Passing Off Responsibility - A Network Analysis of Homeowners Associations and Private Management Companies

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1 Introduction

Homeowners associations, or HOAs, are legally-binding private groups that govern common-interest communities. Consumers must pay into these organizations via monthly fees, for the purposes of service delivery, aesthetic regulation, security, and more. The little previous empirical literature that exists on HOAs has focused on their place in devolving public governance responsibilities, internal democratic processes, and the ways in which they have altered American housing markets in favor of informal socioeconomic and racial segregation. For instance, HOAs are notable in the ways in which they either promote "double taxation" (paying for public services as well as the commmunity's club goods) or substitute for a portion of public services entirely. In particular, the books *Privatopia* (McKenzie, 1994) and *Beyond Privatopia* (McKenzie, 2011) have been instrumental in moving forward research on HOAs, but they lack a strong empirical basis for presenting their behavior in actual urban contexts. While it is helpful to consider conceptualizations of HOAs as extensions of state power and regulation, dual partners with local government, or an entirely new private replacement, we still know relatively little about how these organizations operate in practice. Further, while HOAs are typically thought to only exist in suburban planned developments, their entrance into in-town infill development and the vast majority of any new single-family home development make their study doubly important for understanding the balance of public and private interests in housing markets.

While there is much theoretical work about HOAs' existence and operations (across the fields of law, sociology, public administration, and economics), there is notably no research has focuses on the relationship between HOAs and the private management companies they often contract out their operations to, as well as any work on HOAs conducted in a computationally-oriented way. There is also no work on housing management companies in the American context (Chen and Webster, 2006). Not all HOAs rely on management companies and may use volunteers to handle service delivery or even rely on a hired internal staff. However, on the whole, most communities follow a professionalized form of management, where elected board leaders empower and finance third party entities to deal with contractors for community repairs, pest control, common amenity maintenance, trash collection, security, and much more (Carlee, 2011). Without HOAs, these 9,000 to 10,000 management companies would likely not exist or instead have their resources devoted to other property management focuses such as rental units (Foundation for Community Association Research, 2023). In this respect, HOAs have fostered a "shadow industry" comprised of new actors that transform regional urban regimes and, at their most extreme, retain the power to implement HOA boards' liens and foreclosures on properties (Perkins, 2009; Wells, 1994). These firms are also responsible for the administration of the levying of fines for covenant, condition, and restriction (CC&R) violations and the hiring of lawyers to resolve issues (Sisser et al., 2016; Coren, 2024; Ellickson, 2016). Often, when HOA-bound homeowners encounter difficulties with their association, they directly interact with the HOA's management company since they are entrusted with the fiduciary responsibilities of the board of directors.

Thus, academics and practitioners alike would benefit from exploratory analysis on the makeup and structure of a jurisdictions' HOA-management landscape. Much of the academic and policy discussion regarding urban governance rightly focuses on formal governments, citizen participation, private business, and non-profits. However, homeowners associations and the privatization of housing and its regulation is often missing from this picture. Thus, this project asks the following two research questions. First, how do the networks of HOAs and their management companies change over time, both in terms of their general growth/decline as well as the dominance of certain companies in a region or state? Secondly, are HOAs managed by companies located in urban cores and do companies generally specialize in communities of a specific size? Using Nevada as the context for this work, both due to its public data availability and its reputation as an HOA-dominated and gated community-led state, and a network analysis approach, I investigate the last eight years of HOA-management relations using three snapshots in time. Networks are a useful way to understand this setup as their visual depiction is intuitive and well represents management companies at the middle of a group of HOAs that employ them for various needs.

