America's Housing Affordability Crisis and the Decline of Housing Supply

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Roadmap of Paper

- Key Facts
  - Real house prices are at historical highs
    - Nationally
    - Locally—including in many Sunbelt markets (this is new)
  - Rate of net new supply increase has shrunk over time
    - Convergence across different types of markets is striking
    - Slowdown and convergence occurring in the suburbs, not just the central cities
- Paper argues that supply side conditions are becoming more important
  - Strength of the relationship between *house price* and the *supply of new units* is the key to understanding the potential role of supply side constraints
    - Expensive housing markets do not have much building
    - New unit supply is less correlated with price over time, even in Sunbelt markets
    - Density plays a role, too, but it is not the dominant factor

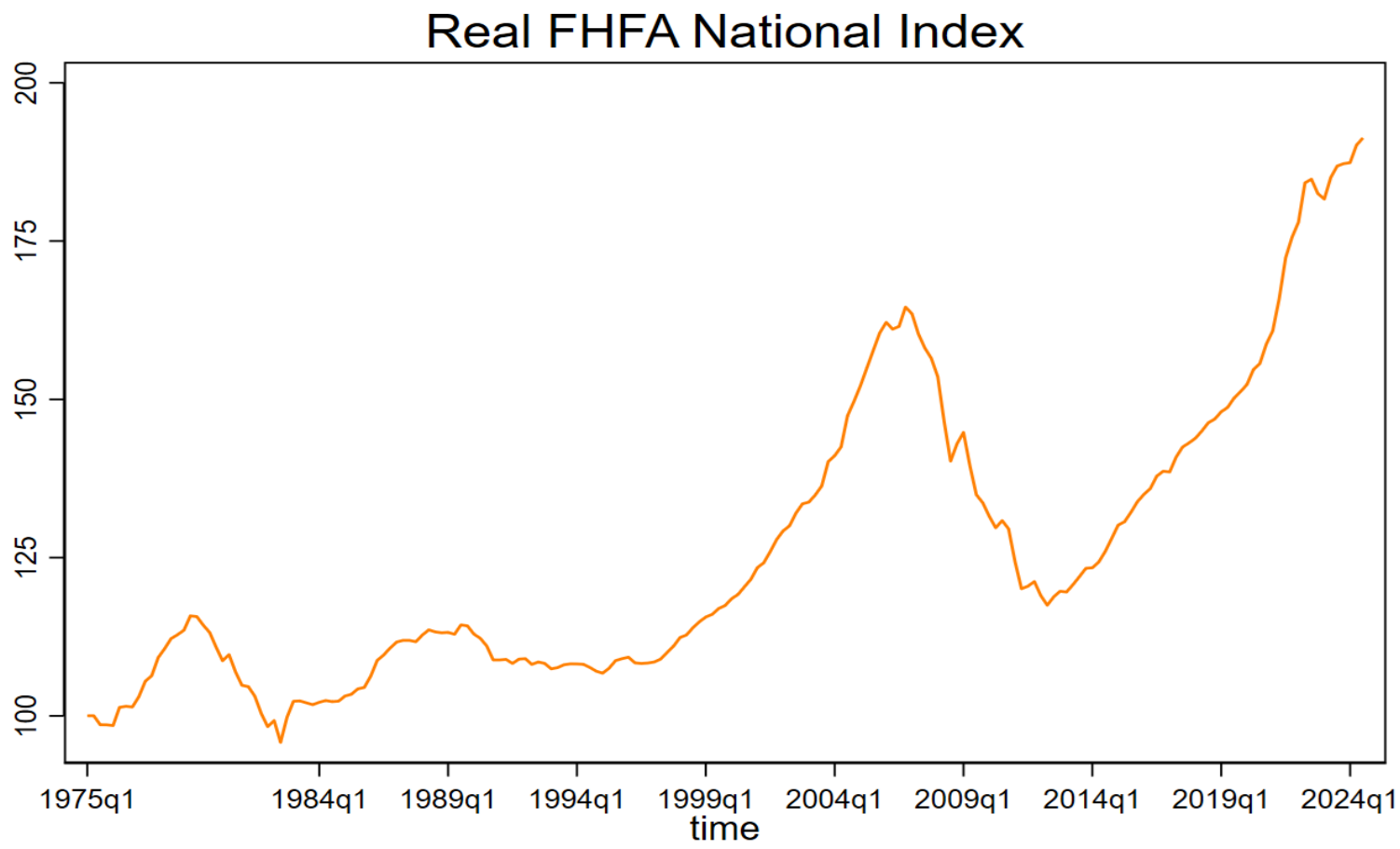
Roadmap of the Paper (cont'd.)

- Other supply side factors in play, too
  - Rising physical construction costs since the early 2000s are important (30%+)
  - Shock to the homebuilding sector from the GFC was severe, but TX markets have fully reconstituted their building sectors

- Use newly-created data base (aka 'Reverse LTDB') for some of the empirical analysis
  - Addresses concerns over endogenous outcomes and noisy data in the LTDB

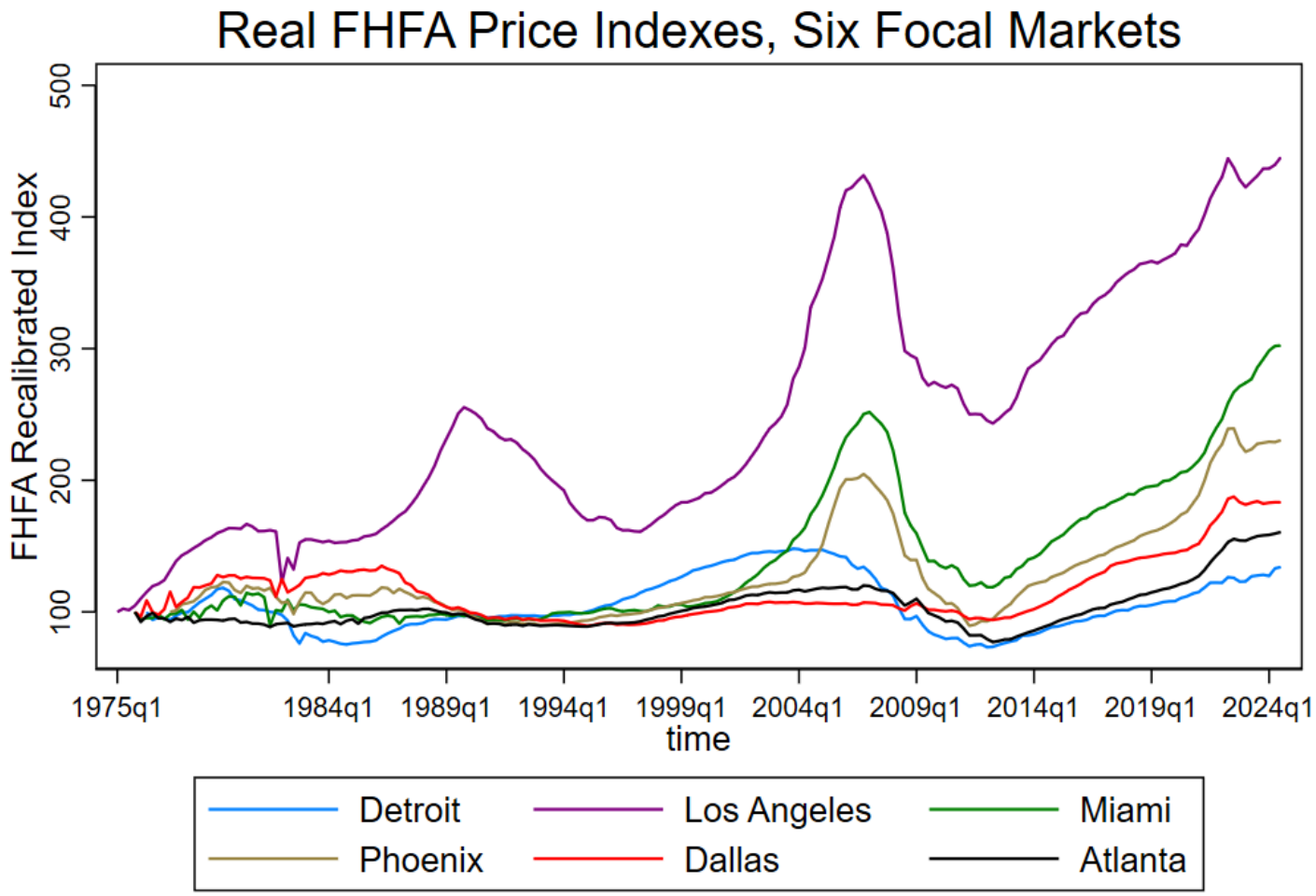
➔Demand does matter, of course, but the longer-run supply-side changes are more important determinants of worsening affordability conditions, especially in Sunbelt markets

The Affordability Issue: Prices (Appendix Figure 1)



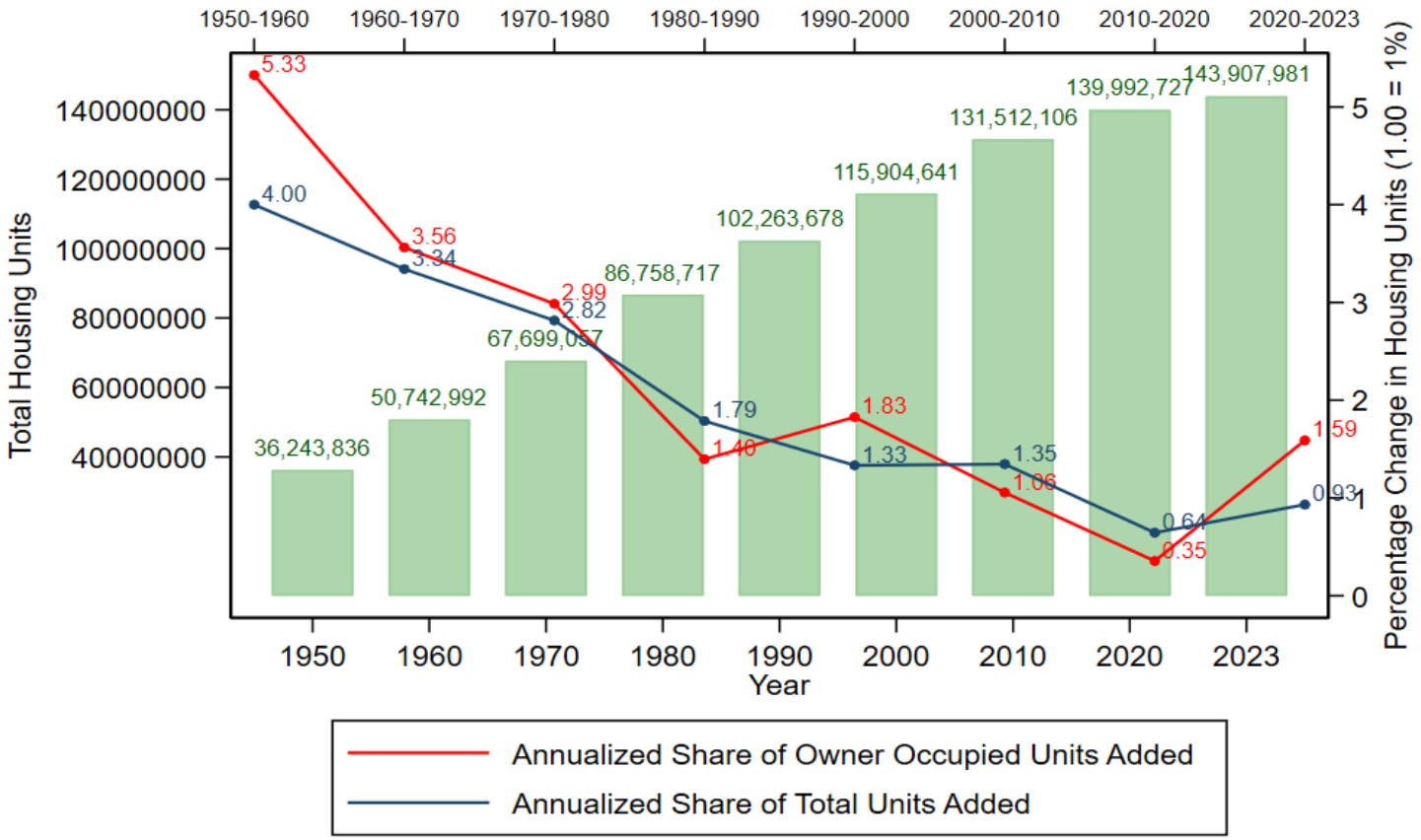
FHFA through 2024q3. 1975q1 = 100.

