Credit Crunch in Housing under Regulation Q [*]

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Abstract

I document the role of a credit crunch in driving the housing market in the 1970s. Binding Regulation Q ceilings tightened funding and induced a credit crunch across the financial sector. I show that the crunch was particularly severe in housing because the primary mortgage lenders, savings and loan associations (S&Ls), lacked the funding flexibility banks had. Banks could substitute rate-capped retail deposits with wholesale funds exempt from the ceiling, whereas S&Ls could not. At the local level, a 1 pp tightening in the effective S&L ceiling is followed over the next year by a 4.7 pp drop in the mortgage growth rate and a 1.1 pp drop in the real house-price growth rate. Effects through banks are muted. This mechanism operates alongside demand-side explanations and helps to explain the joint boom-bust patterns in prices and quantities in the housing market during this era.

JEL Codes: E44, E51, G21, G28, R21, R38

Keywords: housing market; credit crunch; funding frictions; deposit-rate ceilings

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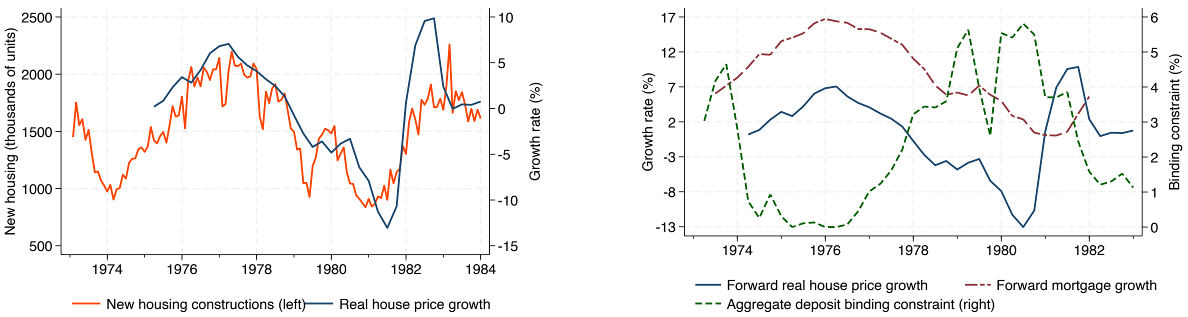
1 Introduction

The U.S. housing market experienced a sharp boom–bust cycle from the mid-1970s through the early 1980s. Figure 1 Panel A shows strong comovement, with new housing construction and real house-price growth climbing, falling, and rebounding together. The 1970s were a period of high inflation, high and volatile interest rates, and the entry of the baby-boom cohort into their prime home-buying years, which all shaped housing market equilibrium (United States. Congress, 1979). At the same time, banks and savings and loan associations (S&Ls) that financed mortgages operated under Regulation Q, which capped deposit rates. Credit conditions tightened and a housing credit crunch emerged (Wojnilower, 1980). The main contribution of this paper is to examine this housing credit crunch and document the channels through which it affected housing market equilibrium.

This paper studies the housing market of the 1970s through the lens of Regulation Q deposit-rate ceilings.[1] I argue that binding deposit-rate ceilings created funding frictions that pushed retail deposits out of financial institutions, particularly S&Ls, which at the time supplied more than half of outstanding mortgages. This funding channel drives joint declines in house prices and mortgage credit when ceilings bind, and a rebound when ceilings are slack. My empirical strategy uses several sources of cross-sectional variation across financial institutions and geographical areas to identify the impact of Regulation Q on trends in the housing market. Figure 1 Panel B plots the aggregate "binding-constraint" index for deposit-rate ceilings over the same period and shows a negative relationship with housing market growth, consistent with this funding channel.

Figure 1: Housing market in the 1970s–1980s



Panel A: Housing construction and prices **Panel B:** Prices, mortgages, and binding constraint

Notes: Panel A plots monthly new housing constructions and year-over-year growth in real house prices. Panel B plots forward year-over-year growth in real house prices and total mortgages, together with the binding-constraint index for the combined bank and S&L sector; see Section 3.1 for construction. New housing constructions are from FRED. House-price growth rate is computed from the Freddie Mac House Price Index.

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[1] Bernanke (2007) discusses the role of Regulation Q in housing finance in his Jackson Hole remarks. Early studies use aggregate series to examine how Regulation Q affected residential construction and mortgages (Jaffee and Rosen, 1979; Duca, 1996; De Leeuw and Gramlich, 1969).

The paper proceeds in five parts. In the first part of the paper, I use the cross-sectional variation in how tightly deposit-rate ceilings bind for different institutions at different times. I construct my deposit-funding friction measure by combining each institution's deposit composition with deposit-product specific spreads between market rates and ceiling rates.[2] This "binding-constraint" measure therefore takes the form of a shift–share approach, and intuitively it captures how much higher an institution would have paid on deposits absent Regulation Q. A 1 pp increase in the measure corresponds to a 1 pp tightening in the effective ceiling. Because deposits are sticky, at each moment in time, the cross-sectional variation in this measure stems from differences in the deposit composition across products.

With this measure in hand, I document two key results of the impact of binding constraint on retail deposit and lending growth, using institution-level data on S&Ls and banks from 1975 to 1983. S&Ls and banks were both major mortgage lenders in this period, and deposits were the primary funding source.[3] First, I show that a tighter effective ceiling causes retail deposits to flow out at all financial institutions. A 1 pp tightening in the effective ceiling lowers retail deposit growth by about 3.6 to 4.8 pp over the subsequent four quarters under a cross-sectional local projection design. Second, I show that the effect on mortgage lending is larger at S&Ls than at banks. Following a 1 pp tightening in the effective ceiling, S&L mortgage credit growth falls by about 6.9 pp, and bank mortgage credit growth falls by only 3.7 pp.

Funding flexibility explains the asymmetry in lending response. A key difference emerges in institutions' ability to substitute to alternative funding sources. Banks reallocated toward wholesale deposits, defined as time deposits above $100,000 that are exempt from the ceilings. In contrast, S&Ls faced regulatory constraints and thinner investor networks in wholesale markets, so they obtained almost all of their funding from retail deposits subject to deposit-rate ceilings. Over four quarters, a 1 pp tightening in the effective ceiling raises wholesale deposit growth by about 11.3 pp at banks but only 2.7 pp at S&Ls. As a result, total deposit growth falls by about 1.8 pp at banks and about 5.3 pp at S&Ls. The stronger pass-through on total deposits for S&Ls reflects their limited funding flexibility, while banks alleviate the shock by shifting toward wholesale funding.

My institution-level results connect to a large literature on funding structure and credit supply. Work on the crisis shows that banks with stable deposit funding cut lending less when markets are under stress, whereas heavy use of fragile wholesale funding amplifies pullbacks in credit (Gatev and Strahan, 2006; Acharya and Mora, 2015; Dagher and Kazimov, 2015; Ippolito et al., 2016; Ivashina and Scharfstein, 2010).[4] The common message is that access to reliable funding helps sustain lending and liquidity when conditions deteriorate.

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[2] This measure was first introduced by Duca (1996), and recently used by Koch (2015) and Drechsler et al. (2022*a*) to quantify how deposit ceilings bind at banks.

[3] Securitization was not yet widespread in this period, so the funding channel mapped closely into origination and on-balance-sheet mortgage holdings (Fuster et al., 2022).

[4] Other work has documented how bank funding shocks propagate to activity in U.S. data (Bernanke et al., 1991; Hancock and Wilcox, 1998; Chodorow-Reich, 2014) and in international settings (Iyer et al., 2014; Amiti and Weinstein, 2018).

I build on this work by emphasizing funding flexibility rather than any single "best" liability mix. What matters is the ability to switch funding sources when one channel tightens. This kind of flexibility can arise in multiple forms in modern day financial system. Lenders can buffer shocks by moving resources across affiliates or geography through internal capital markets and branch networks, which lets lenders redirect funds toward segments where demand is strongest (Gilje et al., 2016; Campello, 2002; Cetorelli and Goldberg, 2012; Hanson et al., 2015). Another highlights the use of secondary markets, where loan sales and securitization free balance-sheet capacity when deposits are scarce (Loutskina and Strahan, 2009). These examples show how flexibility can take the form of either shifting funding across affiliates and regions or offloading assets to make room for new lending. In the setting I study, the scope for funding flexibility is asymmetric. S&Ls face caps that limit wholesale issuance, while banks can draw on national markets and broader investor networks. This paper contributes to the literature by showing that the resulting gap in funding structure and market access matters for local credit and housing outcomes. Where S&L funding frictions are high, limited flexibility on the S&L side is associated with sharper reductions in mortgage credit and slower house-price growth, whereas banks' greater flexibility tends to alleviate the pass-through on their side.

In the second part of the paper, I combine two sources of variation to study local housing outcomes. The first is the overall funding frictions, captured by the binding-constraint measure. The second is geographic variation in how much each area historically relies on S&Ls versus banks. For each core-based statistical area (CBSA), I aggregate institutions by type, compute sector-specific binding-constraint measures for banks and S&Ls, and scale each measure by that sector's historical deposit reliance. These series allow me to jointly measure each local area's exposure to S&L and banks' binding constraints from deposit rate ceilings.

I use cross-sectional local projections to relate changes in mortgage credit and house prices to S&L and bank funding frictions, controlling for local demographics, market structure, and time fixed effects. Identification comes from cross-sectional variation in each area's exposure to ceiling tightness by intermediary type and in its historical reliance on S&Ls versus banks.

Areas with higher S&L funding frictions see larger and more persistent declines in mortgage credit and house prices. In areas that rely entirely on S&Ls, a 1 pp tightening of the effective S&L ceiling is followed over the next year by a 4.7 pp decline in mortgage credit growth and a 1.7 pp decline in per-capita mortgage credit relative to income. House prices move in tandem, with real house-price growth falling by 1.1 pp and real house prices relative to income falling by 4.1 pp. In contrast, the bank measures show no systematic effect on prices and little to no effect on local mortgage credit. These results are consistent with the higher degree of funding flexibility that banks have to replace lost retail deposits.

Taken together, these results complement the existing explanations for the housing market boom–bust cycle during this era. Tighter monetary policy raised borrowing costs and choked rate-sensitive demand from home buyers (Hendershott et al., 1980; Topel and Rosen, 1988; Piazzesi, 2025). High inflation affected housing demand by front-loading real mortgage payments toward the early part of the repayment period (Kearl, 1979), by interacting with the tax code and subsidies (Summers, 1980; Poterba, 1984; Leombroni et al., 2020), by shaping buyers' perceptions of real rates (Brunnermeier and Julliard, 2008), and by eroding long-duration asset values on bank balance sheets (Agarwal and Baron, 2024). Demographic pressure from the baby boom also raised demand for housing services (Mankiw and Weil, 1989; Green and Hendershott, 1996; Ortalo-Magne and Rady, 2006).[5] I show that funding frictions from deposit-rate ceilings operated alongside these forces and help explain the joint movement in prices and quantities, both in aggregate and in the cross section.

The results also have broader policy relevance beyond the historical housing boom-bust cycle of the 1970s. An important question in the literature and for policymakers is how strongly house prices respond to mortgage credit. Existing work estimates this elasticity using natural experiments and structural models (Favara and Imbs, 2015; Adelino et al., 2025; Justiniano et al., 2019; Greenwald and Guren, 2025). My setting adds to this literature by showing that the elasticity is not constant across local markets. The estimates imply a house-price elasticity with respect to mortgage growth of about 0.23 in areas that rely entirely on S&Ls and close to zero in areas that rely entirely on banks. More broadly, the paper shows that the elasticity of house prices to mortgage credit depends on the funding flexibility of the intermediaries operating in the local market.

In the third part of the paper, I assess the transmission from financial institutions to households. Households may switch their mortgage borrowing between banks and S&Ls when banks can raise wholesale deposits more easily than S&Ls. To test this idea, I interact the local funding-friction measures with the relative size of bank wholesale deposits compared with S&L wholesale deposits. I find no evidence that substitution affects house prices and only modest effects for mortgage credit. The interaction on mortgage growth implies that banks partially alleviate tighter S&L frictions in areas with greater wholesale capacity, offsetting about half of the standalone S&L effect at six quarters. This limited substitution is consistent with relationship lending at the household level, where borrowers tend to remain with existing lenders (Allen et al., 2019; Allen and Li, 2025; Basten and Juelsrud, 2023; Agarwal et al., 2023).

In the fourth part of the paper, I examine the quantity response in housing units and show a demand-side transmission of credit crunches in the housing market. When mortgage credit tightens, households are less able to finance purchases, shifting the demand curve downward and lowering both prices and quantities. I provide suggestive evidence on quantities using the long-term change in housing units from 1980 to 1990. Areas with higher exposure to S&L funding frictions from 1975–1980 experience larger declines in housing units, whereas the corresponding bank measure shows no significant effect. This does not rule out supply-side channels, which

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[5] On present day housing dynamics, Justiniano et al. (2019) and Drechsler et al. (2022*b*) link credit supply to the pre-Great Recession housing boom, while theoretical work studies how belief shifts and financing constraints generate boom–bust patterns (Burnside et al., 2016; Kaplan et al., 2020; Favilukis et al., 2017). A complementary line examines how mortgage contract design performs across booms and busts (Guren et al., 2021).

the literature has emphasized for banks (Drechsler et al., 2022*a*). Banks lend to firms, including construction companies, so a bank credit crunch can raise prices and reduce quantities by shifting supply in the housing market. Consistent with this, in areas without S&Ls, higher bank funding frictions are associated with positive house-price growth and a decline in housing units, which points to a supply shift. Overall, the evidence suggests that both sides of the market are relevant, but the demand-side effect dominates on net because funding frictions pass through more strongly at S&Ls and S&Ls focus on mortgage lending.

In the final part of the paper, I develop a model to illustrate how funding frictions map into housing outcomes and how funding flexibility alters that mapping. Households value both housing and deposit services, two lender types (S&Ls and banks) finance mortgages from deposits, a construction sector turns labor into new housing, and deposit-rate ceilings tighten retail funding when they bind. Two comparative exercises anchor the analysis. First, I show that an increase in the effective ceiling tightness reduces mortgage credit and the house price, with a larger pass-through through S&Ls than through banks. Second, I show that allowing S&L access to wholesale deposits attenuates the impact of S&L funding frictions on local outcomes. These mechanisms reproduce the empirical patterns in the data, with areas experiencing tighter S&L frictions showing larger and more persistent declines in mortgage credit and prices, while bank frictions have smaller average effects.

Taken together, the evidence underscores two main contributions already developed above. First, I document a funding channel for the 1970s housing credit crunch that operates primarily through S&Ls. Binding deposit-rate ceilings pushed deposits out of S&Ls and tightened mortgage credit, lowering house prices and quantities across local markets. Second, I show that funding flexibility in financial intermediation matters for real outcomes. Institutions with better access to alternative funding, banks in this setting, attenuated the pass-through by shifting toward wholesale deposits, whereas S&Ls could not. Together, these findings highlight how policy-driven funding frictions and institutional flexibility interact to shape housing-market equilibrium in the era.

The rest of the paper is organized as follows. Section 2 describes the institutional background and the data. Section 3 defines the funding-friction measure and discusses identification. Section 4 presents the funding reallocation and lending response at the institution level. Section 5 turns to local housing equilibrium. Section 6 develops a framework that matches the empirical patterns. Section 7 concludes.

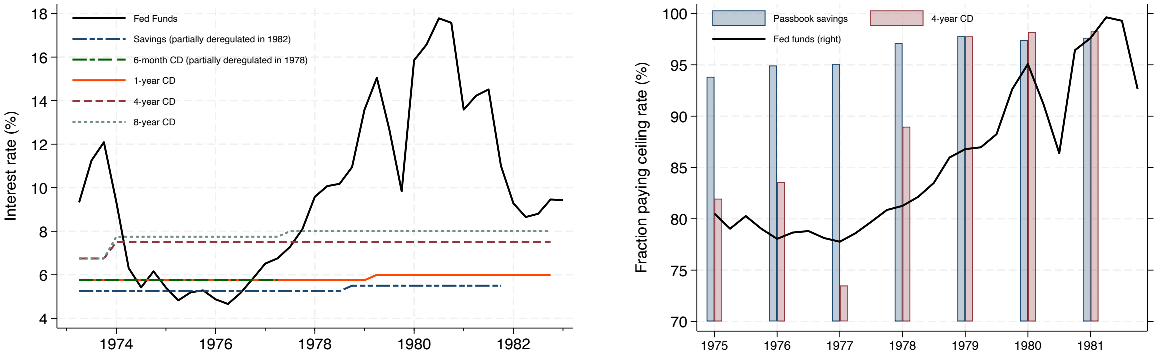
2 Institutional background and data

This section introduces the institutional background and the data that link deposit rate ceilings to housing finance. Regulation Q capped deposit rates and was often binding when market rates were high. By constraining deposit funding, it tightened mortgage credit and produced credit crunches in housing finance. The impact was not uniform. S&Ls, which specialized in mortgages and relied on retail deposits, were more exposed to binding ceilings than banks, which held broader balance sheets and had access to wholesale deposits. Guided by this setting, I assemble institution-level reports for S&Ls and banks from 1975–1983 and link them to local outcomes on house prices, mortgages, and housing units.

2.1 Deposit rate ceilings under Regulation Q

Regulation Q traces back to the Banking Acts of 1933, which authorized the Federal Reserve to prohibit interest on demand deposits and to set maximum rates on time and savings deposits. As short-term market rates climbed above the caps, especially in the 1970s, the ceilings became binding. Panel A of Figure 2 shows that the federal funds rate often exceeded ceiling rates even as policymakers raised ceilings at different times across products. Panel B shows that when the federal funds rate rose and ceilings were binding, more than 95% of S&Ls paid the ceiling rate.

Figure 2: Deposit rate ceilings



Panel A: Deposit rate ceilings over time **Panel B:** Fraction of S&Ls paying ceiling rates

Notes: Panel A plots the federal funds rate and deposit-rate ceilings by product. Panel B plots the share of S&Ls paying the ceiling rate over time. Deposit-rate ceilings are from Gilbert (1986). S&L deposit rates are from the S&L Financial Reports.

Deregulation proceeded in steps.[6] Wholesale deposits were fully deregulated in 1973. For small time deposits, money market certificates with six-month maturities were introduced in 1978 with ceilings tied to market rates, and small saver certificates with 30-month maturities followed in 1979. By the end of 1983, the ceilings on all small time deposits had been eliminated. For savings deposits, transactional NOW accounts began in New England in 1974 with ceilings aligned to savings rates and were authorized nationally in 1980. Money market deposit accounts were

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[6] The first step was in 1970 when ceilings were lifted for 30–90 day Certificates of Deposits with denomination greater than $10,000. The Depository Institutions Deregulation and Monetary Control Act of 1980 mandated a multi-year phaseout of most deposit-rate ceilings. The Garn–St Germain Act of 1982 accelerated the deregulation of deposit rate ceilings. The final ceiling on demand deposits was eliminated in 2010 through the Dodd–Frank Wall Street Reform and Consumer Protection Act.

authorized without a ceiling in 1982. By the end of 1986, all ceilings on time and savings deposits had been removed, while the ban on interest on demand deposits remained in place until 2010.

Although deposit ceilings were national, their staggered and product-specific changes made funding pressure uneven across institutions. In general, the ceilings on savings deposits at S&Ls were 25 basis points higher than the ceilings at banks.[7] Institutions that relied more on capped retail deposits faced tighter constraints than those with greater access to uncapped funding. This heterogeneity is central to the paper's measurement and analysis.

2.2 S&Ls and banks

S&Ls and banks were the main deposit takers and mortgage lenders from 1970s to 1980s, and both were subject to Regulation Q. The ceilings limited what each could pay on retail deposits, but the impact was not uniform. S&Ls depended far more on capped retail funding, while banks carried broader balance sheets and could tap wholesale deposits. As a result, the same ceiling could bite harder at S&Ls than at banks.

S&Ls were large providers of mortgage credit and relied mainly on savings and small time deposits. They were community lenders created to channel local savings into home mortgages, and their traditional model focused on long-term, fixed-rate residential lending funded largely by local retail deposits. At the start of the period, the sector's stock of savings and small time deposits was comparable to that of banks. In 1975 S&Ls held about $273 billion in these deposits, while banks held about $299 billion. By 1980, S&Ls held about $458 billion and banks about $497 billion. Historically, S&Ls originated and held roughly 40- 50% of outstanding mortgages in the United States. The law barred S&Ls from accepting demand deposits.[8] Their access to wholesale deposits was limited. Authority to issue certificates of deposit with denominations of $100,000 or more began only in 1974,[9] and issuance remained modest, with formal caps around 10% of total deposits. When deposit ceilings bound, S&Ls faced tighter funding pressure and often turned to Federal Home Loan Bank advances as a secondary source of funds.

Banks entered the period with more ways to fund their balance sheets. Wholesale deposits were not subject to Regulation Q ceilings, and large banks could sell negotiable certificates directly to institutional investors. Banks also maintained broader lending mixes that included commercial and industrial credit. On average they held about 10% of all U.S. mortgage assets over the period [10]. Their wider investor networks and access to interbank markets gave them more scope to

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[7] Under the Interest Rate Control Act of 1966, thrift institutions (S&Ls and mutual savings banks) were permitted to pay a higher ceiling than banks to encourage deposits at thrifts.

[8] The Home Owners' Loan Act limited the deposit powers of thrifts, including S&Ls, to savings accounts rather than demand deposits. After the introduction of Negotiable Order of Withdrawal (NOW) accounts under the Depository Institutions Deregulation and Monetary Control Act, Pub. L. No. 96–221 (1980), S&Ls were permitted to offer check-writing savings accounts, which remained classified as savings deposits.

[9] S&Ls were authorized to issue marketable certificates of deposit under 12 C.F.R. § 545.1–5 in June 1974.

[10] Aggregate mortgage asset shares for S&Ls and banks are reported in the Federal Reserve Board's *Annual Statistical Digest*. For 1978–1980, see Table 44 in the 1980 volume, available at `https://fraser.stlouisfed.org/files/docs/publications/astatdig/1980/1980.pdf`.

replace lost retail deposits when market rates rose.

Deposits and mortgage lending were largely local in my 1975–1983 sample period. Although intrastate branch networks began to form during the first wave of branching reforms in the 1930s, those early regimes typically permitted cross-city branching only under tight conditions rather than unrestricted statewide de novo branching (Quincy and Xu, 2025). Interstate banking was generally not permitted until the mid-1980s, after my sample period. Full statewide de novo branching was also limited before the 1980s: only 13 jurisdictions permitted statewide de novo branching by 1970,[11] and most other states adopted statewide de novo branching in the mid-1980s (Kroszner and Strahan, 1999; Amel, 1993; Demyanyk et al., 2007). In the analysis, I therefore treat retail deposit taking and mortgage origination as occurring primarily in each institution's home location. To the extent internal capital markets reallocate funds across branches within a state, some activity may not be recorded in the exact home city. Aggregating to the core-based statistical area (CBSA) level mitigates this concern by capturing the economically integrated local market within which branches typically operated in this period, so any remaining misallocation is likely within-CBSA and does not affect the main results.

2.3 Housing and mortgage credit

The housing market moved through a sharp decline, a rebound, and a second downturn between 1974 and 1983. New privately built housing units fell to postwar lows of 0.9 million units per month in 1975, recovered to nearly two million units by the late 1970s, then slipped again during the 1980–1982 tightening as mortgage rates rose and credit became scarce (U.S. Census Bureau and HUD, 2025). Real house prices weakened over the period, and contemporaneous reports, including the 1980 report of the President's Commission on Housing [12], described a fragile housing-finance structure that did not provide a stable, reliable supply of mortgage credit and noted that home buyers and lenders were caught in a credit crunch.

Until the mid-1980s, most mortgages were made by depository institutions and funded on their own balance sheets. Securitization was limited, so local mortgage credit depended on how many deposits they could raise (Fuster et al., 2022). When deposit-rate ceilings bound in a high-rate environment, retail deposits flowed out and lenders had less capacity to make new mortgages. Because S&Ls relied more on capped retail funding, the same policy environment imposed tighter constraints on them than on banks.

At the aggregate level, the patterns line up with broad price movements. Panel B of Figure 1 plots forward year-over-year growth in real house prices (blue, solid) and in total mortgages (red, dot–dash), together with an aggregate binding-constraint index on the right axis. The index is the deposit-type–weighted spread between market rates and the relevant ceilings. After the 1974–1975

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[11] "Statewide" here refers to unrestricted intrastate de novo branching. The jurisdictions are Alaska, Arizona, California, Delaware, District of Columbia, Idaho, Maryland, Nevada, North Carolina, Rhode Island, South Carolina, South Dakota, and Vermont.

[12] Available at `https://www.huduser.gov/Publications/pdf/HUD-2460.pdf`.

downturn, real prices and mortgage growth rise in 1975–1977. As the federal funds rate tightens and ceilings bind, both series trend down, with real price growth at its lowest point of -13% from mid-1980 to mid-1981. The binding-constraint index moves in the opposite direction, falling when mortgage and house-price growth pick up and rising when they weaken. It is consistent with deposit rate ceilings pushing deposits out of S&Ls and banks and producing a credit crunch.

2.4 Data

I assemble the depository institution and housing data for 1975–1983. The start date reflects the availability of house price data at the local level. I end the sample in 1983Q3. By 1983Q4, all ceilings on small time deposits were eliminated, and the S&L crisis began soon after. Stopping in 1983 avoids mixing the deposit-ceiling regime with crisis dynamics at insolvent institutions.

Financial report data: Deposits and mortgage lending data come from the Bank Call Reports and the S&L Financial Reports. The Bank Call Reports are available through WRDS back to 1976. Historical Call Reports before 1976 can be obtained from the Federal Reserve through a FOIA request. S&L Financial Reports from 1974 to 1983 are hosted at the National Archives and are available to the public free of charge. Banks file Call Reports with the Federal Reserve. In my sample period, these reports include detailed balance-sheet variables and a deposit breakdown. S&Ls filed financial reports with the Federal Home Loan Bank Board. There are three sets of reports. Even-numbered quarters include full balance sheets, with detailed assets, deposits by broad category, and lending data. In odd-numbered quarters, I supplement key balance-sheet items with the monthly financial reports, which contain a smaller set of variables. I also collect the new deposit products introduced during the deregulation, money market certificates (MMC), small saver certificates (SSC), and money market deposit accounts (MMDA), from the even-numbered semi-annual reports. I interpolate these three series in odd-numbered quarters following the cleaning and construction approach in Drechsler et al. (2020), who first assembled and analyzed the S&L financial report data.

