Bank Branches and the Allocation of Capital across Cities*

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Abstract

We study how frictions in interbank lending and imperfect competition within local credit markets shape the allocation of capital across cities. Using public and administrative data from Chile, we estimate the pass-through of bank-level deposit shocks to local lending and interest rates. We find the pass-through to be stronger in cities where the bank holds a smaller market share, consistent with imperfect competition. We develop and estimate a quantitative spatial model with multi-city banks, oligopolistic competition in local credit markets, and interbank lending frictions that rationalizes these results. In the model, the cost of credit varies in space as banks with greater deposit funding lend at lower rates in all markets they serve, and cities served by more competing bank branches face lower rates through stronger local competition. We find that capital misallocation arising from spatial variation in loan markups reduces steady-state GDP by 0.55 percent, while frictions in interbank lending reduce GDP by 0.1 percent. We then use the model to evaluate bank mergers, which trade off greater spatial financial integration against weaker local competition, with larger competition losses when merging banks overlap in more cities. In Chile, the competition losses outweigh the gains from integration.

Key words: bank branches, local credit markets, misallocation.

JEL codes: D43, G21, O16.

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1 Introduction

In modern economies, savings are held largely as digital money and can be transferred across locations at virtually no cost. It is therefore natural to conjecture that savings flow toward cities with high loan demand, arbitraging away differences in the return to capital across locations. This view permeates both classical and more recent analyses of the determinants of economic activity across space (Henderson, 1974; Acemoglu and Dell, 2010; Desmet and Rossi-Hansberg, 2013; Kleinman et al., 2023), which assume a perfectly elastic supply of capital in each city.

This assumption is inconsistent with a growing body of evidence that local credit supply depends on the bank branches operating in a city through two channels. First, localized deposit inflows raise lending by the exposed banks elsewhere in their branch network (Becker, 2007; Bustos et al., 2020; Gilje et al., 2016), suggesting that a bank with more deposit funding lends at lower rates in every city it serves. Second, cities served by a smaller number of banks have less lending (Garmaise and Moskowitz, 2006; Nguyen, 2019) and higher interest rates (Bordeu et al., 2026) . Taken together, this evidence suggests that the cost of capital in a location depends on which banks operate branches and on the degree of competition they face. Yet the aggregate consequences of this variation in credit supply have not been quantified.

We make two contributions. First, using both public and administrative data from Chile, we estimate the response of local lending and interest rates to bank-level deposit shocks. Combining quantity and price responses is crucial to distinguish between the two channels, as the response of lending identifies the importance of deposit access, while the response of interest rates identifies firms' ability to substitute between banks and, therefore, the strength of local market power. We find that deposit inflows raise lending and lower interest rates and that both responses are stronger in cities where the exposed bank holds a smaller market share, consistent with banks passing through a larger share of the reduction in their funding costs where they have less market power.

In a second step we embed these channels into a quantitative spatial model of local credit markets with oligopolistic competition among banks and an interbank market subject to frictions, which we estimate to match the elasticities of loan and interest rates to deposit shocks. We use the estimated model to quantify the aggregate cost of the spatial segmentation of credit markets and to evaluate the welfare effects of bank mergers. We find that local market power in credit markets is quantitatively more important than frictions in interbank lending. Correcting spatial variation in loan markups would raise GDP by 0.55%, while eliminating interbank frictions completely would raise GDP by 0.1%. This quantitative result explains why, in our model, Chilean bank mergers reduce welfare despite their potential to improve financial integration.

Using data from Chile, we first show that bank-level deposit inflows lead to more loan issuance and reductions in lending rates relative to other banks. We construct exogenous bank-level deposit shocks by leveraging changes in the world price of salmon interacted with banks' presence in regions specialized in fishing. We identify credit-supply effects by comparing exposed and unexposed banks lending in the same destination city and month, excluding cities directly exposed to salmon production. We estimate that a 1% increase in deposits leads to a relative increase in loans of 0.13% and a reduction in interest rates of around 1 basis point at the bank level. Our results align with Gilje et al. (2016) and Bustos et al. (2020), who study commodity shocks in the U.S. and Brazil but do not examine interest rates due to data constraints. We overcome this limitation by exploiting administrative loan-level data which includes information on interest rates. The data allows us to control for changes in the composition of loans across time and isolate the effect of deposit shocks on interest rates.

We document heterogeneous responses to deposit shocks across cities. The positive effect on loans and the negative effect on interest rates do not decay with distance from the shocked area, suggesting that within-bank capital flows are independent from geography. By contrast, the effect of deposit shocks on loans and interest rates is stronger in cities where the exposed bank held a small market share. The intuition is that banks with greater local market power absorb part of the cost reduction by increasing their markups, dampening the pass-through to borrowers. These results align with studies in industrial organization and finance highlighting the local nature of credit markets (Aguirregabiria et al., 2025).

In the second part of the paper, we build a quantitative spatial model with banks that allows us to quantify how the geographical distribution of bank branches affect interest rates across space and the spatial allocation of capital in Chile. We extend the framework of Kleinman et al. (2023), which includes trade, migration, and local investment decisions by introducing a set of nationally chartered banks. These banks operate branches across cities, where they offer savings and lending instruments to the local population which uses the latter to finance local investment. We incorporate an interbank market in which banks can lend to each other, subject to frictions. Local branches compete oligopolistically in each credit market, as in the trade model of Atkeson and Burstein (2008). Through this mechanism, cities with stronger competition have lower equilibrium interest rates as documented — using the same data — in Bordeu et al. (2026). While banks' pricing decisions are interdependent due to local market structure and interactions in the interbank market, the steady state computation of the model remains tractable.

As in any model with imperfect competition, the elasticity of loan demand with respect to each bank's interest rate plays a central role. This elasticity, which varies across cities and banks, captures two margins of adjustment available to capitalists when a bank raises interest rates: capitalists can substitute by borrowing from other banks without changing how much they invest in physical capital, or they can reduce investment and rely more on deposits to transfer resources inter-temporally. This second elasticity plays the role of the outer-nest elasticity in the well-known model of variable markups from Atkeson and Burstein (2008). Importantly, the outer elasticity is an endogenous object in our model and depends on capitalists' demand for deposits.

We estimate the model to match the elasticity of loan issuance and interest rate reductions to deposit shocks from our empirical analysis, as well as employment, wages, and loans across cities and banks in 2015. In the model, the effect of deposit shocks on loan issuance is closely linked to the size of interbank frictions, while interest rate reductions are closely linked to firms' elasticity of substitution between banks. In the quantified version of the model, we estimate that interbank frictions raise borrowing costs by approximately 50 basis points for the average bank, i.e: a bank borrowing in the interbank market for a rate of 1% would act as if the interest rate was approximately 1.5%. We estimate firms' elasticity of substitution between banks of 13, which, when combined with our estimated outer elasticities, yields average markups on gross loan interest rates of approximately 9%.

In the model, interest rates differ across cities due to two channels which align with the mechanisms highlighted in the empirical literature. Frictions in the interbank market imply that banks with better access to deposits have a lower cost of raising funds. Differences in interest rates across banks translate into differences in interest rates across cities due to banks' heterogeneous geographic presence. Furthermore, the interest rate charged by any bank may differ across cities due to differences in local competition. Banks set lower markups in markets where they face more competition and, all else equal, interest rates are lower in cities with more banks. In the quantified version of the model, gap between the 25th and 75th percentiles of interest rates, net of bank fixed effects, is 79 basis points. While local interest rate levels are not a target of our estimation, these magnitudes align with the empirical findings of Bordeu et al. (2026) using the same data. Bordeu et al. (2026) find the comparable gap to be 103 basis points, meaning that our model can account for a significant part of the gap.

Equipped with the quantified version of the model, we solve for the equilibrium of this economy with no interbank frictions, which leads to an equalization in the cost of raising funds across banks. Productivity in the economy increases by 0.1%. Using subsidies to correct banks' local market power would have a substantially larger impact on GDP. Completely eliminating markups would increase aggregate GDP by 3.8%, while equalizing markups across space would increase GDP by 0.55%. In both cases, the increase in

GDP reflects lower dispersion in the marginal productivity of capital across cities, as well as higher overall investment, which is reflected in a lower average marginal productivity of capital.

Finally, we use the model to analyze bank mergers, a frequent challenge for policymakers — in Chile alone, there were four large mergers during 2000-2020 (Marivil et al., 2021). We compute all possible two-bank mergers and find welfare effects ranging between -1.25% and -0.015%. Welfare effects are more positive when the merging banks have limited geographic overlap, which reduces the effect of the merger on markups, and when the two merging banks have different positions in the interbank market. In such cases, the merged entity can exploit internal capital markets, bypassing the frictions in the interbank market.

This paper contributes to the literature on economic linkages across space by characterizing financial linkages driven by the branch network. The literature has emphasized mechanisms such as trade, migration, and commuting, through which local shocks affect nearby locations via market access or labor flows (Caliendo et al., 2017; Monte et al., 2018; Allen and Arkolakis, 2025). By contrast, the mechanism we highlight operates independently of geographic proximity: through the banking network, distant cities can become linked when they share branches of the same banks (Gilje et al., 2016; Bustos et al., 2020; Maingi, 2026; D'Amico and Alekseev, 2024; Quincy and Xu, 2025). Kleinman et al. (2023) incorporates capital into a quantitative spatial model, but does not model financial linkages between cities.[1]

Recent work has incorporated banks into quantitative spatial models to study the effects of U.S. branching deregulation and deposit reallocation (D'Amico and Alekseev, 2024; Oberfield et al., 2024; Maingi, 2026). A closely related paper is Maingi (2026), which analyzes how deposit reallocation across banks shapes lending across cities. In contrast to these studies, we focus on how the geographic distribution of branches affects steady-state outcomes, including productivity and welfare, using a model with endogenous investment and migration decisions. The financial block of our model is different in two dimensions: we incorporate oligopolistic competition in local credit markets and market-clearing in the interbank market. After laying out the model, we discuss the role of each of these channels in Section 4.3. The focus of our policy analysis, bank mergers, is also different. Corbae et al. (2026) build a quantitative model of bank mergers with imperfect competition but where the fully-fledged spatial component is absent.

Finally, we contribute to the literature in industrial organization and finance that studies the role of geography in lending. Petersen and Rajan (2002) document how advances in information technology allowed U.S. borrowers to access more distant lenders. Ashcraft (2005), Garmaise and Moskowitz (2006) and Nguyen (2019) show that bank branch closures led to declines in lending, while Becker (2007) and Gilje et al. (2016)

[1] A vast literature, including Lucas (1990), study frictions to international investment. See Pellegrino et al. (2025) for a recent framework suitable to analyze frictions in an international context.

show that local bank-level deposit shocks lead to loan growth by exposed banks. Taken together, these studies suggest that despite technological change, credit markets remain local to some extent. In line with this definition of the market, a series of papers have examined banks' local market power in deposits and credit markets (Degryse and Ongena, 2005; Scharfstein and Sunderam, 2016; Drechsler et al., 2017; Crawford et al., 2018; Wang et al., 2020; Aguirregabiria et al., 2025; Bordeu et al., 2026). We contribute to this literature by quantifying the general equilibrium effects of local market power in a spatial model.

The rest of the paper is organized as follows. In Section 2, we overview the banking sector and its geographic footprint in Chile, and describe our data sources. In Section 3, we analyze localized deposit shocks and trace their impact on loans and interest rates across cities. Section 4 presents our quantitative model and Section 5 our estimation procedure. In Section 6, we use the model to explore the economic effects of interbank frictions and market power, while in Section 7 we evaluate the economic effects of all possible two-bank mergers in Chile. Section 8 concludes.

2 Context and data sources

Chile has a well-developed financial system in which banks play a central role. Between 2012 and 2018, the period we analyze, credit to the private sector increased from 104% to 118% of GDP. Banks account for roughly 78% of credit, and survey data show that firms of all sizes rely heavily on banks for financing.[2]

The Chilean banking industry is highly concentrated at the national level. Panel A in Table 1 reports loan market shares for the ten largest banks. The two largest banks each held approximately 18% of the loan market; the top four accounted for just over 60% of the market; and the ten largest banks together covered nearly the entire market. Omitting *BancoEstado*, the only state-owned retail bank, the Herfindahl–Hirschman Index (HHI) in 2015 was 1,600.

Banks in Chile are chartered nationally, headquartered in Santiago, and operate branches across the country. The first column of Panel A of Table 1 shows the number of cities served by each bank. We find no evidence of spatial correlation between a bank's activity on the extensive margin (presence in a city) or on the intensive margin (local market share) across city pairs at varying distances. Following Conley and Topa (2002), we interpret this as evidence that branches are not geographically clustered.[3] This pattern stands in contrast to the U.S., where historical restrictions on interstate expansion have led banks to concentrate regionally (Oberfield et al., 2024). The absence of geographic clustering in Chilean banking makes this an

[2]See Appendix Section A.1 and Section A.2 for a discussion of the empirical references in this paragraph.

[3]See Section A.4 in the Appendix for a detailed description of these results.

ideal setting to isolate the role of financial linkages from that of physical proximity.

Although banks' liabilities also include bonds, external credit, and Central Bank borrowing through credit lines, deposits remain banks' primary funding source, while loans account for the majority of their assets (Marivil et al., 2021). As of December 2015, the system-wide loan-to-deposit ratio stood at 1.14. Panel A of Table 1 documents how this ratio varies across banks. In our subsequent analysis we abstract from alternative instruments and allow banks to lend to each other to capture dispersion in loan-to-deposit ratio across banks.

Table 1: Summary Statistics: The Spatial Distribution of Banks in 2015

A. Top banks	City Coverage	National Loan Share	Loans-to-Deposits
Santander	97	0.18	1.18
de Chile	111	0.18	1.27
BancoEstado	223	0.14	0.89
de Crédito e Inversiones	93	0.12	1.11
BBVA	61	0.06	1.21
Corpbanca	47	0.06	1.17
Scotiabank	51	0.06	1.54
Itaú	38	0.05	1.33
Security	17	0.03	1.12
BICE	16	0.02	1.03
B. Cities	Banks per City	HHI in Loans	Loans-to-Deposits
Average	4.4	3,300	0.92
Percentile 25	2	1,900	0.40
Median	3	2,700	0.66
Percentile 75	7	4,100	1.36

Notes: Authors' calculations using public data from the CMF. We use the stock of outstanding loans and deposits in December 2015 for the second and third columns of panel B.

Given our focus on spatial disparities, it is noteworthy that despite the overall depth and concentration of Chile's financial system, financial development varies markedly across Chilean regions. Figure 1a illustrates this by showing outstanding bank loans in 2015, scaled by regional GDP.[4] Cities tend to be served by a small number of banks. The average number of banks per city was 4.4, and the median was 3. Figure 1b plots, for each region, the median number of banks per city. There is a positive correlation (0.38) between the median number of banks per city and regional financial development, discussed before. The small number of banks translates into an average HHI across cities of 3,300 and a median of 2,700.[5] Figure 1c displays the distribution of local HHI across regions, and the second column in Panel B in Table 1 shows summary

[4] Regions are the finest level of disaggregation at which GDP data are available. This measure of financial development excludes credit extended by non-bank financial institutions and instruments other than loans, so the resulting ratios are lower than those reported nationally.

[5] These indices exclude very small cities with only one bank, typically *BancoEstado*.

statistics at the city-level.

As pointed out by Aguirregabiria et al. (2025) for the US, banks shift resources across cities by using deposits collected in one location to finance loans elsewhere. To measure the extent of domestic capital flows, we calculate the loan-to-deposit ratio for each city using the stock of outstanding loans and deposits as of December 2015. Figure 1d shows the resulting pattern at the regional level and the third column in Panel B of Table 1 at the city level. There is substantial variation in the relative importance of deposits and loans across cities, a feature that our model will be able to replicate.

(a) Financial Development (b) Banks per City (c) HHI in Loans (d) Loans-to-Deposits

Figure 1: Spatial Financial Development and the Network of Bank Branches

Notes: Authors' calculations using public data from the CMF on loans and deposits and regional GDP data from the Central Bank of Chile. The first panel shows the value of loans issued during 2015 in each region over regional GDP, both in current prices. For the third and fourth panels, we use the stock of outstanding loans and deposits in December 2015.

2.1 Data sources

Our first source of data is publicly available data on total deposits and loans at the city-bank level from the Financial Market Commission (henceforth CMF), the agency responsible for supervising the stability and development of Chile's financial markets. The CMF collects detailed reports from financial institutions, including the stock of loans and deposits by type, currency, bank, and city. We construct city-bank aggregates by adding up instruments denominated in local currency, inflation-adjusted units, and foreign currency, combining both commercial and mortgage loans, as well as deposits with varying liquidity. The value of loans and deposits at the city-bank level in 2015 forms the basis of descriptive statistics in Section 2, the empirical analysis focused on quantities in Section 3, and are part of our estimation targets in Section 5. We only consider loans and deposits from *BancoEstado* for the descriptive statistics, and exclude them for all other exercises. The data covers 2012-2018 and is reported monthly.

To analyze the effect of deposit shocks on interest rates we complement this data with administrative loan-level data for the same period, also collected by the CMF. Given that interest rates differ across instruments and borrowers, the main advantage of this data is that we can focus on loans taken by firms, while the value of loans reported in the publicly available data includes loans for all types of purposes such as mortgages or consumer loans. Moreover, the richness of the data allows us to control for a rich set of characteristics of the borrowing firm and the loan, which is crucial for interpreting changes in average interest rates across time. Section A.5 in the Appendix contains detail on the variables and how we restrict our sample. We use these data for the empirical analysis focused on interest rates in Section 3.

In Section 5, we estimate a subset of parameters from our quantitative model by matching the spatial distribution of employment and wages. We measure private-sector employment and average wages by city in 2015 using administrative data from the Unemployment Fund Administrator (henceforth AFC). The AFC is a regulated private entity that manages unemployment insurance contributions made jointly by formal private-sector workers and their employers.[6]

We use data on travel times between cities to estimate transport costs. We draw these data from the Google Maps API.

[6]These contributions are a fixed share of monthly wages, capped at approximately USD 5,000. We impose two additional filters on the sample. We restrict the sample to firms that appear in the Firms' Directory used by Chile's National Accounts and that employ, on average, at least three workers throughout the sample period. The final dataset includes 160,482 firms.

