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Institutional Capital Effect's on Single-Family Housing Markets

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Abstract

This paper examines the impact of institutional investors on single-family housing markets, analyzing six dependent variables and two independent variables across 39 metropolitan cities. Despite receiving significant media attention during the COVID-19 pandemic, the study finds that the impact of institutional investors on median sale price is small and negative. However, institutional investors significantly impact other aspects of the housing market, including homes sold, new listings, inventory, days on market, and average-sale-to-list ratios. The results suggest that institutional investors are creating a more productive market, with transactions happening more quickly and more often. In light of these findings, policy discussions around the role of institutional investors in the housing market can benefit from insights into the complex pricing effects of their investment activities. The following section will summarize the main findings and offer recommendations for future research.

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§1: Introduction

Before diving into the details of this study it is important that the nomenclature used in this study is defined. The first term to define is the property type this study is focused on: single-family homes. A single-family home is a type of residential property that is designed and intended for a single family to live in; it typically consists of one unit or structure located on land that is owned by the homeowner; single-family homes are detached from other buildings and are not shared with other families.

The next important term to define is owner-occupied. Traditionally, when people are looking to buy a home – usually a single-family home – it is vacant. This is because, traditionally, the buyer of the property is going to live in it. So, when the owner of the property is using it as a residence, it is considered owner-occupied.

Similar to owner-occupied the term "tenants in place" is used to refer to a rental property that has an active lease at the time of the sale. Institutional investors would prefer this type of property because they do not have to go the process of finding a tenant. Sometimes, institutional investors will look for owner-occupied houses as well.

Commercial real estate is a term that is used a lot. This is because it means many different things. The major difference between commercial properties and single-family properties is that commercial properties have different zoning – usually because of their size. For example, a single-family home that is an investment or rental property would not be considered a commercial property. But an apartment building with many residential units would be considered a commercial property. There are many types of properties that are classified as commercial. These include office buildings, retail

buildings, industrial buildings, multifamily buildings, hospitality buildings, and special purpose buildings (typically medical, educational, or government buildings).

Institutional investors investing in all types of real estate properties are a trend that deserves inquiry. In this paper, I examine the effects institutional investors have on the single-family housing market. I first draw on the study "*Institutional Investors and the U.S. Housing Recovery"* which determined that institutional investors played a role in local housing price recovery but have decreased local homeownership rates between 2006 and 2014[1]. This study provides a great first look into the institutional investor impact on the nationwide single-family housing market during the period of the Great Financial Crisis and the short period that followed.

Between 2014 and 2023 a lot has happened including the COVID-19 pandemic, leading to more questions about institutional investors impact on the single-family housing market. Considerable media coverage consistently highlights institutions acquiring single-family homes in record numbers. A study done by Martin Hoesli and Richard Malle titled "*Commercial Real Estate Prices and Covid-19"* concluded that commercial real estate products like office and retail buildings were hit the hardest[2]. This observation begs the question of whether institutional investors are substituting away from office and retail buildings to acquire single-family homes.

In addition to market conditions changing, according to Dragana Cvijanović, et. al., and their paper "*Preferences of Institutional Investors in Commercial Real Estate - The*

[1] Lauren Lambie-Hanson, Paul Milchev, and Michael Neal, "Institutional Investors and the U.S. Housing Recovery," SSRN, November 27, 2019.
[2] Martin Hoesli and Richard Malle, "Commercial Real Estate Prices and Covid-19," Journal of European Real Estate Research (Emerald Publishing Limited, 2021).

Journal of Real Estate Finance and Economics" investor preferences have changed as well[3]. Cvijanović, et. al., conclude that the probability that a large (small) seller will sell a property to a similar-sized buyer is higher, keeping all else equal. During the Great Financial Crisis large investors were less likely to buy smaller assets compared to periods before and after the crisis. In other words, large institutional investors are more likely to buy small single-family home properties after the period examined by Lauren Lambie-Hanson and the Great Financial Crisis of 2008.

These market conditions and investor preferences spanning the decade of 2012 to 2022 are what this paper examines. More specifically, this paper examines institutional investors impact to the single-family housing markets, through a national, local, regional, and population lens.

[3] Dragana Cvijanović et al., "Preferences of Institutional Investors in Commercial Real Estate - The Journal of Real Estate Finance and Economics," SpringerLink, Springer US, 15 May 2021.

§2: Motivating Theory and Hypothesis Development

More and more – and especially since the onset of the COVID-19 Pandemic – media and news outlets have been highlighting stories of institutional investors buying up single-family homes. This new institutional asset class has created concern among many, with some even claiming that the American dream has changed from owning to renting. Institutional investors have changed the game by adding single-family assets to their portfolio in record numbers. The majority of the news stories covering this trend are not positive with headlines like "*Blackstone bets $6 Billion on Buying and Renting Homes,*"[4] and "*Wall Street giants are scooping up family homes. The rent checks are pouring in.*"[5] Both of these headlines are from 2021 when this trend reached its peak in the midst of the COVID-19 pandemic.

In addition to negative media coverage, economic studies suggest this trend warrants concern if it continues. Elora L. Raymond, et. al. raise some alarms on this point in "*Corporate Landlords, Institutional Investors, and Displacement.*" The study focused on the Atlanta metropolitan area and found that in 2015 over 20 percent of all rental households were given an eviction notice with up to 12.2 percent of all household forcibly evicted.

A more recent study by Grace Colburn, et. al., "*Capitalizing on Collapse: An Analysis of Institutional Single-Family Rental Investors,*" also highlighted a relationship

[4] Ryan Dezember and Will Parker, "Blackstone Bets $6 Billion on Buying and Renting Homes," Wall Street Journal, June 23, 2021.
[5] Matt Egan, "Wall Street giants are scooping up family homes. The rent checks are pouring in," CNN Business, August 2, 2021.

between institutional single-family investors and high eviction rates.[6] These rising evictions combined with the seemingly increasing institutional single-family investments justifies further research.

In more recent times, this trend has cooled off a bit as interest rates rose in accordance with the FED's response to the economic effects of the COVID-19 pandemic. Following the current markets trends, media coverage has also cooled its alerting headlines. For example, the Wall Street Journal headline on Feb 15, 2023 was "*Investor Home-Purchases Plunge by Half in Fourth Quarter Amid Housing Slump*."[7]

Institutional investors reducing home purchases makes intuitive sense for many reasons. For real estate investors trying to build product, construction costs were astronomically high due to supply chain issues stemming from the COVID-19 pandemic. Additionally, the rate hike increased investors' costs for obtaining construction loans and mortgages as well as limiting their ability to refinance existing projects for further acquisitions. However, these factors slowing down the housing market – specifically for single-family homes – apply to everyone, not just institutional investors.

My initial hypothesis is that increased investor activity – from market share and purchases – will increase, Homes Sold and New Listings, while decreasing Inventory and Days on Market. I am unsure how institutional investors activity in single-family housing markets will affect Median Sale Price and Average Sale to List. To form my

[6] Grace Colburn, Ryan J. Walter, and Deirdre Pfeiffer, "Capitalizing on Collapse: An Analysis of Institutional Single-Family Rental Investors," Urban Affairs Review 57, no. 6 (2021): 1590-1625.
[7] Ryan Dezember, "Investor Home Purchases Plunge by Half in Fourth Quarter Amid Housing Slump," Wall Street Journal, February 12, 2019.

initial hypothesis, I considered three things. First, following the conclusions of Alexander Carlo in *The Determinants of Institutional Capital Allocation to Real Estate,* it makes sense that institutional investors developed a way to engage with the single-family housing market. As interest rates continued to decrease following the collapse of 2008, followed by drastic cuts by the FED in the midst of the COVID-19 pandemic, institutional investors realized they could generate a risk-adjusted higher yield in single-family housing markets than in extremely volatile public equity markets and low yield bond markets. This new asset class also provided institutional investors with a new asset class that was more effective hedging inflation than traditional institutional assets such as public equities and bonds[8]. Additionally, the study done by Gregory Chun, et. al, suggests that if institutions were to invest more – up to 12% of their assets – they would be able to eliminate nonmarket risk, while simultaneously earning predicative returns and diversifying their portfolio[9]. So, the first pillar of my hypothesis is that the market conditions over the last decade were prime for institutional investors to take advantage of the advantages of single-family assets.

The second pillar supporting my initial hypothesis is institutional investors' ability to close single-family real estate deals much more effectively than small investors, let alone people looking to buy a home for themselves. On the surface, a real estate transaction contains three main components: timing, financing, and

[8] Montezuma, Joaquim. "Housing Investment in an Institutional Portfolio Context: A Review of the Issues." Property Management, vol. 22, no. 4, 1 July 2004.
[9] Gregory H. Chun, et al., "The Role of Real Estate in an Institutional Investor's Portfolio Revisited - The Journal of Real Estate Finance and Economics" (Kluwer Academic Publishers, 2005), accessed April 11, 2023.

contingencies. These are somewhat intertwined and can be overcomplicated with nuances, but for the rationalization of my hypothesis, institutional investors don't need a long-time frame for these houses. For the most part (maybe not in 2008), when an institutional investor makes an offer on a single-family home – or any asset for that matter – they have done their due diligence. So, on average, institutional investors can offer a quicker time to close – an attraction for the seller – than competitors. In addition to quicker closing periods, institutions can pay cash for these deals. There may be leverage or financing involved but this financing has been arranged long before the institutional investor places an offer on a single-family home. The certainty of cash financing is another extremely attractive fact for sellers of these homes that ordinary competitors cannot match. Most of the time, homebuyers will need to get a mortgage – a process that adds time to the deal. The last component of a single-family real estate transaction is contingencies. These usually come in the form of a satisfactory home inspection, appraisal, and financing approval. These contingencies give the buyer the opportunity to back out of the transaction if the conditions are not met, which can affect the timing and financing of the sale. However, as previously mentioned the institutional investor has most of this covered by the time they place an offer; they've done their due diligence and aren't going to be living there – they don't care what color the bathroom is; most of the time they are paying cash and don't need to wait for financing approval.

