

Who Owns Our Homes? Methods to Group and Unmask Anonymous Corporate Owners

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Abstract

Institutional investors have been acquiring larger shares of single-family housing markets since the financial crisis of the late 2000s. Evidence shows that institutional single-family property owners negatively impact Black homeownership and evict tenants at higher rates than small landlords.

Identifying institutional ownership in housing is a challenge because it is difficult to assess who owns what. The necessary data are often unavailable or difficult to use. When the data are available, widespread use of limited liability companies and multilevel subsidiary structures make it difficult to identify the ultimate benefiting owner.

This article presents a graph-based analytical model designed to identify sums of properties held by groups of subsidiaries. Florida tax parcel and business registry data were transformed into a graph data structure to cluster owners based on directly or indirectly shared names, addresses, corporate filings, and shared officers. Applying this method to the Jacksonville, Florida, metropolitan area allowed the author to identify the biggest owners of single-family homes, explore aggregate spatial patterns of owners by size, analyze the expansion of two institutional investors' portfolios, and identify three regulatorily concentrated census tracts.

Although this method used single-family housing as a case study, it can easily analyze ownership in other housing sectors. The model can include heterogenous datasets, such as evictions, foreclosures, and financial flows, to identify large evictors, large owners of foreclosed properties, and central financial players.

Introduction

Since the financial crisis of the late 2000s, institutional investors—entities financed through methods such as private equity, real estate investment trusts, and pensions—have been acquiring more and more single-family homes (Colburn, Walter, and Pfeiffer, 2021; Ehrlich et al., 2023).

The impacts of institutional investor acquisition are variegated, and the long-term horizon of institutional investment remains unknown.

Identifying institutional acquisition of single-family housing is a challenge because it is difficult to assess who owns what. The tax parcel data necessary to assess ownership often are unavailable or unstandardized across jurisdictions (Dawes, Cook, and Helbig, 2006). When property ownership data are available, the widespread use of anonymous limited liability corporations and complex multilevel subsidiary corporate structure makes it difficult to truly identify owners (Prechel and Morris, 2010).

This article addresses this challenge with a method that augments models used by academics and activists. Using the single-family housing market of the Jacksonville, Florida, metropolitan statistical area as a test case, Florida tax parcel and business registry data are transformed into networks of owners and properties, allowing the author to identify the biggest single-family landlords of the metropolitan area, analyze acquisition patterns of two of the largest institutional investors, and identify collective patterns among owners of similar size.

Why Study Property Ownership?

A picture of single-family rental (SFR) property ownership is necessary to understand the effects of institutional investment on housing outcomes. For example, it has been found that tenants of large SFR corporate landlords face higher rates of eviction filings compared with small landlords (Seymour and Akers, 2021), even when controlling for foreclosure, tenant, property, and neighborhood characteristics (Raymond et al., 2018). Some find that large institutional investors invest in areas with higher proportions of people of color (Ehrlich et al., 2023), which has led to weakened homeownership opportunities for Black homebuyers (An, 2023). Others find that areas where institutional investors have properties do not have more people of color than the larger metropolitan area (Goodman et al., 2023). Gurun et al. (2022) found mixed results; institutional investors do leverage market power to extract higher rents, but they also internalize costs to improve neighborhood safety.

Ultimately, SFR's long-term horizon remains unclear. From a peak in 2021, purchases of existing homes by institutional SFR investors have declined (Malone, 2023), motivated by fewer cheap foreclosed homes and more owner-occupier demand (Goodman and Zinn, 2023). SFR is beginning to seize on the build-to-rent model, long-term ownership, and rental of newly constructed homes (Brill, Raco, and Ward, 2023; Nethercote, 2020), which may reduce competition for homebuyers but still result in bad outcomes for tenants.

How to Study Ownership?

Studying SFR ownership is difficult for three reasons. First, the SFR market is highly fragmented—nationwide, owners of less than 100 properties own 96.2 percent of the SFR stock (Goodman et al., 2023). Second, tax parcel data are not freely available nationwide; when they are, standardization across jurisdictions is lacking (Dawes, Cook, and Helbig, 2006). Lastly, multilevel subsidiary structures common in corporate ownership (Prechel and Morris, 2010) and the

impenetrability of the limited liability corporation (Travis, 2019) make knowing who owns what quite difficult (Ashwood et al., 2022a). Shelton and Seymour (2024), for example, found that the three largest SFR owners in the Atlanta metropolitan area used over 190 aliases and 74 addresses.

Previous methodologies have attempted to chip away at this problem. Shelton and Seymour (2024) developed an iterative process using name and address similarity matching, identification of similarly named/derivative corporations, and corporate registration matching to find three landlords' aliases and addresses. An et al. (2022) used OpenRefine to cluster similar owner names and addresses using fingerprinting and n-gram methods. For example, they collapsed a list of 6,637 owner names into 1,663 clusters with fingerprinting and another list of 5,011 rows into 669 clusters using n-gram. Anti-Eviction Mapping Project (AEMP; n.d.) and JustFix (n.d.) both relied on a graph data model to connect parcel owners with each other, business registries, and rental registries. Using their model, AEMP (n.d.) found that 66 percent of multifamily units in Concord, California, were owned by the top 10 percent of landlords by size. JustFix (n.d.) found larger landlords owned most rent-regulated buildings and were connected to higher eviction rates.

The method proposed in the following section scales and automates Shelton and Seymour's (2024) method using the data models provided by AEMP and JustFix. Like Shelton and Seymour's, this process relies on an inductive-deductive blend of methodologies, starting from a property owner and matching successively larger groups of names and addresses. However, the following proposed process scales these methodologies across every single owner in an area. The underlying data model—the mechanism that powers the scaling—and the inclusion of business registry data are motivated by AEMP and JustFix. As an example, it is unclear whether JustFix's method applies the same inclusion of both indirectly shared addresses and names as Shelton and Seymour's. The following iterative process is made explicit using a graph model.

Methods

The publicly accessible tax parcel and business registry tables are transformed into a graph to identify, group, and manually label anonymous property owners. The underlying data model is most like AEMP's and JustFix's graph theory-inspired models. A graph is a mathematical object that models connections between objects through nodes and relationships. In graph data structures, table rows are transformed into nodes, and relationships are defined to connect these nodes. The advantage of this structure is the ease of detecting indirect relationships among nodes; with tables, the same query is a convoluted series of many-to-many joins.

From the tax parcel data, parcel nodes are created using fields intrinsic to the parcel and owner nodes based on unique name-address combinations. Separate name and address nodes are then created and related to the owner nodes. These relations assume that sharing an address means that different owners are the same entity or strongly related. In theory, this alone would be enough to create the analysis, but the use of business filing corporations as mailing addresses creates paths between unrelated entities. To disqualify these addresses from pathfinding, a list of registered agents is integrated from the business registry. String matching is used to reconnect corporations based on shared officers. This process is conducted at the scale of the single-family market to understand the local market power of SFR investors.

Data Sources

Unlike much of the United States, the state of Florida makes parcel and business registry data freely available. The Florida Department of Revenue (DOR) posts standardized yearly snapshots of county property appraiser parcels, sales, and geographical data online. The Florida Division of Corporations (Sunbiz) makes quarterly snapshots of its own corporate filing database accessible online.