Housing market data: Housing data come from the Freddie Mac House Price Index (FMHPI), which I deflate by the CPI to construct real house-price growth for 1975–1983. FMHPI is reported at the core-based statistical area (CBSA) level, so the local analyses use CBSAs as the unit of observation. Although current CBSA definitions postdate my sample period, they group adjacent counties and cities into integrated local markets based on commuting and economic ties, which change slowly. I therefore map historical observations to a fixed set of 2015 CBSA boundaries, and where sources report sub-CBSA data, I aggregate those boundaries to maintain a consistent geography over time. Because there is no quarterly time series of level house prices at the CBSA level for this period, I use the 1980 Census median house price as a benchmark and apply the FMHPI to construct price series for each CBSA. For housing quantity, I use total housing units (occupied plus vacant) from the decennial censuses in 1970, 1980, and 1990.

Other data: To construct the binding-constraint measure for deposit rate ceilings, I obtain deposit-product ceiling rates from Gilbert (1986) and federal funds and U.S. Treasury rates from Federal Reserve Economic Data (FRED). Demographic data come from the U.S. Census Bureau. I use the annual population from the Intercensal Population Estimates from 1975 to 1983 and the median household income from the 1980 Census.

Table 1: Summary statistics at institution level

	S&Ls		Banks	
	Mean (1)	St.Dev. (2)	Mean (3)	St.Dev. (4)
Rate ceiling binding constraint (p.p.)	1.79	1.65	2.66	2.24
Assets (mil.)	133.90	427.18	110.60	1490.69
Mortgages/Assets	0.80	0.18	0.18	0.11
Total loans/Assets			0.60	0.12
Deposits/Assets	0.87	0.07	0.88	0.06
Wholesale deposits/Assets	0.03	0.07	0.09	0.08
Wholesale deposits and alternative funds/Assets	0.07	0.09	0.10	0.09
Year-over-year growth rate (%):				
Mortgages	11.89	20.97	14.05	28.82
Total loans			11.66	15.20
Deposits	13.44	18.45	11.66	13.01
Fraction of deposits:				
Demand	0.00	0.01	0.30	0.13
Savings	0.31	0.16	0.24	0.11
Small time ($\leq$ 100,000)	0.65	0.16	0.36	0.16
Wholesale ($>$ 100,000)	0.04	0.08	0.10	0.10
Institutions	4,523		16,123	
Observations	135,311		503,364	

Notes: This table reports institution-level summary statistics. The rate-ceiling binding-constraint measure is the average spread between market rates and deposit ceilings, constructed as in Section 3.1. Year-over-year growth rates are computed as log changes. Data come from S&L Financial Reports and bank Call Reports, 1975Q1–1983Q3.

Table 1 reports summary statistics for institutions in the sample. The panel contains 4,523 S&Ls and 16,123 banks. On average, S&Ls are slightly larger by assets than banks (about 134 million versus 111 million), and banks display much greater dispersion. Deposits are the main funding source for both groups, with deposit-to-asset ratios around 0.87–0.88. S&Ls concentrate on mortgages, which average 80% of assets, compared with 18% for banks. I do not report total loans for S&Ls because they hold little non-mortgage credit. Wholesale deposits account for about 3% of assets at S&Ls and 9% at banks. Including non-deposit sources, the combined share of

Table 2: Summary statistics at local level

	CBSA level				
	Mean (1)	St.Dev. (2)	p25 (3)	Median (4)	p75 (5)
Bank funding frictions (p.p.)	1.895	1.723	0.332	1.406	3.112
S&L funding frictions (p.p.)	0.445	0.641	0.000	0.188	0.660
Housing market:					
Mortgages growth rate (%)	7.467	24.245	1.751	8.952	16.222
Real house price growth rate (%)	-1.120	7.661	-5.468	-0.810	3.553
Mortgage per capita/median income	0.148	0.121	0.082	0.131	0.181
Home price/median income	2.593	0.652	2.140	2.486	2.930
Housing units per capita 1980	0.393	0.055	0.369	0.383	0.402
Housing units per capita 1990	0.361	0.053	0.332	0.360	0.387
Financial institutions:					
S&L share of assets	0.285	0.235	0.118	0.256	0.383
S&L share of deposits	0.286	0.234	0.120	0.257	0.384
S&L share of mortgages	0.533	0.306	0.320	0.603	0.763
Log(Bank wholesale/S&L wholesale)	2.456	1.623	1.480	2.469	3.530
log(Assets)	12.808	1.510	11.946	12.627	13.508
Deposits/Assets	0.870	0.049	0.857	0.881	0.898
Mortgages/Assets	0.370	0.156	0.270	0.353	0.437
Mortgage HHI	0.371	0.234	0.200	0.314	0.486
Demographics:					
log(Population)	11.278	1.166	10.449	11.038	11.830
log(Median income 1980)	9.613	0.180	9.493	9.623	9.732
CBSAs	904				
Observations	31,188				

Notes: This table reports CBSA-level summary statistics. House-price data come from the Freddie Mac House Price Index. Housing units and demographics come from the U.S. Census. Financial institution data come from S&L Financial Reports and bank Call Reports, 1975Q1–1983Q3.

wholesale deposits plus alternative funds averages 7% of assets at S&Ls and 10% at banks. At S&Ls, the alternative funds component, primarily Federal Home Loan Bank advances, is about 4% of assets and accounts for most of the 7%, whereas banks' 10% is driven mainly by wholesale deposits. The average rate-ceiling binding-constraint measure is 1.79 pp for S&Ls and 2.66 pp for banks.

Annual growth rate in mortgages is of similar magnitude across institution types, about 11.9% for S&Ls and 14.1% for banks. Deposit growth averages 13.4% at S&Ls and 11.7% at banks. Deposit composition differs markedly. S&L deposits are mostly small time deposits (65%) and savings deposits (31%), with essentially no demand deposits and about 4% in wholesale deposits. Banks hold a more balanced mix, with roughly 30% in demand deposits, 24% in savings, 36% in small time deposits, and 10% in wholesale deposits.

Table 2 reports summary statistics at the CBSA level. For financial institutions, I aggregate all banks and S&Ls within each CBSA. The mortgage outcomes cover 904 CBSAs, whereas house price data are available for 383 CBSAs. Over 1975–1983, the average annual mortgage growth rate is about 7.5%, while real house prices decline on average by 1.12% per year. Mean house prices are 2.59 times the median household income. Housing units per capita fell from 0.393 in 1980 to 0.361 in 1990. On average, S&Ls account for 28.5% of local financial sector assets and 28.6% of deposits, yet they hold 53.3% of outstanding mortgages. For the typical CBSA, deposits equal about 87% of financial-sector assets, and mortgages account for about 37% of assets.

3 Measuring funding frictions

In this section I construct funding-friction measures with a standard shift–share design. The shift is each deposit product's spread between the market rate and the applicable ceiling in a given quarter. The share is each institution's deposit composition. The measure rises when ceilings bind more on the products an institution relies on, so it summarizes how exposed deposit funding is to policy-driven tightening. I then explain why this construction yields valid cross-sectional exposure and how it fits the broader research design.

3.1 Measurement method

I construct an institution-level binding-constraint measure that combines each institution's deposit mix with product-specific interest-rate gaps in the spirit of a shift–share design. For institution i in quarter t,

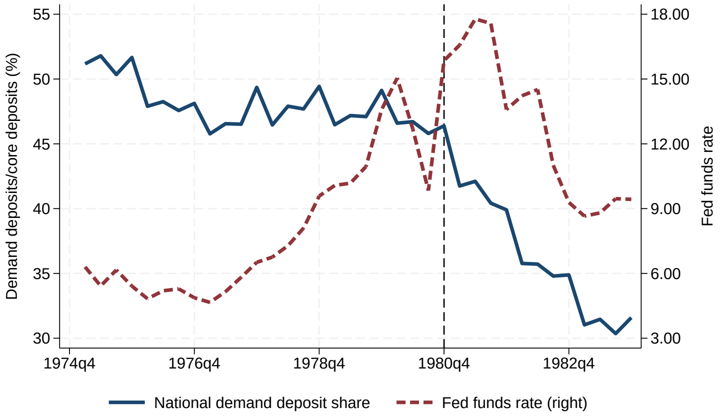
$$\text{Bind}_{i,t} = \sum_j s_{ijt}\, g_{jt}, \qquad s_{ijt} \equiv \frac{\text{Deposits}_{ijt}}{\text{Total Deposits}_{it}}, \qquad g_{jt} \equiv \max\{0, \text{MarketRate}_{tj} - \text{Ceiling}_{tj}\}, \tag{1}$$

where s_{ijt} is the share of deposit product j at institution i and g_{jt} is the national spread between a proxy market rate and the applicable ceiling for product j. For deposit types that are deregulated or have ceilings equal to market rates, the spread is zero. The measure was first introduced in Duca (1996) and recently used by Koch (2015) and Drechsler et al. (2022*a*) to quantify how deposit ceilings bind at banks. Intuitively, it captures how much higher an institution would have paid on deposits absent deposit rate ceilings. A one–percentage-point increase in the measure therefore corresponds to a one–percentage-point tightening in the effective ceiling.

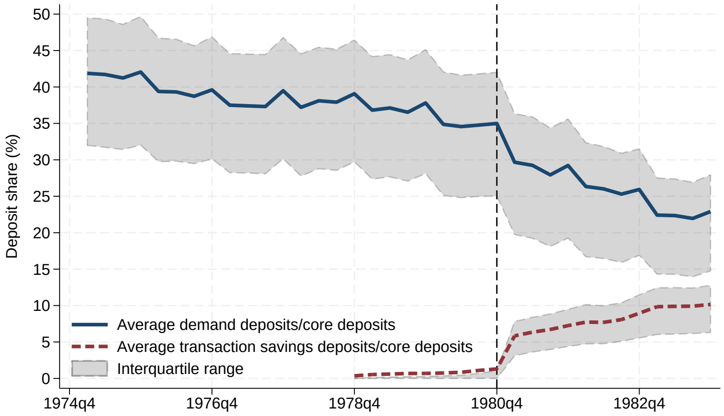
Regulatory reports provide a consistent deposit breakdown for both S&Ls and banks. The categories are demand deposits, regulated nontransaction savings deposits, regulated small time deposits ($\leq$ \$10,000), wholesale deposits ($>$ \$10,000), and a deregulated group. The deregulated group includes money market certificates (3- and 6-month), small savers certificates, money market deposit accounts, and transactional savings deposits (NOW and Super NOW). These products were introduced at different points between 1975 and 1983. They enter with zero spread because their ceilings were absent or aligned with market rates in the relevant periods. Wholesale deposits were fully deregulated before my sample, so I treat them as exempt. I take ceiling schedules from Gilbert (1986) and contemporaneous Federal Reserve sources. Policymakers raised deposit rate ceilings gradually, phasing in increases at different times across deposit types. For market rates, I use maturity-matched Treasury yields for time deposits and the federal funds rate for nontransactional savings. Because the maturity mix of small time deposits is not observed in the financial reports, I proxy their spread with the average of the 3-month, 6-month, 1-year, and 2.5-year spreads.

Figure 3: Demand deposits over time

Panel A: Aggregate demand deposits as a share of retail deposits



Panel B: Demand deposits and transactional savings deposits in the cross section



Notes: Panel A plots the demand-deposit share of retail deposits and the federal funds rate over time at the aggregate level. Panel B plots the demand-deposit share and the transactional-savings share of retail deposits over time. Shaded areas denote interquartile ranges. In both panels, the vertical line marks the national introduction of transactional savings deposits in 1980Q4.

Demand deposits require special handling. Although their posted ceiling was zero throughout the sample, households accepted zero interest in exchange for checking services, so a strict zero-rate assumption would overstate tightness. Two facts guide the construction. First, demand deposits flowed out when market rates rose. Panel A of Figure 3 shows the demand share of retail deposits falling as the federal funds rate increased in the late 1970s. Second, after transactional savings deposits were introduced nationally in 1980, balances shifted from demand into these interest-bearing transaction accounts, as shown in Panel B. These patterns indicate that demand deposits faced binding pressure comparable to other core components of retail deposits, if not greater.

Guided by this evidence, the baseline assigns an implied demand deposit rate equal to the savings deposit rate. In other words, the value of transaction services is treated as equivalent to the savings rate. When forming g_{jt}, I set the demand deposit market and ceiling rates equal to those for savings, so demand deposits contribute to $\text{Bind}_{i,t}$ whenever savings ceilings bind. This choice affects banks only, since S&Ls did not offer demand deposits in this period.

The baseline measure in Equation 1 uses this taxonomy and the implied-rate treatment for demand deposits. Table 1 shows that the average binding-constraint measure is 1.79% for S&Ls and 2.66% for banks. In robustness, I consider alternative constructions that treat demand deposits as progressively less binding, up to the extreme of fully exempt. The qualitative conclusions in the subsequent sections are unchanged under these alternatives.

3.2 Validity of the funding friction measurement

The binding-constraint measure combines national movements in deposit-rate ceilings with deposit composition at each institution. There are two standard ways to justify shift–share designs. One emphasizes exposure validity of the shares, as in Goldsmith-Pinkham et al. (2020). The other emphasizes shock validity of the shifts, as discussed by Borusyak et al. (2022). My approach follows the former. In each analysis I include time or state–time fixed effects, so identification comes from cross-sectional differences among units that face the same aggregate environment in a given quarter. Full specifications and controls appear in Section 4.1 and Section 5.1.

The maintained assumption is that deposit composition is orthogonal to future shocks in deposits and lending. This is plausible for deposits. Deposit composition is sticky because customers face inertia and switching costs. Within a quarter, mixes are unlikely to jump in anticipation of which specific ceilings will bind, so contemporaneous shares behave as predetermined. Regressing current deposit composition on its lag yields an R^2 of 0.93, which validates this stickiness. Cross-sectional variation in deposit composition is not driven by observable institution fundamentals, local market conditions, or demographics, as these factors explain at most 2.5% of the variation, controlling for the state-time fixed effects. Table 3 shows the partial R^2 of each observable is small, with bank assets having the largest value, at about 3%. The remaining variation reflects legacy, slow-moving deposit composition.

Table 3: Partial R^2 of observables for $\text{Bind}_{i,t}$

	S&L $\text{Bind}_{i,t}$	Bank $\text{Bind}_{i,t}$
Asset	1.0%	3.3%
Mortgage/Asset	0.1%	0.0%
Deposit/Asset	0.5%	0.0%
Deposit HHI	0.2%	0.1%
Mortgage HHI	0.1%	0.0%
Population	2.1%	0.9%
Population growth	0.2%	0.0%
Median income	1.0%	0.7%
Joint R^2 of all observables	2.2%	2.5%

Notes: Each row reports the partial R^2 of the listed observable from the full regression of $\text{Bind}_{i,t}$ on all listed observables, controlling for state×time fixed effects. The partial R^2 measures the additional explanatory power of that observable conditional on the other observables in the specification. The last row reports the R^2 from the full regression that includes all listed observables together.

A natural question is whether to use contemporaneous shares or fixed shares from a pre-period. I use contemporaneous shares because they capture the dollars currently at risk when ceilings bind, including the gradual rollout and adoption of deregulated deposit types. Using stale shares would attenuate the mapping from ceiling shifts to actual exposure by blending in outdated mixes that no longer sit on the balance sheet. The relevant econometric concern is not that shares must be frozen in a base year, but that they should be predetermined within the period relative to the common shocks and to residual innovations in the outcomes. In my setting, the institutional frictions noted above make that within-quarter predetermination plausible, while time and state–time fixed effects absorb aggregate forces that move all institutions simultaneously. This logic applies at the intra-quarter horizon, when mixes are unlikely to change discretely, and it allows composition to change over longer horizons. For these reasons I adopt a cross-sectional local projection method to track how the effects of funding frictions evolve over time. I introduce the design and specification in the next section.

4 Institution-level deposit and credit responses

I study how deposit-rate ceilings transmit to institutions' funding and credit. The hypothesis is that tighter constraints reduce retail deposits and weaken lending. Banks can replace part of the shortfall through wholesale deposits, whereas S&Ls have limited scope because of regulatory caps and weaker investor networks. If wholesale substitution is effective at banks, their total funding and lending fall by less, while S&L mortgage lending contracts more and remains depressed for longer. The section documents these patterns and sets up the link from funding frictions to housing-market outcomes.

4.1 Design and specification

The deposit-rate ceilings create funding frictions that differentially affect S&Ls relative to commercial banks. I test this prediction using institution-level regressions at each horizon h, estimated separately for S&Ls and banks:

$$\Delta y_{i,t\to t+h} = \beta_h \,\mathrm{Bind}_{i,t} + \boldsymbol{\phi}_h^{\top}\mathbf{X}_{i,t} + \delta_{s(i),t} + \varepsilon_{i,t+h}, \tag{2}$$

where $\Delta y_{i,t\to t+h}$ is the cumulative growth of the balance-sheet variable y for institution i from quarter t to $t+h$. Horizons h range from one to six quarters. I measure growth rate as the log change between the level at the end of the horizon and the level at the start. $\mathrm{Bind}_{i,t}$ denotes the binding-constraint measure implied by deposit-rate ceilings (see Equation 1) and proxies how much higher the institution would have paid on deposit rate at time t absent Regulation Q. The control vector $\mathbf{X}_{i,t}$ includes two groups: (i) institution fundamentals—log assets and the deposit-to-asset ratio—and (ii) market structure and demographics in the institution's home CBSA, consistent with the assumption that institutions operate only in their local area, measured by the mortgage-lending Herfindahl–Hirschman Index (HHI) computed at the CBSA level, log population, and log median income. Because some banking and thrift regulations are set at the state level, I include state-time fixed effects, $\delta_{s(i),t}$, to absorb shocks that vary across states over time. The design effectively compares institutions with the same asset and deposit size, similar market characteristics, and located in the same state and quarter.

The coefficient of interest is β_h, which measures the h-quarter cumulative response of balance-sheet variable y to a 1 pp increase in the binding-constraint measure at time t. Under the hypothesized mechanism, higher funding frictions reduce deposit growth and lending, so I expect a negative β_h for total deposits and for lending for both S&Ls and banks. Because banks can more readily replace retail deposits with wholesale deposits, the contraction should be attenuated for banks relative to S&Ls, so $|\beta_h|$ is smaller for banks. Consistent with a shift toward alternative funding sources, I expect β_h to be positive for wholesale deposits at banks.

Overlapping horizons induce serial correlation along the time dimension, so I construct baseline confidence intervals using the moving-block bootstrap. The moving-block bootstrap resamples, with replacement, blocks of L consecutive quarters. Each resampled block preserves the full cross-section, which maintains the serial dependence generated by overlapping growth windows (Künsch, 1989; Gonçalves, 2011).[13] I set $L = \max\{4, h\}$, where h is the horizon length,[14] and report point estimates with confidence intervals from the moving-block bootstrap.

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[13] Recent applications of moving-block bootstrap in finance include Lochstoer and Muir (2022) and Schreindorfer and Sichert (2025), among others.

[14] Following Hall et al. (1995), the optimal block length for many statistics scales as $L \propto n^{1/3}$. With roughly 30 quarters, $n^{1/3} \approx 3.1$. I therefore set $L = 4$ for horizons shorter than four quarters and $L = h$ for horizons of four quarters or longer.

For robustness, I complement the baseline moving-block bootstrap with two additional procedures. First, I report two-way cluster-robust standard errors by institution and by time. Because the number of time clusters is modest (about 30 quarters), I also obtain wild cluster bootstrap-*t* confidence intervals using institution and time as clusters (Cameron et al., 2008). Second, I remove the source of serial correlation by re-estimating all specifications on non-overlapping windows that keep a single start date per horizon block, and I cluster standard errors at the institution level.

I next document that the binding-constraint measure is persistent at the institution level. This evidence motivates the multi-quarter horizon design and informs the interpretation of the results that follow.

4.2 Persistence of funding frictions

Institutions that are more constrained today tend to remain more constrained in subsequent quarters. To quantify this persistence, for each horizon h I regress the binding-constraint measure at $t+h$ on its level at t, controlling for the same covariates and state-time fixed effects used in the main specification Equation 2:

$$\text{Bind}_{i,t+h} = \rho_h \,\text{Bind}_{i,t} + \boldsymbol{\phi}_h^{\top} \mathbf{X}_{i,t} + \delta_{s(i),t} + \varepsilon_{i,t+h}. \tag{3}$$

The coefficient ρ_h summarizes h-quarter conditional persistence: it tells how much a higher binding constraint today predicts still being constrained h quarters ahead. Positive values indicate persistence, and a decline in coefficient estimates as horizon increases indicates mean reversion.

Figure 4 Panel A plots ρ_h by horizon. Point estimates decline with horizon yet remain positive for both S&Ls and banks, with similar magnitudes. The estimates show that a one–percentage-point increase in the binding-constraint measure today is followed by increases of 0.8 pp after one quarter, 0.7 pp after four quarters, and 0.6 pp after six quarters. I construct 95% confidence intervals using the moving-block bootstrap with 1,000 repetitions and also mark horizons that are statistically different from zero under two-way clustering.

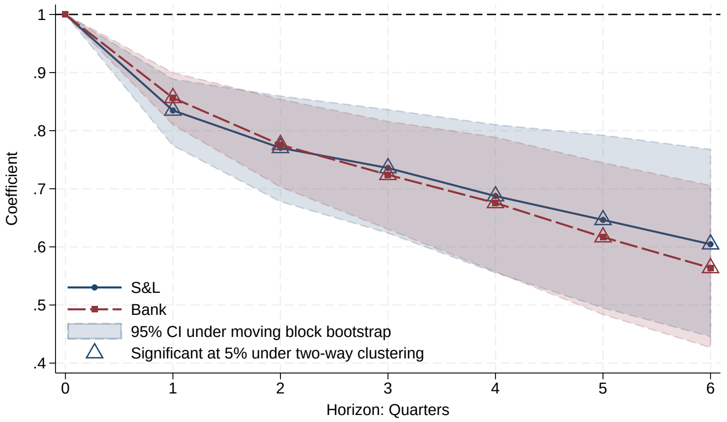
Because the binding constraint persists, the coefficients β_h in Equation 2 should be read as responses to continued tight funding over h quarters, not a one-off shock. A convenient summary of that continued exposure is the cumulative persistence

$$E_h \equiv \sum_{\tau=0}^{h-1} \rho_\tau, \quad \text{with } \rho_0 \equiv 1.$$

This quantity adds the contemporaneous unit shock ($\rho_0 = 1$) and the predicted carry-over at each subsequent quarter. For instance, the four-quarter exposure is $E_4 \approx 1 + 0.85 + 0.78 + 0.72 = 3.35$pp for both banks and S&Ls. Figure 4 Panel B reports the cumulative persistence by horizon for S&Ls and banks. As horizon grows, β_h reflects both the immediate impact and the cumulative exposure summarized by E_h. I carry this interpretation forward when presenting the deposit and lending

Figure 4: Persistence of funding frictions at the institution level

Panel A: Horizon-specific persistence coefficients ρ_h



Panel B: Cumulative exposure to elevated binding constraints over the horizon

	$E_h \equiv \sum_{\tau=0}^{h-1} \rho_\tau$					
Horizon	1	2	3	4	5	6
S&Ls	1.00	1.83	2.61	3.34	4.03	4.68
Banks	1.00	1.86	2.63	3.36	4.03	4.65

Notes: Panel A reports estimates of ρ_h from the persistence regression

$$\text{Bind}_{i,t+h} = \rho_h \, \text{Bind}_{i,t} + \boldsymbol{\phi}_h^\top \mathbf{X}_{i,t} + \delta_{s(i),t} + \varepsilon_{i,t+h},$$

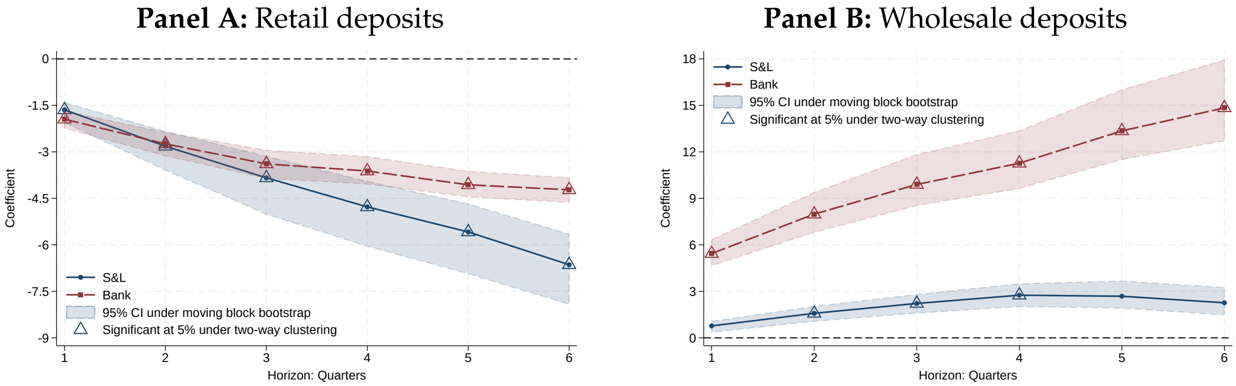
where $\text{Bind}_{i,t}$ is the binding-constraint measure; $\mathbf{X}_{i,t}$ includes log assets, the deposit-to-asset ratio, the mortgage HHI, log population, and log median income; and $\delta_{s(i),t}$ denotes state × time fixed effects. Shaded areas show 95% confidence intervals from the moving-block bootstrap with block length $L = \max\{4, h\}$ quarters and 1,000 repetitions. Markers indicate coefficients that are statistically different from zero under two-way clustering by institution and time. Panel B reports the cumulative persistence E_h, defined as the sum of the contemporaneous unit shock and the predicted carryover at each subsequent quarter up to the horizon. See Section 4.2 for details. The regression table for even horizons appears in Appendix Table C1, which also reports wild cluster bootstrap-*t* confidence intervals.

results.