For demonstration purposes, assume you are the seller of a single-family home. There are two potential buyers. The first, a young married couple who needs a mortgage, wants to negotiate the listing price, has an issue with the wallpaper, wants a

credit to fix one of the door frames, and needs 90 days to make a decision. The second, BlackRock, who will take the house as is, at the asking price, in 21 days, and will pay in all cash.

The third pillar has to do with momentum. As institutional capital floods the single-family housing market, the market conditions become even more appealing to institutional investors. The more appealing market conditions leads to more investors entering the single-family housing market. This cycle – theoretically – creates a positive feedback loop. In the last decade, when conditions are prime, both institutional investors and homebuyers increase activity in the single-family housing market. As more institutions engage, and win these contracts, sellers are incentivized to provide more product. Assuming there were no constraints on supply, this would essentially create a positive feedback loop. My initial hypothesis is that this feedback loop will increase, Homes Sold and New Listings, while decreasing Inventory and Days on Market. I am unsure how institutional investors activity in single-family housing markets will affect Median Sale Price and Average Sale to List.

The variables hypothesized to be impacted by institutional investors' activity are directly related to the three components of a real estate. Other variables considered, such as those related to price, are less clearly impacted by investors' role in housing markets. Investors may need to offer a premium over asking price to ensure they win the contract, but the terms may allow them to secure properties without such a premium. Further, investors are unlikely to overpay for a property unless the value of the property itself justifies the offered price.

§3: Literature Review

Previous scholarship has investigated the determinants and effects of institutional capital (pension funds) allocation into single-family housing and commercial real estate. A study published by Alexander Carlo, *The Determinants of Institutional Capital Allocation to Real Estate*[10], investigates the drivers of pension funds' strategic allocation to real estate. This study used data spanning from 1991 to 2018. The study finds that the strategic allocation to real estate results from the historical performance of real estate relative to other asset classes. The study also concluded that pension funds did not engage in return chasing and maintained a risk-averse attitudes. Finally, the study noted that pension fund real estate positions have increased over time – in absolute terms – but not when corrected for capital appreciation. In short, pension fund portfolios are divesting from real estate. Although this study does not include data during or after to the COVID-19 pandemic and the dramatic shift in investment strategies that followed, this study can provide historical insight into why institutional investments have been made to single-family and commercial real estate projects following the COVID-19 pandemic.

Another study by Patrick Smith and Crocker Liu, *Institutional Investment, Asset Illiquidity and Post-Crash Housing Market Dynamics*[11], examines institutional investors' entry into the equity side of the single-family detached housing market using an asset illiquidity framework. They found that institutional investors purchased owner-occupied houses after the real estate crisis for approximately 6.3–11.8% less than owner-occupiers. The significant discount did not take into account distressed sale and cash

[10] Carlo, Alexander, et al. "The Determinants of Institutional Capital Allocation to Real Estate." VBA Journal, CFA Society Netherlands, 2022.
[11] Smith, Patrick and Crocker Liu. "Institutional Investment, Asset Illiquidity and Post-Crash Housing Market Dynamics." November 30, 2017.

purchase discounts which, when combined, highlight the low liquidation value for owner-occupied housing. Smith and Lui concluded that the illiquidity of real-estate assets is an essential cost of leverage in the owner-occupied housing market. To do this study, in 2017, the two examined the 18 counties that make up the Atlanta metropolitan area in Georgia – which is representative of the U.S. single-family housing market according to various criteria. The study's conclusion was two-fold: The large-scale conversion of owner-occupied housing to rental properties helped stabilize the market but may have unfavorable long-term consequences, including future appreciation rates.

Another study titled "*Institutional Investors and the U.S. Housing Recovery*" written by Lauran Lambie-Hanson, Paul Milchev, and Michael Neal provides a great starting point for examining institutional investors impact on single-family housing. This study examines the impact of institutional investors on the U.S. single-family residential housing market from 2006 to 2011. The study found that unlike the previous housing boom, the house price recovery was not accompanied by an increase in homeownership rates. The emergence of institutional investors is identified as a major factor contributing to this phenomenon. By analyzing comprehensive property-level transaction data, the study estimates that the increasing presence of institutions in the housing market explains more than half of the increase in real house price appreciation rates between 2006 and 2014.[12]

[12] Lauren Lambie-Hanson, Paul Milchev, and Michael Neal, "Institutional Investors and the U.S. Housing Recovery," SSRN, November 27, 2019.

Joaquim Montezuma continues the examination of residential properties in a multi-asset portfolio in *Housing Investment in an Institutional Portfolio Context: A Review of the Issues*[13]. Montezuma examines housing property investment from a macro level and discusses the empirical issues from an institutional portfolio context. The paper continues to support the claim that residential property is more effective as an inflation hedge than traditional institutional assets such as public equities and bonds. The study further concludes that unsecuritized housing investment generates risk-adjusted returns – similar to public equities and bonds – and exhibits low levels of correlation between traditional institutional assets.

Fisher, Ling, and Naranjo broaden their research to institutional capital's effects within private commercial real estate markets – a much broader market than strictly single-family homes. In their 2009 paper, *Institutional Capital Flows and Return Dynamics in Private Commercial Real Estate Markets*[14]. Their study examined the short and long-run effects of institutional capital flows and returns. Their study found that lagged capital flows influence returns at the aggregate U.S. level. Whereas, at the metropolitan level, flows help to explain returns in a limited number of core business statistical areas – which the study refers to as CBSAs. Furthermore, the study concluded that capital flows predict returns in apartment and office sectors only when disregarding property type at the national level.

[13] Montezuma, Joaquim. "Housing Investment in an Institutional Portfolio Context: A Review of the Issues." Property Management, vol. 22, no. 4, 1 July 2004.
[14] Fisher, Jeffery, et al. "Institutional Capital Flows and Return Dynamics in Private Commercial Real Estate Markets." Wiley Online Library, 19 Feb. 2009.

As of this date and as far as I am aware, no economic literature examines the current and post-pandemic effects of institutional capital allocation on single-family housing markets from a national, local, regional, and population perspective. Alexander Carlo examines the determinants of capital flow to real estate but not its effects. Patrick Smith and Crocker Liu examined institutional capital investment in single-family owner-occupied markets in the state of Georgia but they focused on the returns of the investor – not how the investor activity effects the single-family housing market as a whole. Lauren Lambie-Hanson and her peers examined institutional investors impacts on single-family housing markets from 2006 to 2014. Their paper provides great insight but does not account for periods after 2014 where market conditions were extremely appealing for institutions to invest in single-family housing. Joaquim Montezuma analyzed how housing fits into an institutional multi-asset investment portfolio and housing investment's ability to hedge inflation, but not the effects of capital flow on housing investments.

Patrick Smith and Crocker Liu's study – "*Institutional Investment, Asset Illiquidity and Post-Crash Housing Market Dynamics*" – and Lauren Lambie-Hanson's "*Institutional Investors and the U.S. Housing Recovery*" are the closest related studies. The major differences are that Smith's study focused on the returns that followed from capital investment to single-family owner-occupied housing in the greater Atlanta area. Additionally, both of these studies also only look at the period immediately following the Real Estate (Great) Financial Crisis of 2008. This study examines how institutional investors affect single-family housing markets from 2012 to 2022– not how well

investors do when they invest in real estate. An additional minute difference that is still worth mentioning is that this study is looking at a slightly broader market of single-family homes. As discussed previously, single-family *owner-occupied* homes are a small portion of the transactions made within the single-family home market.

§4: Data and Research Design

In this study, I analyzed the single-family housing market trends and the behavior of investors in various regions of the United States using a comprehensive data set. The data set – provided by Redfin[15], a nationwide broker database – includes monthly data beginning in 2012 for the 39 largest metropolitan areas in the country, covering variables such as median sale price, new listings, units sold, inventory, days on market, and sale-to-list ratio. Redfin also provided quarterly investor data beginning in 2012 for the same 39 metropolitan areas, showing investor market share and investor purchases.