The Affordability Issue: Prices (Fig. 4)



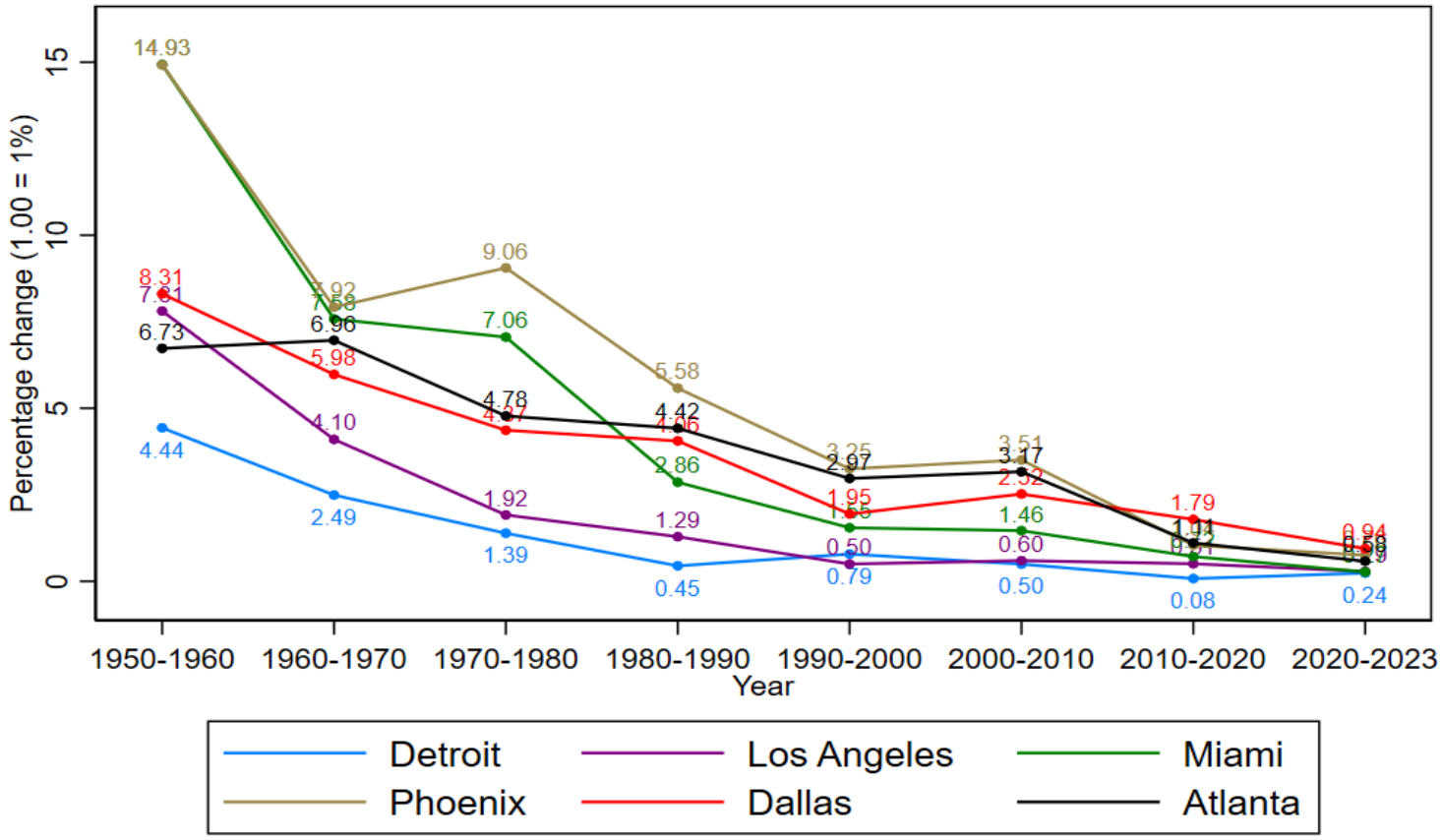
Through 2024q3. 1975q1 = 100.

The American Housing Stock Over Time (Fig. 1)



Note: Housing stock numbers for 1950 and 1960 are constructed using the count of homes built before 1950 and 1960, respectively, in the 1970 census. All others are from the decennial censuses (1970-2020) or built up from county level data from the 2019-2023 5-Year ACS estimates. See the discussion above in the data description subsection for more on these choices.

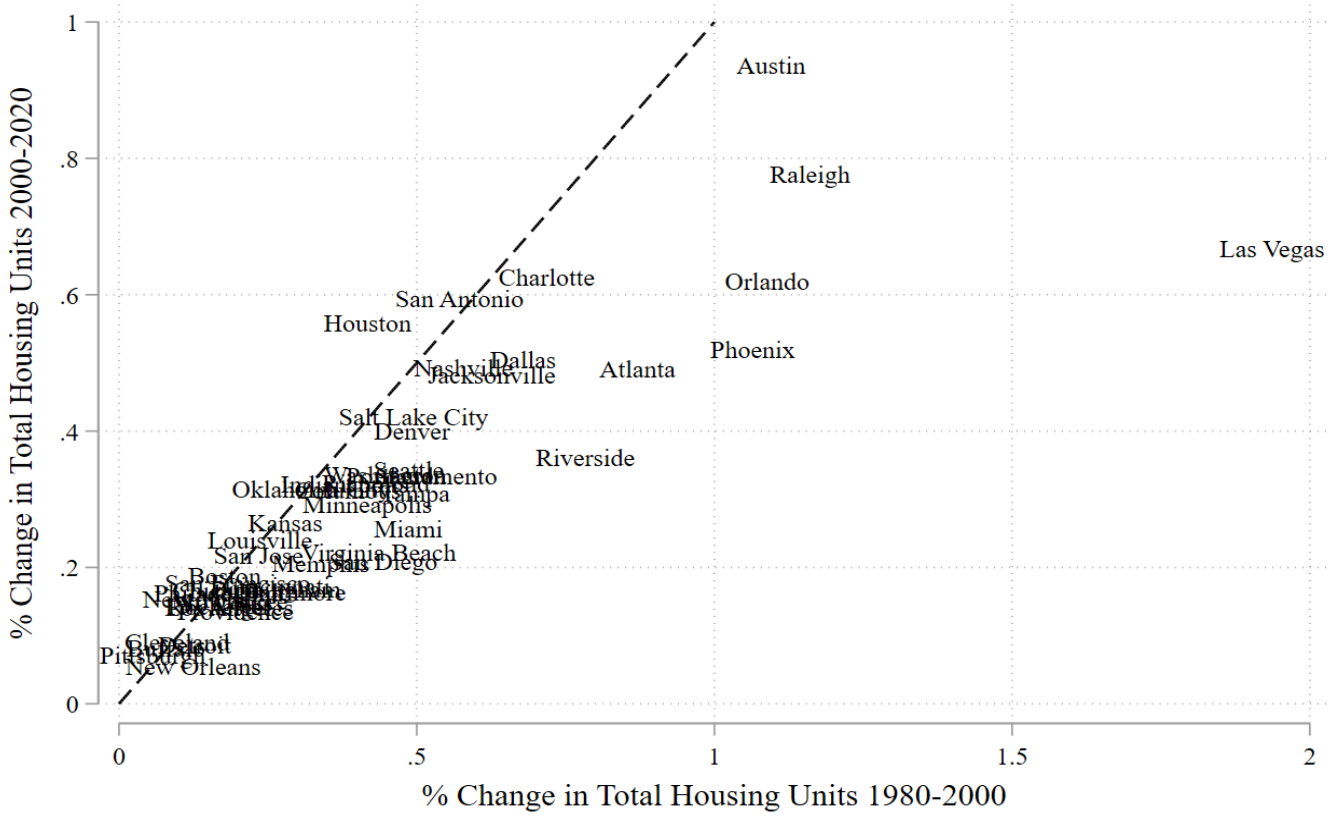
Convergence in Housing Unit Growth Rates Over Time
Six Focal Markets (Fig. 2)



Note: The value for 2020-2023 is the average percentage change over three years. For the years 1950 and 1960, we construct CBSA-level aggregates from 1970's county-level census data on the number of homes built before 1950 and 1960. For each decade in 1970-2000, we construct CBSA-level aggregates from county-level census data from that year. In 2010, 2020 and 2023 we use 2006-2010, 2016-2020 and 2019-2023 5-year ACS county-level estimates to aggregate up to CBSA-level.

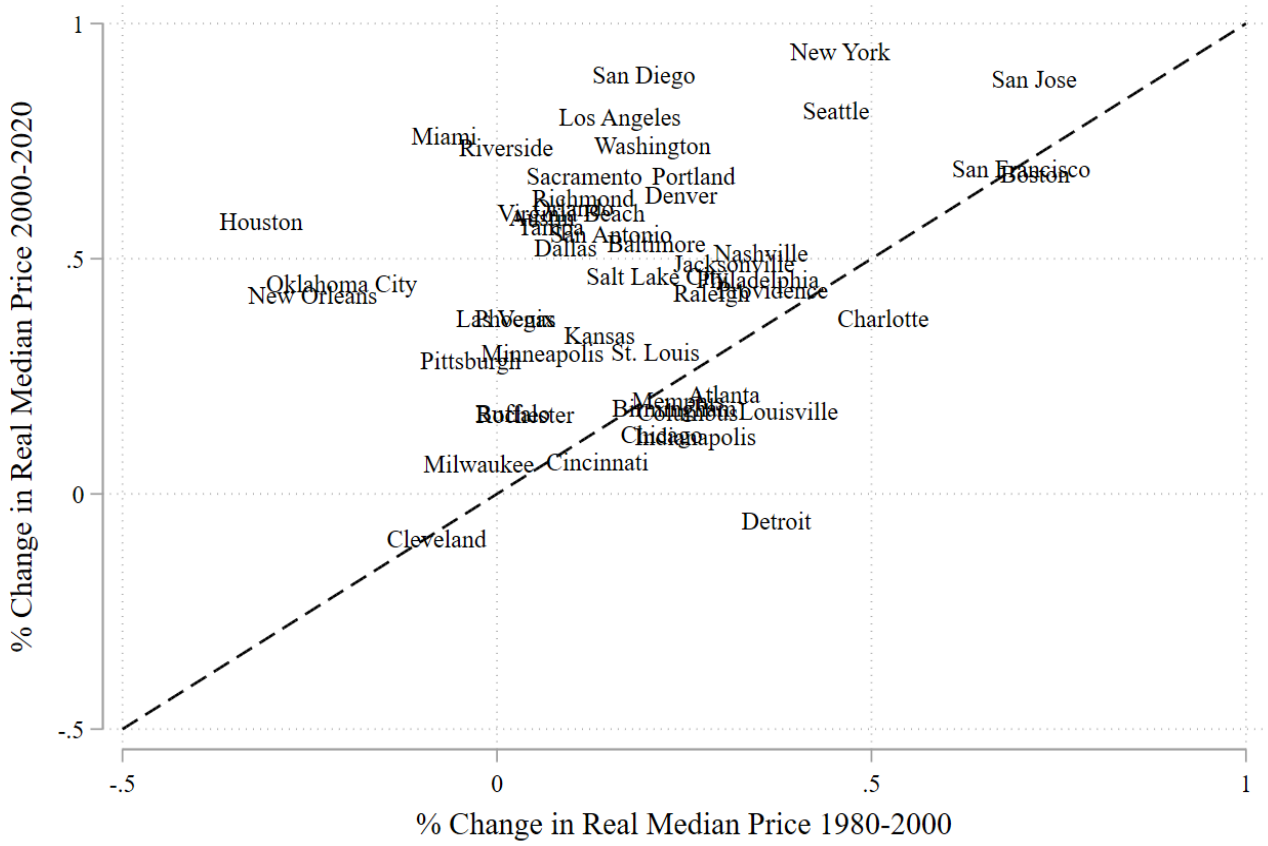
The Decline in the Intensity of New Housing Unit Production is Broad Based, Including in the Sunbelt

Top 50 Markets (by 2020 Population): Percentage Changes in Housing Units Over Time