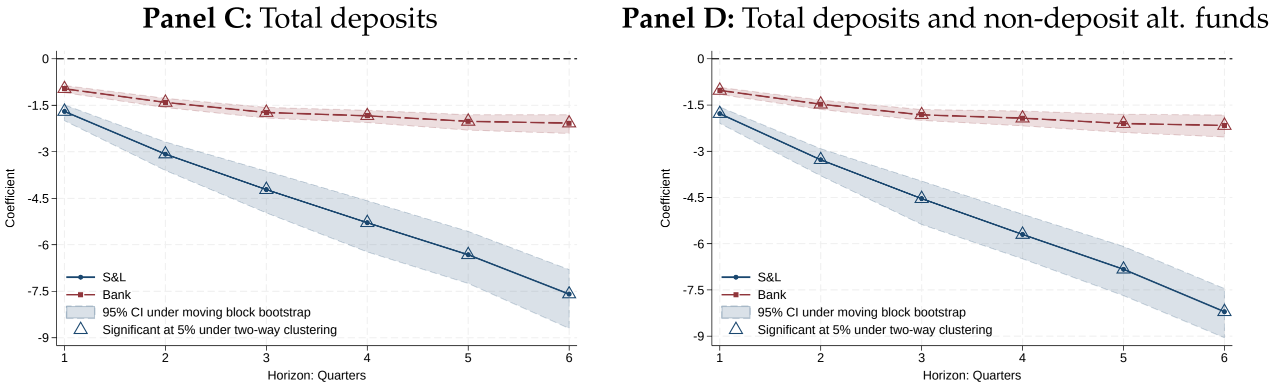
4.3 Deposits and funding reallocation

I examine how institutions reallocate funding in response to tighter deposit-rate ceilings, substituting toward wholesale funding even as total funding may decline. I estimate Equation 2 with four outcomes: retail deposits, wholesale deposits (time deposits with denomination > \$10,000), total deposits, and total deposits plus alternative funds. Outcome variables are cumulative log growth, reported in percentage points, over horizons of up to six quarters. Figure 5 shows the coefficient estimates to a one-percentage-point increase in binding-constraint measure for each funding outcome.

Figure 5: Deposit reallocation at the institution level


Panel A: Retail deposits

Panel B: Wholesale deposits


Panel C: Total deposits

Panel D: Total deposits and non-deposit alt. funds

Notes: Each panel presents coefficient β_h from horizon regression:

$$\Delta y_{i,t\to t+h} = \beta_h \,\mathrm{Bind}_{i,t} + \boldsymbol{\phi}_h^{\top} \mathbf{X}_{i,t} + \delta_{s(i),t} + \varepsilon_{i,t+h},$$

where the outcome variable is the cumulative log growth of the labeled balance-sheet variable, reported in percentage points (p.p.), $\mathbf{X}_{i,t}$ includes log assets, the deposit-to-asset ratio, the mortgage HHI, log population, and log median income, and $\delta_{s(i),t}$ denotes state × time fixed effects. Non-deposit alternative funds include Federal Home Loan Bank advances at S&Ls and fed funds loans and repurchase agreements at banks. Shaded areas show 95% confidence intervals from the moving-block bootstrap with block length of $L = \max\{4, h\}$ quarters and 1,000 repetitions. Triangle markers indicate estimates that are statistically significant at 5% under two-way clustering by institution and time. The regression tables for even horizons appear in Appendix Table C2 – Table C5, which also report wild cluster bootstrap-*t* confidence intervals.

Retail deposits decline for both S&Ls and banks, with comparable magnitudes across horizons. Panel A of Figure 5 shows that, following a 1 pp increase in the binding-constraint measure at time t, the cumulative growth rate of retail deposits falls by about 2 pp after one quarter for both types; by four quarters it is roughly 3.6–4.8 pp lower; by six quarters S&Ls are about 6.5 pp lower while banks are near 4.2 pp Because funding frictions persist, these responses reflect continued exposure rather than a one-off shock. Adjusting for the four-quarter cumulative exposure, a one-off 1 pp increase to the binding-constraint measure leads to a decline in retail deposit growth of about 1.1–1.5 pp.[15]

The wholesale deposit response differs sharply. As shown in Panel B, following a one-percentage-point increase in the binding-constraint measure at time t, the cumulative growth rate of wholesale deposits at banks rises by about 5.4 pp after one quarter, about 11.3 pp after four quarters, and about 14.8 pp after six quarters.[16] For S&Ls, the cumulative growth rate increases only modestly, around 0.8 pp at one quarter and roughly 2.3 pp by six quarters. The bank–S&L gap is economically large and statistically meaningful across horizons. Standardizing by the four-quarter cumulative exposure, the implied one-off effect is roughly 3.4 pp at banks and well under 0.8 pp at S&Ls.

Turning to total deposits, the wholesale offset makes the contraction in banks' total deposits much smaller than for S&Ls. Panel C reports the coefficients. By six quarters, banks' totals are about 2.1 pp below baseline, while S&Ls' totals are roughly 7.6 pp lower. The downward paths are visible at earlier horizons as well. As before, standardizing to a one-off 1 pp shock to the binding-constraint measure using the four-quarter cumulative exposure, the implied one-off effect on total deposit growth is 1.6 pp for S&Ls and 0.5 pp for banks.

Institutions also access non-deposit funding beyond wholesale time deposits. S&Ls obtain advances from the Federal Home Loan Banks (FHLBs), which issue discount notes and bonds and lend the proceeds to members. Banks rely on fed funds loan and repos in interbank markets. In practice, these channels did not fully backfill lost retail deposits over the sample period. For S&Ls, access to FHLB advances can tighten when market stress limits FHLB debt issuance.[17] For banks, interbank credit tightens when many institutions face the same funding frictions, which limits net expansion of alternative funds. Consistent with this, Panel D shows no systematic increase in non-deposit alternative funds, because the estimates for the combined measure (total deposits plus alternative funds) match the estimates for total deposits.

Taken together, the estimates indicate a common decline in retail deposits across institution types, a strong shift into wholesale funding at banks, and limited substitution at S&Ls. These reallocations explain the smaller fall in banks' total deposits relative to S&Ls.

4.4 Wholesale deposit substitutions

Next, I continue the analysis in wholesale deposits and study how reliance on them evolved for S&Ls and banks. S&Ls have limited access to wholesale deposits for two reasons: regulatory caps

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[15] Panel B of Figure 4 reports the four-quarter cumulative exposure E_4: about 3.3 for both S&Ls and banks. Standardizing to a one-off shock divides the four-quarter coefficients in Figure 5 Panel A by E_4. This implies $4.8/3.3 = 1.5$ for S&Ls, and $3.6/3.3 = 1.1$ for banks.

[16] A potential concern is that institutions with higher binding-constraint measures start with fewer wholesale deposits, mechanically inflating growth rates. Appendix Figure A4 shows that substitution between core and wholesale deposits remains clear when comparing institutions with the same baseline levels of retail deposits and wholesale deposits.

[17] For example, in 1981 the FHLB Board anticipated it could not meet S&L liquidity needs and sought Federal Reserve supplementation; see Federal Reserve History (2024).

and limited institutional-investor networks. Before June 1974, S&Ls could not issue wholesale deposits. A rule adopted that month allowed issuance but capped it at 10% of total deposit amount at S&Ls. Commercial banks could issue wholesale deposits throughout and faced no comparable cap. Wholesale deposits are placed in national markets through jumbo negotiable CDs sold directly to investors or through brokered CDs. Most S&Ls relied on brokers, and only the largest associations issued jumbo negotiable CDs directly because they lacked institutional-investor relationships.[18] Consistent with limited adoption, only about 43% of S&Ls reported balances in wholesale deposits in 1974 and the sectorwide share was about 1.23% (Federal Home Loan Bank Board, 1974). By September 1982, the wholesale deposit share is roughly 10% for S&Ls and 27% for banks.

Panel A of Figure 6 documents these institutional differences in the data. In 1975–1977, the mean wholesale deposit share is 1.67% for S&Ls versus 8.02% for banks. In 1978–1980, the means rise to 3.36% and 9.87%, respectively. In 1981–1983, the means reach 7.60% for S&Ls and 12.09% for banks. Dispersion is larger for banks in each subperiod, but the levels remain well above those of S&Ls throughout.

Panel B examines the dynamic response of wholesale reliance. I estimate Equation 2 with the outcome variable equal to the change in the wholesale deposit share over the horizon, reported in percentage points. The figure shows the response to a 1 pp increase in the binding-constraint measure: banks' wholesale share rises by about 0.7 pp after one quarter, about 1.3 pp by four quarters, and about 1.6 pp by six quarters. For S&Ls, the change is close to zero at all horizons. Confidence intervals are computed using the moving-block bootstrap with 1,000 repetitions. Because funding frictions persist, these are responses to continued tight conditions rather than a one-off shock. Using the four-quarter cumulative exposure from Section 4.2 to standardize the response, the implied effect is about 0.4 pp for banks and near zero for S&Ls. In words, a 1 pp tightening of the binding-constraint measure leads banks to increase the wholesale deposit share by 0.4 pp, whereas S&Ls do not increase their wholesale deposit share.

Overall, banks substitute toward wholesale deposits when retail deposits tightens, whereas S&Ls show little or no expansion. This pattern is consistent with regulatory caps and weaker investor networks. With less funding flexibility, S&Ls experience a stronger pass-through of tight conditions, which constrains their mortgage credit more severely than at banks.

4.5 Lending responses

Deposits are the primary funding source for lending, so deposit shortfalls induced by Regulation Q rate ceilings create a credit crunch at the institution level. To test this directly, I estimate Equation 2 with outcomes for outstanding mortgages at S&Ls and at banks, and with bank total loans. Outcomes are cumulative log growth from the current quarter to the end of the horizon, reported

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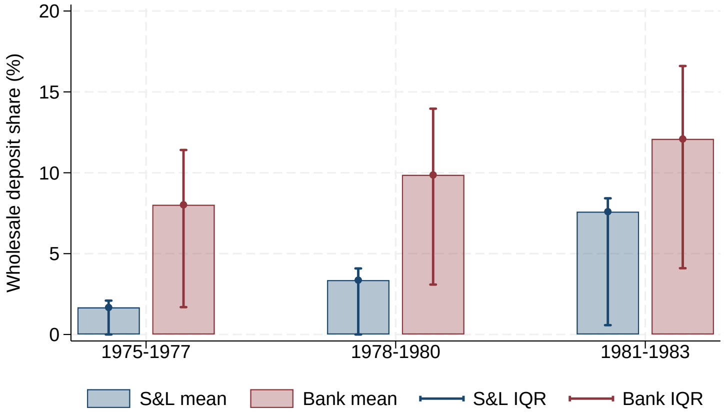
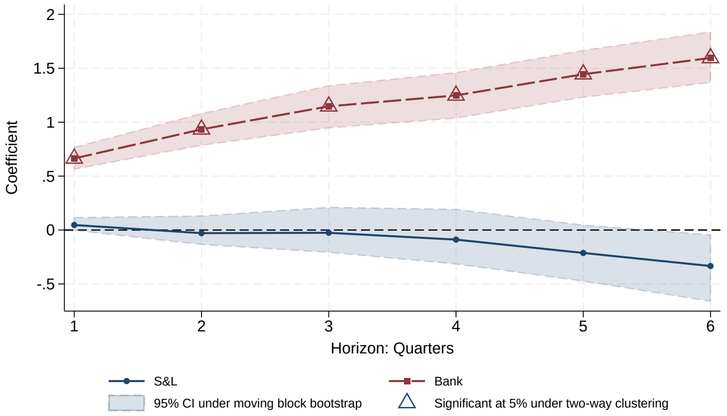
[18] In 1976–1977, S&Ls with jumbo CDs had average savings of roughly $100–114 million versus $34–42 million for associations without them (Federal Home Loan Bank Board, 1978).

Figure 6: Wholesale deposit substitution at the institution level

Panel A: Wholesale deposit share by institution type and subperiod



Panel B: Response of wholesale deposit share to a 1 p.p. increase in the binding constraint



Notes: Panel A shows period means of the wholesale deposit share for S&Ls and banks in 1975–1977, 1978–1980, and 1981–1983. Whiskers mark the interquartile range. Panel B reports coefficients β_h from

$$\Delta y_{i,t\to t+h} = \beta_h \, \text{Bind}_{i,t} + \boldsymbol{\phi}_h^\top \mathbf{X}_{i,t} + \delta_{s(i),t} + \varepsilon_{i,t+h},$$

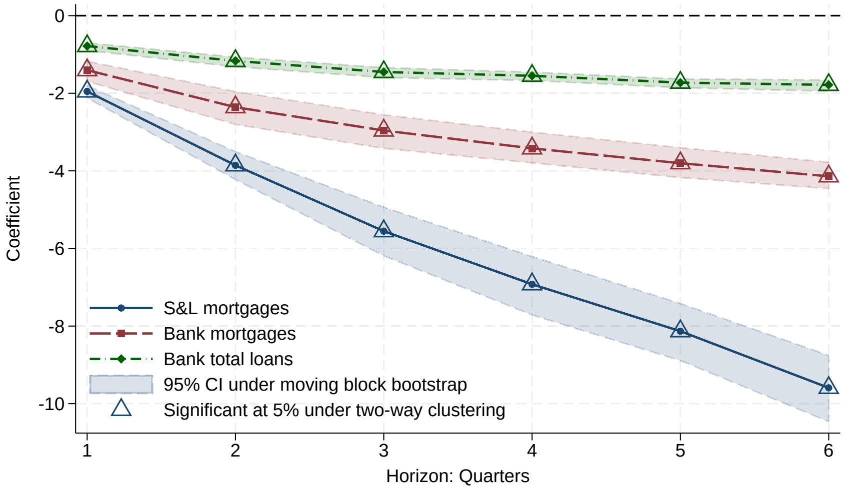
where the outcome is the change in wholesale deposit share from t to $t+h$, reported in percentage points. $\mathbf{X}_{i,t}$ includes log assets, the deposit-to-asset ratio, the mortgage HHI, log population, and log median income, and $\delta_{s(i),t}$ denotes state $\times$ time fixed effects. Shaded areas show 95% confidence intervals from the moving-block bootstrap with block length $L = \max\{4, h\}$ and 1,000 repetitions. Triangle markers indicate estimates that are statistically significant at 5% under two-way clustering by institution and time. The regression table for even horizons appears in Appendix Table C6, which also reports wild cluster bootstrap-t confidence intervals.

in percentage points. Figure 7 plots the coefficients β_h across horizons with inference as discussed in the previous sections.

S&Ls specialize in mortgages. On average, mortgages account for about 80% of S&L assets, so the mortgage response is the key credit margin for this sector. The blue (solid) series in Figure 7 shows a large and persistent contraction after a one-percentage-point increase in the binding-

Figure 7: Lending response at the institution level

Response of lending growth rate to a 1 p.p. increase in the binding constraint



Notes: This figures reports coefficients β_h from

$$\Delta y_{i,t \to t+h} = \beta_h \, \text{Bind}_{i,t} + \boldsymbol{\phi}_h^\top \mathbf{X}_{i,t} + \delta_{s(i),t} + \varepsilon_{i,t+h},$$

where the outcome is the cumulative log growth from t to $t+h$ in S&L mortgages, bank mortgages, and total bank loans, reported in percentage points. $\mathbf{X}_{i,t}$ includes log assets, the deposit-to-asset ratio, the mortgage HHI, log population, and log median income, and $\delta_{s(i),t}$ denotes state × time fixed effects. Shaded areas show 95% confidence intervals from the moving-block bootstrap with block length $L = \max\{4, h\}$ and 1,000 repetitions. Triangle markers indicate estimates that are statistically significant at 5% under two-way clustering by institution and time. The regression table for even horizons appears in Appendix Table C7, which also reports wild cluster bootstrap-t confidence intervals.

constraint measure. The cumulative growth rate of S&L mortgages is about 2.0 pp lower at one quarter, about 6.9 pp lower at four quarters, and close to 9.6 pp lower at six quarters. In the cross section, the interquartile range of the four-quarter mortgage growth rate for S&Ls runs from 2.4% to 16.1%, so a one-percentage-point tightening in deposit rate ceiling explains about half of that 13.7% spread. Using the four-quarter cumulative exposure from Figure 4 to express the effect of a single one-unit shock gives an estimate of about 2.1 pp lower mortgage growth. The corresponding four-quarter deposit response for S&Ls is about 5.3 pp lower, which standardizes to roughly 1.6 pp The implied mortgage-to-deposit pass through is around 1.3 but is not statistically different from one.

Banks hold mortgages as a smaller share of assets, about 18% on average, and their mortgage response is more muted than at S&Ls. The maroon (long dash) series shows that the cumulative growth rate of bank mortgages is about 1.4 pp lower at one quarter, about 3.7 pp lower at four quarters, and about 4.6 pp lower at six quarters. In the cross section, the interquartile range of the four-quarter mortgage growth rate runs from 0% to 22%, so a one-percentage-point tightening in deposit rate ceiling accounts for about 17% of that spread. Standardizing the four-quarter estimate by the cumulative exposure yields a one-off effect of about 1.1 pp lower mortgage growth, notably smaller in magnitude than for S&Ls.

For completeness, I also estimate Equation 2 for bank total loans (green, dot dash series). The response is small: about -0.9 pp at one quarter, roughly -1.6 pp at four quarters, and about -1.8 pp at six quarters. The four-quarter deposit response for banks is also about -1.5 pp, so the raw deposit–lending mapping is close to one-for-one. After standardization by the four-quarter cumulative exposure , both the deposit and total-loan effects are about -0.45 pp, consistent with an approximately one-to-one pass-through from deposits to lending for banks in the literature (Gilje et al., 2016).

These results indicate that deposit-rate ceilings produced a credit crunch in the mortgage market. Mortgage lending at S&Ls contracts sharply, while bank credit falls by a smaller amount. Because these effects differ by institution type, the consequences for housing prices and housing units also differ, which I examine in Section 5.

4.6 Robustness: institution level

I assess robustness along three dimensions. First, I vary how the binding-constraint measure treats demand deposits and re-estimate deposit and lending responses. Second, I address serial correlation by estimating the model on non-overlapping horizons. Third, I include lags of the outcome variables in the analysis following Jordà (2005).

I evaluate two bounding cases for how to treat demand deposits in the binding-constraint measure. Institutions historically could not pay interest on demand deposits until the Dodd-Frank Act in 2010, and many checking accounts still pay zero interest in exchange for services. In the baseline measure I apply the savings-deposit ceiling to demand deposits, which treats demand deposits as paying an implied rate equal to the savings rate. An alternative measure treats demand deposits as exempt from ceilings throughout the sample, which places them at the opposite end of the spectrum.

The true effect lies between these two cases. Under the exempt treatment the average binding-constraint measure is 1.42 for banks and remains 1.79 for S&Ls because S&Ls did not hold demand deposits in the sample period. Figure A2 reports the corresponding estimates for funding allocations and lending. The main conclusions are unchanged. Substitution between core and wholesale deposits remains clear, and mortgage and total-loan responses are of similar magnitude to the baseline. One difference is that the decline in banks' retail deposits is more muted, and the total-deposit response can be slightly positive at short horizons while trending near zero. This pattern is mechanical. In this framework, a larger binding-constraint measure corresponds to a larger funding shortfall. When demand deposits are treated as exempt, banks with a high demand deposit share receive a smaller binding-constraint measure even though their underlying funding frictions are larger. This attenuation makes the results appear as if lower constraints are associated with larger shortfalls and can even reverse the sign at short horizons. For this reason I view the baseline construction as the central measure and the exempt case as a bounding exercise.

The second robustness check addresses serial correlation from overlapping horizons. As summarized in Section 4.1, baseline inference uses moving block bootstrap confidence intervals that account for serial dependence, figures mark estimates that are statistically different from zero under two way clustering by institution and time, and regression tables for baseline figures in Appendix C report wild cluster bootstrap-t confidence intervals. In this exercise, I re-estimate Equation 2 on nonoverlapping horizons by keeping one start quarter in each horizon block and I cluster standard errors by institution. Figure A1 reports the estimates for funding allocations and lending. Removing overlap reduces the number of observations at each horizon and widens the confidence intervals, while the point estimates remain close to the baseline. Retail deposits decline for both institution types, banks expand wholesale funding, total deposits fall less at banks than at S&Ls, the combined measure of total deposits and alternative funds tracks the total. S&L mortgages contract strongly, bank mortgages and total loans decline by a smaller amount. These patterns confirm that the main results do not rely on overlap.

The last robustness test is to include lags as in Jordà (2005). For each analysis, I estimate Equation 2 with four lags of the outcome variables and Figure A3 reports the estimates. The results are comparable to the baseline estimations.

5 Local effects of funding frictions

I have documented at the institution level that deposit-rate ceilings triggered a credit crunch at both S&Ls and banks, with a larger contraction at S&Ls because they had limited access to wholesale deposits. I now examine how this credit crunch maps into local housing outcomes.

Where S&L funding frictions are higher, mortgage credit tightens, borrowing capacity falls, house price growth slows, and the expansion of the housing stock decelerates. By contrast, bank funding frictions have limited average effects because banks can replace part of the retail shortfall with wholesale funding. I provide evidence consistent with a demand-side channel in the housing market. Across CBSAs, higher S&L funding frictions are associated with larger price declines and with slower accumulation of housing units, while the corresponding relationships with bank frictions are weaker.

5.1 Design and specification

I investigate how S&L and bank funding frictions shape housing outcomes at the local level. I combine two sources of variation. The first is ceiling tightness, the binding-constraint measure constructed at the CBSA level. The second is geographic variation in how much each area historically relied on S&Ls versus banks.

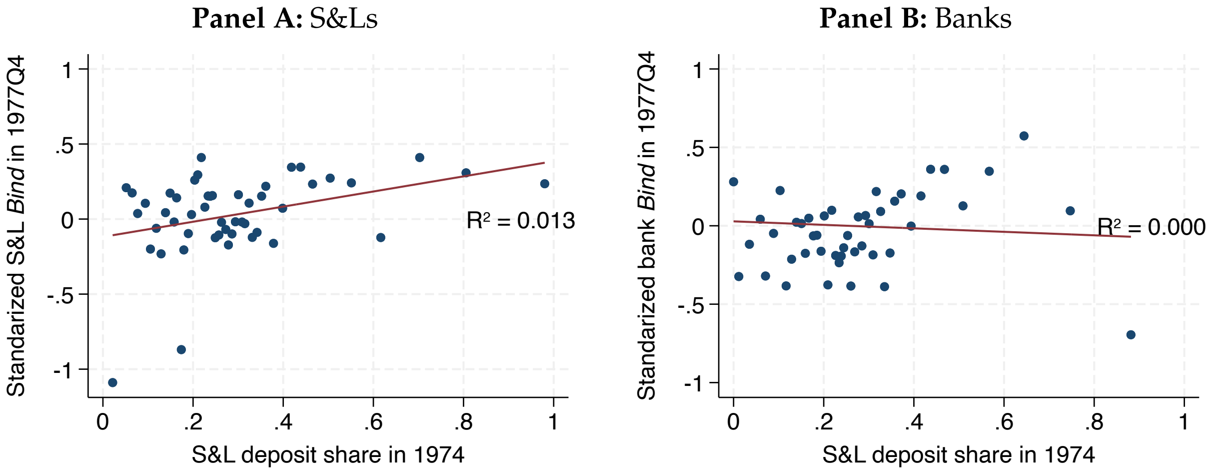
Specifically, for each CBSA c and quarter t, I construct sector-specific binding constraints as in Equation 1. I then weight each series by the sector's 1974 deposit share to obtain funding frictions at the local level,

$$\text{BankFriction}_{c,t} \equiv share^{\text{Bank}}_{c,1974}\,\text{Bind}^{\text{Bank}}_{c,t}, \qquad \text{S\&LFriction}_{c,t} \equiv share^{\text{S\&L}}_{c,1974}\,\text{Bind}^{\text{S\&L}}_{c,t},$$

with $share^{\text{Bank}}_{c,1974} + share^{\text{S\&L}}_{c,1974} = 1$. This construction mirrors the institution-level measure and is consistent with the assumption that institutions conduct retail business in their home CBSA. Using pre-period shares fixes historical reliance and avoids contemporaneous movements that could confound the measure.[19] Intuitively, these variables capture how strongly deposit-rate ceilings raise the average local funding cost through each sector, given historical reliance.

A natural concern is that these two components may be correlated. If they were highly correlated, the local friction measure would effectively rely on a single source of variation rather than separate variation in ceiling tightness and historical reliance. Figure 8 addresses this concern with a binned scatter plot of the binding-constraint measure in 1977Q4, the first quarter in which deposit-rate ceilings bind, against the 1974 deposit share. The relationship is close to zero, and the corresponding R^2 is also close to zero. This pattern suggests that the two components are orthogonal in the data.

Figure 8: Correlation between ceiling tightness and historical reliance


Panel A: S&Ls

Panel B: Banks

Notes: Notes: Each panel shows a binned scatter plot across CBSAs. The x-axis is the sector's 1974 deposit share in the CBSA. The y-axis is the standardized sector-specific binding-constraint measure in 1977Q4, the first quarter in which deposit-rate ceilings bind. The fitted line is from the underlying CBSA-level regression.

I then estimate a regression that relates local outcomes to S&L and bank funding frictions for

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[19] Initial S&L reliance varies substantially across CBSAs and does not display a regional pattern overall. One exception is California, where S&L shares are relatively high on average. See Figure B1 for a map of the 1974 S&L deposit share across CBSAs.

each horizon h,

$$\Delta y_{c,t\to t+h} = \beta_{1,h}\,\text{S\&L Friction}_{c,t} + \beta_{2,h}\,\text{Bank Friction}_{c,t} + \boldsymbol{\phi}_h^\top \mathbf{X}_{c,t} + \delta_t + \varepsilon_{c,t+h}, \tag{4}$$

where $y_{c,t}$ is a housing outcome in CBSA c in quarter t. I focus on house prices and mortgage amounts. For each outcome I report two measures. First, the change scaled by median household income. Second, the cumulative log growth from the current quarter to the end of the horizon. All results are reported in percentage points, and horizons run from one to six quarters. The sample includes CBSAs with both S&L and bank presence so S&L funding frictions and bank funding frictions are comparable within each quarter. The control vector $\mathbf{X}_{c,t}$ aggregates institution fundamentals to the CBSA level and includes log assets and the deposit-to-asset ratio. It also includes the CBSA mortgage Herfindahl–Hirschman Index, the relative size of bank wholesale deposits compared with S&L wholesale deposits to capture the ease of wholesale substitution, and local demographics given by log population and log median income measured in 1980. I include time fixed effects δ_t to absorb aggregate macro conditions. With these controls and fixed effects, identification comes from cross-sectional differences in S&L and bank funding frictions across CBSAs within each quarter.