Historical tax parcel data were sourced from the University of Florida Shimberg Center, which ultimately sources from the DOR's Name-Address-Legal dataset (2019, 2022). Each row in the data represents a tax parcel. Relevant fields include the parcel's physical address, identifier, homestead exemption, assigned state land use code, and the parcel owner's name and mailing address. Parcel geographies were also retrieved from the DOR.

Corporate filing information was sourced directly from Sunbiz (Florida Division of Corporations, 2023). Each row in the Sunbiz table represents a corporation's filing and contains a unique identifier, a name, officers, and a registered agent for the corporation. Using normalization techniques, the data were transformed into a filing table and officer and registered agent tables with joins to the filing table.

All string data fields across tax parcel and business registry data were preprocessed by conversion to uppercase, removal of superfluous whitespace, and removal of characters that were not alphanumeric, dashes, or spaces. Owner records with empty owner names or owner addresses were maintained, but the empty field was not used to match with other owners.

Procedures

Identifying Corporate Owners

Owner names were first classified as corporate in a stepwise manner based on certain criteria and text strings (exhibit 1). Noncorporate owners were identified first based on having a name of fewer than four characters or a marker indicating trust, estate, or government ownership. Corporate owners (any private, nontrust, and nonpersonal entity, including organizations like churches and nonprofits) were then classified based on the presence of a corporate marker. Remaining owners were classified as noncorporate by default.

Exhibit 1

Corporate and Noncorporate Markers (1 of 2)

Noncorporate Markers	Corporate Markers		
No Owner Name	Has a Digit	MORTGAGE	HOMEOWNERS
Name <3 characters	OF, AT, or BY	RENTAL	INVESTMENT
CONFIDENTIAL	LLC	MULTI	CONDO
REFERENCE ONLY	L L C	APARTMENT	PROPERT
REF ONLY	LP	VILLAS	MANAGEMENT
UNKNOWN	L P	REAL PROP	REALTY
ESTATE	LLL P	MARKET	JOINT VENTURES
LIFE ESTATE	L L L P	EQUITY	VENTURE

Exhibit 1

Corporate and Noncorporate Markers (2 of 2)

Noncorporate Markers	Corporate Markers		
TRUST, TRUS, TRU, TR	INC	EQUITIES	BORROWER
LIVING TRUST	I N C	REALTY	CHURCH
REVOCABLE LIVING TRUST	L C	RANCH CLUB	FELLOWSHIP
TRUST COMPANY	LTD	HOUSING	CHRIST
TRUST SERVICE	LIMITED	SERVICE	METHODIST
CUSTODIAN	PARTNERSHIP	COUNTRY CLUB	BAPTIST
401K	CORPORATION	OWNERS	MINISTRIES
IRA	CO	HOLDINGS	“FIRST “
EST OF	COMPANY	RESIDENTIAL	HOLY
TRS	COMPANIES	LEASING	MISSIONARY
CITY OF	ASSOCIATION	COMMUNITY	RENT
COUNTY OF	ASSOCIATES	DEVELOPMENT	HOME
STATE OF	BANK		
HOUSING AUTHORITY			
MANAGEMENT DISTRICT			

Notes: Italics indicate true/false criteria; CAPITALS indicate search strings.

CO = company, EST = estate, INC = incorporated, IRA = individual retirement account, LC = leasing commission, LLC = limited liability company, LLLP = limited liability limited partnership, LP = limited partnership, LTD = limited, TRS = trust.

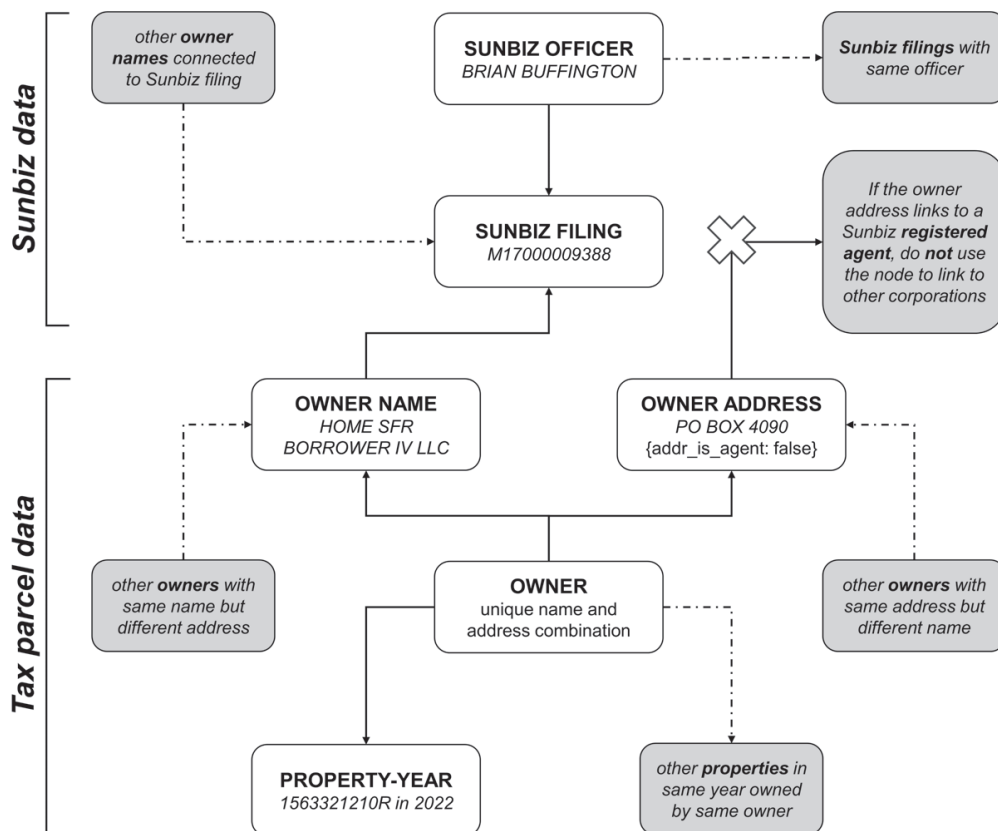
Source: Author's identification of property ownership markers

Grouping Owners and Properties

The bottom half of exhibit 2 describes transformations of the tax parcel data. The following processes were carried out in Neo4j (Neo4j, 2023), using Cypher queries to transform row-level data into relationships and store the nodes and relationships in a database. First, tax parcel data were restructured to lift parcel-specific information into parcel nodes. Combinations of a name and address were identified as “owners,” and relationships were created between parcels and owners. The unique combinations were then split into separate owner name and address nodes, and relationships were created between the original combination and owner name and the combination and owner address. Owners became directly connected by sharing a name or an address and indirectly connected by tracing paths through related owners. In addition, using the Sunbiz data, each owner address was evaluated to see whether it was also a registered agent’s address. Registered agents, such as filing companies and lawyers, provide administrative and tax services for unrelated companies; not accounting for registered agents results in these unrelated companies becoming connected in this analysis. Positively identified agent nodes were discounted from the analysis. Exhibit 2 provides a schematic of the graph data model.

