# The Making of a National Mortgage Market and Its Effects on American Cities*

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November 2024

PRELIMINARY

**Abstract**

How does mortgage affordability shape city growth and fertility choices? We study the revolutions in mortgage financing that took place in the U.S. between 1933 and 1940, which created a national mortgage market facilitating mortgage capital to move from the financial centers to the rest of the country. By digitizing city-level census data and a new sample of loan-level data, we show that differences in mortgage rates across cities went from nearly 300 basis points to just over 100 in only six years. This national mortgage market allowed initially capital-scarce places to grow more than capital-abundant ones. In the decades following the housing policies, cities that had higher mortgage rates before the shock saw higher growth in rates of homeownership, population, housing construction, and house prices. Young households in these cities witnessed higher birth rates even before the post-World War II baby boom.

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## Introduction

How does mortgage affordability affect cities and households? Today, mortgages in the U.S. are among the most affordable in the world: on average, they are amortizing thirty-year contracts with fixed interest rates (Campbell, 2013), invariant across cities (Hurst et al., 2016), and with high loan-to-value (LTV) ratios. Up until the 1930s, however, the typical mortgage was a five-year balloon contract with low LTVs. Moreover, there was a significant gap in mortgage rates between the capital-rich Northeastern financial centers and the capital-poor Southern and Western cities. In 1920, interest rates in Boston, Buffalo, and New York, for instance, were all below 5.8 percent, while they were all above 7.8 percent in Dallas, San Antonio, and Tampa.

In this paper we digitize new mortgage- and city-level data to show that the regional differences in mortgage rates (henceforth, "regional mortgage spreads") eroded in the span of just six years. Differences between low- and high-rate cities went from 300 basis points in 1920 and 1934, to just over 100 basis points in 1940. We show that the Federal housing policies of 1932-38 were the major catalyst of this narrowing, and then rely on this shock to study the real effects of increased mortgage affordability. We exploit the fact that cities like Boston, where mortgage rates were low even before 1933, experienced a 40 bps drop in average interest rates; while initially high-rate cities like Dallas instead saw a decline five times greater. Conditional on a host of controls, high- and low-rate cities were on parallel trends before the intervention, but their paths diverge after 1934. We find higher growth in population, construction, house prices and fertility in initially high-mortgage rate cities, which also experienced a greater mortgage affordability shock. We discuss mechanisms and timing that suggest the unique role of mortgages in driving these trends.

Our results are based on two data series we create from newly-digitized data that trace mortgage conditions between 1920 and 1950. The first is a long-run city-level panel of mortgage interest rates across 237 American cities in 1920 and 1940, which allows us to study mortgage conditions for a large set of cities. For subsets of these cities, we also observe interest rates in 1934 or 1950 from additional newly-digitized sources. The second is a sample collected by the NBER in 1946 of 14,854 individual mortgage loans underwritten between 1920 and 1943 (see Morton, 1956 for additional information). This sample allows us to construct yearly series on mortgage conditions at the regional level.

Our first set of results describes the developments in mortgage markets and highlights the role of the 1932–38 Federal housing policies in reducing cross-city differences in mortgage lending. A crucial element of these policies was the provision of liquidity to local mortgage lenders at the same price everywhere through the introduction of the Federal Home Loan Bank Board (FHLB), which extended everywhere advances to local Building & Loans associations (B&Ls), against local mortgages pledged as collateral.[1] In addition, the policies introduced government insurance and a secondary market for mortgages through the creation of Fannie Mae (FNMA). Mortgages could now be insured and sold on secondary markets, facilitating investment by national lenders, such as Life Insurance Corporations, in places far from their headquarters.

We show that, before the Federal interventions, differences in mortgage rates across cities (henceforth, "regional mortgage spreads") reflected relative imbalances in the supply and demand of capital from households. We follow Auclert et al. (2021) and create the "net asset position" of each city based on the local age distribution and the asset position of each age group. This measure relies on the idea that younger households are net debtors towards the banking system (i.e. have negative net asset positions), as they hold a higher fraction of all housing debt and a smaller fraction of all liquid assets. Older households, on the other hand, act as net lenders. Hence, a city with a higher fraction of net debtors relative to net lenders has a lower net asset position (is more capital-constrained) and needs to pull liquidity from national markets. We report that cities that were more capital-constrained had higher mortgage interest rates in 1920, consistent with a setting where lenders' access to national markets is frictional and increasingly expensive (Becker, 2007; D'Amico and Alekseev, 2024). By 1940, after mortgage rates had rapidly converged, a city's local net asset position was uncorrelated with its mortgage interest rate, consistent with the fact that local imbalances in demand and supply of capital do not matter in determining local prices once regional markets are integrated.

These developments were very rapid and concentrated around the timing of the Federal policies. We use our individual mortgage data to show that regional mortgage spreads were relatively constant before 1934 and then narrow by 1939. These data also allow us to distinguish across different types of lenders, and we show that convergence in mortgage spreads was driven by convergence in rates charged by local lenders (B&Ls and commercial banks), not in rates charged by

[1] Building & Loans came to be known as Savings & Loans later on during the period we study. We keep referring to them as B&Ls for clarity.

life insurance corporations (LICs), which already held national loan portfolio before 1934.[2] By digitizing a special report with data for 37 cities in 1934, we also show that most of the cross-sectional convergence in these cities occurred in 1934–40 rather than in 1920–34.

Finally, the convergence was unique to mortgage markets, asserting the important role of the Federal housing policies. We use data on commercial bank lending rates from Bodenhorn (1995), available only at the state-level, and compare the convergence across states in mortgage rates and in commercial lending rates. States with high mortgage rates also had high commercial lending rates, and between 1920 and 1934, the narrowing of mortgage and commercial rates occurred at a similar pace. However, by 1940 mortgage markets displayed essentially no regional segmentation, while commercial lending markets retained substantial regional differences.

We then turn to the real effects of these revolutions in mortgage finance. We exploit the heterogeneous effects of the Federal housing policies to study the effects of mortgage affordability on economic outcomes at the city level. We rely on a differences-in-differences strategy where we compare the outcomes of cities that experienced greater shocks to mortgage affordability to the outcomes of cities that experienced smaller shocks, before and after the policy change, estimating a dynamic regression model in the style of Hornbeck (2012). We proxy for the extent of the affordability shock in each city with the city's initial mortgage interest rate, since a city that had a 100 bps higher mortgage interest rate in 1920 would see it decrease by 78 bps by 1940.[3] In all models, we control for city-level demographic and economic characteristics that could be correlated with initial mortgage lending conditions.

Further, we leverage the fact that the impressive degree of convergence was unique to mortgage markets, and we add initial commercial lending rates as a control. Since both initial commercial lending rates and initial mortgage rates proxy for capital scarcity, controlling for commercial lending rates helps us capture some of the omitted variable bias from initial economic conditions—such as unobserved differences in levels of economic development—that are likely to be correlated with both initial capital scarcity and higher subsequent growth. We find that, conditional on controls, cities with initially high mortgage rates did not experience differential pre-trends in home-

[2]Although LICs were lending across markets, the size of their lending was clearly not large enough to erode differences in lending rates across cities (Grebler et al., 1956).

[3]For ease of exposition, rather than using the mortgage rate in 1920, we use the predicted interest rate in 1934 for all 237 cities, predicted using the coefficient from a bivariate regression of the interest rate in 1934 on the interest rate in 1920 for our sample of 37 cities with data from 1934. Results are very similar if we directly use the 1920 interest rate.

ownership or population growth prior to the policy. Our results satisfy the parallel trends conditions even in models where we control just for census region fixed effects and the commercial lending rate.

Our results suggest that more affordable mortgage conditions facilitate city growth. In cities with 100 bps higher initial mortgage interest rates, homeownership rates grew by 2.2 percentage points more between 1930 and 1940 and by 1.6 p.p. between 1930 and 1950. Population grew by approximately 5.1 p.p. more between 1930 and 1950, almost all concentrated in 1940–50. Decline in mortgage rates are also associated with increased building. As of 1960, a city with 100 bps higher mortgage interest rates had a 4.9 p.p. higher fraction of its buildings built in the period of 1940-1949 relative to any other period. Delving into the mechanisms, we find no differential growth in wages in either decade for cities with initially higher mortgage rates, and we find increases in housing prices between 1930 and 1950. The increase in house prices is also driven by the 1940–50 period, the decade when we find significant population growth.

Finally, we find that cities where mortgages became more affordable also saw substantially higher fertility. In a city with a 100 bps higher interest rate in 1934 birth rates were up 6 percent in 1940, relative to 1934. By 1948, fertility was higher by 14 percent. Notably this shift occurs even before the U.S. joined World War II suggesting that this result does not proxy for the baby boom often attributed to the post-war period.

In future analysis, we will turn to tract-level data for the largest cities and examine whether the overall city-level effects were concentrated in central city tracts, or equally throughout the MSA.

**Previous Literature.** This paper relates to several strands of the literature. In economic history, a large literature has studied differentials in the cost of borrowing across space, mostly focusing on the "National Banking Era" (1863-1913).[4] We study differentials in an understudied period and trace out at a fine time-granularity the impact of the Federal policies of the 1930s,[5] investigating

[4]This literature highlighted how regional differentials evolved in response to changes in market power and state-level regulation (Sylla, 1969; James, 1976a,b), risk (Rockoff, 1977; Bodenhorn, 1992, 1995; Gendreau, 1999), as well as to the development of national capital markets (Davis, 1965; Sylla, 1972; Smiley, 1975; James, 1978; Smiley, 1981; Sushka and Barrett, 1984; Smiley, 1985; Sushka and Barrett, 1985; Redenius, 2006) and the level of aggregate rates (D'Amico and Alekseev, 2024). A subset of this literature has focused especially on mortgages (Schaaf, 1966; Ostas, 1977; Snowden, 1987; Snowden, 1995).

[5]In this we relate to the literature that studied the Great Depression (Bernanke, 1983; Boustan et al., 2010; Carlson and Rose, 2015; Fishback, 2017; Fishback and Kachanovskaya, 2015; Fishback et al., 2022a; Fishback et al., 2007, 2005, 2006, 2003; Neumann et al., 2010; Rose, 2010, 2014; Rose and Snowden, 2013; Stuckler et al., 2012; White et al., 2014) and especially the mortgage policies of that era (Rose, 2011; Chambers et al., 2014; Fishback et al., 2019).

the mechanisms through which these policies affected all mortgage terms, in addition to rates.[6] Several papers within this strand highlighted the relationship of financial integration with growth at the state or regional level.[7] Here we study this relationship at a more geographically disaggregated level and make progress towards an identification that exploits differences across space in mortgage vs. commercial rates differentials.

Our results also speak to the strand of the literature that highlights the importance of mortgage markets for the US economy, and especially to recent work that, within this theme, highlights how government involvement in the housing market affects regional spreads in mortgage interest rates (Hurst et al., 2016).[8]

Our future analysis, estimating effects separately for the urban and suburban areas within cities, will further shed light on how easier credit conditions affected city structure and suburbanization (Jackson, 1987), in addition to city size and broad development. By asking whether the housing policies facilitated white flight to the suburbs and contributed to racial segregation in urban areas, it will also allow us to relate to the literature and accounts highlighting the racially unequally effects of the housing policies in the post-Depression era (Weaver, 1948; Abrams, 1955; Gelfand, 1975; Fishback et al., 2022a; Fishback et al., 2023).

[6] A book chapter by Chambers et al. (2014) (in White et al., 2014) is close to our paper. They ask if the Federal policies have caused the housing boom in the post-WW2 period, focusing also on the "G.I. bill" and the associated mortgages to WW2 veterans. They show (albeit at the U.S. level) that mortgage durations and LTVs increased in this period and embed this in a macro calibration model that asks how much this increase can explain the housing boom. Our paper also picks up on a large review on capital formation in residential real estate (Grebler et al., 1956), which suggests that regions with greatest rates of population growth in the 1940s and 1950s, the South Atlantic, Pacific and West South Central regions, also experienced the highest rate of construction growth. We work on the hypotheses developed in these works at a more granular level, both in terms of time-frequency and geographic coverage. The annual frequency and richness of the NBER mortgage cards allows us to describe mortgage trends over time and across institutions, focusing on the mechanisms through which the Federal policies revolutionized mortgage markets. The geographic coverage allows us to test the effects of these policies in the cross-section and characterize development across the largest American cities, also allowing us to investigate mechanisms, confounders, and the effect of mortgage policies on the distribution of economic activity in the US.

[7] See, for instance, Williamson (1974), Sylla (1975), Snowden (1988), and D'Amico and Alekseev (2024). Bodenhorn (2018) offers a rich survey of papers that studied the nexus between finance and growth in the U.S.

[8] Several papers studied the effects of easier credit conditions on US home prices, quantities, and real outcomes. See, for instance, Lustig and Van Nieuwerburgh (2005), Piazzesi et al. (2007), Mayer et al. (2009), Adelino et al. (2012), Agarwal et al. (2012), Mian et al. (2013), Scharfstein and Sunderam (2013), Favara and Imbs (2015), Mian et al. (2015), and Di Maggio et al. (2017).

# I Data

## I.A City-Level Series

We assemble several data sources. The backbone of this analysis is a city-level panel of mortgage interest rates for 237 of the largest cities in the U.S. in 1920 and 1940, assembled using newly-digitized Table 38 of the 1920 Census special report on non-farm mortgages (U.S. Census Bureau, 1923), and Table 8 of the 1940 Housing Census (U.S. Census Bureau, 1943). The 1920 special report collected information through questionnaires to the owners of mortgaged homes and provides city-level averages on the value of mortgaged homes, amount of mortgage debt and rate of interest for cities with more than 25,000 people in 1920. The 1940 Housing Census obtained information on home financing as part of the census of owner-occupied nonfarm dwelling units in structures without business and containing no more than 4 dwelling units.[9] Figure 1 shows a map of the 237 cities in our main sample.

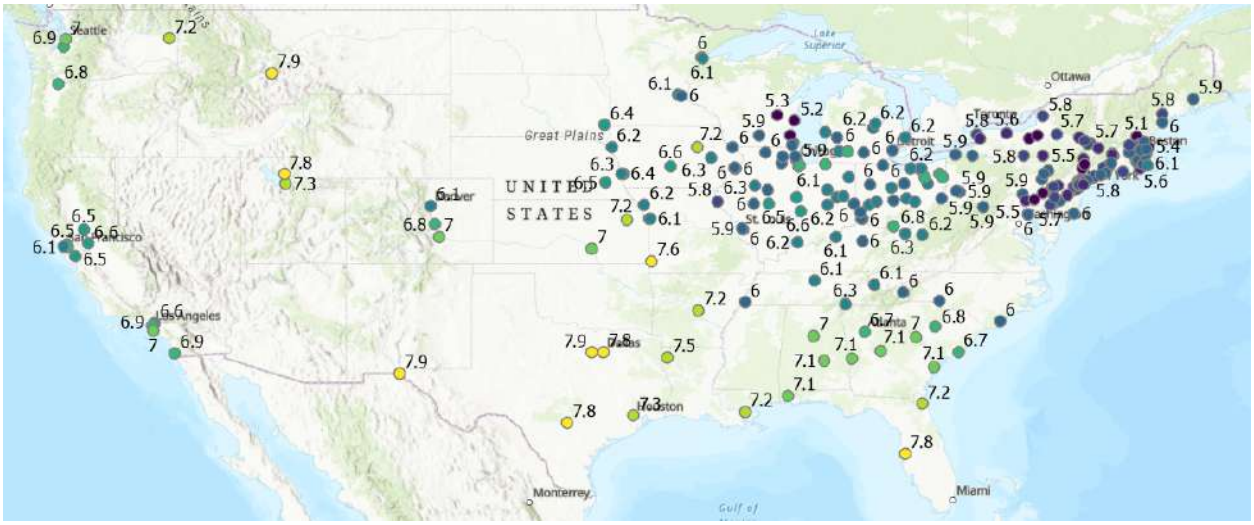
For a subset of 37 cities (out of the 237), we supplement this two-period panel with an additional time stamp of mortgage conditions in 1934 using the Financial Survey of Urban Housing (Wickens, 1935). The survey obtained reports (through interviews and over mail) from owner-occupants on value, amount of indebtedness, source of loan, and interest rate from 5 to 30 percent samples of the families in each city. This dataset provides a snapshot of mortgage conditions on the eve of the roll-out of the biggest housing policies; hence, for these thirty-seven cities we have data in the immediate pre- and post-periods of the housing policies.[10] Finally, for a different and smaller subset of 26 cities (out of 237), we digitize data on interest rates from the 1950 Census of Housing (U.S. Census Bureau, 1952).

We rely on many additional data sources to supplement our analysis of these cities. From the City and County Data Books (Haines and Inter-university Consortium for Political and Social

[9] We note that mortgage data for 1920 were obtained for all owner-occupied nonfarm homes, whereas the 1940 data are restricted to those in 1- to 4-family dwelling structures without business. We expect that the 1940 figures are a slight understatement of the actual number of mortgaged homes, but as argued in census documents, "the difference is not large enough to invalidate comparisons of the figures with those obtained in earlier censues." (U.S. Census Bureau, 1943). We also note that whereas the 1920 report aggregated data at the city-level, the 1940 report is at the county-level. For cities contained within a single county (98 percent), we assume that the county-wide average interest rate was the average at the city-level. For cities contained within multiple counties (2 percent), we take the average of the county-wide interest rates as the average at the city-level.