3 The spatial propagation of local deposit shocks

3.1 Empirical Strategy

We estimate the causal effect of bank-level deposit inflows on credit supply in cities that are not directly exposed to the deposit shock. The analysis uses the monthly CMF city-bank panel of deposits and loans described in Section 2. The identifying variation comes from persistence in deposit supply and world salmon prices interacted with banks' predetermined exposure to salmon-producing deposit markets. Salmon production is geographically concentrated in southern Chile, so salmon-price increases raise local income and deposits in a small set of cities. We therefore compare banks lending in the same destination city and month but with different exposure to these deposit markets.

The second-stage equation is

$$\log L_{nbt} = \beta \widehat{\log D}_{bt} + \rho \log L_{nb,t-4} + \gamma_{nb} + \gamma_{nt} + \varepsilon_{nbt}, \tag{1}$$

where L_{nbt} is current loans in all currencies by bank b in city n and month t, and $\widehat{\log D}_{bt}$ is the fitted value of bank b's deposits. City-bank fixed effects absorb persistent local bank relationships, and city-month fixed effects absorb local credit demand, which may itself respond to the deposit shock. By including city-month fixed effects, therefore, our estimates are on relative increases in lending. The lagged loan stock allows for persistence in lending relationships. Since the treatment varies at the bank-month level, we cluster standard errors by bank-month.

We use two instruments for $\log D_{bt}$: four-month lagged deposits, $\log D_{b,t-4}$, and a salmon shift-share instrument. Let

$$S_b = \sum_{n \notin Santiago} \omega^D_{nb,2011} \alpha^{\mathcal{F}}_n, \tag{2}$$

where $\omega^D_{nb,2011}$ is the share of bank b's 2011 deposits coming from city n, and $\alpha^{\mathcal{F}}_n$ is the 2015 fishing employment share. The salmon instrument is

$$Z^{\Delta p}_{bt} = S_b \left(\log p^{salmon}_{t-1} - \log p^{salmon}_{t-4} \right). \tag{3}$$

The corresponding first stage is

$$\log D_{bt} = \pi_1 \log D_{b,t-4} + \pi_2 Z^{\Delta p}_{bt} + \rho^D \log L_{nb,t-4} + \gamma^D_{nb} + \gamma^D_{nt} + u_{nbt}. \tag{4}$$

Our instruments compare banks with different lagged deposits and predetermined exposure to salmon-producing deposit markets when salmon prices grow between the period at which lagged deposits are measured and the current month.

An increase in the price of salmon may plausibly increase economic activity in cities specializing in this industry, which may in turn increase borrowing. For the exclusion restriction to be plausible in our setting, in the second stage we keep only non-Santiago cities with zero fishing employment and drop cities within 50 kilometers of a core fishing municipality. Core fishing municipalities are those at or above the 90th percentile of the 2015 fishing employment share.

A second concern with our lagged deposits instrument is that a bank's appeal may attract both borrowers and savers alike when, for example, the bank opens new branches in a city. In the Appendix Section A.7 we show that our results are robust to using a measure of deposits on the right-hand side of equation (1) in which we exclude the deposits stemming from the city n and its nearby locations.

Finally, we focus on privately owned banks and, after calculating market shares in the heterogeneity exercises, exclude *BancoEstado* from the estimating bank sample.

We are interested in studying heterogeneous responses in cities with different characteristics; for this section, we proceed as follows. For a predetermined heterogeneity variable H, we replace $\beta\widehat{\log D}_{bt}$ in equation (1) with $\beta_0\widehat{\log D}_{bt} + \beta_1 \widehat{\log D_{bt}} \times H$. We instrument the two endogenous terms with the two instruments, $\log D_{b,t-4}$ and $Z_{bt}^{\Delta p}$, and their interactions with H. We use two characteristics. Distance is the city's distance to core fishing areas, measured in thousands of kilometers. Market share is bank b's share of current loans in city n, computed over the first year in which the city-bank pair is observed and then held fixed.

We replicate the same empirical strategy, using interest rates as the outcome, with the loan-level CMF data described in Section 2. Our estimating equation in this case is

$$\log(1 + i_{\ell ft}^b) = \alpha_1 \widehat{\log D}_{bt} + \gamma_{nb} + \gamma_{nt} + \alpha_2 X_{ft} + \alpha_4 X_{\ell t} + \epsilon_{\ell ft}^b. \tag{5}$$

where X_{ft} and $X_{\ell t}$ capture a detailed set of firm and loan characteristics. We weight observations by the inverse of the number of loans in that city-bank-month bin, so that results are comparable to our analysis of loans.

3.2 Results

Column (1) in Table 2 reports the estimates from the regression of $\log D_{bt}$ on the two instruments. Both coefficients have the expected sign and the excluded instruments F-statistic is 146.21, above conventional levels of significance.

Table 2: Deposit Shocks, Lending, and Interest Rates

	$\log D_{bt}$	*Loans*			*Interest Rates*		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$\log D_{b,t-4}$	0.880***						
	(0.054)						
Salmon price growth IV	13.037**						
	(5.136)						
Deposits		0.132***	0.155***	0.135***	−0.010***	−0.015***	−0.012***
		(0.037)	(0.037)	(0.037)	(0.002)	(0.005)	(0.003)
× Distance			−0.017			−0.0045	
			(0.024)			(0.0028)	
× Mkt Share				−0.208*			0.041***
				(0.123)			(0.006)
Loans_{t-4}		0.605***	0.606***	0.602***			
		(0.027)	(0.027)	(0.029)			
City × Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
City × Month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Loan Controls	–	–	–	–	Yes	Yes	Yes
Observations	19,794	19,794	19,794	19,794	276,009	276,009	276,009
Banks	14	14	14	14	6	6	6
KP F-statistic	146.21	146.21	51.35	77.81			

Notes: Column (1) reports the first-stage regression of bank deposits on the two instruments: four-month lagged deposits and $S_b(\log p^{salmon}_{t-1} - \log p^{salmon}_{t-4})$. Columns (2)–(4) report 2SLS on loan issuance, without weights. The loan sample excludes Santiago, cities with positive fishing employment, and cities within 50 kilometers of core fishing municipalities. Columns (5)–(7) report loan-level interest-rate estimates, weighting observations by the inverse of the number of loans by city-bank-month. Standard errors are clustered at the bank-month level in parentheses for columns (2)–(7). In column (1), the KP F-statistic row reports the excluded-instruments F-statistic. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

The effects of deposit shocks on loan issuance are shown in Columns (2)-(4) in Table 2. The coefficient in Column (2), 0.132, implies that lending increases — relative to other banks — when a bank's deposit funding increases. As shown in Column (3), the effect does not decay with distance to the fishing area, indicating that financial linkages operate independently of it. Our second heterogeneity exercise, shown in Column (4), shows that lending responses are stronger in cities where the shocked bank holds a smaller market share.

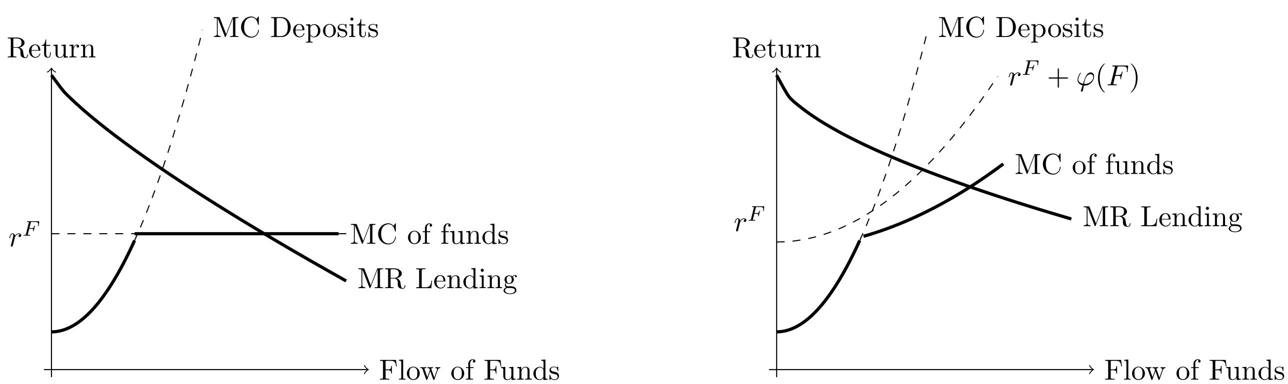
The effects of deposit shocks on interest rates, shown in Columns (5)-(7) in Table 2, point in the same direction. Deposit shocks lower interest rates, and the rate response is independent of distance but is stronger in cities where the bank holds a smaller market share.

Taken together, the quantity and price evidence points to the two mechanisms at the center of our analysis. First, deposit shocks lead banks to lend more and lower their rates, indicating that firms' access to credit depends on the deposit funding of the banks whose branches operate in their city. Second, the finding that lending and interest-rate responses are stronger where the bank holds a smaller market share substantiates the role of local market power.

3.3 Banks' substitutability between deposits and other sources of funding

Our empirical results suggest that deposits and other sources of funding are not perfect substitutes. This argument can be illustrated by focusing on the two sides of the balance sheet and distinguishing between two sources of funds: deposits and an alternative we label wholesale funds in this discussion. With market power over deposits, banks need to pay more to attract additional deposits. With market power in lending, marginal revenue decreases as total loans issued increase. Figure 2 illustrates this basic setting and banks' responses to a shock to deposits in partial equilibrium.

In both panels, the size of banks' balance sheet is determined by equating the marginal revenue of lending with the marginal cost of funds from either retail deposits or wholesale funding. In panel (a), we assume the marginal cost in the wholesale market is constant at r^F. A positive shock to deposits (captured by an outward shift of the MC deposits curve) alters the funding composition but not the size of the balance sheet. In panel (b), where we assume the marginal wholesale costs are increasing in volume, a positive shock to deposits reduces funding costs at the margin, enabling higher lending and lower interest rates on loans. Our empirical results align with this latter case.



(a) Constant wholesale cost r^F

(b) Increasing wholesale cost $r^F + \varphi(F)$

Figure 2: Balance sheet effects of deposit shocks

As illustrated in panel (b), the effects of deposit shocks on lending and interest rates depend on two features of the environment. First, the slope of the wholesale cost curve determines how much a shift in the funding mix reduces marginal costs. Steeper wholesale costs imply that banks rely more on deposits before the shock and that the marginal cost reduction from additional deposits is larger. Second, the slope of the marginal revenue curve governs how much lending expands in response to a given reduction in marginal costs. Flatter marginal revenue—corresponding to more elastic loan demand—implies larger quantity responses and smaller price responses. Following this intuition, we use the results in Table 2 as targets to calibrate the degree of interbank frictions and the elasticity of loan demand in the quantitative version of the model.

Why are deposits and wholesale funding not perfect substitutes? A large literature argues that deposits are banks' preferred funding source due to their low cost and stability (Kashyap et al., 2002; Hanson et al., 2015). Deposits provide liquidity services to customers and are often insured, which enhances their resilience relative to market-based funding. In Chile, as in many countries, deposits are insured up to a legal threshold, further strengthening this channel. In our quantitative model, we capture these frictions parsimoniously by assuming that banks face non-pecuniary costs when borrowing on the wholesale market. Following Oberfield et al. (2024), we assume this cost to be increasing and convex in the volume borrowed.[7]

In our model we will assume that the wholesale market is an interbank market in which banks lend funds to each other. As we showed in Section 2, this approximates the banking sector in Chile where the aggregate ratio of loans to deposits is close to one. Integrating the mechanisms we study in this paper with alternative sources of funds for banks in the wholesale market is an interesting avenue in which to extend our analysis.

4 Model

We build a model that can match our empirical results quantitatively and be used to study the effects of the geographic distribution of bank branches on productivity and welfare, as well as specific policies aimed at improving financial linkages between cities. We borrow the basic structure of the model from Kleinman et al. (2023), which includes trade, migration, and endogenous investment in physical capital. Tractability comes from assuming mobile, hand-to-mouth workers and immobile capitalists. We embed the network of bank branches (which we take as given) into this structure for the rest of the economy. In line with our empirical results and studies at the intersection of industrial organization and finance, we assume that credit markets are local and banks have market power when setting local interest rates (Aguirregabiria et al., 2025).

4.1 Setup

The economy consists of N cities, indexed by n, and B banks, indexed by b. Time is discrete. There are three types of agents: workers, capitalists, and bank owners. Workers are homogeneous, do not save or borrow and are freely mobile across cities. Capitalists are immobile and reside permanently in one city, where they own the local physical capital. Capitalists rely on local bank branches for their saving and borrowing decisions. We denote the set of banks with branch presence in city n as $\mathcal{B}^n$.

[7] One possible interpretation for this functional form assumption is debt overhang costs associated with wholesale funding in a risky environment, as in Andersen et al. (2019).

We begin by specifying local production technologies and workers' migration decision. We then turn to the problem of capitalists, deriving their supply of savings and demand for loans. Finally, we introduce bank owners, their objective function, and constraints when setting interest rates.

4.1.1 Production and trade

Each location produces a differentiated good. The representative firm in location n hires labor, ℓ_{nt}, and capital, k_{nt}, from workers and capitalists, respectively, and makes production decisions in a perfectly competitive environment. The firm produces according to a Cobb-Douglas technology given by

$$y_{nt} = z_n \left(\frac{\ell_{nt}}{\mu}\right)^{\mu} \left(\frac{k_{nt}}{1-\mu}\right)^{1-\mu},$$

where z_n denotes productivity.

Trade is costly. For one unit to arrive in location n, $\tau_{ni} \geq 1$ units must be shipped from location i. The price of a good of variety i for a consumer located in n is given by

$$p_{nit} = \tau_{ni} p_{iit} = \frac{\tau_{ni} w_{it}^{\mu} r_{it}^{1-\mu}}{z_i},$$

where p_{iit} denotes the free-on-board price for the good produced in city i.

4.1.2 Workers

There is a unit mass of identical and infinitely-lived hand-to-mouth workers. The problem of a worker located in city n is as follows. First, she decides how much to consume of each of the N goods in the economy, aggregating goods from all origins with a constant elasticity of substitution,

$$C_{nt}^{w} = \left(\sum_{i=1}^{N} (c_{it}^{w})^{\frac{\sigma_c - 1}{\sigma_c}}\right)^{\frac{\sigma_c}{\sigma_c - 1}}. \tag{6}$$

The consumption price index in city n, P_{nt}, and the fraction of expenditure of city n in goods from city i, π_{nit}, are

$$P_{nt} \equiv \left(\sum_{i} (\tau_{ni} p_{iit})^{1-\sigma_c}\right)^{\frac{1}{1-\sigma_c}} \quad \text{and} \quad \pi_{nit} = \left(\frac{\tau_{ni} p_{iit}}{P_{nt}}\right)^{1-\sigma_c}. \tag{7}$$

The budget constraint of a worker is given by

$$P_{nt}C^w_{nt} = w_{nt}(1-\tau)$$

where τ is a labor income tax. While the tax is zero in our baseline scenario, it will play a role in the policies we study in Section 6. After consuming in period t, the worker faces idiosyncratic utility shocks of moving to each destination city d, ε_{dt}, and makes her moving decision at the end of the period. Given our focus on steady state outcomes, we assume there are no migration costs.

All things considered, workers' value of living in city n at t combines an amenity value b_n, consumption utility, and the continuation value of moving:

$$v^w_{nt} = \log(b_n C^w_{nt}) + \max_d\{\beta \mathbb{E}_t[v^w_{dt+1}] + \rho\epsilon_{dt}\}. \tag{8}$$

We assume that idiosyncratic shocks ϵ are drawn from an extreme value distribution, $F(\epsilon) = \exp(-\exp(-(\epsilon - \bar{\gamma}))$. The parameter ρ captures the relative importance of idiosyncratic reasons for migration that are not captured by amenities or real income in a city. The expectation is taken with respect to future realizations of idiosyncratic shocks ϵ_{dt+1}.

4.1.3 Capitalists: loan demand and investment

There is one infinitely-lived immobile representative capitalist per city. The capitalist owns the local stock of physical capital and rents it to producers. To transfer resources inter-temporally, the capitalist can either invest in physical capital or save using deposits at local bank branches. Both deposits and loans are one-period, risk-free claims. In what follows, we characterize the capitalist's demand for loans and supply of deposits separately, as each plays a distinct role in the model.

To invest in physical capital, the capitalist must borrow from local banks. In practice, banks specialize in lending to firms of different sizes, sectors, or exporting status. We capture this heterogeneity by assuming that loans from different banks are imperfect substitutes from the perspective of the borrower. Specifically, one unit of investment good is produced by combining real borrowed amounts from different banks according to a CES aggregator,

$$i_{nt} = \left[\sum_{b\in\mathcal{B}_n}\left(\gamma^b_n \frac{L^b_{nt+1}}{P_{nt}}\right)^{\frac{\sigma-1}{\sigma}}\right]^{\frac{\sigma}{\sigma-1}}, \tag{9}$$

where L^b_{nt+1} denotes loans issued in period t and maturing at $t+1$, and P_{nt} is the consumption price index from equation (7). The parameters γ^b_n capture the fit between bank b and the activities conducted in city

n. The elasticity of substitution between banks, σ, governs how easily the capitalist can redirect borrowing across banks and is therefore a key determinant of banks' local market power.

The capitalist chooses how much to borrow from each bank to minimize the cost of financing a given level of investment:

$$\mathcal{L}_{nt}(i_{nt}) = \min_{\{L^b_{nt+1}\}_b} \sum_{b \in \mathcal{B}_n} L^b_{nt+1}(1 + r^b_{nt+1}) \quad \text{s.t.} \quad \text{equation (9)}.$$

The solution yields a demand function for loans from bank b that takes the CES form:

$$\frac{L^b_{nt+1}}{P_{nt}} = (\gamma^b_n)^{\sigma-1} \left(\frac{R_{nt+1}}{1 + r^b_{nt+1}} \right)^{\sigma} i_{nt}, \tag{10}$$

where

$$R_{nt+1} \equiv \left[\sum_{b \in \mathcal{B}_n} \left(\frac{1 + r^b_{nt+1}}{\gamma^b_n} \right)^{1-\sigma} \right]^{\frac{1}{1-\sigma}} \tag{11}$$

is the loan price index—the effective cost of one unit of investment financing. Demand for loans from bank b is decreasing in r^b_{nt+1} relative to the price index R_{nt+1}, with the elasticity governed by σ. The total cost of financing investment is

$$\mathcal{L}_{nt}(i_{nt}) = i_{nt} R_{nt+1} P_{nt}. \tag{12}$$

4.1.4 Capitalists: deposits, consumption, and the full problem

Having characterized how the capitalist finances investment, we now turn to her broader inter-temporal problem. Following the finance literature, we assume that capitalists derive utility from both consumption and the liquidity services provided by deposits (Drechsler et al., 2017; Morelli et al., 2024). The parameter α controls the weight on liquidity benefits. Deposits from different banks are aggregated with an elasticity of substitution η, with parameters κ^b_n capturing differences in the utility of deposits across banks associated, for example, with a bank having more branches in the city.