Exhibit 2

Graph Data Model Connecting Data Sourced From Sunbiz (Top) and Tax Parcel Datasets (Bottom)



LLC = limited liability company. SFR = single-family rental.
 Source: Author's depiction of proposed property ownership data model

Consider the example in exhibit 3, with eight owners, five unique owner names, and four unique addresses. Eight owner-to-name and eight owner-to-address relationships were created. Owners 1 and 2, 1 and 3, 3 and 4, 1 and 4, 4 and 5, and 5 and 6 were directly connected by shared names and addresses. Owners 1 and 6 became connected indirectly through 1 and 4's address, 4 and 5's name, and 5 and 6's address. Owner 8 was not connected to Owner 7 because their shared address was a registered agent address. Owners 1–7 form one corporate entity, and the sum of their holdings becomes the corporate entity's holdings.

Exhibit 3

Example of Unique Owner-Name Combinations

ID	Name	Address
1	A LLC	0 MAIN ST, WILMINGTON
2	A LLC	1000 US 90, JACKSONVILLE
3	B LLC	0 MAIN ST, WILMINGTON
4	C LLLP	0 MAIN ST, WILMINGTON
5	C LLLP	1 US 301, BALDWIN
6	D LP	1 US 301, BALDWIN
7	D LP	400 AGENT ST (<i>registered agent</i>)
8	E LLC	400 AGENT ST (<i>registered agent</i>)

LLC = limited liability company. LLLP = limited liability limited partnership. LP = limited partnership.

Source: Author's example using fictional names and addresses

As shown in the top half of exhibit 2, owner names were matched to corporation filing nodes by whether the owner name was a substring of or equal to the other name. Corporate filings became connected through shared officers. By tracing a path through shared officers, owners disconnected by registered agent addresses can become reconnected through the Sunbiz data nodes. For example, in exhibit 3, if Owners 7 and 8 shared an officer, they would become connected.

To understand which owners are related directly or indirectly, the Weakly Connected Components (WCC) algorithm of the Graph Data Science library was implemented (Neo4j, 2023). WCC groups all nodes in a graph based on whether a path exists between nodes, decomposing the graph into intra-connected subgraphs. The resulting connected group of owners is referred to as a “sibling group.” For corporations, a sibling group corresponds to a group of subsidiaries.

After a first pass through WCC, the results were manually inspected for over-clustering—the connection of unrelated entities—and under-clustering—the disconnection of related entities (see the Discussion section for more details). For the 50 biggest owners, the connected owner results were inspected, nodes were manually connected or disconnected, and WCC was run again. This process was iterated for the new biggest 50 owners three times or until convergence.

WCC can only group owners together—neither business registry nor parcel data contain information about corporate hierarchy. Thus, WCC cannot name the ultimate “owner” of a group of owners. For the largest five landlords and select locally important landlords, the parent of their sibling groups was manually identified by cross-referencing names and addresses with news articles, company websites, and/or Electronic Data Gathering, Analysis, and Retrieval filings that linked names and addresses to parent corporate entities.

Identifying Nonowner-Occupied Housing (NOOH)

The properties under analysis are nonowner-occupied housing (NOOH). This designation includes corporate SFR, noncorporate SFR, second or vacation homes, and single properties of multiple parcels. Differentiating between the latter three through parcel data alone is difficult, so all categories are included under NOOH. The status of a property as owner-occupied, NOOH, or

unknown was defined through the following stepwise criteria. The first true criterion determines the status.

1. NOOH: owned by a corporate sibling group (where at least one owner is identified as corporate), the owner state is not in the state of the analysis area, the owner city is not any city in the study area, or the owner ZIP Code does not equal the parcel ZIP Code AND the owner address is not a post office box.
2. Owner-occupied: owner address is a substring of or equal to the physical address (or vice versa), the property is homesteaded, or the owner address and physical address have the same physical location (this occurs frequently when one street may have multiple representations, e.g., in Duval County, Florida: Beaver Street and U.S. 90).
3. Unknown: owner address is a post office box.
4. NOOH: Levenshtein string distance between the owner and physical addresses is greater than 7, or the entity owns four or more properties across Duval County and the property is not homesteaded.
5. Unknown: by default.

Quantifying Neighborhood Concentration

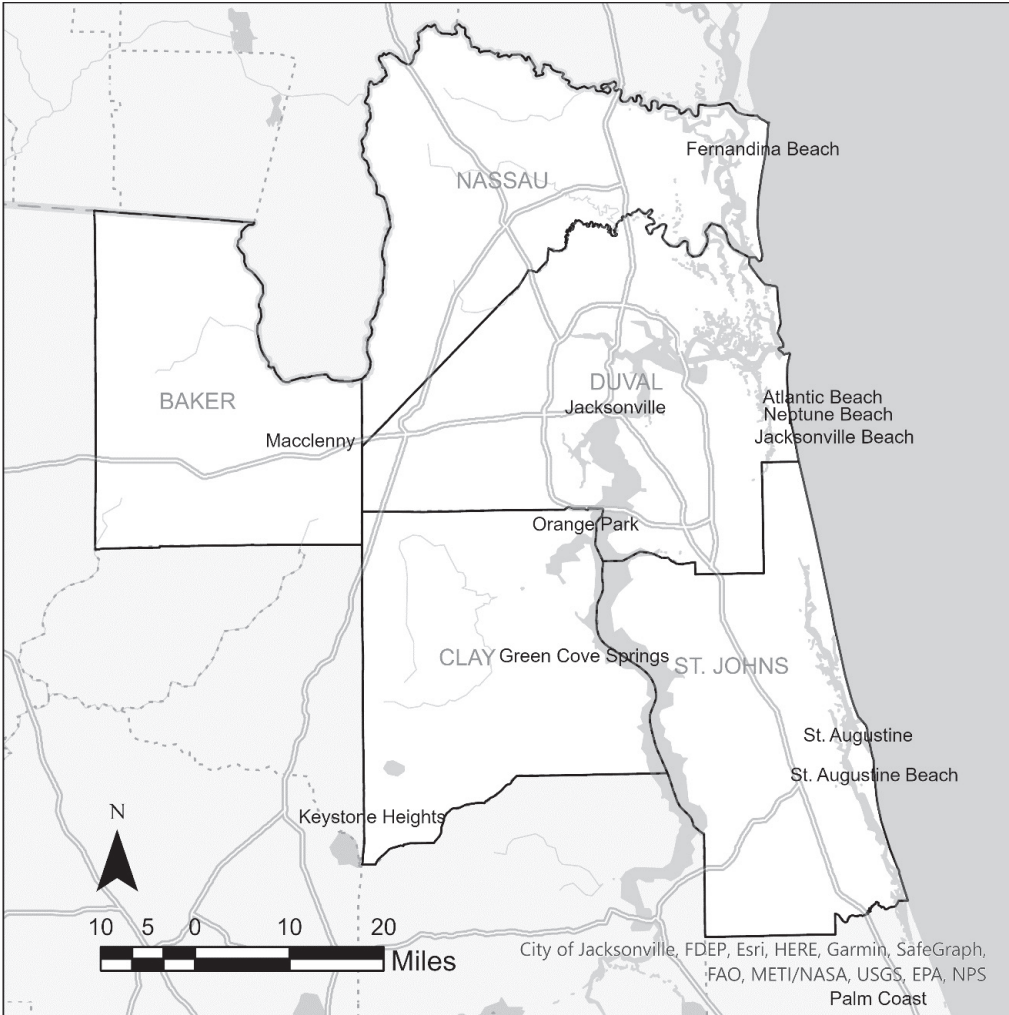
Census tract-level concentration was calculated using the Herfindahl-Hirschman Index (HHI) across NOOH properties only. The Index is defined by the formula $\sum_{i=1}^n s_i^2$, where s_i is the owner's NOOH stock share as a percentage of the total NOOH stock and n is the total number of owners (Rhoades, 1993). The HHI ranges from 0 (an infinitely competitive market) to 10,000 (a monopoly). The resultant HHI was classified according to U.S. Department of Justice regulatory guidelines on concentration (Tapp and Peiser, 2023); an HHI of 2,500 or higher indicates highly concentrated markets, and an HHI of 1,500–2,499 indicates moderate concentration.