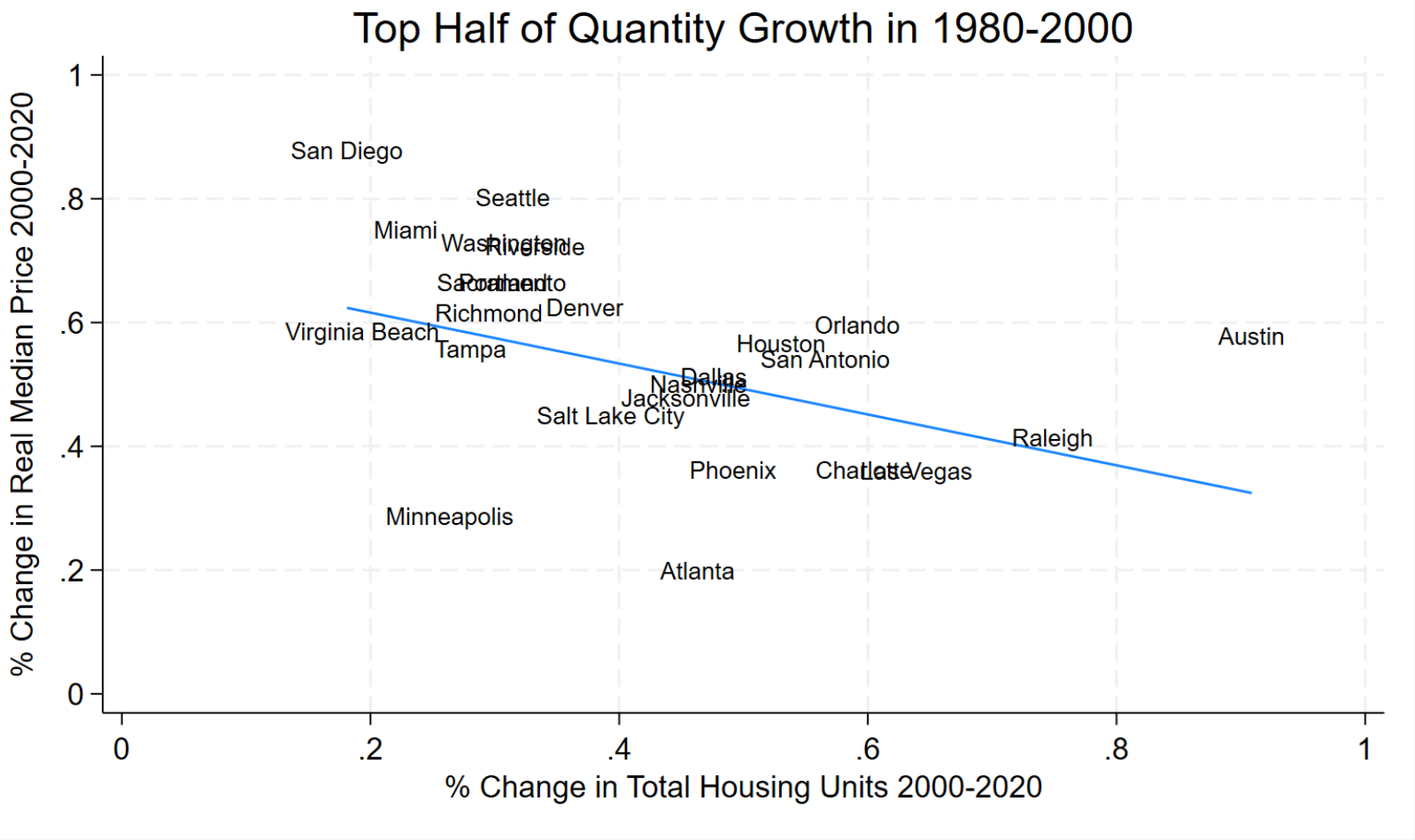


Rising Real House Prices Are Widespread, Too

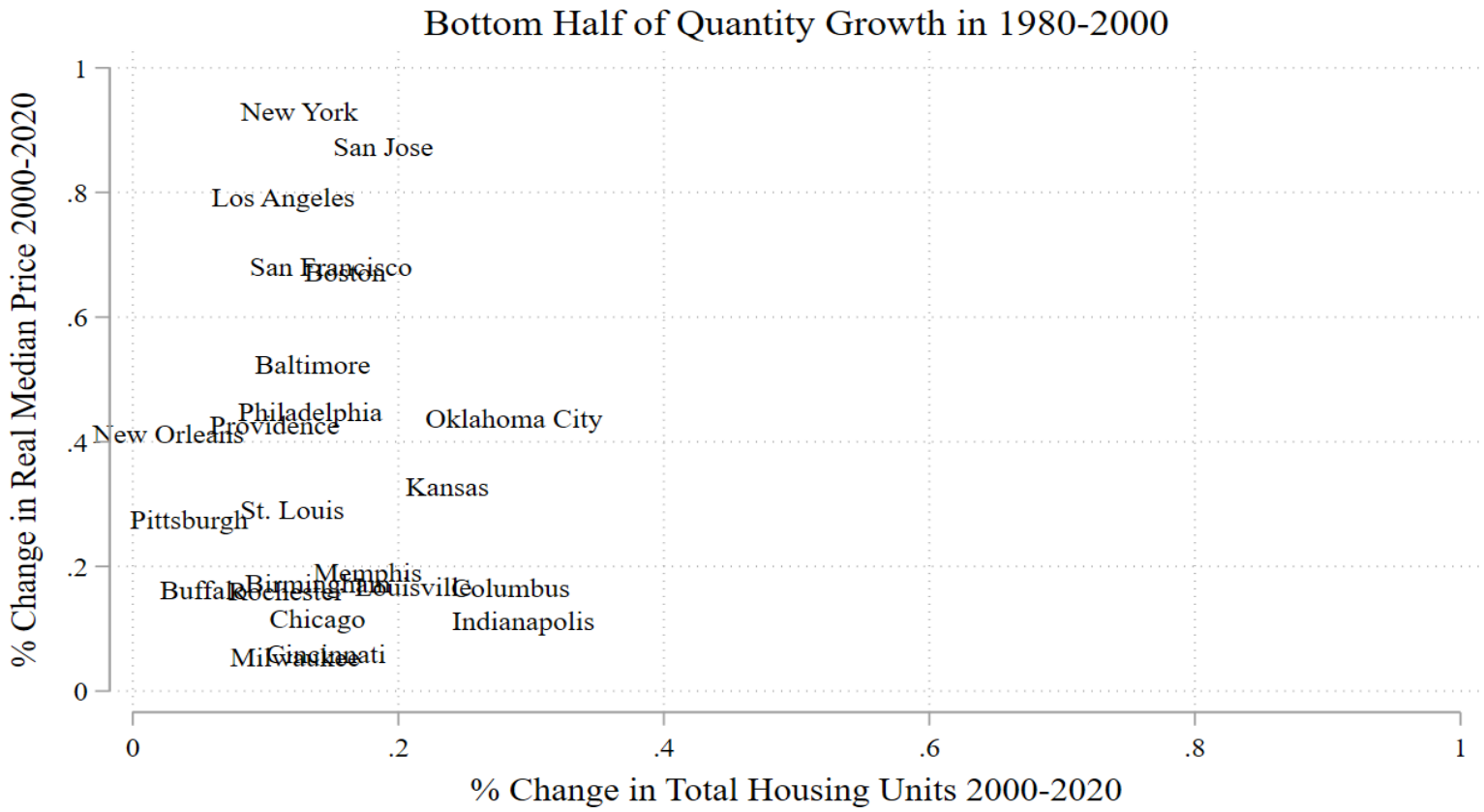
Top 50 Markets (by 2020 Population): Percentage Changes in House Prices Over Time



What Happened in the Metros from the Top Half of the Distribution of Housing Unit Growth in 1980-2000?



What Happened in the Metros from the Bottom Half of the Distribution of Housing Unit Growth in 1980-2000?



Note: Detroit and Cleveland are not included in the plot.
Their %changes in value between 2000-2020 are close to -0.1 and %changes in units are close to 0.05.

Measuring Neighborhood Change

- LTDB (Longitudinal Tract Data Base) widely used to study neighborhood change over time.
  - Has been useful for many analyses (e.g., changing segregation), but its use of 2010 tract borders make it less useful when looking at something such as the changing link between density and growth

- With tract boundaries defined such that they have reached a certain number of housing units by 2010, less populated places are likely to have experienced high growth in the data

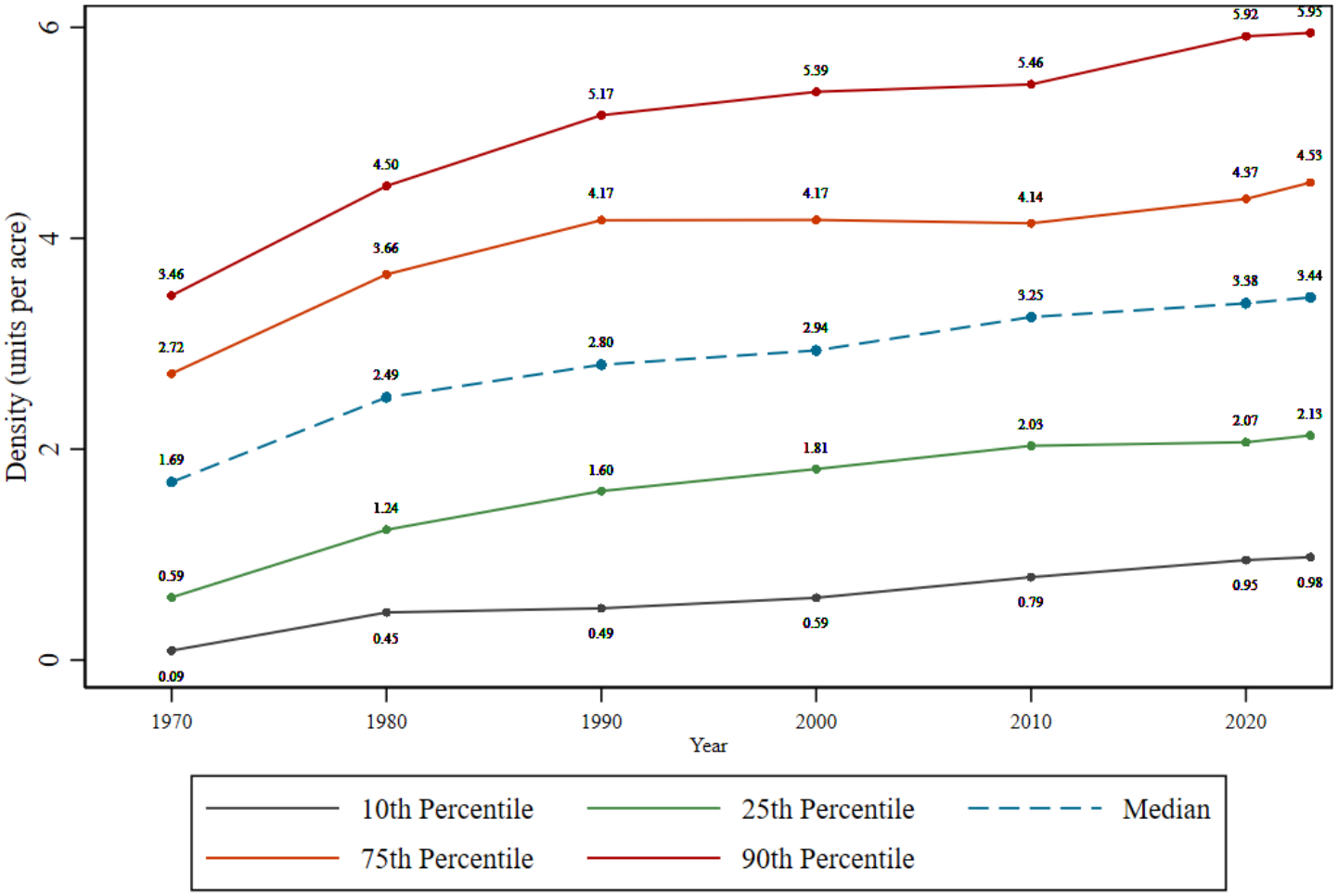
Measuring Neighborhood Change

- This can generate an endogenous outcome for us
  - Consider a tract which has a high density area with 2,000 units and a low density area that has zero units in 1990.
  - Let the high density area's number of units double in 20 years, with no change in the low density area. When the tract is split, presume the low density area is grouped with half the high density area.
  - The result is two tracts
    - One with high density that did actually grow, but the data indicates it did not
    - One with low density that did not actually grow, but the data says it did
  - This shows that it is possible to incorrectly assign growth to low density areas and undercount growth of a dense area (among other potential problems)

Measuring Neighborhood Change

- Our solution is a ‘reverse LTDB’ which starts with 1970 tract definitions
  - This is much less likely to incorrectly measure growth or density
  - A downside is that we have fewer tracts to work with because not every part of every CBSA had been assigned census tracts by 1970

Measuring Neighborhood Change
Density Across Tracts in Phoenix, Reverse LTDB, Fig. 3



Note: : Tract-level total unit density is constructed as the number of all housing units per acre in 1970-standardized tracts. The distribution is calculated in each year based on Phoenix's 1970 CBSA boundary.