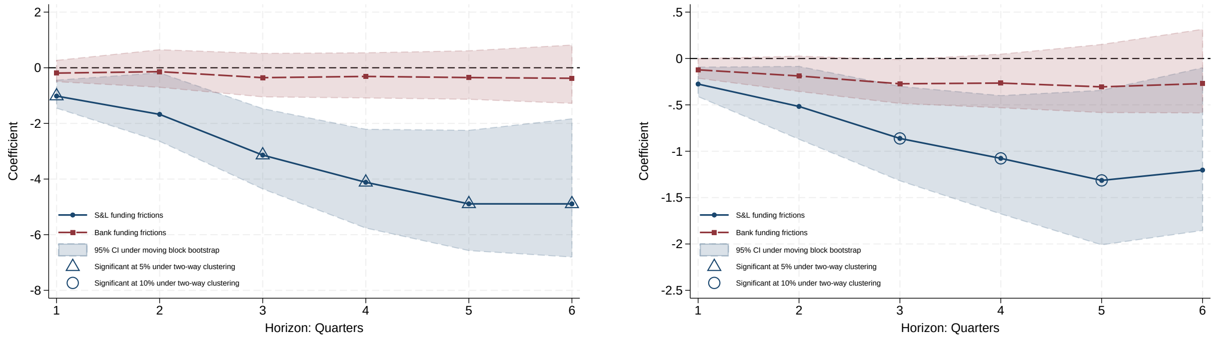
The coefficients of interest are $\beta_{1,h}$ and $\beta_{2,h}$. The former is the h-quarter change in the local housing outcome associated with a one–percentage-point increase in the S&L funding frictions. The latter has the analogous interpretation for banks. Because the funding-friction measure is the product of ceiling tightness and historical reliance, interpret the coefficients as follows. In a CBSA that relies entirely on S&Ls, $\beta_{1,h}$ is the marginal effect on the outcome when the effective S&L ceiling tightens by one percentage point. In a CBSA that relies entirely on banks, $\beta_{2,h}$ is the marginal effect when the effective bank ceiling tightens by one percentage point. Building on the institution-level results, I expect $\beta_{1,h}$ to be negative and larger. Limited funding flexibility at S&Ls turns a given tightening in deposit rate ceiling into a sharper reduction in mortgage credit, which lowers house prices and mortgage amounts. By contrast, $\beta_{2,h}$ should be smaller and often close to zero because banks can replace part of the retail shortfall with wholesale deposits, which dampens the pass-through from frictions to local mortgage credit.

Overlapping horizons introduce serial correlation. Similar to the institution level results, I use moving-block bootstrap confidence intervals in the baseline with block length $L = \max\{4, h\}$ quarters and with 2,000 repetitions. For robustness, I also estimate the specification on non-overlapping horizons that keep one start quarter in each horizon block and I cluster standard errors by CBSA. In addition to the moving-block bootstrap confidence intervals, the main figures mark estimates that are statistically different from zero under two-way clustering by CBSA and time, and the regression tables in Appendix C report wild cluster bootstrap-t confidence intervals given the modest number of time clusters. I now present the empirical results for local housing markets.

5.2 Effects on house prices

Local house prices respond to deposit-rate ceilings through funding frictions that restrict mortgage credit. When funding frictions tighten, institutions reduce mortgage credit to the local market. Fewer borrowers can obtain financing for home purchases, which shifts housing demand downward and lowers prices. To test this, I estimate Equation 4 for two price outcomes. The first is the change in house prices as a share of median household income from the current quarter to the end of the horizon. Median income is observed at the decennial census, so I use the 1980 value and deflate house-price series to 1980 dollars to construct the ratio at each CBSA. The second is the cumulative log growth of real house prices over the horizon using the Freddie Mac house price index deflated by the CPI. Figure 9 reports coefficients for a one-percentage-point increase in S&L funding frictions and in bank funding frictions.

Figure 9: Housing prices at the local level



Panel A: Real house prices relative to income

Panel B: Real house price growth rate

Notes: Each panel presents coefficients $\beta_{1,h}$ and $\beta_{2,h}$ from

$$\Delta y_{c,t\to t+h} = \beta_{1,h}\,\text{S\&LFriction}_{c,t} + \beta_{2,h}\,\text{BankFriction}_{c,t} + \boldsymbol{\phi}_h^{\top}\mathbf{X}_{c,t} + \delta_t + \varepsilon_{c,t+h}.$$

Panel A uses the change in real house prices as a share of median household income. Panel B uses the cumulative log growth of real house prices. The S&L and bank funding frictions are CBSA-level binding-constraint measures scaled by 1974 sector deposit shares. The control vector $\mathbf{X}_{c,t}$ includes log assets, the deposit-to-asset ratio, the CBSA mortgage HHI, the relative size of bank wholesale deposits compared with S&L wholesale deposits, log population, and log median income. δ_t denotes time fixed effects. Shaded areas show 95% confidence intervals from the moving-block bootstrap with block length $L = \max\{4, h\}$ and 2,000 repetitions. Markers indicate estimates that are statistically different from zero under two-way clustering by CBSA and time. The regression table for four-quarter horizons appears in Appendix Table C8, which also reports wild cluster bootstrap-t confidence intervals.

Panel A considers house prices relative to income. All else equal, areas with higher funding frictions in the S&L sector see larger declines in the house-price-to-income ratio. House prices adjust with a lag. Funding frictions at institutions take time to pass through mortgage availability and transactions, so the effect builds gradually. The S&L series is negative and becomes more pronounced over the horizon. The effect is small at one quarter at about -1 pp, widens through quarter four to around -4.1 pp, and stabilizes by six quarters at roughly -4.75 pp. Interpreted directly, a one-percentage-point increase in S&L funding frictions lowers the price-to-income ratio by about 4.1 pp after four quarters. The bank series is near zero and not statistically different from zero at all horizons. As with the institution-level results, these responses reflect continued tightness rather than a one-off shock. Standardizing with the four-quarter cumulative exposure $E_4 \approx 3.35$ implies that a one-off one-percentage-point increase in funding frictions reduces the price-to-income ratio by about 1.2 pp

Panel B turns to real house price growth. At the local level, higher S&L funding frictions are associated with lower real price growth, while bank funding frictions have no impact. The S&L funding friction effect is -0.3 pp at one quarter, about -1.1 pp at four quarters, and remains -1.1 pp at six quarters. The bank series is negative at some horizons but not statistically significant under the moving-block bootstrap or two-way clustering. The standardized one-off effect for S&Ls remains economically meaningful using the same exposure adjustment.

These results show that local house prices respond primarily to S&L funding frictions, whereas bank frictions have muted effects. The evidence is consistent with stronger pass-through from S&L balance-sheet tightening to local mortgage demand and prices. I now present direct evidence that funding frictions reduce mortgage credit at the local level.

5.3 Effects on mortgage credit

Local mortgage credit tightens where S&L frictions are higher, while bank frictions contribute little at the margin. To test this, I estimate Equation 4 for two outcomes: mortgages per capita scaled by median household income and the cumulative log growth of total mortgages. Figure 10 reports the coefficients $\beta_{1,h}$ for S&L funding frictions and $\beta_{2,h}$ for bank funding frictions across horizons.

Panel A shows estimates for mortgages per capita. In areas that experience a one-percentage-point increase in S&L funding frictions, mortgages per capita as a share of income decline by about 0.8 pp at one quarter, about 1.7 pp at four quarters, and about 2.5 pp at six quarters. The banking-sector effect is small, about -0.6 pp by six quarters. It is statistically significant under the moving-block bootstrap but not under two-way clustering by CBSA and time. The pattern indicates that local mortgage credit adjusts mainly where S&L frictions are tighter.

Panel B reports estimates from mortgage growth. The results mirror Panel A. In areas with a one-percentage-point increase in S&L funding frictions, the mortgage growth rate falls by about 3.2 pp at one quarter, about 4.7 pp at four quarters, and about 8.0 pp at six quarters, with significance at all horizons. The bank series remains near zero and is not statistically different from zero under either inference method. These findings align with limited funding flexibility at S&Ls and weaker pass-through at banks.

Combining the estimates from Section 5.2 and Section 5.3, a back-of-the-envelope calculation implies a house price elasticity with respect to mortgage growth of about 0.23 on the S&L side and close to zero on the bank side.[20] In a CBSA with equal reliance on S&Ls and banks, this implies an

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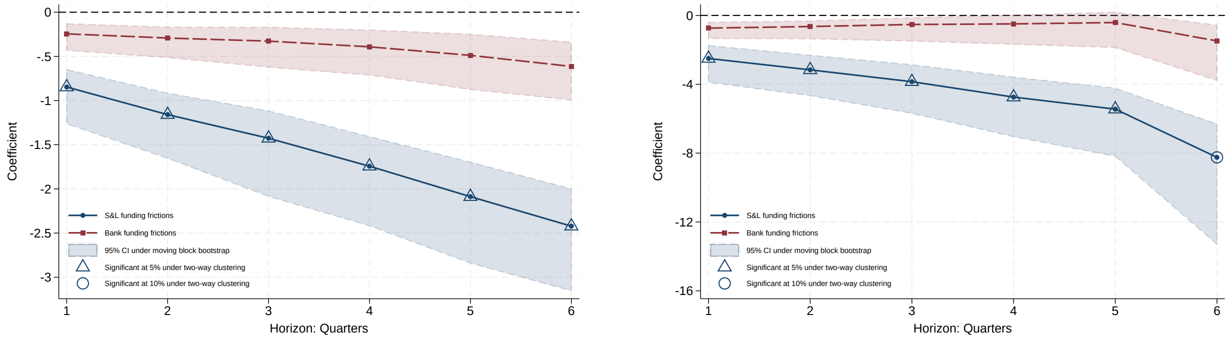
[20] I obtain this elasticity by dividing the four-quarter effect on real house price growth, about -1.1 pp, by the four-

Figure 10: Mortgages at the local level



Panel A: Mortgages per capita relative to income

Panel B: Mortgage growth rate

Notes: Each panel presents coefficients $\beta_{1,h}$ and $\beta_{2,h}$ from

$$\Delta y_{c,t\rightarrow t+h} = \beta_{1,h}\,\text{S\&LFriction}_{c,t} + \beta_{2,h}\,\text{BankFriction}_{c,t} + \boldsymbol{\phi}_h^{\top}\mathbf{X}_{c,t} + \delta_t + \varepsilon_{c,t+h}.$$

Panel A uses the change in mortgage amount per capita, scaled by median household income. Panel B uses the cumulative log growth of mortgage amount. The S&L and bank funding frictions are CBSA-level binding-constraint measures scaled by 1974 sector deposit shares. The control vector $\mathbf{X}_{c,t}$ includes log assets, the deposit-to-asset ratio, the CBSA mortgage HHI, the relative size of bank wholesale deposits compared with S&L wholesale deposits, log population, and log median income. δ_t denotes time fixed effects. Shaded areas show 95% confidence intervals from the moving-block bootstrap with block length $L = \max\{4, h\}$ and 2,000 repetitions. Markers indicate estimates that are statistically different from zero under two-way clustering by CBSA and time. The regression table for four-quarter horizons appears in Appendix Table C8, which also reports wild cluster bootstrap-*t* confidence intervals.

average elasticity of about 0.11. This magnitude is close to the 0.12 elasticity estimated by Favara and Imbs (2015). The contribution here is not just to estimate the sensitivity of house prices to mortgage credit, but also to show that this sensitivity is heterogeneous across local regions, and that this heterogeneity depends on the type of financial institution supplying the credit. In this sense, the elasticity is not a fixed parameter. It depends on the funding flexibility of the institutions that intermediate local mortgage credit.

5.4 Discussion of identification

The local funding friction measure strengthens my identification because an omitted variable would need to be correlated with both components of the measure: the time-varying ceiling tightness and the time-invariant historical reliance. That is a strong requirement in this setting. As Figure 8 shows, the two components are nearly uncorrelated for both sectors. This makes it less plausible that an omitted variable can explain the effects.

Moreover, the comparison between S&Ls and banks provides a useful placebo test. If the decline in house prices and mortgage credit associated with S&L funding frictions were driven by unobserved local demand, then similar patterns should also appear for bank funding frictions

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quarter effect on mortgage growth, about -4.7 pp. The resulting estimate is about 0.23.

within the same CBSA. Instead, the results differ sharply across the two sectors. S&L funding frictions have strong effects on local housing outcomes, while bank funding frictions have null results. This pattern is hard to reconcile with a local-demand explanation and instead points to sector-specific funding frictions as the main mechanism.

Table 4: Sorting by S&L reliance: effects of ceiling tightness on housing outcomes

Panel A: Effects of S&L ceiling tightness across S&L-reliance quartiles

	S&L reliance (1974 S&L deposit share) quartiles			
	1	2	3	4
Mortgage outcome:				
Δ Per-capita mortgage amount / income	-0.21^{**}	-0.65^{***}	-1.21^{**}	-1.96^{**}
	(0.11)	(0.22)	(0.57)	(0.92)
Mortgage growth rate	-0.93	-2.76^{**}	-5.96^{**}	-2.85
	(0.83)	(1.14)	(2.35)	(2.87)
House price outcome:				
Δ Real house price / income	-2.40	-3.67^{***}	-5.37^{**}	1.85
	(2.11)	(1.27)	(1.99)	(2.40)
Real house price growth rate	-1.11^{*}	-1.41^{***}	-2.21^{***}	-0.15
	(0.61)	(0.48)	(0.85)	(0.67)
CBSAs in each bin	221	221	221	221

Panel B: Effects of bank ceiling tightness across S&L-reliance quartiles

	S&L reliance (1974 S&L deposit share) quartiles			
	1	2	3	4
Mortgage outcome:				
Δ Per-capita mortgage amount / income	0.04	-0.15	-0.37	-0.24
	(0.24)	(0.30)	(0.50)	(0.46)
Mortgage growth rate	-1.32	-0.60	-1.57	-2.59
	(2.15)	(1.41)	(1.96)	(2.57)
House price outcome:				
Δ Real house price / income	-4.12	0.37	-0.98	1.07
	(2.48)	(1.39)	(1.15)	(1.19)
Real house price growth rate	-1.30	0.08	-0.42	0.85
	(0.84)	(0.54)	(0.51)	(0.51)
CBSAs in each bin	221	221	221	221

Notes: CBSAs are sorted into quartiles by S&L reliance (1974 S&L deposit share). For each quartile and each housing outcome, I estimate the four-quarter regression:

$$\Delta y_{c,t\to t+4} = \beta\,\mathrm{Bind}_{c,t} + \boldsymbol{\phi}^\top \mathbf{X}_{c,t} + \delta_t + \varepsilon_{c,t+4}.$$

The table reports the coefficient on ceiling tightness. Panel A uses the S&L ceiling tightness ($\mathrm{Bind}_{c,t}^{\mathrm{S\&L}}$). Panel B uses the bank ceiling tightness ($\mathrm{Bind}_{c,t}^{\mathrm{Bank}}$). All specifications include the controls in Equation 4. Standard errors (in parentheses) are two-way clustered by CBSA and time. Asterisks denote significance: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

5.5 Reliance or ceiling tightness: what drives local effects?

A natural question is whether local housing outcomes are driven by historical S&L reliance (the pre-period S&L deposit share) or by the tightness of S&L ceilings (the S&L $\text{Bind}_{c,t}$ measure), noting that the main explanatory variable in Equation 4 is their product. My interpretation is that the shock is S&L ceiling tightness, while S&L reliance scales its impact: tighter ceilings lower prices and mortgage credit, and the effect is larger where the market historically relies more on S&Ls.

To gauge this, I sort CBSAs into quartiles by S&L reliance. Each quartile contains roughly 220 CBSAs, although the exact count varies because only about half of CBSAs have house-price data. Within each bin, I regress the four-quarter change in each housing outcome on the S&L binding-constraint measure, restricting to CBSAs with both S&Ls and banks and using the same controls as in Equation 4. Table 4 Panel A reports the coefficients on the S&L binding-constraint measure. For per-capita mortgage credit relative to income, the coefficients are negative in all four reliance quartiles and grow in magnitude across the distribution. The other outcomes show the same pattern across the first three quartiles. The fourth quartile is less regular, and very high-reliance CBSAs are smaller and more concentrated, so they can follow a different trend. Panel B repeats the exercise using the bank binding-constraint measure. The coefficients are statistically indistinguishable from zero, indicating muted pass-through via banks. Overall, tighter S&L ceilings depress local prices and mortgage credit more in places that historically relied more on S&Ls, whereas bank ceiling tightness shows no local pass-through.

Do local outcomes depend on S&L reliance alone? For each CBSA, I compute the average S&L binding constraints over time and sort CBSAs into quartiles by this average. This is a coarse proxy, since the binding constraint varies over time—rising in the late 1970s and easing in the early 1980s—so the average compresses that time variation. Within each quartile, and for each housing outcome, I regress the four-quarter change in the outcome on S&L reliance (the pre-period S&L deposit share). Table 5 reports the coefficients. I find no evidence that reliance alone drives local house prices or mortgage growth.

Taken together, the sorting evidence aligns with the baseline local regressions. The key driver is ceiling tightness in the S&L sector, and historical S&L reliance amplifies its impact on local prices and mortgage volumes.

5.6 Substitution between S&Ls and banks

Mortgage borrowers may substitute across institution types. If funding frictions tighten for S&Ls in an area and banks face less pressure, some borrowers may shift applications to banks. Such substitution would alleviate the effect of S&L frictions on local mortgage credit and housing outcomes. This mechanism is most plausible where institutions can still raise funds through wholesale deposits, because retail deposits are constrained by ceilings. I proxy for substitution capacity

Table 5: Sorting by S&L ceiling tightness: effects of S&L reliance on housing outcomes

	Average S&L ceiling tightness quartiles			
	1	2	3	4
Mortgage outcome:				
Δ Per-capita mortgage amount / income	-7.85^{**}	0.11	-1.13	-0.50
	(3.93)	(0.91)	(0.80)	(0.53)
Mortgage growth rate	-19.61	2.73	-3.14	-0.70
	(14.95)	(5.33)	(3.65)	(3.47)
House price outcome:				
Δ Real house price / income	-4.71	-1.49	-4.40	2.19
	(7.65)	(4.22)	(3.13)	(5.54)
Real house price growth rate	2.83	0.95	-0.08	1.93
	(3.16)	(1.63)	(1.24)	(1.90)
CBSAs in each bin	226	226	226	226

Notes: CBSAs are sorted into quartiles by the time average of the S&L binding-constraint measure, $\overline{\text{Bind}}_c^{\text{S\&L}}$. For each quartile and each housing outcome, I estimate

$$\Delta y_{c,t\to t+4} = \beta \,\text{share}^{\text{S\&L}}_{c,1974} + \boldsymbol{\phi}^\top \mathbf{X}_{c,t} + \delta_t + \varepsilon_{c,t+4}.$$

The table reports the coefficient on S&L reliance (1974 S&L deposit share). All specifications include the controls in Equation 4. Standard errors (in parentheses) are two-way clustered by CBSA and time. Asterisks denote significance: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

with the relative size of wholesale funding at the CBSA level,

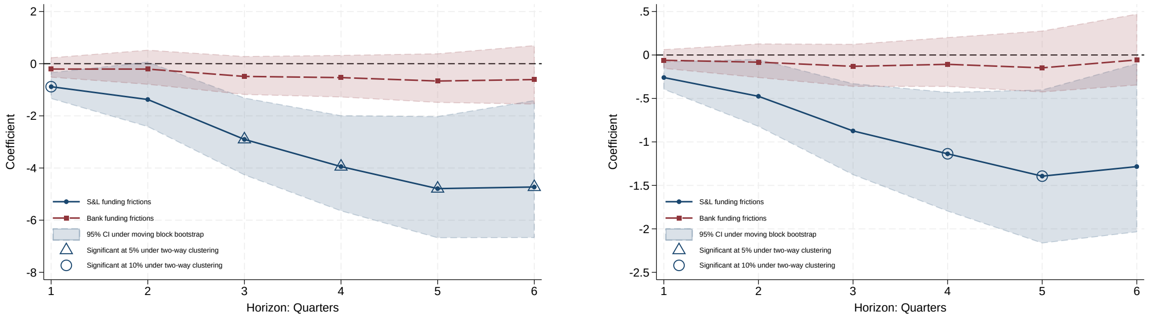
$$\text{RelWholesale}_{c,t} \equiv \ln\left(\frac{W^{\text{Bank}}_{c,t}}{W^{\text{S\&L}}_{c,t}}\right),$$

where $W^{\text{Bank}}_{c,t}$ and $W^{\text{S\&L}}_{c,t}$ are wholesale deposits at banks and S&Ls in CBSA c at time t. Higher values indicate that banks have more wholesale capacity than S&Ls. Lower values indicate the reverse. I then interact this measure with the sector-specific funding frictions in a horizon regression:

$$\begin{aligned}\Delta y_{c,t\to t+h} = {} & \beta_{1,h}\,\text{S\&LFriction}_{c,t} + \beta_{2,h}\,\text{BankFriction}_{c,t} \\ & + \gamma_{1,h}\left(\text{RelWholesale}_{c,t} \times \text{S\&LFriction}_{c,t}\right) + \gamma_{2,h}\left(\text{RelWholesale}_{c,t} \times \text{BankFriction}_{c,t}\right) \\ & + \kappa_h \text{RelWholesale}_{c,t} + \boldsymbol{\phi}_h^\top \mathbf{X}_{c,t} + \delta_t + \varepsilon_{c,t+h}. \end{aligned} \tag{5}$$

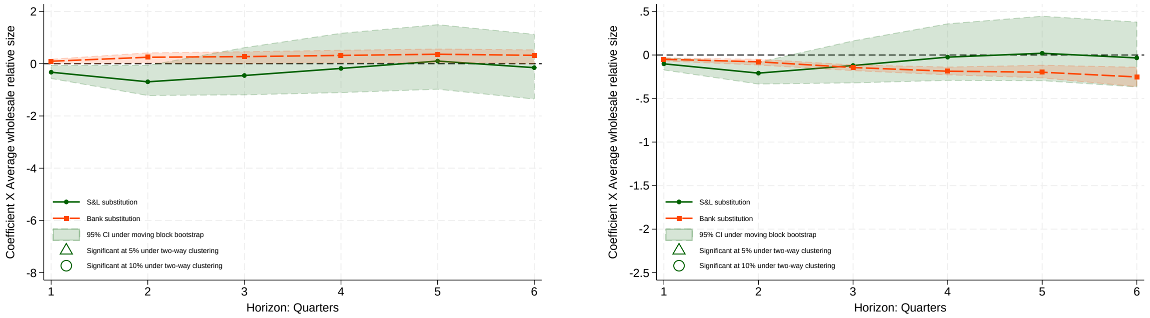
The controls $\mathbf{X}_{c,t}$ and time fixed effects δ_t match Equation 4. Earlier estimates show that mortgage amounts and house prices decline when credit tightens, a positive interaction on the S&L term ($\gamma_{1,h} > 0$) means the S&L effect becomes less negative in places where banks have larger wholesale capacity. In plain terms, where banks can raise more wholesale funding to supplement S&L's mortgage credit, the decline linked to tighter S&L frictions is smaller. Similarly, if S&Ls step in when bank frictions tighten, the adverse effect of bank funding frictions should be weaker ($\gamma_{2,h} < 0$) where S&Ls have larger wholesale capacity. I use these signs to assess whether substitution across institution types meaningfully offsets local funding frictions.

Figure 11: House prices with substitution effect at the local level


Panel A: Real house prices relative to income
Standalone effects $\beta_{1,h}$, $\beta_{2,h}$

Panel B: Real house price growth rate
Standalone effects $\beta_{1,h}$, $\beta_{2,h}$

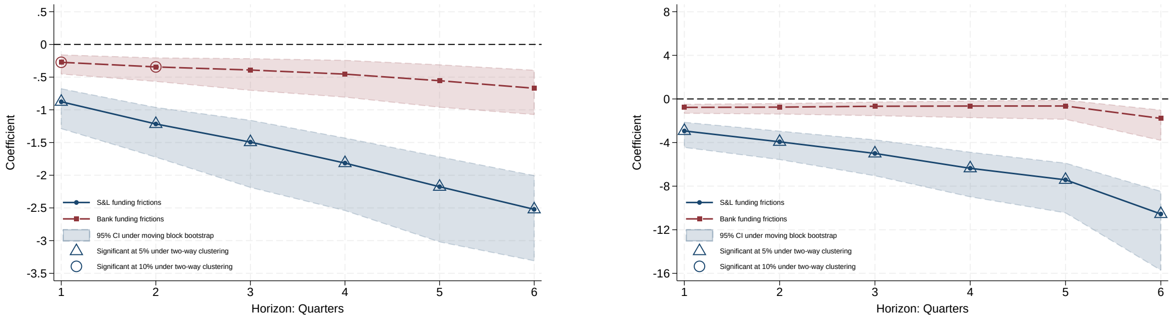
Interaction effects $\gamma_{1,h}$, $\gamma_{2,h}$



Notes: This figure plot the regression coefficients from Equation 5. Panel A uses the change in real house prices as a share of median household income. Panel B uses the cumulative log growth of real house prices. The top panel plots the standalone effects $\beta_{1,h}$, $\beta_{2,h}$. The bottom panel plots the interaction effects $\gamma_{1,h}$, $\gamma_{2,h}$ multiple by the average relative wholesale size of 2.46 so the magnitudes of the top and bottom panels are comparable. See Section 5.6 for details. Shaded areas show 95% confidence intervals from the moving-block bootstrap with block length $L = \max\{4, h\}$ and 2,000 repetitions. Markers indicate estimates that are statistically different from zero under two-way clustering by CBSA and time. The regression table for four-quarter horizons appears in Appendix Table C9, which also reports wild cluster bootstrap-t confidence intervals.

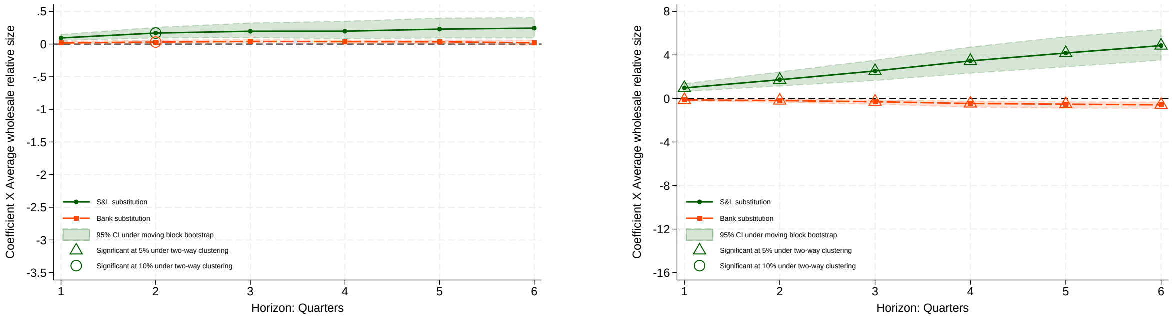
Figure 11 presents coefficients for house prices, showing the standalone effects $\beta_{1,h}$ and $\beta_{2,h}$ and the interaction effects $\gamma_{1,h}$ and $\gamma_{2,h}$ across horizons. The left panel uses the change in house prices as a share of household income, and the right panel uses the cumulative log growth of real house prices. For comparability, I multiply each interaction coefficient by the average value of the relative wholesale size (2.46), so the plotted interaction effects reflect the average CBSA and can be compared directly with the standalone effects. I find no evidence that banks alleviate the effect of S&L funding frictions on local house prices. The bank–S&L interaction is indistinguishable from zero. There is a small effect in which S&Ls alleviate bank funding frictions in the real house price panel, but the magnitude is much smaller than the standalone effects and is not economically meaningful. It is statistically significant under the moving-block bootstrap but not under two-way clustering. As a result, the standalone estimates align with the baseline results in Figure 9.