While HOAs do not inherently rely on sprawl or gated exclusion for their existence and may exist as a tool for promoting infill development, they are most prevalent in housing markets with a large proportion of single-family homes. It is estimated that the proportion of the Las Vegas metropolitan area's housing stock that is made up by single-family houses from 70 to 80 percent, making the entire state an interesting context in which to study these housing organizations (News-Herald, 2024). Relatedly, the West and the South are regions where the number of single-family homes attached to an HOA has grown tremendously

over the last ten years (US Census Bureau, 2024). Further, the state's urban core in the City of Las Vegas maintains a strict zoning and development code that essentially requires HOAs to maintain "a landscaping plan, open scapes, and often security walls" for all new housing subdivision developments (McKenzie, 2005). In this manner, HOAs are not only a vital partner to the city's governance of new housing developments and growth, but also an almost predetermined feature of its urban organization. Due to the state's high number of HOAs, Nevada is also home to one of the premier chapters of the Community Associations Institute (CAI), a national trade advocacy group that lobbies governments on behalf of HOAs and provides resources for boards and their contracted management companies. While much of the HOA literature, especially long-form books, talk about CAI's place in the outgrowth of HOA support infrastructure, there is not a sufficient look at other agents. Finally, Nevada is one of nine states that have the Uniform Common Interest Ownership Act (a boilerplate statute made available by the Uniform Law Commission to states interested in a starting point for regulating their HOAs) on its books. This makes its data collection and HOA support system much more transparent than other states, as well as part of the reason why McKenzie (2011) deems Nevada as having "perhaps the most pervasive CID [common-interest development] policy model of any state."

This project contributes to the literature on homeowners associations by using public administrative data to analyze a key portion of the political economy of the topic that has not previously been studied. There has also been no research that utilizes networks specifically to study HOAs across any of their aspects. It is valuable to understand HOAs' place in local public-private policy structures, for its own sake but also to provide a layer of detail to the work that has already been conducted around HOAs' impacts on residential sorting and housing markets (Scheller, 2017; Meltzer, 2013; Meltzer and Cheung, 2014; Clarke and Freedman, 2019; Hopkins, 2016). Further, it builds on the tradition of focusing on Sunbelt states as the context for HOA growth, since this is where much of the country's new housing stock is located. For many Americans, HOAs represent the most local form of governance and thus the form that is most interacted with. Scholars would benefit from more closely examining management companies' place in the local urban landscape since they act as important intermediaries in the housing production and regulation process.

2 Data and Methods

This project's data come from the Nevada Department of Business and Industry's Real Estate Division.[1] Each month, the division releases data on active HOA licenses. This data also comes with information on a given HOA's associated management company (where communities are not self-managed), as well as the number of housing units that belong to an HOA and where the community's management company is located. Nevada is one of the few geographies that provides accessible data, let alone a comprehensive registry with management company information. This is due, in part, to its statutorily based ombudsman's office for HOA information and complaints. The Real Estate Division only makes the current month's active licensee list publicly downloadable from their website. Therefore, I submitted a public records request to obtain the information, with the same variables and structure for months and years past. The Real Estate Division promptly provided monthly data in the same format from June 2015 to March 2024, totaling 106 months. Since there is a need to display the change in HOA-management networks over time, I select three static periods for visual analysis: January 2016, January 2020, and January 2024. There are two main benefits to this approach. Firstly, we avoid any shocks to housing markets that result from the start and main period of the COVID-19 pandemic and resulting economic crisis. Secondly, using the same month at the start of each four-year period provides ample temporal space to assess changes in the HOA-management network landscape.

I then used the following process for data preparation and analysis. The data were extracted from the files and converted to a pandas dataframe in Python. First, I filtered out any observations that do not have a management company attached to them and those that erroneously list zero units on site, as well as process the text of the files. I then examined the raw Excel files and used a dictionary of replacement names to adjust any typos in common management company names or geographies, which were identifiable thanks to common company addresses. It is likely that this data is entered by hand by division staff, which leads to errors. Moving forward, I intend to systematize this process by using natural language processing disambiguation to

[1] Code and data can be located at `https://github.com/RoryRenzy/cssma-project`.

identify unique management companies. I then resaved the dataframes as comma-delimited files for analysis. Lastly, I constructed networks using the *graph-tool* package, adjusting the optimal distance between nodes for ease of interpretation, as well as assessed basic statistics (Peixoto, 2014). For simplicity in this analysis, I only use active licenses that belong to HOAs that are registered on their own, which excludes parent-child HOA licenses (master associations and their subsidiaries).