The methodology used in this study involves several steps to ensure the accuracy and reliability of the findings. First, all monthly data was converted to quarterly data to match the independent variable data of investor activity. Next, all variables were logged to account for any non-linearity in the data. Unit root issues were then tested for using appropriate statistical techniques[16]. In this study, the Median Sale Price variable demonstrated unit root problems and was differenced accordingly but no other variables demonstrated significant non-stationarity. Dependent variables (Differenced Median Sale Price, Homes Sold, New Listings, Inventory, Days on Market, and Average Sale to List) were then regressed on the independent variables (Investor Market Share and Investor Purchases) without fixed effects, followed by a regression with fixed effects. The results in this paper are from the fixed effects regression to control for

[15] Redfin. "Data Center." Redfin. Accessed April 20, 2023. https://www.redfin.com/news/data-center/.
[16] The Im-Pesaran-Shin (Im, K. S., Pesaran, M. H., & Shin, Y. (2003). Testing for unit roots in heterogeneous panels. *Journal of econometrics*, *115*(1), 53-74.) and the Phillips-Perron test (Choi, I. (2001). Unit root tests for panel data. *Journal of international money and Finance*, *20*(2), 249-272.)

market-specific and period-specific heterogeneity. Finally, Driscoll-Kraay standard error procedures were employed to account for spatial and temporal persistence in residuals when assessing the significance of the results. Table 1 below shows the 39 different metropolitan areas with their respective Region ID:

Table 1.1: City Summary

Region ID's

Region ID	City	Region ID	City
1	Anaheim, CA	21	New Brunswick, NJ
2	Atlanta, GA	22	New York, NY
3	Baltimore, MD	23	Newark, NJ
4	Charlotte, NC	24	Oakland, CA
5	Chicago, IL	25	Orlando, FL
6	Cincinnati, OH	26	Philadelphia, PA
7	Cleveland, OH	27	Phoenix, AZ
8	Columbus, OH	28	Portland, OR
9	Denver, CO	29	Providence, RI
10	Detroit, MI	30	Riverside, CA
11	Fort Lauderdale, FL	31	Sacramento, CA
12	Jacksonville, FL	32	San Diego, CA
13	Las Vegas, NV	33	San Francisco, CA
14	Los Angeles, CA	34	San Jose, CA
15	Miami, FL	35	Seattle, WA
16	Milwaukee, WI	36	Tampa, FL
17	Minneapolis, MN	37	Virginia Beach, VA
18	Montgomery County, PA	38	Warren, MI
19	Nashville, TN	39	Washington, DC
20	Nassau County, NY		

To extend the analysis of study, the 39 metropolitan areas were then divided into different sub-samples based on the following characteristics: Region, Population, and Population Change. The regional grouping was done based off of geographical locations of the metropolitan areas. Thus, there are four distinct regional groups: West,

South, Midwest, and Northeast. For Population and Population Change groups, data was collected from the 2010[17]-2020 census[18]. The metropolitan areas were also split into sub-samples based on their population: Small Population, Medium Population, and Large Population. The same procedure was used for Population Change leading to the four following groups: High Growth, Mid Growth, Low Growth, and Negative Growth. Tables 1.2-1.4 below provide a breakdown of the respective metropolitan areas into these different groupings. This methodology allows for a rigorous analysis of the data and ensures that the results are robust and reliable.

Table 1.2 Regional Breakdown

Region Breakdown			
West	South	Midwest	Northeast
Oakland, CA	Orlando, FL	Columbus, OH	Montgomery County, PA
San Diego, CA	Atlanta, GA	Milwaukee, WI	Philadelphia, PA
Anaheim, CA	Nashville, TN	Minneapolis, MN	Nassau County, NY
San Francisco, CA	Charlotte, NC	Detroit, MI	New Brunswick, NJ
San Jose, CA	Jacksonville, FL	Cincinnati, OH	Providence, RI
Denver, CO	Tampa, FL	Warren, MI	Baltimore, MD
Phoenix, AZ	Fort Lauderdale, FL	Cleveland, OH	Newark, NJ
Seattle, WA	Miami, FL	Chicago, IL	Washington, DC
Portland, OR	Virginia Beach, VA		New York, NY
Las Vegas, NV			
Sacramento, CA			
Los Angeles, CA			
Riverside, CA			

[17] United States Census Bureau, "2020 Census: Apportionment Results," accessed April 19, 2023
[18] United States Census Bureau, "2010 Census Summary File 1," accessed April 19, 2023

Table 1.3 Population Breakdown

Population Breakdown		
Small Population	Mid Population	Large Population
New Brunswick, NJ	Oakland, CA	Atlanta, GA
Fort Lauderdale, FL	Milwaukee, WI	Baltimore, MD
Warren, MI	Minneapolis, MN	Charlotte, NC
Anaheim, CA	Nashville, TN	Chicago, IL
Montgomery County, PA	Portland, OR	Cincinnati, OH
Warren, MI	Riverside, CA	Cleveland, OH
	Sacramento, CA	Columbus, OH
	San Francisco, CA	Denver, CO
	San Jose, CA	Detroit, MI
	Seattle, WA	Jacksonville, FL
	Tampa, FL	Las Vegas, NV
		Los Angeles, CA
		Miami, FL
		Nassau County, NY
		New York, NY
		Philadelphia, PA
		Phoenix, AZ
		Providence, RI
		San Diego, CA
		Virginia Beach, VA
		Washington, DC
* < 500,000	* 500,00 < x < 1,000,000	* 1,000,000 +

Table 1.4 Population Growth Breakdown

Population Growth Breakdown			
Negative Growth	Low Growth	Mid Growth	High Growth
Baltimore, MD (-4.6%),	Cincinnati, OH (1.2%)	Anaheim, CA (7.2%)	Charlotte, NC (59.4%)
Chicago, IL (-6.9%)	Milwaukee, WI (1.6%)	Fort Lauderdale, FL (7.9%)	Columbus, OH (17.7%)
Cleveland, OH (-5.1%)	Montgomery County, PA (4.6%)	Jacksonville, FL (16.8%)	Denver, CO (20.5%)
Detroit, MI (-10.5%)	Nassau County, NY (1.8%)	Las Vegas, NV (16.7%)	Nashville, TN (19.2%)
Providence, RI (-1.4%)	Philadelphia, PA (4.0%)	Miami, FL (12.7%)	Seattle, WA (22.0%)
Warren, MI (-1.4%)	Virginia Beach, VA (4.4%)	Minneapolis, MN (9.9%)	Orlando, FL (25.8%)
	Los Angeles, CA (2.8%)	New Brunswick, NJ (13.2%)	Atlanta, GA (17.4%)
	New York, NY (4.3%)	Oakland, CA (10.1%)	
		Phoenix, AZ (11.2%)	
		Portland, OR (12.0%)	
		Riverside, CA (11.6%)	
		Sacramento, CA (7.6%)	
		San Diego, CA (8.0%)	
		San Francisco, CA (7.7%)	
		San Jose, CA (10.0%)	
		Tampa, FL (15.9%)	
		Washington, DC (14.6%).	
* <0%	* 0 < x < 5%	* 5 < x < 17%	* 17% +

Six dependent variables using one regression models makes twelve distinct regressions, as follows:

$$\boldsymbol{dlogMedianSalePrice_{it} = \beta_i + \delta_t + \beta_1 InvestorMarketShare_{it} + \varepsilon_{it}}$$

$$\boldsymbol{log(HomesSold)_{it} = \beta_i + \delta_t + \beta_1 InvestorMarketShare_{it} + \varepsilon_{it}}$$

$$\boldsymbol{log(NewListings)_{it} = \beta_i + \delta_t + \beta_1 InvestorMarketShare_{it} + \varepsilon_{it}}$$

$$\boldsymbol{log(Inventory)_{it} = \beta_i + \delta_t + \beta_1 InvestorMarketShare_{it} + \varepsilon_{it}}$$

$$\boldsymbol{DaysonMarket_{it} = \beta_i + \delta_t + \beta_1 InvestorMarketShare_{it} + \varepsilon_{it}}$$

$$\boldsymbol{AveragesaletoList_{it} = \beta_i + \delta_t + \beta_1 InvestorMarketShare_{it} + \varepsilon_{it}}$$

$$\boldsymbol{dlogMedianSalePrice_{it} = \beta_i + \delta_t + \beta_1 InvestorPurchases_{it} + \varepsilon_{it}}$$

$$\boldsymbol{log(HomesSold)_{it} = \beta_i + \delta_t + \beta_1 InvestorPurchases_{it} + \varepsilon_{it}}$$

$$\boldsymbol{log(NewListings)_{it} = \beta_i + \delta_t + \beta_1 InvestorPurchases_{it} + \varepsilon_{it}}$$

$$\boldsymbol{log(Inventory)_{it} = \beta_i + \delta_t + \beta_1 InvestorPurchases_{it} + \varepsilon_{it}}$$

$$\boldsymbol{DaysonMarket_{it} = \beta_i + \delta_t + \beta_1 InvestorPurchases_{it} + \varepsilon_{it}}$$

$$\boldsymbol{AveragesaletoList_{it} = \beta_i + \delta_t + \beta_1 InvestorPurchases_{it} + \varepsilon_{it}}$$

To ensure that the standard errors of this study were accurate, I employed an additional test using the Driscoll-Kraay standard errors. This led to the results found table 1.5. The regression analysis on the different groupings (Region, Population, and Population Change) can be found in Tables 1.6-1.8.

§5: Empirical Results

An explanation of the results can be found after the results tables on page 30. I will discuss each dependent variable with an integrated perspective.