The capitalist's problem is[8]

$$\max_{\{C^c_{nt}, D^b_{nt+1}, k_{nt+1}\}_{t=0}^{\infty}} \sum_{t=0}^{\infty} \beta^t \left[\log C^c_{nt} + \alpha \log D_{nt+1} \right], \tag{13}$$

where

$$D_{nt+1} = \left[\sum_b (\kappa^b_n D^b_{nt+1})^{1-\frac{1}{\eta}} \right]^{\frac{\eta}{\eta-1}},$$

[8] We assume that the intra-temporal consumption problem of a capitalist is equivalent to the workers' with the same elasticity of substitution across goods from different locations.

subject to the budget constraint

$$P_{nt}C_{nt}^{c} + \sum_{b} D_{nt+1}^{b} + i_{nt-1}R_{nt}P_{nt-1} = \hat{r}_{nt}k_{nt} + \sum_{b} D_{nt}^{b}(1+\tilde{r}_{nt}^{b}) + T_{nt}^{c} \tag{14}$$

and the capital accumulation equation $k_{nt+1} = k_{nt}(1-\delta) + i_{nt}$.

The budget constraint has a natural interpretation: income on the right-hand side comes from renting out capital at rate $\hat{r}_{nt}$, the return on deposits maturing at t, and a government transfer T_{nt}^{c} specified below. This income finances consumption, new deposits, and the repayment of loans that were taken out at $t-1$ to finance investment.

The first-order conditions yield a demand for deposits from bank b that mirrors the CES structure of loan demand:

$$D_{nt+1}^{b} = (\kappa_{n}^{b})^{\eta-1}\left(\frac{Q_{nt+1}}{q_{nt+1}^{b}}\right)^{\eta} D_{nt+1}. \tag{15}$$

Here q_{nt+1}^{b} is the effective price of a deposit with bank b, defined as

$$q_{nt+1}^{b} \equiv 1 - \frac{1+\tilde{r}_{nt+1}^{b}}{(1-\delta)R_{nt+1}P_{nt}/(R_{nt}P_{nt-1}-\hat{r}_{nt})}, \tag{16}$$

and Q_{nt+1} is the corresponding deposit price index.

The expression for q_{nt+1}^{b} captures the key economic trade-off facing the capitalist. The numerator of the adjustment factor is the gross return on deposits. The denominator is the gross return on physical capital investment, derived from the Euler equation. A deposit is costly to the extent that its pecuniary return falls short of the return the capitalist could earn by investing in physical capital instead. When deposit rates are high, or when investment returns are low, q_{nt+1}^{b} is low and deposits become relatively more attractive.

This connection between q_{nt+1}^{b} and the return on investment plays an important role in the rest of our analysis, where we show that capitalist's demand for deposits shapes the elasticity of *loan* demand faced by banks and, therefore, the markups they charge on loans.

Combining the first-order conditions for deposits and consumption yields closed-form solutions for aggregate deposits and capitalist consumption:

$$D_{nt+1} = \frac{\alpha M_{nt}}{Q_{nt+1} + \alpha Q_{nt+1}^{\eta}\tilde{Q}_{nt+1}}, \tag{17}$$

$$P_{nt}C_{nt}^{c} = \frac{Q_{nt+1}M_{nt}}{Q_{nt+1} + \alpha Q_{nt+1}^{\eta}\tilde{Q}_{nt+1}}, \tag{18}$$

where $M_{nt} \equiv \hat{r}_{nt} k_{nt} + \sum_b (1+\tilde{r}^b_{nt}) D^b_{nt} - i_{nt-1} R_{nt} P_{nt-1}$ is the capitalist's income and $\tilde{Q}_{nt+1}$ is an alternative index across local q^b_{nt+1}, defined in Appendix Section B.2.

The key demand functions stemming from capitalists' behavior are

$$L^b_{nt+1} = (\gamma^b_n)^{\sigma-1} \left(\frac{R_{nt+1}}{1+r^b_{nt+1}} \right)^{\sigma} i_{nt} P_{nt}, \tag{19}$$

$$\text{and } D^b_{nt+1} = (\kappa^b_n)^{\eta-1} \left(\frac{Q_{nt+1}}{q^b_{nt+1}} \right)^{\eta} \frac{\alpha M_{nt}}{Q_{nt+1} + \alpha Q^{\eta}_{nt+1} \tilde{Q}_{nt+1}}. \tag{20}$$

which banks' will take as given. Loan demand from bank b is decreasing in the bank's interest rate r^b_{nt+1}; deposit supply to bank b is increasing in the deposit rate $\tilde{r}^b_{nt+1}$ (which corresponds to a decrease in q^b_{nt+1}). We now turn to how banks set these rates.

4.1.5 Banks

The owner of bank b operates branches in a set of cities denoted by $\mathcal{C}^b$. The cash flow of bank b at time t is

$$\Pi^b_t \equiv \left\{ \sum_{n \in \mathcal{C}^b} \overbrace{L^b_{nt}(1+r^b_{nt})(1-\tau^b_n) + D^b_{nt+1}}^{\text{Retail inflow}} - \overbrace{L^b_{nt+1} - D^b_{nt}(1+\tilde{r}^b_{nt})}^{\text{Retail outflow}} \right\} + F^b_{t+1} - (1+r^F_t) F^b_t - T^b_t.$$

Retail inflows at time t consist of loans maturing at t and new deposits issued at t in all cities where the bank has branches. Retail outflows consist of loans issued at t and deposits maturing at t. The term τ^b_n represents city–bank–specific taxes on loans ($\tau^b_n < 0$ for subsidies). These taxes are zero in our baseline scenario, but they play a role in the policy analysis in Section 6, where we study policies that correct market power. The position of each bank in the interbank market is denoted by F^b_{t+1}. All banks have access to the same interbank interest rate r^F_t, and a positive value of F^b_{t+1} indicates that the bank borrows from other banks. The term T^b_t is a bank-specific lump-sum tax, defined below.

Bank owners choose city-specific nominal interest rates on loans r^b_{nt+1} and the cost of deposits q^b_{nt+1} to maximize the discounted sum of cash flows net of a non-pecuniary cost of tapping into the interbank market, which captures the forces discussed in subsection 3.3.[9] Non-pecuniary costs are assumed to be increasing in the amount borrowed or lent in the interbank market, as in Oberfield et al. (2024). The parameter ϕ governs the elasticity of non-pecuniary costs with respect to volume. Finally, banks must satisfy the balance sheet constraint, equation (22).

[9]We write the bank's problem in terms of the deposit cost q_{nt+1} instead of $\tilde{r}_{nt+1}$ for simplicity; the interest rate can be recovered from equation (16).

The problem of a bank owner is therefore

$$\max_{\{\{r^b_{nt},q^b_{nt}\},F^b_t\}^{\infty}_{t=0}} \sum_{t=0}^{\infty} \beta^t \left\{ \Pi^b_t - \big(\exp(\phi\omega^b) - 1\big)(1 + r^F_t) F^b_t \right\} \tag{21}$$

$$\underline{\text{s.t.}}\ [\mu^b_t] \sum_{n\in\mathcal{C}^b} L^b_{nt+1} = \sum_{n\in\mathcal{C}^b} D^b_{nt+1} + F^b_{t+1} \quad \forall t, \tag{22}$$

$$\text{equation (11), equation (19), equation (20)} \quad \forall t,\ \forall n \in \mathcal{C}^b,$$

where we defined reliance on the interbank market as

$$\omega^b \equiv \frac{F^b_t}{\sum_{n\in\mathcal{C}^b} D^b_{nt}}.$$

We assume oligopolistic competition in the loan market and monopolistic competition in the market for deposits. That is, the bank owner takes the demand for deposits and loans given by equation (20) and equation (19) as given and internalizes its own effect on the interest rate index R_{nt}, but not on Q_{nt} or $\tilde{Q}_{nt}$.[10]

From the first-order conditions of this maximization problem, the marginal cost of issuing loans for bank b is:

$$\mathcal{MC}^b_t \equiv \left(\tfrac{1}{\beta} + \mu^b_t\right) = \exp(\phi\omega^b)(1 + r^F_{t+1})\big(1 + \phi\omega^b\big). \tag{23}$$

From the perspective of a bank, the marginal cost of issuing a loan includes the dollar the bank must give up today in exchange for a dollar tomorrow, in addition to the value of balance sheet space, captured by μ^b_t. The latter depends on how much the bank is currently tapping into the interbank market, as shown in the last expression in equation (23).

Optimal local interest rates satisfy

$$(1 + r^{b*}_{nt+1})(1 - \tau^b_n) = \frac{\varepsilon^{Lb}_{nt}}{\varepsilon^{Lb}_{nt} - 1} \mathcal{MC}^b_t, \tag{24}$$

$$q^b_{nt+1} = -\frac{\eta}{\eta - 1}\beta \left\{ \exp(\phi\omega^b)(1 + r^F_{t+1})\phi(\omega^b)^2 + \mathcal{MC}^b_t - \frac{1}{\beta} \right\}. \tag{25}$$

where $\varepsilon^{Lb}_{nt} \equiv -\frac{\partial L^b_{nt}}{\partial r^b_{nt}} \frac{(1+r^b_{nt})}{L^b_{nt}}$ is the demand elasticity of loans. Equation (24) shows how loan markups vary across cities depending on the local sensitivity of loan demand to interest rates. The local elasticity faced

[10] We exclude oligopolistic competition in deposits to keep the analysis focused on loan rates and because we do not have detailed data on deposit rates to include in our empirical analysis, but it could be easily incorporated into our framework.

by a particular bank is

$$\varepsilon_{nt}^{Lb} \equiv -\frac{\partial L_{nt}^{b}}{\partial r_{nt}^{b}} \frac{(1+r_{nt}^{b})}{L_{nt}^{b}} = \sigma\big(1 - s_{nt+1}^{b}\big) + s_{nt+1}^{b} \varepsilon_{nt+1}^{i}, \tag{26}$$

$$\text{where } \varepsilon_{n}^{i,R} \equiv -\frac{\partial i_{nt}}{\partial R_{nt+1}} \frac{R_{nt+1}}{i_{nt}} \overbrace{=}^{\text{at the steady state}} \frac{1}{\beta(1-\delta)} \left[1 + \frac{D_n Q_n}{\alpha i_n R_n P_n}\right]. \tag{27}$$

and $s_{nt+1}^{b} \equiv \frac{(1+r_{nt+1}^{b})L_{nt+1}^{b}}{i_{nt}R_{nt+1}P_{nt}}$ is bank b's local revenue share.

As in Atkeson and Burstein (2008), the relevant elasticity is a revenue-share-weighted average of the local elasticity of substitution between banks, σ, and the city-level aggregate elasticity of investment with respect to the price index, $\varepsilon_{n}^{i,R}$. We discuss each of these objects in more detail in Section 4.3 below. Similar expressions feature in the models of loan demand in Herreño (2023) and Altavilla et al. (2022). The main feature of our setting is that the aggregate elasticity of investment $\varepsilon_{n}^{i,R}$ is linked to the local availability of deposits.

Equation (25) shows that markdowns on deposits are constant in the model, which follows from our assumption of monopolistic competition in the deposit market. The right-hand side of equation (25) includes an additional term because capturing deposits reduces non-pecuniary costs.[11]

In Section 3 we documented that, following a shock to its deposit base, a bank issues more loans and lowers its interest rates, and we used a simple partial equilibrium model to explain these results in subsection 3.3. The quantitative model captures the same intuition: an increase in deposits lowers marginal costs in the right-hand side of equation (23), which translates into lower interest rates through equation (24) and leads to higher lending through the loan demand function equation (19).

4.1.6 Fiscal policy

The government collects taxes and transfers the revenue back into the economy. In the baseline scenario, the government levies taxes on banks and rebates the revenue to capitalists, both lump-sum from the perspective of banks and capitalists. Taxes on bank b are

$$T_t^b = \sum_{n \in \mathcal{C}^b} L_{nt}^{b}(r_{nt}^{b}(1-\tau_n^b) - \tau_n^b) - D_{nt}^{b}\tilde{r}_{nt}^{b} - r_t^F F_t. \tag{28}$$

The taxes defined in equation (28) are such that after-tax bank cash flows are zero at the steady state, which makes the geographic location of bank owners irrelevant. The government uses these funds to finance

[11] For analyses of market power on the deposit side, see Drechsler et al. (2017) and Albertazzi et al. (2024).

lump-sum transfers to capitalists,

$$T^c_{nt} = \sum_{b \in \mathcal{B}^n} L^b_{nt} r^b_{nt} - D^b_{nt} \tilde{r}^b_{nt}. \tag{29}$$

With the transfers defined in equation (29), capitalist's net interest losses (or gains) from interacting with their local branches are undone by the government transfers. After defining the steady state, we show that government finances are balanced.

Counterfactual analysis. To study the role of market power, we implement policies that undo markups into our baseline model. These city-bank specific subsidies τ^b_n are fully financed by a labor-income tax τ, which adjusts endogenously to satisfy the government's budget balance condition

$$\tau \sum_n w_n \ell_n = -\sum_{b=1}^{B} \sum_{n \in \mathcal{C}^b} L^b_n (1 + r^b_n) \tau^b_n. \tag{30}$$

As we show below, proportional taxes on labor income do not distort workers' moving decisions, and therefore provide a useful tool to undo the distortions coming from market power without incorporating other distortions. Assuming that these policies are fully financed by taxing workers, naturally, is highly demanding on the effect they can have on workers' welfare.

4.2 Steady state

Given a vector of productivity and amenity values, $\{z_n, b_n\}_{n \in N}$, the set of cities in which each bank is present, $\{\mathcal{C}^b\}_{b \in B}$ and fiscal policy $\tau, \{T^b\}_{b \in B}, \{T_n, \{\tau^b_n\}_{b \in \mathcal{B}^n}\}_{n=1}^N$, a steady state consists of a vector of prices $r^F, \{w_n, p_n, \{r^b_n, \tilde{r}^b_n\}_{b \in B}\}_{n \in N}$, and quantities $\{F^b\}_{b \in B}, \{\ell_n, k_n, i_n, y_n, C^w_n, C^c_n, k_n, \{L^b_n, D^b_n\}_{b \in B}\}_{n \in N}$, that satisfy: ($i$) optimality for consumption shares, equation (7); (ii) the labor market clearing condition:[12]

$$\ell_n = \frac{\left(\frac{b_n w_n (1-\tau)}{P_n}\right)^{\frac{\beta}{\rho}}}{\sum_{i=1}^N \left(\frac{b_i w_i (1-\tau)}{P_i}\right)^{\frac{\beta}{\rho}}} \ \ \forall n, \tag{31}$$

where ℓ_n is labor demand from local firms; (iii) capitalist's consumption, borrowing, and saving optimality conditions, equation (18), equation (20) and equation (19); (iv) optimality conditions from the bank owner's problem, equation (23), equation (24) and equation (25); (v) market clearing for final goods

[12]See Section B.1 for a derivation.

$$w_n \ell_n + \hat{r}_n k_n = \sum_{i=1}^{N} \pi_{ni} \left(P_i C_i^w + P_i C_i^c + \sum_{b \in \mathcal{B}^i} L_i^b \right) \quad \forall n, \tag{32}$$

where consumption of city n goods comes from workers and capitalists nationally; (vi) market clearing in the interbank market,

$$\sum_b F^b = 0; \tag{33}$$

(vii) the definition of bank taxes and capitalist's transfers, equation (28) and equation (29); and $(viii)$ all variables are time invariant.

4.2.1 Fiscal policy at the steady state

Bank profits are fully taxed at the steady state: Bank b's cash flows are

$$\Pi_t^b = \left\{ \sum_n L_{nt}^b (1 + r_{nt}^b)(1 - \tau_n^b) + D_{nt+1}^b - L_{nt+1}^b - D_{nt}^b (1 + \tilde{r}_{nt}^b) \right\} + F_{t+1}^b - (1 + r_t^F) F_t^b - T_t^b.$$

At a steady state in which $L_n^b = L_{nt}^b, D_n^b = D_{nt}^b$, and $F^b = F_t^b$ for all t, and using equation (28),

$$\Pi^b = \left\{ \sum_n L_n^b (r_n^b (1 - \tau_n^b) - \tau_n^b) - D_n^b \tilde{r}_n^b \right\} - r^F F^b - T^b = 0.$$

Budget balance: The budget constraint of the government in the baseline case, $\tau_n^b = 0 \ \forall n, b$ is satisfied if

$$\sum_{n=1}^{N} T^c = \sum_{b=1}^{B} T^b$$

$$\sum_{n=1}^{N} \sum_{b \in \mathcal{B}^n} L_n^b r_n^b - D_n^b \tilde{r}_n^b = \sum_{b=1}^{B} \sum_{n \in \mathcal{C}^b} L_n^b r_n^b - D_n^b \tilde{r}_n^b - r^F F^b$$

$$r^F \sum_{b=1}^{B} F^b = 0$$

which follows from market clearing in the interbank market equation (33).

4.3 The determinants of local interest rates

Bordeu et al. (2026) document substantial dispersion in interest rates across Chilean cities, even after controlling for borrower characteristics and the identity of the lending bank, suggesting that credit markets have a strong local component. In line with this idea, our empirical results in Section 3 show that interest rate responses differ across cities depending on local market structure. In this section, we show how the model generates city-specific interest rates as an equilibrium outcome and discuss the mechanisms at play. We begin with a simplified version of the model to build intuition, then present the general case.

A simplified benchmark. Consider a version of the model in which there are no city-bank-specific matches ($\gamma_n^b = 1$ for all n, b) and no interbank frictions ($\phi = 0$). In this case, all banks face the same marginal cost, equal to the interbank rate $\mathcal{MC}^b = 1 + r^F$. By symmetry, all banks charge identical interest rates in a given city and hold equal market shares, $s_n^b = 1/B_n$, where B_n is the number of banks present. The common interest rate in city n then satisfies

$$1 + r_n = \frac{\sigma B_n - \Delta_n}{B_n(\sigma - 1) - \Delta_n}(1 + r^F) \quad \text{and} \quad \Delta_n \equiv \sigma - \varepsilon_n^{i,R}, \tag{34}$$

where Δ_n is the gap between the elasticity of substitution across banks and the aggregate elasticity of investment demand with respect to the loan price index. equation (34) highlights two determinants of local interest rates: the number of competing banks and the sensitivity of local investment to borrowing costs.