Case Study: Jacksonville, Florida

This analysis uses the Jacksonville, Florida, single-family residential market (Baker, Clay, Duval, Nassau, and St. Johns Counties; exhibit 4) in the years 2019 and 2022 as a case study. Like other Sunbelt metropolitan areas after the foreclosure crisis between 2007 and 2010, Jacksonville's single-family market has had intense investor encroachment and high growth of single-family rental and build-to-rent markets (City of Jacksonville, 2022; Fields and Vergerio, 2022; Hughes and *Action News Jax*, 2021; Immergluck, 2018; JAX Rental Housing Project, n.d.).

Exhibit 4

Map of Five-County Study Area and Major Cities



Source: Author's depiction of Jacksonville metropolitan area, Esri basemap

The following sections explore findings informed by a comprehensive who-owns-what analysis: the geographical distribution of NOOH as a share of all single-family homes, an identification of the biggest single-family owners, aggregate distributions of owner activity by size of owner, geographical patterns of expansion of two large SFR landlords, and NOOH ownership concentration by tract.

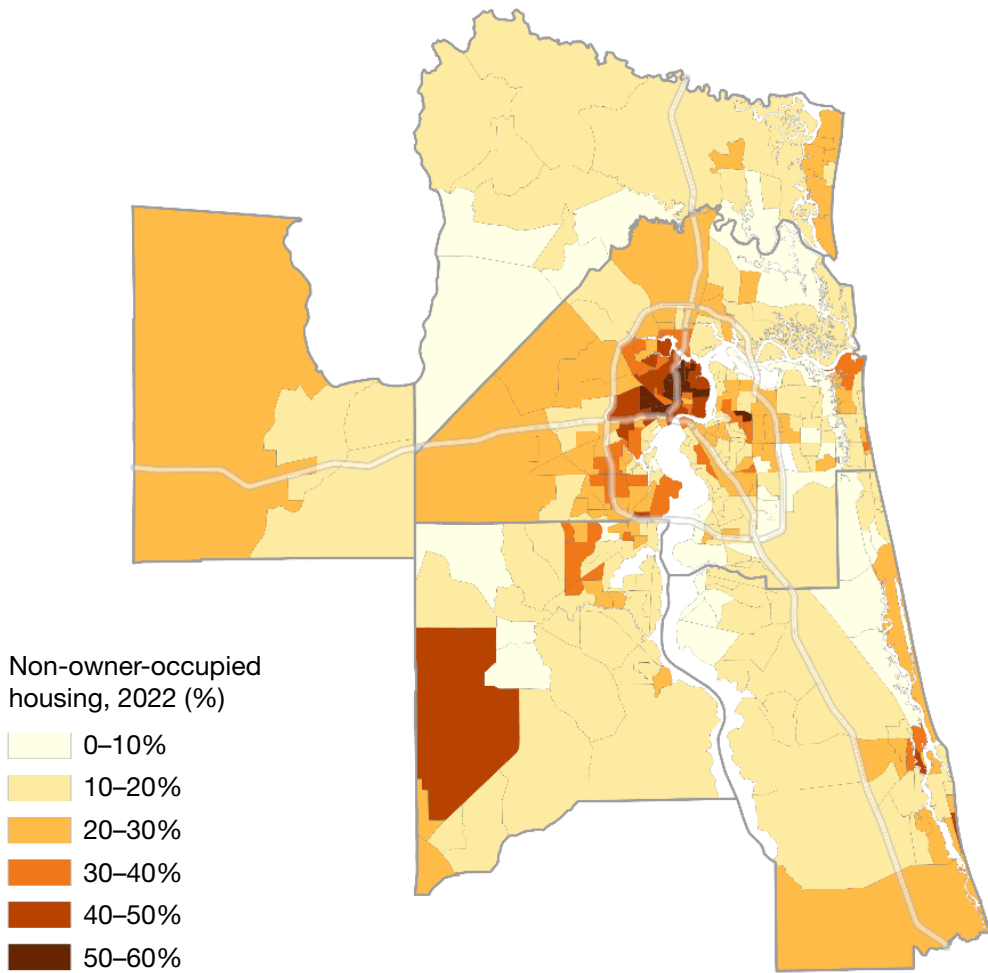
Where Is Nonowner-Occupied Housing?

In 2022, there were 468,733 single-family parcels across the Jacksonville metropolitan area. Of those parcels, 368,826 (78.7 percent) were classified as owner-occupied housing, 96,137 (20.5 percent) as nonowner-occupied housing (NOOH), and 3,770 (0.8 percent) of unknown status.

When aggregated by census tract, the areas with the highest percentages of NOOH were in the urban core of Jacksonville, with some tracts as high as 60 percent NOOH (exhibit 5). Medium percentages of NOOH prevailed across southwest and west Jacksonville, Orange Park, St. Augustine, and beach areas in Nassau and St. Johns Counties. Lower proportions of NOOH prevailed across Jacksonville’s Southside neighborhood and most other counties’ inland areas.

Exhibit 5

Map of Nonowner-Occupied Housing in 2022 by Percentage and Census Tract



Source: Author's tabulation of tax parcel and business registry data

Who Were the Biggest Owners Identified by WCC?

In 2022, 429,133 unique owners owned 468,733 single-family homes. Among these owners, there were 424,731 unique owner names and 404,531 unique owner addresses. The Weakly Connected Components (WCC) algorithm condensed these owners into 408,615 sibling groups, and 9,281 were identified as corporate. Before WCC, the largest number of properties owned by a single owner was 1,205. After WCC clustering, this number increased to 4,863. About 13.8 percent of 2022 owner addresses were discounted as agents.

The biggest owners by number of properties were Progress Residential, AMH (previously American Homes 4 Rent), Invitation Homes, FirstKey Homes, and Amherst Group. These owners were represented by myriad names and addresses (exhibit 6). WCC only clusters owners together; the algorithm cannot identify the ultimate owner of the subsidiaries. Therefore, the groups in exhibit 6 were manually labeled using information from 10-K filings for publicly traded AMH and Invitation Homes and corporate websites for the balance.

Exhibit 6

Weakly Connected Components Algorithm Summary for the Top Five Largest Owners by Properties Owned, 2022

Parent	Properties	Owners	Names	Addresses	Filings
Progress Residential	4,863	151	89	35	64
AMH	2,965	126	62	39	17
Invitation Homes	1,999	92	52	19	8
FirstKey Homes	1,688	162	62	43	14
Amherst Group	1,424	152	67	28	19

Note: The term Owners refers to unique owner name-address combinations.

Source: Author's tabulation of tax parcel and business registry data

Cross Validation

The estimates for AMH and Invitation Homes concurred with their 10-K filings within 4 percent. For AMH, there were an estimated 2,965 properties as of October 2022; AMH's December 2022 10-K showed 2,891 Jacksonville metropolitan area properties (American Homes 4 Rent, 2022). For Invitation Homes, there were an estimated 1,999 properties; Invitation's 2022 10-K listed 1,928. (Invitation Homes, 2022). Possible causes of the differences include false positives in the data model and property sales in the lag between October and December.