Table 1.5 **Full Sample Results**

Full Sample Results

Independent Variable: Investor Market Share

Median Sale Price (log)	Homes Sold (log)	New Listings (log)	Inventory (log)	Days on Market	Avg Sale to List
0.00212	0.122	0.249*	-1.347***	-54.40***	0.100***
-0.0578	-0.389	-0.236	-0.36	-12.32	-0.0397

Independent Variable: Investor Purchases

Median Sale Price (log)	Homes Sold (log)	New Listings (log)	Inventory (log)	Days on Market	Avg Sale to List
-2.49E-07	9.55e-06*	-3.29E-06	-5.91e-05***	-0.00279***	-1.55e-06**
-2.10E-06	-1.37E-05	-7.87E-06	-9.34E-06	-0.001	-1.17E-06

Driscoll-Kraay Standard Errors in Parentheses
*** p < 0.01, ** p < 0.05, * p <0.10

Table 1.6 **Regional Results**

Regional Results

Region: West

Independent Variable: Investor Market Share

Median Sale Price (log)	Homes Sold (log)	New Listings (log)	Inventory (log)	Days on Market	Avg Sale to List
-0.0319	-0.495*	-0.227	-5.112***	-108.5***	0.348***
(0.0800)	(0.283)	(0.340)	(0.470)	(18.36)	(0.0309)

Independent Variable: Investor Purchases

Median Sale Price (log)	Homes Sold (log)	New Listings (log)	Inventory (log)	Days on Market	Avg Sale to List
6.79e-06*	8.50e-05***	5.02e-05***	-0.000182***	-0.00857***	1.25e-05***
(3.47e-06)	(1.15e-05)	(1.43e-05)	(2.06e-05)	(0.000717)	(1.36e-06)

Region: South

Independent Variable: Investor Market Share

Median Sale Price (log)	Homes Sold (log)	New Listings (log)	Inventory (log)	Days on Market	Avg Sale to List
-0.0753	0.450**	0.0357	-4.089***	-184.1***	0.164***
(0.0666)	(0.208)	(0.193)	(0.346)	(27.21)	(0.0118)

Independent Variable: Investor Purchases

Median Sale Price (log)	Homes Sold (log)	New Listings (log)	Inventory (log)	Days on Market	Avg Sale to List
1.82e-07	6.95e-05***	2.40e-05***	-0.000169***	-0.0112***	6.92e-06***
(2.70e-06)	(7.45e-06)	(7.37e-06)	(1.31e-05)	(0.000969)	(4.51e-07)

Region: Northeast

Independent Variable: Investor Market Share

Median Sale Price (log)	Homes Sold (log)	New Listings (log)	Inventory (log)	Days on Market	Avg Sale to List
-0.440*	0.388	1.104*	-4.934***	-143.9**	0.309***
(0.256)	(0.616)	(0.632)	(0.710)	(67.17)	(0.0536)

Independent Variable: Investor Purchases

Median Sale Price (log)	Homes Sold (log)	New Listings (log)	Inventory (log)	Days on Market	Avg Sale to List
1.74e-05	0.000555***	0.000289***	-0.000367***	-0.0462***	4.62e-05***

(1.97e-05)	(3.57e-05)	(4.52e-05)	(5.35e-05)	(0.00445)	(3.43e-06)

Region: Midwest

Independent Variable: Investor Market Share

Median Sale Price (log)	Homes Sold (log)	New Listings (log)	Inventory (log)	Days on Market	Avg Sale to List
-0.804***	0.759**	-0.319	-5.305***	-179.1***	0.256***
(0.212)	(0.382)	(0.405)	(0.457)	(30.84)	(0.0341)

Independent Variable: Investor Purchases

Median Sale Price (log)	Homes Sold (log)	New Listings (log)	Inventory (log)	Days on Market	Avg Sale to List
-9.73e-06	0.000307***	0.000103***	-0.000374***	-0.0297***	3.01e-05***
(1.79e-05)	(2.55e-05)	(3.19e-05)	(3.83e-05)	(0.00199)	(2.43e-06)

Driscoll-Kraay Standard Errors in Parentheses
*** p < 0.01, ** p < 0.05, * p <0.10

Table 1.7 Population Results

Population Results

Large Population

Independent Variable: Investor Market Share

Median Sale Price (log)	Homes Sold (log)	New Listings (log)	Inventory (log)	Days on Market	Avg Sale to List
-0.140	-0.413	-0.123	-4.743***	-64.82**	0.286***
(0.134)	(0.423)	(0.443)	(0.484)	(32.23)	(0.0350)

Independent Variable: Investor Purchases

Median Sale Price (log)	Homes Sold (log)	New Listings (log)	Inventory (log)	Days on Market	Avg Sale to List
1.71e-06	8.93e-05***	2.99e-05**	-0.000130***	-0.00693***	9.17e-06***
(4.71e-06)	(1.36e-05)	(1.50e-05)	(1.74e-05)	(0.00104)	(1.21e-06)

Mid Population

Independent Variable: Investor Market Share

Median Sale Price (log)	Homes Sold (log)	New Listings (log)	Inventory (log)	Days on Market	Avg Sale to List
-0.206**	0.716***	0.0984	-4.712***	-156.2***	0.243***
(0.0920)	(0.233)	(0.251)	(0.321)	(18.12)	(0.0200)

Independent Variable: Investor Purchases

Median Sale Price (log)	Homes Sold (log)	New Listings (log)	Inventory (log)	Days on Market	Avg Sale to List
8.78e-06	0.000210***	0.000111***	-0.000355***	-0.0228***	2.12e-05***
(6.90e-06)	(1.50e-05)	(1.78e-05)	(2.33e-05)	(0.00106)	(1.39e-06)

Small Population

Independent Variable: Investor Market Share

Median Sale Price (log)	Homes Sold (log)	New Listings (log)	Inventory (log)	Days on Market	Avg Sale to List
-0.297***	-0.0947	-0.0414	-4.493***	-198.0***	0.221***
(0.110)	(0.239)	(0.264)	(0.396)	(29.18)	(0.0237)

Independent Variable: Investor Purchases

Median Sale Price (log)	Homes Sold (log)	New Listings (log)	Inventory (log)	Days on Market	Avg Sale to List
5.28e-07	7.73e-05***	3.17e-05***	-0.000167***	-0.0122***	8.93e-06***
(4.28e-06)	(8.57e-06)	(9.63e-06)	(1.45e-05)	(0.00103)	(8.88e-07)

Driscoll-Kraay Standard Errors in Parentheses
*** p < 0.01, ** p < 0.05, * p <0.10

Table 1.8 Population Growth Results

Population Change Results

High Population Growth

Independent Variable: Investor Market Share

Median Sale Price (log)	Homes Sold (log)	New Listings (log)	Inventory (log)	Days on Market	Avg Sale to List
-0.136	0.0848	-0.249	-4.787***	-174.8***	0.178***
(0.0949)	(0.262)	(0.286)	(0.459)	(27.57)	(0.0232)

Independent Variable: Investor Purchases

Median Sale Price (log)	Homes Sold (log)	New Listings (log)	Inventory (log)	Days on Market	Avg Sale to List
-6.78e-07	5.64e-05***	2.13e-05**	-0.000153***	-0.00980***	6.52e-06***
(3.18e-06)	(8.01e-06)	(9.31e-06)	(1.52e-05)	(0.000791)	(7.44e-07)

Mid Population Growth

Independent Variable: Investor Market Share

Median Sale Price (log)	Homes Sold (log)	New Listings (log)	Inventory (log)	Days on Market	Avg Sale to List
-0.0314	0.247	0.277	-4.312***	-157.6***	0.275***
(0.0781)	(0.226)	(0.264)	(0.347)	(24.50)	(0.0232)

Independent Variable: Investor Purchases

Median Sale Price (log)	Homes Sold (log)	New Listings (log)	Inventory (log)	Days on Market	Avg Sale to List
7.82e-06*	0.000117***	7.00e-05***	-0.000222***	-0.0137***	1.37e-05***
(4.29e-06)	(1.13e-05)	(1.37e-05)	(1.84e-05)	(0.00124)	(1.27e-06)

Low Population Growth

Independent Variable: Investor Market Share

Median Sale Price (log)	Homes Sold (log)	New Listings (log)	Inventory (log)	Days on Market	Avg Sale to List
-0.221*	-0.816*	-0.580	-5.795***	-143.4***	0.311***
(0.133)	(0.453)	(0.457)	(0.567)	(39.79)	(0.0326)

Independent Variable: Investor Purchases

Median Sale Price (log)	Homes Sold (log)	New Listings (log)	Inventory (log)	Days on Market	Avg Sale to List
1.06e-05	0.000298***	8.25e-05***	-0.000319***	-0.0263***	3.08e-05***
(9.24e-06)	(2.58e-05)	(3.01e-05)	(3.94e-05)	(0.00234)	(1.80e-06)

Negative Population Growth

Independent Variable: Investor Market Share

Median Sale Price (log)	Homes Sold (log)	New Listings (log)	Inventory (log)	Days on Market	Avg Sale to List
-1.205***	1.701***	0.349	-4.155***	-147.4***	0.183***
(0.307)	(0.465)	(0.455)	(0.541)	(35.32)	(0.0418)

Independent Variable: Investor Purchases

Median Sale Price (log)	Homes Sold (log)	New Listings (log)	Inventory (log)	Days on Market	Avg Sale to List

