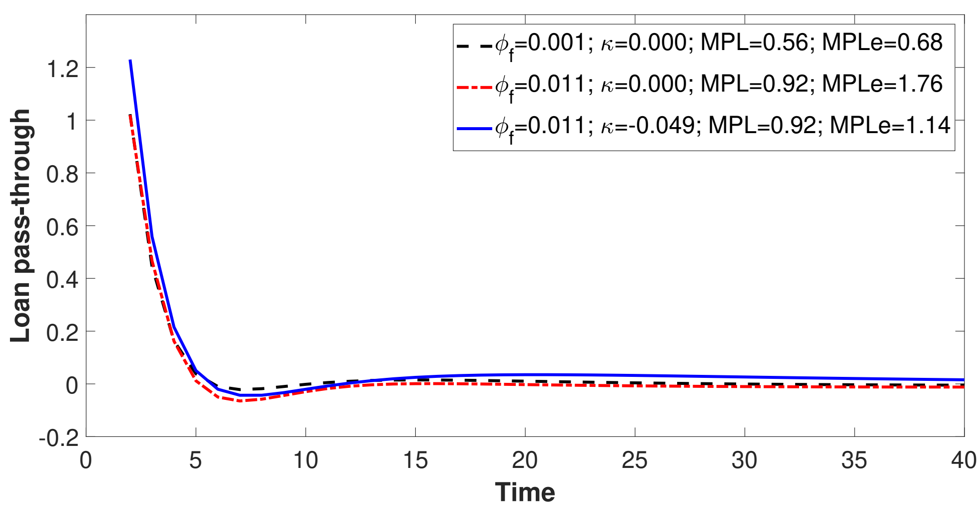
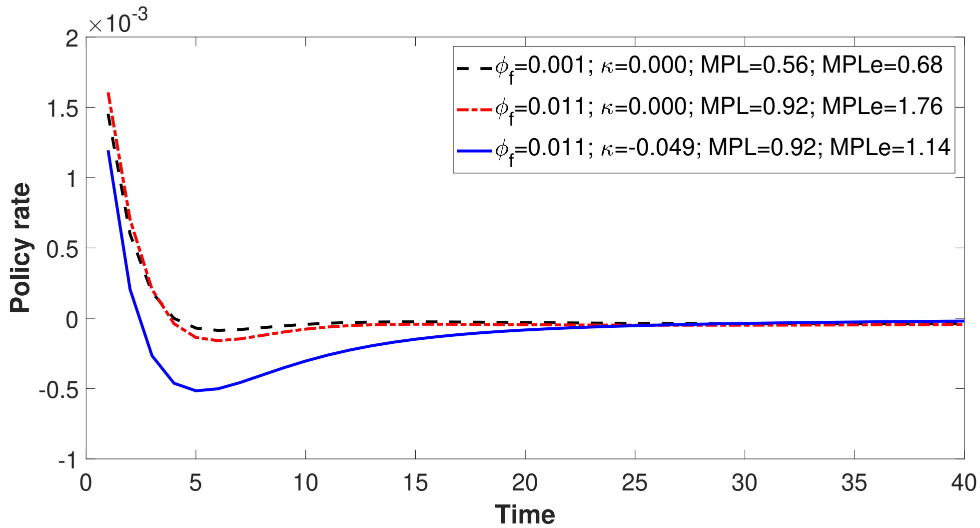


Figure 8: Policy rate



Monetary policy plays a central role in stabilizing the economy, as the central bank adjusts its policy rate to maintain inflation on target. Following a contractionary monetary shock, the central bank reacts less aggressively to prevent excessive declines in real activity in economies with high MPLs (see Figure 8). On impact, the policy rate rises 18% less in the economy with more sensitive marginal costs, whereas it increases 10% more in the second economy. This difference reflects the fact that financial frictions dampen the immediate transmission of monetary policy in the second economy, while amplifying the transmission of monetary policy in the third economy. However, at longer horizons, the policy rate in both economies declines as amplification effects materialize.

4 Conclusion

This paper studies the role of the marginal propensity to lend, out of deposit shocks, in the transmission of monetary policy to macroeconomic aggregates in a general equilibrium model. The main finding of the paper is that higher financial frictions that increase the aggregate MPL by 66% amplify the transmission of monetary policy to bank lending and investment, on impact, by 11% and 16%, respectively. Moreover, if the sensitivity of the marginal cost of wholesale funding to the policy rate also increases, the loan pass-through increases by 20%, which amplifies the response of bank lending and investment by 31% and 54%, respectively.

Financial frictions that increase the role of deposits for banks do not amplify the transmission of monetary policy to production in the short run. However, they do amplify the response of production to monetary shocks at longer horizons due to the decline in investment. The amplification of monetary shocks is larger in economies with a high sensitivity of their marginal costs. On impact, the response of total production after a 1% increase in the policy rate is amplified by 23% in economies with 66% higher MPL and a 20% higher loan pass-through. However, the central bank reduces its policy rate so that the response of production is identical to that of the baseline economy in the short run.

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