The HOA-management networks produced here are expected to take on a visual form with distinct clusters of HOAs around specific companies, but no connections between said clusters (bipartite affiliation). There may be collaboration between HOAs and/or management companies within a local area with regard to best practices, but this does not relate to issues of license registration. This is in contrast to all three types of social networks theoretically depicted in much of the literature: those that are highly structured, those with a random element to them, and those that represent "small world" networks where a few shortcuts between nodes dramatically increases the speed of connections through shorter average path lengths (Watts and Strogatz, 1998; Barabási and Albert, 1999; Christakis and Fowler, 2007). As a result, it is very unlikely that the number of edges is greater than the number of nodes.

Limitations to this data should be noted here. For instance, we only have access to the physical addresses of the management companies, not the residential communities themselves. While a cursory web search reveals the location of neighborhoods, we only know where management companies are located, which is likely in the state's centers of industry, such as primarily in and around Las Vegas. Therefore, while it would be interesting to focus just on the HOAs that are located in Las Vegas proper, we are thus unable to do so without the assistance of a standardized search tool.[2] Additionally, some of the community associations listed may refer to condominiums. While these types of residential communities are different than HOAs in single-family homes or even townhouses, their inclusion here is to maximize the number of communities investigated and they could be separated out in other work. Lastly, this dataset does not contain information about the mean or median price or monthly HOA fees in a given community, which would allow us to assess the management-HOA landscape in more detail.

3 Results

3.1 Visuals

3.1.1 2016

Figure 1 presents the structure of the HOA-management network in Nevada in January 2016. The names of management companies and the HOAs they work for are anonymized for ease of presentation. HOAs are represented by blue circles and their management companies are represented by red circles, respectively connected by edge lines. Management companies located in the Las Vegas MSA are colored in green. It should be noted that some of these companies are national in brand, but have local offices in Las Vegas that HOAs can work with.

As expected, there is a clear concentration of management companies in Nevada, evidenced by the five to ten well-populated clusters of HOAs surrounding their management nodes. In other words, an "eyeball test" reveals that the corporatization and financialization of housing extends to the sphere of HOA management. However, there is still a large number of "boutique" management companies that only serve one to ten HOAs. Investigating the raw dataframe, some of these cases are HOAs that appear to be managed by an internal professional staff. There nonetheless exist small independent management companies that likely have geographical catchment zones. There is also one HOA community that is linked to two separate management companies, indicating some of its units use one firm and the remaining use another. More broadly, the vast majority of the state's population lives in the Las Vegas metropolitan statistical area, so it is logical that many of the state's management companies would also be located there. The agglomeration externalities that exist in urban areas produce easier sharing of information and financial resources, which is thus a possible reason why many of the state's management companies are located in an urban hub. Therefore, even HOAs that exist in the parts of the state near Lake Tahoe, for example, may be managed by companies far away in the Las Vegas area. Further, the companies colored purple are out-of-state, showing that there are a few instances where companies that nationally manage residential communities have entered the Nevada market.

[2]Moving forward, I would like to venture into using the Google Maps API to make progress in this regard.