-9.48e-06	0.000318***	0.000123***	-0.000284***	-0.0239***	2.32e-05***
(2.37e-05)	(2.76e-05)	(3.19e-05)	(3.96e-05)	(0.00214)	(2.76e-06)

Driscoll-Kraay Standard Errors in Parentheses
*** p < 0.01, ** p < 0.05, * p <0.10

COVID Results

Post COVID

Independent Variable: Investor Market Share

Median Sale Price (log)	Homes Sold (log)	New Listings (Log)	Inventory (log)	Days on Market	Avg Sale to List
-0.185**	-0.210	-0.383	-4.045***	-91.97***	0.219***
(0.0828)	(0.262)	(0.255)	(0.334)	(15.59)	(0.0229)

Independent Variable: Investor Purchases

Median Sale Price (log)	Homes Sold (log)	New Listings (Log)	Inventory (log)	Days on Market	Avg Sale to List
6.92e-06*	0.000102***	3.23e-05***	-0.000145***	-0.00715***	1.12e-05***
(3.88e-06)	(1.15e-05)	(1.19e-05)	(1.64e-05)	(0.000688)	(1.06e-06)

Before COVID

Independent Variable: Investor Market Share

Median Sale Price (log)	Homes Sold (log)	New Listings (Log)	Inventory (log)	Days on Market	Avg Sale to List

-0.623***	-1.462***	-0.868***	-2.926***	6.959	0.147***
(0.138)	(0.271)	(0.332)	(0.327)	(27.68)	(0.0227)

Independent Variable: Investor Purchases

Median Sale Price (log)	Homes Sold (log)	New Listings (Log)	Inventory (log)	Days on Market	Avg Sale to List
-8.54e-07	0.000177***	9.74e-05***	-0.000150***	-0.0219***	1.13e-05***
(7.49e-06)	(1.28e-05)	(1.64e-05)	(1.64e-05)	(0.00123)	(1.12e-06)

Driscoll-Kraay Standard Errors in Parentheses

*** p < 0.01, ** p < 0.05, * p <0.10

Table 1.9 COVID-19 Results

Considering Average Sale to List Price in the full sample, the 0.100 coefficient on Investor Market Share indicates an 1% increase in Investor Market Share is associated with a 0.001 point increase in the Average Sale to List Ratio. The regional coefficients range from 0.164 in the South Region to 0.348 in the West Region and are statistically significant at convention levels in every region. The population coefficients range from 0.221 in Small Population cities to 0.286 in Large Population cities and are statistically significant at convention levels at every population size. The Population Growth coefficients range from 0.178 in cities that experienced High Population Growth to 0.311 in cities that experienced Low Population Growth and are statistically significant at convention levels for all Population Growth levels. The coefficients for COVID-19 are 0.147 before the onset of the pandemic and 0.219 during and after the pandemic. Both coefficients are statistically significant at conventional levels.

With respect to Investor Purchases, Average Sale to List Price in the full sample has a -1.55e-6 coefficient on Investor Purchases indicating that a 1000 unit increase in the number of Investor Purchases is associated with a 0.155% decrease in the Average Sale to List Price Ratio. Assuming list prices remain constant, this means that institutional investors are able to acquire these homes at a discount. If sale prices are remaining constant, than the sellers are listing their properties at higher prices. The regional coefficients range from 6.92e-6 in the South Region to 4.62e-5 in the Northeast Region, and are all statistically significant at conventional levels. The population coefficients range from 8.93e-6 in Small Population cities to 2.12e-5 in Mid Population cities, and are all statistically significant at conventional levels. The Population Growth

coefficients range from 6.52e-6 in High Population Growth cities to 3.08e-5 in Low Population Growth cities, while all Population Growth coefficients are statistically significant at conventional levels. The coefficient on Average Sale to List Price before COVID-19 is 1.133e-5 while the coefficient is 1.12e-5 during and after the pandemic. Both coefficients are statistically significant at conventional levels.

Considering Days on Market in the full sample, the -54.40 coefficient on Investor Market Share indicates that a 1% increase in Investor Market Share is associated with a 0.54 unit decrease in the number of Days on Market. The regional coefficients range from -108.5 in the West Region to -184.1 in the South Region; the coefficients are statistically significant at conventional levels for all regions. The population coefficients range from -64.82 in High Population cities to -198.0 in Small Population cities, while all Days on Market coefficients are statistically significant at conventional levels. The population growth coefficients range from -174.8 in High Population Growth cities to -143.4 in Low Population Growth cities; all coefficients for Days on Market on Investor Market Share are statistically significant at conventional levels. Before the onset of the COVID-19 pandemic the coefficient was 6.59 indicating a positive association between Investor Market Share and Days on Market; however, during and after COVID-19 the coefficient changes drastically to -91.97. Both coefficients are statistically significant at conventional levels.

With respect to Investor Purchases, Days on Market in the full sample has a -0.00279 coefficient on Investor Purchases indicating that a 1000 unit increase in the number of Investor Purchases is associated with a 2.79 unit decrease in the number of

Days on Market. The regional coefficients range from -0.0112 in the South Region to -0.00857 in the West Region, and are all statistically significant at conventional levels. The population coefficients range from -0.00693 in Large Population cities to -0.228 in Mid Population cities, and are all statistically significant at conventional levels. The Population Growth coefficients range from -0.00980 in High Population Growth cities to -0.0263 in Low Population Growth cities, while all Population Growth coefficients are statistically significant at conventional levels. The coefficient on Days on Market before COVID-19 is -0.0219 while the coefficient is -0.00715 during and after the pandemic. Both coefficients are statistically significant at conventional levels.

Considering Inventory (log) in the full sample, the -1.347 coefficient on Investor Market Share indicates a 10% increase in Investor Market Share is associated with a 13.47% point decrease in Inventory. The regional coefficients range from -5.305 in the Midwest Region to -4.089 in the South Region and are statistically significant at convention levels in every region. The Population coefficients range from -4.493 in Small Population cities to -4.473 in Large Population cities and are statistically significant at convention levels at every population size. The Population Growth coefficients range from -4.155 in cities that experienced Negative Population Growth to -5.795 in cities that experienced Low Population Growth and are statistically significant at convention levels for all population change levels. The coefficients for COVID-19 are -2.926 before the onset of the pandemic and -4.05 during and after the pandemic. Both coefficients are statistically significant at conventional levels.

With respect to Investor Purchases, Inventory (log) in the full sample has a -5.91e-5 coefficient on Investor Purchases indicating that a 1000 unit increase in the number of Investor Purchases is associated with a 5.9% decrease in the Inventory. The regional coefficients range from -0.000169 in the South Region to -0.000374 in the Midwest Region, and are all statistically significant at conventional levels. The population coefficients range from -0.000130 in Large Population cities to -0.000355 in Mid Population cities, and are all statistically significant at conventional levels. The Population Growth coefficients range from -0.000153 in High Population Growth cities to -0.000319 in Low Population Growth cities, while all Population Growth coefficients are statistically significant at conventional levels. The coefficient on Inventory (log) before COVID-19 is -0.00015 while the coefficient is -0.000145 during and after the pandemic. Both coefficients are statistically significant at conventional levels.

Considering New Listings (log) in the full sample, the 0.249 coefficient on Investor Market Share indicates a 10% increase in Investor Market Share is associated with a 2.49% point increase in New Listings. The coefficient for the full sample has a p-value less than 0.1 meaning it is somewhat significant. The regional coefficients range from -0.319 in the Midwest Region to -1.104 in the Northeast Region. The coefficient for the Northeast Region has a p-value less than 0.1, all other regional coefficients are not statistically significant. None of the Population or Population Growth coefficients are statistically significant indicating a weak relationship between New Listings (log) and Investor Market Share for Population and Population Growth. The coefficients for COVID-19 are -0.868 before the onset of the pandemic and -0.383 during and after the

pandemic. Only the coefficient for New Listings (log) on Investor Market Share prior to COVID-19 is statistically significant at conventional levels.

With respect to Investor Purchases, New Listings (log) in the full sample has a -3.29e-6 coefficient on Investor Purchases indicating that a 1000 unit increase in the number of Investor Purchases is associated with a -0.33% decrease in the number of New Listings. The regional coefficients range from 2.40e-5 in the South Region to 0.000289 in the Northeast Region, and are all statistically significant at conventional levels. The population coefficients range from -2.99e-5 in Large Population cities to 0.000111 in Mid Population cities, and are all statistically significant at conventional levels. The Population Growth coefficients range from 2.13e-5 in High Population Growth cities to 0.000123 in Negative Population Growth cities, while all Population Growth coefficients are statistically significant at conventional levels. The coefficient on New Listings (log) before COVID-19 is 9.71e-5 while the coefficient is 3.23e-5 during and after the pandemic. Both coefficients are statistically significant at conventional levels.