Do Investors Target Different Areas Based on Their Scale?

Sibling groups were classified by portfolio size using a classification system adapted from CoreLogic, Inc. (Goodman et al., 2023): extra small owners as 1–3 properties owned, small as 4–9, medium as 10–99, large as 100–999, and mega as 1,000 and more. Extra small owners continue to dominate single-family NOOH, but the large presence of mega investors still looms at 14.9-percent ownership of all NOOH, almost the same number as all medium and large investors' holdings combined (exhibit 7).

Exhibit 7

Descriptions of Size Classifications for Investors and Summaries of Properties Owned, 2022

Category	Properties Owned by Single Owner	Sibling Groups	Total Class 2022 Properties	% Total 2022 NOOH Stock
Extra Small	1–3	47,809	54,545	56.7
Small	4–9	2,522	12,473	13.0
Medium	10–99	438	9,284	9.7
Large	100–999	23	5,556	5.8
Mega	1000+	6	14,279	14.9
<i>Total</i>		<i>50,798</i>	<i>96,137</i>	<i>100</i>

NOOH = nonowner-occupied housing.

Source: Author's definition of size classifications, tabulation of tax parcel and business registry data

Between 2019 and 2022, there was a dramatic shift in NOOH ownership from extra small owners to mega investors. Collectively, mega investors gained ownership of 9.8 percent of the NOOH stock, whereas extra small entities lost 16.1 percent of the same stock in the same period (exhibit 8). Small, medium, and large owners saw less appreciable gains.

Exhibit 8

Changes in Percent of Market Owned in Aggregate by Size of Investor, 2019–22

Category	Properties Owned by Single Owner	% Total 2019 NOOH Stock	% Total 2022 NOOH Stock	% Change 2019 to 2022
Extra Small	1–3	72.8	56.7	–16.1
Small	4–9	10.9	13.0	+2.1
Medium	10–99	7.7	9.7	+2.0
Large	100–999	3.5	5.8	+2.3
Mega	1000+	5.1	14.9	+9.8

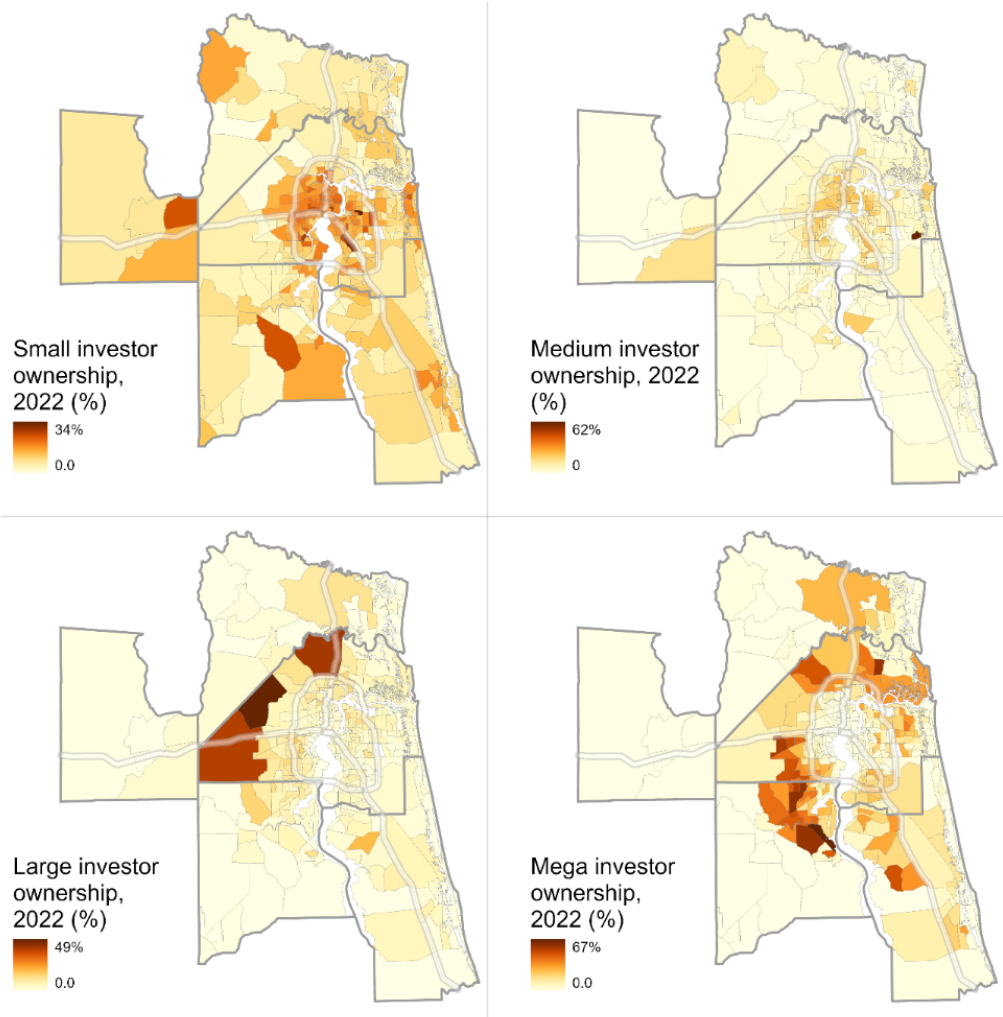
NOOH = nonowner-occupied housing.

Source: Author's tabulation of tax parcel and business registry data

Investors' geographical distribution depended on their size. Small investors clustered around Jacksonville's urban core and inner-ring suburbs, with minor pockets around Jacksonville beaches and St. Augustine (exhibit 9, top left). Medium investors also targeted the urban core, but that activity was overshadowed by intense ownership in a southeast Duval census tract (exhibit 9, top right). Large and mega investors formed a ring outside of Interstate 295 in north, west, and southwest Duval County, northeast Clay County surrounding Orange Park, and inland north St. Johns County (exhibit 9, bottom left and right, respectively).

Exhibit 9

Ownership of Nonowner-Occupied Housing Properties by Size Category of Investor, 2022



Source: Author's tabulation of tax parcel and business registry data

By weighted average, small, medium, and large investors were active in census tracts¹ with higher proportions of people of color (not “White and Non-Hispanic”), as tabulated by the 2021 American Community Survey (U.S. Census Bureau, 2021). In contrast, mega investors were active in tracts with roughly the same proportion of people of color as the whole NOOH market (exhibit 10).

¹ Note the offset between the year of the American Community Survey data and the year of the parcel dataset, which is due to unavailability of 2022 American Community Survey data at time of writing.

Exhibit 10

Weighted Percent Average of Census Tracts With Investor Activity by Size of Investor, 2022 Nonowner-Occupied Housing and 2021 American Community Survey Data

Category	Property Range	% People of Color in Census Tract (2021), Weighted Average	% People of Color in Census Tract (2021), Standard Deviation	% Difference From Whole 2022 NOOH Market
Extra Small	1–3	40.6	27.4	–4.3
Small	4–9	51.9	27.6	+7.0
Medium	10–99	60.0	25.8	+15.1
Large	100–999	50.7	23.4	+5.8
Mega	1000+	43.6	19.7	–1.3
<i>All NOOH</i>		<i>44.9</i>		

NOOH = nonowner-occupied housing.