[10] The actual samples contain 287 for 1920, and 52 for 1934, but we limit our panel to cities that appear in all years and for which we have non-missing demographic and economic variables.

Figure 1: Map of Cities in Main Analysis Sample




*Notes.* This figure maps the location of the 237 cities that form our main analysis sample. Lighter-colored dots denote places with higher initial interest rates in 1920, while darker-colored dots denote places with lower initial interest rates in 1920. Labels report the mortgage interest rate in 1920.

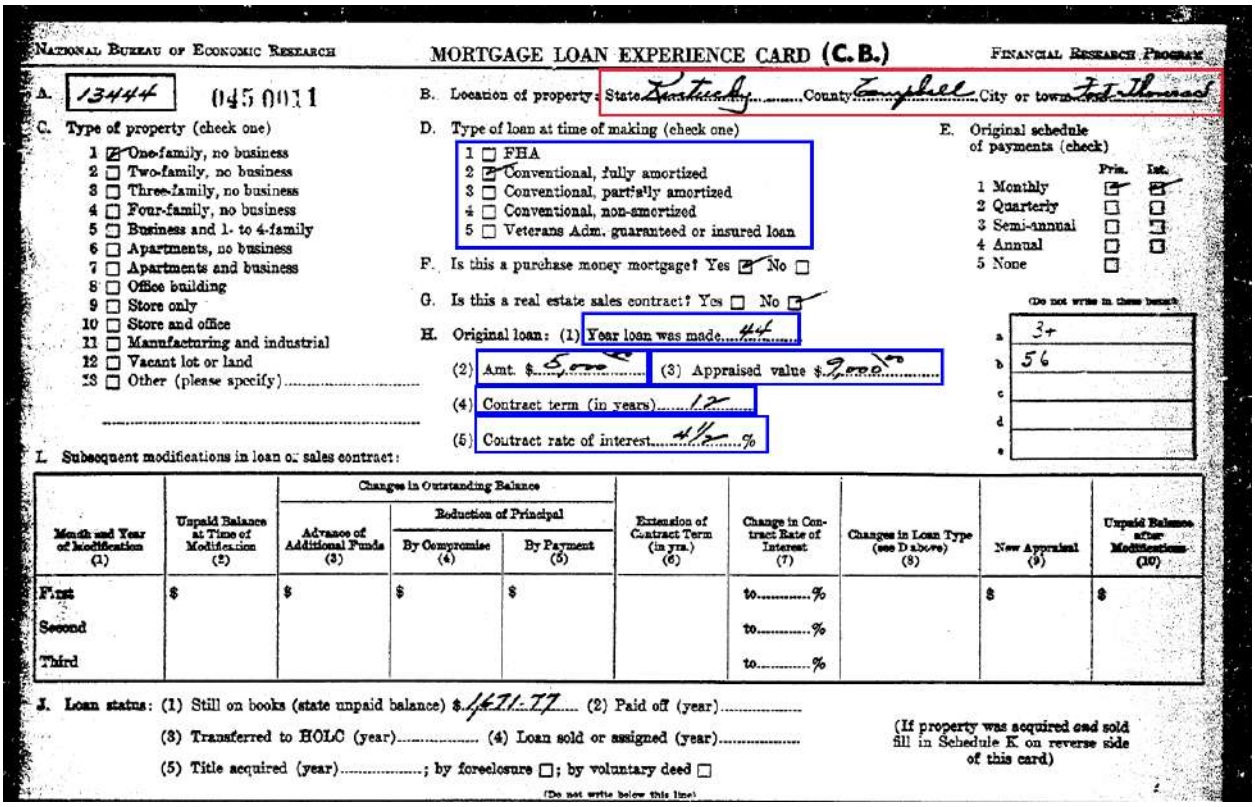
Research, 2010), we collect socio-economic and demographic characteristics, such as total population, fraction of city residents who are white, U.S.-born, or male; the average manufacturing wage and number of manufacturing establishments. Key economic controls are the amount of New Deal relief spending at the city level, retail sales per capita in 1929 and growth in retail sales per capita between 1929 and 1933 (Fishback et al., 2003), and the amount of World War II military spending in each city (Brunet, 2024). We also rely on the the average commercial lending rate at the state level over time measured as the the total amount of interest and charges on all loans made by commercial banks divided by the total amounts of loans (Bodenhorn, 1995). To measure new construction activity in cities over time we rely on city-level data for around 100 cities on the age structure of buildings from the 1960 Census (U.S. Census Bureau, 1963).

## I.B Individual Mortgage Loans

A key limitation of our city-level series is that, while spanning the entire U.S. at a granular level, the data are over long horizons, and the only mortgage characteristics available are the mortgage interest rates and LTV ratios. To supplement our analysis we digitize 14,854 individual mortgage loans made between 1920 and 1943 sampled in a survey conducted by the National Bureau of

Economic Research in 1946.[11] The survey was made in response to the paucity of disaggregated data on nonfarm mortgage investment (Morton, 1956). Its primary purpose was to obtain a random sample of individual mortgages to study the characteristics of the nonfarm mortgage loans made by major institutional lenders and to describe the lenders' experience with such mortgages since 1920.

Figure 2: Example NBER Loan Card


NATIONAL BUREAU OF ECONOMIC RESEARCH — MORTGAGE LOAN EXPERIENCE CARD (C. B.) — FINANCIAL RESEARCH PROGRAM

A. 13444 045 0031

B. Location of property: State Kentucky County Campbell City or town Fort Thomas

C. Type of property (check one)
1 ☑ One-family, no business
2 ☐ Two-family, no business
3 ☐ Three-family, no business
4 ☐ Four-family, no business
5 ☐ Business and 1- to 4-family
6 ☐ Apartments, no business
7 ☐ Apartments and business
8 ☐ Office building
9 ☐ Store only
10 ☐ Store and office
11 ☐ Manufacturing and industrial
12 ☐ Vacant lot or land
13 ☐ Other (please specify)

D. Type of loan at time of making (check one)
1 ☐ FHA
2 ☑ Conventional, fully amortized
3 ☐ Conventional, partially amortized
4 ☐ Conventional, non-amortized
5 ☐ Veterans Adm. guaranteed or insured loan

E. Original schedule of payments (check)

| | Prin. | Int. |
|---|---|---|
| 1 Monthly | ☑ | ☑ |
| 2 Quarterly | ☐ | ☐ |
| 3 Semi-annual | ☐ | ☐ |
| 4 Annual | ☐ | ☐ |
| 5 None | ☐ | |

F. Is this a purchase money mortgage? Yes ☑ No ☐

G. Is this a real estate sales contract? Yes ☐ No ☑

H. Original loan: (1) Year loan was made 44
(2) Amt. $ 5000 (3) Appraised value $ 9000
(4) Contract term (in years) 12
(5) Contract rate of interest 4½ %

(Do not write in these boxes)
a 34
b 56
c
d
e

I. Subsequent modifications in loan or sales contract:

| Month and Year of Modification (1) | Unpaid Balance at Time of Modification (2) | Changes in Outstanding Balance: Advance of Additional Funds (3) | Reduction of Principal: By Compromise (4) | Reduction of Principal: By Payment (5) | Extension of Contract Term (in yrs.) (6) | Change in Contract Rate of Interest (7) | Changes in Loan Type (see D above) (8) | New Appraisal (9) | Unpaid Balance after Modifications (10) |
|---|---|---|---|---|---|---|---|---|---|
| First | $ | $ | $ | $ | | to ....% | | $ | $ |
| Second | | | | | | to ....% | | | |
| Third | | | | | | to ....% | | | |

J. Loan status: (1) Still on books (state unpaid balance) $ 1471.77 (2) Paid off (year) ....
(3) Transferred to HOLC (year) .... (4) Loan sold or assigned (year) ....
(5) Title acquired (year) ....; by foreclosure ☐; by voluntary deed ☐

(If property was acquired and sold fill in Schedule K on reverse side of this card)

(Do not write below this line)

*Notes.* This figure shows an example of a loan card from the National Bureau of Economic Research's survey on individual mortage loans. Cards were filled by lenders with information on the location of the mortgaged property, including state, county and town (annotated in red), as well as details on the contract (annotated in blue).

The survey itself was implemented in two steps. First, a random sample of large institutional holders from three groups (life insurance companies, commercial banks and savings and loans associations) was selected. Second, within each selected institution, a random sample of all underwritten individual mortgages was chosen. For each individual mortgage, the institution had to fill out a uniform "mortgage loan card" which collected key characteristics, such as the type of loan (FHA-insured, conventional amortized, conventional non-amortized, etc.), the year loan was made,

[11] The original survey includes loans from 1944 and 1945. We only keep loans made by 1943 due to the confounding effects that World War II might have had on mortgage loan-making over this period.

the contract rate of interest, the contract term, the amount of the loan and the appraised value of the property. Figure 2 shows an example of mortgage loan card for a loan made by a commercial bank. Panel A of Appendix Figure A.1 reports the number of loan cards by year and by whether or not they were government-insured, and Panel B reports the number of loan cards by year and by institution.

The collection of these loan cards is the only available microdata of individual mortgages from this period, and we are the first to digitize it in full (Ghent, 2011; Rose, 2011, have focused on smaller subsets of this data). We note, however, that despite its richness and novelty, there are potential concerns about the representativeness of the data. First, some commercial banks and savings and loans institutions contained no information on their inactive loans, but such bias concerns are small for the sample of life insurance companies. In our results, we highlight that mortgage conditions change across all institutions. Most importantly, the sample is limited to large institutions that remained in business during the Great Depression. Under the assumption that the institutions that survived engaged in less risky mortgage lending, we might be understating changes in mortgage spreads with this sample if risk premia narrowed over time or differences in riskiness also converged.

## II Institutional Background

We provide a brief overview of the institutional characteristics of mortgage markets between 1920 and 1950, and summarize the main aspects of the Federal mortgage legislation passed over this period. Grebler et al. (1956), Snowden (2010), Price and Walter (2019), Fishback et al. (2019), and Fishback et al. (2022b) offer a much richer review of this era.

**Mortgage Markets between 1920 and 1933.** Mortgage markets in the 1920s and early 1930s were dominated by local lenders. More than two-thirds of the mortgage debt in 1920 was held by local actors: building and loans association (B&Ls), commercial banks and individual investors (Grebler et al., 1956). Most B&Ls had few members, and membership was confined to a single city (Price and Walter, 2019). Commercial banks were prohibited from branching across states and, in most states, even across city lines. Life insurance corporations (LICs), mostly based out of New York or Connecticut, constituted the only significant source of inter-state lending, but they

never held more than 15 percent of *all* mortgages prior to 1934 (Grebler et al., 1956) as they faced costs in maintaining large long-distance portfolios and were unwilling to be over-exposed to a single region (Snowden, 2010). The modal mortgage in the years before the housing policies was a non-amortizing 5-year balloon mortgage.[12]

**The Policy Intervention.** The Great Depression decimated the housing market with a rapid decline in housing prices and spikes in unemployment, causing many households to default on their mortgages once their terms expired and the entire principal came due. The Federal government responded with a far-reaching policy package aimed at stabilizing the mortgage market.

1. It established the Federal Home Loan Bank (FHLB) system in 1932, which, among other things, acted as a discount facility to B&Ls providing liquidity ("advances") to these local lenders against mortgages pledged as collateral. B&Ls came to be known as savings and loans associations (S&Ls), and started being regulated by the FHLB.[13,14]

2. The government also supported mortgage lending done by other institutions, such as commercial banks and life insurance companies, by founding the Federal Housing Authority (FHA) in 1934 and the Federal National Mortgage Association (FNMA) in 1938. The role of the FHA was to provide insurance on mortgages made by private institutions, while FNMA offered a secondary market on FHA-insured mortgages.[15] Importantly, a second purpose behind the FHA was the recovery of the residential construction industry. In particular, starting in 1938 the FHA offered insurance for mortgage loans with better terms, such as longer durations and lower down payments, only if the loan was for a newly constructed property (Fishback et al., 2022b).

[12]An exception to these kinds of loans were those offered by B&Ls, which had been in the business of offering a long-term amortizing mortgage plan to their members since the end of the 19th century (see Rose and Snowden, 2013, for more details). Mortgages made by buildings and loans had on average 83 bps higher interest rates than those made by life insurance companies and commercial banks, and their terms were 6 years longer. Yet, these associations were highly constrained by the funding they received from their members, and constituted at most a fifth of all mortgage debt by 1930 (Grebler et al., 1956).

[13]For clarity, we will keep referring to S&Ls as B&Ls.

[14]The government also established the Federal Savings and Loan Insurance Corporation (FSLIC), whose goal was to insure B&L deposits, similarly to the role played by the Federal Deposit Insurance Corporation for commercial banks.

[15]FHA insurance for a new mortgage loan was limited to contracts where the underlying project was "economically sound," which was often interpreted as housing with small risk of deterioration in the physical structure and low risk of neighborhood change (Fishback et al., 2022b).

3. The government also set up the Home Owners' Loan Corporation (HOLC) in late 1933, which bought and restructured mortgages from borrowers judged to have defaulted on the loan "through no fault of their own" (Fishback et al., 2019). At the peak of its activity HOLC held up to a fifth of all mortgage loans in the U.S. HOLC restructured all mortgages the same way: increasing the term to 15 years, fixing the rate at 5 percent regardless of location and making them fully amortizing.

## III The Making of a National Mortgage Market

In this section, we trace the effects of the Federal policies using our data on mortgage conditions across cities and over time. Mortgage rates varied widely across cities prior to 1934, with a spread of up to 300 bps. By 1940 the spread had decreased to just over 100 bps. We show that the rapid convergence in mortgage rates was concurrent with the timing of the Federal policies and unique to mortgage markets. We also document the convergence in all other mortgage characteristics.

### III.A Integration of Mortgage Markets in the Cross-Section

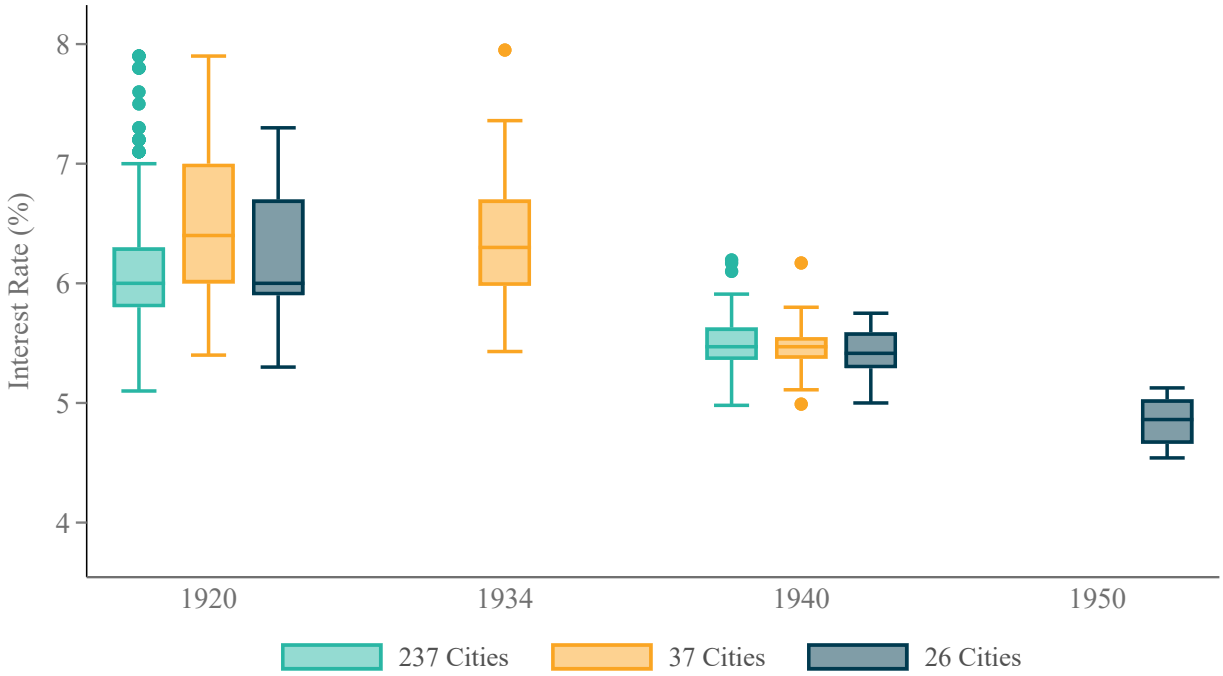
Figure 3 shows the spread in average mortgage interest rates at the city-level for our full sample of 237 cities in 1920 and 1940, for the subsample sample of 37 cities in 1920, 1934 and 1940, and for the subsample of 26 cities in 1920, 1940 and 1950.

In 1920 mortgage rates ranged between 5.1 percent and 7.9 percent. For the subsample of 37 cities, we observe virtually the same spread, but a slightly higher average (6.4 percent compared to 6.0 percent). By 1934, the spread and the average of these 37 cities had not changed. By 1940 the spread in average interest rates had fallen to just over 100bps (from nearly 300bps), converging to an average of 5.5 percent.