Considering Homes Sold (log) in the full sample, the 0.122 coefficient on Investor Market Share indicates a 10% increase in Investor Market Share is associated with a 1.22% point increase in Homes Sold; however the coefficient in the full sample is not statistically significant. The regional coefficients range from -0.495 in the West Region to 0.759 in the Midwest Region. The coefficient for the Midwest Region is statistically significant at conventional levels. The coefficient for the West Region has a p-value less than 0.1, and the coefficients The South and the Northeast are not statistically

significant. The Population coefficients range from -0.413 in Large Population cities to 0.716 in Mid Population cities. Only the coefficient for Mid Population cities is statistically significant at conventional levels. The Population Growth coefficients range from -0.816 in cities that experienced Low Population Growth to 1.701 in cities that experienced Negative Population Growth. The coefficient for Negative Population Growth is statistically significant at conventional levels; the coefficient for Low Population Growth has a p-value less than 0.1; the coefficients for Mid Population Growth and High Population Growth are not statistically significant. The coefficients for COVID-19 are -1.462 before the onset of the pandemic and -0.210 during and after the pandemic. Only the coefficient for Homes Sold (log) on Investor Market Share prior to COVID-19 is statistically significant at conventional levels.

With respect to Investor Purchases, Homes Sold (log) in the full sample has a 9.55e-6 coefficient on Investor Purchases indicating that a 1000 unit increase in the number of Investor Purchases is associated with a 0.96% increase in the number of Homes Sold; the coefficient for the full sample has a p-value less than 0.1. The regional coefficients range from 6.95e-5 in the South Region to 0.000555 in the Northeast Region, and are all statistically significant at conventional levels. The population coefficients range from 7.73e-5 in Small Population cities to 0.000210 in Mid Population cities, and are all statistically significant at conventional levels. The Population Growth coefficients range from 5.64e-5 in High Population Growth cities to 0.000318 in Negative Population Growth cities, while all Population Growth coefficients are statistically significant at conventional levels. The coefficient on Homes Sold (log) before COVID-19 is 0.000177

while the coefficient is 0.000102 during and after the pandemic. Both coefficients are statistically significant at conventional levels.

Considering Median Sale Price (log) in the full sample, the coefficient for Median Sale Price on Investor Market Share is not statistically significant. The regional coefficients range from -0.0319 in the West Region to -0.804 in the Midwest Region. The coefficient for the Midwest Region is statistically significant at conventional levels. The coefficient for the Northeast Region has a p-value less than 0.1, and the coefficients The West and the South are not statistically significant. The Population coefficients range from -0.140 in Large Population cities to 0.297 in Small Population cities. The coefficients for Mid Population and Small Population cities are statistically significant at conventional levels. The Population Growth coefficients range from -0.0314 in cities that experienced High Population Growth to -1.205 in cities that experienced Negative Population Growth. The coefficient for Negative Population Growth is statistically significant at conventional levels; the coefficient for Low Population Growth has a p-value less than 0.1; the coefficients for Mid Population Growth and High Population Growth are not statistically significant. The coefficients for COVID-19 are -0.623 before the onset of the pandemic and -0.185 during and after the pandemic. Both of the coefficients for Median Sale Price (log) on Investor Market Share prior to COVID-19 are statistically significant at conventional levels.

With respect to Investor Purchases and Median Sale Price (log), the coefficient for Median Sale Price on Investor Market Share is not statistically significant. The regional coefficients range from 1.82e-7 in the South Region to 1.74e-5 in the Northeast Region.

The coefficients for the West Region and the Northeast Region have p-values less than 0.1, the other coefficients are not statistically significant. The majority of the Population coefficients and the Population Growth coefficients are not statistically significant; the only exception is Mid Population Growth which has a coefficient of 7.82e-6 and a p-value less than 0.1. The coefficient on Median Sale Price (log) before COVID-19 is -8.54e-7 while the coefficient is 6.92e-6 during and after the pandemic. Only the coefficient for Median Sale Price on Investor Purchases during and after the pandemic is statistically significant at conventional levels.

§6: Discussion

From the full sample, regional, population, population change, and COVID-19 results it is clear that institutional investor activity has a statically significant impact on single-family housing markets. However, the impact may not be as dystopian as previously reported. Based on the results from this study it is clear that the full sample as well as the sub-samples indicate a statistically significant association between institutional investor activity (investor market share and investor purchases) and the inventory, days on market, and the average sale to list price ratio of single-family housing markets – on both a national and local level. The effects on the inventory levels and the number of days on market simply tell us that institutional investors are creating a more productive market. Transactions are happening more quickly and more often.

With respect to institutional investors' impact on the average sale to list price ratio – which is small, yet statistically significant – provides us with slightly more insight into the pricing effects of institutional investment on single-family housing markets. Interestingly, investor market share and investor purchases have opposite effects. With investor market share, holding the list prices constant – sellers are not changing prices based on investor activity – the sale prices are slightly decreased. This decrease aligns with the findings of Marcus T. Allen, et. al., which finds that on average institutional investors purchase single-family properties at a 9.5% discount.[19] Conversely, while holding the list price constant, an increase in investor purchases is

[19] Marcus T. Allen, Edward B. Saff, and Andrey D. Pavlov, "Impact of Investors in Distressed Housing Markets," Journal of Real Estate Finance and Economics 54, no. 4 (2017): 458-82

associated with a decrease in the sale to list price ratio. Under these assumptions that means that an increase in investor purchases is associated with a increase in the average sale price. The increase in the average sale price could be because institutional investors are paying a premium or there is more demand while supply remains (relatively) constant, among other various possibilities.

Flipping the above example would generate inverse results. For example, holding sale prices constant, an increase in investor market share is associated with an increase in the average sale price. Markets are dynamic and are a mix of these two examples. However, the association between investor activity and the average sale to list price ratio is statistically significant and provides insight into the pricing effects of institutional investors on single-family housing markets.

Most of the other variables – new listings, homes sold, and median sale price – are not statistically significant with respect to investor market share. However, new listings and homes sold are statistically significant for investor purchases in all of the sub-samples but not the full sample. From these results, similar associations can be made. More investor activity leads to more productive single-family housing markets. More homes are put up for sale and more homes get sold when investor activity increases. How the prices of single-family properties are affected cannot be concluded; however, these results give us more insight into the market dynamics.

Considering current market conditions and recent events, concern is understandable. Events such as the collapse of Silicon Valley Bank and other banks combined with the fact that a vast number of mid-size banks' balance sheet show a

large portion of assets in commercial real-estate adjustable loans as the FED has dramatically raised rates over the last few quarters warrant concern. However, Jiawei Zhang, et. al., change their attitude from concern to caution in their paper *"US House Price Projections form the Economic Impact of the Coronavirus.*[20]"Zhang, et. al., conclude that the (presumably) shock to US house prices – or single-family properties – will be much milder than the experience during the Great Financial Crisis of 2008. Similar to the results of this study, institutional investors' impact on single-family housing markets – nationwide and locally – may not be as devastating as once thought.

[20] Jiawei "David" Zhang, et al., "US House Price Projections from the Economic Impact of the Coronavirus," The Journal of Structured Finance 26, no. 3 (2020): 52-61

§7: Conclusion

In conclusion, this study demonstrates that institutional investor activity has a significant impact on single-family housing markets, particularly on inventory, days on market, and average sale to list price ratio. Although the impact on median sale price may not be as alarming as previously reported, the pricing effects of institutional investment remain complex and depend on multiple factors. Overall, the results suggest that institutional investors are creating a more productive market, with transactions happening more quickly and more often. The findings provide valuable insights into the market dynamics and can inform policy discussions around the role of institutional investors in the housing market. In the next section, we will summarize the main findings and offer some recommendations for future research.

§8: References

Allen, Marcus T., Edward B. Saff, and Andrey D. Pavlov. "Impact of Investors in Distressed Housing Markets." Journal of Real Estate Finance and Economics 54, no. 4 (2017): 458-82. https://doi.org/10.1007/s11146-017-9609-0.

Carlo, Alexander, et al. "The Determinants of Institutional Capital Allocation to Real Estate." *CFA Society Netherlands* , VBA Journal, 2022, https://cfasociety.nl/uploads/2022/Najaar%202022/Opinion%2002/Opinion%202.pdf.

Chun, Gregory H., et al. "The Role of Real Estate in an Institutional Investor's Portfolio Revisited - The Journal of Real Estate Finance and Economics." *SpringerLink*, Kluwer Academic Publishers, https://link.springer.com/article/10.1023/B:REAL.0000036675.46796.21.

Colburn, Gregg, et al. "Capitalizing on Collapse: An Analysis of Institutional Single-Family Rental Investors ." *Urban Affairs Review* , https://journals.sagepub.com/doi/10.1177/1078087420922910.

Cvijanović, Dragana, et al. "Preferences of Institutional Investors in Commercial Real Estate - The Journal of Real Estate Finance and Economics." *SpringerLink*, Springer US, 15 May 2021, https://link.springer.com/article/10.1007/s11146-020-09816-y.

Dezember, Ryan and Will Parker. "Blackstone Bets $6 Billion on Buying and Renting Homes." Wall Street Journal, June 23, 2021. https://www.wsj.com/articles/blackstone-bets-6-billion-on-buying-and-renting-homes-11624359600.

Dezember, Ryan. "Investor Home Purchases Plunge by Half in Fourth Quarter Amid Housing Slump." Wall Street Journal, February 12, 2019. https://www.wsj.com/articles/investor-home-purchases-plunge-by-half-in-fourth-quarter-amid-housing-slump-33875581.

