When Shadow Banking Helps and Hurts: Entrusted Lending and Capital Allocation

Binkai Chen Qi Sun Junjie Xia*

Abstract

Shadow banking can redirect credit toward constrained firms while changing how a credit expansion is allocated. We study this tradeoff through entrusted lending in China, combining linked bank and entrusted-loan records with a quantitative model. We first document that entrusted borrowers pay higher bank loan rates than their matched lenders, and entrusted contracts carry a rate premium over ordinary bank loans. Around the 2009 credit expansion, an amount-based regression finds relatively more bank lending to state-owned firms; lender credit exposure is positively associated with entrusted lending in a small matched sample. Motivated by these patterns, we construct a model in which firms with favorable bank access choose between productive capital and loans to constrained firms. Entrusted lending lowers stationary log-return dispersion from 0.438 to 0.379. With a 16% increase in bank-credit supply under an illustrative lending-rate floor, dispersion rises to 0.430 even as re-lending expands. Corporate loans redirect part of the new bank funding toward constrained firms, while differences in financing terms and net worth produce uneven capital growth. The distinction between initial bank loans, net financing after corporate transfers, and productive capital informs how credit programs are evaluated.

JEL codes: E44, E52, G21, O16.

Keywords: entrusted lending; shadow banking; credit allocation; monetary transmission; financial frictions.

*Binkai Chen: Central University of Finance and Economics (chenbinkai@cufe.edu.cn). Qi Sun: Shanghai University of Finance and Economics (sunqi@sufe.edu.cn). Junjie Xia (corresponding author): Central University of Finance and Economics and Peking University (junjiexia@nsd.pku.edu.cn). We thank Wukuang Cun, Feng Dong, Shenzhe Jiang, Dirk Krueger, Vincenzo Quadrini, Pengfei Wang, Chunzan Wu, Kairong Xiao, Changhua Yu, and seminar and conference participants for helpful comments. Binkai Chen acknowledges support from the National Natural Science Foundation of China (72595873; 72342031). Junjie Xia acknowledges support from the National Natural Science Foundation of China (72473172) and the Major Program of the National Social Science Foundation of China (24ZDA057). All errors are ours.

1 Introduction

When firms differ in access to banks, the initial recipients of bank loans can invest the funds in production or lend them to other firms. The destination of new credit, and ultimately of productive capital, depends on direct bank lending, subsequent corporate lending, and firms' own net worth. This paper studies these choices through entrusted lending in China, a form of corporate lending arranged through a trustee bank in which the corporate lender conventionally bears the credit risk.

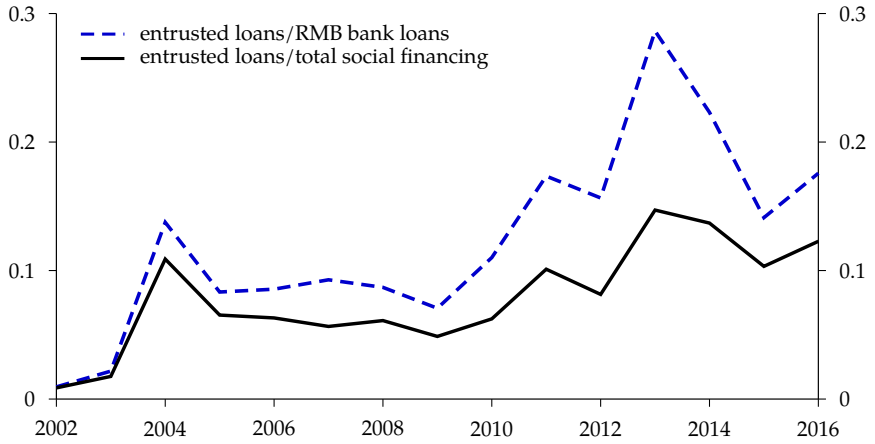
This question connects closely to monetary transmission. Chen et al. (2018) show that monetary contractions during 2009–2015 increased shadow lending, offsetting part of the decline in traditional bank credit. Chen et al. (2023) find that infrastructure investment weakened the transmission of monetary stimulus to private borrowers while reinforcing it for state-owned firms. Building on these studies, we examine how firms' re-lending decisions affect the allocation that follows an unequal initial distribution of bank credit. Our analysis starts from differences in formal financing conditions and studies their implications for lenders' own capital and financing supplied to other firms.

Entrusted lending was a substantial financing channel during the period we study. Figure 1 plots annual entrusted-lending flows relative to bank lending and total social financing over 2002–2016. Both ratios rise after 2009 and reach approximately 29% and 15% in 2013; subsequent movements include a change in the statistical definition of entrusted lending in 2015. The People's Bank of China's 2013 annual financing figures imply 28.7% and 14.7%: entrusted loans increased by RMB 2.55 trillion, renminbi loans to the real economy by RMB 8.89 trillion, and total social financing by RMB 17.29 trillion. The figure thus provides historical scale for a flow of credit that could reach firms beyond the initial bank borrowers. Entrusted lenders often have favorable access to bank finance, whereas their borrowers face more costly financing conditions. Allen et al. (2019) document this intermediation role, and Tian et al. (2024) study its benefits for borrower innovation. These findings motivate our question: how does corporate re-lending change the relationship between bank-credit allocation and productive capital when credit supply expands?

We combine linked loan records from a major Chinese commercial bank with a quantitative equilibrium model. The bank acts as both an ordinary lender and an entrusted-loan trustee, allowing us to connect both sides of an entrusted transaction to their financing from the same institution. Within matched relationships, borrowers are smaller, pay higher bank loan rates, have higher leverage, and hold less cash than their lenders. Entrusted contracts also carry a premium over ordinary bank loans. Around the 2009 credit expansion, an amount-based regression shows a relative increase in bank lending to state-owned firms; the asset-scaled estimate is imprecise. Within borrower-years, lender-side credit exposure is positively associated with entrusted lending in a small matched sample. These patterns motivate the model's two margins: the initial allocation of bank credit and firms' choices between productive capital and re-lending. The calibrated productivity ordering provides a benchmark for studying how those financing choices affect capital allocation.

In the model, firms with favorable bank access have lower mean productivity, looser borrowing limits, and subsidized bank funding. They choose between productive capital and entrusted-loan assets. Higher-productivity firms face tighter bank borrowing limits and can obtain additional entrusted

Figure 1: Entrusted lending relative to bank lending and total social financing



Notes: The dashed line divides the annual increase in entrusted loans by the annual increase in renminbi loans to the real economy; the solid line divides the same entrusted-loan increase by the annual total social financing flow. Both axes show ratios of annual flows. The People's Bank of China revised the entrusted-loan component of total social financing in 2015 to exclude cash-management entrusted loans. Sources: National Bureau of Statistics, *China Statistical Yearbook 2012*, Table 19-11; People's Bank of China, annual social-financing releases and 2016 Q4 Monetary Policy Report, Table 5.

credit subject to a separate constraint. Convex intermediation costs limit re-lending, while retained earnings change firms' future financing capacity. The model thus connects three distinct objects: the initial allocation of bank credit, net external finance after interfirm transfers, and productive capital, which also depends on accumulated net worth.

The stationary comparison shows a substantial reallocation benefit from entrusted lending. Holding structural parameters fixed, the standard deviation of log marginal returns to capital (MRPK) is 0.379 with the channel and 0.438 without it. In this calibrated economy, corporate re-lending directs finance toward constrained uses and lowers dispersion. We then consider a 16% increase in bank-credit supply, with the scale motivated by China's 2009 expansion. Under an illustrative binding lending-rate floor, overall log-MRPK dispersion rises from 0.379 to 0.430. Entrusted lending grows, yet the response of productive capital remains uneven because initial bank-credit access and firms' net worth differ. The re-lending channel thus improves the stationary allocation and narrows the initial financing disparity during an expansion, even as the capital response remains uneven. These estimates quantify dispersion in productive capital; welfare and the full effects of the historical stimulus lie beyond this exercise.

Our contribution is to quantify how the corporate re-lending option changes the mapping from bank finance to productive capital. In the model, firms with favorable bank access pass some of their resources to other firms, so the distribution of new production funding differs from the distribution of direct bank loans. Differences in net worth and borrowing constraints then shape how that funding becomes productive capital. We use bilateral financing evidence and the model's balance-sheet choices to examine these links, building on the established insight that secondary credit markets can partly offset distorted formal lending.

This distinction matters for credit policy. Tracking both direct bank lending and subsequent entrusted loans reveals the financing that reaches firms beyond the initial bank borrowers. Investment responses still depend on direct credit terms and the accumulation of net worth. The model therefore connects the regulation of corporate re-lending to the allocation of bank credit. Its reported results concern productive-capital allocation; default risk and fiscal costs call for separate analysis.