Initial differences across cities in mortgage rates can be partially explained by frictions to the mobility of financial capital: local lending rates partly reflected an imbalance between the supply of funds from households to lenders and the demand for mortgage borrowing. A Brookings report of 1929, for instance, highlights the imperfect geographic mobility of financial capital:

> The existence of substantial geographical differentials in interest rates not attributable to the character of the security indicates an insufficient fluidity in the movement of loan

Figure 3: Distributions of Mortgage Interest Rates across Cities, 1920-1950




*Notes.* This figure plots the distribution of mortgage interest rates across cities for different years. The green boxplots show the spreads for our main sample of 237 cities in 1920 and 1940. Data for these cities comes from the 1920 Census special report for cities in the U.S. with at least 25,000 residents and the 1940 Housing Census. We winsorize the values for two outlier cities that had 1920 mortgage interest rates above the 99th percentile of 7.9 percent. The orange boxplots show the spreads of a subsample of thirty-seven cities, for which we have data in 1934 from the Financial Survey of Urban Housing (Wickens, 1935). The navy boxplots show the spreads for a different subsample of twenty-six cities, for which we digitize data from the 1950 Census on Housing.

> funds, a defect which may be due to a number of conditions, including differences in the cost of administering loans at a distance. (Gray and Terborgh, 1929)

We show that local capital scarcity is correlated with mortgage interest rates by constructing the "net asset position" of the residents in each city based on the local demographic age distribution. The approach follows Auclert et al. (2021). Individuals differ over their age profile in how much assets they hold compared to how much debt they owe. Younger households are more indebted, while older households are more likely to be net suppliers of funds to the banking sector. Thus, cities with a higher fraction of older households relative to younger households should have a larger supply of funds relative to demand (as in Becker, 2007). If local imbalances between supply and demand of financial capital matter, for instance because local lenders face frictions in

pulling capital from outside their city (D'Amico and Alekseev, 2024), then the age distribution should be predictive of local mortgage rates.

We construct the local net asset position by first calculating what fraction of households in 1920 falls in one of five age bins according to the age of the household head. The age bins are: 18-30, 31-40, 41-50, 51-60 and 61+. From the 1949 Survey of Consumer Finances, the earliest wave available to us, we calculate the national net asset position associated with each age bin by splitting the surveyed households by the same age bins, and calculating the fraction of *all* household debt held by households in each bin and the fraction of *all* liquid assets held by households in each bin. For example, households in the lowest age bin hold 24 percent of all US housing debt, but only 8 percent of all US liquid assets, whereas households in the highest age bin hold 4 percent of housing debt, but 15 percent of liquid assets. The net asset position of each age bin equals the difference between the fraction of assets held and the fraction of housing debt. We project this at the city level by weighting each age-bin net asset positions by the city-level fraction of households in the relevant bin.

Figure 4 reports the correlation between local net assets and mortgage rates, controlling for total population using the log of 1920 population and weighting cities by total population in 1920.[16] Panel A shows that initial mortgage interest rates in 1920 are strongly negatively correlated with the net asset position. Cities with higher net assets had lower mortgage rates consistent with mortgage demand being lower than the supply of funds to lenders.[17]

Panel B shows that the negative relationship between the net asset position in 1920 and local mortgage rates has vanished by 1940, after the Federal policies were implemented. This result is in line with the decline in the interest rate spread reported in Figure 3 and further bolsters the argument that, by 1940, markets had integrated. The initial imbalance between local demand and supply forces had become irrelevant in shaping local prices (mortgage rates) if prices are increasingly set on a national market.

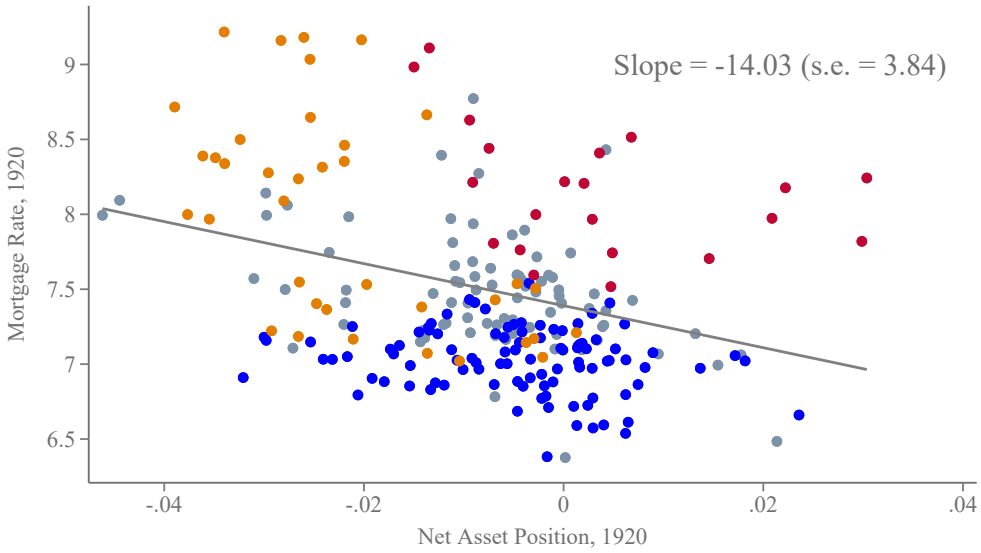
Panel A of Figure 5 shows evidence of this integration by plotting the difference in interest rates for each city between 1940 and 1920 relative to the initial interest rate in 1920. The figure

[16] Unweighted results are even stronger. The raw correlation without controlling for log of initial population is similar and reported in Appendix Figure A.5.

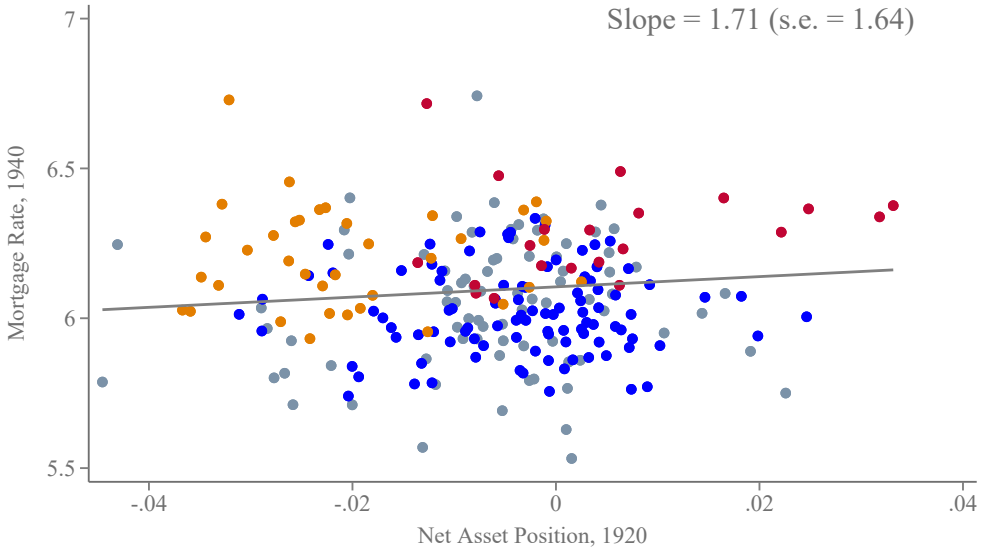
[17] Appendix Table A.1 shows that mortgage rates are correlated with other proxies for capital scarcity: the historical fraction of B&L debtors over all B&L members from 1893, as well as cities with a larger historical fraction of bank deposits over total bank assets from 1904. These results complement other work on geographic segmentation of commercial lending markets by Becker (2007) and D'Amico and Alekseev (2024).

Figure 4: Mortgage Interest Rates and City-Level Relative Scarcity

A. 1920




B. 1940

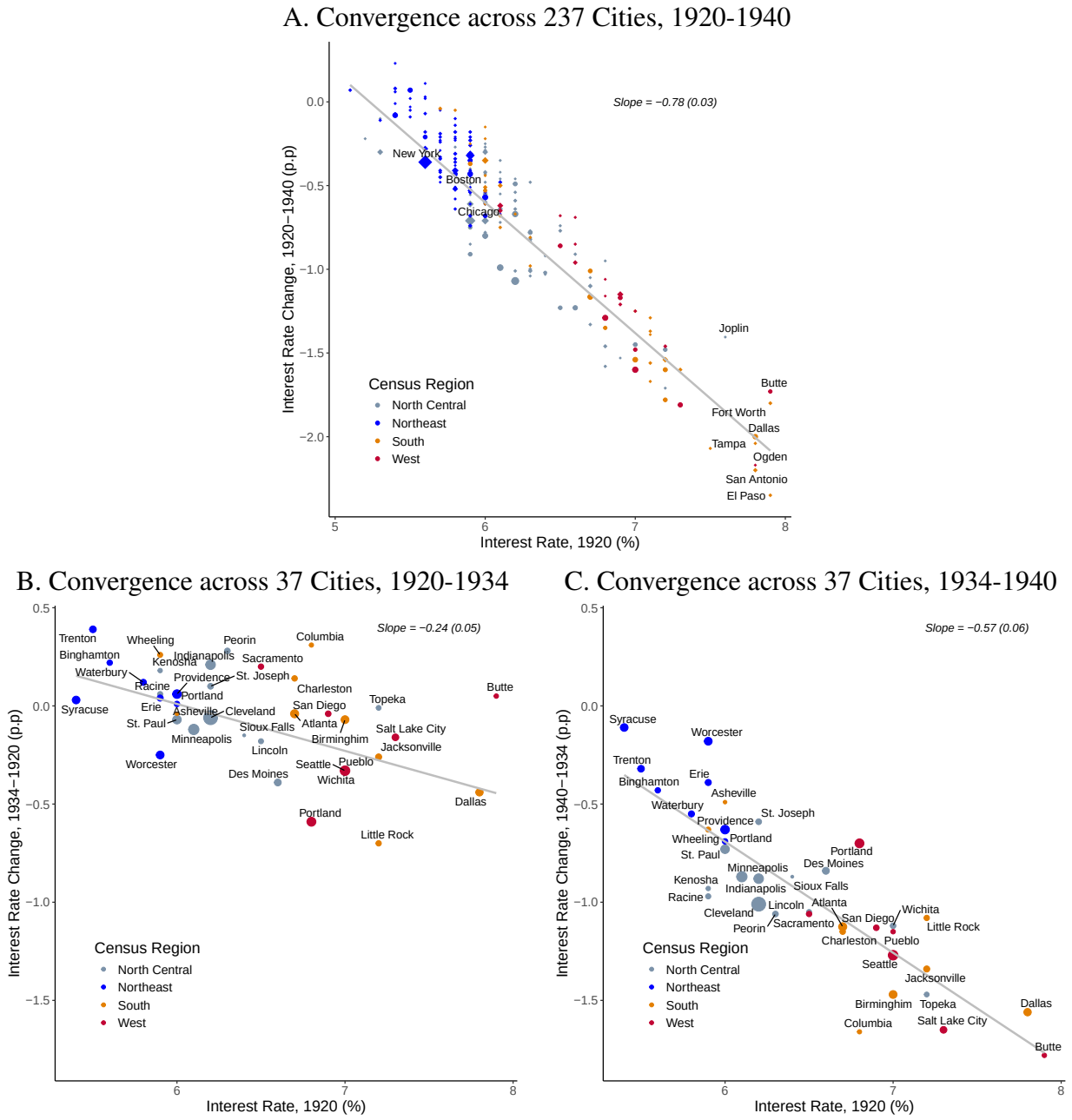



*Notes.* This figure plots the residualized mortgage interest rate in 1920 (Panel A) and in 1940 (Panel B) against the residualized city-level relative capital scarcity in 1920 for the 237 cities in our sample. We residualize against the log of population in the respective year. The net asset position in each city is the predicted difference between households' debt and households' liquid assets, predicted based on the demographic age distribution (following Auclert et al., 2021). The gray line reports the best weighted linear fit and the associated coefficient, weighting cities by 1920 population. Cities are colored according to their census region. Cities in the Northeast are in blue, in gray for the North Central, yellow for the South, and dark red for the West. Robust standard errors are in parentheses.

documents a strong degree of convergence. Cities with a one percentage higher mortgage rate in 1920 saw its rate decline by 0.78 percentage point on average. This plot highlights the heterogeneity in the mortgage affordability shock: whereas some cities had mortgage interest rates close to their 1940 values twenty years earlier, moving along the x-axis we encounter cities that experienced tremendous declines over this period.

Focusing on the 37 cities for which we have data in 1934 in Panels B and C of Figure 5, we show that almost all of this convergence occurred within the six years between 1934 and 1940, right after the passage of the Federal policies. We provide further evidence on how the timing of this convergence was tightly related to the Federal policies when we turn to the yearly series constructed from the individual loan cards.

Figure 5: Convergence in Mortgage Interest Rates, 1920-1940




*Notes.* This figure plots the convergence in mortgage interest rates across cities between 1920 and 1940. Panel A plots the difference in mortgage interest rates between 1940 and 1920 against the initial mortgage interest rate in 1920 for each of the 237 cities in our main sample. Panel B plots the difference in mortgage interest rates between 1920 and 1934 against the initial mortgage interest rate in 1920 for the subsample of 37 cities that has data on mortgage conditions in 1934. Panel C plots the difference in mortgage interest rates between 1934 and 1940 against the initial mortgage interest rate in 1920 for that subsample. Each panel reports the coefficient from a bivariate regression and the best linear weighted fit of the respective difference on the initial interest rate, weighting by initial population in 1920. The size of each dot is proportional to population in 1920. Colors indicate census regions.

## III.B Evidence over Time

We next trace the development in mortgage characteristics in the years surrounding the Federal legislation using our sample of individual loans. Given the size of our sample, we aggregate our individual loan cards to the state-year level, keeping only those states with loan data in at least nineteen years between 1922 and 1943 (equal to 94.7 percent of the full sample of loans made in those years).[18] For each mortgage characteristic, we split states into two mutually exclusive groups based on whether the state had above or below median value of the respective characteristic in 1922. Appendix Figure A.3 reports results aggregating cards at the US Census Region level.

The data shows that all mortgage contract properties remained relatively stable throughout 1920 and 1934, and then changed rapidly. Panel A shows the average interest rates over time for loans made in states that had above median interest rate in 1922 in blue and in states with below median interest rates in 1922 in pink. The average interest rates in the above-median states and below-median states stayed around 6.3 percent and 6.0 percent respectively between 1920 and 1933 (Panel A of Figure 6). LTV ratios exhibited similar stable patterns, ranging between 43.2 and 54.0 percent (Panel B of Figure 6). Loan terms hovered around 5 years on average across the U.S. (Panel C of Figure 6), and around a third of mortgage contracts would see their principal paid off progressively throughout the life of the loan (Panel D of Figure 6). Between 1934 and 1940, we witness the convergence in all aspects of the mortgage contract as differences in mortgage characteristics largely disappear.[19]

Our individual-level series allow us to study the convergence across different types of mortgage loans and for different institutional holders. We show in Panel A of Appendix Figure A.2 that the convergence in mortgage characteristics occurred both for government-sponsored mortgages, insured by the FHA, and also for private (conventional) mortgages, which were not insured by the government. This result suggests that convergence was not the mechanical effect of FHA imposing a uniform cap: these mortgages were not owned by HOLC, not insured by the FHA, and not sold off to FNMA (which could only buy FHA-insured mortgages).[20]

[18] Due to the small sample size, we group loans made in 1920, 1921 and 1922 together. We also group the loans made in 1933 under 1934.