Egan, Matt, "Wall Street giants are scooping up family homes. The rent checks are pouring in," CNN Business, August 2, 2021, https://www.cnn.com/2021/08/02/business/family-homes-wall-street/index.html

Fisher, Jeffery, et al. *Institutional Capital Flows and Return Dynamics in Private Commercial Real Estate Markets ... - Wiley Online Library*. 19 Feb. 2009, https://onlinelibrary.wiley.com/doi/full/10.1111/j.1540-6229.2009.00236.x.

Hoesli, Martin, and Richard Malle. "Commercial Real Estate Prices and Covid-19." *Journal of European Real Estate Research*, Emerald Publishing Limited, 11 Oct. 2021,

https://www.emerald.com/insight/content/doi/10.1108/JERER-04-2021-0024/full/html.

Lambie-Hanson, Lauren, et al. "Institutional Investors and the U.S. Housing Recovery." *SSRN*, 27 Nov. 2019, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3494193.

Montezuma, Joaquim. "Housing Investment in an Institutional Portfolio Context: A Review of the Issues." *Property Management*, Emerald Group Publishing Limited, 1 July 2004, https://www.emerald.com/insight/content/doi/10.1108/02637470410545011/full/html.

Raymond, Elora L, et al. "Corporate Landlords, Institutional Investors, and Displacement: Eviction Rates in Single-Family Rentals." *SSRN*, 4 Jan. 2017, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2893552.

Redfin. "Data Center." Redfin. Accessed April 20, 2023. https://www.redfin.com/news/data-center/.

Smith, Patrick, and Crocker Liu. *Institutional Investment, Asset Illiquidity and Post-Crash Housing Market Dynamics*. 30 Nov. 2017, https://onlinelibrary.wiley.com/doi/full/10.1111/1540-6229.12231.

United States Census Bureau. "2010 Census Summary File 1." Accessed April 19, 2023. https://www.census.gov/data/datasets/2010/dec/summary-file-1.html.

United States Census Bureau. "2020 Census: Apportionment Results." Accessed April 19, 2023. https://www.census.gov/data/tables/2020/dec/2020-apportionment-data.html.

Jiawei "David" Zhang, et al., "US House Price Projections from the Economic Impact of the Coronavirus," The Journal of Structured Finance 26, no. 3 (2020): 52-61, doi:10.3905/jsf.2020.26.3.052, https://jsf.pm-research.com/content/26/3/52.abstract.

§9: Appendix

Table 1.1

Region ID's

Region ID	City	Region ID	City
1	Anaheim, CA	21	New Brunswick, NJ
2	Atlanta, GA	22	New York, NY
3	Baltimore, MD	23	Newark, NJ
4	Charlotte, NC	24	Oakland, CA
5	Chicago, IL	25	Orlando, FL
6	Cincinnati, OH	26	Philadelphia, PA
7	Cleveland, OH	27	Phoenix, AZ
8	Columbus, OH	28	Portland, OR
9	Denver, CO	29	Providence, RI
10	Detroit, MI	30	Riverside, CA
11	Fort Lauderdale, FL	31	Sacramento, CA
12	Jacksonville, FL	32	San Diego, CA
13	Las Vegas, NV	33	San Francisco, CA
14	Los Angeles, CA	34	San Jose, CA
15	Miami, FL	35	Seattle, WA
16	Milwaukee, WI	36	Tampa, FL
17	Minneapolis, MN	37	Virginia Beach, VA
18	Montgomery County, PA	38	Warren, MI
19	Nashville, TN	39	Washington, DC
20	Nassau County, NY		

Table 1.2

Region Breakdown

West	South	Midwest	Northeast
Oakland, CA	Orlando, FL	Columbus, OH	Montgomery County, PA
San Diego, CA	Atlanta, GA	Milwaukee, WI	Philadelphia, PA
Anaheim, CA	Nashville, TN	Minneapolis, MN	Nassau County, NY
San Francisco, CA	Charlotte, NC	Detroit, MI	New Brunswick, NJ
San Jose, CA	Jacksonville, FL	Cincinnati, OH	Providence, RI
Denver, CO	Tampa, FL	Warren, MI	Baltimore, MD
Phoenix, AZ	Fort Lauderdale, FL	Cleveland, OH	Newark, NJ
Seattle, WA	Miami, FL	Chicago, IL	Washington, DC
Portland, OR	Virginia Beach, VA		New York, NY
Las Vegas, NV			
Sacramento, CA			
Los Angeles, CA			
Riverside, CA			

Table 1.3

Population Breakdown

Small Population	Mid Population	Large Population
New Brunswick, NJ	Oakland, CA	Atlanta, GA
Fort Lauderdale, FL	Milwaukee, WI	Baltimore, MD
Warren, MI	Minneapolis, MN	Charlotte, NC
Anaheim, CA	Nashville, TN	Chicago, IL
Montgomery County, PA	Portland, OR	Cincinnati, OH
Warren, MI	Riverside, CA	Cleveland, OH
	Sacramento, CA	Columbus, OH
	San Francisco, CA	Denver, CO
	San Jose, CA	Detroit, MI
	Seattle, WA	Jacksonville, FL
	Tampa, FL	Las Vegas, NV
		Los Angeles, CA
		Miami, FL
		Nassau County, NY
		New York, NY
		Philadelphia, PA
		Phoenix, AZ
		Providence, RI
		San Diego, CA
		Virginia Beach, VA
		Washington, DC
* < 500,000	* 500,00 < x < 1,000,000	* 1,000,000 +

Table 1.4

Population Growth Breakdown

Negative Growth	Low Growth	Mid Growth	High Growth
Baltimore, MD (-4.6%),	Cincinnati, OH (1.2%)	Anaheim, CA (7.2%)	Charlotte, NC (59.4%)
Chicago, IL (-6.9%)	Milwaukee, WI (1.6%)	Fort Lauderdale, FL (7.9%)	Columbus, OH (17.7%)
Cleveland, OH (-5.1%)	Montgomery County, PA (4.6%)	Jacksonville, FL (16.8%)	Denver, CO (20.5%)
Detroit, MI (-10.5%)	Nassau County, NY (1.8%)	Las Vegas, NV (16.7%)	Nashville, TN (19.2%)
Providence, RI (-1.4%)	Philadelphia, PA (4.0%)	Miami, FL (12.7%)	Seattle, WA (22.0%)
Warren, MI (-1.4%)	Virginia Beach, VA (4.4%)	Minneapolis, MN (9.9%)	Orlando, FL (25.8%)
	Los Angeles, CA (2.8%)	New Brunswick, NJ (13.2%)	Atlanta, GA (17.4%)
	New York, NY (4.3%)	Oakland, CA (10.1%)	
		Phoenix, AZ (11.2%)	
		Portland, OR (12.0%)	
		Riverside, CA (11.6%)	
		Sacramento, CA (7.6%)	
		San Diego, CA (8.0%)	
		San Francisco, CA (7.7%)	
		San Jose, CA (10.0%)	
		Tampa, FL (15.9%)	
		Washington, DC (14.6%).	
* <0%	* 0 < x < 5%	* 5 < x < 17%	* 17% +

Table 1.5 – Full Sample Results

Full Sample Results

Independent Variable: Investor Market Share

Median Sale Price (log)	Homes Sold (log)	New Listings (Log)	Inventory (log)	Days on Market	Avg Sale to List
0.00212	0.122	0.249*	-1.347***	-54.40***	0.100***
-0.0578	-0.389	-0.236	-0.36	-12.32	-0.0397

Independent Variable: Investor Purchases

Median Sale Price (log)	Homes Sold (log)	New Listings (Log)	Inventory (log)	Days on Market	Avg Sale to List
-2.49E-07	9.55e-06*	-3.29E-06	-5.91e-05***	-0.00279***	-1.55e-06**
-2.10E-06	-1.37E-05	-7.87E-06	-9.34E-06	-0.001	-1.17E-06

Driscoll-Kraay Standard Errors in Parentheses
*** p < 0.01, ** p < 0.05, * p <0.10

Table 1.6 – Regional Results

Regional Results

Region: West

Independent Variable: Investor Market Share

Median Sale Price (log)	Homes Sold (log)	New Listings (log)	Inventory (log)	Days on Market	Avg Sale to List
-0.0319	-0.495*	-0.227	-5.112***	-108.5***	0.348***
(0.0800)	(0.283)	(0.340)	(0.470)	(18.36)	(0.0309)

Independent Variable: Investor Purchases

Median Sale Price (log)	Homes Sold (log)	New Listings (log)	Inventory (log)	Days on Market	Avg Sale to List
6.79e-06*	8.50e-05***	5.02e-05***	-0.000182***	-0.00857***	1.25e-05***
(3.47e-06)	(1.15e-05)	(1.43e-05)	(2.06e-05)	(0.000717)	(1.36e-06)

Region: South

Independent Variable: Investor Market Share

Median Sale Price (log)	Homes Sold (log)	New Listings (log)	Inventory (log)	Days on Market	Avg Sale to List
-0.0753	0.450**	0.0357	-4.089***	-184.1***	0.164***
(0.0666)	(0.208)	(0.193)	(0.346)	(27.21)	(0.0118)