Related literature. Our paper relates to several strands of literature. The first connection is to monetary transmission through shadow banking. Chen et al. (2018) study banks' shadow-lending response and balance-sheet risk under monetary tightening, while Chen et al. (2023) examine how infrastructure investment changes the transmission of monetary stimulus across borrowers. Our focus is the subsequent allocation of credit through corporate re-lending. Chang et al. (2019) analyze differentiated financing and stabilization policy, and Liu et al. (2021) study interest-rate liberalization when other financing and incentive distortions persist. We retain these formal-credit asymmetries and assess the allocation margin created by firms' lending choices.

We also contribute to research on entrusted lending and China's dual credit system. Allen et al. (2019) examine entrusted-loan allocation, pricing, and the differences between affiliated and nonaffiliated transactions. Tian et al. (2024) study borrower innovation and interpret entrusted lending as a second-best reallocation channel. Wang et al. (2016) explicitly model credit resale from state-owned to private firms within a dual-track interest-rate system. We build on this mechanism and examine its quantitative implications when lenders choose both their own productive capital and their interfirm financial positions. The linked records provide bilateral financing evidence within a common trustee-bank network.

The third related literature is the work on financial frictions and capital misallocation. Restuccia and Rogerson (2008) and Hsieh and Klenow (2009) provide frameworks for evaluating allocation distortions, while Buera et al. (2011), Midrigan and Xu (2014), and Bai et al. (2018) examine the quantitative role of financial frictions. Bleck and Liu (2018) show how liquidity injections can overheat a sector with weaker financing frictions through feedback between credit, asset prices, and collateral. Gopinath et al. (2017) show how lower interest rates can direct capital toward firms with greater net worth even when they are less productive. We study the corporate re-lending choice within this broader problem of uneven capital expansion. David and Venkateswaran (2019) emphasize that observed return dispersion has several sources; our model quantifies a particular credit-allocation margin.

Finally, China's 2009 stimulus provides the setting and scale for the credit-supply exercise. Bai et al. (2016) study the fiscal expansion; Cong et al. (2019) document the allocation of stimulus bank credit; Chen et al. (2020) examine the subsequent financing of local governments; and Huang et al. (2020) analyze crowding out by local government debt. We complement this work by examining how corporate re-lending separates the initial recipients of bank loans from the ultimate allocation of financing to production.

Section 2 presents the institutional background and empirical evidence. Section 3 develops the model, Section 4 describes the calibration and stationary comparisons, and Section 5 reports the credit-expansion exercises. Section 6 concludes.

2 Background, Data, and Empirical Evidence

This section develops the empirical motivation for the model. Linked records of ordinary bank loans and entrusted loans let us compare the two sides of an interfirm credit relationship and study how their financing responds around a bank-credit expansion. The evidence has three parts. Entrusted borrowers and lenders differ in their balance sheets and the prices they pay for bank credit; entrusted contracts carry a premium over ordinary bank loans; and state ownership and lender-side bank-credit exposure are associated with credit quantities around the 2009 expansion. Together these patterns motivate a model in which the initial allocation of bank credit and firms' subsequent re-lending choices shape productive capital.

2.1 Institutional background and data

An entrusted loan is an interfirm loan administered by a qualified financial institution. In the conventional arrangement, the corporate lender supplies the funds and bears the credit risk, while the trustee bank records and services the contract. The arrangement enables a firm with financing capacity to lend to another firm. Entrusted loans can draw on several funding sources, particularly in later years; the contract records identify the corporate lender and borrower but do not trace each yuan to its origin. We study how the option to re-lend can redirect financing after an unequal initial distribution of bank credit.

The data come from a major Chinese commercial bank that both lends directly and serves as a trustee. We link ordinary bank-loan contracts, entrusted-loan contracts, and available firm balance sheets. The trustee records span 2002–2018 and contain 19,171 distinct borrower–lender pairs in the original descriptive sample. Appendix Table A.1 describes the entrusted-loan records. The paired comparisons, pooled contract-rate regressions, and within-borrower-year regressions use different samples according to variable coverage. Recorded bank loans cover activity at the sample bank. Firm-year sums of originated contracts are annual flows; the model instead represents bank and entrusted credit as financial positions.

The 2009 expansion offers a setting for examining how additional bank lending was distributed across firms. Observed borrowing reflects credit supply, credit demand, and concurrent policies, so these regressions provide descriptive context for the model. Appendix B describes changes in the aggregate funding composition of entrusted lending and banks' investment receivables. Financial-institution funding becomes more prominent after 2012. The corporate lending mechanism here complements the bank balance-sheet and risk-taking channel analyzed by Chen et al. (2018), with the strongest institutional match to the earlier corporate-lending period.

2.2 Financing differences within entrusted-loan relationships

Table 1 compares lenders and borrowers within observed entrusted-loan pairs. Lenders are substantially larger: the borrower-minus-lender difference in log assets is −1.61. Borrowers pay bank-loan rates about 65 basis points higher, have more leverage and less cash, and are 17.4 percentage points less likely to be state owned. The pre-access measure also differs strongly within pairs. These contrasts motivate the model's distinction between firms with more favorable bank finance and firms whose marginal funding is relatively costly.

Entrusted borrowers also use direct bank finance: their bank loans at the sample bank are 0.212 of assets, compared with 0.143 for their lenders. Their higher borrowing rate and simultaneous use of entrusted credit point to a marginal financing need that direct bank loans alone may leave unmet. Loan limits, collateral requirements, maturity, and other frictions are possible sources of that need. These comparisons characterize financing within observed relationships at the sample bank.

The original level measure of sales-based marginal revenue product of capital (MRPK) is higher for borrowers. The distribution is skewed, and the log-MRPK differences reverse sign and are statistically indistinguishable from zero, whether the numerator is sales or value added. The sales and value-added measures are available for 528 and 404 pairs, respectively. Revenue-based MRPK can also reflect prices, markups, and capital measurement. The robust pair-level pattern is therefore the financing asymmetry; the model introduces differences in productive opportunities as a calibrated feature. State ownership is an imperfect proxy for both dimensions.

[Insert Table 1 Here]

2.3 Entrusted-loan pricing

We next compare contract rates on entrusted loans and ordinary bank loans in the same bank's records. The baseline specification can be written as

$$rate_{\ell f t} = \alpha + \beta ELContract_{\ell f t} + \Gamma X_f^{pre} + \delta_t + u_{\ell f t}, \tag{1}$$

where $ELContract_{\ell f t}$ equals one for an entrusted-loan contract, X_f^{pre} denotes pre-period firm characteristics, and δ_t denotes year fixed effects. Column (2) also interacts contract type with pre-existing bank access and prior entrusted-loan borrowing. Both specifications weight contracts by their amounts and cluster standard errors by firm. Their controls differ slightly, as the table notes make explicit.

In column (1) of Table 2, entrusted contracts have rates 1.74 percentage points higher conditional on the included characteristics. The column (2) coefficient of 2.50 percentage points applies to the reference group at zero values of the interaction variables. The −0.0132 coefficient is the *main effect* of prior entrusted borrowing; the contract-type interaction is −0.000537 with a standard error of 0.00543, giving little evidence of a distinct entrusted premium for prior borrowers. The contract-by-access interaction is −0.00102 (standard error 0.000452), consistent with a smaller entrusted premium for

borrowers with stronger prior bank access in this specification. The positive contract premium is the central pricing pattern for the mechanism we quantify.

The observed premium is consistent with demand for additional credit at a higher contract price and with an incentive for firms holding lending capacity to participate in the entrusted market. Borrower risk, maturity, selection into contract types, and intermediation costs may contribute to the spread. The model represents financing incentives through wedges and a convex cost of corporate lending.

[Insert Table 2 Here]

2.4 Bank-credit allocation around the 2009 expansion

The direct bank-credit regressions examine whether firms with stronger pre-existing access or state ownership received more lending during 2009–2010. A stylized specification is

$$Y_{it} = \alpha_i + \delta_t + \beta_S(Access_i^{pre} \times Stim_t) + \beta_T(Access_i^{pre} \times Tight_t) + \Gamma X_{i,t-1} + \lambda_{s\times t} + \lambda_{r\times t} + \varepsilon_{it}, \qquad (2)$$

with ownership interactions replacing the access interactions in the SOE columns. $Stim_t$ denotes 2009–2010, $Tight_t$ denotes 2011–2013, and the richer specifications include firm, year, industry-year, and region-year fixed effects. Y_{it} is either recorded bank-loan amounts relative to assets or the inverse hyperbolic sine (IHS) of the annual amount. The amount and asset-scaled outcomes capture distinct aspects of bank-credit allocation.

Table 3 reports positive stimulus interactions for bank loans relative to assets in the displayed access specifications. The magnitude varies across sample windows and versions of the access index, and a later event-study specification detects differential pre-period movements. These estimates describe how lending covaries with prior access around the expansion and motivate the model's unequal bank-credit allocation.