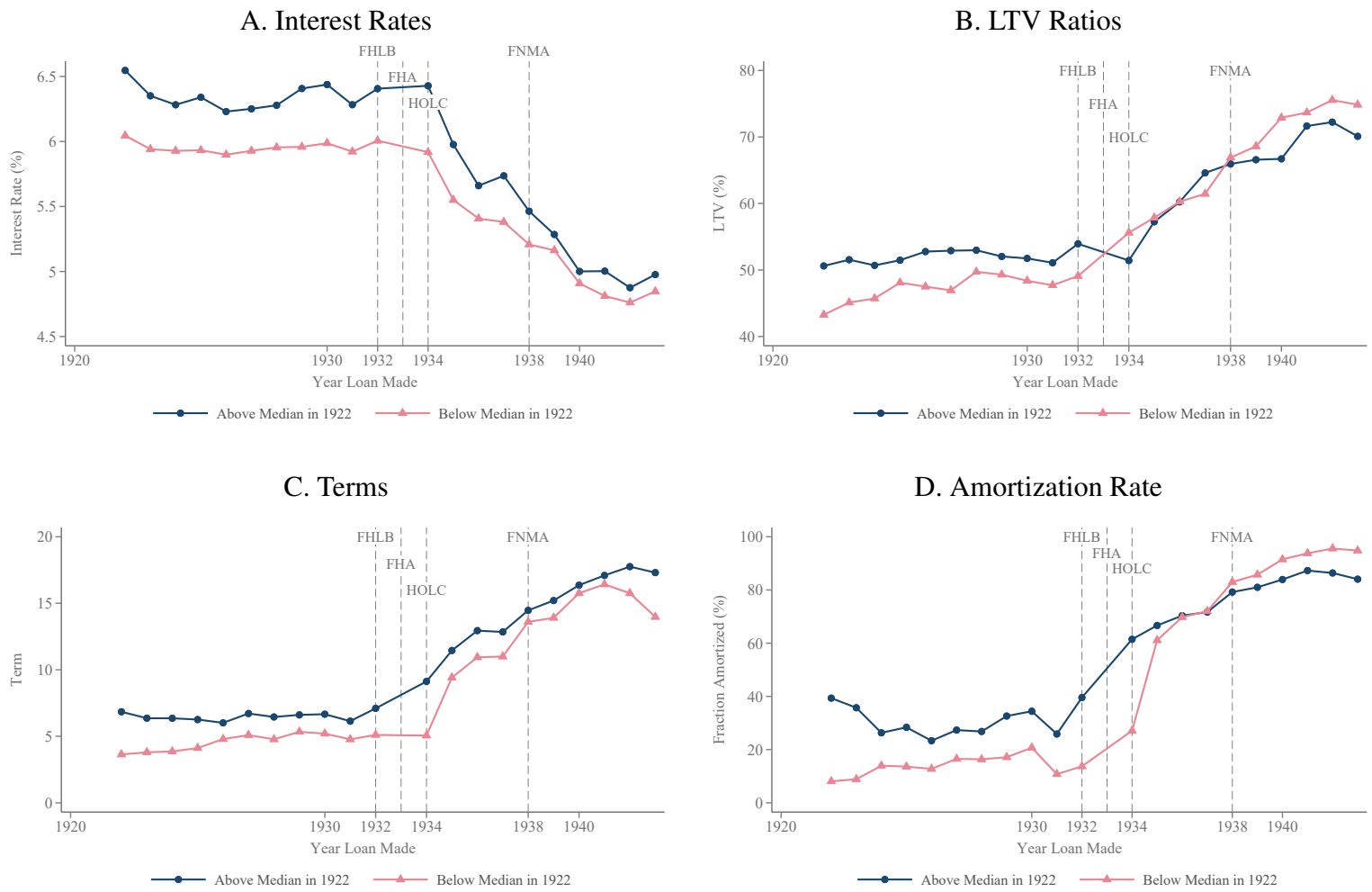
[19] Aggregate averages also rapidly changed. Between 1933 and 1940, mortgage rates decreased by 120 basis points; the average LTV ratio increased by 20 percentage points (40 percent of the pre-1934 mean); terms increased by 10 years (nearly 3 times the pre-1934 mean); rates of amortization increased by 63 percentage points (3.5 times the pre-1934 mean).

[20] We do observe persistent differences in the levels of LTV ratios and terms once we drop FHA-insured mortgages

Moreover, we show that the spatial convergence in interest rates was driven by local lenders. Panel A of Appendix Figure A.4 shows that most of the convergence in rates is driven by B&Ls: those local lenders that, before the FHLB, only had imperfect access to national sources of funds. On the other hand, mortgage rates for the national lenders (the LICs) were almost identical across regions. The different experiences of local and national lenders supports the importance of frictions and regional imbalances in supply and demand, and in the policies that eased these frictions.

in the post-period (Appendix Figure A.2). This persistence suggests that Federal insurance played a special role in allowing lenders who made government-insured mortgages to expand LTVs and maturities. While Federal insurance does not remove duration risk, a possible explanation of this pattern is that lenders were unwilling to take the credit risk for long periods of time or for high LTVs. The creation of FNMA also made these kinds of long-term mortgages more liquid, since they were easier to sell on secondary markets. This provided further liquidity to local lenders and made long-term mortgages more palatable. Recall that, differently from Freddie Mac (chartered in 1970) FNMA was authorized to buy and resell only FHA-insured mortgages, and did not provide any insurance itself on the mortgage.

Figure 6: Mortgage Conditions, 1920-1943




*Notes.* This figure plots changes in average mortgage characteristics over time from our digitization of the NBER's survey of individual mortgage loans (see Morton, 1956 for additional information on the survey). We aggregate the individual mortgage loans to the state level, keeping only states with loan data in at least nineteen years between 1922 and 1943. In each panel, we split states into two mutually exclusive groups based on whether the state had above or below median value of the respective characteristic in 1922. Panel A shows the average interest rates over time for loans made in states that had above median interest rate in 1922 in blue and in states with below median interest rates in 1922 in pink. Panels B, C and D show the analogous time trends for loan-to-value ratios, terms and amortization rate. We plot vertical lines for the years when the FHLB, FHA, HOLC and FNMA were established.

## III.C Comparing Mortgages with Other Forms of Lending

The Federal housing policies we discussed applied only to mortgage markets; hence, we compare the evolution of commercial lending rates to mortgage interest rates over our period as additional evidence that the Federal intervention in mortgage markets was the main driver of the mortgage convergence. We use data on the lending rates charged by commercial banks at the state level, from Bodenhorn (1995). Commercial banks were active in mortgage lending, but their lending rates also capture lending to businesses, farms, and consumers.

Panel A of Figure 7 shows that commercial lending rates and mortgage interest rates are indeed strongly correlated in the pre-period of 1920. The $R^2$ from the bivariate OLS regression is 0.6. Panel B plots the distribution across states in commercial lending rates and mortgage rates (averaging city rates at the state level). The distributions show that commercial lending markets featured higher variation compared to mortgage markets both in 1920 and 1934, but both types of rates feature substantial geographic variation. Yet by 1940 mortgage rates are effectively all concentrated around 5.5 percent, while commercial lending rates retained greater differences across states.

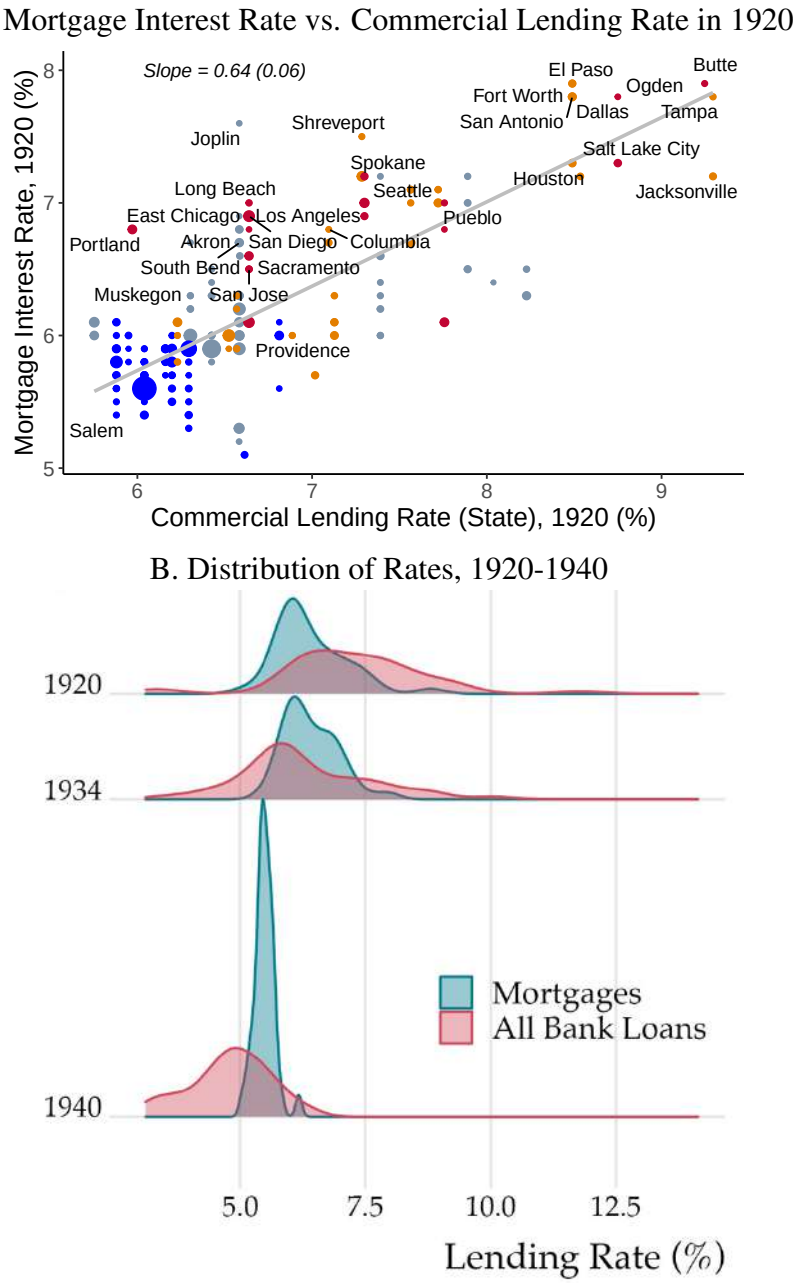
That is, geographic convergence is much stronger in mortgage markets—where the Federal government intervened—than in commercial lending markets.[21] The difference in rates of convergence further highlights the unique role of the Federal interventions, and eases concerns that the convergence in mortgage rates we document is the result of convergence in risk levels across space or in economic conditions. These competing explanations are hard to rationalize with the dramatic pace of convergence in the mortgage market and with the lack of convergence in the commercial lending market.

# IV Effects on City Growth and Structure

In this section, we study how shocks to mortgage affordability affect city structure and growth. When mortgages become more affordable and mortgage financing more widespread, homeownership is expected to also increase. Moreover, an affordability shock specific to urban mortgages, rather than farm mortgages, brings costs of homeownership in cities down relative to housing prices

[21] This finding is even more surprising as naturally there are spillovers across markets within each locality.

Figure 7: Comparison of Regional Spreads in Mortgage Rates and Commercial Lending Rates




*Notes.* Panel A plots the mortgage interest rate against the state-level commercial lending rate in 1920 for our sample of 237 cities, as well as the coefficient from a bivariate OLS regression of the mortgage rate on the commercial rate. The size of each dot is proportional to population in 1920. Colors indicate census regions. Panel B plots the cross-sectional distribution of mortgage interest rates (in blue) and commercial lending rates (in red) in 1920, 1934, and 1940. The 1934 distribution in Panel B is based on the subsample of 37 cities for which we have data in that year.

in rural areas, incentivizing migration to the cities and increasing the urban population. These general predictions are not tied to the specific historical episode we discussed in the previous section.

One aspect specific to the the 1930s Federal policies is the stimulation of new construction: the FHA would only insure mortgages on newly built houses and would even collaborate with property developers to pre-certify that borrowers would have access to FHA insurance. Hence, in this context we expect that we may also see particularly strong effects of mortgage affordability on rates of construction.

## IV.A Empirical Strategy

Our key insight in addressing these questions is that the size of the affordability shock brought about by the Federal policies differed across cities as illustrated in Panel A of Figure 5. We leverage this heterogeneity and study whether places that experienced a higher affordability shock also saw greater changes in homeownership, population, or rates of construction.[22] The main threat to our empirical strategy is that cities that had initially higher interest rates were less economically developed, and rather than capturing the effect of shocks to mortgage affordability, we are estimating the effects of economic convergence across space more broadly. In other words, less-developed cities (that happened to have higher mortgage interest rates) would grow at higher rates by virtue of overall economic convergence forces (as in Barro and Sala-i-Martin, 1992).

## IV.B Results

We implement our empirical strategy using a dynamic regression approach in the spirit of (Hornbeck, 2012), following a differences-in-differences intuition. We are comparing the difference in a given outcome between 1930 (which we consider our base year) and any other year for cities that experienced a high mortgage affordability shock relative to cities that went through a smaller mortgage affordability shock. As outlined in the previous section, we proxy for the mortgage af-

[22] With mortgage affordability shock ideally we would mean the change in rate between 1920 and a given year $t$ in our sample. We do not have mortgage rate data for all cities for all years, but Section II shows that the bulk of the convergence occurred between 1934 and 1940. Thus, instead of instrumenting the change in rates after 1920 with the initial mortgage rate, we use as the independent variable the city mortgage rate before the Federal housing policies. Thus, our regressions can be interpreted as a "reduced form" of a 2SLS procedure that uses the initial rate as an instrument. A city with a 100 bps higher mortgage interest rate in 1920 would see it decrease by 78 bps more by 1940. In our main results, we rely on the predicted interest rate in 1934 for all 237 cities, estimated by applying the coefficients from a bivariate regression of the interest rate in 1934 on the interest rate in 1920 for our sample of 37 cities with data from 1934 to our full sample. The regression has an $R^2 = 0.84$ of and a $\beta$ coefficient of 0.79. We opt for this strategy for simplicity of exposition since we consider 1934 to be the base year before the unrolling of the Federal housing policies. Our results are unchanged if we use the 1920 interest rate as the independent variable.

fordability shock with the predicted mortgage interest rate in 1934 (the year in our data that is closest to the Federal housing policies).

We estimate the following regression equation for each city $j$ and census decade $t$:

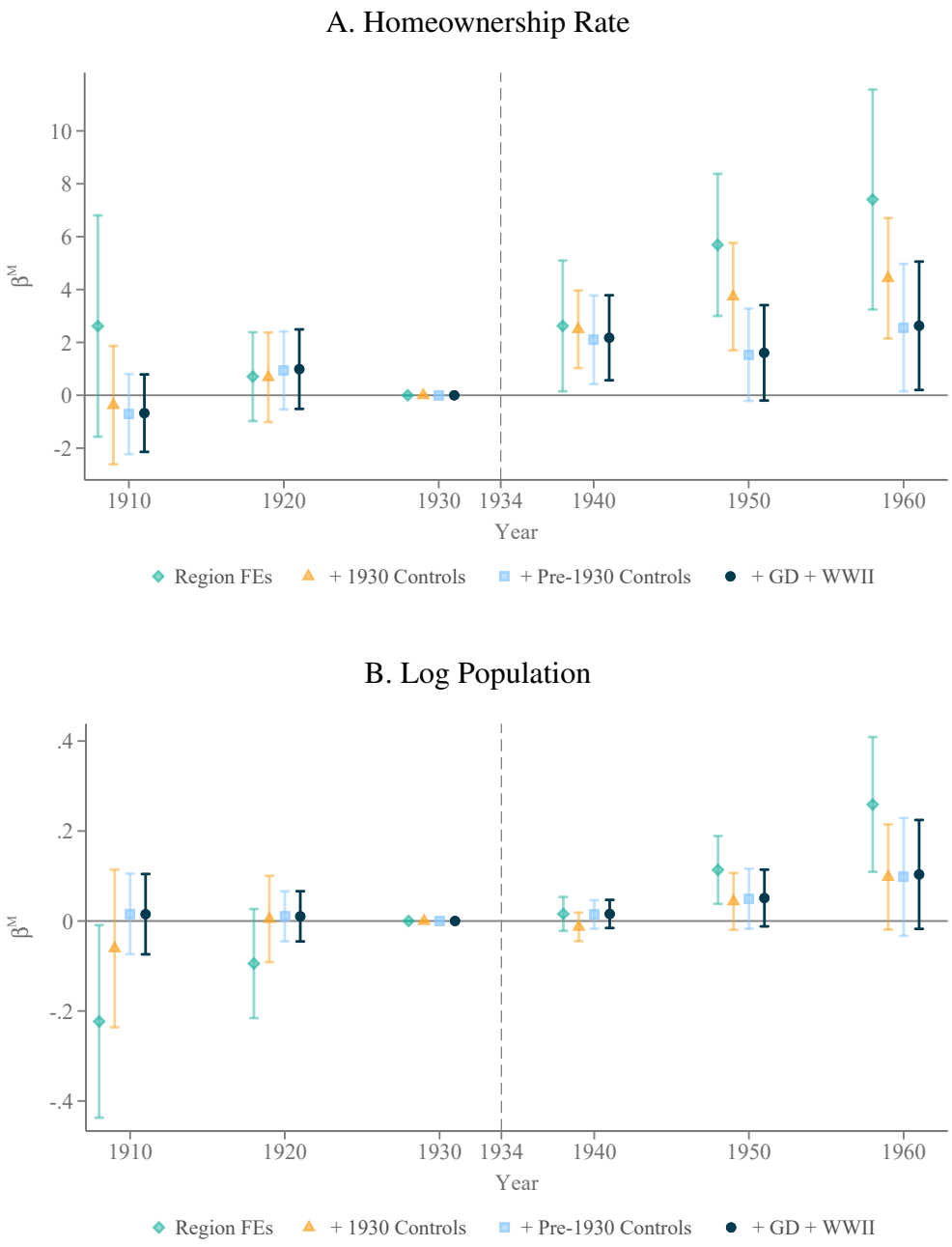
$$Y_{jt} - Y_{j,1930} = \alpha + \sum_{t \neq 1930} \beta_t^M \cdot r_{j,1934}^M + \sum_{t \neq 1930} \beta_t^C \cdot r_{s(j),1934}^C + \sum_{t \neq 1930} X_j \cdot \theta_t + \phi_{tl} + \varepsilon_{jt} \quad (1)$$

where $r_{j,1934}^M$ is the mortgage interest rate in 1934, $r_{s(j),1934}^C$ is the state commercial lending rate in 1934, and $X_j$ is a vector of characteristics from 1930 and pre-1930 periods. We control for demographics (percent native-born population, percent Black population and the log of total population); economic development (average manufacturing wages, the log of the number of manufacturing establishments, the log of the number of farms, fraction of state population that is rural); the Great Depression through proxies for the size of Great Depression shock and the amount of New Deal relief grants (see Fishback et al., 2005); shocks to amenities via average January temperatures (Glaeser and Tobio, 2008); World War II military spending (see Brunet, 2024); the value of the outcome variable in 1930, $Y_{j,1930}$, and its lag $Y_{j,t-1}$ (as in Hornbeck, 2012). Finally, $\phi_{tl}$ are region-by-year fixed effects. We interpret $\beta^C$ as capturing the effects of market convergence, and $\beta^M$ as the effects of convergence in mortgage conditions beyond market convergence.