The markup in equation (34) can be rewritten as $(\sigma - \Delta_n/B_n)/(\sigma - \Delta_n/B_n - 1)$. As the number of banks increases, $\Delta_n/B_n \to 0$ and the markup converges to the standard monopolistic competition benchmark, $\sigma/(\sigma - 1)$, which obtains when each bank's market share is negligible. The rate of convergence depends on Δ_n: in cities where the gap between the inner and outer elasticities is large, adding a bank has a bigger effect on markups. When $\Delta_n > 0$ (which, as we discuss below, is the empirically relevant case), it follows that

$$\frac{\partial(1 + r_n)}{\partial B_n} = \frac{-\Delta_n}{[B_n(\sigma - 1) - \Delta_n]^2}(1 + r^F) < 0$$

and more banks unambiguously lower local interest rates. In cities where Δ_n is large, local investment demand is relatively inelastic at the aggregate level, making the number of banks a more important determinant of interest rates.

The general case. In the full model, bank-specific marginal costs and city-bank matches generate asymmetric market shares, leading to the steady-state general markup expression from equation (26):[13]

$$1 + r_n^b = \underbrace{\frac{\sigma - s_n^b \Delta_n}{\sigma - s_n^b \Delta_n - 1}}_{\text{markup}} \mu^b \tag{35}$$

The markup is increasing in s_n^b whenever $\Delta_n > 0$: A bank with a larger local market share faces less elastic demand because borrowers have fewer alternatives, pushing the effective elasticity toward the lower outer elasticity $\varepsilon_n^{i,R}$.

The effective elasticity of loan demand faced by bank b in city n is given by equation (26). As in Atkeson and Burstein (2008), this is a revenue-share-weighted average of two elasticities: σ, which governs substitution between banks for a given level of investment, and $\varepsilon_n^{i,R}$, which governs how aggregate investment responds to the overall cost of borrowing. Similar expressions feature in the models of loan demand in Herreño (2023) and Altavilla et al. (2022).

A distinguishing feature of our framework is that $\varepsilon_n^{i,R}$ is not a structural parameter but an endogenous object linked, in steady state, to the local availability of deposits:

$$\varepsilon_n^{i,R} = \frac{1}{\beta(1-\delta)} \left(1 + \frac{D_n Q_n}{\alpha i_n R_n P_n}\right). \tag{36}$$

The ratio $D_n Q_n / (\alpha i_n R_n P_n)$ compares the value of the capitalist's deposit portfolio to her investment expenditure. In cities where this ratio is high, capitalists rely more on deposits as a means of inter-temporal transfer and investment demand is more elastic, because capitalists can more easily substitute away from investment toward saving. A high deposit-to-investment ratio therefore tightens the competitive environment that banks face, limiting the role of local market shares in loans.

This expression for the outer elasticity contrasts with Atkeson and Burstein (2008), where both the inner and outer elasticities are fixed parameters of consumer preferences. In our setting, the outer elasticity responds to equilibrium conditions, creating an additional channel through which local financial conditions shape markups.

The role of interbank frictions. In the simplified model, equation (34) shows how the interbank market transmits shocks across cities: an increase in loan demand elsewhere raises r^F, crowding out lending in city n. In the full model, interbank frictions create additional heterogeneity across banks. To understand their

[13] All derivations in this subsection are relegated to Appendix Section B.4.

effect on local interest rates, we take a first-order approximation around the frictionless benchmark ($\phi = 0$) and decompose the change in the loan-weighted average interest rate:[14]

$$1 + r_n(\phi) \approx (1 + r_n(0))(1 + 2\phi\bar{\omega}_n) \tag{37}$$

where $\omega^b \equiv F^b/D^b$ is bank b's reliance on the interbank market (positive for net borrowers, negative for net lenders) and $\bar{\omega}_n \equiv \frac{1}{B_n}\sum_{b\in\mathcal{B}_n}\omega^b$ is the simple average across banks in city n.[15]

This approximation shows that local interest rates depend on whether the banks lending in the city are connected to deposits. In cities with branches from banks that rely mostly on deposits for funding, $\omega_n \approx 0$ and local interest rates are lower. The strength of this mechanism depends on the size of interbank frictions.

Our model introduces two key ingredients relative to benchmark models at the intersection of banking and spatial economics: frictions in the interbank market and oligopolistic competition in local credit markets. Having illustrated the role of these channels theoretically, we now turn to estimating the model to assess their quantitative importance.

5 Estimation

We estimate the model by matching our empirical results in Section 3 and the spatial distribution of employment, wages, and lending in 2015. Table 3 lists the parameters we borrow from the literature as well as internally estimated parameters with their empirical counterparts.

We borrow μ, δ, β and ρ from Kleinman et al. (2023), who parameterize their model to the U.S. economy. We set the value of the elasticity of substitution across final goods to 4, which is standard in the literature, and assume that transport costs are a function of travel times, namely $\tau_{ij} = t_{ij}^{0.375}$ (Redding and Rossi-Hansberg, 2017). We borrow the deposit-elasticity of substitution across banks from Albertazzi et al. (2024), who study deposit markdowns in Europe.

The elasticity of substitution across banks is pinned down by the ratio of the loan and interest-rate responses to deposit shocks, and this mapping is exact. Taking logs of the loan demand function equation (19),

$$\log L_n^b = -\sigma \log\big(1 + r_n^b\big) + \underbrace{(\sigma - 1)\log\gamma_n^b}_{\text{city-bank FE}} + \underbrace{\sigma \log R_n + \log i_n + \log P_n}_{\text{common to all } b\in\mathcal{B}_n},$$

[14] The factor of 2 in equation equation (37) comes from the functional-form assumption on nonpecuniary costs of tapping into the interbank market.

[15] Throughout this section, F^b and D^b denote bank b's total (across all cities) interbank position and deposits, respectively.

which holds as an identity for every city-bank pair. The match term $(\sigma-1)\log\gamma_n^b$ is absorbed by the city-bank fixed effects γ_{nb}, while the loan price index R_n, aggregate investment i_n, and the price level P_n are common to all banks operating in city n and are absorbed by the city-month fixed effects γ_{nt} present in both equation (1) and equation (5).

Conditional on these fixed effects, the loan response equals exactly $-\sigma$ times the interest-rate response, pair by pair: $\widetilde{\log L_n^b} = -\sigma\,\widetilde{\log(1+r_n^b)}$, where $\tilde{\cdot}$ denotes the residual after partialling out both fixed effects. Since both second-stage regressions instrument $\log D^b$ with the same instruments on the same city-bank cells, this identity carries over to the estimated coefficients, so that

$$\frac{\beta}{\alpha_1} = \frac{\text{quantity coefficient}}{\text{price coefficient}} = -\sigma.$$

Given the elasticity of substitution, we estimate the interbank friction and the vector of productivities, amenities and city-bank matches jointly. The parameter for interbank frictions is tightly connected to the effect of deposit shocks on lending from Section 3. For higher values of ϕ, deposit inflows have a stronger effect on lending, as deposits constitute the main source of funds.

To replicate our empirical exercise in the model, we increase the city productivity shifter z_n proportionally to city n's employment share in the fishing industry. This generates a bank-level deposit inflow analogous to the one induced by salmon price movements in the data: banks with a larger share of deposits originating in fishing cities experience a larger increase in their deposit base driven by higher incomes in the city.

We solve the model under the new values of z_n and compare the resulting equilibrium to the baseline. Using the model-generated data, we then replicate our empirical strategy by instrumenting for bank-level deposit growth with exposure to the shock and estimating the effects on city-bank loan volumes and interest rates. We search over values of ϕ and select the value that matches the estimated effects of deposit shocks on quantities reported in column (2) of Table 2. As discussed in Appendix C.1, we are able to exactly match this empirical elasticity.

We estimate the vector of city-bank matches for loans and deposits, γ_n^b and κ_n^b, to match the observed values of loans and deposits in each city-bank in 2015. Using the wages observed in the data, we estimate the value of productivity $\{z_n\}$ and amenities $\{b_n\}$ in each city as those that rationalize observed labor shares and such that model-implied market clearing conditions hold. For a full description of the estimation algorithm, see Section C.1 and Section C.2.

Table 3: Estimated Parameters

	Description	Value/Range	Source or Objective
A. External sources			
μ	Capital share	0.65	Kleinman et al. (2023)
δ	Rate of depreciation	0.05	Kleinman et al. (2023)
β	Discount factor	0.95	Kleinman et al. (2023)
ρ	Such that the elasticity of migration to ϵ_d is $\frac{1}{3}$	3β	Kleinman et al. (2023)
σ_c	Elasticity of substitution (consumption)	4	Redding and Rossi-Hansberg (2017)
$\{\tau_{nj}\}_{n,j=1,..,N}$	Elasticity of trade costs to travel times t_{ij}	$t_{ij}^{0.375}$	Redding and Rossi-Hansberg (2017)
η	Elasticity of substitution (deposits)	1.6	Albertazzi et al. (2024)
B. Internally estimated			
ϕ	Cost of wholesale funding	0.08	Quantity IV results in Section 3
σ	Elasticity of substitution (loans)	13	Quantity IV/ Price IV in Section 3
$\{z_n\}_{n=1}^N$	Productivity	[0.26, 0.48]	Wages
$\{b_n\}_{n=1}^N$	Amenity	[0.79, 1.16]	Employment
$\{\{\gamma_n^b\}_{b\in\mathcal{B}^n}\}_{n=1}^N$	Bank-city match	[9.19, 10.93]	Loans
$\{\{\kappa_n^b\}_{b\in\mathcal{B}^n}\}_{n=1}^N$	Bank-city match	[0.10, 1.51]	Deposits

Notes: For productivity, amenity and the bank-city matches, the range shows the 25th-75th percentile ranges.

5.1 Discussion

Elasticity of loan demand across banks. Our estimate for the elasticity of loan demand across banks is 13, which lies within the wide range of estimates available in the literature. Maingi (2026) estimates a range of 1.14 to 2.06 using U.S. data, while Altavilla et al. (2022) estimate values between 7 and 22 using European data. Our estimation of σ relies on matching the effects of deposit shocks on interest rates which, as explained in Section 3.3, are closely linked to the slope of loan demand. The GMM approach in Maingi (2026) focuses instead on matching the banks' increase in lending, relative to local aggregates.

Besides the differences in the estimation approaches, several factors could explain this differences in estimates: borrowers in Chile may face lower switching costs, relationship lending may be less prevalent, or the composition of firms in our sample may differ. Given the importance of this elasticity in shaping local market power, understanding its determinants across contexts is an important avenue for future research.

Interbank frictions. In our baseline calibration, the bank with the average interbank borrowing finances 10 percent of its total funding through the interbank market. Our estimate of $\phi = 0.08$ implies that such a bank behaves as if the interbank rate were 50 basis points higher than the market rate.

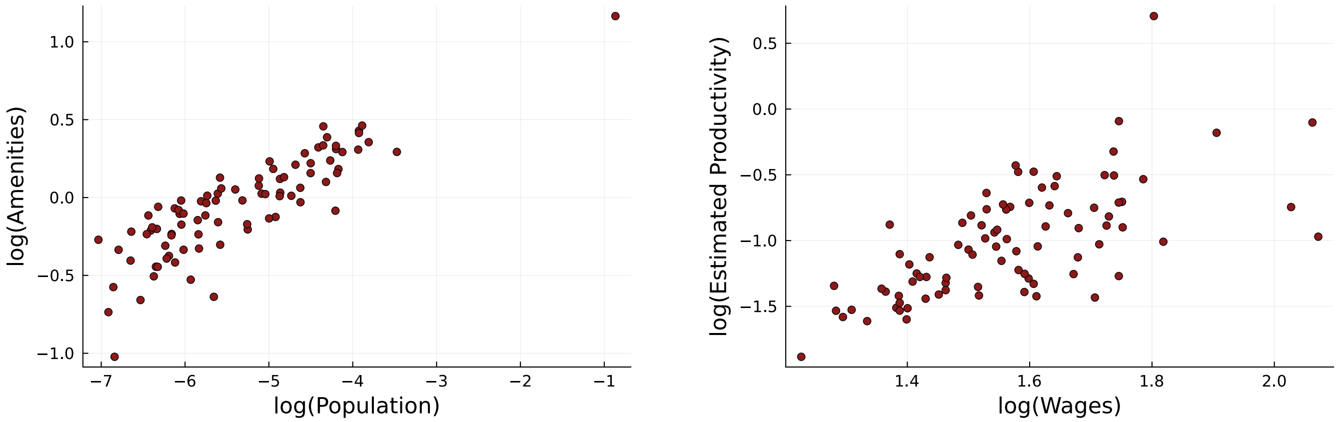
Our estimate of the frictions is not independent from our estimate of the elasticity of substitution between banks. To see this, consider a bank that receives an exogenous inflow of deposits. If demand for loans was very inelastic, the bank would prefer to lend in the interbank market rather than to retail lending, to avoid decreasing prices. To match our quantity responses in Table 2, therefore, interbank frictions would need to be substantially higher. In particular, if we had assumed a value of $\sigma = 2.06$, similar to Maingi (2026), our estimate of ϕ would have been ten times larger.

Productivity and amenities. Figure 3a shows the estimated local amenities against employment shares. The two are tightly connected through the lens of the model. Figure 3b shows the estimated productivity values against average local wages from the data. Wages and productivity are positively related, but the relationship is not as tight because the model imposes market clearing, which introduces additional constraints on wages besides the direct effect of productivity.

City-bank matches. The full estimates of $\{\gamma_n^b\}$ are shown in Section C.2 in the Appendix. While micro-founding the origins of city-bank matches is beyond the scope of this paper, we find a positive role for the number of local branches (which may reduce the distance between clients and the bank). We estimate

$$\hat{\gamma}_n^b = \beta_0 + \beta \times \text{LogBranches}_n^b + \gamma_n + \gamma_b + \epsilon_n^b$$

using data on the number of branches in each city-bank pair in December 2015. The left-hand side includes our estimates of city-bank matches. By including city fixed effects, our results capture the effect of having a higher share of the local branches. By including bank fixed effects, our results are not mechanically capturing other qualities that differentiate banks. We estimate a positive and statistically significant coefficient on log-branches, indicating that the number of branches within cities plays a role (Appendix Table 8).



(a) Employment Data and Estimated Amenities

(b) Wage Data and Estimated Productivities

Figure 3: Estimated Residential Amenities and Productivity Parameters

6 Interbank frictions, market power, and the spatial allocation of capital

A large literature has argued that the misallocation of factors of production across establishments is a major source of aggregate productivity losses (Hsieh and Klenow, 2009).[16] Identifying the specific frictions behind differences in factor prices for different firms is a crucial first step in addressing the misallocation of resources.

In our setting, interbank frictions create dispersion in banks' cost of funds, and oligopolistic competition creates dispersion in markups across cities. Both channels raise interest rates in some cities relative to others, distorting investment and generating spatial variation in the marginal productivity of capital. Figure 4 shows the resulting distribution of MPK in our baseline calibration. In the rest of this section, we eliminate each source of misallocation in turn and quantify its contribution to aggregate productivity and welfare. Table 4 summarizes the results. Our main finding is that local market power accounts for the bulk of the distortion: equalizing markups across space raises steady-state GDP by 0.55 percent, while eliminating interbank frictions by 0.10 percent.

[16] See Bergquist et al. (2026) for a recent survey.

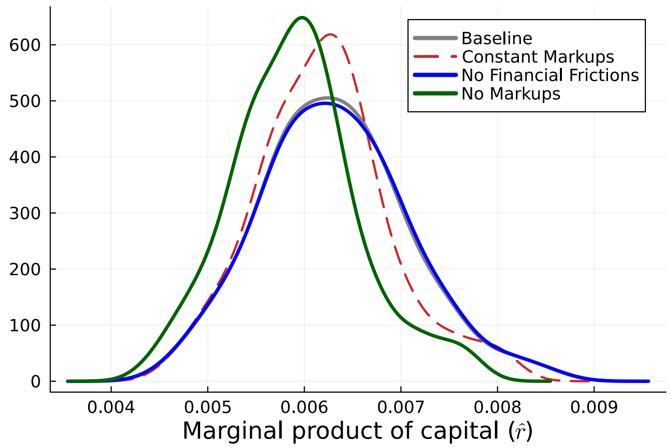


Figure 4: Spatial dispersion of the marginal productivity of capital

A growing literature discusses how to characterize welfare and productivity in spatial models (Baqaee and Burstein, 2026). Given our assumption of no migration costs, expected worker's welfare, given by

$$\overline{V}^w = \left(\sum_{n=1}^{N} \left(\frac{b_n w_n}{P_n} \right)^{\theta} \right)^{\frac{1}{\theta}}$$

equalizes across cities.[17] Given that workers are homogeneous, we focus on this object as our measure of worker's welfare.

We measure capitalists' welfare directly,

$$V_n^c = C_n^c D_n^{\alpha}.$$

and report changes in the average and median welfare across capitalists. In all counterfactual exercises, subsidies correcting markups are financed by a proportional labor income tax τ, which does not distort workers' moving decisions. This financing assumption is, naturally, demanding on the effect of each experiment on workers' welfare. We report both pre-tax and post-tax effects on workers' welfare.

No interbank frictions. We begin by eliminating the non-pecuniary costs of accessing the interbank market, setting $\phi = 0$ and recomputing the steady state. This equalizes the marginal cost of funds across banks. The aggregate effects are small, and GDP rises by 0.1%. This negligible aggregate effect masks heterogeneous responses across city-bank pairs. While equalizing the costs of funds across banks would, all

[17] Realized welfare does not, as it includes idiosyncratic shocks.

Table 4: The role of interbank frictions and market power

	No interbank frictions	No markups	Constant markups
Steady state outcomes			
Aggregate productivity	0.10%	3.80%	0.55%
Average MPK ($\mathrm{E}[\hat{r}_n]$)	0.10%	-6.34%	-1.76%
MPK dispersion ($\mathrm{std}(\hat{r}_n)/\mathrm{E}[\hat{r}_n]$)	0.22%	-1.51%	-1.51%
Workers			
Welfare	0.08%	-0.01%	-0.03%
Pre-tax welfare	0.08%	3.80%	0.60%
Capitalists			
Average welfare	-0.21%	4.60%	1.03%
Median welfare	1.41%	4.46%	1.12%

else equal, have compressed spatial disparities between cities, markups respond endogenously in a way that more than offsets the direct effect. Dispersion in MPK relative to its mean, in fact, rises by 0.22%.