The ownership columns give a more specific result relevant to the model's calibration. The SOE interaction is positive for the annual *amount* of bank lending, at 0.0462 IHS units in the displayed specification. The bank-loans-to-assets estimate is negative and imprecise. A scale channel offers one possible explanation: if SOE assets grow alongside borrowing, larger loan amounts can coexist with little change in the loan-to-assets ratio. Separate evidence on asset growth would help assess this mechanism. In the model, type A represents more favorable access to bank finance; state ownership provides an empirical comparison, while Table 1 shows that ownership varies on both sides of entrusted-loan pairs.

[Insert Table 3 Here]

The ownership result motivates asking where bank credit goes after its first allocation. The linked records allow a limited comparison of entrusted lending across lenders serving the same borrower in the same year. We estimate

$$\text{IHS}(EL_{ijt}) = \alpha_{ij} + \alpha_{jt} + \beta Shock_{it} + \Gamma Z_{i,t-1} + u_{ijt}, \qquad (3)$$

where i indexes lenders, j borrowers, α_{ij} is a pair fixed effect, and α_{jt} is a borrower-year fixed effect. The first exposure is the lender's pre-access index interacted with the stimulus and subsequent tightening windows; the second is branch-level leave-one-out bank-loan growth. The fixed effects compare changes among lenders serving the same borrower-year, while time-varying lender choices and matching can still shape the estimated associations.

Table 4 reports positive lender-exposure coefficients in this restricted design. The first column uses 32 pair-year observations, and the branch-growth column uses 43, so these estimates offer suggestive evidence from a small matched sample. The access coefficient is also positive in the subsequent tightening window, consistent with a persistent role for lender access across periods. The coefficients measure IHS associations between lender exposure and entrusted amounts; the share of bank funds transferred through entrusted lending remains unmeasured. The SOE credit result above and this within-borrower-year comparison capture complementary margins of the model's financing mechanism.

[Insert Table 4 Here]

The evidence thus supplies three distinct ingredients for the quantitative exercise. Pair comparisons document cheaper bank finance and greater balance-sheet capacity on the lender side; direct-loan regressions show an ownership-related amount difference around the expansion in one specification; and the matched regressions show a positive lender-credit association with entrusted amounts in a small sample. Combining these observations makes corporate re-lending a relevant allocation margin. The model brings these margins together to quantify how the option to lend changes investment and the distribution of capital when bank-credit supply rises.

3 The Model

The economy contains two types of firms. Type A has privileged access to bank credit; type B has more limited access and higher mean productivity. The types index financing access, with ownership supplying their quantitative counterpart. Their masses are γ and one, respectively, and the population of each type is fixed. Both types produce the same good, whose price is normalized to one. Bank-credit supply and labor supply are exogenous; bank and entrusted-loan rates and the wage adjust to clear the corresponding markets.

The model takes preferential bank access as given. The interest-rate wedge and collateral parameters summarize differences in guarantees, pledgeability, and credit rationing. The term "subsidy" denotes this reduced-form funding advantage. The exercise studies how corporate re-lending changes the allocation consequences of that advantage.

3.1 Privileged-access firms

A type-A firm produces

$$y_{it} = z_{it}(K_{it}^{1-\alpha} L_{it}^{\alpha})^{\eta}, \tag{4}$$

where z_{it} is idiosyncratic productivity, K_{it} is capital, L_{it} is labor, $0 < \alpha < 1$, and $0 < \eta < 1$. The parameter α is labor's exponent within the capital-labor composite; the output elasticity of labor is $\alpha\eta$. Decreasing returns limit firm scale.

The firm borrows from banks at $r_{st} = (1 - \tau)r_{mt}$, where r_{mt} is the unsubsidized bank rate and τ captures preferential financing. Its borrowing satisfies $B_{it} \leq \theta_1 K_{it}$. It may also extend entrusted loans $F_{it} \geq 0$ at rate r_{ft}. Its balance-sheet identity is

$$A_{it} = K_{it} + F_{it} - B_{it}, \tag{5}$$

where A_{it} is net worth. Thus entrusted loans are assets of type-A firms and liabilities of their borrowers.

Following the timing convention used in models such as Buera et al. (2011) and Midrigan and Xu (2014), net worth is predetermined, and the firm chooses current capital and financial positions after observing productivity. Capital can therefore be reallocated within the period. The individual state is (A_{it}, z_{it}), and capital-holding costs apply to the chosen stock in each period.

Given net worth and productivity, the firm first chooses capital, labor, and entrusted lending:

$$\Pi_{it}(A_{it}, z_{it}) = \max_{K_{it}, L_{it}, F_{it} \geq 0} \quad y_{it} - w_t L_{it} - (r_{st} + \delta)K_{it} + (r_{ft} - r_{st})F_{it} - \chi(F_{it}) - \phi(K_{it}) \tag{6}$$

$$\text{subject to} \quad K_{it} \leq \frac{A_{it} - F_{it}}{1 - \theta_1}. \tag{7}$$

Bank borrowing has been substituted out using (5). The parameter δ is depreciation. The convex function χ captures the resource costs of providing entrusted credit, including intermediation and agency costs in reduced form. The function ϕ is a static cost of holding capital. Functional forms are specified in Section 4.

The firm then chooses dividends and next-period net worth:

$$V_A(A_{it}, z_{it}) = \max_{D_{it}, A_{i,t+1}} \left\{ D_{it} + \beta_1 \mathbb{E}_t[V_A(A_{i,t+1}, z_{i,t+1})] \right\}, \tag{8}$$

$$\varphi(D_{it}) + A_{i,t+1} = \Pi_{it}(A_{it}, z_{it}) + (1 + r_{st})A_{it}. \tag{9}$$

Negative dividends denote equity issuance. The convex function φ affects positive distributions as well as external equity finance and summarizes both margins as a reduced-form financing friction.

Let $\mu_{it} \geq 0$ be the multiplier on (7), written in the displayed normalization. For positive bank borrowing, positive entrusted lending, and interior capital and labor choices, the first-order conditions are

$$\frac{1}{\varphi'(D_{it})} = \beta_1 \mathbb{E}_t \left[\frac{1 + r_{s,t+1} + \mu_{i,t+1}/(1-\theta_1)}{\varphi'(D_{i,t+1})} \right], \tag{10}$$

$$r_{ft} = r_{st} + \frac{\mu_{it}}{1-\theta_1} + \chi'(F_{it}), \tag{11}$$

$$\frac{\partial y_{it}}{\partial K_{it}} = r_{st} + \delta + \mu_{it} + \phi'(K_{it}), \tag{12}$$

$$\frac{\partial y_{it}}{\partial L_{it}} = w_t. \tag{13}$$

These conditions apply where $\varphi' > 0$; corner choices require the corresponding inequalities. The entrusted-loan rate compensates the lender for its bank funding cost, the shadow cost of borrowing capacity, and the marginal cost of intermediation. Capital also provides collateral, so its effective user cost differs from the marginal cost of extending an entrusted loan. Changes in the bank rate, entrusted-loan rate, and constraint multipliers jointly govern the response of re-lending to cheaper bank credit.

The choice between K_{it} and F_{it} is the first allocation margin in the paper. An additional unit of bank borrowing can support the firm's own production or an entrusted asset, subject to the balance sheet and the same bank-credit limit. The rising marginal intermediation cost $\chi'(F)$ shapes how the firm divides additional financing between these uses. The quantitative exercise tracks the initial bank borrower, the entrusted transfer, and the resulting allocation of productive capital.

3.2 Constrained firms

Type-B firms have the same production function as type A, with a different productivity distribution. They borrow from banks at r_{mt} and face a tighter limit, $B_{jt} \leq \theta_2 K_{jt}$, where $0 \leq \theta_2 < \theta_1 < 1$. They can also borrow entrusted funds subject to $F_{jt} \leq \zeta K_{jt}$. Their balance sheet is

$$A_{jt} = K_{jt} - B_{jt} - F_{jt}. \tag{14}$$

The parameters θ_2 and ζ describe access through two lending relationships. In the calibration, $\theta_2 + \zeta < 1$, so the combined limits leave a positive equity requirement. The constraints summarize borrowing capacity across those relationships.