Figure 8 summarizes our results for the two main outcomes of interest: rates of homeownership and the log of city population, by plotting the $\beta^M$ coefficients from four different regressions. The coefficients in green result from a regression that only controls for region-by-year fixed effects; the orange coefficients reflect additions of demographic and economic controls for the base year, 1930; the light-blue coefficients reflect additions of demographic and economic controls for all periods before the event for which we have data and the lag of the outcome variable; finally, the navy coefficients reflect our main specification and add the variables related to other contemporaneous economic shocks, the Great Depression and World War II.

Panel A of Figure 8 shows that cities with higher ex-ante mortgage interest rates experienced higher growth in rates of homeownership in the years following the Federal housing policies. In particular, a city with a 100 bps higher mortgage rate in 1934 would have 2.2 p.p. higher increase in the homeownership rate between 1930 and 1940, and a 1.6 higher increase between 1930 and 1950. These effects are economically and statistically significant given that the average city saw a decrease in the homeownership rate of 4.5 p.p. between 1930 and 1940, and an increase of 7.5

Figure 8: Changes in Homeownership Rate and Population in Cities with a Larger Reduction in Mortgage Rates after 1934




*Notes.* This figure plots the coefficients $\beta^M$ estimated in the dynamic regression in Equation 1 of the change in homeownership rate between each year and 1930 (Panel A) and the change in log population (Panel B) between each year and 1930 against mortgage rates in 1934 for our sample of 237 cities. In all regressions we control for the state commercial lending rate in 1934. Estimates in green result from a regression that controls for census region-by-year fixed effects; the orange coefficients add controls for demographic and economic conditions in 1930; the light-blue coefficients add demographic and economic controls for all periods before the event and the lag of the outcome variable; finally, the navy coefficients reflect our main specification, which adds controls for heterogeneous exposure to the Great Depression and World War II spending. All regressions are weighted by city population in 1930.

p.p. over the entire period from 1930 to 1950. We note that we see limited pre-trends in rates of homeownership in the decades prior to the housing policies.

Panel B of Figure 8 tells a slightly different story for population growth. Cities with higher ex-ante mortgage interest rates saw no difference in their population growth in the immediate aftermath of the policies, but witnessed higher population growth in following decade. In particular, a city with a 100 bps higher mortgage rate in 1934 would experience a 5.1 p.p. higher population growth between 1930 and 1950. We note that we see limited pre-trends in population growth in the decades prior to the housing policies as soon as we include our base controls.

The results so far are consistent with a story wherein increased mortgage affordability led to higher rates of homeownership, which in turn attracted migration in the following decade. Table 1 reports the coefficients on homeownership and population for the immediate post periods. Additionally, we report the results from the regression in 1 with the change in median housing prices (columns 2 and 6), and in the growth of average manufacturing wages (columns 4 and 8) as outcomes. We see limited effects of mortgage convergence on wages, consistent with our results not being driven by productivity growth or economic convergence as in Barro and Sala-i-Martin (1992). Moreover, we detect considerable effects on median housing prices between 1930 and 1950, consistent with the increased demand for housing that followed the higher population growth in cities that were ex-ante more constrained.

We complement our findings on housing prices with an additional annual-frequency dataset which has yearly data on housing and rental prices for 26 cities in our sample (Lyons et al., 2024, made available by the Federal Reserve Bank of Philadelphia, 2024). We caution that given the much smaller sample these results remain suggestive. We adapt the model from Equation 1 to this smaller sample by limiting the number of controls to a single control variable for each category of demographic characteristics (the percent of city residents who are Black in 1930) and economic characteristics (the number of manufacturing establishments in 1930). Additionally, we control for the average January temperatures at the city level (as a proxy for amenities), and for the Great Depression and World War II shocks as described above. We also change the base year from 1930 to 1934 to better align with our mortgage interest rate data. When we look at the effects on our two main outcomes, homeownership rate and population growth, for this smaller sample, we find that the 26 cities experienced similar effects on homeownership following the Federal housing policies (Panel A of Appendix Figure A.6). We note that the magnitude on the effect in 1950 ($\beta^M = 0.049$,

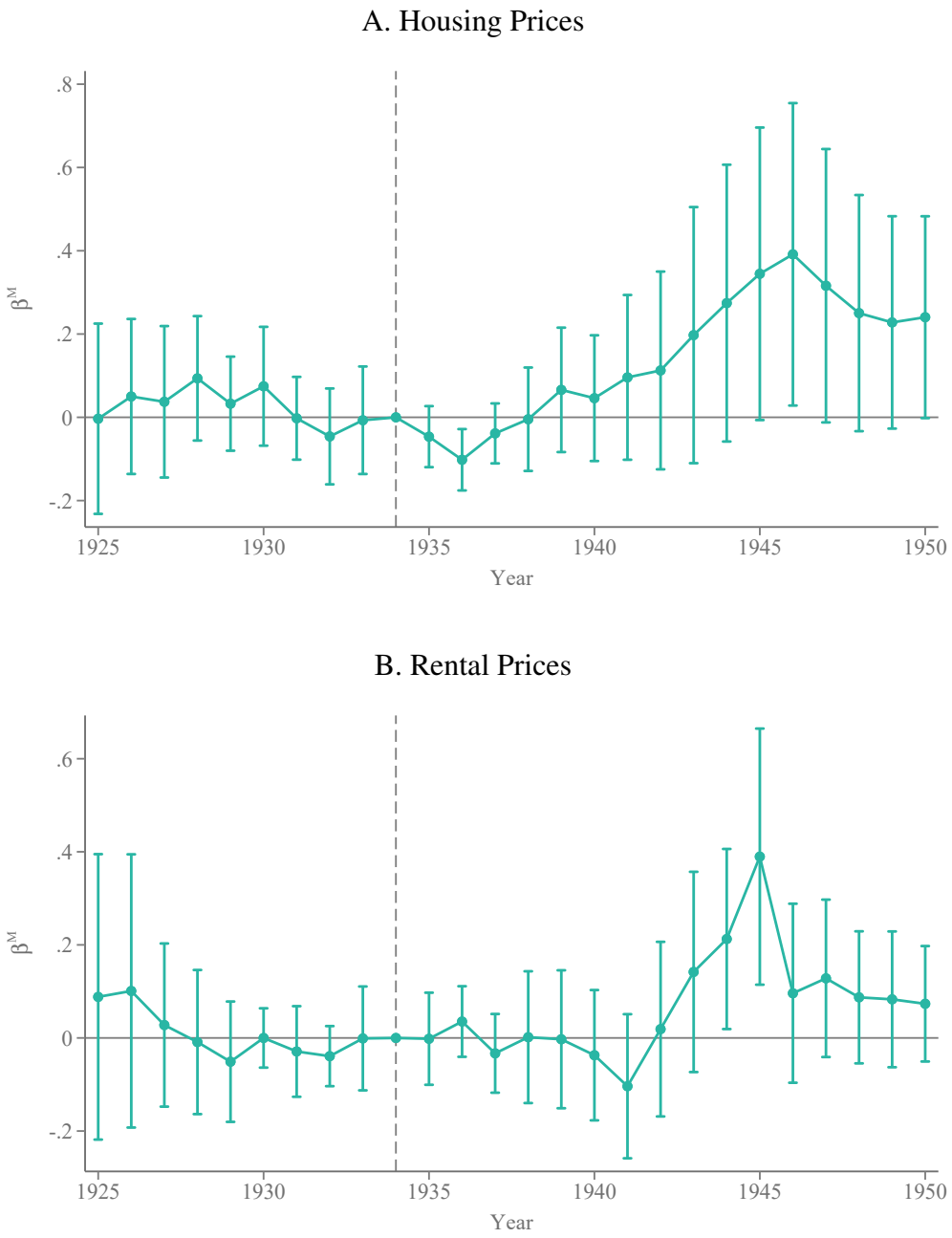
Table 1: Mortgage Affordability on City Growth

| | Δ 1930-1940 | | | | Δ 1930-1950 | | | |
|---|---|---|---|---|---|---|---|---|
| | % HO | $P_{home}$ | Pop. | w | % HO | $P_{home}$ | Pop. | w |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| $r^M_{1934}$ | 2.18 | 0.002 | 0.016 | 0.004 | 1.61 | 0.097 | 0.051 | 0.016 |
| | (0.84) | (0.039) | (0.016) | (0.024) | (0.94) | (0.042) | (0.033) | (0.019) |
| $r^C_{1934}$ | 0.99 | 0.017 | -0.003 | 0.020 | 1.12 | -0.013 | 0.016 | 0.010 |
| | (0.27) | (0.015) | (0.006) | (0.009) | (0.44) | (0.014) | (0.012) | (0.007) |
| Controls | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| $R^2$ | 0.80 | 0.64 | 0.75 | 0.73 | 0.88 | 0.74 | 0.84 | 0.79 |
| Cities | 237 | 237 | 237 | 237 | 237 | 237 | 237 | 237 |
| Average Value | -4.46 | -0.488 | 0.030 | 0.756 | 7.53 | 0.406 | 0.189 | 0.756 |

*Notes.* Columns 1-4 show results from cross-sectional regressions of growth in homeownership rate, median home prices, population and wages between 1930 and 1940 against mortgage interest rates in 1934, $r^M_{1934}$, commercial lending rates in 1934, $r^C_{1934}$, and the full set of variables described in the main text, which we omit from the table for ease of exposition. Columns 5-8 show results from the analogous regressions for the changes between 1930 and 1950. Regressions are weighted by city population in 1930.

Panel B of Appendix Figure A.6) is almost identical to the effect in the full sample (column 5 of Table 1), although statistically insignificant. With these qualifications in mind, we find that the dynamic data on housing prices, supports our main findings in columns 2 and 6 of Table 1. Namely, there is no immediate effect on the dynamics of housing prices following the Federal housing policies – the coefficient on 1940 is small and insignificant. By 1943, we see that housing prices in cities with higher ex-ante mortgage rates grow at higher rates. By 1950, housing prices in these cities have grown at much higher rates, consistent with our finding in column 6 of Table 1. Notably the data do not exhibit any pre-trends in the ten years leading up to the Federal housing policies. Rental price dynamics are more muted, with the exception of a spike around 1945.

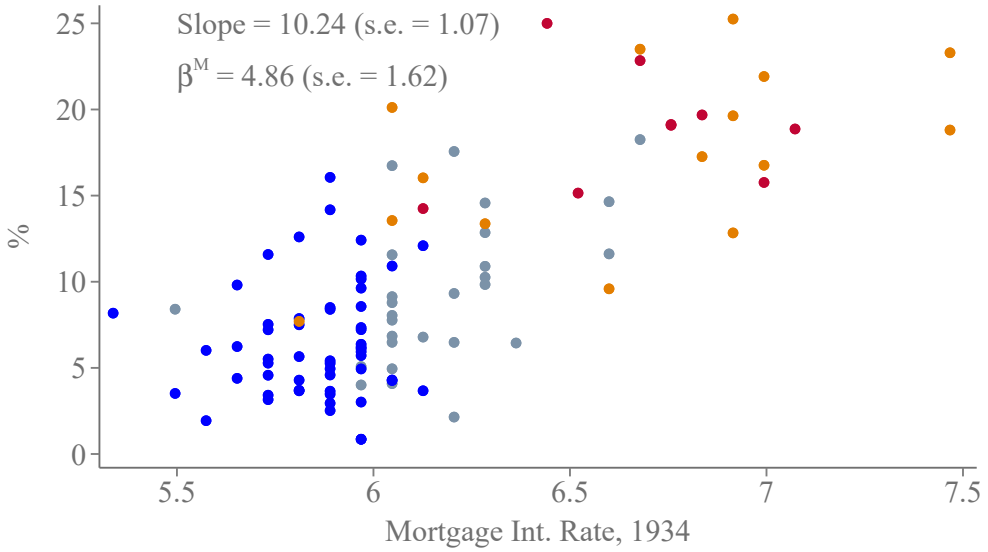
Figure 9: Changes in House Prices and Rents in Cities with a Larger Reduction in Mortgage Rates, for 26 Cities




*Notes.* This figure plots the coefficients $\beta^M$ estimated in the dynamic regression in the style of Equation 1 of the change in housing prices (Panel A) and rental prices (Panel B), compared to 1934, against mortgage rates in 1934 for a subsample of 26 cities. The regression controls for the percent of city residents who are Black in 1930, the number of manufacturing establishments in 1930, the average January temperatures at the city level, and for the Great Depression and World War II shocks as described in the text. All regressions are weighted by the city population in 1930. Data on housing and rental prices for these cities come from Federal Reserve Bank of Philadelphia (2024).

We expect that the mortgage affordability shocks that we study were also associated with

Figure 10: Percent of City Built in 1940-1949, as of 1960, Against Mortgage Rates in 1934




*Notes.* This figure plots the percent of city structures built between 1940 and 1949, as of 1960, and mortgage interest rates in 1934 for 106 cities in our sample. We report the coefficient from a bivariate regression of the fraction built in 1940-1949 on initial mortgage interest rates, and the coefficient $\beta^M$ estimated using Equation 1 in the top left corner.

higher rates of construction, also because construction of new housing was directly incentivized by the FHA, which would only provide insurance on loans where the underlying project showed limited risk of deterioration in the physical structure (Fishback et al., 2022b). We proxy for rates of construction by estimating what fraction of structures as of 1960 were constructed in each of the following periods: before 1929, 1930-1939, 1940-1949 and 1950-1959 for a subsample of 106 cities.[23] Figure 10 shows that places that had higher initial interest rates, and thus experienced higher mortgage affordability shocks, also saw higher fraction of their cities built in the immediate aftermath of the Federal housing policies. Appendix Figure A.8 reports the $\beta^M$ for the other three periods and shows that cities with initially higher interest rates had higher fraction of structures built after the policies, and lower fraction of structures built prior to the policies, suggesting that the mortgage convergence brought on by the Federal housing policies led to higher rates of construction for cities that were ex-ante capital constrained.

The alternative interpretation to our results that we introduced in the previous section would be that high mortgage rates are just correlated with a lower level of economic development—even

[23] Appendix Figure A.7 shows that our main results in Figure 8 are noisier, but similar for this smaller sample.

after controlling for bank lending rates. Thus, places with initially lower mortgage rates would have "caught up" regardless of changes in mortgage affordability. If economic convergence (à la Solow, 1956; Swan, 1956; Barro and Sala-i-Martin, 1992) was indeed the root cause, we would see wages grow as these places become more productive. We find small insignificant effects on wages in the immediate post-period, inconsistent with this competing story.[24]

Another possible explanation is that we might be confounding our effect with changes in amenities. That is, these high-mortgage places did not grow because they were less-developed, but because they offered amenities that became more valuable. This squares the path of population and wages, but cannot explain the effects on homeownership. Furthermore, our regressions proxy for the flow to the Sunbelt which began in this period and is usually linked to rising amenities by controling for cities' average January temperatures (Glaeser and Tobio, 2008).

Overall, the dynamics of house prices and construction seem to be in line with the effects of increased mortgage affordability.

## V Mortgages and Fertility

In this final section, we trace whether city-level changes in local mortgage conditions affected fertility choices. We expect that mortgage affordability facilitated younger couples' buying their own house and starting a family sooner after the policy.

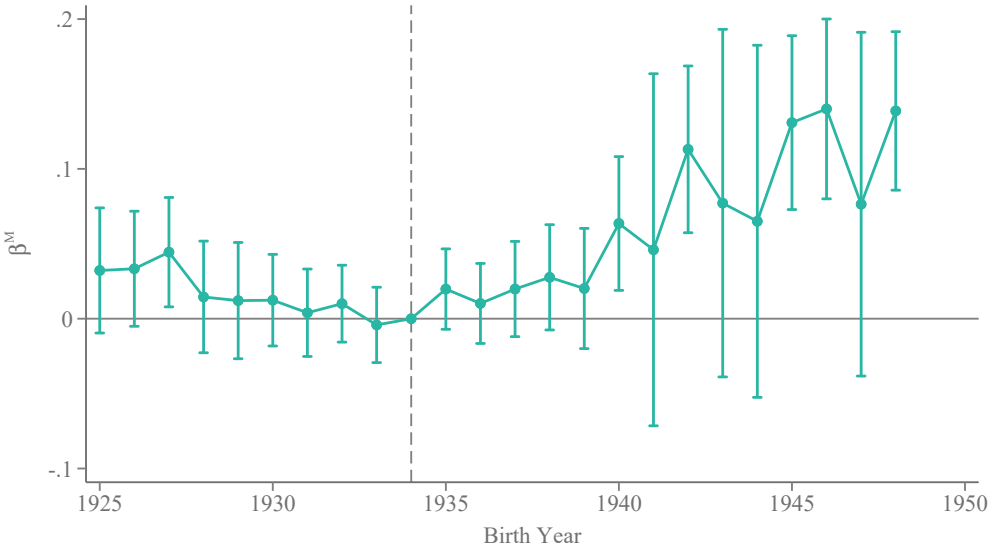
We use the full censuses to construct a yearly birth rate at the city level. To measure the number of births in a city in year $t$ we count the number of individuals whose birth year is $t$ in the census succeeding $t$.[25] To construct the denominator, the population living in a city in a given year, we linearly interpolate between census years.[26] Constructed this way the measure is likely an upper bound for birth rates since it assumes that someone born in 1934 and captured in 1940 in a given city was also born there. While imperfect, it remains, to the best of our knowledge, the best way to measure birth rates at the city level over this period. We rely on the model outlined in Equation 1 where we change the base year from 1930 to 1934 to better align with our mortgage

[24]Note that the correlation between manufacturing wages and initial mortgage rates is weakly positive, both unconditionally and conditional on all other controls, which also questions the idea that these places were simply less developed.