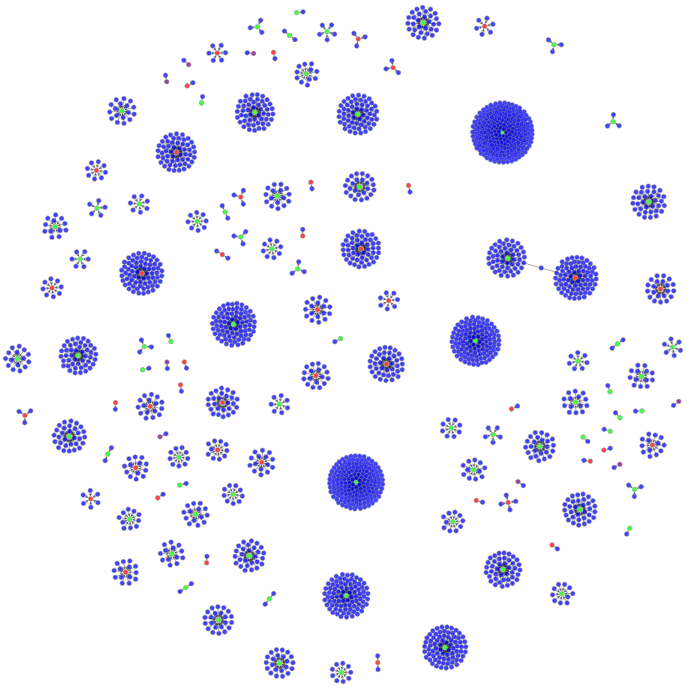

Figure 1: Network of HOA-management relations, Jan. 2016

Additional research also reveals that some companies (such as Camco) are national firms listed as having regional Las Vegas addresses. However, we would not be able to tell this from the data set alone. Of the HOAs listed as having out-of-state addresses, these cases are rare in this dataset and these companies do not manage the large clusters of HOAs, instead following the pattern of the aforementioned "boutique" cases in the influence they have over the Nevada network landscape.

3.1.2 2020

Next, Figure 2 presents the same network, but in January 2020. Notably, there are again large clusters of HOA communities around certain management companies (mostly headquartered in the Las Vegas MSA), but there also seems to be an overall increase in the number of HOAs managed from the January 2016 data. It is unclear, though, at first glance how the picture of concentration has changed from the previous year.

3.1.3 2024

Finally, Figure 3 depicts the change in network structure by active license registration in January 2024. By the end of the study period, there appears to be more highly populated clusters than in the previous two depictions, perhaps indicating the transfer of some HOAs to other companies and thus a balancing of the management distribution. Although a minor detail, there are fewer out-of-state management companies operating in Nevada by the end of the study period, meaning some of their HOAs now contract with new and more local companies.

3.2 Statistics

Since it is difficult assess the characteristics of the network from the visual depictions alone, I then present summary statistics that allow for year-to-year comparisons.