Figure 5 illustrates the mechanism, showing differences in markups and costs across city-bank pairs. Banks experiencing a reduction in marginal costs capture larger market shares and respond by increasing their markups. Conversely, banks that previously benefited from preferential access to deposits now face greater competition for funds. Their marginal costs rise, their market shares shrink, and they reduce their markups.

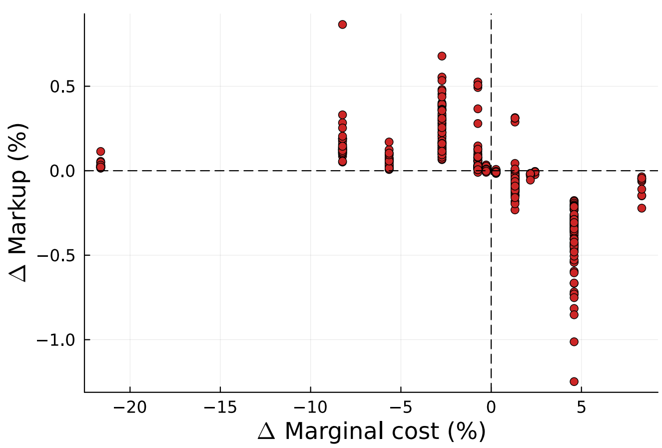


Figure 5: Markup responses to changes in marginal cost

Despite the limited aggregate gains, the spatial effects are heterogeneous, as we discussed analytically in Section 4.3. Some cities benefit from the geographic segmentation of capital markets, as they have banks with ample access to deposits. When interbank lending becomes frictionless, banks with a local presence in these cities find it easier to channel funds elsewhere. Figure 6a plots investment responses against exogenous city productivity z_n. Cities at the bottom of the productivity distribution lose capital, while capital flows toward more productive cities. In Chile, this channel tends to benefit the least productive cities.

In terms of welfare, the effects of reducing interbank frictions are also small. Worker welfare increases by 0.08%. The median capitalist gains 1.41%, but the average capitalist loses -0.21%, reflecting how heterogeneous interest-rate effects across cities impact capitalists' welfare.

Constant markups. We now turn to market power, which Table 4 identifies as the quantitatively dominant channel. We present two exercises. The first isolates the cost of spatial variation in markups by equalizing them across cities; the second eliminates markups entirely.

To equalize markups, we solve for the steady state of an economy in which city-bank specific subsidies replicate monopolistic competition markups,

$$1 - \tau_n^b = \frac{\varepsilon_n^{L,b} - 1}{\varepsilon_n^{L,b}} \frac{\sigma - 1}{\sigma} \ \forall n, b$$

$$\text{and, from equation (24)}, \ 1 + r_n^b = \frac{\sigma}{\sigma - 1} \mathcal{MC}^b \ \forall n, b.$$

Under this policy, all banks in a given city charge the same markup $\sigma/(\sigma - 1)$ over their respective marginal costs, eliminating the variation in markups that arises from differences in local market shares.

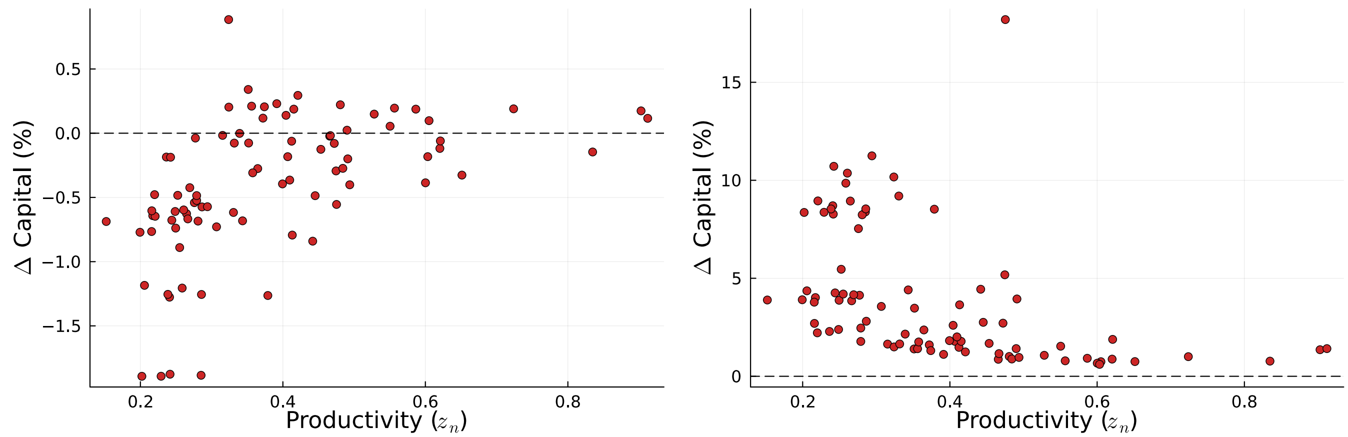
Equalizing markups reduces MPK dispersion by 1.51% and the average MPK by 1.76%, leading to an increase in GDP of 0.55%. When markups are equalized, capital flows to cities where markups were high (and investment was depressed) from cities where markups were low. Figure 6b shows that, as with interbank frictions, the effects are spatially heterogeneous. Market power hinders investment the most in the least productive cities, where banks tend to hold larger market shares. Capitalist welfare increases by 1.03% on average, while workers see a small after-tax welfare decline of 0.03%, despite a pre-tax welfare gain of 0.60%.

No markups. To provide an upper bound on the effect of market power, we eliminate markups entirely using subsidies that set interest rates equal to marginal cost,

$$1 - \tau_n^b = \frac{\varepsilon_n^{L,b} - 1}{\varepsilon_n^{L,b}} \ \forall n, b$$

$$\text{and, from equation (24)}, \ 1 + r_n^b = \mathcal{MC}^b \ \forall n, b.$$

Eliminating markups reduces MPK dispersion by 1.51% and the average MPK by 6.34%, as shown in Figure 4, leading to an increase in aggregate productivity of 3.80%. Workers' pre-tax welfare rises by 3.80%, but their after-tax welfare falls by 0.01%. Average capitalist welfare rises by 4.60%.



(a) No financial frictions

(b) Constant markups

Figure 6: Heterogeneous Investment Responses

6.1 Financial integration, distance, and the propagation of productivity shocks

A key prediction of our model is that bank branch networks create financial linkages between cities that operate independently of geographic proximity. To assess the importance of this channel relative to standard spatial linkages, we perform the following experiment in the quantified version of our model. We shock the productivity z_n of each city n by 100%, solve for the counterfactual equilibrium, and record the percentage change in the local interest-rate index R_j in every other city $j \neq n$.

For each experiment, we construct two ex-ante measures of bilateral financial integration between the shocked city n and each destination city j:

$$\mathrm{FI}^D_{nj} = \sum_b \frac{D^b_n}{D^b + W^b} \frac{(1 + r^b_j) L^b_j}{L^R_j}, \qquad \mathrm{FI}^L_{nj} = \sum_b \frac{L^b_n}{L^b - W^b} \frac{(1 + r^b_j) L^b_j}{L^R_j}. \tag{38}$$

Here D^b_n and L^b_n are bank b's baseline deposits and loans in city n, $D^b = \sum_m D^b_m$ and $L^b = \sum_m L^b_m$ are bank-level totals, and W^b is bank b's baseline net interbank position. The term $L^R_j = \sum_b (1 + r^b_j) L^b_j$ is repayment-weighted lending in city j. Thus, FI^D_{nj} measures whether city j borrows from banks whose funding base is concentrated in the shocked city, while FI^L_{nj} measures whether city j borrows from banks whose loan book is concentrated in the shocked city.

Pooling across all N experiments, we estimate regressions of the normalized rate-index response $(\Delta R_j / R_j)$ on quintile dummies for bilateral travel time τ_{nj}, FI^D_{nj}, and FI^L_{nj}, controlling for shocked-city fixed effects. Quintiles are computed within each experiment, so the comparisons are across destination cities exposed to the same productivity shock.

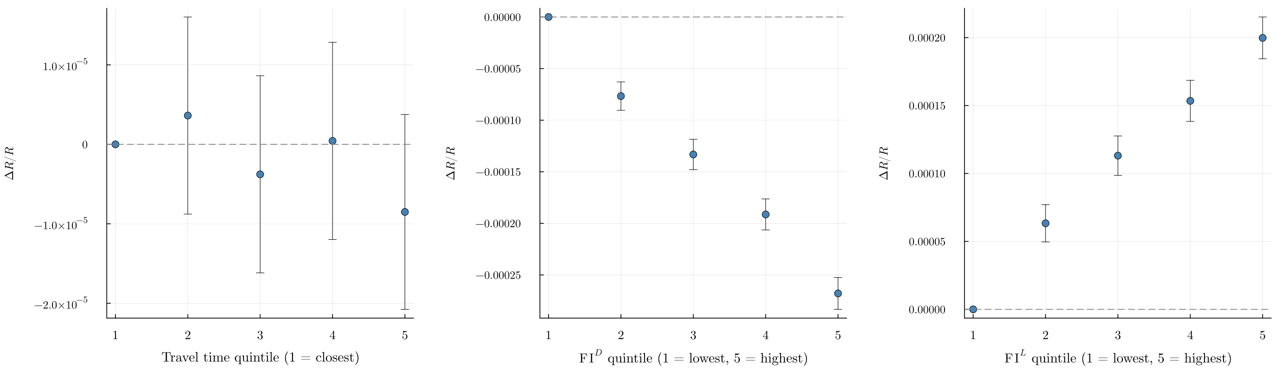


Figure 7: Propagation of productivity shocks through the financial network

Figure 7 plots the estimated coefficients for the local interest-rate index with 95% confidence intervals. The left panel shows that, conditional on financial linkages, proximity does not play a role for interest rate responses. The second panel shows that local interest rates decline when productivity goes up in cities that provide deposits to the banks with local branches, while the third panel shows the opposite pattern when productivity increases in cities that, through the branch network, compete for the funds of the banks with local branches.

7 Bank mergers

While our results in Section 6 suggest an important role for banks' market power, city-bank specific subsidies are rarely used in practice. On the other hand, evaluating and regulating bank mergers are recurrent questions facing policymakers. In Chile alone, four large bank mergers occurred during 2000-2020 (Marivil et al., 2021).

A natural concern with bank mergers is that lower competition will lead to higher interest rates. In Chile, where the median number of banks per city is three, bank mergers could lead to a substantial increase in markups in cities where both merging banks were present before the merger. Bank mergers, on the other hand, can enhance the efficiency of the banking sector if they allow the merging banks to circumvent the interbank market. Our framework with oligopolistic competition allows us to capture both sides of the trade-off.

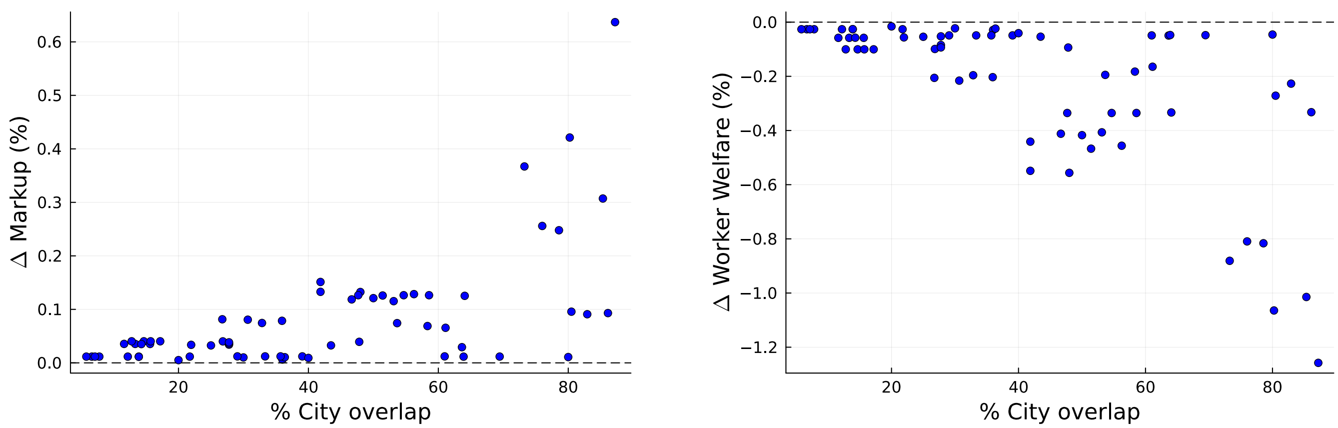
Using the quantified version of our model, we evaluate every possible two-bank merger between the twelve largest banks in our data, leading to sixty-six mergers. For each merger, we compute the steady state of the economy where the two banks merge. We assume that the city-bank match, γ_n^b and κ_n^b of the merged bank equals the maximum among the two merging banks in city n whenever both banks are present in the city.

We focus on worker welfare, productivity, and the average markup for each merger.

The economic effects of mergers are heterogeneous. The change in welfare ranges between -1.25% and $\approx 0\%$; the increase in markups varies between $\approx 0\%$ and 0.63%.

A first determinant of the welfare effect of a merger is the overlap in space of the two merging banks. We calculate geographic overlap as the percentage of cities where banks overlap relative to the largest number of cities in which each of the merging banks has branches.[18] If both banks have branches in the same cities, the merger will lead to a strong increase in markups without improving financial integration.

Figure 8 shows the effects of each merger as a function of city overlap. Figure 8a shows that the increase in markups is higher when banks' overlap in more cities. Figure 8b shows that the increase in markups is a key driver of welfare losses: higher markups lead to lower worker welfare.



(a) Δ Markup (b) Δ Worker Welfare

Figure 8: Mergers' outcomes as a function of geographic overlap

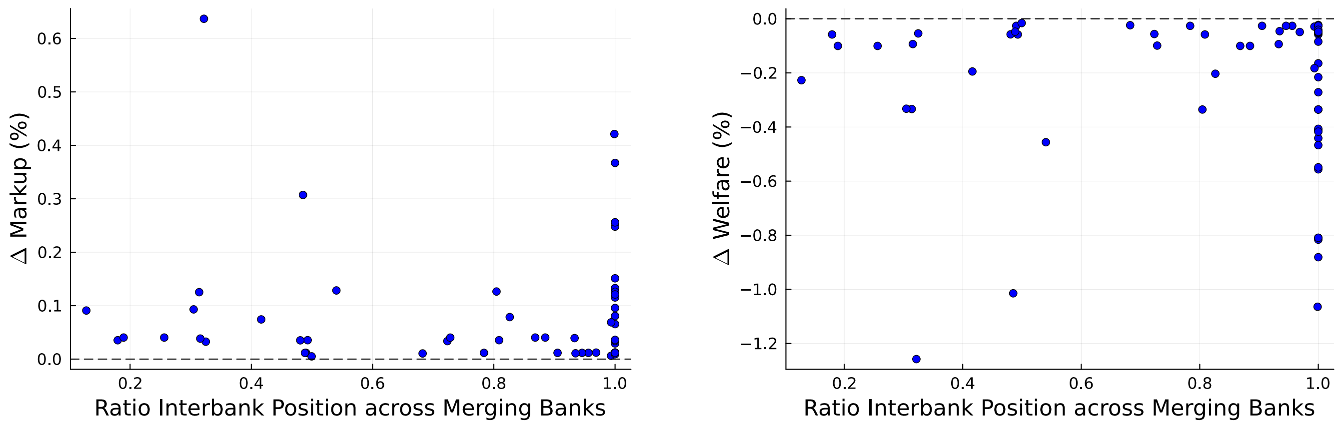
We then sort mergers according to the financial integration dimension. If the two merging banks have opposite positions with the interbank market, merging allows them to transfer funds internally, bypassing the frictions associated with the interbank market. We define a measure of differences in merging banks' position in the interbank market as

$$\text{Ratio of interbank market positions between A and B} = \frac{|F^A + F^B|}{|F^A| + |F^B|}.$$

The ratio takes the value of one if both banks have the same position in the interbank market and value zero whenever they have opposite positions. Whenever both banks' reliance on the interbank market is similar, merging will not change their reliance on it. Indeed, Figure 9 shows that markup reductions and

[18] That is, if Bank A, present in 10 cities, merges with Bank B, present in 8 cities, and the overlap in 5 cities, the city overlap would be 50%.

welfare effects are larger when merging banks have opposite positions in the interbank market. Merging allows these banks to circumvent the interbank market.



(a) Δ Markup (b) Δ Worker Welfare

Figure 9: Mergers' outcomes as a function of banks' position in the interbank market

8 Conclusion

A varied body of evidence suggests that credit markets remain, to some extent, local, leading to a geographic segmentation of capital markets within which banks exploit their local market power. Building on this idea, researchers have studied the spatial propagation of local deposit shocks and found that lending by banks with branches in the shocked area increases disproportionately, indicating some frictions to interbank lending. While these studies showed that market power and interbank frictions are empirically relevant, they did not provide a quantification of their aggregate effects.

Our main contribution in this paper is to provide a framework that can rationalize the spatial propagation of deposit shocks observed in the data and be used to study the macroeconomic implications of imperfect capital mobility within countries. Towards that goal, we also delved deeper into the spatial propagation of deposit shocks by studying interest rates on bank loans as a novel outcome and heterogeneous responses across cities.

Our main quantitative finding is that local credit market power is more costly in terms of GDP than interbank frictions. Policies addressing spatial variation in markups could lead to an increase in GDP of 0.55%, while improving the latter would have effects on GDP of 0.1%.

These quantitative conclusions shed some light on the welfare effects of bank mergers from a spatial perspective. A priori, bank mergers can have ambiguous effects on welfare because they lead to higher markups and efficiency gains, as merged banks can bypass frictional interbank markets and consolidate their funds. Not surprisingly, given our result that market power is more important, we find that all two-bank mergers have negative welfare effects, with heterogeneous effects depending on the geographic overlap of the merging banks.

An important limitation of our analysis is that we take the bank branch network as given throughout. This means that our counterfactual exercises capture the effects of interbank frictions and market power conditional on the observed geographic distribution of branches, but cannot account for how banks would adjust their entry and exit decisions in response to changes in the competitive environment. This limitation is particularly relevant for the policy implications of our market power counterfactuals. For example, under constant markups (Figure 6b), most of the increase in capital is directed toward lower-productivity cities. In practice, however, policies that tax oligopolistic rents may also reduce banks' incentives to maintain branches in these cities, potentially undoing some of the gains from lower markups. A full analysis of competition policy in banking should therefore incorporate banks' endogenous branching decisions, as in Oberfield et al. (2024). Integrating entry and exit with oligopolistic pricing in a spatial framework is a challenging but important direction for future research.