Using (14) to eliminate bank borrowing, the static problem is

$$\Pi_{jt}(A_{jt}, z_{jt}) = \max_{K_{jt}, L_{jt}, F_{jt} \geq 0} \quad y_{jt} - w_t L_{jt} - (r_{mt} + \delta) K_{jt} - (r_{ft} - r_{mt}) F_{jt} - \phi(K_{jt}) \tag{15}$$

$$\text{subject to} \quad K_{jt} \leq \frac{A_{jt} + F_{jt}}{1 - \theta_2}, \tag{16}$$

$$F_{jt} \leq \zeta K_{jt}. \tag{17}$$

Its dividend and saving problem is

$$V_B(A_{jt}, z_{jt}) = \max_{D_{jt}, A_{j,t+1}} \left\{ D_{jt} + \beta_2 \mathbb{E}_t [V_B(A_{j,t+1}, z_{j,t+1})] \right\}, \tag{18}$$

$$\varphi(D_{jt}) + A_{j,t+1} = \Pi_{jt}(A_{jt}, z_{jt}) + (1 + r_{mt}) A_{jt}. \tag{19}$$

This expression uses the bank rate as the accounting reference rate in both the profit function and the net-worth recursion. Using the entrusted-loan rate in both places gives the same total resources after imposing the balance-sheet identity.

Let μ_{jt} and ξ_{jt} be the nonnegative multipliers on (16) and (17). For positive bank and entrusted borrowing and interior capital and labor choices,

$$\frac{1}{\varphi'(D_{jt})} = \beta_2 \mathbb{E}_t \left[\frac{1 + r_{m,t+1} + \mu_{j,t+1}/(1 - \theta_2)}{\varphi'(D_{j,t+1})} \right], \tag{20}$$

$$r_{ft} = r_{mt} + \frac{\mu_{jt}}{1 - \theta_2} - \xi_{jt}, \tag{21}$$

$$\frac{\partial y_{jt}}{\partial K_{jt}} = r_{mt} + \delta + \mu_{jt} - \zeta \xi_{jt} + \phi'(K_{jt}), \tag{22}$$

$$\frac{\partial y_{jt}}{\partial L_{jt}} = w_t. \tag{23}$$

The bank-credit constraint raises the value of additional entrusted funds. When the entrusted-loan limit binds, its multiplier enters the borrowing condition and capital's collateral value. The term $-\zeta \xi_{jt}$ in (22) reflects the fact that more capital relaxes that limit. These conditions also explain why entrusted-loan rates can substantially exceed bank rates.

For type B, entrusted borrowing relaxes a tight bank limit and supports additional productive capital. The resulting capital response depends on the entrusted-loan rate r_f, both collateral multipliers, and type-B net worth. This is the second allocation margin. A credit expansion can therefore increase re-lending to type B while still producing faster capital growth at the initially advantaged type A.

3.3 Equilibrium

Let $G_{A,t}$ and $G_{B,t}$ be the probability distributions of net worth and productivity within the two types. Market clearing requires

$$\gamma \int B_{it}\, dG_{A,t} + \int B_{jt}\, dG_{B,t} = \bar{B}_t, \tag{24}$$

$$\gamma \int L_{it}\, dG_{A,t} + \int L_{jt}\, dG_{B,t} = \bar{L}_t, \tag{25}$$

$$\gamma \int F_{it}\, dG_{A,t} = \int F_{jt}\, dG_{B,t}. \tag{26}$$

Bank-credit supply $\bar{B}_t$ and labor supply $\bar{L}_t$ are given. Prices (r_{mt}, r_{ft}, w_t) and the subsidy rule determine firms' choices, and their saving policies and productivity transitions determine the evolution of the distributions. A stationary equilibrium consists of optimal policies, market-clearing prices, and invariant distributions. In the lending-rate-floor experiment, the bank-credit equality is replaced by an inequality when the floor binds, and the difference is unused credit supply. This experiment is described in Section 5.

The bank-credit and entrusted-credit conditions jointly determine the final allocation. Entrusted lending redistributes financing from a fixed aggregate supply of bank funds. A binding lending-rate floor can leave some offered credit unused, creating a gap between offered credit and outstanding loans. Both margins shape the credit-supply experiment.

3.4 Capital reallocation and the response to credit supply

The following two propositions organize the mechanism: a local gain from moving capital toward a higher-return use and the return-gap response to unequal capital growth. Proofs are in Appendix E.

Proposition 1 (Local capital reallocation)**.** *Consider one firm of each type, holding productivity and labor fixed, with $MRPK_B > MRPK_A$. A feasible marginal transfer of productive capital from A to B, holding their combined capital fixed, raises their combined gross output and narrows their MRPK gap. This statement applies locally, before the gap changes sign, and excludes any additional intermediation costs.*

This is the productive reallocation margin opened by entrusted lending. In stationary equilibrium, prices, net worth, collateral capacity, and intermediation costs govern the size of the reallocation. Even with active re-lending, the first-order conditions (12) and (22) imply the following gap for a pair of firms:

$$MRPK_B - MRPK_A = \tau r_m + \mu_B - \mu_A - \zeta \xi_B + \phi'(K_B) - \phi'(K_A). \tag{27}$$

The financing and capital-cost wedges can therefore remain positive even with active re-lending. The stationary comparison in Section 4 quantifies the net outcome for the calibrated economy.

Proposition 2 (A condition for a widening return gap)**.** *For two firms with fixed productivities and common technology parameters that hire labor optimally at a common wage, let* $g = \log MRPK_B - \log MRPK_A$*. Between two allocations,*

$$\Delta g = \frac{1-\eta}{1-\alpha\eta}\left(\Delta \log K_A - \Delta \log K_B\right). \tag{28}$$

Thus the log return gap widens if A's capital grows proportionally faster than B's. If the gap is initially nonnegative, this also raises the between-type dispersion in a two-representative-firm economy with fixed type weights.

The proposition shifts attention from the first-round distribution of bank loans to relative growth in productive capital. Re-lending narrows the return gap when it supports enough additional type-B capital. The gap widens when type-A capital instead grows proportionally faster. The quantitative exercise measures both changes in capital and their combined effect on dispersion.

Under the calibrated production parameters, the coefficient is $(1-0.8)/(1-0.5\times 0.8) = 1/3$: for a pair with fixed productivities, a ten-percentage-point difference in log capital growth changes their log-MRPK gap by about 3.3 percentage points. This comparative static gives the scale of the capital-growth mechanism. Changes in productivity, net worth, prices, and within-type allocation also enter the full quantitative result.

Within-type productivity and net-worth heterogeneity also shape aggregate dispersion. For fixed type weights $\omega = \gamma/(1+\gamma)$, its exact decomposition is

$$\mathrm{Var}(\log MRPK) = \omega v_A + (1-\omega)v_B + \omega(1-\omega)(m_A - m_B)^2, \tag{29}$$

where m_s and v_s are the within-type mean and variance of log MRPK. We therefore report both within- and between-type measures and distinguish changes in dispersion from its level.

4 Quantitative Analysis

The quantitative exercise maps type-A firms to state-owned enterprises (SOEs) and type-B firms to private enterprises. This mapping captures average differences in productivity and financing conditions while allowing substantial variation within each type. The calibration combines firm balance-sheet information from the National Bureau of Statistics (NBS) industrial survey with aggregate credit information from the People's Bank of China (PBOC). The benchmark uses the pre-2008 moments in Table 6. The independent 2005–2013 NBS panel in Appendix C describes changes in dispersion around the stimulus.

Parameters and targets. A period is one year. Table 5 reports the preset parameters. Capital depreciates at $\delta = 0.1$, returns to scale are $\eta = 0.8$, and the labor parameter is $\alpha = 0.5$, implying a labor output elasticity of $\alpha\eta = 0.4$. Type-A and type-B discount factors are 0.9 and 0.8. These reduced-form values capture differences in the valuation of retained earnings across ownership types (Liu and Siu, 2011).

Productivity persistence and volatility are $\rho_z = 0.7$ and $\sigma_z = 0.4$ for both types; their productivity scales differ.

[Insert Table 5 Here]

Table 6 presents the remaining parameters and targets. We normalize the type-A productivity scale to one and set the type-B scale to 1.5. The model produces a private-to-state mean-return ratio of 1.52 against a target of 1.5. The relative mass of type-A firms, $\gamma = 1.35$, matches the SOE revenue share of 0.32. The collateral parameters $\theta_1 = 0.85$, $\theta_2 = 0.52$, and $\zeta = 0.25$ are chosen jointly using the leverage of the two types and the entrusted-to-bank-credit ratio.

Bank-credit supply is $\bar{B} = 15.5$. A reference real lending rate of 0.04 is an input to the calibration, and type A's bank rate is targeted at 1.25 times that rate, or 0.05. With the funding wedge $\tau = 0.25$, this corresponds to the unsubsidized equilibrium bank rate $r_m \simeq 0.067$. These three rates are distinct: the reference input, the type-A rate $r_s = (1 - \tau)r_m$, and the market-clearing rate r_m.

The entrusted-lending cost is $\chi(F) = \nu F^2/2$, with $\nu = 0.007$ chosen using the entrusted-loan rate of 0.12. Equations (11) and (21) explain why this rate can exceed the bank rate: constrained borrowers value the additional financing, while lenders require compensation for funding, the use of borrowing capacity, and intermediation costs.