[25]For example, to measure the number of births in 1934 in Boston, we count the number of individuals living in Boston and born in 1934 recorded in the 1940 census.

[26]Our results are robust to using as denominator the population in the city in the preceding census, or the population in the succeeding census. Results are available on request.

Figure 11: Changes in Birth Rates in Cities with a Larger Reduction in Mortgage Rates After 1934




*Notes.* This figure plots the coefficients $\beta^M$ estimated in the dynamic regression of Equation 1 of the change in city birth rates between each year and 1934, against mortgage rates in 1934 for the 237 cities in our sample. The regression weights by the city population in 1930. Birth rates are calculated using the full count decennial censuses between 1930 and 1950.

interest rate data.[27] Figure 11 shows our main results: we find that cities that experienced higher mortgage affordability shocks see higher growth in birth rates as soon as 1940. Notably, this shift occurred years before the U.S. joined World War II, assuaging concerns that the mortgage and housing affordability dynamics we study proxied for unobservable factors related to the war. Finally, note that birth rates do not appear to be growing at different rates across cities in the ten years leading up to the Federal housing policies.

## VI Conclusion

Today, the thirty-year fixed-rate mortgage is one of the hallmarks of American housing markets. We use novel data to describe its birth and transformative effects on the development of American cities. These policies revolutionized mortgage financing by effectively creating a national mortgage market that facilitated capital flows to areas that were constrained in their ability to rely on external capital. By enabling these capital flows, these policies lowered the user cost of homeownership, making cities more attractive to families and unleashing growth. As capital flowed to those cities,

[27] Note that due to the annual-frequency nature of these data we also omit the lag of the outcome variable.

labor moved, highlighting a complementarity between the mobility of financial and real factors. The mortgage affordability shock also affected intra-household decision-making, allowing young households to move out of their parents' households sooner and have larger families.

This is a new view on what has now become a traditional instrument. In addition to changing affordability at the individual level, the Federal Housing policies affected the geography of American development. However, while they seem to have reduced inequality across places—by allowing capital-scarce areas to reach their potential—it might have increased inequality across people within places. Several accounts describe how many of these policies were slanted towards relatively stable-income white families, potentially marginalizing other demographics and racial groups. By spurring construction, they also might have affected city structure and allowed segregation to increase. In future iterations of this project we want to take up these questions and study these potentially important effects of our policies. Some places won from these policies, but asking who reaped the benefits is essential to our understanding of the multi-faceted consequences of the Federal interventions of the 1930s.

Our results also show a tight link between mortgage affordability and fertility choices, which we plan to explore more structurally in future work.

## References


Abrams, Charles (1955). *Forbidden Neighbors: A Study of Prejudice in Housing*. First Edition. Harper & Brothers.

Adelino, Manuel, Antoinette Schoar, and Felipe Severino (2012). *Credit Supply and House Prices: Evidence from Mortgage Market Segmentation*. URL: https://www.nber.org/papers/w17832 (visited on 02/26/2024). preprint.

Agarwal, Sumit, Efraim Benmelech, Nittai Bergman, and Amit Seru (2012). *Did the Community Reinvestment Act (CRA) Lead to Risky Lending?* URL: https://www.nber.org/papers/w18609 (visited on 04/08/2024). preprint.

Auclert, Adrien, Hannes Malmberg, Frederic Martenet, and Matthew Rognlie (2021). *Demographics, Wealth, and Global Imbalances in the Twenty-First Century*. Working Paper 29161. National Bureau of Economic Research.

Barro, Robert J. and Xavier Sala-i-Martin (1992). "Convergence". In: *Journal of Political Economy* 100 (2), pp. 223–251.

Becker, Bo (2007). "Geographical Segmentation of US Capital Markets". In: *Journal of Financial Economics*.

Bernanke, Ben S. (1983). "Nonmonetary Effects of the Financial Crisis in the Propagation of the Great Depression". In: *The American Economic Review* 73 (3), pp. 257–276.

Bodenhorn, Howard (1992). "Capital Mobility and Financial Integration in Antebellum America". In: *The Journal of Economic History* 52 (3), pp. 585–610.

Bodenhorn, Howard (1995). "A More Perfect Union: Regional Interest Rates in the United States, 1880-1960". In: *Anglo-American Financial Systems: Institutions and Markets in the Twentieth Century*. Ed. by Michael Bordo and Richard Sylla. New York, NY: Irwin Professional Publishing, pp. 415–453.

— (2018). "Two Centuries of Finance and Growth in the United States, 1790–1980". In: *Handbook of Finance and Development*. Edward Elgar Publishing, pp. 107–147.

Boustan, Leah Platt, Price V. Fishback, and Shawn Kantor (2010). "The Effect of Internal Migration on Local Labor Markets: American Cities during the Great Depression". In: *Journal of Labor Economics* 28 (4), pp. 719–746.

Brunet, Gillian (2024). "Stimulus on the Home Front: The State-Level Effects of WWII Spending". In: *The Review of Economics and Statistics*, pp. 1–46.

Campbell, John Y. (2013). "Mortgage Market Design*". In: *Review of Finance* 17 (1), pp. 1–33.

Carlson, Mark and Jonathan D. Rose (2015). "Credit Availability and the Collapse of the Banking Sector in the 1930s". In: *Journal of Money, Credit and Banking* 47 (7), pp. 1239–1271.

Chambers, Matthew, Carlos Garriga, and Don E. Schlagenhauf (2014). "Did Housing Policies Cause the Postwar Boom in Home Ownership?" In: *Housing and Mortgage Markets in Historical Perspective*. University of Chicago Press, pp. 351–385.

D'Amico, Leonardo and Maxim Alekseev (2024). *Capital Market Integration and Growth Across the United States*.

Davis, Lance E. (1965). "The Investment Market, 1870-1914: The Evolution of a National Market". In: *The Journal of Economic History* 25 (3), pp. 355–399.

Di Maggio, Marco, Amir Kermani, Benjamin J. Keys, Tomasz Piskorski, Rodney Ramcharan, Amit Seru, and Vincent Yao (2017). "Interest Rate Pass-Through: Mortgage Rates, Household Consumption, and Voluntary Deleveraging". In: *American Economic Review* 107 (11), pp. 3550–3588.

Favara, Giovanni and Jean Imbs (2015). "Credit Supply and the Price of Housing". In: *American Economic Review* 105 (3), pp. 958–992.

Federal Reserve Bank of Philadelphia (2024). *Historical Housing Prices Project*. https://www.philadelphiafed.org/surveys-and-data/regional-economic-analysis/historical-housing-prices. Accessed Nov 01, 2024.

Fishback, Price (2017). "How Successful Was the New Deal? The Microeconomic Impact of New Deal Spending and Lending Policies in the 1930s". In: *Journal of Economic Literature* 55 (4), pp. 1435–1485.

Fishback, Price and Valentina Kachanovskaya (2015). "The Multiplier for Federal Spending in the States during the Great Depression". In: *The Journal of Economic History* 75 (1), pp. 125–162.

Fishback, Price, Jonathan Rose, Kenneth A. Snowden, and Thomas Storrs (2022a). "New Evidence on Redlining by Federal Housing Programs in the 1930s". In: *Journal of Urban Economics*, p. 103462.

Fishback, Price, Jonathan Rose, Kenneth A Snowden, and Thomas Storrs (2022b). "New evidence on redlining by federal housing programs in the 1930s". In: *Journal of Urban Economics*, p. 103462.

Fishback, Price V., Michael R. Haines, and Shawn Kantor (2007). "Births, Deaths, and New Deal Relief during the Great Depression". In: *The Review of Economics and Statistics* 89 (1), pp. 1–14.

Fishback, Price V., William C. Horrace, and Shawn Kantor (2005). "Did New Deal Grant Programs Stimulate Local Economies? A Study of Federal Grants and Retail Sales during the Great Depression". In: *The Journal of Economic History* 65 (1), pp. 36–71.

— (2006). "The Impact of New Deal Expenditures on Mobility during the Great Depression". In: *Explorations in Economic History* 43 (2), pp. 179–222.

Fishback, Price V., Shawn Kantor, and John Joseph Wallis (2003). "Can the New Deal's Three Rs Be Rehabilitated? A Program-by-Program, County-by-County Analysis". In: *Explorations in Economic History* 40 (3), pp. 278–307.

Fishback, Price V., Jessica LaVoice, Allison Shertzer, and Randall P. Walsh (2023). "The HOLC Maps: How Race and Poverty Influenced Real Estate Professionals' Evaluation of Lending Risk in the 1930s". In: *The Journal of Economic History* 83 (4), pp. 1019–1056.

Fishback, Price V., Jonathan Rose, and Kenneth Snowden (2019). *Well Worth Saving: How the New Deal Safeguarded Home Ownership*. University of Chicago Press.

Gelfand, Mark I. (1975). *A Nation of Cities: The Federal Government and Urban America, 1933-1965*. First Edition. New York: Oxford University Press. 494 pp.

Gendreau, Brian C. (1999). "Risk Structure of Postbellum U.S. Deposit Rates". In: *Explorations in Economic History* 36 (4), pp. 409–427.

Ghent, Andra C. (2011). "Securitization and Mortgage Renegotiation: Evidence from the Great Depression". In: *The Review of Financial Studies* 24 (6), pp. 1814–1847.

Glaeser, Edward L. and Kristina Tobio (2008). "The Rise of the Sunbelt". In: *Southern Economic Journal* 74 (3), pp. 609–643.

Gray, John H. and George W. Terborgh (1929). *First Mortgages in Urban Real Estate Finance*. Tech. rep. Brookings Institution.

Grebler, Leo, David M. Blank, and Louis Winnick (1956). *Capital Formation in Residential Real Estate: Trends and Prospects*. Princeton University Press.

Haines, Michael R. and Inter-university Consortium for Political and Social Research (2010). *Historical, Demographic, Economic, and Social Data: The United States, 1790-2002*. Inter-university Consortium for Political and Social Research [distributor].

Hornbeck, Richard (2012). "The Enduring Impact of the American Dust Bowl: Short- and Long-Run Adjustments to Environmental Catastrophe". In: *American Economic Review* 102 (4), pp. 1477–1507.

Hurst, Erik, Benjamin J. Keys, Amit Seru, and Joseph Vavra (2016). "Regional Redistribution through the US Mortgage Market". In: *American Economic Review* 106 (10), pp. 2982–3028.

Jackson, Kenneth T. (1987). *Crabgrass Frontier: The Suburbanization of the United States*. Oxford, New York: Oxford University Press. 432 pp.

James, John A. (1976a). "Banking Market Structure, Risk, and the Pattern of Local Interest Rates in the United States, 1893-1911". In: *The Review of Economics and Statistics* 58 (4), pp. 453–462.

— (1976b). "The Development of the National Money Market, 1893-1911". In: *The Journal of Economic History* 36 (4), pp. 878–897.

— (1978). *Money and Capital Markets in Postbellum America*. Princeton University Press.

Lustig, Hanno N. and Stijn G. Van Nieuwerburgh (2005). "Housing Collateral, Consumption Insurance, and Risk Premia: An Empirical Perspective". In: *The Journal of Finance* 60 (3), pp. 1167–1219.

Lyons, Ronan C, Allison Shertzer, Rowena Gray, and David N Agorastos (2024). *The Price of Housing in the United States, 1890-2006*. Working Paper 32593. National Bureau of Economic Research.

Mayer, Christopher, Karen Pence, and Shane M. Sherlund (2009). "The Rise in Mortgage Defaults". In: *Journal of Economic Perspectives* 23 (1), pp. 27–50.

Mian, Atif, Kamalesh Rao, and Amir Sufi (2013). "Household Balance Sheets, Consumption, and the Economic Slump*". In: *The Quarterly Journal of Economics* 128 (4), pp. 1687–1726.

Mian, Atif, Amir Sufi, and Francesco Trebbi (2015). "Foreclosures, House Prices, and the Real Economy". In: *The Journal of Finance* 70 (6), pp. 2587–2634.

Morton, J.E. (1956). *Urban Mortgage Lending: Comparative Markets and Experience*. Princeton: Princeton University Press.

Neumann, Todd C., Price V. Fishback, and Shawn Kantor (2010). "The Dynamics of Relief Spending and the Private Urban Labor Market during the New Deal". In: *The Journal of Economic History* 70 (1), pp. 195–220.

Ostas, James R. (1977). "Regional Differences in Mortgage Financing Costs: A Reexamination". In: *The Journal of Finance* 32 (5), pp. 1774–1778.

Piazzesi, Monika, Martin Schneider, and Selale Tuzel (2007). "Housing, Consumption and Asset Pricing". In: *Journal of Financial Economics* 83 (3), pp. 531–569.

Price, David A. and John R. Walter (2019). "It's a Wonderful Loan: A Short History of Building and Loan Associations". Economic Brief of the Federal Reserve Bank of Richmond.

Redenius, Scott A. (2006). "New National Bank Loan Rate Estimates, 1887–1975". In: *Research in Economic History*. Ed. by Alexander J. Field, Gregory Clark, and William A. Sundstrom. Vol. 24. Research in Economic History. Emerald Group Publishing Limited, pp. 55–104.

Rockoff, Hugh (1977). "Regional Interest Rates and Bank Failures, 1870–1914". In: *Explorations in Economic History* 14 (1), pp. 90–95.

Rose, Jonathan D. (2010). "Hoover's Truce: Wage Rigidity in the Onset of the Great Depression". In: *The Journal of Economic History* 70 (4), pp. 843–870.

— (2011). "The Incredible HOLC? Mortgage Relief during the Great Depression". In: *Journal of Money, Credit and Banking* 43 (6), pp. 1073–1107.

— (2014). "The Prolonged Resolution of Troubled Real Estate Lenders during the 1930s". In: *Housing and Mortgage Markets in Historical Perspective*. University of Chicago Press, pp. 245–284.

Rose, Jonathan D. and Kenneth A. Snowden (2013). "The New Deal and the Origins of the Modern American Real Estate Loan Contract". In: *Explorations in Economic History* 50 (4), pp. 548–566.

Schaaf, A. H. (1966). "Regional Differences in Mortgage Financing Costs". In: *The Journal of Finance* 21 (1), pp. 85–94.

Scharfstein, David S. and Adi Sunderam (2013). *Concentration in Mortgage Lending, Refinancing Activity and Mortgage Rates*. URL: https://www.nber.org/papers/w19156 (visited on 04/08/2024). preprint.

Smiley, Gene (1975). "Interest Rate Movement in the United States, 1888–1913". In: *The Journal of Economic History* 35 (3), pp. 591–620.

— (1981). "Regional Variation in Bank Loan Rates in the Interwar Years". In: *The Journal of Economic History* 41 (4), pp. 889–901.

— (1985). "Banking Structure and the National Capital Market, 1869-1914: A Comment". In: *The Journal of Economic History* 45 (3), pp. 653–659.

Snowden, Kenneth (1995). "The Evolution of Interregional Mortgage Lending Channels, 1870-1940: The Life Insurance-Mortgage Company Connection". In: *Coordination and Information: Historical Perspectives on the Organization of Enterprise*. University of Chicago Press, pp. 209–256.

Snowden, Kenneth A. (1987). "Mortgage Rates and American Capital Market Development in the Late Nineteenth Century". In: *The Journal of Economic History* 47 (3), pp. 671–691.

— (1988). "Mortgage Lending and American Urbanization, 1880–1890". In: *The Journal of Economic History* 48 (2), pp. 273–285.

— (2010). *The Anatomy of a Residential Mortgage Crisis: A Look Back to the 1930s*. URL: https://www.nber.org/papers/w16244 (visited on 02/13/2024). preprint.

Solow, Robert M. (1956). "A Contribution to the Theory of Economic Growth". In: *The Quarterly Journal of Economics* 70 (1), p. 65.

Stuckler, David, Christopher Meissner, Price Fishback, Sanjay Basu, and Martin McKee (2012). "Banking Crises and Mortality during the Great Depression: Evidence from US Urban Populations, 1929–1937". In: *J Epidemiol Community Health* 66 (5), pp. 410–419.

Sushka, Marie Elizabeth and W. Brian Barrett (1984). "Banking Structure and the National Capital Market, 1869-1914". In: *The Journal of Economic History* 44 (2), pp. 463–477.

— (1985). "Banking Structure and the National Capital Market, 1869-1914: A Reply". In: *The Journal of Economic History* 45 (3), pp. 661–665.

Swan, T. W. (1956). "Economic Growth and Capital Accumulation". In: *Economic Record* 32 (2), pp. 334–361.

Sylla, Richard Eugene (1969). “Federal Policy, Banking Market Structure, and Capital Mobilization in the United States, 1863–1913”. In: *The Journal of Economic History* 29 (4), pp. 657–686.