The Slowdown in Production of New Units Is In the Suburbs, not Just the Central City

Table 1: Decadal Percentage Change in Single Housing Unit Density by Miles from the City Center

CBSA	Miles from Center	1970-1980	1980-1990	1990-2000	2000-2010	2010-2020
Atlanta	0-5	-0.087	-0.000	0.042	0.015	0.071
	5-10	-0.074	0.113	0.158	0.044	0.089
	10 Plus	0.526	0.991	0.501	0.204	0.044
Dallas	0-5	-0.023	-0.045	0.088	0.015	0.077
	5-10	0.090	0.041	0.051	0.003	0.123
	10 Plus	0.406	0.480	0.408	0.298	0.152
Miami	0-5	-0.176	0.054	0.107	-0.048	-0.078
	5-10	-0.098	0.065	0.112	-0.031	-0.032
	10 Plus	0.059	0.172	0.352	0.356	0.047
Phoenix	0-5	-0.034	-0.079	0.089	-0.099	0.127
	5-10	0.587	0.039	0.186	0.047	0.017
	10 Plus	1.180	1.270	0.780	0.275	0.133
Los Angeles	0-5	-0.005	-0.165	0.046	0.094	0.028
	5-10	-0.007	-0.016	0.036	-0.019	0.018
	10 Plus	0.178	0.125	0.147	0.004	-0.008
Detroit	0-5	-0.207	-0.264	0.026	-0.196	-0.024
	5-10	-0.047	-0.130	-0.008	-0.165	-0.130
	10 Plus	0.286	0.084	0.182	0.029	0.009

Note: Single family unit density in each distance-to-center ring is calculated by adding all single-unit housing in each distance bin, and dividing by the total acreage of the tracts in that distance bin. A tract is considered within a distance to center bin if its centroid is in that distance bin. Using these decadal density measures, we compute the decadal percentage change for a distance to center bin within a CBSA, which are reported in the table.

Growing Shares of Expensive Units
Los Angeles, Miami and Phoenix

Table 3: Share of Tracts in P:MPPC Bins - Los Angeles, Miami, and Phoenix

CBSA	P:MPPC Bin	1970	1980	1990	2000	2010	2020	2023
Los Angeles	P:MPPC < 0.8	0.856	0.383	0.085	0.149	0.015	0.019	0.011
	0.8 < P:MPPC < 1.2	0.096	0.361	0.292	0.451	0.096	0.232	0.057
	P:MPPC > 1.2	0.048	0.256	0.624	0.400	0.889	0.749	0.932
Miami	P:MPPC < 0.8	0.899	0.657	0.659	0.531	0.288	0.393	0.183
	0.8 < P:MPPC < 1.2	0.081	0.198	0.161	0.258	0.361	0.300	0.403
	P:MPPC > 1.2	0.020	0.145	0.180	0.210	0.351	0.307	0.413
Phoenix	P:MPPC < 0.8	0.955	0.839	0.825	0.683	0.535	0.588	0.346
	0.8 < P:MPPC < 1.2	0.036	0.106	0.122	0.229	0.287	0.268	0.355
	P:MPPC > 1.2	0.009	0.055	0.052	0.088	0.178	0.145	0.298

Note: P:MPPC is calculated for each tract in each year by taking the real median home value (P), and dividing it by the CBSA-level value of MPPC. We compute the share of tracts within a CBSA in the designated bins accordingly.

Shifting Empirical Supply Curves

- Our supply curve is

  Log(Housing Unit Growth)=a*Log(Price)-b*Log(Density) + e

- There is also a housing demand curve, even within metropolitan areas, in which density can matter (as well as idiosyncratic features)

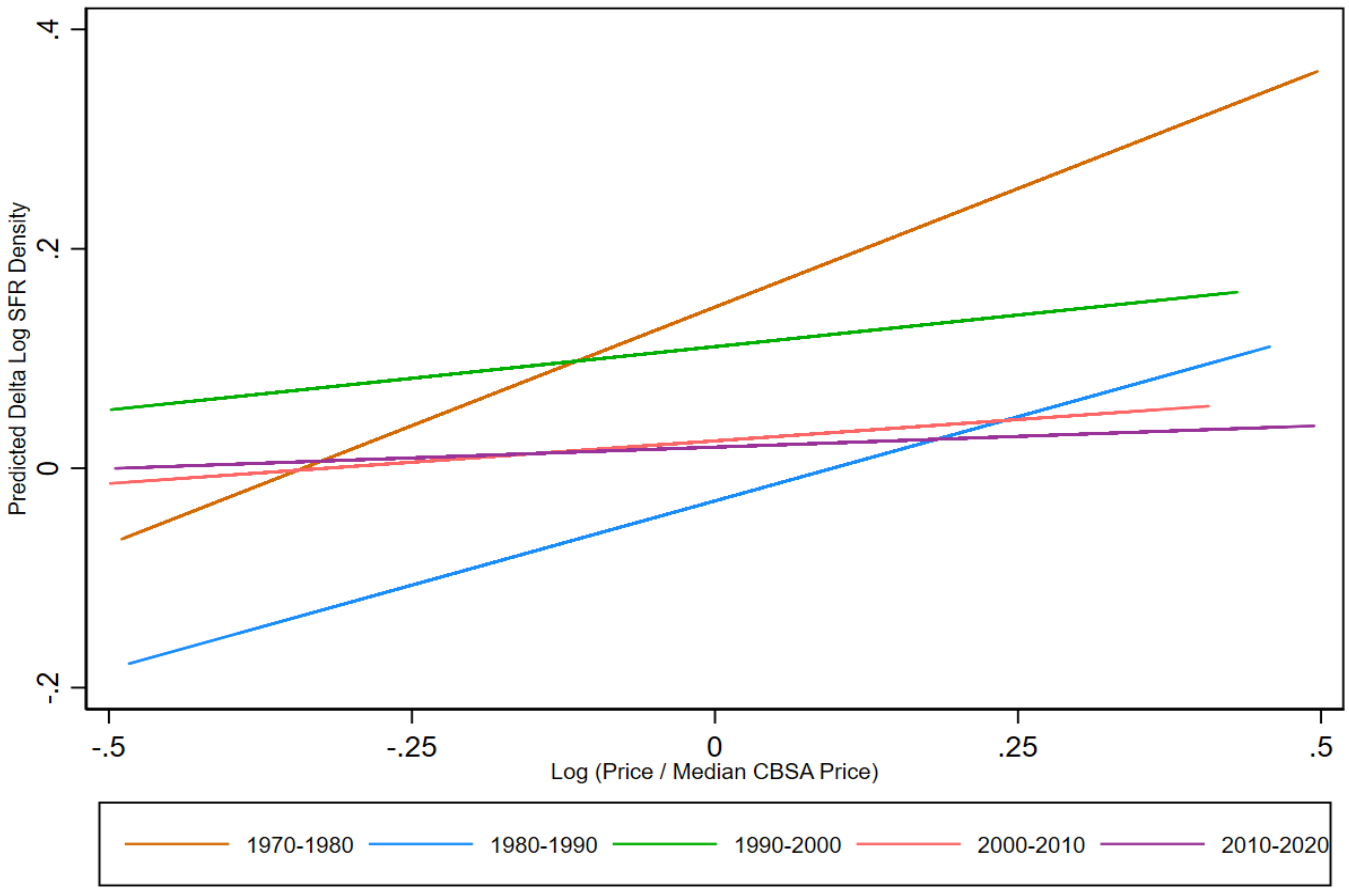
- When demand heterogeneity is extensive, the estimated supply curve slopes up with price and down with density

- When supply heterogeneity is big, then these relationships are reversed

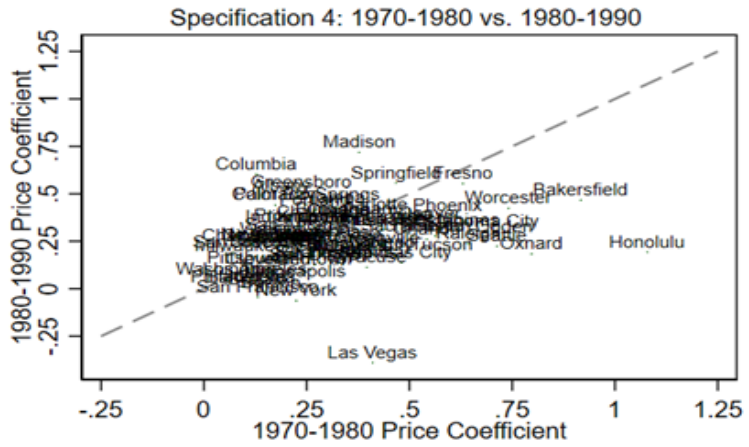
Shifting Empirical Supply Curves (cont'd.)

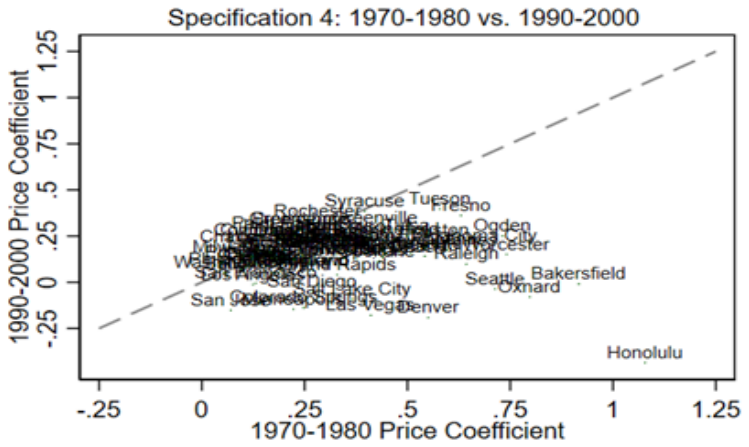
- We IV for current price using lagged price and geography, but there are no valid instruments for long-run shifts in demand (there are for short run, as in Baum-Snow and Han, 2024) as demographics shift with desirability
  - Believe the empirical results are interesting and useful without specific parameters of supply being cleanly identified

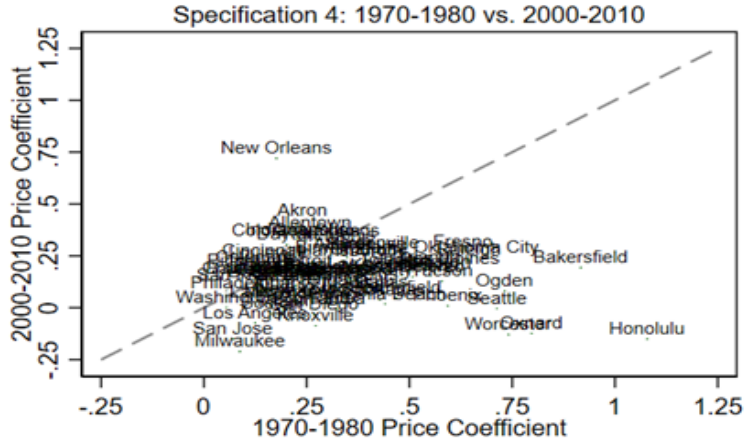
Empirical Supply Curves Over Time: Dallas, TX
Specification 4: Lagged Price & Location IV from Table 6

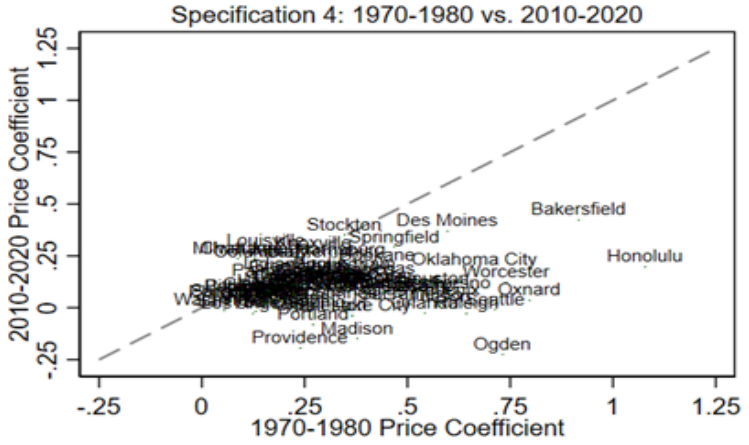


ΔPrice Coefficients Over Time, Single Units
82 CBSAs (Fig. 13)