Source: Author's tabulation of tax parcel, business registry, and 2021 American Community Survey data

Investor Acquisition Patterns

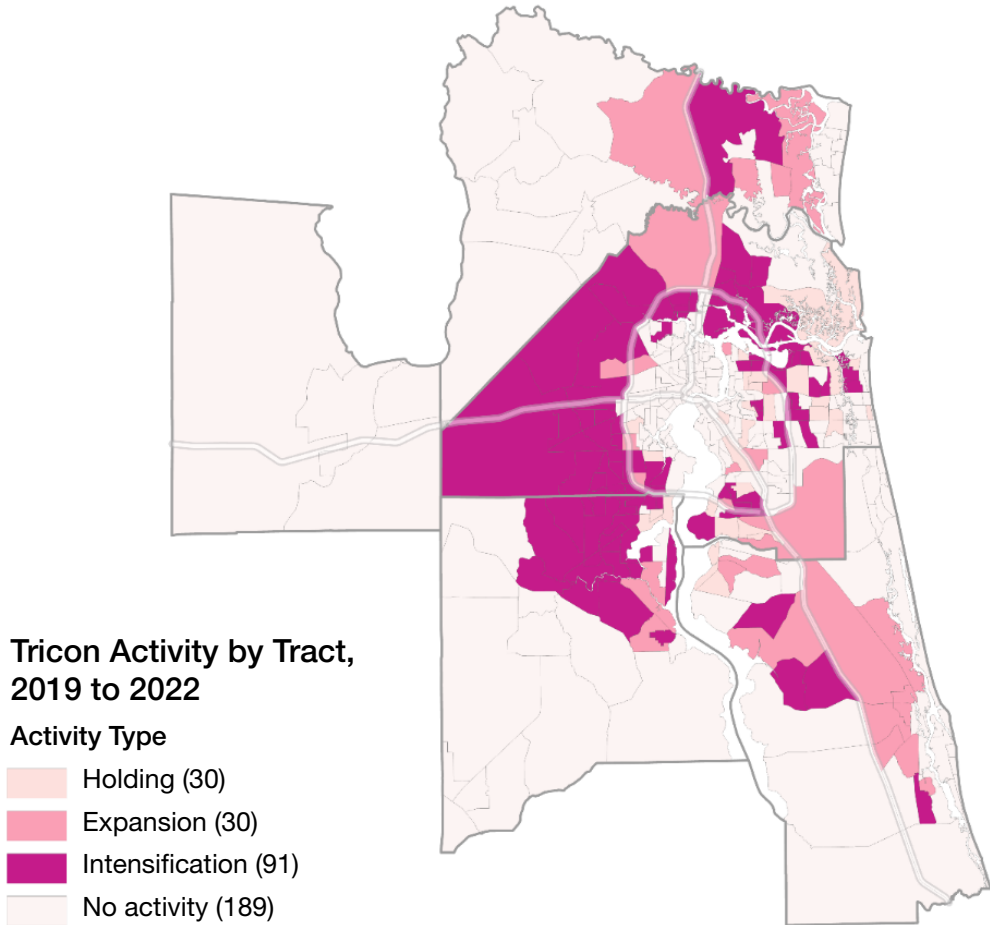
Using this analysis, one can also investigate the behavior of individual investors, such as their geographical distribution and change over time and from whom they acquire properties. This section explores two nationwide SFR operators that rapidly increased their Jacksonville area portfolios between 2019 and 2022: Tricon Residential and Progress Residential.

Tricon Residential was the fifth largest owner of Jacksonville metropolitan area single-family homes in 2019 and sixth largest in 2022. Despite the drop in ranking, Tricon increased its Jacksonville portfolio from 549 to 1,340 homes in 2022. It sold 3 homes and gained 794. Of its acquisitions, 53 percent were previously owner-occupied in 2019, 26 percent were NOOH, and 21 percent were built since 2019. About 80 percent of its NOOH acquisitions were from owners of fewer than four properties.

Tricon generally intensified its presence in neighborhoods rather than expanding to other census tracts. Of the 151 census tracts where Tricon had properties in 2022, 91 already had properties in 2019, and Tricon added more (exhibit 11; intensification). Only 30 census tracts, mostly in outlying Duval County and suburban counties, were new areas (expansion).

Exhibit 11

Changes in Tricon Residential Activity by Census Tract, 2019 to 2022



Notes: "Holding" means no changes in property numbers. "Expansion" means census tracts with parcels acquired where none existed in 2019. "Intensification" means census tracts with preexisting acquisitions to which more properties were added.

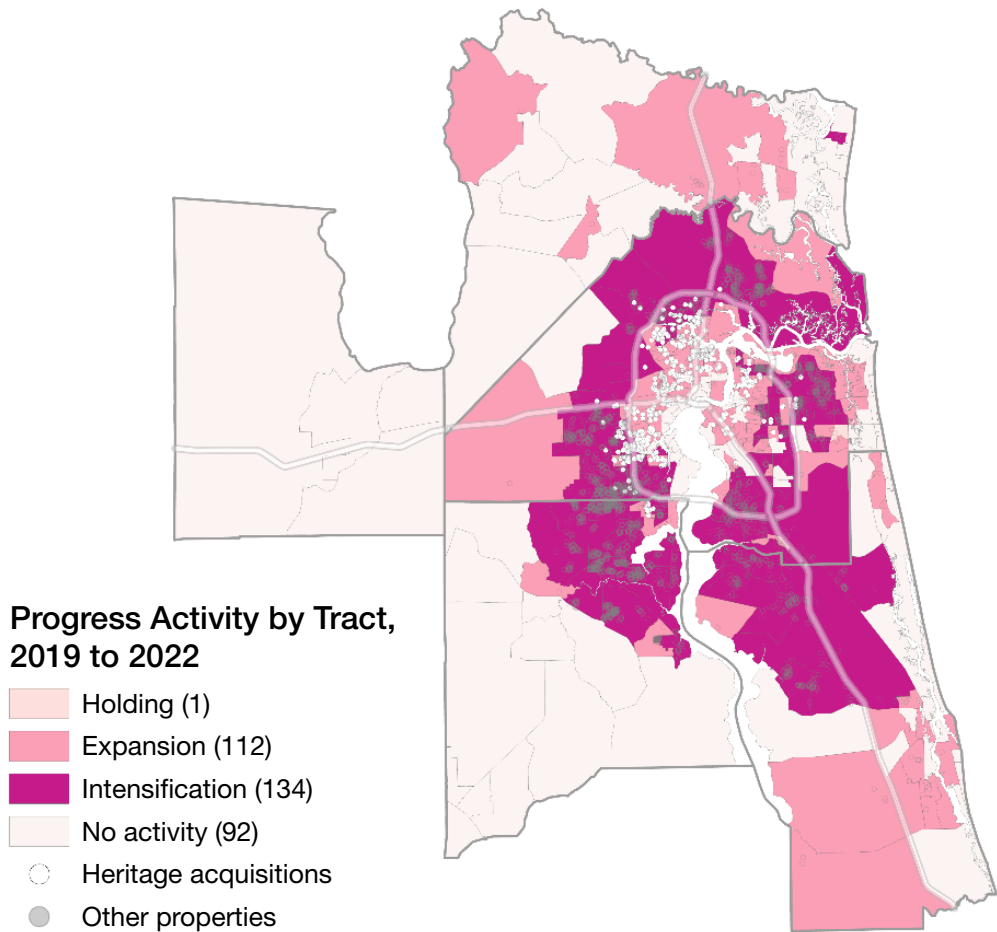
Source: Author's tabulation of tax parcel and business registry data