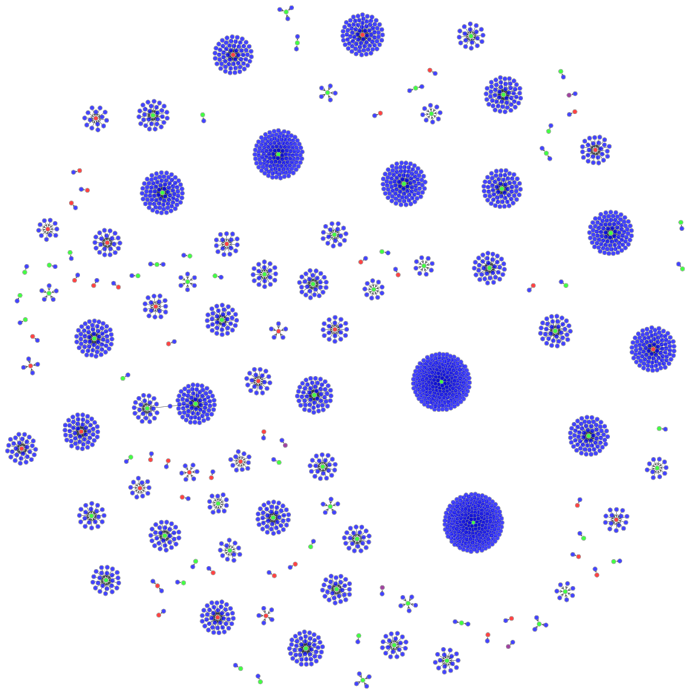

Figure 2: Network of HOA-management relations, Jan. 2020

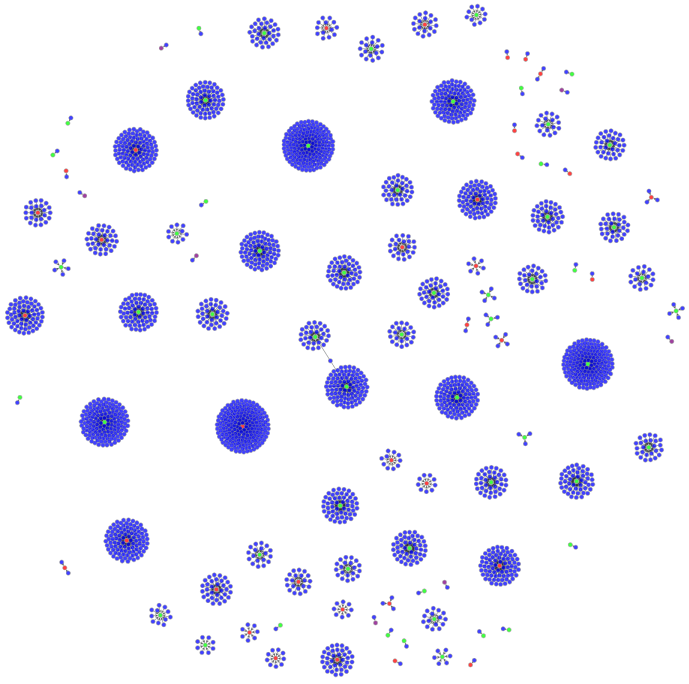

Figure 3: Network of HOA-management relations, Jan. 2024

3.2.1 Centrality/Degrees

Since the entire Nevada network is comprised of groupings of HOAs by their management company, statistics like betweenness and closeness centrality do not fit the structure of the data. However, degree centrality tells us a good amount about the most dominant management companies since the statistic reports the proportion of neighbor nodes (HOAs) that are connected to the company relative to the total number of HOAs in the network.

Table 1 displays the top five companies by their number of edges (representing HOAs managed) and the proportion that number makes up of the entire individual HOA registration license list for a given year. Moving forward with this research, management company names would be anonymized, but they are retained here for interpretation purposes. We see an increase in the total number of individually registered HOAs between the three years (a 25% growth from 2016 to 2024), which likely all comes from new communities opening rather than the formation of HOAs in existing neighborhoods. However, there are company-level changes both in the number of HOAs they represent and their dominance relative to the entire state's market. For instance, in 2016, Firstservice Residential (the nation's largest property management company) had over 10 percent of Nevada's registered HOAs (with 246 communities), but by the start of 2024, that share had dropped to 7.7 percent and 202 communities managed. Regardless, this firm was still the most dominant of any of the companies in terms of its relative presence. Another good example to highlight is that of Terra West Management. From 2016 to 2020, its number of HOAs managed increased but not by more than the total rate of change. From 2020 to 2024, its increase in 36 HOAs managed raised its proportion by about one percentage point. Substantively, this does not mean much, in contrast to Camco's rise and decline over the years detailed here. Overall, there is a modest decline of 2.8 percentage points in the proportion of total HOAs managed by the top five companies in 2016 and 2024. This result supports the initial finding from the visual depictions that there is an equalizing of management dominance over the study period, evidenced, for example, by Nevada Community Management's rapid rise to the fourth most dominant company after not appearing in the top five the past two years of study. However, there is no definitive method to assess the processes by which HOAs switch management companies other than to examine their listings each year.

Table 1: Top 5 Companies by Degree Centrality

Rank	**2016 - Total HOAs: 2,101**	**2020 - Total HOAs: 2,418**	**2024 - Total HOAs: 2,631**
1	Firstservice Residential # of HOAs: 246 11.7% of total HOAs	Camco # of HOAs: 254 10.5% of total HOAs	Firstservice Residential # of HOAs: 202 7.7% of total HOAs
2	Camco # of HOAs: 170 8.1% of total HOAs	Firstservice Residential # of HOAs: 236 9.8% of total HOAs	Camco # of HOAs: 177 6.7% of total HOAs
3	Terra West Management # of HOAs: 115 5.5% of total HOAs	Terra West Management # of HOAs: 135 5.6% of total HOAs	Terra West Management # of HOAs: 171 6.5% of total HOAs
4	Taylor Management # of HOAs: 85 4.0% of total HOAs	Thoroughbred Management # of HOAs: 95 3.9% of total HOAs	Nevada Comm. Management # of HOAs: 144 5.5% of total HOAs
5	Colonial Management # of HOAs: 79 3.8% of total HOAs	Taylor Management # of HOAs: 93 3.8% of total HOAs	The Management Trust # of HOAs: 102 3.9% of total HOAs
Top 5	**33.1%**	**33.6%**	**30.3%**

3.2.2 HOA Community Size

Next, I investigate the average size of the properties that management companies contract with and how this changes across the three years of data. This section provides us with a better understanding of the community types that certain companies may specialize in. Table 2 displays these results, with the top ten again by the three years.