Figure 12: Mortgages with substitution effect at the local level



Panel A: Mortgages per capita relative to income
Standalone effects $\beta_{1,h}$, $\beta_{2,h}$

Panel B: Mortgage growth rate
Standalone effects $\beta_{1,h}$, $\beta_{2,h}$



Interaction effects $\gamma_{1,h}$, $\gamma_{2,h}$

Interaction effects $\gamma_{1,h}$, $\gamma_{2,h}$

Notes: This figure plot the regression coefficients from Equation 5. Panel A uses the change in mortgage amount per capita, scaled by median household income. Panel B uses the cumulative log growth of mortgage amount. The top panel plots the standalone effects $\beta_{1,h}$, $\beta_{2,h}$. The bottom panel plots the interaction effects $\gamma_{1,h}$, $\gamma_{2,h}$ multiple by the average relative wholesale size of 2.46 so the magnitudes of the top and bottom panels are comparable. See Section 5.6 for details. Shaded areas show 95% confidence intervals from the moving-block bootstrap with block length $L = \max\{4, h\}$ and 2,000 repetitions. Markers indicate estimates that are statistically different from zero under two-way clustering by CBSA and time. The regression table for four-quarter horizons appears in Appendix Table C9, which also reports wild cluster bootstrap-t confidence intervals.

Figure 12 presents coefficients for mortgages. The left panel uses the change in mortgage amount per capita as a share of income, and the right panel uses the cumulative log growth of total mortgages. There is no evidence of substitution in the mortgages per capita. In contrast, the mortgage growth panel shows a notable effect in which banks partially alleviate tighter S&L funding frictions. In areas with a one-percentage-point increase in S&L funding frictions, the mortgage growth rate falls by about 10 pp at six quarters. The bank interaction, scaled by the average relative wholesale size, offsets this by about 5 pp in the average CBSA. The net effect is therefore a decline of about 5 pp in mortgage growth at six quarters for the average CBSA.

Overall, the evidence points to limited reallocation between S&L and banks when funding frictions tighten, with only modest backfilling on mortgage growth and little to no effect on prices. This pattern is consistent with the literature in relationship lending, in which households often remain with their established lenders (Allen et al., 2019; Allen and Li, 2025; Basten and Juelsrud, 2023; Agarwal et al., 2023).

5.7 Real effects on housing units

I provide suggestive evidence on quantities by studying how funding frictions in 1975–1980 relate to the long-run change in housing units. The mechanism is on the demand side. When institutions face tighter frictions, fewer households obtain mortgages, which lowers both prices and quantities by shifting the demand curve of home buyers downward. Section 5.2 documents the decline in real house prices in areas with higher S&L funding frictions. Because local housing-unit data are not available at an annual frequency for this period, I rely on decennial census counts and examine the change from 1980 to 1990. The outcome is the change in housing units per 1,000 persons between the two censuses, which serves as a proxy for new construction scaled by population following the funding-friction exposure. To summarize pre-1980 funding conditions, I construct sector-specific standardized measures as follows. For each quarter in 1975–1980, I standardize the S&L and bank funding frictions across CBSAs (z-scores) and then average those z-scores over 1975–1980 for each CBSA. One unit therefore represents a one–standard-deviation increase in funding frictions in the 1975–1980 cross section. I then estimate the cross-sectional regression

$$\Delta h_{c,1980\to 1990} = \alpha + \beta_1 Z(\text{S\&LFriction})_c + \beta_2 Z(\text{BankFriction})_c + \boldsymbol{\phi}^\top \mathbf{X}_c + \varepsilon_c, \tag{6}$$

where $\Delta h_{c,80\to 90}$ is the change in housing units per 1,000 persons in CBSA c from 1980 to 1990, and $\mathbf{X}_c$ includes log median income in 1980, log population in 1980, and the average deposits-to-assets ratio in 1975–1980.

Table 6 reports the estimates. In the preferred specification with all controls (column 3), a one–standard-deviation increase in S&L funding frictions is associated with about -9.91 fewer housing units per 1,000 persons between 1980 and 1990. The corresponding estimate for bank funding frictions is smaller in magnitude (about -3.42) and not statistically significant.

To study short- to medium-run effects of funding frictions on housing activity, I use construction employment as a proxy for housing quantity. Construction activity moves with housing quantity. Using annual County Business Patterns data for 1975–1983, Appendix Table B1 relates one-year construction employment growth to the S&L and bank funding frictions. The estimates show a negative relationship between construction employment growth and the funding frictions, with larger magnitudes for the S&L measure. These results complement the long-run quantity evidence for 1980–1990 and the price results, and they are consistent with a demand-driven credit

Table 6: Funding frictions and total housing units

	Δ Housing units per 1,000 persons (1980–1990)		
	(1)	(2)	(3)
S&L funding frictions 1975–1980	-9.47^{**}	-11.02^{**}	-9.91^{**}
	(4.46)	(4.48)	(4.43)
Bank funding frictions 1975–1980	-5.72	-6.45	-3.42
	(4.43)	(4.43)	(4.43)
Log(Median income 1980)	11.61		0.75
	(9.90)		(10.01)
Log(Population 1980)	-5.24^{***}		-18.42^{***}
	(1.52)		(2.80)
Average deposits/assets 1975–1980		71.22	-47.52
		(51.47)	(54.23)
Constant	-75.21	-99.86^{*}	83.19
	(90.26)	(54.96)	(117.16)
Observations	884	884	884
R^2	0.02	0.01	0.06

Notes: This table reports cross-sectional regressions of the change in housing units per 1,000 persons from 1980 to 1990 on standardized S&L and bank funding frictions measured over 1975–1980, along with controls. Funding frictions are constructed as in Section 3.1 and scaled by historical deposit reliance. Standard errors are reported in parentheses. Asterisks denote significance levels *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

crunch in which S&L frictions play the larger role.

It is possible that credit crunches at depository institutions also work through the supply side of the housing market by reducing credit to construction firms. The evidence here does not rule out such supply-side channels. My aim is to show that, in areas with higher S&L funding frictions, the hit to household demand appears to dominate any supply response, so both prices and quantities move down. The housing quantity data are coarse and the analysis of construction is limited, so the results are best interpreted as descriptive evidence consistent with a credit crunch that operates through housing demand.

5.8 Areas with no S&Ls

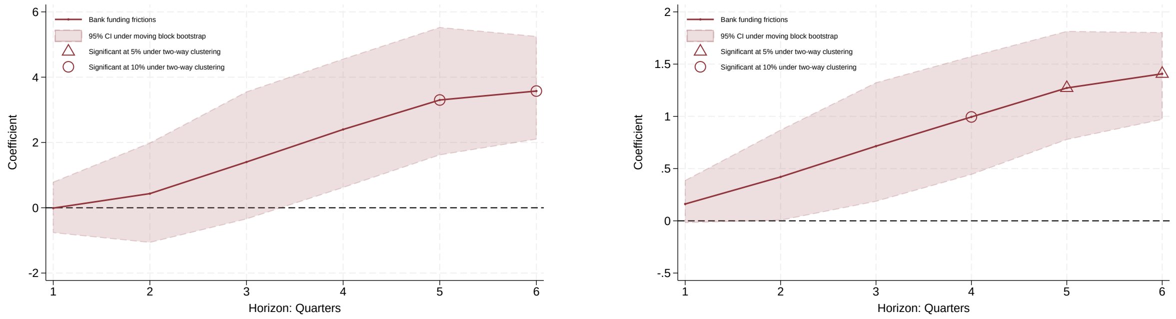
I complement the demand-side evidence with a simple exercise that speaks to potential supply-side effects. Prior work shows that bank credit crunches can constrain firms' activity, including the construction industry (Drechsler et al., 2022*a*). To explore a supply-side channel, I focus on CBSAs without S&Ls and estimate a modified local horizon specification,

$$\Delta y_{c,t\rightarrow t+h} = \beta_h \,\text{BankFriction}_{c,t} + \boldsymbol{\phi}_h^{\top}\mathbf{X}_{c,t} + \delta_t + \varepsilon_{c,t+h}, \tag{7}$$

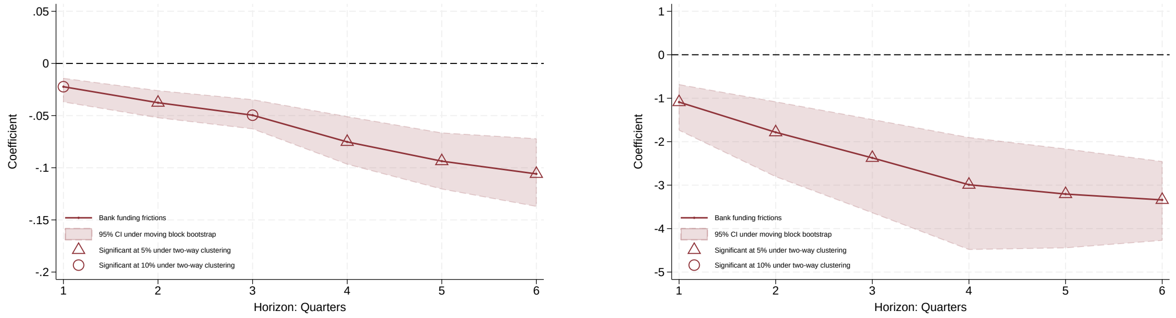
keeping the same controls as in Equation 4 and omitting the relative wholesale size term, which is not defined when S&Ls are absent. Figure 13 reports the coefficients for house price and mortgage outcomes. Only a small fraction of CBSAs do not have an S&L: the price sample covers 52 CBSAs and the mortgage sample covers 89. Panel A shows that in areas with higher bank funding frictions, house prices tend to drift up at longer horizons. Panel B shows that mortgage amounts move in the opposite direction as the horizon extends.

Figure 13: House prices and mortgages in areas with no S&Ls

Panel A: Real house prices relative to income **Panel B:** Real house price growth rate



Panel C: Mortgages per capita relative to income **Panel D:** Mortgage growth rate



Notes: Each panel presents coefficients β_h from

$$\Delta y_{c,t\to t+h} = \beta_h \, \text{BankFriction}_{c,t} + \boldsymbol{\phi}_h^\top \mathbf{X}_{c,t} + \delta_t + \varepsilon_{c,t+h},$$

Panel A uses the change in real house prices as a share of median household income. Panel B uses the cumulative log growth of real house prices. Panel C uses the change in mortgage amount per capita, scaled by median household income. Panel D uses the cumulative log growth of mortgage amount. The bank funding frictions are CBSA-level binding-constraint measures scaled by 1974 sector deposit shares. The control vector $\mathbf{X}_{c,t}$ includes log assets, the deposit-to-asset ratio, the CBSA mortgage HHI, log population, and log median income. δ_t denotes time fixed effects. Shaded areas show 95% confidence intervals from the moving-block bootstrap with block length $L = \max\{4, h\}$ and 2,000 repetitions. Markers indicate estimates that are statistically different from zero under two-way clustering by CBSA and time. The regression table for four-quarter horizons appears in Appendix Table C10, which also reports wild cluster bootstrap-t confidence intervals.

Mortgage amounts reflect price times quantity. When prices rise and mortgage amounts fall, the implication is that quantities decline. To shed light on quantities, I estimate Equation 6 for CBSAs without S&Ls, omitting the S&L term. The cross section includes 98 CBSAs. Table 7 shows that, in areas with higher bank funding frictions over 1975–1980, housing units per 1,000 persons decline between 1980 and 1990, and the estimates are statistically significant.

These patterns are consistent with a supply-side tightening in places where banks are the

Table 7: Total housing units in areas without S&Ls

	Δ Housing units per 1,000 persons (1980–1990)		
	(1)	(2)	(3)
Bank funding frictions 1975–1980	-24.73***	-23.14**	-22.14**
	(8.45)	(8.94)	(8.82)
Log(Median income 1980)	-81.47**		-86.04**
	(32.82)		(33.03)
Log(Population 1980)	31.99***		22.82**
	(8.72)		(10.92)
Average deposits/assets 1975–1980		-516.51	-260.66
		(358.25)	(366.16)
Constant	402.37	285.13	692.38
	(318.75)	(322.23)	(479.13)
Observations	98	98	98
R^2	0.23	0.15	0.24

Notes: This table reports cross-sectional regressions of the change in housing units per 1,000 persons from 1980 to 1990 on standardized bank funding frictions measured over 1975–1980, along with controls. Funding frictions are constructed as in Section 3.1 and scaled by historical deposit reliance. Standard errors are reported in parentheses. Asterisks denote significance levels *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

sole lenders. Bank credit crunches can affect both mortgage borrowers and construction firms because banks lend broadly to households and businesses, including mortgages and commercial and industrial loans. In these CBSAs, the supply-side effect appears to dominate on net. As before, the small sample and the coarse timing of the housing unit data limit inference. The results should be read as suggestive evidence that complements the demand-side findings.

5.9 Robustness: local level

I conduct three robustness checks, paralleling the institution-level analysis. First, I vary how demand deposits enter the construction of the S&L and bank funding-frictions measures and re-estimate the price and mortgage specifications. Second, I repeat the analysis on non-overlapping horizons to verify that the results are not driven by overlap. Third, I include lags of the outcome variables in the analysis following Jordà (2005).

I consider five constructions for how demand deposits enter the S&L and bank funding-frictions measures: (i) 100% treated as savings deposits (baseline), (ii) 75% savings and 25% exempt, (iii) 50% savings and 50% exempt, (iv) 25% savings and 75% exempt, and (v) 100% exempt. Moving from (i) to (v) treats demand deposits as progressively less binding. For each construction, I re-estimate Equation 5 and report the results in Appendix Figure B2–Figure B5. As demand deposits are treated as less binding, the bank and S&L frictions become mechanically more similar, so the estimated gap between the two series narrows. The qualitative ordering remains: the S&L series is more negative than the bank series for house prices as a share of income, for mortgages per capita, and for mortgage growth across all constructions. For real house-price growth, the gap narrows further. Confidence intervals widen, especially for the bank series, as demand deposits are treated as less binding. This reflects a greater measurement error once a larger share of deposits is assumed exempt. For these reasons, I view the economically relevant case as closer to the baseline that imputes an implicit savings rate to demand deposits rather than the extreme exempt case. Overall, the main conclusion is unchanged: funding frictions operating through the S&L sector have larger effects on local housing outcomes than frictions operating through banks.

Next, I address concerns about overlap in the horizon design. I re-estimate Equation 5 on non-overlapping horizons by keeping one start quarter in each horizon block, and I cluster standard errors by CBSA. Figure B6 reports the estimates for the four housing outcomes. Removing overlap reduces the number of observations at each horizon and widens the confidence intervals. The point estimates for the two price outcomes are larger in magnitude, while the estimates for the two mortgage outcomes are similar to the baseline. These patterns indicate that the main results do not rely on overlapping windows.

The last robustness test is to include lags as in Jordà (2005). For each result in Figure 9 and Figure 10, I estimate Equation 4 with four lags of the outcome variables, and Figure B7 reports the estimates. The results are comparable to the baseline estimations.

6 Model of local housing under funding frictions

I develop a simple model in which households value housing and the convenience of saving, and two intermediaries —- S&Ls and banks —- differ in funding flexibility. The model generates the main stylized facts in the data. When funding frictions tighten and the deposit-rate ceiling binds, deposits flow out and mortgage funding contracts, creating a credit crunch that lowers prices and quantities. Greater funding flexibility, especially at banks, dampens these effects by shifting toward wholesale funding. The subsections that follow present the setup and equilibrium and then link the model's predictions to the empirical design.

6.1 Setup and equilibrium

The local economy has a continuum of households that value housing and the convenience of holding safe liquid balances, a financial sector with two types of intermediaries (S&Ls and banks), and a representative construction firm that hires labor and builds housing. The government sector sets the deposit rate ceiling and the federal funds rate, both taken as exogenous.

The model has two periods: morning and evening. In the morning, households allocate their savings between deposits and bonds and enjoy the convenience services of safe and liquid holdings during the day. They choose housing, borrow with a mortgage from the financial sector, and supply up to one unit of labor elastically. The firm hires labor and begins construction. S&Ls and banks raise deposits and wholesale funds and issue mortgages. In the evening, the construction firm delivers housing and pays wages. Households receive interest on savings, earn wages, and repay their mortgages.

Household sector A continuum of households values housing and the convenience of holding safe balances. Each household purchases H units of housing at price P and finances the purchase with a mortgage $M = HP$ from the financial sector. The mortgage rate r_m is determined in equilibrium.

Each household is endowed in the morning with one unit of wealth to allocate between deposits D and bonds B. Deposits pay an interest rate r_D subject to a ceiling $\bar{r}_D$ under Regulation Q. Bonds pay the federal funds rate r_f and are placed in the national market. A CES aggregator captures the convenience benefit from holding liquid balances as in Begenau and Landvoigt (2022)

$$\Lambda(D) = \left(\alpha D^{\rho} + (1-\alpha)B^{\rho}\right)^{1/\rho},$$

where α controls the weight on deposits and $\rho \in (-\infty, 1)$ governs substitutability between deposits and bonds. Households supply up to one unit of labor L at wage w.

Further, let $b \equiv r_f - r_D$ denote the spread between the federal funds rate and the deposit rate. When the ceiling binds, $b > 0$, which corresponds to the retail deposit portion of the empirical binding-constraint measure. The household's problem is

$$\begin{aligned} \max_{H,D} \quad & H + \kappa\Lambda(D) \\ \text{s.t.} \quad & HP(1+r_m) = -Db + (1+r_f) + wL, \end{aligned} \tag{8}$$

where κ scales the convenience benefit relative to housing services. The constraint is derived from the household's balance sheet constraint in the evening period, namely, the mortgage payment equates the sum of the household's labor income and savings plus interest.

Financial intermediary sector The financial sector has S&Ls and banks. Each intermediary raises local retail deposits D_j from households and wholesale funds W_j from national markets, with $j \in \{\text{S\&L}, \text{Bank}\}$. Since the model focus on the local economy, wholesale funds raised from the national market need not equal household bond holdings in the local area.

Intermediary j chooses D_j and pays the deposit rate r_D subject to deposit rate ceiling $r_D \leq \bar{r}_D$ to depositors. In addition, acquiring deposits entails a type-specific production cost $c_j(D_j) = \frac{1}{2}\phi_j D_j^2$ with $\phi_j > 0$, which governs the split of the household deposit pool across intermediaries. Intuitively, deposits are homogeneous to households, so the price r_D has to be the same; however, institutions with high deposit production costs (for instance, less efficient labor, weaker customer network) raise fewer deposits. A common shadow price η on deposits enforces market clearing. The shadow price η is effectively a regulatory cost on banks taking deposits and I chooses η so that the effective rate paid by banks is r_D and that the sum of S&L and bank deposits equates to the total deposit supply from the housing sector. Wholesale funds pay an interest rate equal to the fed funds rate r_f. In addition, they carry a convex marginal cost. Banks access these markets more easily and face a lower wholesale acquisition cost: $\frac{\psi_j}{1+\theta}W_j^{1+\theta}$ with $\theta > 0$ and $\psi_{\text{S\&L}} \gg \psi_{\text{Bank}}$. On the asset side, intermediary j supplies mortgages M_j at rate r_m. With spread $b \equiv r_f - r_D$, the problem for intermediary j is to maximize profit

$$\begin{aligned} \max_{D_j, W_j} \Pi_j \;&=\; (r_m - r_f)M_j + b\,D_j - c_j(D_j) - \eta D_j - \frac{\psi_j}{1+\theta}W_j^{1+\theta} \\ \text{s.t.} \quad & M_j = D_j + W_j, \quad b \geq r_f - \bar{r}_D, \end{aligned} \tag{9}$$

where the constraints are the balance sheet constraint and deposit rate ceiling constraint.

Deposit split From the first-order condition for D_j in (9), $c_j'(D_j) = \phi_j D_j = b + (r_m - r_f) - \eta$, the implied split for S&Ls and banks is

$$\frac{D_{\text{S\&L}}}{D_{\text{Bank}}} = \frac{\phi_{\text{Bank}}}{\phi_{\text{S\&L}}}.$$

This split reflects historical footprints and customer network between institutions. I take it as given as a primitive of the model. The clearing condition $D_{\text{S\&L}} + D_{\text{Bank}} = D^{\text{Supply}}$ pins down the shadow price for retail deposits η:

$$\eta = b + (r_m - r_f) - \frac{D^{\text{Supply}}}{\phi_{\text{Bank}}^{-1} + \phi_{\text{S\&L}}^{-1}}.$$

Intuitively, the shadow price η can be interpreted as a regulatory cost that forces institutions to pay ceiling rate rather than the equilibrium price when deposit rate ceiling is binding. These terms determine only how the household deposit pool is split across intermediaries. They do not change the aggregate deposit supply D, total mortgage funding M, aggregate wholesale funding W, or each intermediary's wholesale choice W_j.

Housing market and government The representative construction firm hires labor $L \in [0,1]$ from households at wage w. I treat w as fixed because the broader local economy, not the housing sector, sets wages in equilibrium. Housing is produced with a Cobb–Douglas technology $H = AL^{\zeta}$ where $A > 0$ is the productivity and $\zeta \in (0,1)$ is the labor elasticity of output. The firm sells houses at price P. They choose labor $L \in [0,1]$ to maximize profit subject to production technology:

$$\max_{L} HP - wL \quad \text{s.t.} \quad H = AL^{\zeta}, 0 \leq L \leq 1 \tag{10}$$

Finally, The government sets the deposit-rate ceiling $\bar{r}_D$ and the federal funds rate r_f, which are taken as exogenous.

Equilibrium An equilibrium consists of (i) household choices of housing H and deposits D, (ii) financial institutions' choices of deposits $D_{\text{S\&L}}, D_{\text{Bank}}$ and wholesale funds $W_{\text{S\&L}}, W_{\text{Bank}}$, which together determine mortgage credit $M_{\text{S\&L}}, M_{\text{Bank}}$, (iii) the construction firm's labor choice L, and (iv) prices (r_D, r_m, P), such that

1. Households, intermediaries, and the firm solve the problems in Equations 8, 9, and 10.

2. The housing market clears with $M = HP$ and H produced as in Equation 10.

3. The deposit market clears with retail deposits supplied by households equal to deposits raised by S&Ls and banks.

4. The mortgage market clears with household mortgage borrowing equal to retail deposits plus wholesale funds at S&Ls and banks.

I present the solution and full derivations in Appendix D. The model matches the main stylized facts. When the ceiling binds so that $b > 0$, retail deposits flow out. Banks partly backfill with wholesale funding, while S&Ls replace little because wholesale is costly for them. Mortgage credit decline, and local prices and housing quantities fall.

6.2 Mapping to empirical results

The empirical results point to two key patterns in how deposit-rate ceilings translate into house prices and quantities. First, when the measured funding frictions are higher, mortgage credit contracts, house prices grow more slowly and quantities fall, and mortgage rates rise. Second, institutions with greater funding flexibility mitigate these effects by expanding wholesale funding when retail funding tightens. Banks do so more than S&Ls, which is consistent with their easier access to wholesale markets.

To connect the model to the measurement, note that the retail tightness in the model is the spread $b \equiv r_f - \bar{r}_D$ which captures how far the relevant ceiling sits below the short rate for the retail deposits. The empirical measure $\text{Bind}_{i,t}$ accounts for both retail deposits and wholesale deposits. In the model, the object that corresponds to the empirical measure is

$$\text{Bind}_j = b\,\frac{\omega_j D}{\omega_j D + W_j}, \qquad \omega_j \equiv \frac{\phi_j^{-1}}{\phi_{\text{Bank}}^{-1} + \phi_{\text{S\&L}}^{-1}}, \tag{11}$$

where $j \in \{\text{S\&L}, \text{Bank}\}$, D denotes total retail deposits, and ω_j is the constant fraction of total retail deposits allocated to institution type j based on its historical footprint. The fraction $\frac{\omega_j D}{\omega_j D + W_j}$ scales the retail gap by the institution's reliance on retail funding and mirrors the share weighting in Equation 1. I consider two comparative-statics exercises that mirror the empirical tests.

Ceiling relief: A policy loosening that raises the ceiling reduces b. Holding funding flexibility fixed, the model implies that an increase in $\text{Bind}_{\text{S\&L}}$ (a tighter retail constraint on S&Ls) lowers local prices and quantities and raises mortgage rates:

$$\frac{\partial P}{\partial \, \text{Bind}_{\text{S\&L}}} < 0, \qquad \frac{\partial H}{\partial \, \text{Bind}_{\text{S\&L}}} < 0.$$

At the institution level, tighter retail funding shifts balance-sheet composition. With $\psi_{\text{S\&L}} \gg \psi_{\text{Bank}}$ and moderate wholesale curvature, these responses are more muted for banks than for S&Ls,

$$\left| \frac{\partial W_{\text{Bank}}}{\partial \, \text{Bind}_{\text{Bank}}} \right| > \left| \frac{\partial W_{\text{S\&L}}}{\partial \, \text{Bind}_{\text{S\&L}}} \right|, \quad \left| \frac{\partial D_{\text{Bank}}}{\partial \, \text{Bind}_{\text{Bank}}} \right| < \left| \frac{\partial D_{\text{S\&L}}}{\partial \, \text{Bind}_{\text{S\&L}}} \right|, \quad \left| \frac{\partial M_{\text{Bank}}}{\partial \, \text{Bind}_{\text{Bank}}} \right| < \left| \frac{\partial M_{\text{S\&L}}}{\partial \, \text{Bind}_{\text{S\&L}}} \right|.$$

which matches the empirical finding that banks backfill more with wholesale funding and exhibit a smaller net contraction in lending (see Appendix Section D.3 for a formal derivation).

Increased funding flexibility: Holding the ceiling path fixed, let S&Ls have greater access to wholesale deposits, that is $\psi_{\text{S\&L}}$ decreases. Appendix Section D.3 shows that greater S&L funding flexibility weakens the pass-through from funding tightness to prices and quantities,

$$\frac{\partial}{\partial \psi_{\text{S\&L}}} \left(\frac{dP}{d \, \text{Bind}_{\text{S\&L}}} \right) < 0, \qquad \frac{\partial}{\partial \psi_{\text{S\&L}}} \left(\frac{dH}{d \, \text{Bind}_{\text{S\&L}}} \right) < 0, \tag{12}$$

because lower $\psi_{\text{S\&L}}$ makes it easier for S&Ls to substitute toward wholesale funds when retail funding tightens. This comparative static shows that greater funding flexibility eases the impact of funding frictions on house prices and quantities.