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9 Appendix

A Empirical appendix

A.1 Chile's financial development

We use public data from the World Bank, accessed online on June 2024. Figure 10 below shows the evolution of the two indicators of financial development mentioned in the main text.

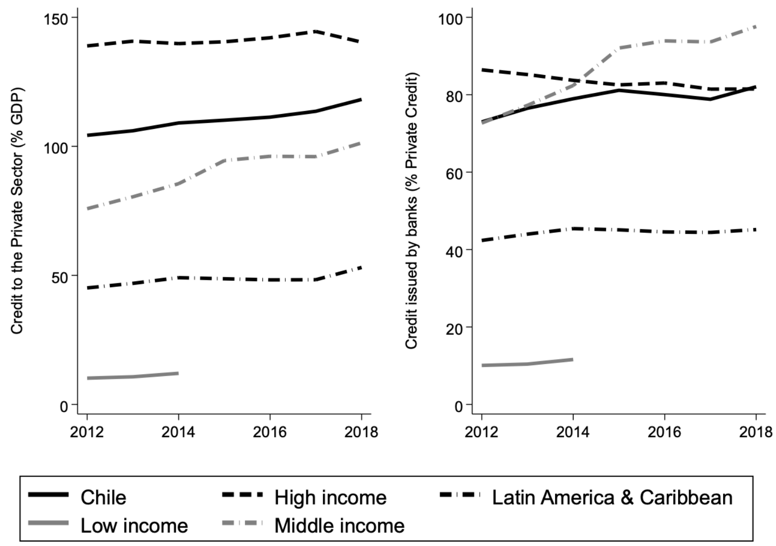

Figure 10: Financial development

A.2 The importance of banks for domestic credit in Chile: Survey evidence

Firms and households rely mostly on banks for financial services and local branches play a significant role.

Firms. To delve deeper into the importance of banks for private firms in Chile, we rely on firm-level data from the 2015 *Encuesta Longitudinal de Empresas* (ELE), a nationally representative survey that includes a module on firms' sources of credit. We calculate the percentage of private firms that borrow from banks and the percentage of firms for which banks constitute the main source of credit. We exclude Santiago, the capital city and home to approximately 29% of the population and bigger firms, to show that Santiago does not drive the results. The first two columns of Table 5 show that banks stand out as the main source of credit for large private firms outside the capital area.

Table 5: Credit sources for firms (excluding Santiago)

Firm size	2015 ELE		
	% borrows from banks	% biggest loan comes from banks	% private employment
Micro	57.1	16.7	7.7
Small	66.4	29.6	39.3
Medium	77.7	42.1	21.9
Large	80.5	50.4	30.1

Households. In 2007 and 2017, the *Encuesta Financiera de Hogares* (EFH), a nationally representative survey of households' financial behavior, included modules on the financial assets held by households; using these modules, we first document that households rely significantly on banks to purchase financial assets (compared to other institutions) and, secondly, that Internet banking remains limited.

In the EFH we separately observe the total amount invested by an individual household in stocks, mutual funds, fixed income, saving accounts, and other instruments. The survey contains information on the financial institution through which these assets were purchased. Panel A in Table 6 shows — for the sub-sample of respondents with positive financial assets — what percentage of savings were allocated to each asset and the percentage of respondents who used banks to purchase that asset. Banks are the primary institutions used by households to invest in mutual funds and fixed-income assets and to open savings accounts. These represent around half the total investment in financial assets in 2007 and 2017.

The main concern regarding reliance on local branches is the expansion of Internet banking, which makes it easier to save and borrow from geographically distant banks. The EFH includes a question on the use of Internet banking, where people are asked whether they used the Internet to carry out a variety of financial transactions. Panel B in Table 6 shows the share of respondents who used the Internet to purchase financial assets or get new loans. In both cases, we calculate the percentage over the total number of respondents who either purchase assets or get new loans. Internet was used more intensively to purchase new financial assets than to get loans. Although there was an increase in both uses between 2007 and 2017, a majority of the transactions still happen in physical branches. Moreover, the survey does not distinguish between new transactions and the first transaction with a bank, therefore representing an upper bound on the reliance on the Internet to start new financial relationships with an institution.

Table 6: Households' savings behavior

A. Asset types	2007 EFH		2017 EFH	
	% of assets	% purchased through banks	% of assets	% purchased through banks
Stock	19.1	36.1	15.1	44.2
Mutual Fund	30.8	80.4	24.3	83.7
Fixed-income	9.4	82.9	21.3	90.0
Saving Account	7.0	91.6	7.3	72.3
Other	33.6	-	31.7	-
B. Used the internet to...	% respondents in 2007		% respondents in 2017	
purchase financial assets	6.5		21.0	
get a loan	0.3		2.1	

A.3 Concentration in banking industry

We calculate the market share for top banks using aggregate data from the CMF. Results are shown in Figure 11.

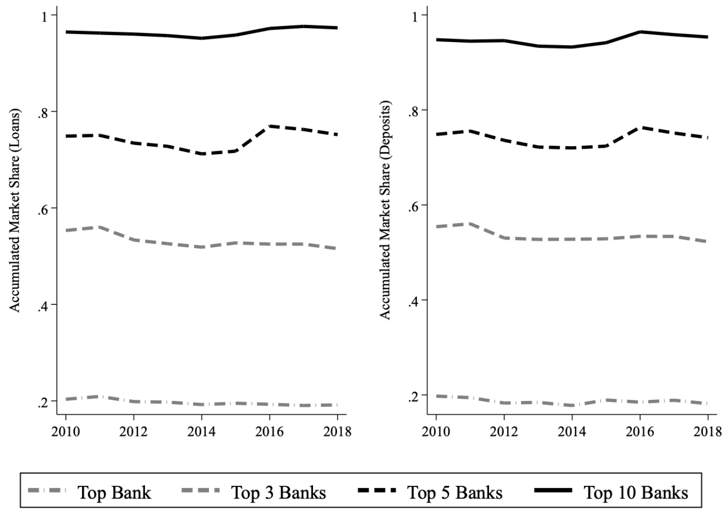

Figure 11: Concentration in the Banking Industry

A.4 Spatial Clustering of Banks

To determine whether banks' economic activity is geographically clustered we follow the approach in Conley and Topa (2002), who study the degree of spatial correlation in unemployment between neighborhoods. More closely related to our setting, the approach has been used to study the degree of geographical concentration in market shares for a variety of consumer goods in Bronnenberg et al. (2007). For this exercise, we use aggregate data from the year 2015 (publicly available through the CMF) and focus exclusively on banks present in at least ten cities in 2015. These banks explained 96.8% of all the outstanding loans in that year. We exclude the metropolitan area around Santiago.

Extensive margin. First, we define the dummy variable X_{ib}, which takes the value 1 if bank b gave any loans in city i. We are interested in the correlation of X_{ib} between pairs of cities i, j as the distance between i and j changes. Figure 12 shows these correlations for each individual bank, where we have defined bins of 250 kilometers in size.

A correlation close to zero suggests that banks' presence is independent across cities. To determine how close to zero the observed measures of correlation would be if the X_{ib} were independent we follow the bootstrap approach in Conley and Topa (2002). We create 100 samples in which we randomize the identity of the cities in which each bank is present by drawing (with replacement) from the observed distribution of that particular bank. The two dashed lines in each figure show the 90% confidence interval across bootstrapped samples. For almost all banks and all distance bins we cannot reject that the observed correlations are different than what we would observe if banks' presence was independent across cities.

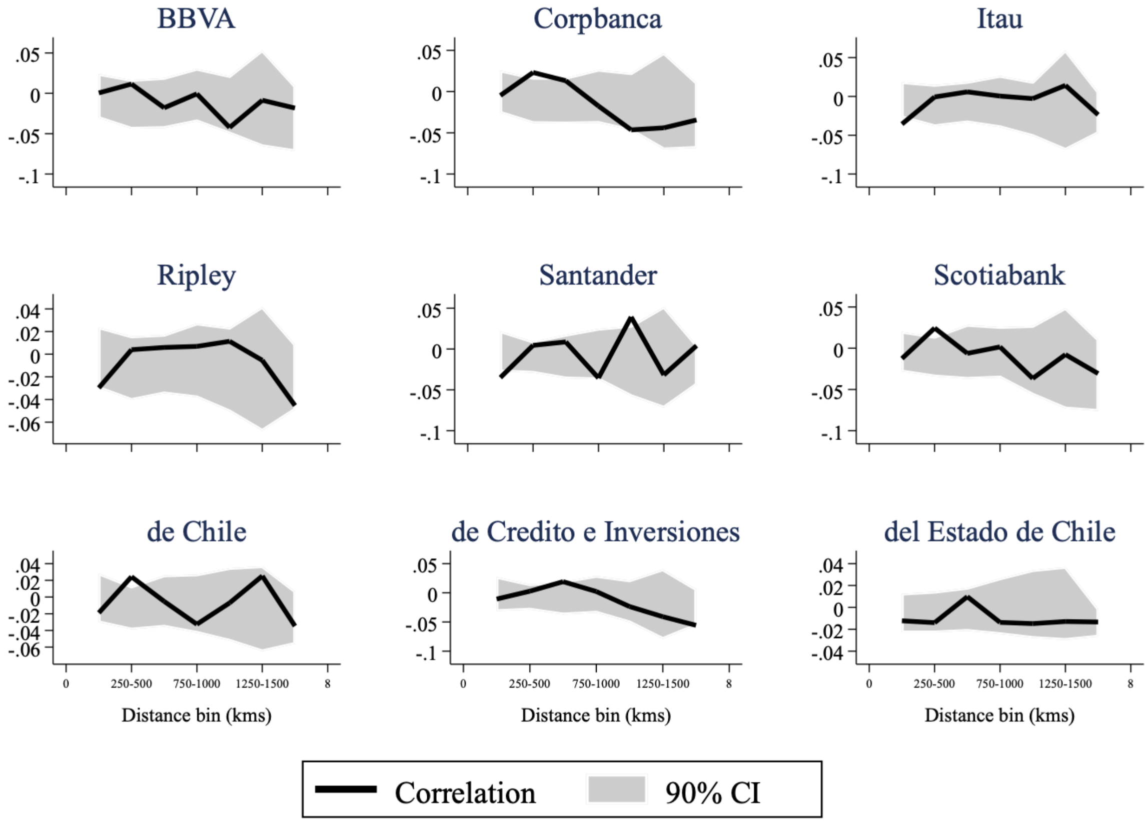

Figure 12: Spatial Correlation in Bank's Presence (Extensive Margin)

Intensive margin. To complement the previous analysis, we study whether there is spatial correlation in market shares (conditional on banks' presence). The approach is analogous to the one described above except that, in this case, the outcome variable is defined as the share of outstanding loans in city i issued by bank b in 2015. When we construct the confidence intervals, we randomize the particular market share of a bank in a city without changing the cities in which a bank is present, therefore focusing exclusively on the intensive margin.

Figure 13 shows the results. The conclusion is similar to the one before, albeit less clear-cut. *Banco de Crédito e Inversiones* and *Banco Santander* exhibit patterns of geographical clustering in market shares.

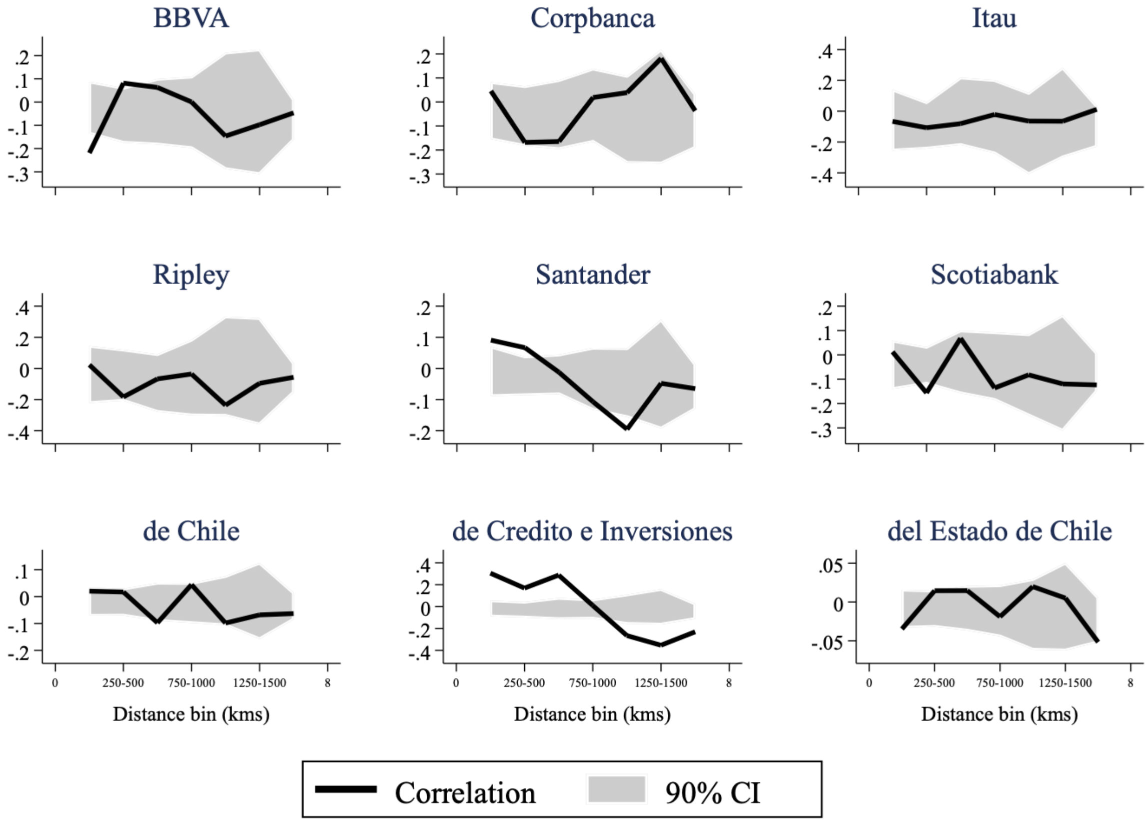

Figure 13: Spatial Correlation in Loan Market Shares (Intensive Margin)

A.5 Details on the loan subsample for interest rate analysis

The administrative dataset includes, for each loan, the size and sector of the borrowing firm, the type of loan, its maturity, and amount. Moreover, the dataset includes two measures of risk at the loan level. The first is a categorical risk rating assigned by banks when a firm applies for a loan. For large firms, banks conduct individual assessments, classifying them into one of 16 risk categories: A1–A6 (low risk), B1–B4, and C1–C6 (high risk). For smaller firms, the risk is assessed after the banks classify firms with similar characteristics together. The second measure of risk is the expected loss on each loan, reflecting the bank's projection of potential default costs.[19]

We restrict the sample to loans denominated in Chilean pesos and not associated with any public guarantee. We keep fixed-interest rate loans and exclude loans issued by *BancoEstado* and drop the first loan in a firm-bank relationship, where the interest rate may be systematically different given that the bank lacks information about the firm. By omitting these loans, our interest rates results should be interpreted as declines in interest rates that banks offer to firms with existing relationships.

[19]This study was developed within the scope of the research agenda conducted by the Central Bank of Chile (CBC) in economic and financial affairs of its competence. The CBC has access to anonymized information from various public and private entities, by virtue of collaboration agreements signed with these institutions. To secure the privacy of workers and firms, the CBC mandates that the development, extraction and publication of the results should not allow the identification, directly or indirectly, of natural or legal persons. Officials of the Central Bank of Chile processed the disaggregated data. All the analysis was implemented by the authors and did not involve nor compromise the SII, the CMF, and AFC. The information contained in the databases of the Chilean IRS is of a tax nature originating in self-declarations of taxpayers presented to the Service; therefore, the veracity of the data is not the responsibility of the Service.

A.6 Details on the Shift-Share IV

We use data from the IMF Commodity Price series. Figure 14 shows the evolution of the world price of salmon at a monthly frequency.

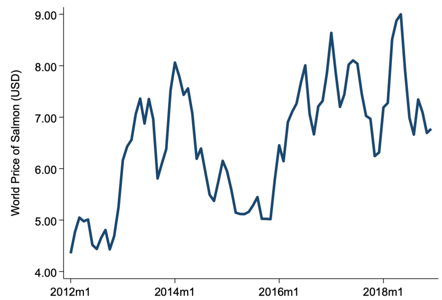

Figure 14: World Price of Salmon

Figure 15 shows the share of local employment in the Fishing industry. The industry is concentrated in the Southern region.

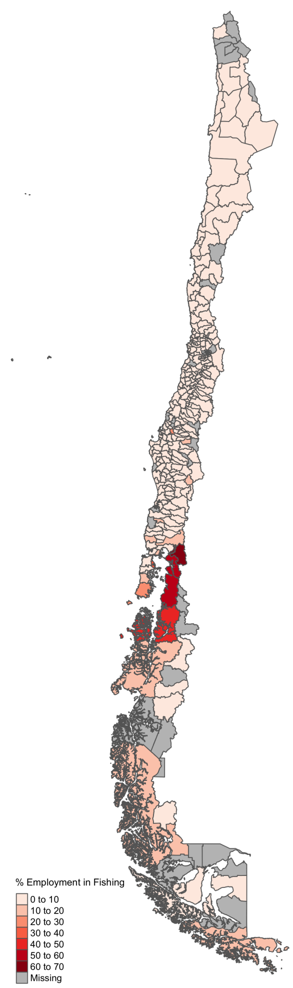

Figure 15: Share of local employment in the fishing industry

A.7 Robustness of the empirical analysis in Section 3

Spatial leave-out deposit instruments. Our deposit-supply specification instruments a bank's current deposit stock with the four-month lag of its deposits. This lag is predetermined relative to contemporaneous lending, but a bank's own deposits and its loans in a given city may both reflect persistent local conditions, so the lagged own-deposit stock could still inherit loan-demand shocks in the destination city. To break this link we construct a spatial leave-out version of the instrument. For each bank–city–month observation, we sum the bank's deposits held in cities more than D kilometers from the lending city — discarding the lending city itself and every city within D km — and use the four-month lag of this far-away deposit stock as the excluded instrument. Because it drops the bank's nearby deposits, the instrument retains variation in the bank's overall funding capacity while removing the component most likely to co-move with local credit demand. Throughout we exclude Santiago and Santiago-only banks, so the estimates isolate the regional deposit–lending relationship.