Progress Residential was the biggest owner of Jacksonville metropolitan area single-family homes in 2022, growing from third largest in 2019. Progress owned 1,845 homes in 2019; it added 3,021 homes and sold only 3 for a total of 4,863 homes in their 2022 Jacksonville portfolio. Forty-nine percent of their acquisitions were owner-occupied in 2019, 47 percent were NOOH in 2019, and 4 percent were housing built since 2019. Compared with Tricon, only about 32 percent of the NOOH acquisitions by Progress were from owners of fewer than four properties; 527 acquisitions of previously built housing were from Heritage Holdings, a once locally large SFR player focused on Jacksonville's urban core, as a portfolio acquisition; and 184 were from Havenbrook Homes as part of another merger.

Unlike Tricon, Progress greatly expanded its presence to new areas. Of the 247 census tracts it was invested in during 2022, 112 (47 percent) were new tracts to Progress (exhibit 12). Along with the outward expansion by Tricon, Progress expanded inward into Jacksonville’s urban core, atypical compared with other mega investors. The acquisition of Heritage properties allowed Progress to springboard into a new racial and geographical market, Jacksonville’s mostly Black inner city.

Exhibit 12

Changes in Progress Residential Activity, by Census Tract, 2019 to 2022



*Notes: "Holding" means no changes in property numbers. "Expansion" means census tracts with parcels acquired where none existed in 2019. "Intensification" means census tracts with preexisting acquisitions to which more properties were added. Opaque dots indicate portfolio acquisitions from Heritage Holdings.
Source: Author's tabulation of tax parcel and business registry data*

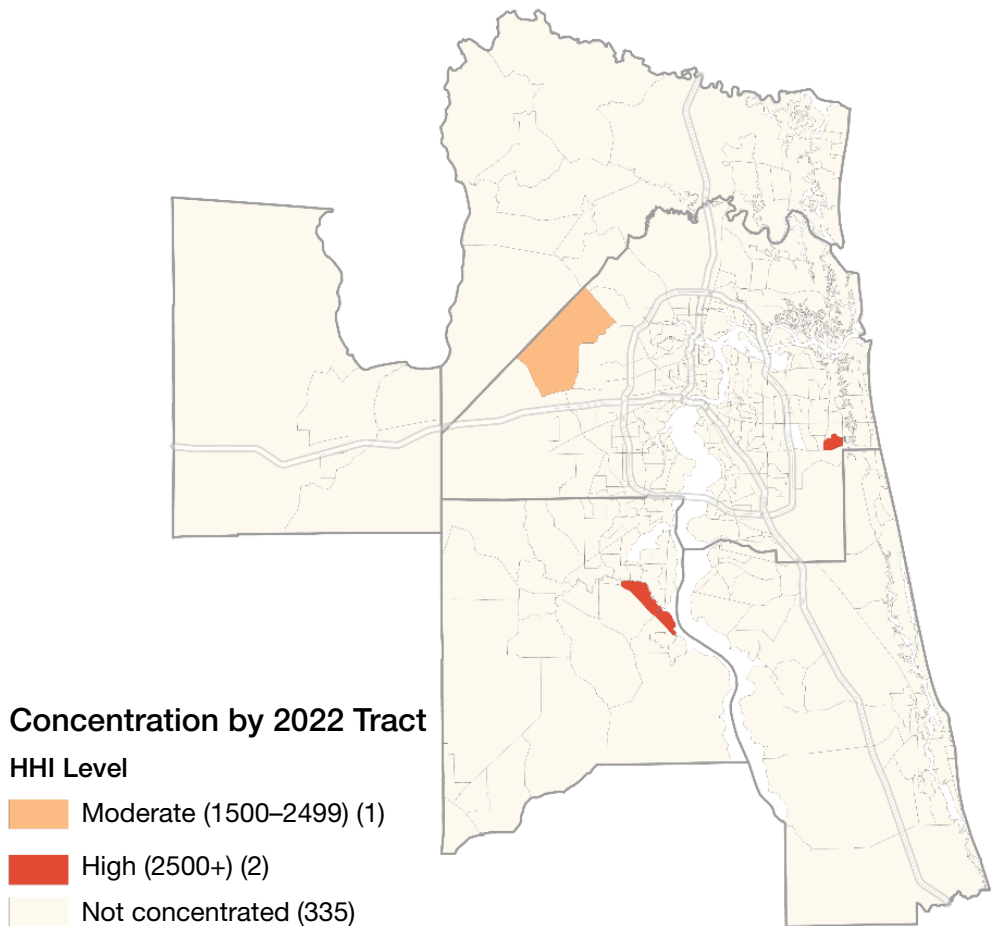
Are There Locally Concentrated Single-Family Rental Markets?

In 2022, as measured by the Herfindahl-Hirschman Index, two tracts met regulatory definitions of highly concentrated NOOH markets, one in southeast Duval County and one in northeast Clay

County (exhibit 13). The Duval County tract had 105 NOOH properties, 62 percent of which were owned by Cypress Garden Homes, LLC. This tract is also the one with high medium investor ownership in exhibit 9 (top right). Cypress Garden is a subsidiary of Healthpeak Properties, Inc. (Healthpeak Properties, Inc., 2023), an investor in medical real estate. The Clay County tract had 143 NOOH properties, 61 percent of which were owned by AMH, and generally showed high ownership by mega investors (exhibit 9, bottom right). One tract in northwest Duval County met regulatory definitions of moderate concentration. That tract had high large investor ownership (exhibit 9, bottom left) and 190 single-family NOOH properties, 89 (47 percent) of which were owned by Upward America Southeast Property Owner, a build-to-rent company formed by homebuilder Lennar Corporation (Lennar Corporation, 2021). AMH owned another 31 (16 percent).

Exhibit 13

Single-Family Nonowner-Occupied Housing Market Concentration Levels by Tract, 2022



HHI = Herfindahl-Hirschman Index.