These links formalize the two empirical messages in the model. The share-scaled tightness in Equation 11 is the model counterpart to the measured Bind. A higher value contracts deposits and lending and lowers prices and quantities, with smaller effects where funding can be reallocated toward wholesale sources.

7 Conclusion

I revisit the housing credit crunch of the 1970s, a period of high inflation and high interest rates with baby boomers coming of age. I add a funding channel to the explanation of housing-market equilibrium. Deposit-rate ceilings under Regulation Q pushed deposits out of banks and S&Ls, and tightened mortgage credit. The pass-through was strongest at S&Ls, which relied on rate-capped retail deposits. At the local level, higher S&L funding frictions are associated with lower house prices and lower housing quantities, consistent with a downward shift in the household demand curve of the housing market. Funding frictions at banks have muted effects. The contrast reflects funding flexibility, because banks shifted toward wholesale deposits that were exempt from the ceilings while S&Ls could not.

Although this study examines a historical setting, its lessons speak to today's financial system. Housing finance has changed, yet regulatory frictions and funding flexibility remain central for banks, shadow banks, and fintech lenders (Begenau and Landvoigt, 2022; Buchak et al., 2018). Deposit-rate ceilings no longer exist in the United States, but caps and related constraints persist in some emerging markets, including China (Buchak et al., 2021). As fintech expands, funding and mortgage origination reallocate across platforms. The Regulation Q experience shows how limits in one channel shift activity to others and shape the pass-through of monetary and regulatory shocks to housing finance. Understanding these mechanisms helps interpret bank–fintech competition and design policies that support credit without amplifying shocks to prices and quantities.

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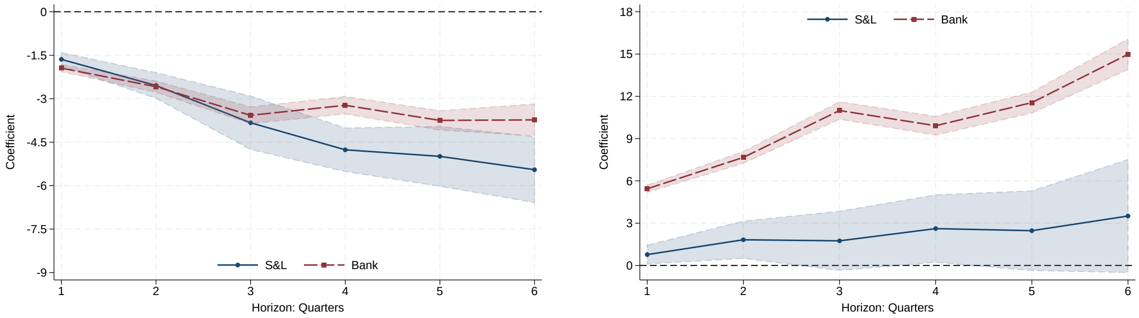
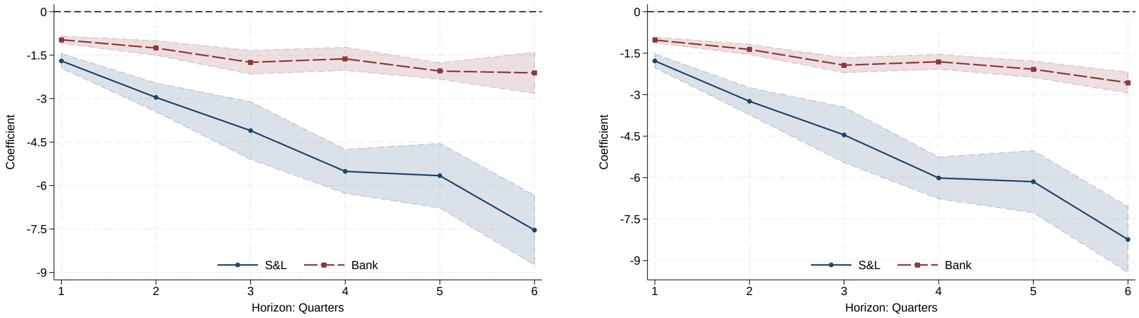
Appendix

A Robustness results at the institution level

Figure A1: Robustness: non-overlapping horizons at the institution level


Panel A: Retail deposits

Panel B: Wholesale deposits


Panel C: Total deposits

Panel D: Total deposits and alt. funds

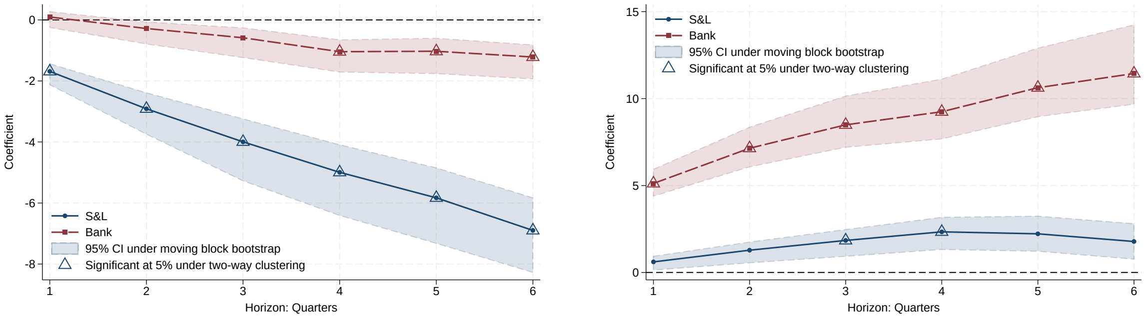

Panel E: Mortgage and total loans

Notes: Each panel presents coefficient β_h from the horizon regression

$$\Delta y_{i,t\to t+h} = \beta_h \,\text{Bind}_{i,t} + \boldsymbol{\phi}_h^{\top}\mathbf{X}_{i,t} + \delta_{s(i),t} + \varepsilon_{i,t+h},$$

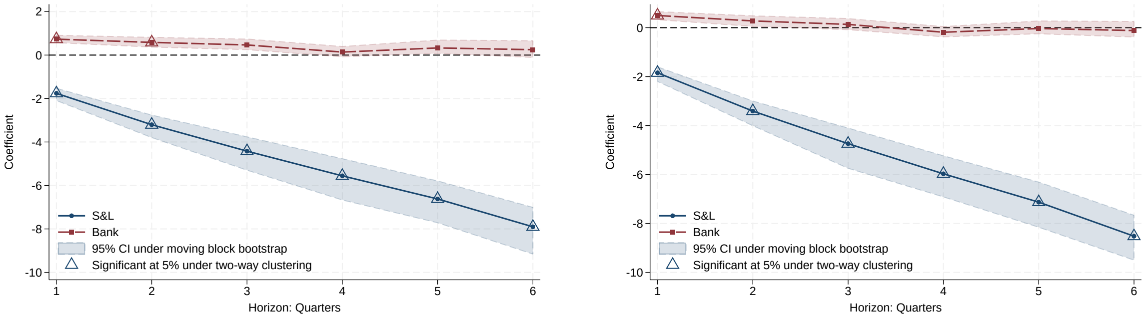
estimated on non-overlapping horizons that keep one start date per horizon. The outcome variable is the cumulative log growth of the labeled balance-sheet variable, reported in percentage points (p.p.). The control vector $\mathbf{X}_{i,t}$ includes log assets, the deposit-to-asset ratio, the mortgage HHI, log population, and log median income, and $\delta_{s(i),t}$ denotes state × time fixed effects. Shaded areas show 95% confidence intervals based on institution-clustered standard errors. Results are comparable to the baseline overlapping-horizon estimates in Figure 5 and Figure 7.

Figure A2: Robustness: treating demand deposits as exempt from ceilings



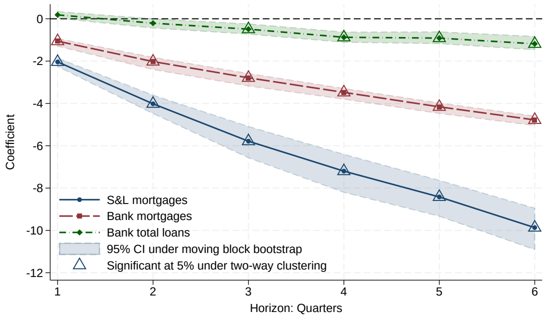
Panel A: Retail deposits

Panel B: Wholesale deposits



Panel C: Total deposits

Panel D: Total deposits and alternative funds



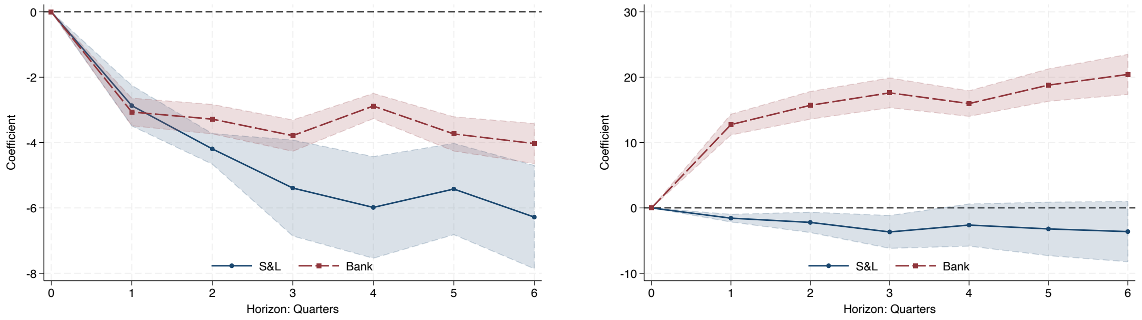
Panel E: Mortgages and total loans

Notes: Each panel presents coefficients β_h from the horizon regression

$$\Delta y_{i,t\to t+h} = \beta_h \, \mathrm{Bind}_{i,t} + \boldsymbol{\phi}_h^\top \mathbf{X}_{i,t} + \delta_{s(i),t} + \varepsilon_{i,t+h},$$

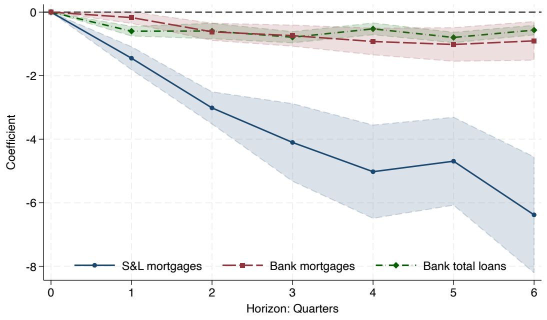
estimated with the binding-constraint measure $\mathrm{Bind}_{i,t}$ constructed by treating demand deposits as exempt from deposit-rate ceilings (no ceiling applied to demand deposits). The outcome variable is the cumulative log growth of the labeled balance-sheet variable, reported in percentage points (p.p.). The control vector $\mathbf{X}_{i,t}$ includes log assets, the deposit-to-asset ratio, the mortgage HHI, log population, and log median income, and the fixed effects $\delta_{s(i),t}$ are state × time fixed effects. Shaded areas show 95% confidence intervals from the moving-block bootstrap with block length $L = \max\{4, h\}$ and 1,000 repetitions. Markers indicate estimates that are statistically different from zero under two-way clustering by institution and time. Results are comparable to the baseline estimates in Figure 5 and Figure 7.

Figure A3: Robustness: with lags of outcome variables


Panel A: Retail deposits

Panel B: Wholesale deposits

Panel E: Mortgages and total loans



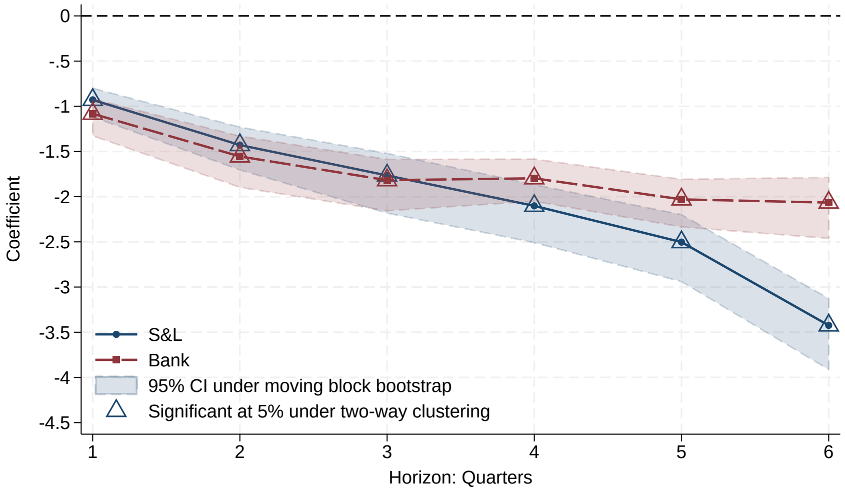
Notes: Each panel presents coefficients β_h from the horizon regression

$$\Delta y_{i,t\to t+h} = \beta_h \, \text{Bind}_{i,t} + \boldsymbol{\phi}_h^\top \mathbf{X}_{i,t} + \delta_{s(i),t} + \varepsilon_{i,t+h},$$

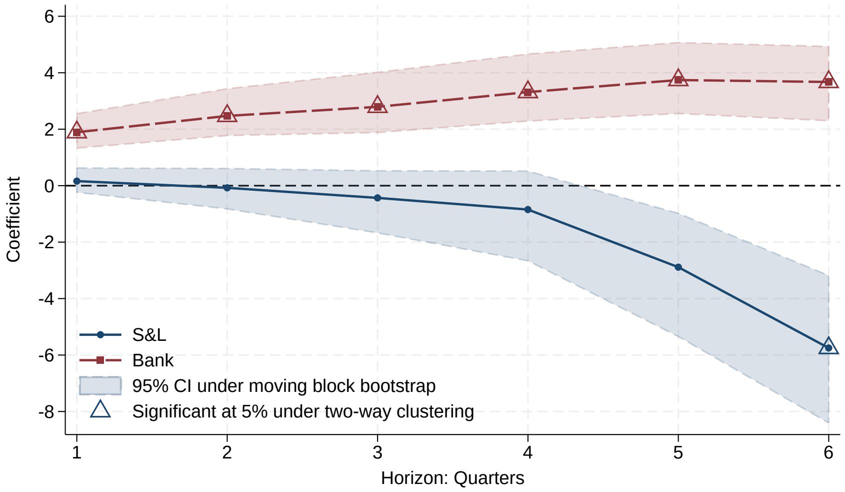
with an additional four lags of the outcome variables as in Jordà (2005). The outcome variable is the cumulative log growth of the labeled balance-sheet variable, reported in percentage points (p.p.). The control vector $\mathbf{X}_{i,t}$ includes log assets, the deposit-to-asset ratio, the mortgage HHI, log population, log median income, and four lags of outcome variables, and the fixed effects $\delta_{s(i),t}$ are state × time fixed effects. Shaded areas show 95% confidence intervals from the moving-block bootstrap with block length $L = \max\{4, h\}$ and 1,000 repetitions.

Figure A4: Robustness: controlling for baseline retail deposits at the institution level

Panel A: Retail deposits



Panel B: Wholesale deposits



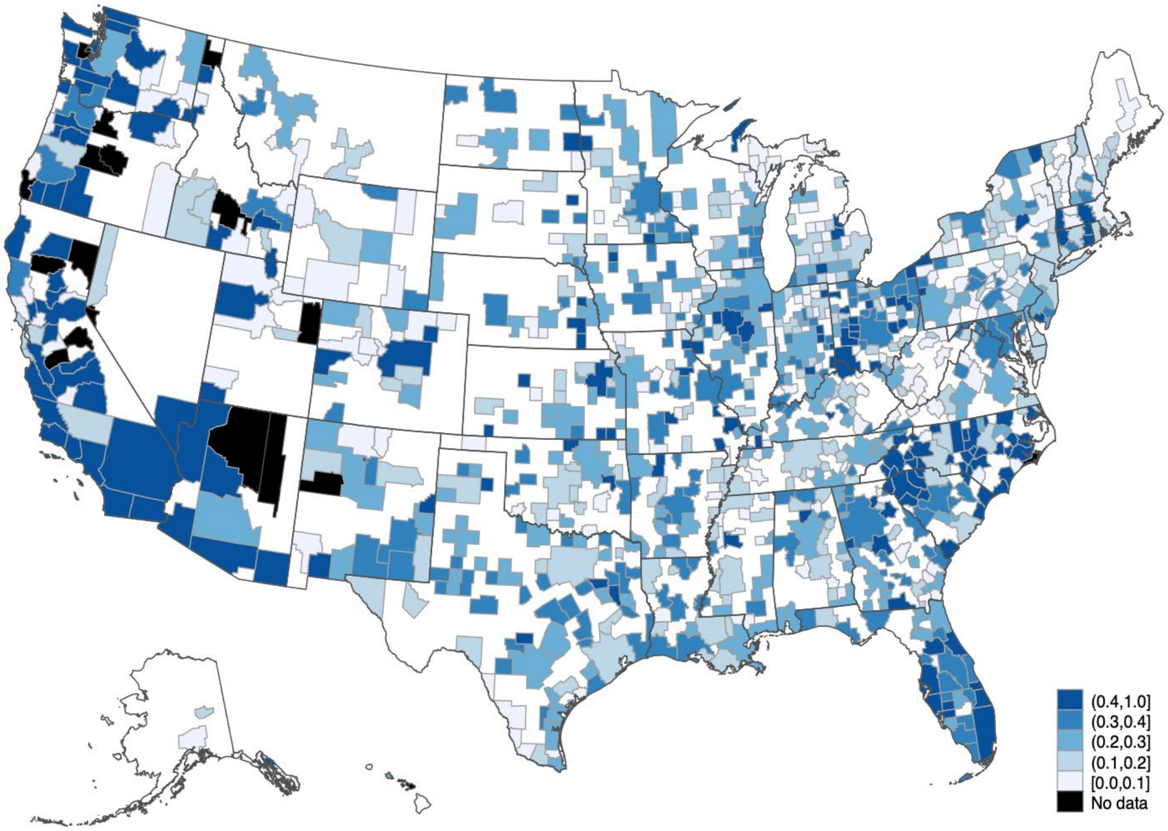
Notes: Each panel presents coefficients β_h from the horizon regression

$$\Delta y_{i,t \to t+h} = \beta_h \, \text{Bind}_{i,t} + \boldsymbol{\phi}_h^\top \mathbf{X}_{i,t} + \delta_{s(i),t} + \varepsilon_{i,t+h},$$

estimated with an additional control for log retail deposits (measured at the start of the horizon). The outcome variable is the cumulative log growth of the labeled balance-sheet item, reported in percentage points (p.p.). Confidence intervals are computed using the moving-block bootstrap with block length $L = \max\{4, h\}$ and 1,000 repetitions. Markers indicate estimates that are statistically different from zero under two-way clustering by institution and time. This specification effectively compares institutions with the same asset size, deposit size, and retail deposit size, located in the same state and quarter.

B Robustness results at the local level

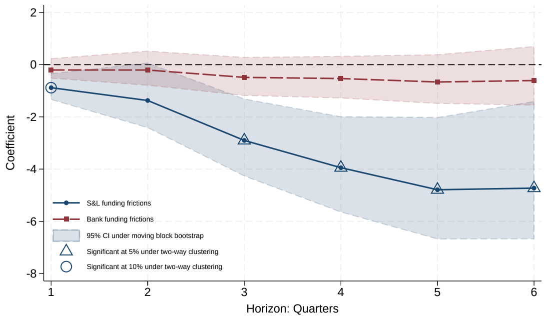
Figure B1: Geographic variation in initial S&L deposit share



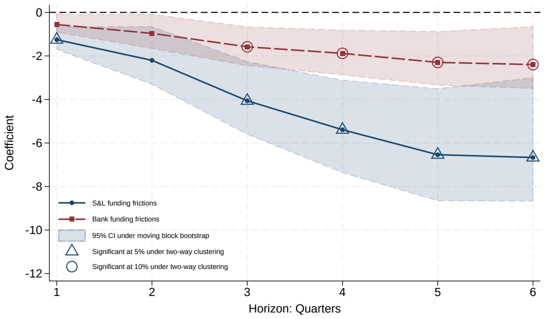
Notes: This figure maps the 1974 S&L deposit share across CBSAs. Each shaded area represents a CBSA. Darker shading indicates a higher S&L share. Black areas indicate CBSAs for which S&L data are unavailable. White areas are rural areas outside CBSAs and are therefore not included in the sample.

Figure B2: Robustness on house prices as share of income: different treatments of demand deposits

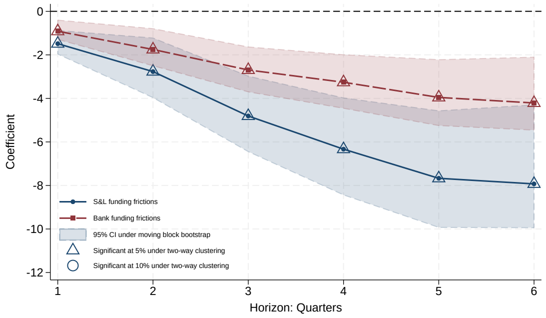
Panel A: 100% savings deposits (Baseline)



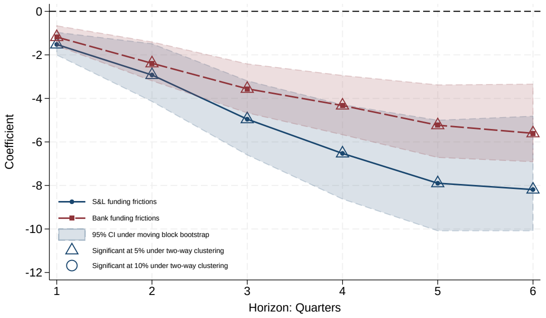
Panel B: 75% savings and 25% demand



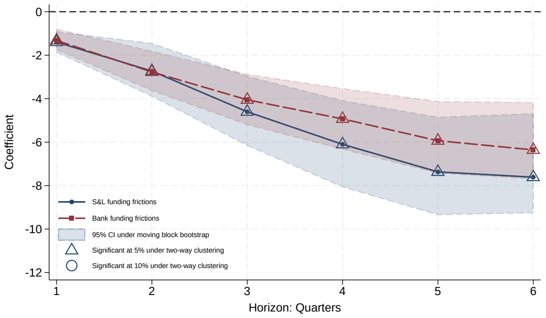
Panel C: 50% savings and 50% demand



Panel D: 25% savings and 75% demand



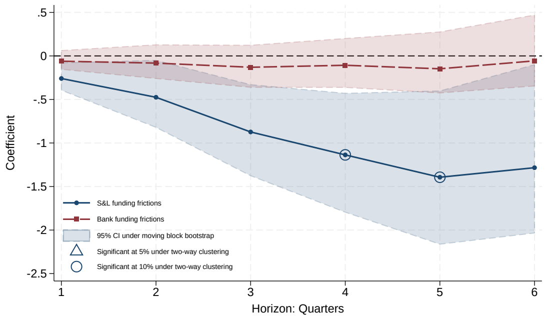
Panel E: 100% demand



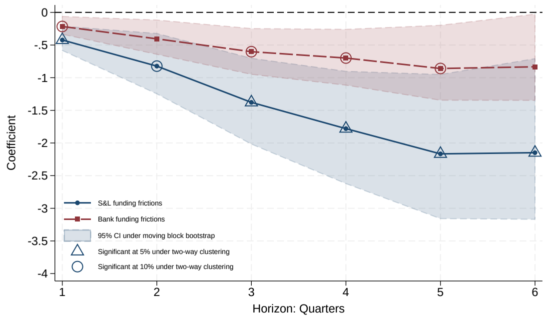
Notes: Each panel reports coefficients from Equation 4 for real house prices relative to income under alternative treatments of demand deposits in the funding-friction measure. Panel A is the baseline, which treats demand deposits as 100% savings. Panels B–D progressively treat demand deposits as less binding by downweighting them in the savings bucket (75%/25%, 50%/50%, 25%/75%). Panel E treats demand deposits as fully exempt. Shaded areas show 95% confidence intervals from the moving-block bootstrap with block length $L = \max\{4, h\}$ and 2,000 repetitions. Markers indicate estimates that are statistically different from zero under two-way clustering by CBSA and time. See Section 3.1 for construction of funding frictions and Section 5.1 for controls.