The payout-and-issuance function is $\varphi(D) = D + \kappa D^2/2$, with $\kappa = 0.005$. Its curvature affects both positive distributions and external equity issuance. The financial-assets ratio is 0.22 in the model against a target of 0.20; the data measure uses liquid assets net of inventories. The capital holding cost is $\phi(K) = \psi K^2/2$, with $\psi = 0.01$. It raises the marginal cost of the chosen capital stock by ψK. The joint calibration uses the standard deviation of leverage, producing 0.25 against a target of 0.27.

The targets discipline three parts of the story. The return ratio and leverage moments describe the pre-existing difference in productive opportunities and formal financing. The entrusted-credit ratio and rate describe the size and price of the route between the two firm types. Return dispersion is an untargeted outcome of the calibrated model, allowing the analysis to assess how these financing margins affect the allocation of capital.

[Insert Table 6 Here]

4.1 Capital Allocation in the Benchmark

The main allocation statistic is the standard deviation of log marginal returns to capital. The empirical proxy is sales divided by capital. Under the model's common production elasticities, the marginal product is $(1-\alpha)\eta y/K$. The constant elasticity factor leaves log dispersion and ratios of sectoral mean returns unchanged. In the data, varying intermediate-input shares can make sales-based and value-added-based measures differ.

Benchmark log-return dispersion is 0.379, compared with approximately 0.87 in the 2005–2008 NBS panel. The lower model level is consistent with a setting focused on financing differences and capital holding costs, while the data also reflect other firm-specific distortions and measurement differences. The comparisons below use modeled dispersion as an allocation statistic.

The entrusted-lending channel. Table 7 removes entrusted lending while retaining the benchmark structural parameters. Overall dispersion rises from 0.379 to 0.438 when the channel is removed, an increase of 15.6%. Equivalently, introducing the channel lowers dispersion by 13.5% relative to the no-lending allocation. Within-type dispersion rises from 0.282 to 0.313 for type A and from 0.382 to 0.468 for type B when lending is unavailable. The between-type component rises from 0.191 to 0.205.

Entrusted lending provides an asset to firms with favorable bank access and a source of financing to constrained borrowers. Removing it lowers type-A leverage from 0.550 to 0.487 and type-B leverage from 0.571 to 0.300. Both within-type and between-type reallocation contribute to the dispersion result. Using the reported variance components, the between-type share of the total variance reduction is $(0.205^2 - 0.191^2)/(0.438^2 - 0.379^2) = 11.5\%$. Most of the improvement occurs within types, especially among firms facing the tighter formal-credit limit. This equilibrium comparison gives a quantitative counterpart to the local mechanism in Proposition 1.

The stationary comparison shows how the secondary credit market improves capital allocation in an economy with unequal formal bank access. Constrained firms gain financing for productive capital, and within-type dispersion falls most among type-B firms. The improvement reflects both financing differences among private firms and the gap in average returns between the two types.

[Insert Table 7 Here]

The preferential bank rate. Table 8 removes the type-A funding wedge while preserving the differences in collateral capacity and the entrusted-lending option. Overall log-return dispersion falls from 0.379 to 0.374, and its between-type component falls from 0.191 to 0.179. The market bank rate r_m declines from 0.067 to 0.054 as demand adjusts. Type A's effective bank rate moves in the opposite direction, from $0.75 \times 0.067 \simeq 0.0503$ to 0.054, a rise of about 7.5%. Type-A leverage falls from 0.550 to 0.541, while type-B leverage rises from 0.571 to 0.576; the entrusted rate remains close to 0.12.

This experiment isolates the price of privileged borrowing as a second policy margin. Removing the wedge raises type A's effective funding cost while lowering the market rate paid by type B. The resulting reduction in dispersion is modest because collateral limits and direct bank access remain unequal. Appendix Table A.5 checks discount-factor sensitivity at a bank-credit supply of 16.4, separate from the 15.5 benchmark.

[Insert Table 8 Here]

5 Credit Supply and the Allocation of Productive Capital

We increase exogenous bank-credit supply by 16%, from 15.5 to 17.98, to examine how additional bank funding is divided between firms' own capital and interfirm lending. The scale reflects the bank-credit component of the 2009 episode: Chen, He, and Liu (2020) estimate additional lending of RMB 4.7 trillion relative to an end-2008 bank-credit stock of approximately RMB 30 trillion. The model then traces this funding through bank borrowing, corporate re-lending, and productive capital.

Table 9 compares the benchmark and higher-credit allocations under two interest-rate regimes. In the first, we impose a floor of $r_m = 0.014$. We construct this illustrative real-rate scenario by applying the 2009 nominal lending-rate multiplier of 0.9 to the end-2008 benchmark rate of 5.31% and subtracting average 2007–2013 inflation of 3.41%. If loan demand at the floor is below offered credit supply, the difference remains unused. In the second regime, the bank rate adjusts freely and falls to 0.009.

The People's Bank of China's fourth-quarter 2008 report records both the 5.31% one-year benchmark and a 0.9 multiplier for the ordinary lending-rate floor. The comparison isolates how a rate restriction changes credit absorption and re-lending in the calibrated economy. Actual contract rates varied across borrowers and transactions in 2009.

Unequal capital expansion. Both firm types increase bank borrowing, capital, and output. With the floor, type-A capital rises from 7.289 to 8.663, or 18.9%, while type-B capital rises from 13.72 to 15.06, or 9.8%. Without the floor, the corresponding increases are 20.7% and 10.6%. Entrusted transfers support type-B investment, while unequal funding costs, collateral capacity, and balance sheets let type-A capital grow faster in proportional terms.

Under the floor, the bank market absorbs about 17.77 of the 17.98 units offered, leaving about 0.21 units unused. When the floor is removed, bank borrowing rises to the offered 17.98 units as the equilibrium rate falls. Even in the floor case, both drawn bank credit and entrusted credit increase. The final capital allocation reflects three linked responses: the amount of credit drawn, its initial distribution across firm types, and the re-lending decision after type A receives financing.

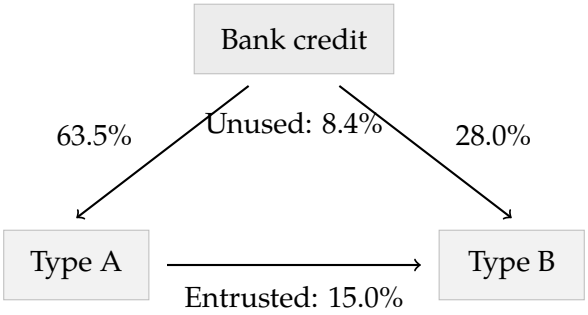
With the floor, overall dispersion increases from 0.379 to 0.430. The within-type components rise to 0.338 and 0.409, and the between-type component rises to 0.218. The between-type contribution to the increase in variance is approximately $(0.218^2 - 0.191^2)/(0.430^2 - 0.379^2) = 26.8\%$. Without the floor, aggregate dispersion reaches 0.434. Proposition 2 explains how unequal capital growth can widen relative returns at fixed productivities; within-type heterogeneity and equilibrium prices shape the full quantitative result. The NBS series documents the contemporaneous dispersion pattern, while this experiment identifies a channel within the model.

[Insert Table 9 Here]

Initial credit recipients and subsequent uses. The initial allocation of bank loans differs from firms' net financing after entrusted transfers. Figure 2 illustrates the floor experiment using shares calculated from the displayed levels. Type A initially receives 63.5% of the additional bank-credit supply and type B receives 28.0%; 8.4% remains unused. Entrusted lending reallocates an amount equivalent to 15.0% of the additional supply from A to B. Net of this transfer, the shares are 48.5% for A and 43.1% for B.

Without the floor, type A initially receives 69.7% of additional bank credit and type B receives 30.3%. The entrusted transfer is 16.4%, leaving net shares of 53.3% and 46.7%. Corporate re-lending substantially narrows the asymmetry in net credit financing. Type A also accumulates more net worth and starts from a smaller aggregate capital base, helping explain why its capital grows faster in pro-

Figure 2: Allocation of additional bank credit with the rate floor



Notes: Shares use the increase in aggregate bank-credit supply, $0.16 \times 15.5 = 2.48$, as the denominator. Type-A mean quantities are multiplied by its mass $\gamma = 1.35$. Entrusted lending transfers financing between firms, leaving aggregate bank-credit supply fixed; capital changes also reflect changes in net worth. Shares are calculated from the displayed levels in Table 9; rounding can prevent them from summing exactly.

portional terms. Initial bank-credit shares, net credit financing, and productive-capital growth thus capture distinct stages of the allocation.