— (1972). “The United States, 1863-1913”. In: *Banking and Economic Development: Some Lessons of History*. Ed. by Cameron. New York: Oxford University Press.

— (1975). *The American Capital Market, 1846-1914: A Study of the Effects of Public Policy on Economic Development*. Arno Press. 336 pp.

U.S. Census Bureau (1923). *1920 Census Monograph 2. Mortgages on Homes*. Tech. rep. U.S. Census Bureau.

— (1943). *1940 Census of Housing: Volume 4*. Tech. rep. U.S. Census Bureau.

— (1952). *1950 Census of Housing: Volume 4*. Tech. rep. U.S. Census Bureau.

— (1963). *1960 Census of Housing*. Tech. rep. U.S. Census Bureau.

Weaver, Robert (1948). *The Negro Ghetto*. New York: Harcourt, Brace and Company.

White, Eugene N., Kenneth Snowden, and Price Fishback (2014). *Housing and Mortgage Markets in Historical Perspective*. University of Chicago Press.

Wickens, David L. (1935). “The Financial Survey for Urban Housing”. In: *Journal of the American Statistical Association* 30 (189), pp. 295–300.

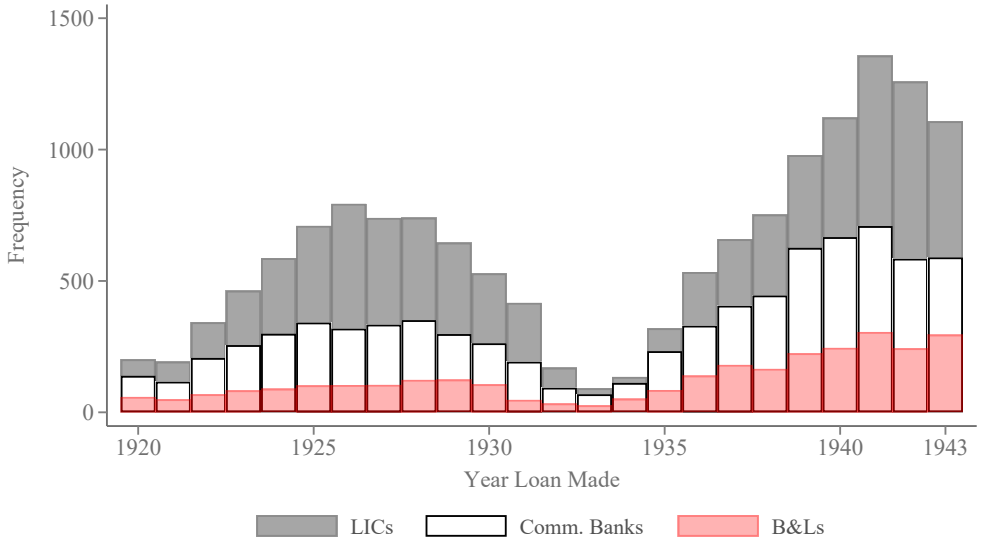
Williamson, Jeffrey G. (1974). *Late Nineteenth-Century American Development: A General Equilibrium History*. CUP Archive. 382 pp.

# Appendix A: Additional Figures and Tables

Figure A.1: NBER Loan Cards Histograms

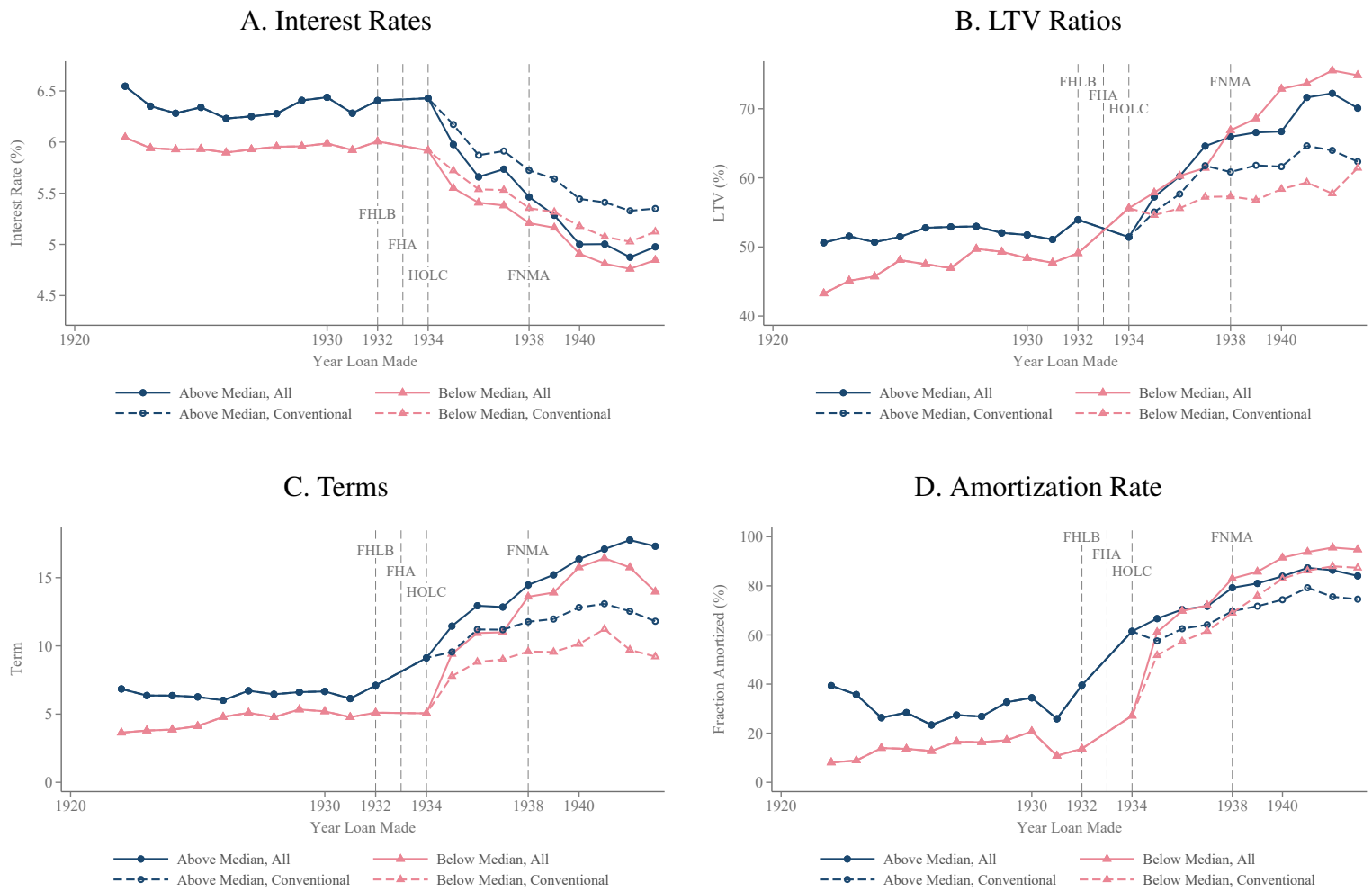
A. Number of Loans by Government Insurance

B. Number of Loans by Holder



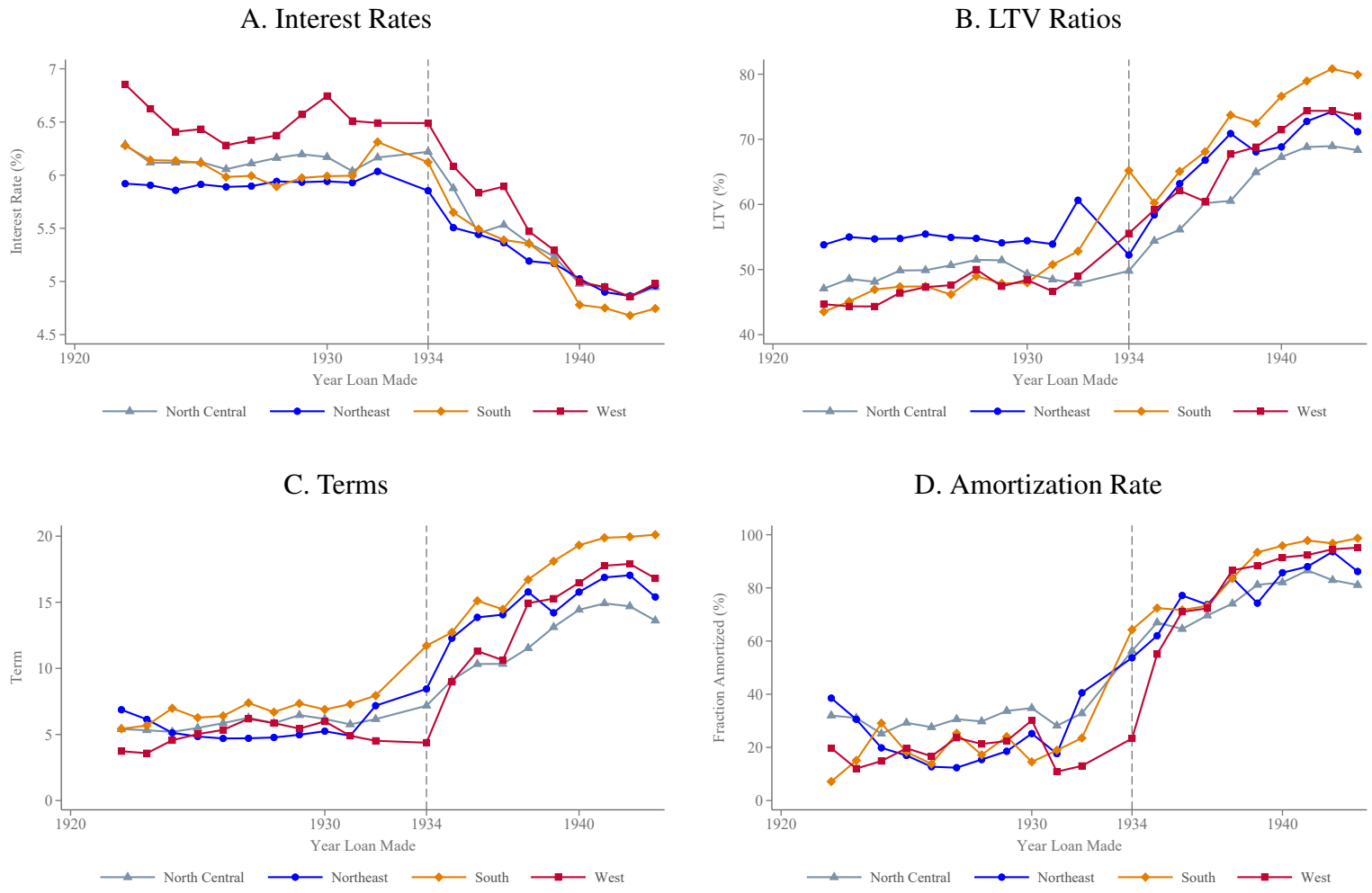

*Notes.* This figure plots histograms of the number of individual mortgage loans from the NBER's survey by the year in which they were made. Panel A shows results separately by whether or not the loans were government insured, and Panel B shows results separately by holder (Life Insurance Companies, Commercial Banks or B&Ls). See Morton, 1956 for additional information on the purpose of the survey.

Figure A.2: Mortgage Conditions by Government Insurance Status, 1920-1943



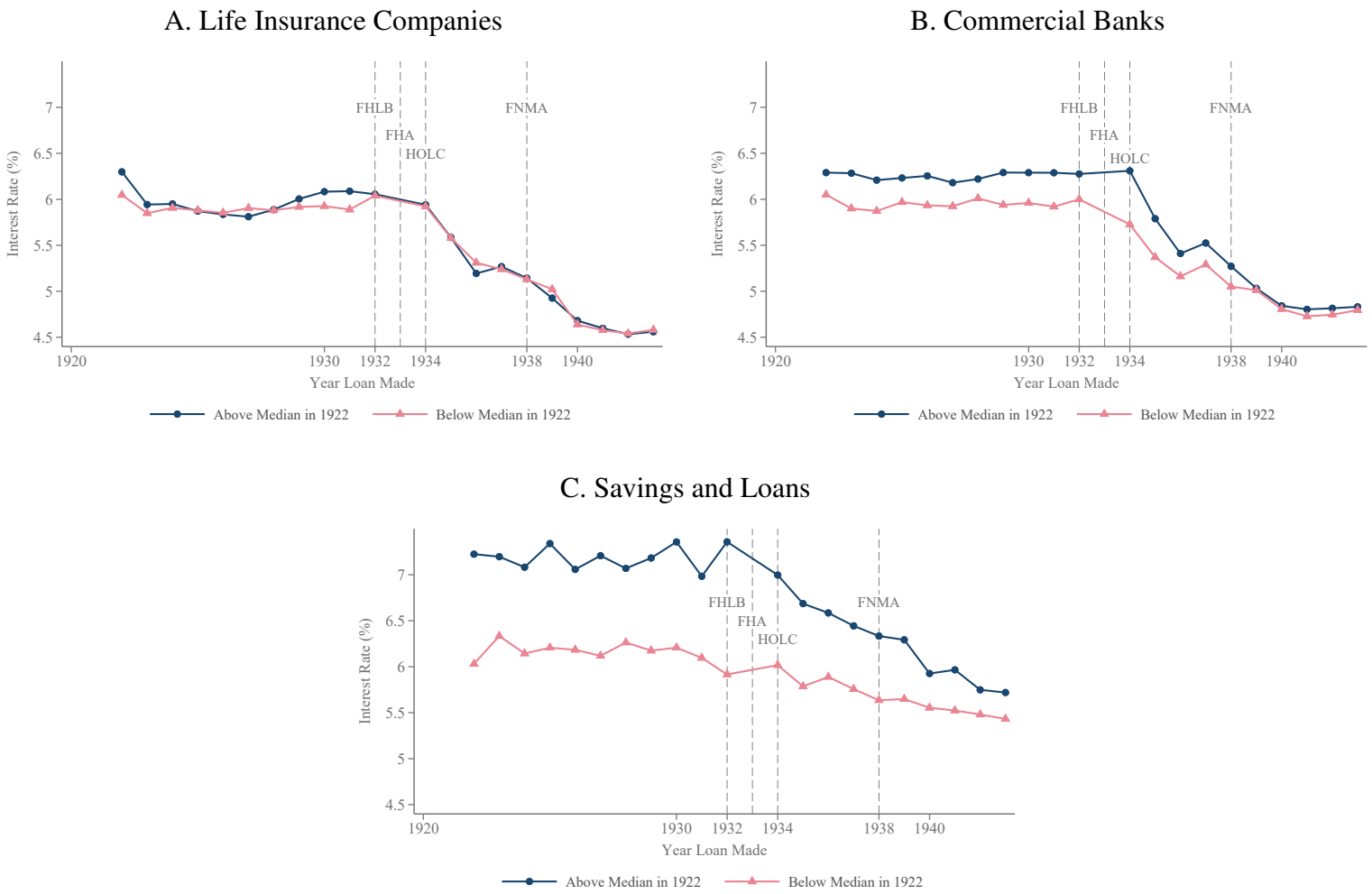

*Notes.* This figure plots changes in average mortgage characteristics over time from the NBER's survey individual mortgage loans by government insurance status. In each panel, we split states into two mutually exclusive groups based on whether the state had above or below median value of the respective characteristic in 1922. Panel A shows the average interest rates over time for loans made in states that had above median interest rate in 1922 in blue and in states with below median interest rates in 1922 in pink. Panels B, C and D show the analogous time trends for loan-to-value ratios, terms and amortization rate. We plot vertical lines for the years when the FHLB, FHA, HOLC and FNMA were established. See the notes to Figure 6 for additional information.

Figure A.3: Mortgage Conditions by Region, 1920-1943




*Notes.* This figure plots changes in average mortgage characteristics over time from the NBER's survey individual mortgage loans by census region. See the notes to Figure 6 for additional information.