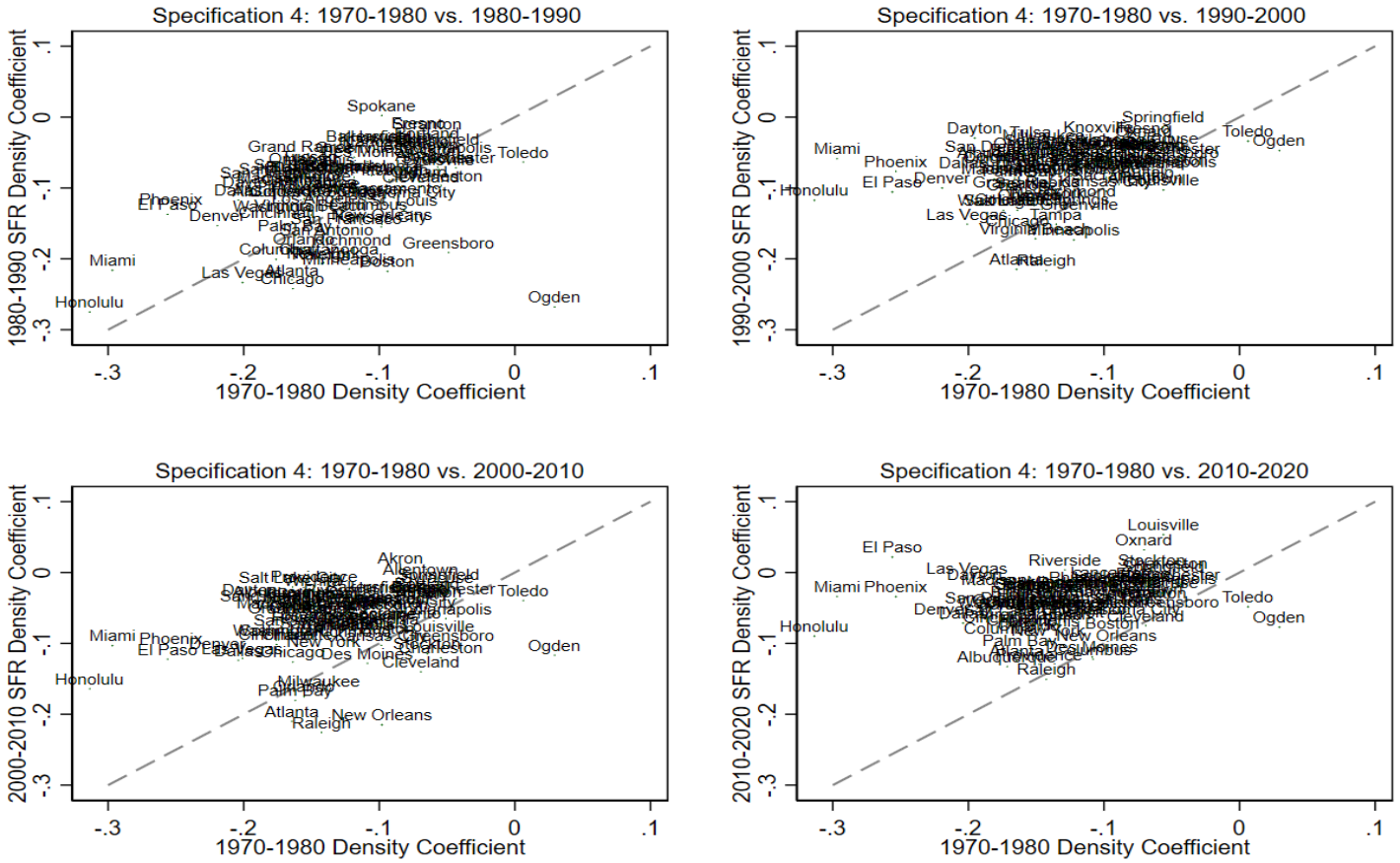








ΔDensity Coefficients Over Time, Single Units
82 CBSAs (Fig. 15)



Units Added: Density by Price/Cost Over Time

Table 7: Percentage Changes in Housing Production, Price vs Density by Decade, 6 CBSAs

CBSA	Year	Total change in units	Low Density/Low Price	Low Density/Moderate-to-High Price	High Density/Low Price	High Density/Moderate-to-High Price
Atlanta	1970s	231,118	0.059	0.901	-0.004	0.044
	1980s	297,572	0.045	0.884	0.019	0.052
	1990s	258,881	0.046	0.860	0.001	0.093
	2000s	331,861	0.320	0.508	0.051	0.121
	2010s	164,869	0.204	0.395	0.053	0.347
Dallas	1970s	347,958	0.136	0.694	0.005	0.165
	1980s	389,433	0.126	0.674	0.020	0.180
	1990s	338,408	0.110	0.753	-0.002	0.139
	2000s	497,227	0.138	0.722	0.023	0.118
	2010s	444,406	0.136	0.570	0.041	0.252
Detroit	1970s	258,898	0.039	0.828	-0.005	0.138
	1980s	115,810	0.016	1.001	-0.247	0.229
	1990s	145,227	0.003	1.001	-0.171	0.167
	2000s	75,078	0.021	1.161	-0.397	0.215
	2010s	36,451	0.052	1.121	-0.696	0.523
Los Angeles	1970s	577,763	0.049	0.412	0.039	0.500
	1980s	453,678	0.082	0.359	0.166	0.394
	1990s	211,335	0.074	0.433	0.167	0.326
	2000s	188,100	0.145	0.413	0.186	0.256
	2010s	231,359	0.057	0.196	0.278	0.470
Miami	1970s	595,427	0.238	0.444	0.083	0.236
	1980s	416,262	0.039	0.654	0.055	0.252
	1990s	299,419	0.051	0.596	0.099	0.253
	2000s	275,001	0.091	0.267	0.170	0.472
	2010s	179,585	0.064	0.121	0.262	0.552
Phoenix	1970s	286,947	0.178	0.627	0.046	0.149
	1980s	292,202	0.060	0.637	0.044	0.259
	1990s	300,577	0.014	0.817	0.011	0.159
	2000s	378,479	0.075	0.775	0.030	0.119
	2010s	177,490	0.027	0.696	0.063	0.214

Conclusions

- Changes in supply-side conditions, especially in Sunbelt markets, are important and (relatively) new
  - Higher physical construction costs dating back to the early 2000s
  - GFC shock to the housing construction sector was severe, but the sector has reconstituted itself in TX markets; we do not believe this is driving reduced new unit production in other Sunbelt markets
  - Lower new housing unit supply rates
    - Sunbelt markets are converging with the rest of the country over past two decades
    - Slowdown and convergence in suburban areas within metros, not just urban cores
  - Weakening relationship between local neighborhood prices and new supply
    - Not producing as much in these high demand, high amenity tracts
  - Weakening relationship between local neighborhood density and new unit supply
    - Statistically significant, but economically modest: hitting a density wall does not appear to be able to account for the changing supply side environment
  - Also see declining production in lower density *and* higher priced tracts
  - See more production in high density, higher price tracts; multifamily projects appear doable in these places

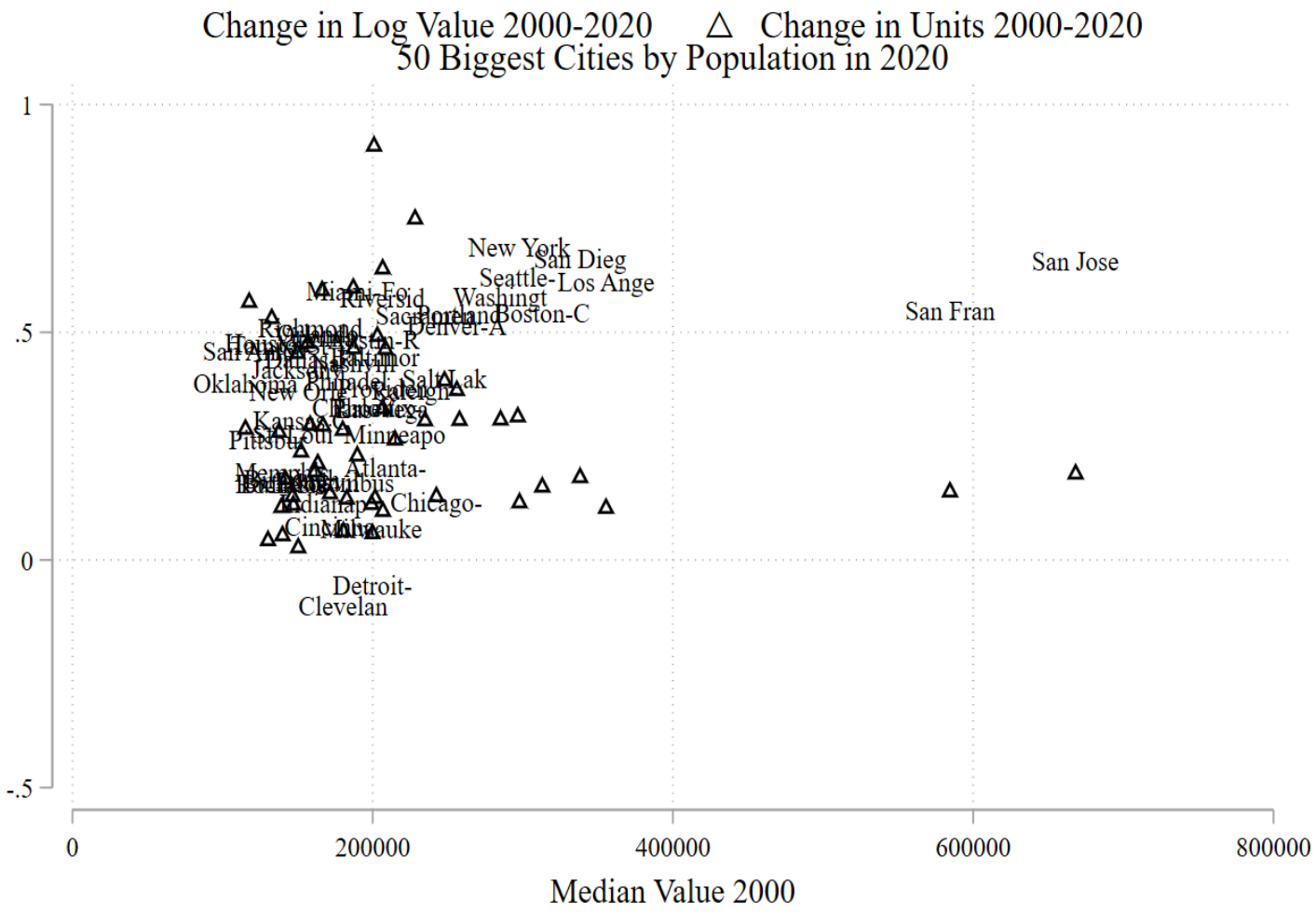
What Follows Are Slides for Anticipated Questions?

Paper Argues that Supply Side Conditions Are Becoming More Important, Especially in Sunbelt Markets

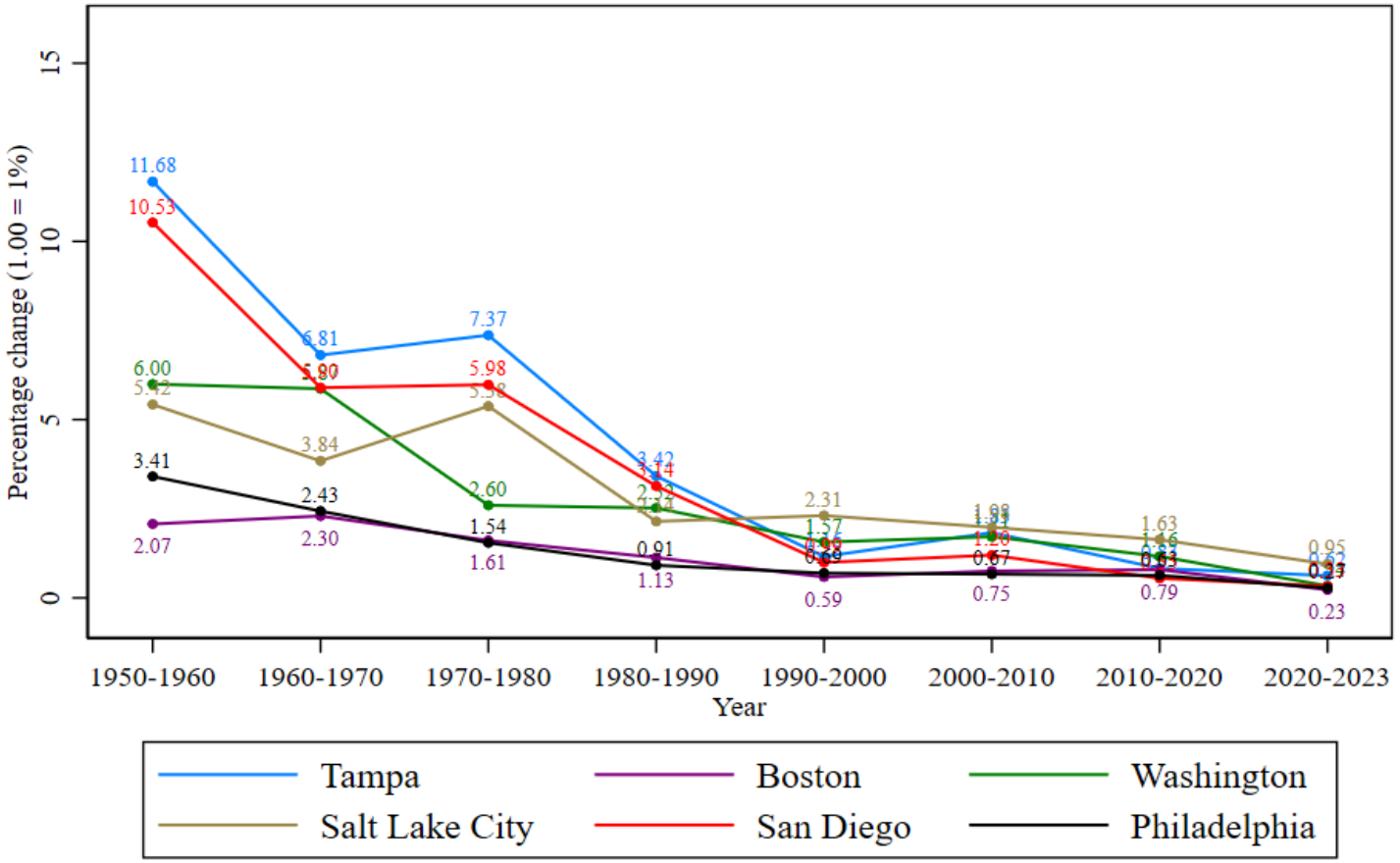
- Strength of the relationship between *house price* and the supply of *new units* is key to understanding the potential role of supply side constraints
  - Expensive housing markets on the coasts have not been building much for decades now
  - What is new is the weakening of this relationship over time in many previously strongly expanding Sunbelt markets
    - This clearly predates Covid and recent Fed policy raising interest rates