Table 10 puts these financing shares beside capital-growth rates for both interest-rate regimes. Re-lending substantially narrows the disparity in net credit financing, while the capital-growth difference remains. The balance sheets explain this distinction. Let $\overline{X}_s$ denote a mean within type s and let F denote aggregate entrusted credit, so $F = \gamma \overline{F}_A = \overline{F}_B$. Taking changes gives

$$\gamma \Delta \overline{K}_A = \gamma \Delta \overline{A}_A + \gamma \Delta \overline{B}_A - \Delta F, \tag{30}$$

$$\Delta \overline{K}_B = \Delta \overline{A}_B + \Delta \overline{B}_B + \Delta F. \tag{31}$$

The bank-funding terms tracked in Figure 2 combine with changes in net worth in these identities. In the floor experiment, type B's capital increases by 1.340 model units: 0.695 in additional bank borrowing, 0.373 in entrusted borrowing, and 0.272 in net worth. This balance-sheet calculation shows how an entrusted transfer can narrow net financing shares while different net-worth changes and starting capital bases sustain unequal proportional capital growth.

[Insert Table 10 Here]

5.1 Interpretation for credit policy

The two comparisons establish complementary findings. Entrusted lending lowers dispersion in the benchmark, while a broad credit expansion with the channel in place produces uneven capital growth and higher dispersion. Corporate re-lending offsets part of the initial bank-credit asymmetry, but the differences in borrowing costs, collateral capacity, and net worth still favor type-A capital growth. The contribution of entrusted lending during a credit expansion remains a separate comparison requiring a high-credit equilibrium with the channel switched off.

This distinction has a practical implication for evaluating broad credit programs. In the no-floor experiment, type A receives 69.7% of additional bank lending, while its increase in bank borrowing

net of new entrusted lending amounts to 53.3% of offered credit. Entrusted transfers and productive-capital growth also differ because firms' net worth and initial capital stocks matter. An assessment of credit allocation should therefore follow bank loans, corporate financial claims, and capital expenditure together, and distinguish offered credit from loans actually drawn when a rate floor binds. These are accounting implications of the calibrated model; identifying the historical causal effect of a policy intervention requires a separate empirical design.

The model also separates policies that change the quantity of bank credit from policies that change who can obtain it and at what price. An aggregate credit increase transmits through existing differences in bank access; in the reported experiment, the indirect entrusted channel narrows the initial financing gap while type A retains faster capital growth. A policy that changes collateral or credit eligibility would act directly on those differences. The subsidy comparison shows that changing a funding advantage alters both the privileged firm's effective borrowing cost and the common market rate. The model thus identifies distinct quantity, price, and access margins for credit policy.

The historical interpretation also depends on the rules governing entrusted loans. The 2018 banking-regulator measures describe entrusted loans as an agency service and prohibit trustee banks from accepting bank credit funds, among other borrowed funds, as the source of entrusted-loan principal. Introduced after the 2009 episode, this rule shapes the mechanism's application to current practice. The modeled object is a firm's joint bank-debt and entrusted-asset position; regulatory analysis of particular contracts requires source-of-funds evidence. Evaluating welfare and financial-stability effects of restricting the channel would also require default risk, bank exposures, and substitution to other financing routes.

6 Conclusion

Entrusted lending lets a firm with favorable bank access choose between its own productive capital and a financial claim on another firm. The linked lending records show financing differences within entrusted-loan relationships and a premium on corporate loans over ordinary bank credit. An amount-based regression finds relatively more bank lending to state-owned firms around the 2009 expansion, while a small matched sample shows a positive association between lenders' bank-credit exposure and entrusted lending. Together, these facts motivate a model that follows financing beyond the initial bank borrower to its ultimate use in productive capital.

In the calibrated economy, entrusted lending reduces stationary log-MRPK dispersion from 0.438 to 0.379 by expanding constrained firms' access to productive capital. A broad credit expansion operates through the same unequal access conditions: with a binding rate floor, the 16% increase in offered bank credit raises dispersion from 0.379 to 0.430. Re-lending passes additional financing toward constrained firms, while differences in funding costs, collateral capacity, and net worth allow type-A capital to grow faster. The balance-sheet accounting distinguishes the initial distribution of bank loans, the subsequent entrusted transfer, and the final growth of productive capital.

The policy lesson is to examine credit after interfirm transfers as well as at its initial placement by banks. Aggregate credit supply, privileged borrowing rates, and direct bank eligibility act on distinct margins. A secondary credit channel improves the benchmark allocation, while a large credit expansion with that channel in place produces more uneven capital growth. A matched high-credit comparison without entrusted lending remains for future quantitative work. Assessing welfare would also require evidence on borrower risk, bank exposure, funding sources, and alternative financing routes.

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Table 1: Within-pair lender–borrower differences

Variable	Observations	Lender	Borrower	Difference
log(assets)	1,413	12.861	11.246	−1.614**
Recorded bank loans / assets	1,413	0.143	0.212	0.070**
Bank-loan rate	3,692	0.0562	0.0627	0.00651**
Sales-based MRPK, level	528	57.24	145.09	87.85**
log(sales-based MRPK)	528	1.537	1.422	−0.115
log(value-added MRPK)	404	0.047	−0.130	−0.176
Sales / assets	547	0.488	0.767	0.278**
Leverage	1,413	0.541	0.592	0.0517**
Cash / assets	1,287	0.102	0.0808	−0.0217**
Inventory / assets	923	0.115	0.188	0.0726**
SOE indicator	4,039	0.564	0.390	−0.174**
Pre-access index	1,536	10.221	2.051	−8.170**

Notes: Each row compares lender and borrower values observed within entrusted-loan pairs; the difference is borrower minus lender. Bank-loan measures refer to the sample bank. MRPK is revenue divided by capital, using sales or value added as indicated. The level sales-MRPK difference has a pairwise-test p-value of 0.0067; the log sales- and log value-added-MRPK differences have p-values of 0.371 and 0.185. The level contrast is positive, while the two log contrasts are small and statistically imprecise. Counts differ with variable coverage; repeated firms across pairs may affect inference. ** denotes 1% significance in the reported pairwise difference test.

Table 2: Ordinary bank loans versus entrusted-loan contract rates

	(1) Contract rate	(2) Contract rate
Entrusted-loan contract	0.0174**	0.0250**
	(0.00207)	(0.00329)
Contract × pre-access index	–	−0.00102*
		(0.000452)
Prior entrusted borrower: main effect	−0.00905**	−0.0132**
	(0.00169)	(0.00226)
Contract × prior entrusted borrower	–	−0.000537
		(0.00543)
Observations	1,912,554	1,912,554

Notes: The omitted contract type is an ordinary bank loan. Both specifications include the pre-access index, pre-period SOE status, firm size, and year fixed effects; column (1) also controls for prior entrusted-lender status, while column (2) includes the shown interaction terms. Contracts are weighted by amount, and standard errors are clustered by borrowing firm. The prior-borrower main effect and its interaction with contract type are separate coefficients. The column (2) entrusted-loan coefficient applies at zero values of the interacting variables. * and ** denote 5% and 1% significance, respectively. These are conditional contract-rate differences; borrower risk and intermediation costs also enter their economic interpretation.

Table 3: Bank-credit allocation around the 2009–2010 expansion

Dependent variable	(1) Bank loans/assets	(2) Bank loans/assets	(3) Bank loans/assets	(4) IHS bank-loan amount
Pre-access × 2009–2010	0.00812**	0.0115**	–	–
	(0.00126)	(0.00140)		
Pre-access × 2011–2013	0.000961	0.00191*	–	–
	(0.000796)	(0.000838)		
SOE × 2009–2010	–	–	−0.00423	0.0462*
			(0.00272)	(0.0209)
Prior entrusted lender × 2009–2010	–	–	−0.0440**	−0.228*
			(0.0108)	(0.0945)
Prior entrusted lender × 2011–2013	–	–	−0.0395**	−0.252**
			(0.00780)	(0.0746)
Observations	163,914	165,573	165,573	174,348
Firm and year FE	Yes	Yes	Yes	Yes
Industry-year and region-year FE	No	Yes	Yes	Yes
Lagged firm controls	Yes	Yes	Yes	Yes

Notes: Columns (1)–(2) interact the pre-period access index with the expansion and subsequent tightening windows; columns (3)–(4) use state ownership and also include prior-lender interactions. Annual bank-loan amounts are recorded at the sample bank; IHS is the inverse hyperbolic sine. The ratio and amount outcomes are different objects. The later-window coefficients distinguish the expansion from subsequent tightening. Standard errors in parentheses are clustered by firm. * and ** denote 5% and 1% significance. The estimates describe conditional differences; the access results vary with index construction, period definition, and pre-period trends.