Table 7 reports the results. Column (1) is the baseline, which instruments deposits with the bank's own four-month lagged deposit stock; columns (2)–(4) replace it with the far-away leave-out instrument at thresholds of $D = 200$, 300, and 400 kilometers. Across all four columns the estimated deposit-to-loan elasticity is positive, statistically significant, and tightly clustered around 0.10–0.12; the leave-out estimates are, if anything, only marginally below the own-deposit baseline and are statistically indistinguishable from it. The first stage is strong throughout — the Kleibergen–Paap F statistic is well above conventional weak-instrument thresholds — reflecting the high persistence of bank deposits. That purging the bank's local deposits leaves the estimate essentially unchanged indicates that the lagged-deposit instrument is not being driven by loan demand in the destination city.

Table 7: Deposit-to-loan pass-through: leave-out deposit IV (excl. Santiago)

	(1) Baseline	(2) Leave-out <200km	(3) Leave-out <300km	(4) Leave-out <400km
Deposits (log)	0.120***	0.108***	0.103***	0.112***
	(0.032)	(0.034)	(0.033)	(0.034)
Loans_$t-4$ (log)	0.608***	0.609***	0.609***	0.609***
	(0.025)	(0.025)	(0.025)	(0.025)
Observations	29154	29143	29143	29143
KP first-stage F	408.65	327.56	335.54	335.96

B Mathematical appendix

B.1 Workers

Starting from equation (8) in the main text we derive steady-state employment shares. Using properties of the T1EV distribution of idiosyncratic shocks and dropping time-subindices (as we focus on a steady state), the value function of a worker who has moved to n is

$$v_n = \ln b_{nt} + \ln \frac{w_n(1-\tau^{ss})}{P_{nt}} + \rho \ln \Big(\sum_{d=1}^{N} exp\Big(\tfrac{\beta}{\rho} v_d\Big)\Big).$$

Then,

$$exp\Big(\frac{\beta}{\rho} v_n\Big) = b_n^{\frac{\beta}{\rho}} \times [w_n(1-\tau^{ss})]^{\frac{\beta}{\rho}} \times P_n^{\frac{-\beta}{\rho}} \times \Big(\sum_{d=1}^{N} exp\Big(\tfrac{\beta}{\rho} v_d\Big)\Big)^{\beta}.$$

We define

$$\phi \equiv \sum_{d=1}^{N} exp\Big(\tfrac{\beta}{\rho} v_d\Big). \tag{39}$$

The steady-state value of ϕ solves

$$\phi = \sum_{d=1}^{N} b_d^{\frac{\beta}{\rho}} \times [w_d(1-\tau^{ss})]^{\frac{\beta}{\rho}} \times P_d^{\frac{-\beta}{\rho}} \times \phi^{\beta} \tag{40}$$

$$= \Big(\sum_{d=1}^{N} b_d^{\frac{\beta}{\rho}} \times [w_d(1-\tau^{ss})]^{\frac{\beta}{\rho}} \times P_d^{\frac{-\beta}{\rho}} \Big)^{\frac{1}{1-\beta}} \tag{41}$$

From the T1EV assumption for idiosyncratic shocks, migration shares between any cities n and d are

$$M_{nd} = \ell_d = \frac{exp\Big(\tfrac{\beta}{\rho} v_d\Big)}{\sum_{m=1}^{N} exp\Big(\tfrac{\beta}{\rho} v_m\Big)} = exp\Big(\frac{\beta}{\rho} v_d\Big)\phi^{-1} = b_d^{\frac{\beta}{\rho}} \, [w_d(1-\tau^{ss})]^{\frac{\beta}{\rho}} \, P_d^{\frac{-\beta}{\rho}} \, \phi^{\beta-1}.$$

Given that we have normalized the population to 1, migration shares and population equalize in the steady state. The expression for population in the main text, equation (31), follows.

B.2 Capitalists

For this subsection we drop n from the sub-indices for clarity, as the problem is isomorphic for all capitalists. The problem of the capitalist can be divided in two stages. In a first stage, the capitalist decides from which banks to borrow in order to finance a level of investment i_t at the lowest cost. In a second stage she maximizes her welfare by deciding how much investment to make taking the cost of investment, $\mathcal{L}_t(i_t)$, as given. We begin by solving the latter.

Solving for $\mathcal{L}_t(i_t)$ The problem of minimizing the cost of investment is

$$\mathcal{L}_t(i_t) = \min_{\{L^b_{t+1}\}_b} \sum_{b\in\mathcal{B}} L^b_{t+1}(1 + r^b_{t+1}) \tag{42}$$

$$s.t.\ \ i_t = \left[\sum_{b\in\mathcal{B}} (\gamma^b \tfrac{L^b_{t+1}}{P_t})^{\frac{\sigma-1}{\sigma}}\right]^{\frac{\sigma}{\sigma-1}}, \tag{43}$$

From the first order condition with respect to an arbitrary L^b_{t+1},

$$\mu(\tfrac{\gamma^b}{P_t})^{\frac{\sigma-1}{\sigma}} \Big(\frac{i_t}{L^b_{t+1}}\Big)^{\frac{1}{\sigma}} = (1 + r^b_{t+1}), \tag{44}$$

where μ is the multiplier associated with the constraint in equation (43). Taking the ratio of equation (44) for two banks b and b',

$$\frac{L^{b'}_{t+1}}{L^b_{t+1}} = \Big(\frac{1 + r^b_{t+1}}{1 + r^{b'}_{t-1}}\Big)^{\sigma} \Big(\frac{\gamma^{b'}}{\gamma^b}\Big)^{\sigma-1}. \tag{45}$$

From here, picking an arbitrary b':

$$i_t = \Big(\sum_{b\in\mathcal{B}} (\gamma^b \tfrac{L^b_{t+1}}{P_t})^{\frac{\sigma-1}{\sigma}}\Big)^{\frac{\sigma}{\sigma-1}} = (1 + r^{b'}_{t+1})^{\sigma} (\gamma^{b'})^{1-\sigma} \tfrac{L^{b'}_{t+1}}{P_t} \Big[\sum_{b\in\mathcal{B}} (\tfrac{1+r^b_{t+1}}{\gamma^b})^{1-\sigma}\Big]^{-\frac{\sigma}{1-\sigma}}. \tag{46}$$

Defining $R_{t+1} \equiv \Big[\sum_{b\in\mathcal{B}} (\frac{1+r^b_{t+1}}{\gamma^b})^{1-\sigma}\Big]^{\frac{1}{1-\sigma}}$,

$$i_t R^{\sigma}_{t+1} = (1 + r^b_{t+1})^{\sigma} (\gamma^b)^{1-\sigma} \tfrac{L^b_{t+1}}{P_t} \tag{47}$$

and, therefore, we can express the equilibrium loans from bank b as

$$\frac{L^b_{t+1}}{P_t} = \Big(\frac{R_{t+1}}{1 + r^b_{t+1}}\Big)^{\sigma} i_t (\gamma^b)^{\sigma-1}, \tag{48}$$

which shows as equation (10) in the main text. From equation (48) and the definition of $\mathcal{L}_t(i_t)$,

$$\mathcal{L}_t(i_t) = \sum_{b\in\mathcal{B}} L^b_{t+1}(1 + r^b_{t+1}) = i_t R_{t+1} P_t. \tag{49}$$

which shows as equation (12) in the main text.

Capitalist's full problem The full problem of the capitalist is

$$\max_{\{C^c_t, D^b_{t+1}, k_{t+1}\}^{\infty}_{t=0}} \sum_{t=0}^{\infty} \beta^t \Big[\log C^c_t + \alpha \log D_{nt+1}\Big]$$

$$\underline{s.t:}\ C^c_t + \sum_b \frac{D^b_{t+1}}{P_t} + \frac{(k_t - k_{t-1}(1-\delta))R_t P_{t-1}}{P_t} = \frac{\hat{r}_t k_t}{P_t} + \sum_b \frac{D^b_t}{P_t}(1 + \tilde{r}^b_t) + \frac{T^c_t}{P_t} \tag{50}$$

$$D_{t+1} = \Big[\sum_b (\kappa^b D^b_{t+1})^{1-\frac{1}{\eta}}\Big]^{\frac{\eta}{\eta-1}} \tag{51}$$

$$k_0, \{D^b_0, L^b_0\}_b$$

where we have replaced $i_{t-1} = k_t - k_{t-1}(1-\delta)$ and expressed the budget constraint in real terms. The first-order conditions with respect to k_t, C_t^c and D_{t+1}^b are

$$\lambda_t \frac{\hat{r}_t}{P_t} + \lambda_{t+1} \frac{(1-\delta)R_{t+1}P_t}{P_{t+1}} = \lambda_t \frac{R_t P_{t-1}}{P_t}, \tag{52}$$

$$\frac{\beta^t}{C_t^c} = \lambda_t, \tag{53}$$

$$\text{and} \;\; \beta^t \alpha D_{t+1}^{\frac{1-\eta}{\eta}} (D_{t+1}^b)^{-\frac{1}{\eta}} (\kappa^b)^{\frac{\eta-1}{\eta}} + \lambda_{t+1} \frac{1+\tilde{r}_{t+1}^b}{P_{t+1}} = \frac{\lambda_t}{P_t}. \tag{54}$$

Equation (52) equates the marginal benefit of an extra unit of capital in period t, which consists of the per-period rental rate and the extra capital she would carry to period $t+1$, to its cost, loan repayment in period t. The first order condition with respect to consumption, equation (53), is standard. The first order condition with respect to deposits in a specific bank, equation (54), reflects the dual role of deposits in the model: they enter directly into the utility function and are means for transferring resources between periods.

By combining equation (52) and equation (53) we derive the following Euler equation,

$$\frac{P_{t+1}C_{t+1}}{P_t C_t} = \beta(1-\delta) \frac{R_{t+1}P_t}{R_t P_{t-1} - \hat{r}_t}. \tag{55}$$

Replacing equation (53) into equation (54), and then replacing $C_{t+1}P_{t+1}$ from equation (55),

$$\frac{\alpha}{D_{t+1}} (\kappa^b)^{\frac{\eta-1}{\eta}} \left(\frac{D_{t+1}}{D_{t+1}^b} \right)^{\frac{1}{\eta}} = \frac{1}{P_t C_t} \left[1 - \frac{(1+\tilde{r}_{t+1}^b)(R_t P_{t-1} - \hat{r}_t)}{(1-\delta)R_{t+1}P_t} \right]. \tag{56}$$

Dividing this equation for two banks, b and b',

$$\frac{D_{t+1}^b}{D_{t+1}^{b'}} = \left(\frac{\kappa^b}{\kappa^{b'}} \right)^{\eta-1} \left(\frac{q_{t+1}^b}{q_{t+1}^{b'}} \right)^{-\eta}, \tag{57}$$

where we defined q_{t+1}^b as

$$q_{t+1}^b \equiv 1 - \left(1 + \tilde{r}_{t+1}^b \right) / \left(\frac{(1-\delta)R_{t+1}P_t}{R_t P_{t-1} - \hat{r}_t} \right). \tag{58}$$

We define the deposit price index as

$$Q_{t+1} \equiv \left(\sum_b \left(\frac{q_{t+1}^b}{\kappa^b}\right)^{1-\eta} \right)^{\frac{1}{1-\eta}}. \tag{59}$$

It follows from equation (57) and the definition of D_{t+1} that the supply of deposits to bank b is given by

$$D_{t+1}^b = D_{t+1} (\kappa^b)^{\eta-1} \left(\frac{Q_{t+1}}{q_{t+1}^b} \right)^{\eta}. \tag{60}$$

Replacing this back into equation (56) we obtain that the capitalist equalizes of expenditure on the two 'goods' available to her, consumption and deposits,

$$D_{t+1} Q_{t+1} = \alpha P_t C_t. \tag{61}$$

The nominal value of total deposits at t is given by

$$\sum_b D_{t+1}^b = \sum_b D_{t+1}(\kappa^b)^{\eta-1}(\tfrac{Q_{t+1}}{q_{t+1}^b})^\eta = D_{t+1}Q_{t+1}^\eta \overbrace{\sum_b (\kappa^b)^{\eta-1}(q_{t+1}^b)^{-\eta}}^{\equiv \tilde{Q}_{t+1}}, \tag{62}$$

where $\tilde{Q}_{t+1} \equiv \sum_b \kappa^b)^{\eta-1}(q_{t+1}^b)^{-\eta}$. Plugging equation (62) into the budget constraint, equation (50), using equation (61) and defining M_t as

$$M_t \equiv \hat{r}_t k_t + \sum_b (1+\tilde{r}_t^b)D_t^b - (k_t - (1-\delta)k_{t-1})R_t P_{t-1} + T_t \tag{63}$$

we get

$$Q_{t+1}D_{t+1} + D_{t+1}Q_{t+1}^\eta \tilde{Q}_{t+1} = M_t \to D_{t+1} = \frac{\alpha M_t}{Q_{t+1} +_{t+1}^\eta \tilde{Q}_{t+1}}$$

$$\text{and } P_t C_t^c = \frac{Q_{t+1}M_t}{Q_{t+1} + Q_{t+1}^\eta \tilde{Q}_{t+1}}.$$

which are equations equation (17) and equation (18) in the main text.

B.2.1 Derivatives at the steady state

Having calculated capitalists' demand for loans and deposits, we calculate the derivatives of these functions with respect to the cost of loans and deposits (r and q respectively). Throughout, we will use the fact that in a steady state, the Euler equation (55) becomes

$$1 = \frac{\beta(1-\delta)R_n P_n}{R_n P_n - \hat{r}_n}. \tag{64}$$

Derivative of L with respect to r. The demand function for loans is

$$L_{t+1}^b = P_t i_t(R_{t+1})(\gamma^b)^{\sigma-1}\left(\frac{R_{t+1}}{1+r_{t+1}^b}\right)^\sigma.$$

The derivative and elasticity of loans with respect to r are, respectively,

$$\frac{\partial L^b_{t+1}}{\partial r^b_{t+1}} = \underbrace{\left\{\sigma \frac{L^b_{t+1}}{R_{t+1}} + \frac{L^b_{t+1}}{i_t}\frac{\partial i_t}{\partial R_{t+1}}\right\}\left(\frac{R_{t+1}}{1+r^b_{t+1}}\right)^{\sigma} (\gamma^b)^{\sigma-1}}_{\frac{\partial L^b_n}{\partial R_n}\frac{\partial R_n}{\partial r_n}} \underbrace{-\sigma\frac{L^b_n}{1+r^b_n}}_{\frac{\partial L^b_n}{\partial r^b_n}}$$

$$\begin{aligned}
\text{and } \varepsilon_L &\equiv -\frac{\partial L^b_{t+1}}{\partial r^b_{t+1}}\frac{1+r^b_{t+1}}{L^b_{t+1}} \\
&= \sigma\left(1 - s^b_{t+1}\right) - s^b_{t+1} \times \underbrace{\frac{\partial i_t}{\partial R_{t+1}}\frac{R_{t+1}}{i_t}}_{\equiv -\varepsilon^{i,R}_n} \\
&= \sigma\left(1 - s^b_{t+1}\right) + s^b_{t+1}\varepsilon^{i,R}_n, \\
\text{where } s^b_{t+1} &\equiv \left(\frac{R_{t+1}}{1+r^b_{t+1}}\gamma^b\right)^{\sigma-1} = \underbrace{\frac{(1+r^b_{r+1})L^b_{t+1}}{i_t R_{t+1} P_t}}_{\text{Revenue Share}}.
\end{aligned}$$

To calculate the elasticity of investment with respect to the interest rate R, start from the budget constraint equation (50) evaluated at $t+1$ and the Euler equation, equation (55),

$$\frac{P_{t+1}C_{t+1}}{P_tC_t} = \frac{\hat{r}_{t+1}k_{t+1} + \sum_b D^b_{t+1}(1+r^b_{t+1}) + T^c_{t+1} - \sum_b D^b_{t+2} - i_t R_{t+1} P_t}{P_tC_t} = \frac{\beta(1-\delta)R_{t+1}P_t}{R_tP_{t-1} - \hat{r}_t}$$

$$i_t\left(\hat{r}_{t+1} - R_{t+1}P_t\right) + \hat{r}_{t+1}(1-\delta)k_t + \sum_b D^b_{t+1}(1+r^b_{t+1}) + T^c_{t+1} - \sum_b D^b_{t+2} = \frac{\beta(1-\delta)R_{t+1}P_t}{R_tP_{t-1} - \hat{r}_t}P_tC_t$$

$$i_t = \frac{1}{\hat{r}_{t+1} - R_{t+1}P_t}\left(\frac{\beta(1-\delta)R_{t+1}P_t}{R_tP_{t-1} - \hat{r}_t}P_tC_t - \hat{r}_{t+1}(1-\delta)k_t - \sum_b D^b_{t+1}(1+r^b_{t+1}) - T^c_{t+1} + \sum_b D^b_{t+2}\right)$$

$$\frac{\partial i_t}{\partial R_{t+1}} = -\frac{i_tP_t}{R_{t+1}P_t - \hat{r}_{t+1}} - \frac{\beta(1-\delta)P_t}{R_tP_{t-1} - \hat{r}_t} \times \frac{P_tC_t}{R_{t+1}P_t - \hat{r}_{t+1}}$$

Evaluated at the steady state, this expression can be simplified to

$$\begin{aligned}
\frac{\partial i_n}{\partial R_n} &= -\frac{1}{R_n} \times \frac{i_nR_nP_n + P_nC_n}{\beta(1-\delta)R_nP_n}, \\
\to \varepsilon^{i,R}_n &= -\frac{1}{i_n} \times \frac{i_nR_nP_n + P_nC_n}{\beta(1-\delta)R_nP_n} = \frac{1}{\beta(1-\delta)}\left(1 + \frac{D_nQ_n}{\alpha i_nR_nP_n}\right)
\end{aligned}$$

which shows as equation (27) in the main text. Plugging this back into the loan-elasticity,

$$\varepsilon^{L,r}_n = \sigma(1 - s^b_n) + s^b_n\varepsilon^{i,R}_n.$$

which shows as equation (26) in the main text.

B.3 Banks

We assume oligopolistic competition at the local level in loans, and monopolistic competition on the deposit side. While our framework is amenable to incorporating oilgopolistic competition on deposits, we prefer to assume monopolistic competition given that it is arguably easier for depositors to move their money between banks.