Independent Variable: Investor Purchases

Median Sale Price (log)	Homes Sold (log)	New Listings (log)	Inventory (log)	Days on Market	Avg Sale to List
1.82e-07	6.95e-05***	2.40e-05***	-0.000169***	-0.0112***	6.92e-06***
(2.70e-06)	(7.45e-06)	(7.37e-06)	(1.31e-05)	(0.000969)	(4.51e-07)

Region: Northeast

Independent Variable: Investor Market Share

Median Sale Price (log)	Homes Sold (log)	New Listings (log)	Inventory (log)	Days on Market	Avg Sale to List
-0.440*	0.388	1.104*	-4.934***	-143.9**	0.309***
(0.256)	(0.616)	(0.632)	(0.710)	(67.17)	(0.0536)

Independent Variable: Investor Purchases

Median Sale Price (log)	Homes Sold (log)	New Listings (log)	Inventory (log)	Days on Market	Avg Sale to List
1.74e-05	0.000555***	0.000289***	-0.000367***	-0.0462***	4.62e-05***
(1.97e-05)	(3.57e-05)	(4.52e-05)	(5.35e-05)	(0.00445)	(3.43e-06)

Region: Midwest

Independent Variable: Investor Market Share

Median Sale Price (log)	Homes Sold (log)	New Listings (log)	Inventory (log)	Days on Market	Avg Sale to List
-0.804***	0.759**	-0.319	-5.305***	-179.1***	0.256***
(0.212)	(0.382)	(0.405)	(0.457)	(30.84)	(0.0341)

Independent Variable: Investor Purchases

Median Sale Price (log)	Homes Sold (log)	New Listings (log)	Inventory (log)	Days on Market	Avg Sale to List
-9.73e-06	0.000307***	0.000103***	-0.000374***	-0.0297***	3.01e-05***
(1.79e-05)	(2.55e-05)	(3.19e-05)	(3.83e-05)	(0.00199)	(2.43e-06)

Driscoll-Krayy Standard Errors in Parentheses
*** p < 0.01, ** p < 0.05, *P < 0.10

Table 1.7 - Population Results

Population Results

Large Population

Independent Variable: Investor Market Share

Median Sale Price (log)	Homes Sold (log)	New Listings (log)	Inventory (log)	Days on Market	Avg Sale to List
-0.140	-0.413	-0.123	-4.743***	-64.82**	0.286***
(0.134)	(0.423)	(0.443)	(0.484)	(32.23)	(0.0350)

Independent Variable: Investor Purchases

Median Sale Price (log)	Homes Sold (log)	New Listings (log)	Inventory (log)	Days on Market	Avg Sale to List
1.71e-06	8.93e-05***	2.99e-05**	-0.000130***	-0.00693***	9.17e-06***
(4.71e-06)	(1.36e-05)	(1.50e-05)	(1.74e-05)	(0.00104)	(1.21e-06)

Mid Population

Independent Variable: Investor Market Share

Median Sale Price (log)	Homes Sold (log)	New Listings (log)	Inventory (log)	Days on Market	Avg Sale to List
-0.206**	0.716***	0.0984	-4.712***	-156.2***	0.243***
(0.0920)	(0.233)	(0.251)	(0.321)	(18.12)	(0.0200)

Independent Variable: Investor Purchases

Median Sale Price (log)	Homes Sold (log)	New Listings (log)	Inventory (log)	Days on Market	Avg Sale to List
8.78e-06	0.000210***	0.000111***	-0.000355***	-0.0228***	2.12e-05***
(6.90e-06)	(1.50e-05)	(1.78e-05)	(2.33e-05)	(0.00106)	(1.39e-06)

Small Population

Independent Variable: Investor Market Share

Median Sale Price (log)	Homes Sold (log)	New Listings (log)	Inventory (log)	Days on Market	Avg Sale to List
-0.297***	-0.0947	-0.0414	-4.493***	-198.0***	0.221***
(0.110)	(0.239)	(0.264)	(0.396)	(29.18)	(0.0237)

Independent Variable: Investor Purchases

Median Sale Price (log)	Homes Sold (log)	New Listings (Log)	Inventory (log)	Days on Market	Avg Sale to List
5.28e-07	7.73e-05***	3.17e-05***	-0.000167***	-0.0122***	8.93e-06***
(4.28e-06)	(8.57e-06)	(9.63e-06)	(1.45e-05)	(0.00103)	(8.88e-07)

Driscoll-Krayy Standard Errors in Parentheses
*** p < 0.01, ** p < 0.05, *P < 0.10

Table 1.8 - Population Change Results

Population Change Results

High Population Growth

Independent Variable: Investor Market Share

Median Sale Price (log)	Homes Sold (log)	New Listings (log)	Inventory (log)	Days on Market	Avg Sale to List
-0.136	0.0848	-0.249	-4.787***	-174.8***	0.178***
(0.0949)	(0.262)	(0.286)	(0.459)	(27.57)	(0.0232)

Independent Variable: Investor Purchases

Median Sale Price (log)	Homes Sold (log)	New Listings (log)	Inventory (log)	Days on Market	Avg Sale to List
-6.78e-07	5.64e-05***	2.13e-05**	-0.000153***	-0.00980***	6.52e-06***
(3.18e-06)	(8.01e-06)	(9.31e-06)	(1.52e-05)	(0.000791)	(7.44e-07)

Mid Population Growth

Independent Variable: Investor Market Share

Median Sale Price (log)	Homes Sold (log)	New Listings (log)	Inventory (log)	Days on Market	Avg Sale to List
-0.0314	0.247	0.277	-4.312***	-157.6***	0.275***
(0.0781)	(0.226)	(0.264)	(0.347)	(24.50)	(0.0232)

Independent Variable: Investor Purchases

Median Sale Price (log)	Homes Sold (log)	New Listings (log)	Inventory (log)	Days on Market	Avg Sale to List
7.82e-06*	0.000117***	7.00e-05***	-0.000222***	-0.0137***	1.37e-05***
(4.29e-06)	(1.13e-05)	(1.37e-05)	(1.84e-05)	(0.00124)	(1.27e-06)

Low Population Growth

Independent Variable: Investor Market Share

Median Sale Price (log)	Homes Sold (log)	New Listings (Log)	Inventory (log)	Days on Market	Avg Sale to List
-0.221*	-0.816*	-0.580	-5.795***	-143.4***	0.311***
(0.133)	(0.453)	(0.457)	(0.567)	(39.79)	(0.0326)

Independent Variable: Investor Purchases

Median Sale Price (log)	Homes Sold (log)	New Listings (Log)	Inventory (log)	Days on Market	Avg Sale to List
1.06e-05	0.000298***	8.25e-05***	-0.000319***	-0.0263***	3.08e-05***
(9.24e-06)	(2.58e-05)	(3.01e-05)	(3.94e-05)	(0.00234)	(1.80e-06)

Negative Population Growth

Independent Variable: Investor Market Share

Median Sale Price (log)	Homes Sold (log)	New Listings (log)	Inventory (log)	Days on Market	Avg Sale to List
-1.205***	1.701***	0.349	-4.155***	-147.4***	0.183***
(0.307)	(0.465)	(0.455)	(0.541)	(35.32)	(0.0418)

Independent Variable: Investor Purchases

Median Sale Price (log)	Homes Sold (log)	New Listings (log)	Inventory (log)	Days on Market	Avg Sale to List
-9.48e-06	0.000318***	0.000123***	-0.000284***	-0.0239***	2.32e-05***
(2.37e-05)	(2.76e-05)	(3.19e-05)	(3.96e-05)	(0.00214)	(2.76e-06)

Driscoll-Krayy Standard Errors in Parentheses
*** p < 0.01, ** p < 0.05, *P < 0.10

Table 1.9 COVID Results

COVID Results

Post COVID

Independent Variable: Investor Market Share

Median Sale Price (log)	Homes Sold (log)	New Listings (log)	Inventory (log)	Days on Market	Avg Sale to List
-0.185**	-0.210	-0.383	-4.045***	-91.97***	0.219***
(0.0828)	(0.262)	(0.255)	(0.334)	(15.59)	(0.0229)

Independent Variable: Investor Purchases

Median Sale Price (log)	Homes Sold (log)	New Listings (log)	Inventory (log)	Days on Market	Avg Sale to List
6.92e-06*	0.000102***	3.23e-05***	-0.000145***	-0.00715***	1.12e-05***
(3.88e-06)	(1.15e-05)	(1.19e-05)	(1.64e-05)	(0.000688)	(1.06e-06)

Before COVID

Independent Variable: Investor Market Share

Median Sale Price (log)	Homes Sold (log)	New Listings (log)	Inventory (log)	Days on Market	Avg Sale to List
-0.623***	-1.462***	-0.868***	-2.926***	6.959	0.147***
(0.138)	(0.271)	(0.332)	(0.327)	(27.68)	(0.0227)

Independent Variable: Investor Purchases

Median Sale Price (log)	Homes Sold (log)	New Listings (log)	Inventory (log)	Days on Market	Avg Sale to List
-8.54e-07	0.000177***	9.74e-05***	-0.000150***	-0.0219***	1.13e-05***
(7.49e-06)	(1.28e-05)	(1.64e-05)	(1.64e-05)	(0.00123)	(1.12e-06)

Driscoll-Krayy Standard Errors in Parentheses
*** p < 0.01, ** p < 0.05, *P < 0.10