Paper Argues that Supply Side Conditions Are Becoming More Important in Sunbelt Markets

- Also find a weakening over time of the relationship between density and the supply of new units
  - Occurs everywhere, but has become pronounced in Sunbelt markets
  - Consistent with a 'hitting a density wall' hypothesis, but regression results indicate these changes are not empirically large (more on that below)


Change in Log Value 2000-2020
Change in Units 2000-2020
50 Biggest Cities by Population in 2020
1
.5
0
-.5
0
200000
400000
600000
800000
Median Value 2000
New York
San Dieg
Seattle-
Los Ange
San Jose
San Fran
Boston-C
Denver-A
Minneapo
Atlanta-
Chicago-
Detroit-
Clevelan

Convergence in Housing Unit Growth, Another Six Markets



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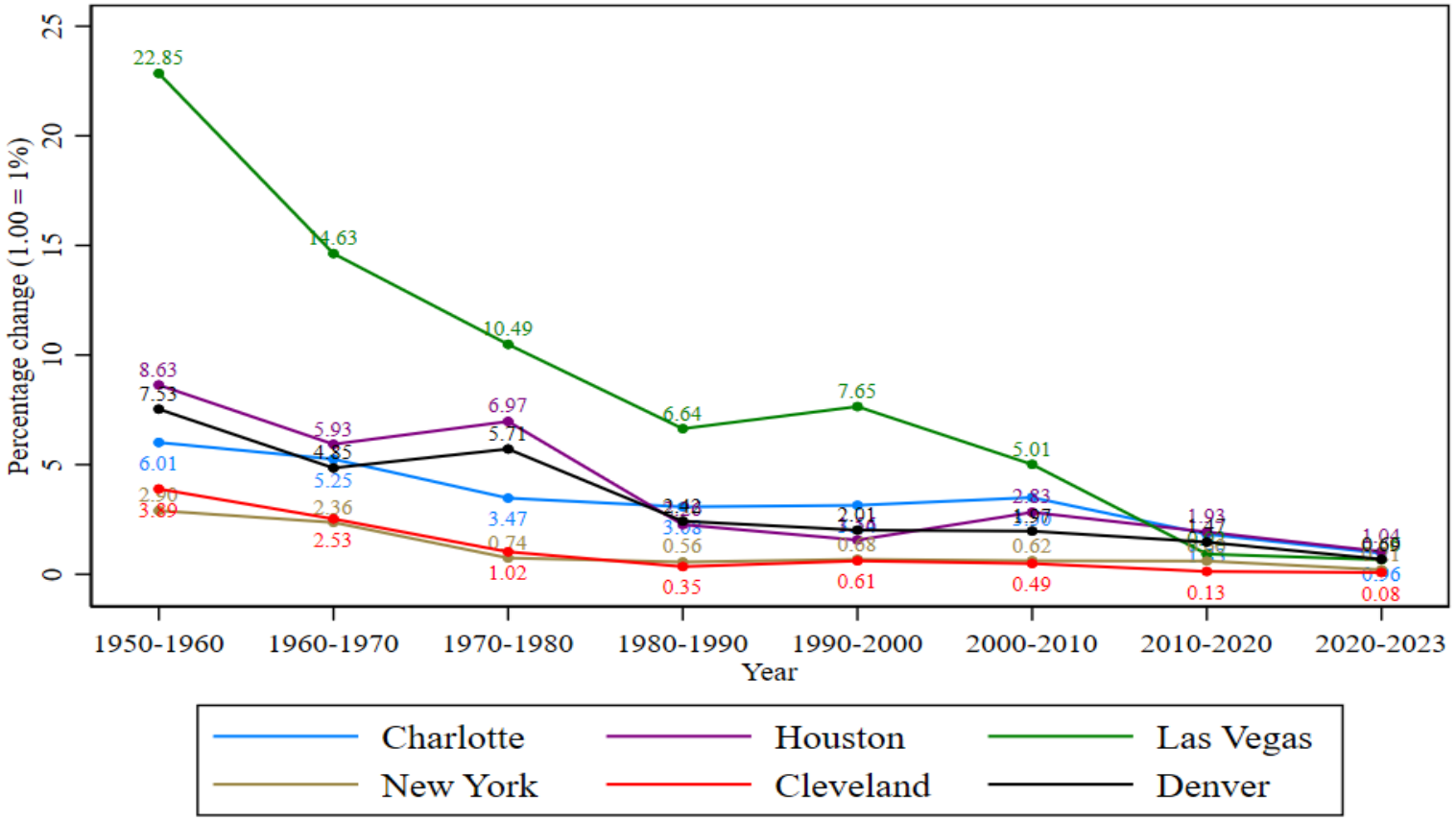
Convergence in Housing Unit Growth, Another Six Markets



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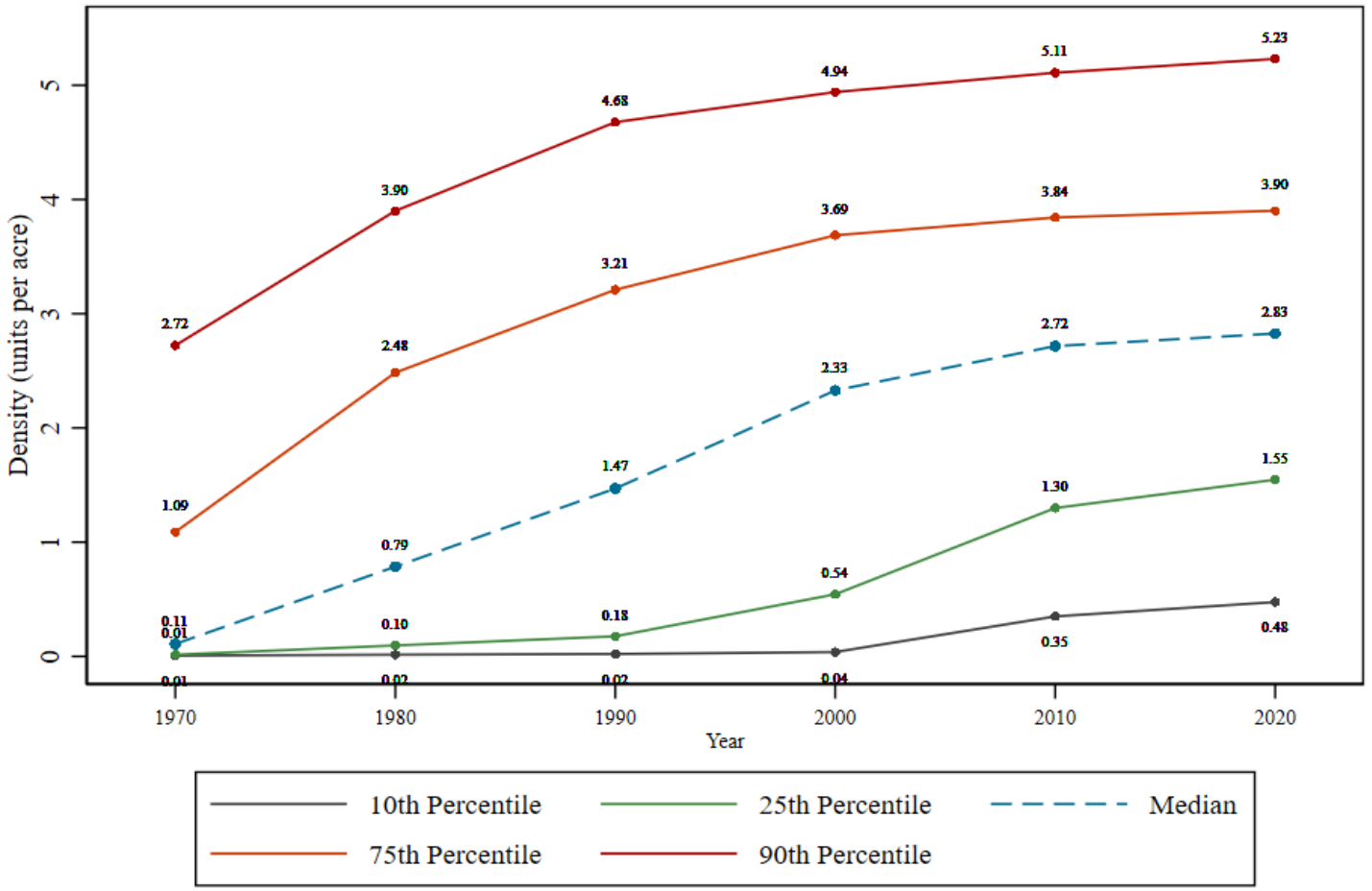
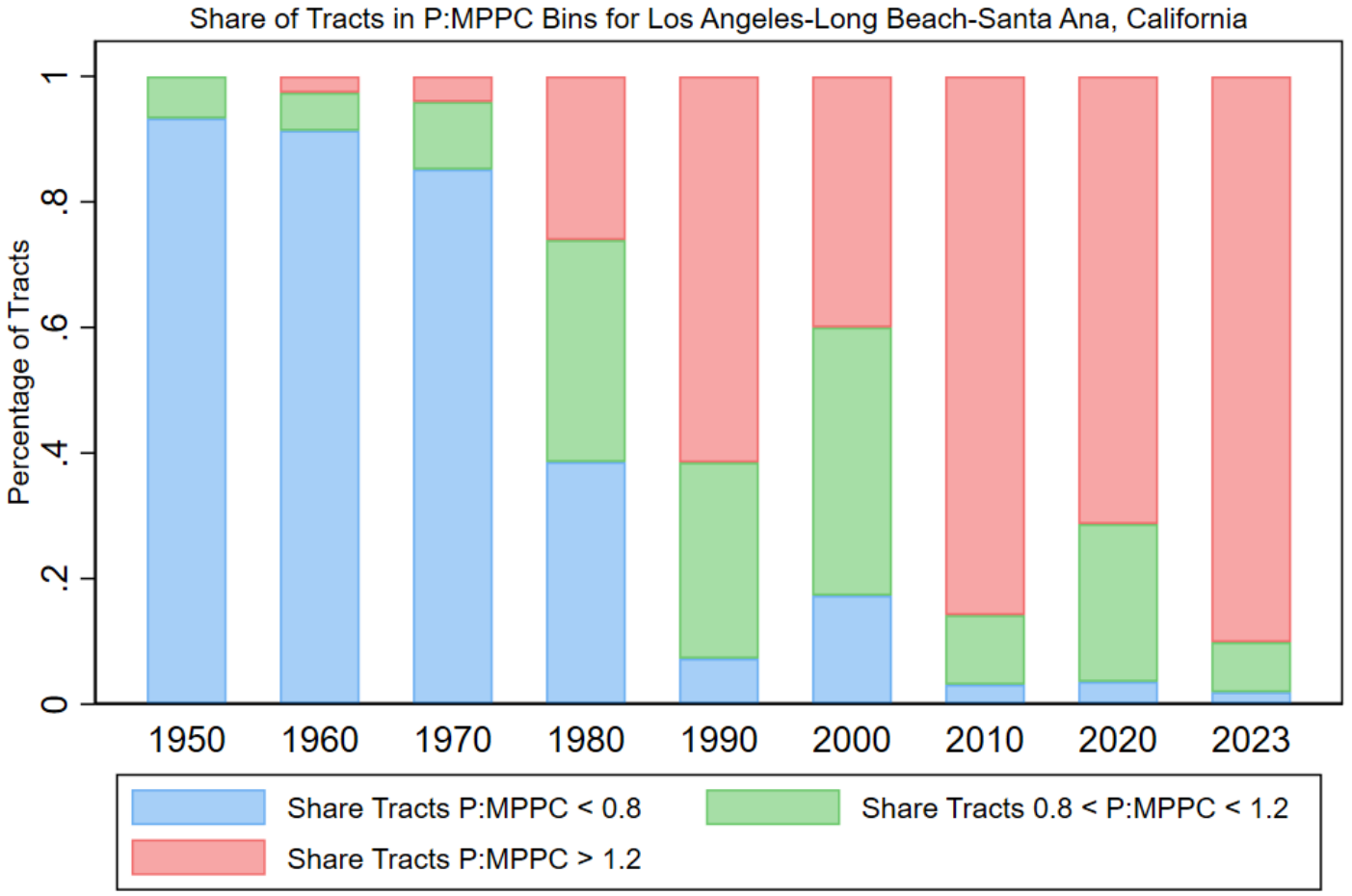
Measuring Neighborhood Change
Density Across Tracts in Phoenix, LTDB, Technical Memo



Note: : Tract-level total unit density is constructed as the number of all housing units per acre in 2010-standardized tracts. The distribution is calculated in each year based on Phoenix's 2010 CBSA boundary.