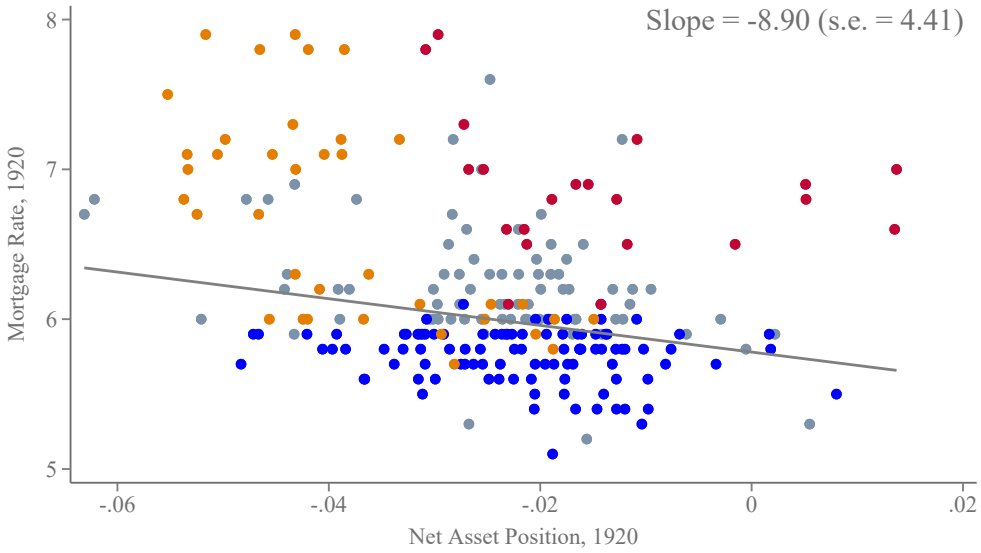
Figure A.4: Mortgage Interest Rates by Holder, 1920-1943



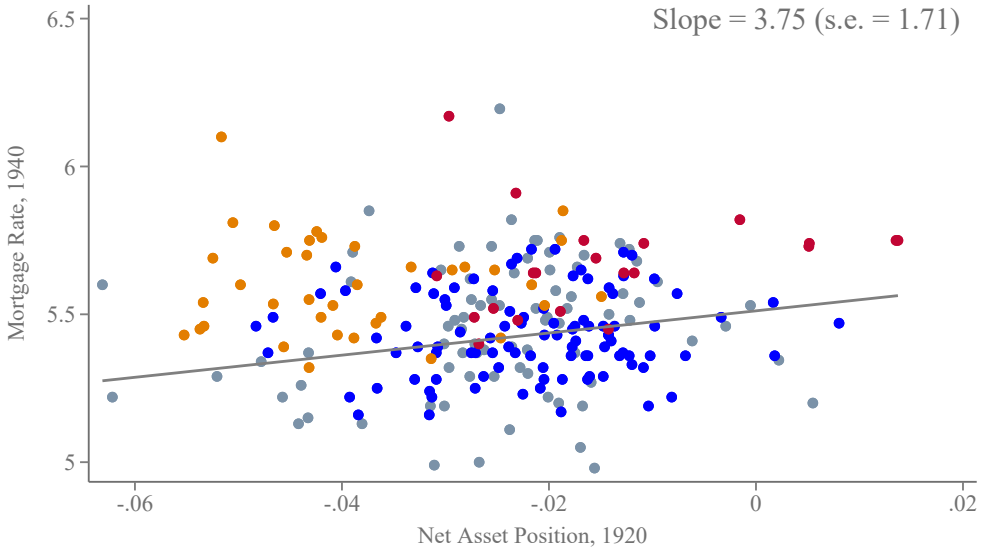

*Notes.* This figure plots changes in average mortgage interest rates over time from the NBER's survey individual mortgage loans by institutional holder. In each panel, we split states into two mutually exclusive groups based on whether the state had above or below median interest rate in 1922. We plot vertical lines for the years when the FHLB, FHA, HOLC and FNMA were established. See the notes to Figure 6 for additional information.

Figure A.5: Mortgage Interest Rates and City-Level Relative Scarcity

A. 1920

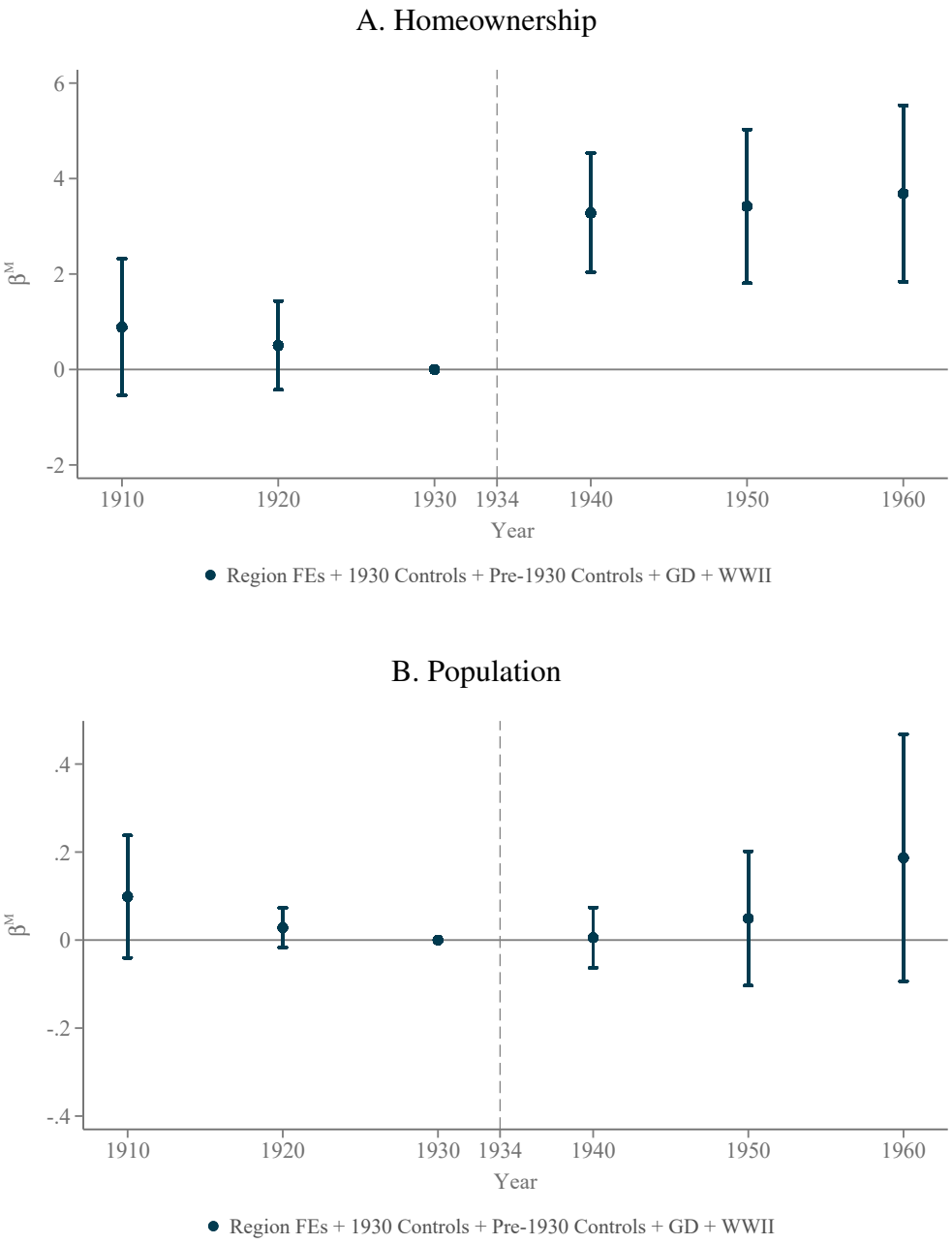



B. 1940



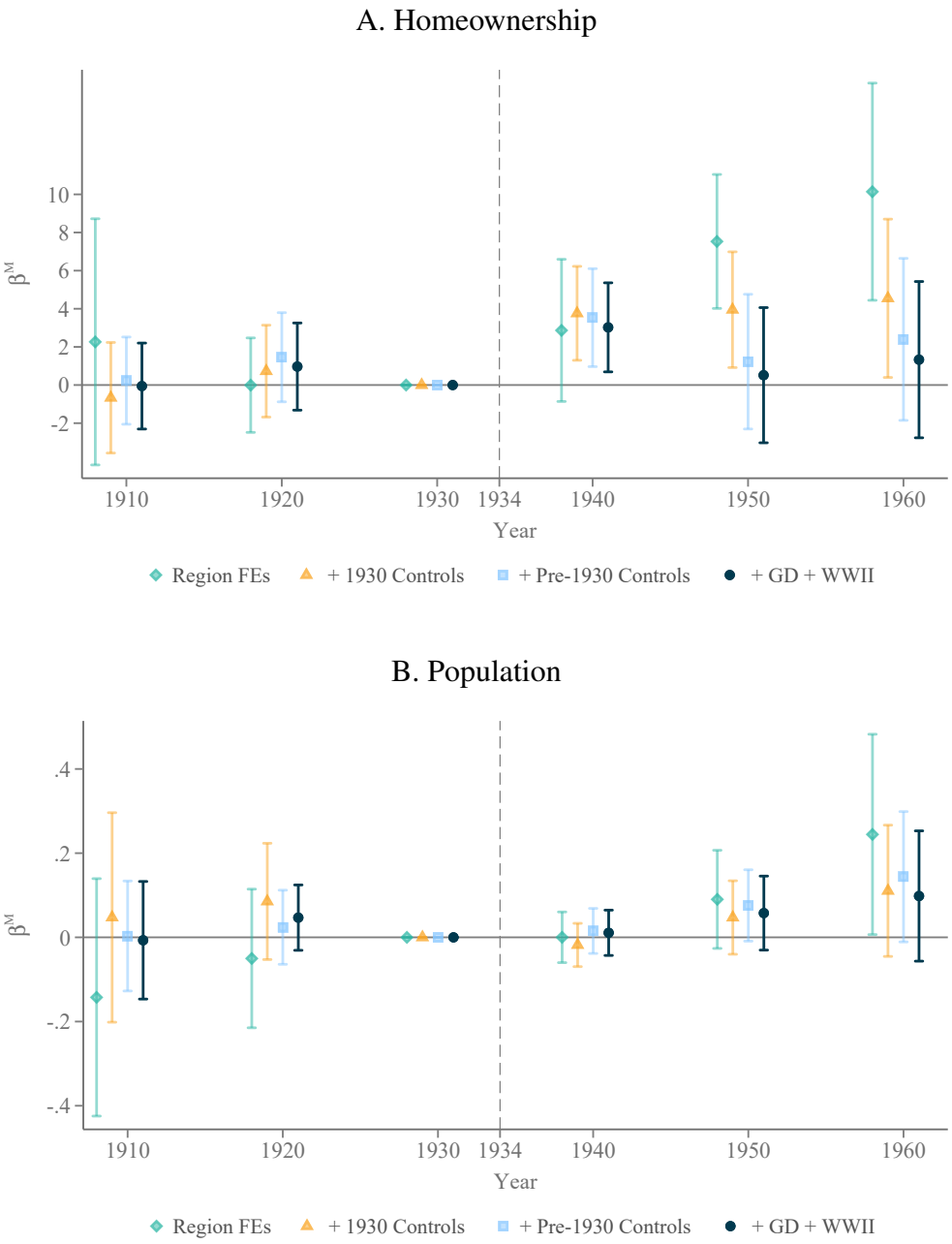

*Notes.* This figure plots the mortgage interest rate in 1920 (Panel A) and in 1940 (Panel B) against the city-level relative capital scarcity in 1920 for the 237 cities in our sample. We proxy for relative capital scarcity using the city's net asset position, constructed using the approach of Auclert et al. (2021) (see the main text for further details). We show the results from a bivariate regression of interest rates on relative capital scarcity in the top left corner.

Figure A.6: Changes in Homeownership Rate and Population in Cities with a Larger Reduction in Mortgage Rates, for 26 Cities



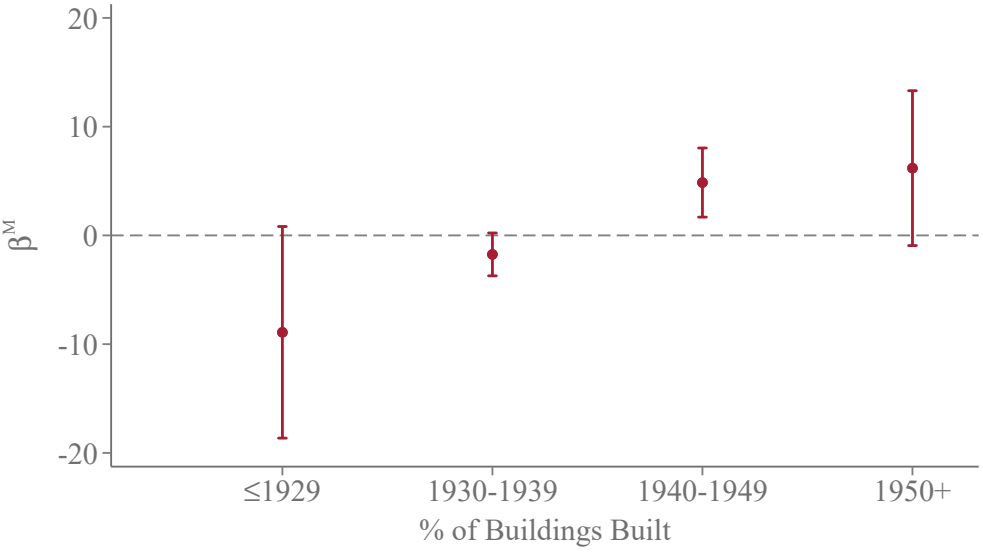

This figure plots the coefficients $\beta_t^m$ estimated in the dynamic regression in thes tyle of Equation 1 for the *Notes.* homeownership rate (Panel A) and log population (Panel B) for the subsample of 26 cities for which we have data on housing and rental prices from Federal Reserve Bank of Philadelphia (2024). The regressions control for the percent of city residents who are Black in 1930, the number of manufacturing establishments in 1930, the average January temperatures at the city level, and for the Great Depression and World War II shocks as described in the text. All regressions are weighted by the city population in 1930. All regressions are weighted by the city population in 1930.

Figure A.7: Changes in House Prices and Rents in Cities with a Larger Reduction in Mortgage Rates, for 106 Cities




*Notes.* This figure plots the coefficients $\beta_t^m$ estimated in the dynamic regression in Equation 1 for the homeownership rate (Panel A) and log population (Panel B) for the subsample of 106 cities for which we have age of construction data. The coefficients in green result from a regression that only controls for region-by-year fixed effects; the orange coefficients reflect additions of demographic and economic controls for the base year, 1930; the light-blue coefficients reflect additions of demographic and economic controls for all periods before the event and the lag of the outcome variable; finally, the navy coefficients reflect our main specification and include the variables related to other contemporaneous economic shocks, the Great Depression and World War II. All regressions are weighted by the city population in 1930.

Figure A.8: Percent of City Built by Decade, as of 1960




*Notes.* This figure reports $\beta^M$ coefficients from estimating the regression model in Equation 1 for four different outcomes: the fraction of city structures built before 1929; fraction of structures built between 1930 and 1939; fraction of structures built between 1940 and 1949, and fraction of structures built after 1950, as of 1960, for 106 cities with data on age of structures. See the main text for more details.

Table A.1: Determinants of Initial Interest Rates

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| *Demographics, 1920* | | | | | |
| Frac 21-30 | 7.94 | | | | 5.61 |
| | (3.53) | | | | (2.64) |
| Frac 31-50 | 5.44 | | | | 5.01 |
| | (2.66) | | | | (2.53) |
| Frac 51+ | 2.61 | | | | -0.53 |
| | (3.06) | | | | (2.26) |
| *Industry Composition, 1920* | | | | | |
| Frac. Agriculture | | 12.94 | | | 9.25 |
| | | (3.96) | | | (4.23) |
| Frac Mining | | 3.59 | | | 3.46 |
| | | (1.95) | | | (2.32) |
| Frac Construction | | 8.20 | | | 6.12 |
| | | (3.52) | | | (3.17) |
| Frac Manufacturing | | 1.28 | | | 1.89 |
| | | (1.56) | | | (2.30) |
| Frac Transport., Telecomm. & Utlt. | | 3.13 | | | 2.27 |
| | | (1.53) | | | (2.28) |
| Frac Trade | | -3.39 | | | 1.81 |
| | | (2.26) | | | (3.14) |
| Frac Finance & Business | | 6.09 | | | 1.55 |
| | | (3.02) | | | (4.69) |
| *Economic Chars., 1920* | | | | | |
| Avg. Mfg. Wage (log) | | | 0.22 | | 0.37 |
| | | | (0.36) | | (0.36) |
| Mfg. Estab. (log) | | | -0.57 | | -0.23 |
| | | | (0.16) | | (0.14) |
| Farms (log) | | | 0.05 | | 0.02 |
| | | | (0.04) | | (0.03) |
| Average Occ. Score | | | -0.17 | | -0.06 |
| | | | (0.07) | | (0.06) |
| Fraction Top 10% | | | 8.69 | | 2.92 |
| | | | (2.36) | | (1.67) |
| Population (log) | | | 0.51 | | 0.17 |
| | | | (0.18) | | (0.16) |
| *Financial Chars.* | | | | | |
| Frac. Deposits/Assets, 1904 | | | | 0.442 | 0.051 |
| | | | | (0.254) | (0.306) |
| Frac. B&L Members/Popln., 1893 | | | | -0.003 | 0.001 |
| | | | | (0.006) | (0.004) |
| Frac. B&L Debtors/Members, 1893 | | | | 0.016 | 0.009 |
| | | | | (0.004) | (0.004) |
| CBs RE Holdings Limited, 1910 | | | | -0.271 | -0.085 |
| | | | | (0.102) | (0.098) |
| CBs RE Loans Restricted, 1910 | | | | 0.083 | -0.019 |
| | | | | (0.065) | (0.083) |
| SBs RE Holdings Limited, 1910 | | | | -0.474 | -0.268 |
| | | | | (0.212) | (0.196) |
| SBs RE Loans Restricted, 1910 | | | | -0.093 | 0.037 |
| | | | | (0.105) | (0.100) |
| $R^2$ | 0.14 | 0.41 | 0.38 | 0.39 | 0.62 |
| Cities | 205 | 205 | 205 | 205 | 205 |

*Notes.* This table shows results from OLS regressions of city-level interest rates in 1920 on demographic, economic and financial characteristics for 205 cities in our sample. All regressions weight by the city population in 1920.