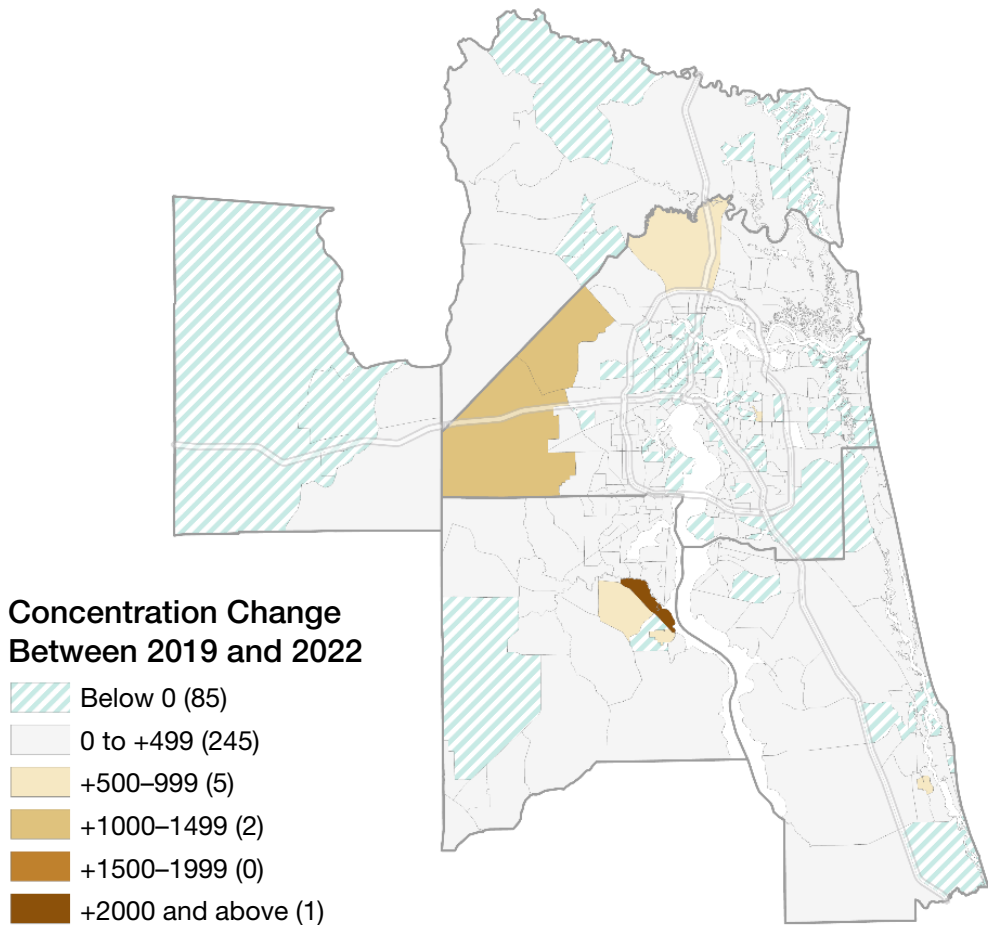
Source: Author's tabulation of tax parcel and business registry data

In all three tracts, most properties owned by the dominant owners were developed at the same time and intended for rent. In the first case, Cypress Garden’s homes were built for rent around 1995. Many of those properties entered owner-occupied markets but have since returned to Cypress Garden for long-term rental. In contrast, AMH and Upward America’s properties were developed as recently as 2020 solely for rent, and those properties are truer build-to-rent exemplars.

Between 2019 and 2022, a handful of tracts in northeast Clay and west Duval Counties saw rises in HHI Index values of 1,000 or more (exhibit 14). The highest increase was in the Clay County tract mentioned previously, primarily due to the construction of AMH build-to-rent community Black Creek Village in Green Cove Springs. The second highest jump in HHI Index values was in the Upward America Duval County tract mentioned previously. About one-fourth of all tracts, mostly in the urban core, saw their HHI values decrease.

Exhibit 14

Changes in Single-Family Nonowner-Occupied Housing Market Concentration Levels by Tract, 2019 to 2022



Source: Author’s tabulation of tax parcel and business registry data

Discussion

The graph-based method demonstrated in this article allowed exploration of property ownership through a transformation of tax parcel and business registry data. Graph paths were used through shared owner names, owner addresses, and business officers to group owners and their properties. With these results, several metrics and methods were derived to study investor activity in aggregate and by entity and to identify market concentration. These metrics are comparable with similar literature findings.

Although single-family nonowner-occupied housing (NOOH) properties were clustered in Jacksonville's urban core, large and mega investor activity was highest in Jacksonville's outer-ring suburbs, similar to findings in Atlanta (An, 2023). Mega investors made up 14.9 percent of the 2022 NOOH market, an estimate in line with Ehrlich et al.'s (2023) 16 percent for Jacksonville in 2022. Mega investors did not have properties where there were more people of color, as in Goodman et al.'s (2023) finding. In contrast, small, medium, and large investors were more active in Jacksonville neighborhoods of color.

Mega investors Tricon Residential and Progress Residential had differing expansion strategies; both intensified their market power and geographically expanded their portfolios outward through acquisitions from owner-occupiers and build-to-rent, but Progress used a portfolio acquisition from a local SFR institutional investor to expand inward toward the urban core.

The analysis identified three tracts with single-family NOOH markets concentrated mostly due to the impact of build-to-rent housing developments (as derived from parcel data on year of construction). It may be worthwhile to separate build-to-rent from other SFR in analyzing concentration; build-to-rent is more like multifamily than SFR converted from owner-occupied housing because prospective single-family homebuyers do not compete with build-to-rent in a market.

Limitations

Known problems include over-clustering and under-clustering. Over-clustering happens most commonly with errors such as an owner name being changed after a sale but not the address, leading most often to owner-occupiers or small landlords becoming clustered. The data model also assumes that corporations clustered at a non-agent address are in fact the same entity or at least strongly related, which may not be true. Under-clustering is generally caused by spelling errors and the agent address discounting step. For example, two spellings of the same owner name remain unconnected if they do not share an address. Discounting agent addresses separates unrelated entities using the same business agent, but related entities also become disconnected. Business registry data may not reconnect these truly related entities. Over- and under-clustering were mitigated by manually connecting nodes and discounting relationships; anyone with time available can carry out a similar manual inspection. Spelling errors can be mitigated by employing text clustering methods suggested by An et al. (2022).

Underlying model assumptions may be inapplicable to other jurisdictions because of data availability and local practices. Florida is unique in the standardization and free availability of statewide tax parcel data, so this analysis can be carried out statewide. Although less data may

be available elsewhere, this fact does not render the analysis invalid but just limits its scope. To overcome this circumstance, commercial nationwide datasets can be purchased at cost from services like Regrid, and alternatives like web scraping are possible (St-Hilaire, Brunila, and Wachsmuth, 2023). Jurisdictions may differ on registration requirements for businesses to own property; these requirements have bearing on the business registry data's completeness. Florida Statute 607.1501 requires non-Floridian businesses to register with Sunbiz to rent property, and therefore, all corporate rental owners in Florida are represented in Sunbiz. Even if this regulation exists in other states, business registries may not always be available. Where this regulation does not exist, multiple states' business registries may have to be used.

Directions for Further Research

One way to expand property ownership with this methodology is exploring other real estate sectors. This article focused on SFR because it is perhaps the most fragmented of all real estate sectors, but there is no reason multifamily homes, mobile homes, and other properties cannot be analyzed in the same way. For example, single-family build-to-rent might be better analyzed with other multifamily homes rather than single-family homes.

The graph data structure, unlike tables, also lends itself well to linking with other datasets. For example, if a parcel sales dataset indicates distressed sales, one can relate these sales to the parcel to understand when, where, and how investors are acquiring previously distressed housing and how that housing became distressed. Tabular models may require many-to-many joins to explore the same relationship. Evictions, liens, code violations, and other administrative data sources can be linked to explore similar relationships.

Lastly, adding corporate family trees to the analysis can allow one to quickly identify the parents of subsidiaries. With this information, one can further attach ownership and creditor relationships to determine financial relationships between entities. For example, one could identify central shareholders and creditors in housing (Ashwood et al., 2022b) and anti-competitive practices (Tapp and Peiser, 2023). Ultimately, all these directions would be useful to tenants, policymakers, regulators, and other housing stakeholders.

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