Table 2: Top 10 Companies by Average Number of Units

Rank	**2016**	**2020**	**2024**
1	Neighborhood Assn Group 1990	Capital Consultants Mgmt. 1718	Capital Consultants Mgmt. 1350
2	Capital Consultants Mgmt. 1103	Touchstone 1500	Touchstone 685
3	Res. at Mandarin Oriental 999	Colonial Management 558	AMH Portfolio 406
4	Hometown Management 986	Lipson Neilson P.C. 485	Firstservice Residential 389
5	Prof. Comm. Mgmt. of NV 775	Desert HOA Management 415	Olympia Management 387
6	The Prescott Companies 498	CTF Development 400	CTF Development 313
7	Real Manage 481	Gaston Wilkerson Services 374	AMC 300
8	Firstservices Residential 456	Associated Management 371	Lennar Reno 300
9	Espania 416	MJK Company 367	Gaston Wilkerson Services 292
10	CTF Development 400	BBCM 361	Ovation Management 278

As a reminder, some of the listed units are condominium buildings, since Nevada's bureaucracy groups all HOAs together in this data. Thus, almost all of the companies that appear in Table 2 do not appear in Table 1, leading to the conclusion that these are likely condo buildings that have internal one-off management companies rather than single-family or townhouse HOAs that contract out to a larger company. The dropping out of certain companies from the list, such as Neighborhood Association Group, could also indicate an HOA transition to a larger external company with a much smaller average number of units managed. Similar to the degree centrality case, there is no way to truly know if these averages are affected by any one of the following possibilities: management companies shuttering services completely, management companies contracting with more or fewer communities, or new communities opening. The main conclusion here is that these management companies/internal bodies have few properties (confirmed by data inspection not detailed here), but those properties have a lot of units. This is in contrast to more dominant companies, in terms of the overall landscape, that manage smaller (and likely single-family home) communities. The notable exception is Firstservice Residential, which appears in both tables for 2016 and 2024. In the future, I would like to perform more formal community detection with this data, leveraging the number of units variable to see if there is specialization of certain companies by development size.

3.2.3 Rewiring

Lastly, I investigate how likely it is that the actual wiring patterns exhibited in the data are due to a significant pattern in management-HOA clustering and not random chance. To do so, I calculate z-scores

after 20 iterations of random rewiring and plot their distribution along with the z-score for the actual setup to assess if it differs significantly from random noise. For simplicity, I only run this exercise for the January 2024 data. Figure 4 presents the results, where underlying degree values are log-transformed to normalize the distribution and where logged bins are used to plot the resulting z-scores. Further, I ensure that HOAs are only rewired across management companies and not each other.[3]

In comparison to the 20 iterations' z-scores, the actual setup (with a z-score of about 1.83) is statistically significant at the 0.10 level under a two-tailed exploratory hypothesis. While not significant at the standard 0.05 level, I would expect the estimate to be more precise should more rewiring iterations be used. Further, although the degree values are log-transformed and the graphic is plotted using log bins, the distribution is still rather skewed; this may also be resolved with more iterations. The positive sign on the actual structure's z-score indicates that the January 2024 HOA-management network has more edges/connections between certain companies and HOAs than we would expect from random chance (represented by the constructed sample population), likely meaning there are fewer HOAs left without a management company than may occur by random chance (although it is unclear that they would be included in the registration data to begin with) and more likely that there is a concentration of HOAs into certain companies in the real scenario. Possible policy explanations as to why that is so include a first mover advantage in national or regional presence in reputation that leads to path dependency in contracting, that certain firms have more effective marketing or business practices than others, and that local government suggestion of already popular management firms assists new HOAs in their selection of outsourcing. More broadly speaking, having only the observed data brings up issues of selection bias, as we do not have true counterfactual scenarios where certain companies are not present in the Nevada market. Regardless, even with a small number of random chance iterations, it appears as though Nevada's current setup is structured in a top-heavy manner.