Figure B3: Robustness on real house price growth: different treatments of demand deposits

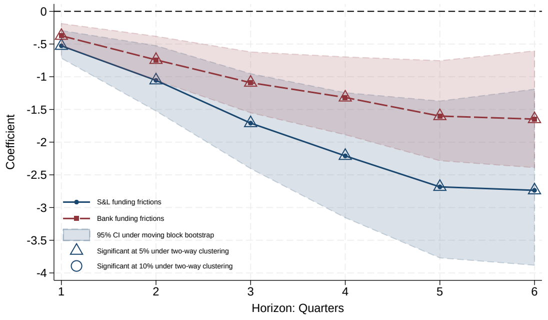
Panel A: 100% savings deposits (Baseline)



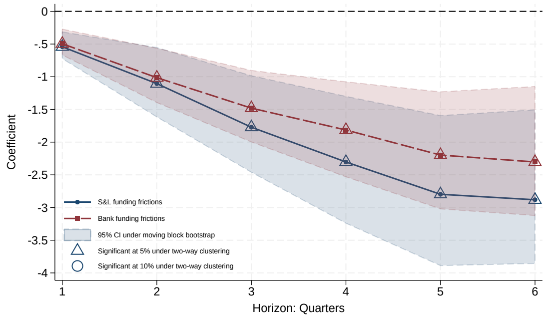
Panel B: 75% savings and 25% demand



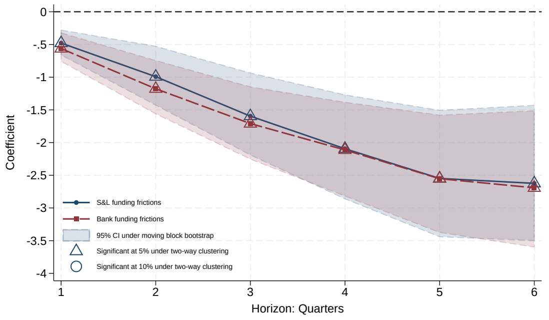
Panel C: 50% savings and 50% demand



Panel D: 25% savings and 75% demand

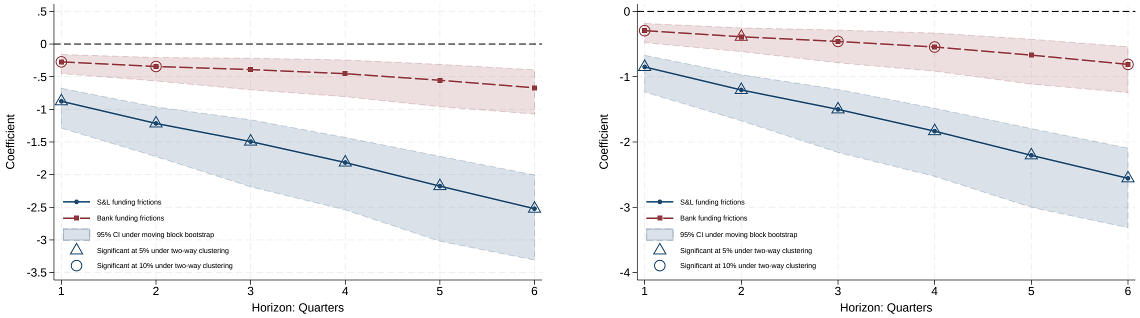


Panel E: 100% demand



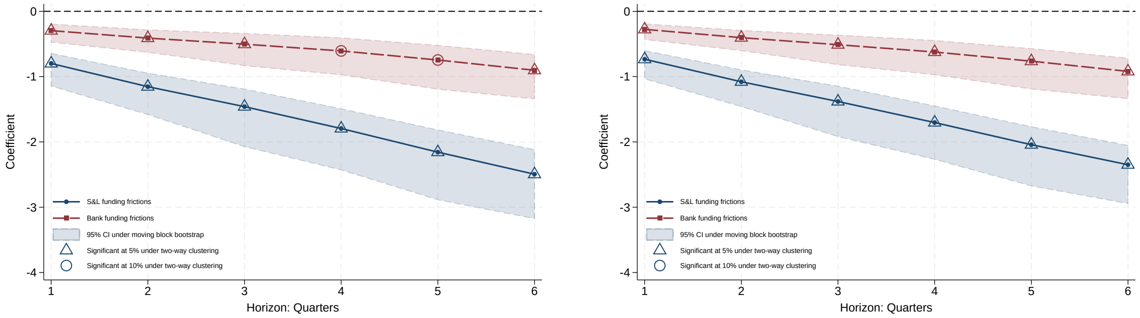
Notes: Each panel reports coefficients from Equation 4 for real house prices growth rate under alternative treatments of demand deposits in the funding-friction measure. Panel A is the baseline, which treats demand deposits as 100% savings. Panels B–D progressively treat demand deposits as less binding by downweighting them in the savings bucket (75%/25%, 50%/50%, 25%/75%). Panel E treats demand deposits as fully exempt. Shaded areas show 95% confidence intervals from the moving-block bootstrap with block length $L = \max\{4, h\}$ and 2,000 repetitions. Markers indicate estimates that are statistically different from zero under two-way clustering by CBSA and time. See Section 3.1 for construction of funding frictions and Section 5.1 for controls.

Figure B4: Robustness on mortgage per capita as share of income: different treatments of demand deposits



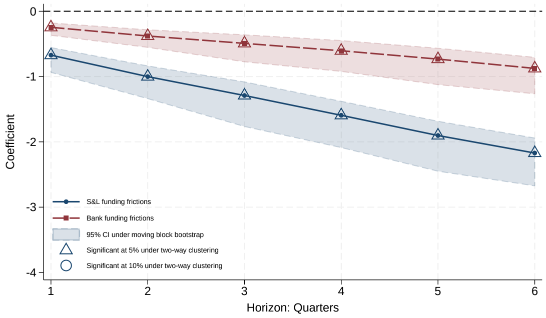
Panel A: 100% savings deposits (Baseline)

Panel B: 75% savings and 25% demand



Panel C: 50% savings and 50% demand

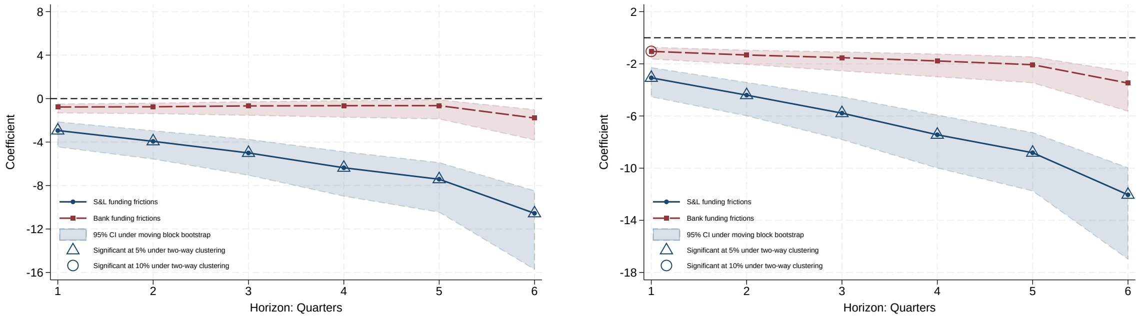
Panel D: 25% savings and 75% demand



Panel E: 100% demand

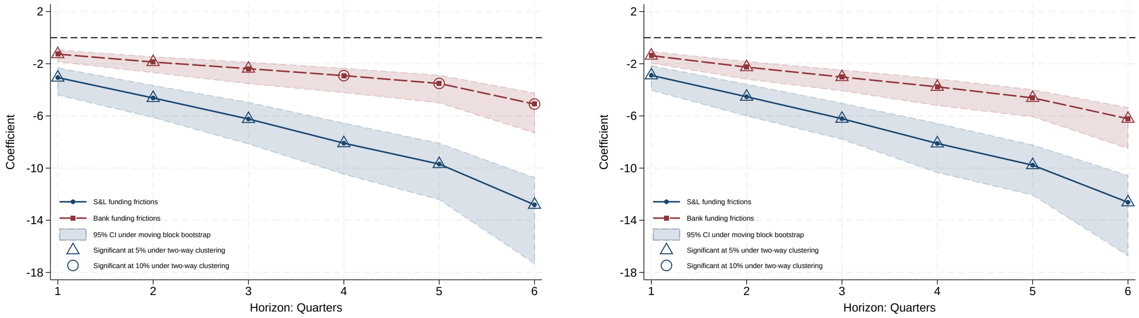
Notes: Each panel reports coefficients from Equation 4 for per-capita mortgage credit relative to income under alternative treatments of demand deposits in the funding-friction measure. Panel A is the baseline, which treats demand deposits as 100% savings. Panels B–D progressively treat demand deposits as less binding by downweighting them in the savings bucket (75%/25%, 50%/50%, 25%/75%). Panel E treats demand deposits as fully exempt. Shaded areas show 95% confidence intervals from the moving-block bootstrap with block length $L = \max\{4, h\}$ and 2,000 repetitions. Markers indicate estimates that are statistically different from zero under two-way clustering by CBSA and time. See Section 3.1 for construction of funding frictions and Section 5.1 for controls.

Figure B5: Robustness on mortgage growth: different treatments of demand deposits



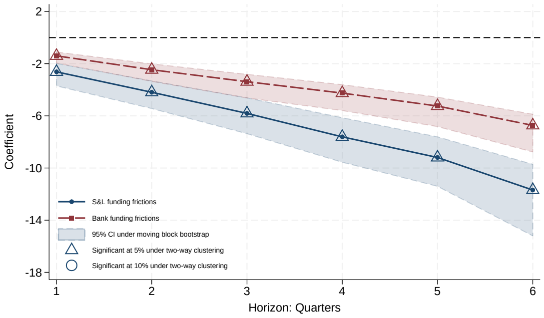
Panel A: 100% savings deposits (Baseline)

Panel B: 75% savings and 25% demand



Panel C: 50% savings and 50% demand

Panel D: 25% savings and 75% demand



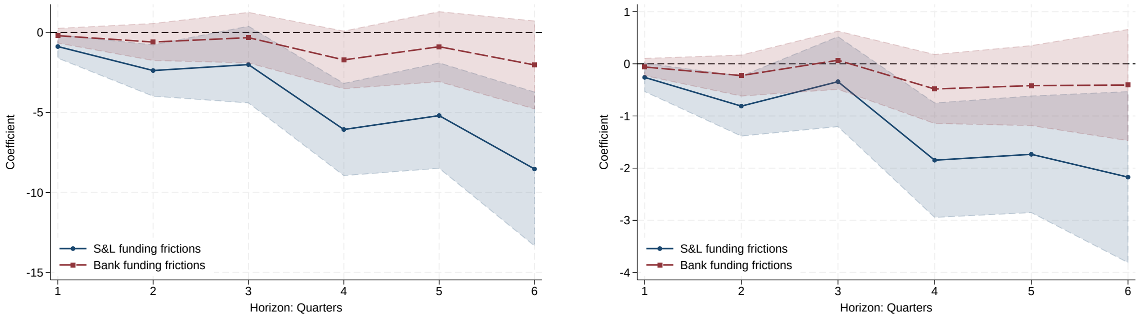
Panel E: 100% demand

Notes: Each panel reports coefficients from Equation 4 for mortgage growth rate under alternative treatments of demand deposits in the funding-friction measure. Panel A is the baseline, which treats demand deposits as 100% savings. Panels B–D progressively treat demand deposits as less binding by downweighting them in the savings bucket (75%/25%, 50%/50%, 25%/75%). Panel E treats demand deposits as fully exempt. Shaded areas show 95% confidence intervals from the moving-block bootstrap with block length $L = \max\{4, h\}$ and 2,000 repetitions. Markers indicate estimates that are statistically different from zero under two-way clustering by CBSA and time. See Section 3.1 for construction of funding frictions and Section 5.1 for controls.

Figure B6: Robustness: non-overlapping horizons at the local level

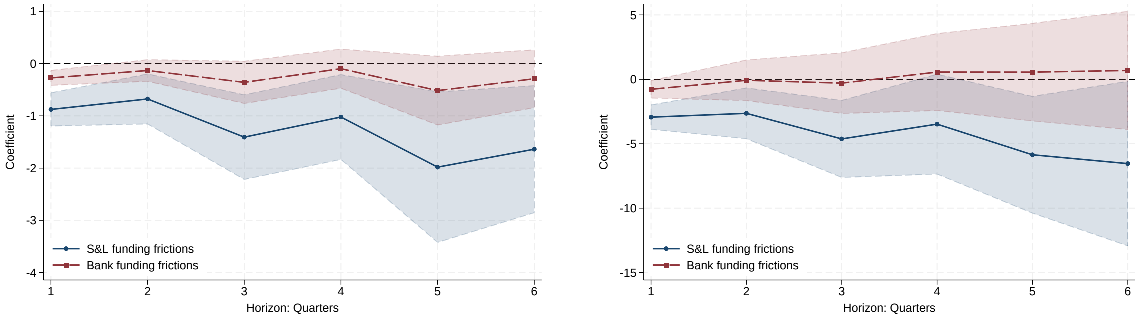
Panel A: House prices/income

Panel B: Real house price growth



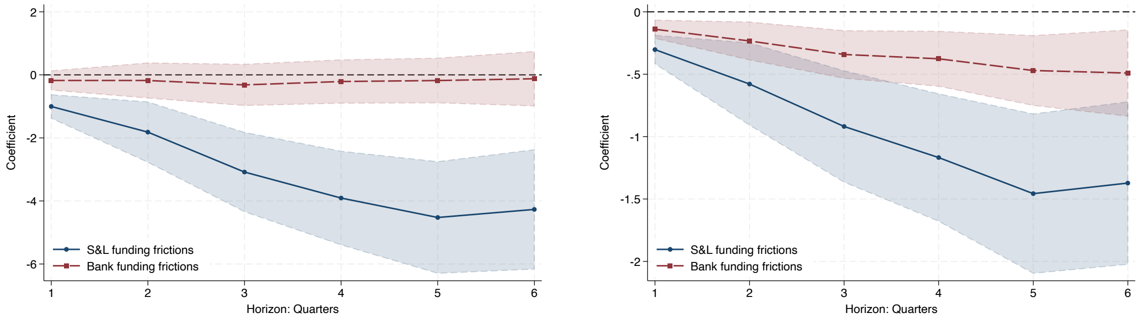
Panel C: Mortgages per capita/income

Panel D: Mortgage growth



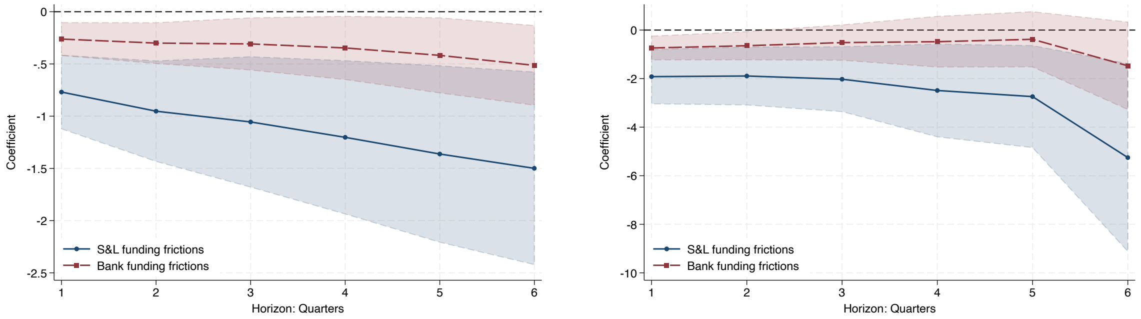
Notes: Panels A–D report coefficients from Equation 4 estimated on non-overlapping horizons that keep one start quarter per horizon block. Outcomes are house prices relative to income (Panel A), real house-price growth (Panel B), per-capita mortgage credit relative to income (Panel C), and mortgage credit growth (Panel D). Shaded areas show 95% confidence intervals from CBSA-clustered standard errors. See Section 5.1 for controls and specification.

Figure B7: Robustness: with lags of outcome variables at the local level



Panel A: House prices/income

Panel B: Real house price growth



Panel C: Mortgages per capita/income

Panel D: Mortgage growth

Notes: Panels A–D report coefficients from Equation 4 with additional four lags of the outcome variables in the controls, following Jordà (2005). Outcomes are house prices relative to income (Panel A), real house-price growth (Panel B), per-capita mortgage credit relative to income (Panel C), and mortgage credit growth (Panel D). Shaded areas show 95% confidence intervals from the moving-block bootstrap with block length $L = \max\{4, h\}$ and 2,000 repetitions. See Section 5.1 for controls and specification.

Table B1: Funding frictions and construction employment

	Construction employment growth		
	(1)	(2)	(3)
S&L funding frictions	-8.11^{*}	-6.31^{*}	-7.65^{*}
	(4.23)	(3.74)	(4.10)
Bank funding frictions	-4.15	-3.59	-4.16
	(2.58)	(2.26)	(2.54)
Log(Population)	9.03^{***}		5.92^{**}
	(2.23)		(2.50)
Log(Median income 1970)			
Log(Assets)		8.10^{***}	3.90^{*}
		(2.82)	(2.08)
Deposits/Assets		24.75	42.49
		(60.09)	(60.98)
Mortgage HHI		1.85	0.42
		(12.04)	(12.08)
Year FE	Yes	Yes	Yes
Observations	6,008	6,033	6,008
No. of CBSA	862	862	862
No. of year	8	8	8
R^2	0.01	0.01	0.01

Notes: This table reports regressions of one-year construction-employment growth on S&L and bank funding frictions. The dependent variable is the annual growth rate of CBSA construction employment from County Business Patterns. Funding frictions are constructed as in Section 3.1 and scaled by 1974 deposit reliance. All specifications include year fixed effects. Standard errors (in parentheses) are clustered by CBSA. Asterisks denote significance levels *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

C Full tables of horizon regression results

Table C1: Horizon-specific persistence regressions

	S&Ls			Banks		
	(H2)	(H4)	(H6)	(H2)	(H4)	(H6)
$\text{Bind}_{i,t}$	0.770***	0.688***	0.605***	0.776***	0.676***	0.564***
	(0.045)	(0.066)	(0.083)	(0.036)	(0.058)	(0.072)
Robustness for $\text{Bind}_{i,t}$						
Two-way clusters (t-stat)	9.049	7.322	5.148	9.960	8.168	5.427
Wild bootstrap (90% CI)	(0.62, 0.93)	(0.52, 0.87)	(0.39, 0.86)	(0.64, 0.92)	(0.53, 0.84)	(0.38, 0.80)
Institution controls	Yes	Yes	Yes	Yes	Yes	Yes
Market controls	Yes	Yes	Yes	Yes	Yes	Yes
State × Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Institution count	4,445	4,375	4,297	15,901	15,601	15,383
Observations	126,163	117,316	108,600	470,548	438,924	407,858
Adj-R^2	0.95	0.93	0.91	0.97	0.96	0.94

Notes: This table reports coefficient estimates from the horizon-specific persistence regression from Equation 3

$$\text{Bind}_{i,t+h} = \rho_h \,\text{Bind}_{i,t} + \boldsymbol{\phi}_h^\top \mathbf{X}_{i,t} + \delta_{s(i),t} + \varepsilon_{i,t+h},$$

estimated separately for S&Ls and banks. Columns (H2), (H4), and (H6) correspond to horizons of two, four, and six quarters. All specifications include state × time fixed effects $\delta_{s(i),t}$. Standard errors in parentheses are computed using the moving-block bootstrap with block length $L = \max\{4, h\}$ and 1,000 repetitions. For the coefficient on $\text{Bind}_{i,t}$, the table also reports t-statistics under two-way clustering by institution and time and 90% wild cluster bootstrap-t confidence intervals based on 5,000 repetitions. Figure 4 plots ρ_h across horizons. Asterisks denote significance levels *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table C2: Horizon-specific retail deposit regressions

	S&Ls			Banks		
	(H2)	(H4)	(H6)	(H2)	(H4)	(H6)
$\text{Bind}_{i,t}$	-2.819***	-4.774***	-6.641***	-2.742***	-3.617***	-4.224***
	(0.045)	(0.066)	(0.083)	(0.036)	(0.058)	(0.072)
Robustness for $\text{Bind}_{i,t}$						
Two-way clusters (t-stat)	-6.207	-5.856	-6.352	-9.328	-9.773	-12.004
Wild bootstrap (90% CI)	(-3.64, -2.07)	(-6.32, -3.42)	(-8.63, -4.79)	(-3.33, -2.25)	(-4.39, -2.99)	(-4.96, -3.61)
Institution controls	Yes	Yes	Yes	Yes	Yes	Yes
Market controls	Yes	Yes	Yes	Yes	Yes	Yes
State × Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Institution count	4,456	4,383	4,306	15,950	15,686	15,452
Observations	129,137	120,272	111,534	484,697	452,918	421,690
Adj-R^2	0.18	0.23	0.25	0.28	0.31	0.32

Notes: This table reports coefficients from the horizon-specific institution-level regression in Equation 2 with the dependent variable equal to the cumulative log growth of retail deposits (reported in percentage points). Columns (H2), (H4), and (H6) correspond to horizons of two, four, and six quarters. Specifications are estimated separately for S&Ls and banks and include state–time fixed effects $\delta_{s(i),t}$ and the control vector $\mathbf{X}_{i,t}$ (log assets, deposits-to-assets, mortgage HHI, log population, and log median income). Standard errors in parentheses are computed using the moving-block bootstrap with block length $L = \max\{4, h\}$ and 1,000 repetitions. For the coefficient on $\text{Bind}_{i,t}$, I also report two-way clustered t-statistics (institution and time) and 90% wild cluster bootstrap-t confidence intervals based on 5,000 repetitions. Figure 5 Panel A plots β_h across horizons. Asterisks denote significance levels *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table C3: Horizon-specific wholesale deposit regressions

	S&Ls			Banks		
	(H2)	(H4)	(H6)	(H2)	(H4)	(H6)
$\text{Bind}_{i,t}$	1.584***	2.752***	2.262***	7.983***	11.270***	14.842***
	(0.045)	(0.066)	(0.083)	(0.036)	(0.058)	(0.072)
Robustness for $\text{Bind}_{i,t}$						
Two-way clusters (t-stat)	2.329	2.584	1.359	8.641	8.752	8.376
Wild bootstrap (90% CI)	(0.39, 2.83)	(0.86, 4.58)	(-0.70, 5.19)	(6.40, 9.87)	(9.14, 13.84)	(11.93, 18.40)
Institution controls	Yes	Yes	Yes	Yes	Yes	Yes
Market controls	Yes	Yes	Yes	Yes	Yes	Yes
State × Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Institution count	3,984	3,840	3,727	15,637	15,301	15,019
Observations	87,672	79,294	71,704	423,351	392,651	362,989
Adj-R^2	0.06	0.08	0.09	0.06	0.08	0.10

Notes: This table reports coefficients from the horizon-specific institution-level regression in Equation 2 with the dependent variable equal to the cumulative log growth of wholesale deposits (reported in percentage points). Columns (H2), (H4), and (H6) correspond to horizons of two, four, and six quarters. Specifications are estimated separately for S&Ls and banks and include state–time fixed effects $\delta_{s(i),t}$ and the control vector $\mathbf{X}_{i,t}$ (log assets, deposits-to-assets, mortgage HHI, log population, and log median income). Standard errors in parentheses are computed using the moving-block bootstrap with block length $L = \max\{4, h\}$ and 1,000 repetitions. For the coefficient on $\text{Bind}_{i,t}$, I also report two-way clustered t-statistics (institution and time) and 90% wild cluster bootstrap-t confidence intervals based on 5,000 repetitions. Figure 5 Panel B plots β_h across horizons. Asterisks denote significance levels *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table C4: Horizon-specific total deposit regressions

	S&Ls			Banks		
	(H2)	(H4)	(H6)	(H2)	(H4)	(H6)
Bind$_{i,t}$	-3.076***	-5.288***	-7.592***	-1.407***	-1.840***	-2.075***
	(0.045)	(0.066)	(0.083)	(0.036)	(0.058)	(0.072)
Robustness for Bind$_{i,t}$						
Two-way clusters (t-stat)	-8.300	-7.515	-7.988	-9.349	-9.367	-8.211
Wild bootstrap (90% CI)	(-3.75, -2.45)	(-6.63, -4.09)	(-9.40, -5.92)	(-1.70, -1.17)	(-2.21, -1.52)	(-2.57, -1.65)
Institution controls	Yes	Yes	Yes	Yes	Yes	Yes
Market controls	Yes	Yes	Yes	Yes	Yes	Yes
State × Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Institution count	4,456	4,383	4,306	15,988	15,688	15,453
Observations	129,137	120,272	111,534	484,747	452,921	421,691
Adj-R^2	0.20	0.26	0.28	0.28	0.30	0.31

Notes: This table reports coefficients from the horizon-specific institution-level regression in Equation 2 with the dependent variable equal to the cumulative log growth of total deposits (reported in percentage points). Columns (H2), (H4), and (H6) correspond to horizons of two, four, and six quarters. Specifications are estimated separately for S&Ls and banks and include state–time fixed effects $\delta_{s(i),t}$ and the control vector $\mathbf{X}_{i,t}$ (log assets, deposits-to-assets, mortgage HHI, log population, and log median income). Standard errors in parentheses are computed using the moving-block bootstrap with block length $L = \max\{4, h\}$ and 1,000 repetitions. For the coefficient on Bind$_{i,t}$, I also report two-way clustered t-statistics (institution and time) and 90% wild cluster bootstrap-t confidence intervals based on 5,000 repetitions. Figure 5 Panel C plots β_h across horizons. Asterisks denote significance levels *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table C5: Horizon-specific total deposit and alternative funds regressions

	S&Ls			Banks		
	(H2)	(H4)	(H6)	(H2)	(H4)	(H6)
$\text{Bind}_{i,t}$	-3.277***	-5.699***	-8.206***	-1.473***	-1.927***	-2.163***
	(0.045)	(0.066)	(0.083)	(0.036)	(0.058)	(0.072)
Robustness for $\text{Bind}_{i,t}$						
Two-way clusters (t-stat)	-9.192	-8.363	-8.938	-9.513	-9.263	-7.558
Wild bootstrap (90% CI)	(-3.93, -2.67)	(-7.03, -4.54)	(-9.97, -6.59)	(-1.76, -1.22)	(-2.32, -1.58)	(-2.73, -1.68)
Institution controls	Yes	Yes	Yes	Yes	Yes	Yes
Market controls	Yes	Yes	Yes	Yes	Yes	Yes
State × Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Institution count	4,456	4,383	4,306	15,951	15,688	15,453
Observations	129,134	120,269	111,531	484,703	452,921	421,691
Adj-R^2	0.18	0.24	0.27	0.25	0.27	0.29

Notes: This table reports coefficients from the horizon-specific institution-level regression in Equation 2 with the dependent variable equal to the cumulative log growth of total deposits and non-deposit alternative funds (reported in percentage points). Columns (H2), (H4), and (H6) correspond to horizons of two, four, and six quarters. Specifications are estimated separately for S&Ls and banks and include state–time fixed effects $\delta_{s(i),t}$ and the control vector $\mathbf{X}_{i,t}$ (log assets, deposits-to-assets, mortgage HHI, log population, and log median income). Standard errors in parentheses are computed using the moving-block bootstrap with block length $L = \max\{4, h\}$ and 1,000 repetitions. For the coefficient on $\text{Bind}_{i,t}$, I also report two-way clustered t-statistics (institution and time) and 90% wild cluster bootstrap-t confidence intervals based on 5,000 repetitions. Figure 5 Panel D plots β_h across horizons. Asterisks denote significance levels *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table C6: Horizon-specific wholesale deposit share regressions

	S&Ls			Banks		
	(H2)	(H4)	(H6)	(H2)	(H4)	(H6)
$\text{Bind}_{i,t}$	-0.029	-0.089	-0.334**	0.934***	1.248***	1.595***
	(0.064)	(0.119)	(0.153)	(0.078)	(0.112)	(0.124)
Robustness for $\text{Bind}_{i,t}$						
Two-way clusters (t-stat)	-0.267	-0.500	-1.340	7.968	7.203	8.520
Wild bootstrap (90% CI)	(-0.21, 0.16)	(-0.39, 0.22)	(-0.80, 0.11)	(0.74, 1.17)	(0.95, 1.60)	(1.28, 1.96)
Institution controls	Yes	Yes	Yes	Yes	Yes	Yes
Market controls	Yes	Yes	Yes	Yes	Yes	Yes
State × Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Institution count	4,445	4,375	4,297	15,864	15,601	15,383
Observations	126,163	117,316	108,600	470,504	438,924	407,858
Adj-R^2	0.08	0.12	0.16	0.07	0.10	0.11