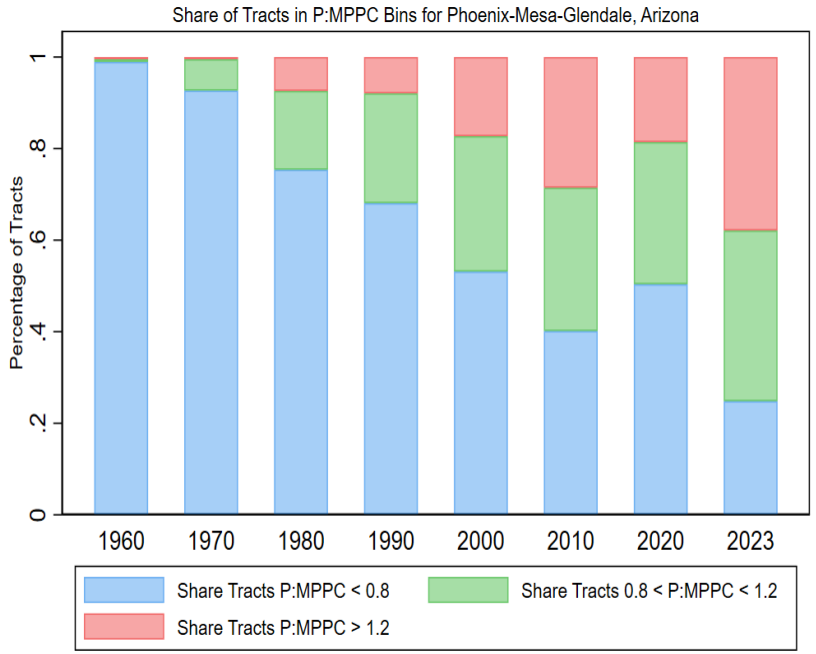
Much of the Housing Stock in the LA Metro Has Been Expensive for 3+ Decades (1970 Boundaries)



Note: P:MPPC is calculated for each tract in each year by taking the real median home value (P), and dividing it by the CBSA-level value of MPPC. We compute the share of tracts in a CBSA in the designated bins accordingly.

Larger Shares of the Housing Stocks of Miami and Phoenix Have Become More Expensive Recently

Phoenix (1970 Tract Boundaries)



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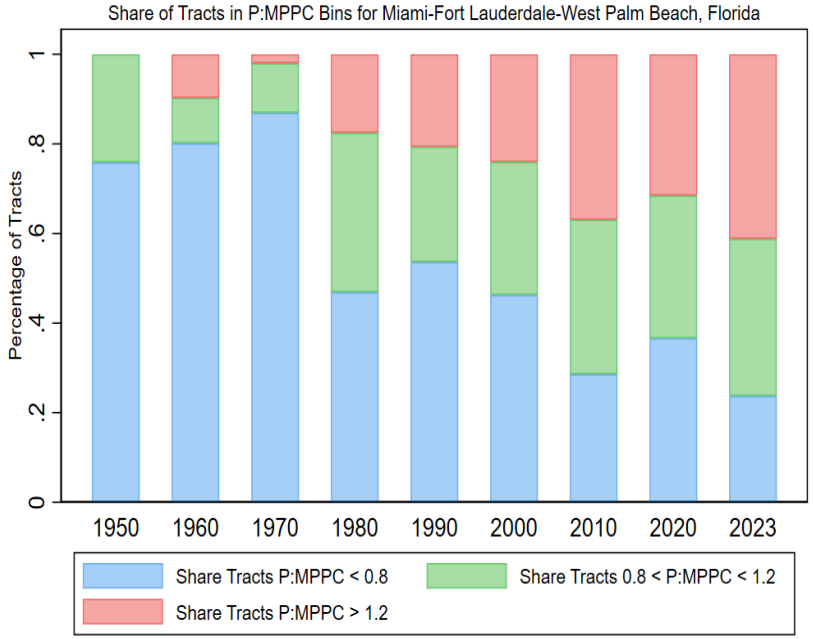
Miami (1970 Tract Boundaries)

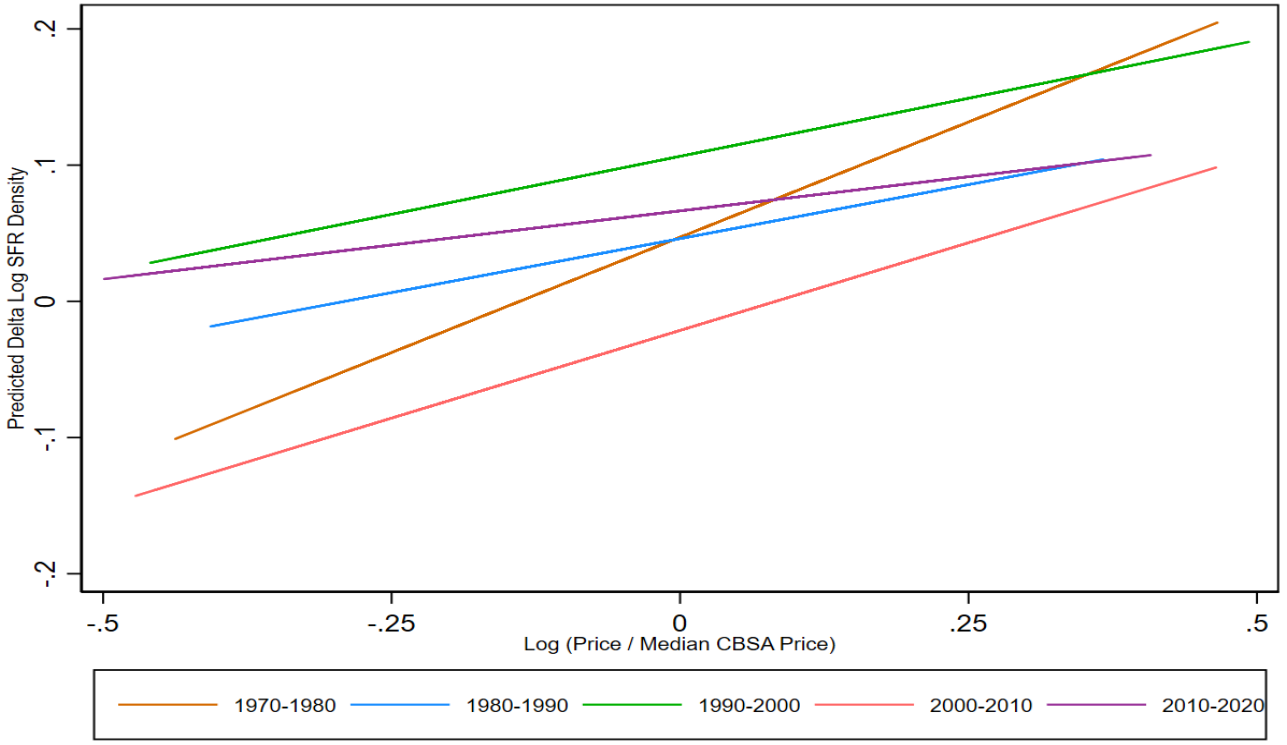


Note: P:MPPC is calculated for each tract in each year by taking the real median home value (P), and dividing it by the CBSA-level value of MPPC. We compute the share of tracts in a CBSA in the designated bins accordingly.

Atlanta-Sandy Springs-Roswell, GA, Georgia

Specification (4): Lagged Price and Location IV

Regression Specification 4: Empirical Housing Supply Curves for Atlanta-Sandy Springs-Roswell, GA



Note: In predicted values, log single-unit owner occupied density held constant at CBSA-level median

Detroit-Warren-Livonia, MI, Michigan

Specification (4): Lagged Price and Location IV

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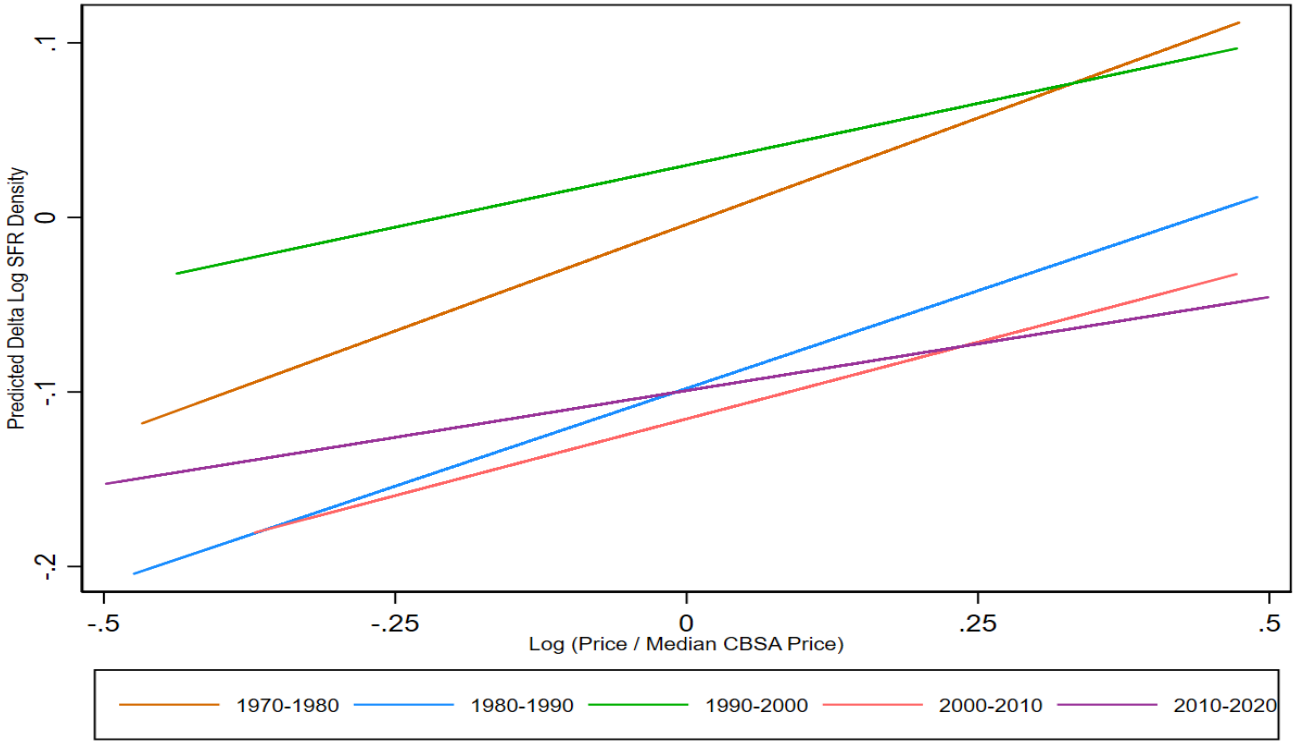