Omitting super-script b to keep notation clean, the problem of a bank is described as

$$\max_{\{\{r_{nt},\tilde{r}_{nt}\},F_t\}_{t=0}^{\infty}} \sum_{t=0}^{\infty} \beta^t \Big\{ \sum_n L_{nt}(1+r_{nt}) + D_{nt+1} - L_{nt+1} - D_{nt}(1+\tilde{r}_{nt}) + F_{t+1} - \exp\left(\phi \frac{F_t}{\sum_n D_{nt}}\right)(1+r_t^F)F_t \Big\}$$

$$\underline{s.t:}\ [\lambda_t]\ \sum_n L_{nt+1} = \sum_n D_{nt+1} + F_{t+1} \quad \forall t.$$

The first order condition with respect to F_{t+1} reads

$$\beta^t - \beta^{t+1}\left\{\exp\left(\phi \frac{F_{t+1}}{\sum_n D_{nt+1}}\right)(1+r_{t+1}^F) + \exp\left(\phi \frac{F_{t+1}}{\sum_n D_{nt+1}}\right)(1+r_{t+1}^F)\phi \frac{F_{t+1}}{\sum_n D_{nt+1}}\right\} + \lambda_t = 0$$

$$\frac{1}{\beta} + \mu_t = \exp\left(\phi \frac{F_{t+1}}{\sum_n D_{nt+1}}\right)(1+r_{t+1}^F)\left(1+\phi \frac{F_{t+1}}{\sum_n D_{nt+1}}\right) \tag{65}$$

Where $\mu_t = \frac{\lambda_t}{\beta^{t+1}}$. This expression for the marginal cost is equation (23) in the main text.

The first order condition with respect to L_{nt} reads

$$\frac{\partial L_{nt+1}}{\partial r_{nt+1}}\left[\frac{1}{\beta} - (1+r_{nt+1}) + \mu_t\right] = L_{nt+1}$$

$$\varepsilon_L \left[-\frac{1}{\beta} + (1+r_{nt+1}) - \mu_t\right] = (1+r_{nt+1})$$

Solving for the interest rate,

$$1 + r_{nt+1} = \frac{\varepsilon_L}{\varepsilon_L - 1}\left(\frac{1}{\beta} + \mu_t\right) \tag{66}$$

which is equation (24) in the main text. The first order condition with respect to deposits reads

$$\frac{\partial D_{nt+1}}{\partial q_{nt+1}} \underbrace{\frac{\partial q_{nt+1}}{\partial \tilde{r}_{nt+1}}}_{\text{in SS: } -\beta} \left[\frac{1}{\beta} - (1+\tilde{r}_{nt+1}) + \exp\left(\phi \frac{F_{t+1}}{\sum_n D_{nt+1}}\right)(1+r_{t+1}^F)\phi\left(\frac{F_{t+1}}{\sum_n D_{nt+1}}\right)^2 + \mu_t\right] = D_{nt+1}$$

$$\varepsilon_D \left[\underbrace{1 - \beta(1+\tilde{r}_{nt+1})}_{q_{nt+1}} + \beta \exp\left(\phi \frac{F_{t+1}}{\sum_n D_{nt+1}}\right)(1+r_{t+1}^F)\phi\left(\frac{F_{t+1}}{\sum_n D_{nt+1}}\right)^2 + \beta\mu_t\right] = q_{nt+1}$$

Solving for q

$$q_{nt+1} = -\frac{\varepsilon_D}{\varepsilon_D - 1}\beta\left\{\exp\left(\phi \frac{F_{t+1}}{\sum_n D_{nt+1}}\right)(1+r_{t+1}^F)\phi\left(\frac{F_{t+1}}{\sum_n D_{nt+1}}\right)^2 + \mu_t\right\} \tag{67}$$

In equation (25) we have substituted $\varepsilon_D = \eta$ given our monopolistic competition assumption.

B.4 Special case in Section 4.3

We fix a city n and omit the subscript n throughout this section. Define

$$y_b(\phi) \equiv 1 + r^b(\phi) \tag{68}$$
$$c_b(\phi) \equiv \mathcal{MC}^b(\phi) \tag{69}$$
$$s_b(\phi) \equiv \frac{y_b(\phi)^{1-\sigma}}{\sum_{v=1}^{B} y_v(\phi)^{1-\sigma}} \tag{70}$$

From equation (24) and equation (26),

$$y_b(\phi) = M(s_b(\phi))c_b(\phi), \text{ where } M(s) \equiv \frac{\sigma - s\Delta}{\sigma - s\Delta - 1} \tag{71}$$

and Δ is defined in equation (34). At the frictionless benchmark $\phi = 0$, and all banks are symmetric within the city, so

$$s_b(0) = \tfrac{1}{B}, \; c_b(0) = c_0 \equiv 1 + r^F. \tag{72}$$

Defining also

$$A \equiv \sigma - \tfrac{\delta}{B}, \; M_0 \equiv M(\tfrac{1}{B}) = \frac{A}{A-1}, \; M_1 \equiv M'(\tfrac{1}{B}) = \frac{\Delta}{(A-1)^2} \tag{73}$$

From here it follows that $y_0 = M_0 c_0$. From equation (23) it follows that

$$\frac{\partial c_b}{\partial \phi}|_{\phi=0} = 2(1 + r^F)\omega_b = 2c_0\omega_b, \tag{74}$$

where, as in the main text, $\omega_b \equiv \frac{F^b}{D^b}$ and $\bar{\omega} \equiv \frac{1}{B}\sum_{v=1}^{B} \omega_v$.

To recover how local average rates depend on ϕ we begin by differentiating bank share with respect to ϕ. Due to variable markups, interest rates depend on market shares which in turn depend on interest rates. To write the system of equations that captures these interactions we begin by looking at market shares.

In logs, shares are

$$\log s_b = (1-\sigma)\log y_b - \log \sum_{v=1}^{B} y_v^{1-\sigma}. \tag{75}$$

Differentiating,

$$\frac{\partial s_b}{\partial \phi} = (1-\sigma)s_b\Big[\frac{1}{y_b}\frac{\partial y_b}{\partial \phi} - \sum_{v=1}^{B} \tfrac{s_v}{y_v}\frac{\partial y_v}{\partial \phi}\Big] \tag{76}$$

which evaluated at the symmetric benchmark yields

$$\frac{\partial s_b}{\partial \phi}|_{\phi=0} = \frac{(1-\sigma)}{By_0}\Big[\frac{\partial y_b}{\partial \phi}|_{\phi=0} - \frac{\partial \bar{y}}{\partial \phi}|_{\phi=0}\Big] \;\; \bar{y} \equiv \tfrac{1}{B}\sum_{v=1}^{B} y_v \tag{77}$$

Differentiating equation (71),

$$\frac{\partial y_b}{\partial \phi} = M(s_b)\frac{\partial c_b}{\partial \phi} + c_b M'(s_b)\frac{\partial s_b}{\partial \phi}. \tag{78}$$

At $\phi = 0$,

$$\frac{\partial y_b}{\partial \phi}|_{\phi=0} = M_0 \frac{\partial c_0}{\partial \phi}|_{\phi=0} + c_0 M_1 \frac{\partial s_b}{\partial \phi}|_{\phi=0}. \tag{79}$$

Using equation (77),

$$\frac{\partial y_b}{\partial \phi}|_{\phi=0} = M_0 \frac{\partial c_0}{\partial \phi}|_{\phi=0} + \frac{(1-\sigma)c_0 M_1}{B y_0}\Big[\frac{\partial y_b}{\partial \phi}|_{\phi=0} - \frac{\partial \bar{y}}{\partial \phi}|_{\phi=0}\Big]. \tag{80}$$

Defining

$$\lambda \equiv \frac{(1-\sigma)c_0 M_1}{B y_0} = \frac{(1-\sigma)M_1}{B M_0} = \frac{(1-\sigma)\Delta}{BA(A-1)}, \tag{81}$$

equation (80) becomes

$$(1-\lambda)\frac{\partial y_b}{\partial \phi}|_{\phi=0} + \lambda \frac{\partial \bar{y}}{\partial \phi} = M_0 \frac{\partial c_0}{\partial \phi}|_{\phi=0}. \tag{82}$$

Taking the average of this expression across banks,

$$\frac{\partial \bar{y}}{\partial \phi}|_{\phi=0} = M_0 \frac{\partial \bar{c}}{\partial \phi}|_{\phi=0} \tag{83}$$

where $\bar{c} \equiv \frac{1}{B}\sum_{v=1}^{B} c_v$. Using equation (74),

$$\frac{\partial \bar{c}}{\partial \phi}|_{\phi=0} = \tfrac{1}{B}\sum_{v=1}^{B} 2c_0\omega_v = 2c_0\bar{\omega} \tag{84}$$

and, therefore,

$$\frac{\partial \bar{y}}{\partial \phi}|_{\phi=0} = 2M_0 c_0 \bar{\omega} \tag{85}$$

Substituting back into equation (82),

$$\frac{\partial y_b}{\partial \phi}|_{\phi=0} = \frac{M_0}{1-\lambda}(\omega_b - \lambda\bar{\omega}) = 2y_0\Big(\bar{\omega} + \frac{\omega_b - \bar{\omega}}{1-\lambda}\Big). \tag{86}$$

From here it follows that

$$\frac{\partial y_b}{\partial \phi}|_{\phi=0} = 2y_0\Big(\bar{\omega} + \tfrac{\omega_b - \bar{\omega}}{\Xi}\Big) \tag{87}$$

and

$$\frac{\partial s_b}{\partial \phi}|_{\phi=0} = \frac{2(1-\sigma)}{B}\frac{\omega_b - \bar{\omega}}{\Xi}, \tag{88}$$

where the dampening factor Ξ is defined as

$$\Xi \equiv 1 - \lambda = 1 + \frac{(\sigma-1)\Delta/B}{A(A-1)} = 1 + \frac{(\sigma-1)\Delta/B}{(\sigma-\Delta/B)(\sigma-\Delta/B-1)}. \tag{89}$$

Finally, we can calculate changes in the average interest rate,

$$y_n^w(\phi) \equiv \sum_{b=1}^{B} y_b(\phi) s_b(\phi) \tag{90}$$

$$\frac{\partial y_n^w(\phi)}{\partial \phi}|_{\phi=0} = y_0 \overbrace{\sum_{b=1}^{B} \frac{\partial s_b}{\partial \phi}}^{=0} + \frac{1}{B} \sum_{b=1}^{B} \frac{\partial y_b}{\partial \phi}|_{\phi=0} = 2 y_o \bar{\omega} \tag{91}$$

which leads to the expression in the main text.

C Estimation Appendix

C.1 Estimation algorithm

Our estimation strategy proceeds in two stages. In the outer loop, we discipline the structural parameters $\Gamma^o \equiv \{\sigma, \phi\}$. As we show in Section 5, the city-month fixed effects in our empirical specifications absorb every term common to banks within a city, so that the model reproduces the ratio of the second-stage coefficients on loan quantities and interest rates as exactly $-\sigma$. The elasticity of substitution is therefore pinned down by this ratio and requires no numerical search, which leaves the interbank friction ϕ as the only parameter to be searched over, chosen to match the level of the loan response. For a given pair $\{\sigma, \phi\}$, the inner loop inverts the model to recover $\Gamma^I \equiv \{z_n, b_n, \overline{\{\gamma_n^b, \kappa_n^b\}}_{b \in \mathcal{C}^b}\}_{n=1}^{N}$.

Inner loop For a given pair $\{\sigma, \phi\}$, we recover the model's implied fundamentals Γ^I in four steps.

Step 1: City-bank match parameters. We estimate the city-bank match parameters $\{\gamma_n^b\}$ and $\{\kappa_n^b\}$ to exactly replicate observed loan and deposit volumes at the city-bank level in 2015.[20]

In the data we observe total loan repayment in each city,

$$\mathcal{L}(i_n) = \sum_{b \in \mathcal{B}^n} (1 + r^b) L_n^b.$$

In the model, loan repayment equals investment expenditure: $\mathcal{L}(i_n) = i_n R_n P_n$. Using the loan demand function, equation (10), we can write loan volumes as a function of the match parameters

$$L_n^b = \mathcal{L}(i_n) \frac{R_n^{\sigma_0 - 1}}{(1 + r_n^b)^{\sigma_0}} (\gamma_n^b)^{\sigma_0 - 1}.$$

This yields a system of $\tilde{N}$ equations in $\tilde{N}$ unknowns (where $\tilde{N}$ is the number of city-bank pairs operating in Chile in 2015). Solving this system delivers estimates $\{\hat{\gamma}_n^b\}$ that perfectly rationalize observed city-bank loan volumes.

To estimate κ_n^b, we use data on average deposit rates by bank in 2015. Under our assumption of monopolistic competition in the deposit market, banks offer uniform deposit rates across all cities they serve. In steady state, equation (57) implies that the ratio of deposits from two banks in the same city satisfies:

$$\frac{D_n^b}{D_n^{b'}} = \left(\frac{\kappa^b}{\kappa^{b'}}\right)^{\eta - 1} \left(\frac{\beta - (1 + r_n^b)}{\beta - (1 + r_n^{b'})}\right)^{-\eta}. \tag{92}$$

For each city n, we normalize $\kappa_n^b = 1$ for one bank, then use equation (92) to solve for κ_n^b for all other banks operating in that city. Finally, we normalize the city-level average of κ_n^b to equal one.

[20] We cannot extract information specific to a bank from the micro-data, so in this section we use publicly available data on new loans by city-bank, the average interest rate by bank, and the average interest rate by city from the CMF.

Step 2: Free-on-board prices. Given the estimated match parameters, we solve for the vector of (unobserved) free-on-board prices $\{p_n\}$ that rationalizes the observed spatial distribution of wages and employment as an equilibrium. This requires imposing goods market clearing in all N cities. We normalize the average price of local goods to one, yielding N independent equations in N unknowns.

Step 3: Local productivities. With prices $\{\hat{p}_n\}$ in hand, we back out city-specific productivities from the zero-profit condition:

$$\hat{z}_n = \frac{w_n^{\mu} \hat{r}^{1-\mu}}{\hat{p}_n}, \tag{93}$$

where w_n is observed in the data and $\hat{r}_n$ is the estimated marginal product of capital in city n. We recover $\hat{r}_n$ from equation (64) using our estimates of γ_n^b from Step 1, which allow us to compute the loan price indices R_n and P_n.

Step 4: Local amenities. Finally, we recover amenities $\{\hat{b}_n\}$ as the values that rationalize the observed distribution of workers across cities as a migration equilibrium. These are pinned down by the labor market clearing condition, equation (31), where all other terms are now known. We normalize the average amenity to equal one.

Outer loop We discipline the structural parameters $\Gamma^o = \{\sigma, \phi\}$ using our reduced-form estimates from Section 3.

To construct model-based analogs of the empirical moments, we increase productivity by 1% in the fishing cities (those with high employment shares in fishing). For each candidate $\{\sigma, \phi\}$, we solve for the new equilibrium and replicate the empirical strategy of Section 3: we construct bank-level exposure to the shock as in equation (3), run the bank-level first-stage regression of the change in log total deposits on this exposure, and use predicted deposit growth to estimate two second-stage regressions at the city-bank level,

- *Quantity response* (β): change in log loans at the city-bank level; and
- *Price response* (α_1): change in $\log(1 + r_n^b)$ at the city-bank level,

which correspond to equation (1) and equation (5) in the main text. By differencing at the city-bank level before and after the shock, we effectively control for the analog of city fixed effects.

Identification of Γ^o has a simple recursive structure. As shown in Section 5, the city-month fixed effects in equation (1) and equation (5) absorb every term common to banks operating in the same city, so the model reproduces the ratio of the two second-stage coefficients as exactly $-\sigma$, independently of ϕ and of the remaining fundamentals. The elasticity of substitution is therefore identified by the ratio of the empirical coefficients,

$$\sigma = -\frac{\beta}{\alpha_1},$$

and does not require a numerical search. Given σ, the interbank friction ϕ is the only free parameter. It governs the common level of the two responses: larger frictions force banks to rely more heavily on retail deposits, so a deposit inflow lowers marginal cost by more and both responses scale up. We therefore choose ϕ with a one-dimensional search to match the level of the quantity response. Because σ already reproduces the ratio exactly, matching the level of one moment matches both, and the two empirical elasticities are reproduced exactly.

Figure 16 illustrates the role of ϕ, with the dashed line indicating our preferred estimate. It plots the model's quantity elasticity against ϕ: the elasticity is increasing in ϕ and equals zero at $\phi = 0$, where deposits flow freely through the interbank market to the best lending opportunities, so that the identity of the shocked bank is irrelevant.

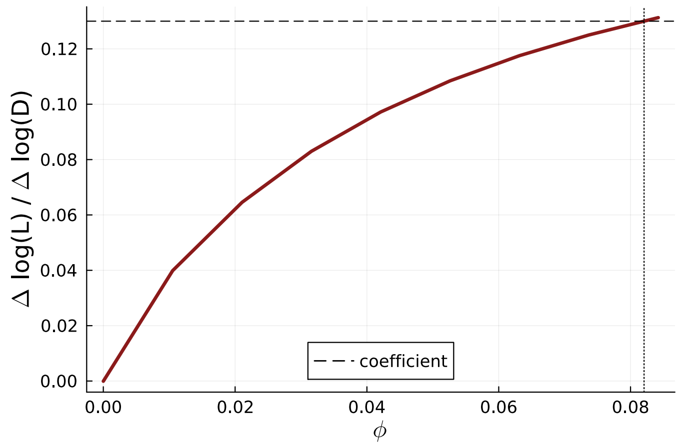

Figure 16: Estimation strategy, interbank frictions (ϕ

C.2 Estimated city-bank match γ_n^b

Figure 17 shows the estimated value of city-bank matches.

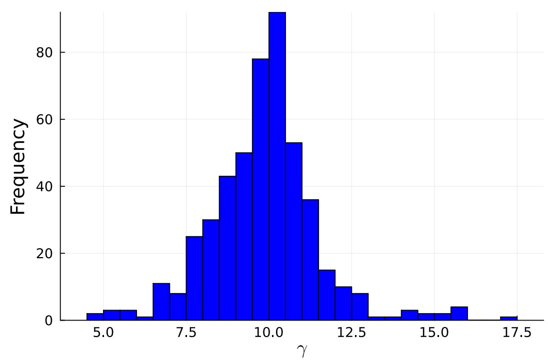

Figure 17: Estimated city-bank match γ

These estimates are closely related to the number of branches that bank b has in city n, after controlling for city and bank fixed effects. Table 8 below shows the results of an OLS estimate of

$$Log(\gamma_n^b) = \beta_0 + \gamma_n + \gamma_b + \beta_1 Log(Branches_n^b) + \varepsilon_n^b. \tag{94}$$

Table 8: Branches

	Estimated city-bank match (Log)
Branches	0.03***
	(0.006)
Bank FE	Yes
City FE	Yes
Observations	344