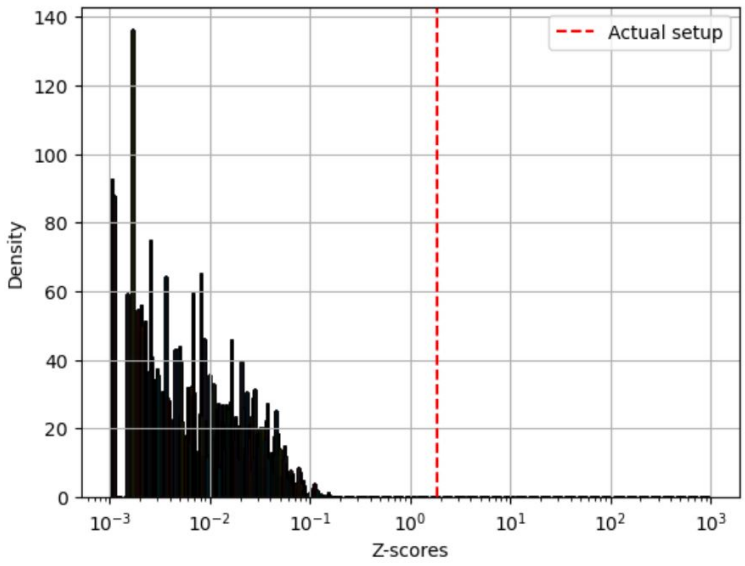

Figure 4: Distribution of Z-score iterations

[3]This process is more computationally intensive than rewiring across all node types (2.5 hours for 20 iterations on my laptop), hence the smaller number of iterations. I intend to increase the number of iterations for more precise estimation. Any advice on optimizing the rewiring function or changing the graphical output would be appreciated.

4 Discussion

It is inarguable that homeowners associations have fundamentally changed the relationship between consumers for housing and their market options. This transformation in both urban form and urban governance has been approved and pushed by local governments looking to ease their staffing and financial burdens. Moreover, the use of private management companies to handle HOA boards' fiduciary responsibilities has led to the emergence of a "middleman" industry with immense power. In this project that focuses on one Sunbelt state with a large number of HOAs in its sprawling landscape, I provide evidence that not only has the number of homeowners associations grown in Nevada over a relatively short period of time (2016 to 2024), but also that a handful of management companies have come to consolidate the aforementioned hidden market. However, that consolidation has equalized across the available management companies over time, with HOAs perhaps seeking more devoted attention from their managers. Additionally, most of HOAs' business partners are located in the Las Vegas area, meaning the financial and managerial professional skill is concentrated in the state's core, regardless of HOA location. Therefore, HOAs not in Las Vegas may feel that more local management companies better fit their needs. Lastly, there are no clear patterns regarding companies specializing in managing certain sizes of communities, other than the clear differentiation between condominium management and that of single-family homes and townhouses. This preliminary work has broad implications for how both states and local governments may regulate HOAs' business with management companies. Furthermore, the analysis of HOA-management networks allows for a better understanding of the breadth and depth of contracted private management amidst neoliberal housing policy that relies on nongovernmental market choice.

Future research should focus on expanding the time frame of study, as well as comparing the structure of HOA-management relations in other states that have similar data collection under the Uniform Common Interest Ownership Act. While enlightening, these results are not generalizable to other contexts, for two key reasons. Nevada is part of the Western Census region, which, in addition to the South, has seen the largest growth in single-family home construction and units that belong to an HOA. Therefore, it is unclear what the HOA management landscape looks like in declining or older/non-HOA contexts. Also, Nevada is one of only seven states that has an HOA ombudsman office tasked with non-legal conflict resolution and data collection. In other states where HOA regulation is less strict, we are not able to claim that the private management of communities is as concentrated because such data does not exist or is much more difficult to access. In conclusion, the contracting out of HOA responsibilities to private management companies is an important phenomenon in local urban governance. The visual and statistical results of this brief analysis support the claim that the management of HOAs in a Sunbelt state is becoming both more concentrated and dispersed over time, in addition to HOAs' general growth. Therefore, this work is a sufficient starting point for future work that considers why HOAs match with certain management companies and how governments should regulate companies' presence within a market.

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