Table 4: Lender bank-credit exposure and entrusted lending within borrower-years

	(1) IHS entrusted amount	(2) IHS entrusted amount
Lender pre-access × 2009–2010	0.533	–
	(0.102)	
Lender pre-access × 2011–2013	0.460	–
	(0.105)	
Lender branch leave-one-out loan growth	–	0.163
		(0.0467)
Observations	32	43
Pair FE	Yes	Yes
Borrower-year FE	Yes	Yes
Lagged lender controls	Yes	Yes

Notes: The dependent variable is the IHS of the entrusted-loan amount from lender i to borrower j in year t. Pair and borrower-year fixed effects restrict the comparison to changes across lenders linked to the same borrower-year after removing persistent pair differences. The branch measure proxies for lender-side bank-credit exposure. Parentheses reproduce the reported lender- and borrower-clustered standard errors. The 32- and 43-observation samples contain few effective borrower groups, so significance stars are omitted. The IHS coefficients describe bilateral variation in entrusted lending; neither specification includes an SOE-specific re-lending term.

Table 5: Preset Parameter Values

Parameter	**Value**
Capital depreciation rate, δ	0.1
Returns-to-scale parameter, η	0.8
Labor parameter, α	0.5
Persistence of productivity shock, ρ_z	0.7
Volatility of productivity shock, σ_z	0.4
The subsidy rate, τ	0.25
The discount factor of Firm A, β_1	0.9
The discount factor of Firm B, β_2	0.8

Table 6: Benchmark Calibration

Parameters		
Productivity, $\bar{z}_2/\bar{z}_1$		1.5
Relative mass of type-A firms, γ		1.35
The total supply of bank loans, $\bar{B}$		15.5
Collateral rate (bank loans of Firm A), θ_1		0.85
Collateral rate (bank loans of Firm B), θ_2		0.52
Collateral rate (entrusted loans), ζ		0.25
Agency cost of entrusted loans, ν		0.007
Payout-and-issuance cost, κ		0.005
Capital holding cost, ψ		0.01
Target Moments (before 2008)	Data	Model
$\text{MRPK}_{poe}/\text{MRPK}_{soe}$	1.5	1.52
SOE share of revenue	0.32	0.32
Reference lending-rate input	0.04	—
Leverage (SOE)	0.55	0.55
Leverage (POE)	0.57	0.57
Entrusted loans/bank loans	0.15	0.15
Interest rate of entrusted loans	0.12	0.12
Financial assets ratio	0.20	0.22
Standard deviation of leverage	0.27	0.25

Notes: The reference rate of 0.04 is a calibration input. The type-A bank rate is targeted at 1.25 times this reference; the unsubsidized equilibrium bank rate is approximately 0.067. A dash denotes an input rather than an independently fitted model moment. The model credit ratio measures outstanding positions; it is distinct from the annual financing-flow ratios in Figure 1.

Table 7: The Effects of Entrusted Lending

	Benchmark	Without Entrusted Loans	Percent Change
mean($MRPK_1$)	0.232	0.230	-1%
mean($MRPK_2$)	0.353	0.371	+5%
sd(log($MRPK_1$))	0.282	0.313	+11%
sd(log($MRPK_2$))	0.382	0.468	+23%
sd(log($MRPK_{all}$))	0.379	0.438	+16%
sd(log($MRPK_{btw}$))	0.191	0.205	+7%
mean(Leverage$_1$)	0.550	0.487	-11%
mean(Leverage$_2$)	0.571	0.300	-47%

Notes: The no-entrusted-lending allocation holds the benchmark structural parameters fixed. Percentage changes use the with-lending benchmark as the denominator. Removing lending raises overall dispersion by approximately 15.6%; conversely, introducing it lowers dispersion by approximately 13.5% relative to the no-lending allocation. Subscripts 1 and 2 denote types A and B, respectively.

Table 8: The Interest Subsidy

	Benchmark	Without Subsidy	Percent Change
mean($MRPK_1$)	0.232	0.234	+1%
mean($MRPK_2$)	0.353	0.350	-1%
sd(log($MRPK_1$))	0.282	0.276	-2%
sd(log($MRPK_{all}$))	0.379	0.374	-1%
sd(log($MRPK_{btw}$))	0.191	0.179	-6%
mean(Leverage$_1$)	0.550	0.541	-2%
mean(Leverage$_2$)	0.571	0.576	+1%
Bank rate r_m	0.067	0.054	-19%
Entrusted-loan rate r_f	0.120	0.1202	+0.2%

Notes: Bank rates are the unsubsidized rate r_m. Type-A firms initially pay $0.75r_m$, or approximately 0.0503; without the subsidy they pay 0.054. Thus their effective bank rate rises while the market reference rate falls. Percentage changes are computed from the displayed rounded levels.

Table 9: Credit Expansion

		Binding Floor		Without Floor	
	Before	After	Changes	After	Changes
mean($MRPK_1$)	0.232	0.212	-9%	0.211	-9%
mean($MRPK_2$)	0.353	0.339	-4%	0.338	-4%
sd(log($MRPK_1$))	0.282	0.338	+20%	0.344	+22%
sd(log($MRPK_2$))	0.382	0.409	+7%	0.412	+8%
sd(log($MRPK_{all}$))	0.379	0.430	+13%	0.434	+15%
sd(log($MRPK_{btw}$))	0.191	0.218	+14%	0.221	+16%
Bank rate r_m	0.067	0.014	-79%	0.009	-87%
Entrusted-loan rate r_f	0.120	0.121	+1%	0.121	+1%
mean(Bank loans B_1)	6.196	7.363	+19%	7.476	+21%
mean(Bank loans B_2)	7.136	7.831	+10%	7.888	+11%
mean(Entrusted loans F_1)	1.701	1.977	+16%	2.002	+18%
mean(Entrusted loans F_2)	2.296	2.669	+16%	2.702	+18%
mean(Leverage$_1$)	0.550	0.579	+5%	0.582	+6%
mean(Leverage$_2$)	0.571	0.592	+4%	0.595	+4%
mean(Capital K_1)	7.289	8.663	+19%	8.795	+21%
mean(Capital K_2)	13.72	15.06	+10%	15.17	+11%
mean(Output Y_1)	5.424	6.000	+11%	6.052	+12%
mean(Output Y_2)	15.70	16.56	+5%	16.63	+6%

Notes: The supply of bank credit increases by 16%. The floor, when imposed, applies to r_m. Changes are percentages relative to the pre-expansion values. Type-specific quantities are means, and aggregate type-A quantities therefore use the mass $\gamma = 1.35$.

Table 10: From initial bank-credit allocation to productive capital

	With rate floor	Without floor
A. Shares of the increase in offered bank credit (%)		
Initial bank credit to type A	63.5	69.7
Initial bank credit to type B	28.0	30.3
Unused supply	8.4	0.0
Entrusted transfer from A to B	15.0	16.4
Net credit financing of type A	48.5	53.3
Net credit financing of type B	43.1	46.7
B. Change in productive capital relative to each type's baseline (%)		
Type A	18.9	20.7
Type B	9.8	10.6

Notes: All entries are calculated from the displayed levels in Table 9. Panel A divides aggregate changes by $\Delta\bar{B} = 0.16 \times 15.5 = 2.48$. Type-A bank-loan means are multiplied by $\gamma = 1.35$; the entrusted transfer is computed from type-B borrowing. Net shares subtract this transfer from A and add it to B. The calculation follows the model balance sheets and the aggregate entrusted transfer. The unused share without the floor is zero to the reporting precision of the original levels. Rounding can affect sums. Panel B uses each type's initial capital as its denominator. Panel B incorporates the capital response, which also depends on net-worth changes; see Equations (30)–(31).

Online Appendix

When Shadow Banking Helps and Hurts:
Entrusted Lending and Capital Allocation

A Empirical Sample and Measurement

Table A.1 describes the entrusted-loan sample used for the descriptive comparisons. A relationship can generate several contracts within a year and recur over time, so transactions, pairs, and pair-years count different objects. Availability of matched bank and financial records also differs across variables, as shown by the observation counts in Table 1. The pooled pricing sample in Table 2 additionally includes ordinary bank contracts; these differences explain the sample sizes across tables.

[Insert Table A.1 Here]

The loan measures in the micro evidence describe records held by the sample bank. Total balance-sheet liabilities and the model's aggregate financial positions cover broader objects. Contract rates are expressed as annual rates in decimals. The paired comparisons and the cross-channel pricing regression establish financing differences among observed relationships and contracts.

B Funding Sources and Bank Risk Exposure

The entrusted-loan market includes funding supplied by nonfinancial firms and financial institutions. Table A.2 reports aggregate entrusted loans alongside amounts funded through bank wealth management products, funds, and brokers. The underlying sources are the Asset Management Association of China (AMAC), the China Banking Wealth Management Registration System (CBWMRS), and the People's Bank of China (PBOC). The reported financial-institution share is 3% in 2012 and approximately 30% at its 2014 peak in the displayed period.