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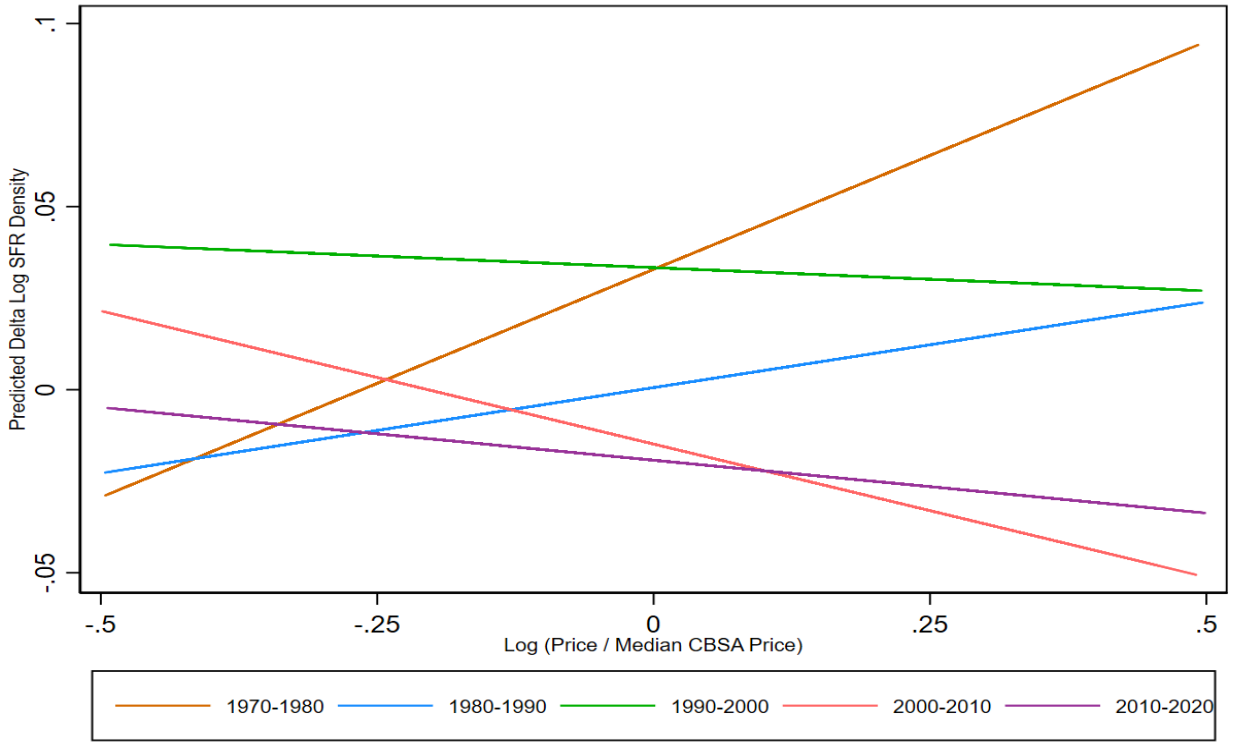
Los Angeles-Long Beach-Santa Ana, CA, California

Specification (4): Lagged Price and Location IV

Regression Specification 4: Empirical Housing Supply Curves for Los Angeles-Long Beach-Santa Ana, CA

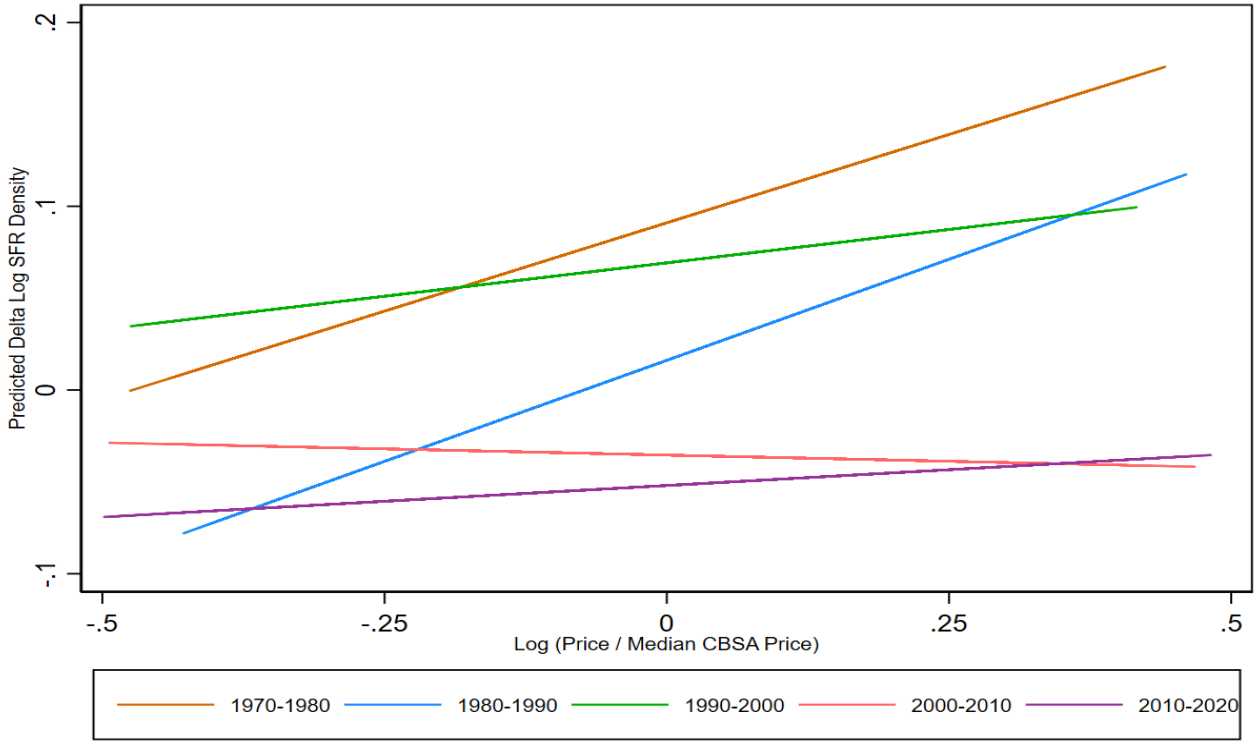


Note: In predicted values, log single-unit owner occupied density held constant at CBSA-level median

Miami-Fort Lauderdale-West Palm Beach, FL, Florida

Specification (4): Lagged Price and Location IV

Regression Specification 4: Empirical Housing Supply Curves for Miami-Fort Lauderdale-West Palm Beach, FL

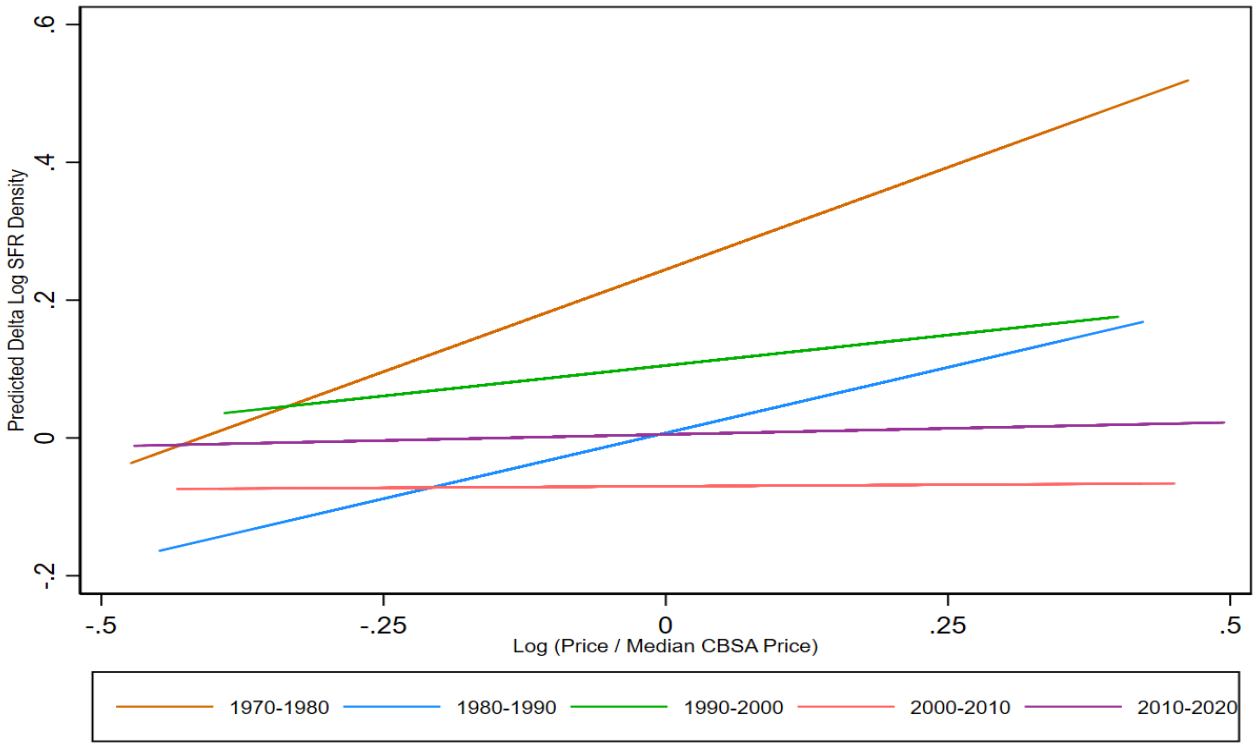


Note: In predicted values, log single-unit owner occupied density held constant at CBSA-level median

Phoenix-Mesa-Glendale, AZ, Arizona

Specification (4): Lagged Price and Location IV

Regression Specification 4: Empirical Housing Supply Curves for Phoenix-Mesa-Glendale, AZ

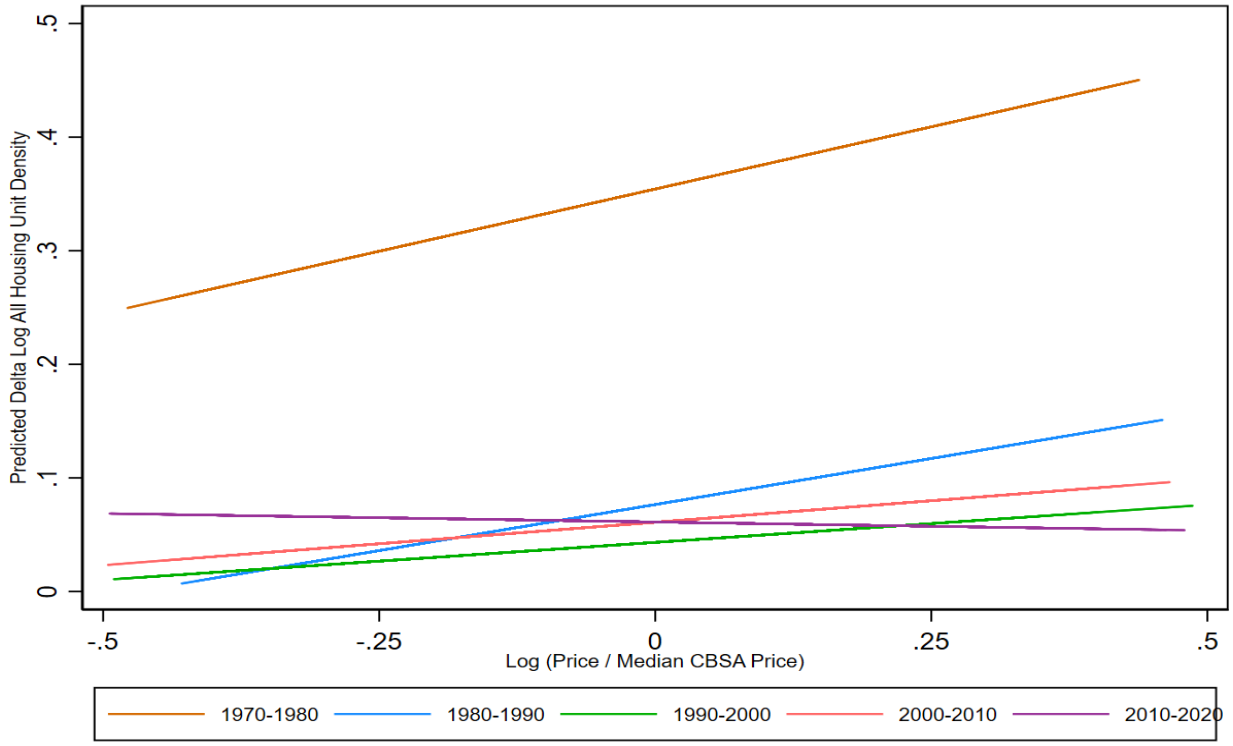


Note: In predicted values, log single-unit owner occupied density held constant at CBSA-level median

Miami-Fort Lauderdale-West Palm Beach, FL, Florida

Specification (4): Lagged Price and Location IV

Regression Specification 4: Empirical Housing Supply Curves for Miami-Fort Lauderdale-West Palm Beach, FL



Note: In predicted values, log all-unit density held constant at CBSA-level median