Notes: This table reports coefficients from the horizon-specific institution-level regression in Equation 2 with the dependent variable equal to the cumulative change in wholesale deposit share (reported in percentage points). Columns (H2), (H4), and (H6) correspond to horizons of two, four, and six quarters. Specifications are estimated separately for S&Ls and banks and include state–time fixed effects $\delta_{s(i),t}$ and the control vector $\mathbf{X}_{i,t}$ (log assets, deposits-to-assets, mortgage HHI, log population, and log median income). Standard errors in parentheses are computed using the moving-block bootstrap with block length $L = \max\{4, h\}$ and 1,000 repetitions. For the coefficient on $\text{Bind}_{i,t}$, I also report two-way clustered t-statistics (institution and time) and 90% wild cluster bootstrap-t confidence intervals based on 5,000 repetitions. Figure 6 Panel B plots β_h across horizons. Asterisks denote significance levels *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table C7: Horizon-specific lending response regressions

Panel A: Mortgage response at S&Ls and banks

	S&Ls			Banks		
	(H2)	(H4)	(H6)	(H2)	(H4)	(H6)
$\text{Bind}_{i,t}$	-3.856***	-6.922***	-9.591***	-2.358***	-3.420***	-4.139***
	(0.045)	(0.066)	(0.083)	(0.036)	(0.058)	(0.072)
Robustness for $\text{Bind}_{i,t}$						
Two-way clusters (t-stat)	-10.423	-9.259	-9.389	-7.718	-9.671	-10.171
Wild bootstrap (90% CI)	(-4.56, -3.24)	(-8.41, -5.62)	(-11.66, -7.79)	(-2.97, -1.83)	(-4.16, -2.81)	(-4.99, -3.43)
Institution controls	Yes	Yes	Yes	Yes	Yes	Yes
Market controls	Yes	Yes	Yes	Yes	Yes	Yes
State × Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Institution count	4,452	4,358	4,289	15,862	15,588	15,347
Observations	128,140	119,290	110,595	480,835	449,212	418,205
Adj-R^2	0.17	0.22	0.25	0.09	0.13	0.16

Panel B: Total lending response at banks

	Banks		
	(H2)	(H4)	(H6)
$\text{Bind}_{i,t}$	-1.167***	-1.549***	-1.783***
	(0.036)	(0.058)	(0.072)
Robustness for $\text{Bind}_{i,t}$			
Two-way clusters (t-stat)	-9.747	-10.605	-9.666
Wild bootstrap (90% CI)	(-1.39, -0.98)	(-1.83, -1.31)	(-2.14, -1.49)
Institution controls	Yes	Yes	Yes
Market controls	Yes	Yes	Yes
State × Time FE	Yes	Yes	Yes
Institution count	15,974	15,687	15,453
Observations	484,695	452,890	421,662
Adj-R^2	0.14	0.20	0.23

Notes: This table reports coefficients from the horizon-specific institution-level regression in Equation 2 with the dependent variable equal to the cumulative log growth of mortgage in Panel A and total loans in Panel B (reported in percentage points). Columns (H2), (H4), and (H6) correspond to horizons of two, four, and six quarters. Specifications are estimated separately for S&Ls and banks and include state–time fixed effects $\delta_{s(i),t}$ and the control vector $\mathbf{X}_{i,t}$ (log assets, deposits-to-assets, mortgage HHI, log population, and log median income). Standard errors in parentheses are computed using the moving-block bootstrap with block length $L = \max\{4, h\}$ and 1,000 repetitions. For the coefficient on $\text{Bind}_{i,t}$, I also report two-way clustered t-statistics (institution and time) and 90% wild cluster bootstrap-t confidence intervals based on 5,000 repetitions. Figure 7 plots β_h across horizons. Asterisks denote significance levels *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table C8: Local level housing response regressions

	House price		Mortgages	
	(Share)	(Growth)	(Share)	(Growth)
	(1)	(2)	(3)	(4)
S&L frictions	−4.117***	−1.077***	−1.743***	−4.744***
	(0.906)	(0.317)	(0.268)	(0.887)
Bank frictions	−0.311	−0.265*	−0.391***	−0.490
	(0.429)	(0.150)	(0.136)	(0.463)
Robustness for S&L frictions				
Two-way clusters (*t*-stat)	−2.489	−1.731	−2.772	−2.144
Wild bootstrap (90% CI)	(-7.17, -1.30)	(-2.22, -0.03)	(-2.95, -0.72)	(-8.92, -1.32)
Robustness for bank frictions				
Two-way clusters (*t*-stat)	−0.304	−0.840	−1.266	−0.311
Wild bootstrap (90% CI)	(-2.35, 1.69)	(-0.88, 0.29)	(-0.99, 0.12)	(-3.61, 2.02)
Institution controls	Yes	Yes	Yes	Yes
Market controls	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
CBSA count	279	362	762	762
Observations	9,099	11,494	20,176	20,176
Adj-R^2	0.38	0.43	0.10	0.16

Notes: This table reports the four-quarter coefficients from the local housing regressions in Equation 4 corresponding to Figure 9 and Figure 10. Columns (1)–(2) report house-price outcomes (price-to-income change and real house-price growth). Columns (3)–(4) report mortgage outcomes (per-capita mortgage credit relative to income and mortgage credit growth). "S&L frictions" and "Bank frictions" are the sector-specific funding-friction measures constructed as in Section 3.1 and scaled by 1974 deposit reliance. All specifications include the controls in Section 5.1 and time fixed effects. Standard errors in parentheses are computed using the moving-block bootstrap with block length $L = \max\{4, h\}$ and 2,000 repetitions. For the coefficient on S&L and bank funding frictions, I also report two-way clustered *t*-statistics (CBSA and time) and 90% wild cluster bootstrap-*t* confidence intervals based on 10,000 repetitions. Asterisks denote significance levels *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table C9: Local level housing response with substitutions

	House price		Mortgages	
	(Share)	(Growth)	(Share)	(Growth)
	(1)	(2)	(3)	(4)
S&L frictions	-3.946^{***}	-1.136^{***}	-1.814^{***}	-6.363^{***}
	(0.957)	(0.345)	(0.298)	(1.077)
Bank frictions	-0.533	-0.107	-0.454^{***}	-0.650
	(0.415)	(0.145)	(0.147)	(0.408)
S&L frictions × Rel. wholesale	-0.073	-0.010	0.080^{***}	1.406^{***}
	(0.236)	(0.068)	(0.028)	(0.258)
Bank frictions × Rel. wholesale	0.130^{**}	-0.076^{***}	0.015^{***}	-0.188^{***}
	(0.050)	(0.010)	(0.005)	(0.057)
Relative wholesale size	-0.659^{***}	-0.020	-0.136^{***}	-0.626^{***}
	(0.157)	(0.033)	(0.035)	(0.100)
Robustness for S&L frictions				
Two-way clusters (t-stat)	-2.260	-1.714	-2.735	-2.711
Wild bootstrap (90% CI)	(-7.18, -0.96)	(-2.35, -0.00)	(-3.08, -0.72)	(-10.77, -2.50)
Robustness for bank frictions				
Two-way clusters (t-stat)	-0.554	-0.328	-1.402	-0.394
Wild bootstrap (90% CI)	(-2.42, 1.31)	(-0.75, 0.46)	(-1.07, 0.08)	(-3.86, 2.08)
Robustness for S&L interaction				
Two-way clusters (t-stat)	-0.157	-0.077	1.049	2.452
Wild bootstrap (90% CI)	(-0.89, 0.73)	(-0.23, 0.21)	(-0.05, 0.21)	(0.51, 2.50)
Robustness for bank interaction				
Two-way clusters (t-stat)	0.822	-1.619	0.903	-1.100
Wild bootstrap (90% CI)	(-0.17, 0.41)	(-0.17, 0.01)	(-0.02, 0.04)	(-0.49, 0.07)
Institution controls	Yes	Yes	Yes	Yes
Market controls	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
CBSA count	279	362	762	762
Observations	9,099	11,494	20,176	20,176
Adj-R^2	0.38	0.43	0.10	0.16

Notes: This table reports the four-quarter coefficients from the local housing substitution regressions in Equation 5 corresponding to Figure 11 and Figure 12. Columns (1)–(2) report house-price outcomes (price-to-income change and real house-price growth). Columns (3)–(4) report mortgage outcomes (per-capita mortgage credit relative to income and mortgage credit growth). "S&L frictions" and "Bank frictions" are the sector-specific funding-friction measures constructed as in Section 3.1 and scaled by 1974 deposit reliance. All specifications include the controls in Section 5.1 and time fixed effects. Standard errors in parentheses are computed using the moving-block bootstrap with block length $L = \max\{4, h\}$ and 2,000 repetitions. For the coefficient on funding frictions and the interaction terms, I also report two-way clustered t-statistics (CBSA and time) and 90% wild cluster bootstrap-t confidence intervals based on 10,000 repetitions. Asterisks denote significance levels *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table C10: House prices and mortgages in areas with no S&Ls

	House price		Mortgages	
	(Share)	(Growth)	(Share)	(Growth)
	(1)	(2)	(3)	(4)
Bank frictions	2.399**	0.994***	-0.075***	-2.990***
	(0.975)	(0.269)	(0.012)	(0.638)
Robustness for bank frictions				
Two-way clusters (t-stat)	1.310	1.902	-2.250	-2.330
Wild bootstrap (90% CI)	(-1.77, 5.85)	(-0.01, 1.96)	(-0.13, -0.02)	(-5.44, -0.94)
Institution controls	Yes	Yes	Yes	Yes
Market controls	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
CBSA count	29	52	202	204
Observations	452	775	3,694	3,710
Adj-R^2	0.43	0.41	0.12	0.17

Notes: This table reports the four-quarter coefficients from the local housing regressions in areas without S&Ls corresponding to Figure 13. Columns (1)–(2) report house-price outcomes (price-to-income change and real house-price growth). Columns (3)–(4) report mortgage outcomes (per-capita mortgage credit relative to income and mortgage credit growth). "Bank frictions" are the sector-specific funding-friction measures constructed as in Section 3.1 and scaled by 1974 deposit reliance. Standard errors in parentheses are computed using the moving-block bootstrap with block length $L = \max\{4, h\}$ and 2,000 repetitions. For the coefficient on funding frictions and the interaction terms, I also report two-way clustered t-statistics (CBSA and time) and 90% wild cluster bootstrap-t confidence intervals based on 10,000 repetitions. Asterisks denote significance levels *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

D Full derivations and comparative statics for the model

D.1 Solution

Households The households' FOC is

$$\kappa \Lambda'(D) = \frac{b}{(1+r_m)P}, \quad \text{where } \Lambda(D) = (\alpha D^{\rho} + (1-\alpha)(1-D)^{\rho})^{1/\rho} \tag{13}$$

From the budget constraint, households' housing demand is

$$H = \frac{(1+r_f) + wL - bD}{(1+r_m)P} \tag{14}$$

Note that $\Lambda''(D) < 0$ with $\rho < 1$. From here, derive the comparative statics of household retail deposit D using the implicit function theorem:

$$\frac{\partial D}{\partial b} = \frac{1}{PT} \cdot \frac{1}{\kappa \Lambda''(D)} < 0, \quad \frac{\partial D}{\partial P} = \frac{b}{P^2 T} \cdot \frac{1}{\kappa |\Lambda''(D)|} > 0, \quad \frac{\partial D}{\partial r_m} = \frac{b}{PT^2} \cdot \frac{1}{\kappa |\Lambda''(D)|} > 0. \tag{15}$$

Construction firm The construction firm' FOC is

$$PA\zeta L^{\zeta-1} - w = 0$$

From here, solve for the construction firm's labor demand and housing supply

$$L^*(P) = \left(\frac{w}{PA\zeta}\right)^{\frac{1}{\zeta-1}} \in (0,1), \qquad H^s(P) = A\left[L^*(P)\right]^{\zeta} = A\left(\frac{w}{PA\zeta}\right)^{\frac{\zeta}{\zeta-1}}. \tag{16}$$

Intermediaries The deposit split between S&Ls and banks are constant and depends on historical reliance

$$D_j = \omega_j D, \qquad \omega_j = \frac{\phi_j^{-1}}{\phi_{\text{Bank}}^{-1} + \phi_{\text{S\&L}}^{-1}}, \quad j \in \{\text{S\&L, Bank}\}$$

Next, derive wholesale deposit from intermediary's profit maximization problem

$$W_j = \left(\tfrac{r_m - r_f}{\psi_j}\right)^{1/\theta}, \quad j \in \{\text{S\&L, Bank}\}$$

From here, derive the partial derivative of wholesale deposits

$$\frac{\partial W_j}{\partial r_m} = \frac{W_j}{\theta(r_m - r_f)} > 0, \quad \frac{\partial W_j}{\partial \psi_j} = -\frac{1}{\theta}\frac{W_j}{\psi_j} < 0. \tag{17}$$

Equilibrium conditions The mortgage market clearing implies

$$\begin{aligned} & D + W_{\text{S\&L}} + W_{\text{Bank}} = HP && (18) \\ \Longrightarrow & D + W_{\text{S\&L}} + W_{\text{Bank}} = \frac{(1+r_f) + wL - bD}{1+r_m} \end{aligned}$$

The housing market clearing implies

$$\begin{aligned} & H^s(P) = H && (19) \\ \Longrightarrow & A\left(\frac{w}{PA\zeta}\right)^{\frac{\zeta}{\zeta-1}} = \frac{(1+r_f) + wL - bD}{(1+r_m)P} \end{aligned}$$

These two equations determine (P, r_m) given exogenous $(b, \psi_{\text{Bank}}, \psi_{\text{S\&L}})$. Then $L = L^*(P)$, $H = H^s(P)$, $D = D(b, P, r_m)$, and (D_j, W_j, M_j) follow mechanically.

D.2 Comparative statics with respect to b

In this subsection, I derive the comparative statics with respect to the retail deposit ceiling spread $b = r_f - \bar{r}_D$.

(1) Deposit response $\partial D/\partial b$. From the household FOC

$$\kappa\Lambda'(D) = \frac{b}{(1+r_m)P}, \qquad \Lambda(D) = (\alpha D^\rho + (1-\alpha)(1-D)^\rho)^{1/\rho}, \ \rho < 1,$$

define

$$J(D; b, P, r_m) \equiv \kappa\Lambda'(D) - \frac{b}{(1+r_m)P} = 0.$$

Compute the partial derivatives:

$$J_D = \kappa\Lambda''(D) < 0, \qquad J_b = -\frac{1}{(1+r_m)P}, \qquad J_P = \frac{b}{(1+r_m)P^2}, \qquad J_{r_m} = \frac{b}{(1+r_m)^2 P}.$$

By the implicit function theorem,

$$\begin{aligned} \frac{\partial D}{\partial b} &= -\frac{J_b}{J_D} = \frac{1}{(1+r_m)P} \cdot \frac{1}{\kappa\Lambda''(D)} \ < \ 0, && (20) \\ \frac{\partial D}{\partial P} &= -\frac{J_P}{J_D} = \frac{b}{(1+r_m)P^2} \cdot \frac{1}{\kappa|\Lambda''(D)|} \ > \ 0, && (21) \\ \frac{\partial D}{\partial r_m} &= -\frac{J_{r_m}}{J_D} = \frac{b}{(1+r_m)^2 P} \cdot \frac{1}{\kappa|\Lambda''(D)|} \ > \ 0. && (22) \end{aligned}$$

(2) $\partial r_m/\partial b$ and $\partial P/\partial b$. Start from the equilibrium conditions (with $L = L(P)$ and $H = H^s(P)$):

$$D(b,P,r_m) + W_{\text{S\&L}}(r_m) + W_{\text{Bank}}(r_m) = \frac{(1+r_f) + wL(P) - b\,D(b,P,r_m)}{1+r_m}, \tag{MC}$$

$$(1+r_m)\,P\,H^s(P) = (1+r_f) + wL(P) - b\,D(b,P,r_m). \tag{HC}$$

Differentiate (MC) w.r.t. b. Writing the right-hand side as $R(b,P,r_m) = N/(1+r_m)$ with $N = (1+r_f) + wL(P) - bD$, we obtain

$$\frac{\partial D}{\partial b} + \left(\frac{\partial W_{\text{S\&L}}}{\partial r_m} + \frac{\partial W_{\text{Bank}}}{\partial r_m}\right)\frac{\partial r_m}{\partial b} = \frac{1}{1+r_m}\left(w\,\frac{dL}{dP}\frac{\partial P}{\partial b} - D - b\,\frac{\partial D}{\partial b}\right) - \frac{(1+r_f) + wL(P) - bD}{(1+r_m)^2}\,\frac{\partial r_m}{\partial b}. \tag{MC-b}$$

Differentiate (HC) w.r.t. b. Using the product rule on the left-hand side,

$$P\,H^s(P)\,\frac{\partial r_m}{\partial b} + (1+r_m)\Big(H^s(P) + P\,\frac{dH^s}{dP}\Big)\frac{\partial P}{\partial b} = w\,\frac{dL}{dP}\frac{\partial P}{\partial b} - D - b\,\frac{\partial D}{\partial b}. \tag{HC-b}$$

The solution satisfies

$$\frac{\partial r_m}{\partial b} > 0, \qquad \frac{\partial P}{\partial b} < 0. \tag{23}$$

(3) Mortgage response $\partial M/\partial b$. Using the funding identity $M = D + W_{\text{S\&L}} + W_{\text{Bank}}$,

$$\frac{\partial M}{\partial b} = \frac{\partial D}{\partial b} + \left(\frac{\partial W_{\text{S\&L}}}{\partial r_m} + \frac{\partial W_{\text{Bank}}}{\partial r_m}\right)\frac{\partial r_m}{\partial b}. \tag{24}$$

Given $\partial D/\partial b < 0$, $\partial r_m/\partial b > 0$, and $\partial W_j/\partial r_m > 0$ (derived below), the sign of $\partial M/\partial b$ is negative whenever wholesale substitution does not dominate the deposit decline.

(4) Wholesale response $\partial W_j/\partial b$. From $W_j = ((r_m - r_f)/\psi_j)^{1/\theta}$,

$$\frac{\partial W_j}{\partial r_m} = \frac{W_j}{\theta(r_m - r_f)} > 0 \quad \Longrightarrow \quad \frac{\partial W_j}{\partial b} = \frac{\partial W_j}{\partial r_m}\cdot\frac{\partial r_m}{\partial b} = \frac{W_j}{\theta(r_m - r_f)}\cdot\frac{\partial r_m}{\partial b} > 0. \tag{25}$$

(5) Housing response $\partial H/\partial b$. Market clearing implies $H = H^s(P)$ with

$$H^s(P) = A\left(\frac{w}{PA\zeta}\right)^{\frac{\zeta}{\zeta-1}}, \qquad \frac{dH^s}{dP} = -\frac{\zeta}{\zeta-1}\cdot\frac{H^s(P)}{P} > 0.$$

Therefore,

$$\frac{\partial H}{\partial b} = \frac{dH^s}{dP}\cdot\frac{\partial P}{\partial b} < 0. \tag{26}$$

D.3 Derivations for the empirical mappings

This appendix maps the model's derivatives obtained above to the empirical objects in §6.2. Throughout, use the signs established in Section D.2:

$$\frac{\partial r_m}{\partial b} > 0, \qquad \frac{\partial P}{\partial b} < 0, \qquad \frac{\partial H}{\partial b} < 0,$$

and the wholesale and deposit derivatives in (17) and (15).

A. Ceiling relief (vary b; technologies fixed). For $j \in \{\text{S\&L}, \text{Bank}\}$ define

$$\text{Bind}_j = b\,p_j, \qquad p_j = \frac{D_j}{M_j} = \frac{\omega_j D}{\omega_j D + W_j} \in (0,1), \qquad D_j = \omega_j D, \quad M_j = D_j + W_j.$$

Differentiating $\text{Bind}_{\text{S\&L}} = b\,p_{\text{S\&L}}$ with respect to b,

$$\frac{d\,\text{Bind}_{\text{S\&L}}}{db} = p_{\text{S\&L}} + b\,\frac{\partial p_{\text{S\&L}}}{\partial b}, \qquad \frac{\partial p_{\text{S\&L}}}{\partial b} = \frac{\omega_{\text{S\&L}}\big((\partial D/\partial b) W_{\text{S\&L}} - D\,\partial W_{\text{S\&L}}/\partial b\big)}{M_{\text{S\&L}}^2}, \qquad \frac{\partial W_{\text{S\&L}}}{\partial b} = \frac{\partial W_{\text{S\&L}}}{\partial r_m}\frac{\partial r_m}{\partial b}. \tag{27}$$

Because $\partial D/\partial b < 0$, $\partial r_m/\partial b > 0$, and $\partial W_{\text{S\&L}}/\partial r_m > 0$, one has $\partial p_{\text{S\&L}}/\partial b < 0$ and $p_{\text{S\&L}} + b\,\partial p_{\text{S\&L}}/\partial b > 0$. By the chain rule,

$$\frac{\partial P}{\partial\,\text{Bind}_{\text{S\&L}}} = \frac{\frac{\partial P}{\partial b}}{\frac{d\,\text{Bind}_{\text{S\&L}}}{db}} < 0, \qquad \frac{\partial H}{\partial\,\text{Bind}_{\text{S\&L}}} = \frac{\frac{\partial H}{\partial b}}{\frac{d\,\text{Bind}_{\text{S\&L}}}{db}} < 0, \tag{28}$$

which matches the first empirical statement.

At the institution level (still varying b), use $D_j = \omega_j D$ and $\partial W_j/\partial b = (\partial W_j/\partial r_m)(\partial r_m/\partial b) > 0$ to obtain

$$\frac{\partial W_j}{\partial\,\text{Bind}_j} = \frac{\left(\frac{\partial W_j}{\partial r_m}\right)\left(\frac{\partial r_m}{\partial b}\right)}{p_j + b\,\frac{\partial p_j}{\partial b}} > 0, \tag{29}$$

$$\frac{\partial D_j}{\partial\,\text{Bind}_j} = \frac{\omega_j\,\frac{\partial D}{\partial b}}{p_j + b\,\frac{\partial p_j}{\partial b}} < 0, \tag{30}$$

$$\frac{\partial M_j}{\partial\,\text{Bind}_j} = \frac{\omega_j\,\frac{\partial D}{\partial b} + \left(\frac{\partial W_j}{\partial r_m}\right)\left(\frac{\partial r_m}{\partial b}\right)}{p_j + b\,\frac{\partial p_j}{\partial b}}. \tag{31}$$

With $\psi_{\text{S\&L}} \gg \psi_{\text{Bank}}$ (so $\partial W_{\text{Bank}}/\partial r_m \gg \partial W_{\text{S\&L}}/\partial r_m$) and moderate curvature, this implies the magnitude ordering:

$$\left|\frac{\partial W_{\text{Bank}}}{\partial\,\text{Bind}_{\text{Bank}}}\right| > \left|\frac{\partial W_{\text{S\&L}}}{\partial\,\text{Bind}_{\text{S\&L}}}\right|, \qquad \left|\frac{\partial D_{\text{Bank}}}{\partial\,\text{Bind}_{\text{Bank}}}\right| < \left|\frac{\partial D_{\text{S\&L}}}{\partial\,\text{Bind}_{\text{S\&L}}}\right|, \qquad \left|\frac{\partial M_{\text{Bank}}}{\partial\,\text{Bind}_{\text{Bank}}}\right| < \left|\frac{\partial M_{\text{S\&L}}}{\partial\,\text{Bind}_{\text{S\&L}}}\right|.$$

B. Increased funding flexibility (vary $\psi_{\text{S\&L}}$; hold b fixed). Holding b fixed, differentiate (17)–(14) and the two equilibrium conditions with respect to $\psi_{\text{S\&L}}$. Since only $W_{\text{S\&L}}$ depends directly on $\psi_{\text{S\&L}}$,

$$\frac{\partial W_{\text{S\&L}}}{\partial \psi_{\text{S\&L}}} = -\frac{1}{\theta}\frac{W_{\text{S\&L}}}{\psi_{\text{S\&L}}} < 0, \qquad \frac{\partial r_m}{\partial \psi_{\text{S\&L}}} > 0, \qquad \frac{\partial P}{\partial \psi_{\text{S\&L}}} < 0,$$

where the signs for r_m and P follow from solving the same 2×2 system as in (MC-b)–(HC-b) with the appropriate right-hand side. Write

$$\text{Bind}_{\text{S\&L}} = b\, p_{\text{S\&L}}(b), \qquad \frac{d\,\text{Bind}_{\text{S\&L}}}{db} = p_{\text{S\&L}} + b\,\frac{\partial p_{\text{S\&L}}}{\partial b} > 0,$$

so that

$$\frac{dP}{d\,\text{Bind}_{\text{S\&L}}} = \frac{\frac{\partial P}{\partial b}}{\frac{d\,\text{Bind}_{\text{S\&L}}}{db}}.$$

Applying the quotient rule with respect to $\psi_{\text{S\&L}}$ (and b fixed),

$$\frac{\partial}{\partial \psi_{\text{S\&L}}}\left(\frac{dP}{d\,\text{Bind}_{\text{S\&L}}}\right) = \frac{\frac{\partial}{\partial \psi_{\text{S\&L}}}\left(\frac{\partial P}{\partial b}\right)}{\frac{d\,\text{Bind}_{\text{S\&L}}}{db}} - \frac{\frac{\partial P}{\partial b}}{\left(\frac{d\,\text{Bind}_{\text{S\&L}}}{db}\right)^2} \cdot \frac{\partial}{\partial \psi_{\text{S\&L}}}\left(\frac{d\,\text{Bind}_{\text{S\&L}}}{db}\right).$$

When $\psi_{\text{S\&L}}$ rises (harder wholesale), $\partial(\partial P/\partial b)/\partial \psi_{\text{S\&L}} < 0$ (the price response to b becomes more negative) and $\partial\big(d\,\text{Bind}_{\text{S\&L}}/db\big)/\partial \psi_{\text{S\&L}} > 0$ (reliance on deposits increases). Because $\partial P/\partial b < 0$ and $d\,\text{Bind}_{\text{S\&L}}/db > 0$, both terms are negative:

$$\frac{\partial}{\partial \psi_{\text{S\&L}}}\left(\frac{dP}{d\,\text{Bind}_{\text{S\&L}}}\right) < 0.$$

Since $H = H^s(P)$ with $dH^s/dP > 0$,

$$\frac{dH}{d\,\text{Bind}_{\text{S\&L}}} = \frac{dH^s}{dP}\,\frac{dP}{d\,\text{Bind}_{\text{S\&L}}}, \qquad \Rightarrow \qquad \frac{\partial}{\partial \psi_{\text{S\&L}}}\left(\frac{dH}{d\,\text{Bind}_{\text{S\&L}}}\right) < 0.$$