The 2012 wealth management component applies the 2013 share invested in entrusted loans to the RMB 7.1 trillion stock of wealth management products in 2012. It is therefore an estimate based on a constant-share assumption. The series show the growing importance of financial-institution funding after 2012, when the composition of the entrusted-loan market was changing.

[Insert Table A.2 Here]

Funding sources and risk bearing are separate questions. Chen et al. (2018) examine bank risk taking associated with shadow lending, including the acquisition of beneficiary rights through investment receivables. Table A.3 presents new entrusted lending and changes in banks' accounts receivable investments (ARI). The changes in ARI are close to zero in 2011–2012 and increase in subsequent years. ARI covers a broader set of investments, so the comparison describes growth in a related bank asset category.

[Insert Table A.3 Here]

The model focuses on corporate lending in which the trustee administers the contract and the lending firm bears its risk. Other funding and risk-bearing arrangements coexist in the wider market. The aggregate series provide institutional context for the corporate-lending mechanism studied here.

C MRPK Dispersion in the Industrial-Firm Data

Table A.4 uses a separate balanced panel of Chinese industrial firms for 2005–2013; the data used here exclude 2009 and 2010. The MRPK proxy is sales relative to capital. The average standard deviation of log MRPK is approximately 0.87 in 2005–2008 and 0.94 in 2011–2013, an increase of 0.07 log points. The between-sector measure, comparing state-owned and privately owned firms, rises by approximately 0.014. Bai et al. (2016) report a similar pattern using these data. This industrial-firm panel is distinct from the matched bank-loan sample in Section 2.

The comparison supplies descriptive context for the quantitative experiment. It measures the change across the observed pre- and post-stimulus windows; 2009–2010 are absent, and concurrent economic and reporting changes also enter the comparison. A balanced panel reduces changes in the set of observed firms, although the survey's sales threshold changed around 2011; see Brandt et al. (2014).

Sales relative to capital differ from the value-added measure commonly used in the misallocation literature. Differences in intermediate-input intensity, markups, prices, and capital measurement also affect this proxy. We use its dispersion as a revenue-based indicator of allocation, with these measurement and selection differences in mind when comparing the data with the model.

[Insert Table A.4 Here]

D Additional Quantitative Comparisons

Discount factors. Table A.5 compares three discount-factor configurations at a common bank-credit supply of 16.4. Its first column supplies the baseline for this sensitivity exercise; the principal benchmark elsewhere uses 15.5. The table shows how saving incentives and financing conditions shape the allocation at a fixed credit supply.

[Insert Table A.5 Here]

Accounting conventions. For the production function in the model, $MRPK = (1-\alpha)\eta y/K$ and optimal labor satisfies $wL = \alpha\eta y$. The simple mean of firm returns differs from the return calculated using mean output and mean capital. Likewise, the mean of leverage ratios differs from the ratio of mean debt to mean assets. Aggregate bank and entrusted credit use the firm-type masses in the market-clearing equations, while the dispersion decomposition in Equation (29) uses $\omega = \gamma/(1+\gamma)$. These distinctions are necessary when interpreting the displayed moments.

E Analytical results

E.1 Proof of Proposition 1

Proof. With labor and productivity fixed, write $y_s = f_s(K_s)$ for $s \in \{A, B\}$. Both functions are strictly concave in positive capital because $0 < \eta(1-\alpha) < 1$. Consider a feasible transfer $dx > 0$ with $dK_B = dx$ and $dK_A = -dx$. Then

$$\frac{d(y_A + y_B)}{dx} = f_B'(K_B) - f_A'(K_A) > 0,$$

and

$$\frac{d(MRPK_B - MRPK_A)}{dx} = f_B''(K_B) + f_A''(K_A) < 0.$$

The result holds locally while $MRPK_B > MRPK_A$. Any marginal intermediation cost must be subtracted from the gross-output gain. The transfer must remain feasible because reducing A's capital can tighten its borrowing limit. Changes in prices and net worth across stationary equilibria are outside this argument, so it does not establish their unconditional ranking. □

E.2 Proof of Proposition 2

Proof. The labor first-order condition is $\alpha\eta y_s/L_s = w$. Substituting optimal labor into the production function gives

$$y_s = C(w) z_s^{1/(1-\alpha\eta)} K_s^a, \qquad a = \frac{\eta(1-\alpha)}{1-\alpha\eta},$$

where $C(w) = (\alpha\eta/w)^{\alpha\eta/(1-\alpha\eta)}$ is common to both firms. The marginal product of capital in the original technology is $MRPK_s = \eta(1-\alpha)y_s/K_s$. Hence

$$g = \frac{\log z_B - \log z_A}{1-\alpha\eta} + (a-1)(\log K_B - \log K_A).$$

Taking differences at fixed productivities and using $1 - a = (1-\eta)/(1-\alpha\eta)$ yields (28). A common wage change cancels from the ratio. For two representative firms with fixed weights, between-type variance is $\omega(1-\omega)g^2$ and its standard deviation is $\sqrt{\omega(1-\omega)}|g|$. A positive increase in a nonnegative gap therefore increases that dispersion. In the heterogeneous-firm model, changes in productivity composition and within-type dispersion must also be included through (29). □

Table A.1: Entrusted-loan descriptive sample

Statistic	Value
Sample period	2002–2018
Entrusted-loan transactions	36,204
Average entrusted-loan amount	RMB 54.39 million
Average entrusted-loan rate	8.31%
Unique borrower-lender pairs	19,171
Unique lenders	10,186
Unique borrowers	13,271
Pair-year observations	25,660

Notes: This table reports the descriptive entrusted-loan sample from the bank's trustee records. Affiliated loans are excluded. The bank also extends ordinary bank loans to firms on both sides of the entrusted-loan market. Linked bank-loan and balance-sheet information is available for subsets of this sample; observation counts therefore vary across analyses. The pooled pricing regression also includes ordinary bank contracts, whereas the transaction count here includes entrusted loans only.

Table A.2: Financial-institution funding of entrusted loans

	2012	2013	2014	2015	2016
Outstanding entrusted loans	5.9	8.2	9.3	10.9	13.2
Bank wealth management products	0.16	0.30	0.36	0.34	0.64
Fund asset management	0.0	0.21	0.75	1.35	1.08
Broker asset management	0.0	0.93	1.64	1.49	1.75
Share funded by these sources	3%	18%	30%	29%	26%

Data Source: AMAC, CBWMRS, PBOC

Table A.3: Entrusted lending and changes in banks' investment receivables

	2011	2012	2013	2014	2015	2016
New entrusted loans	1.30	1.28	2.55	2.17	1.59	2.18
Change in ARI holdings	-0.05	0.01	1.36	2.22	3.42	0.87

Data Source: Wind, PBOC

Table A.4: Sales-based MRPK dispersion in the industrial-firm panel

	2005	2006	2007	2008	2011	2012	2013
$\text{sd}(\log(MRPK_{all}))$	0.89	0.86	0.87	0.86	0.91	0.94	0.97
$\text{sd}(\log(MRPK_{btw}))$	0.21	0.20	0.20	0.20	0.21	0.21	0.23

Notes: The industrial-firm panel is distinct from the bank-linked micro sample. MRPK is proxied by sales relative to capital. The table reports standard deviations of log MRPK; the between-sector measure compares state-owned and privately owned firms. The data used here do not include 2009 or 2010.

Table A.5: Sensitivity to discount factors

	$\beta_1 = 0.90$ $\beta_2 = 0.80$	$\beta_1 = 0.90$ $\beta_2 = 0.85$	$\beta_1 = 0.93$ $\beta_2 = 0.85$
mean($MRPK_1$)	0.224	0.227	0.229
mean($MRPK_2$)	0.347	0.344	0.341
sd(log($MRPK_1$))	0.304	0.294	0.290
sd(log($MRPK_2$))	0.392	0.374	0.391
sd(log($MRPK_{all}$))	0.399	0.382	0.382
sd(log($MRPK_{btw}$))	0.202	0.192	0.180
Interest rate of bank loans	0.045	0.054	0.067
Interest rate of entrusted loans	0.121	0.119	0.084
mean(Bank loans B_1)	6.652	6.450	6.363
mean(Bank loans B_2)	7.419	7.692	7.809
mean(Leverage$_1$)	0.562	0.583	0.553
mean(Leverage$_2$)	0.580	0.532	0.564
mean(Output Y_1)	5.657	5.555	5.511
mean(Output Y_2)	16.06	16.62	16.67
mean(Capital K_1)	7.826	7.589	7.487
mean(Capital K_2)	14.27	14.79	15.02
mean(Entrusted loans F_1)	1.811	1.453	1.755
mean(Entrusted loans F_2)	2.445	1.961	2.370

The supply of bank credit is fixed at $\bar{B}_t = 16.4$ in each column. Apart from the discount factors shown, parameters are held at their benchmark values.