The Journal of Real Estate Finance and Economics (2024) 69:29–69
https://doi.org/10.1007/s11146-022-09927-8

Is there a Principal-Agency Problem with Real Estate Agents in Rental Markets?

Luis A. Lopez[1]

Accepted: 25 October 2022 / Published online: 19 November 2022

Abstract
This paper examines the principle-agency problem between landlords and real estate agents using novel data on rental contracts. Real estate agents are found to obtain higher contract rents by approximately 1% more for themselves (and family members) than for other landlords, which is economically small. The results suggest that the principle-agency program with real estate agents is less of a concern in the rental market than the ownership market. The reason potentially relates to the commission structure, the relatively low effort associated with finding a tenant, the landlord's ability to evaluate an agent's performance, and reputation concerns from repeated interactions.

Keywords Rent · Housing returns · Tenant search · Landlords · Intermediaries

JEL classification: D8 · D14 · R30

Introduction

Rental income is a common component of wealth for households (Saez & Zucman, 2016; Favilukis et al., 2017; Heathcote & Perri, 2018) and typically considered a passive form of income. But to obtain rental income, households as landlords may hire real estate agents who in turn find tenants and craft rental contracts in exchange

I thank Sumit Agrawal, Dominique Badoer, Itzhak Ben-David, Walter D'Lima, Yulia Demyanyk, Joan Ferre-Mensa, Erasmo Giambona, John Graham, Jacob Sagi, Ruchi Singh, Rohan Williamson and seminar participants at the Financial Management Association International 2020 Diversity Emerging Scholars Initiative for helpful comments and suggestions. I also thank the Nevada Real Estate Division, Clark County Assessor Office, and LIED Institute for Real Estate Studies at the University of Nevada Las Vegas for providing data.

✉ Luis A. Lopez
lal@uic.edu

[1] College of Business Administration, University of Illinois at Chicago, Illinois, USA

for a commission. Although the intermediary role of real estate agents in rental markets likely improves matches between landlords and tenants, if real estate agents face limited incentives to search, bargain, screen or advance any other actions that warrant more effort than what the commission justifies, then landlords who hire real estate agents could end up accepting sub-optimal rental contracts. Hence, the motivation and subsequent behavior of real estate agents may affect the rental income of passive landlords.

This paper examines whether landlords who are also real estate agents (or personally affiliated with one) obtain higher rental rates than other landlords. I use novel data on more than 270,000 new rental contracts for single family and condominium properties crafted by more than 7,700 real estate agents in Las Vegas, NV from 2009Q3 to 2019Q3. In this market, listing agents commonly negotiate with landlords for a flat commission amount (e.g., $600) that is contingent on a successful transaction, which contrasts with the standard percentage-based commission (e.g., 6% of sale price) in the ownership market. I exploit state mandated disclosures in the available data on whether each property owner holds a real estate license or a personal affiliation with a real estate licensee to examine the principle-agency problem with real estate agents. Following the intuition developed in early theoretical work, if real estate agents always exert the same effort in leasing a property when the commission structure results in correctly crafted incentives, then rent should not vary depending on whether the landlord is a real estate agent or personally affiliated with one.[1]

I find that properties of landlords who hold a real estate license (i.e., agent-owned properties) are leased at an average premium of 0.7% (or about $9 per month). Similarly, properties of landlords who have a personal affiliation with a licensee (i.e., agent-related properties) are found to be leased at an average premium of 1.1%. Although the average agent-related premium is higher than that of the average agent-owned premium, the conditional difference in rent between agent-owned and agent-related properties is statistically insignificant. Thus, the results suggest that when an ongoing relationship exists between an agent and a client—such as when the client is a family member—the agent will likely exert the same effort leasing the client's home as if it were his or her own. These results exploit variation within lease agreements crafted by the same real estate agents; control for an extensive set of characteristics about the broker, property, neighborhood, and rental contract; and are robust to a battery of alternative specifications including a correction for unobservable heterogeneity or possible sample selection bias based on a doubly robust approach that includes propensity score matching within neighborhoods.

Although the difference in the rental rate between agent-owned and arm's-length properties on rent is positive and statistically significant, it is economically small. For example, using the income valuation approach and the average capitalization rate of 9.3 in the local metro area (shown in Table 1), the agent-owned rental properties can be valued at an average of $1,165 more than arm's-length rental properties. This amount is less than half the sale price premium of $3,200 that Lopez (2021)

[1] Early theoretical work on the agency problem with real estate agents include: Yinger (1981), Geltner et al. (1991), Miceli (1991), Anglin and Arnott (1991), Arnold (1992), Yavaş (1994, 1995), and Williams (1998).

estimates for agent-owned homes in the same metro area. One implication of this finding is that the principal-agency problem is less of a concern in the rental market than the ownership market. Hence, even if an ongoing relationship does not exist between an agent and a client, the typical real estate agent will help a client secure a rental contract that closely reflects the market rent.

To better understand the underlying mechanisms, I examine several potential channels that may influence the tenant search effort besides the commission structure and provide insights to the efficiency of the matching environment in the rental market. First, I test whether agent-owned and agent-related effects are larger at the higher end of the rent distribution where the tenant search effort is likely greater. Second, I examine whether asymmetric information about the distribution of rental rates (from an abundance of comparable rental properties) that could make observing agent effort easier reduces the agent-owned effects. Furthermore, I test for the effect of long-run incentives on agent effort using data on whether the listing agent will manage the rental property. Lastly, I examine whether agents who handle more contracts obtain better rent prices. A less experienced real estate agent may face a higher search cost because he or she has no expertise or experience in finding tenants and perhaps is less concerned about reputation. The results indicate that the premium on agent-owned properties is low among those that are not expensive to rent, when the expected market rental price distribution of the property is not a challenge to observe, and when the listing agent is experienced. In addition, agent-related properties appear to perform better when the listing agent manages the property than when the owner self-manages the property. Thus, one possible explanation for observably low agent-owned and agent-related effects is that landlords can more easily evaluate the effort of agents in rental markets than ownership markets and design an incentive-compatible compensation contract. Other reasons may relate to low search effort costs associated with leasing a property, long-term arrangements invoked by management contracts, and experience or reputation concerns from repeated interactions with landlords.

I also examine the performance of agent-owned and agent-related properties in other market outcomes and aspects of the rental process to provide additional validity to the results. First, an agent could advise a non-agent landlord at arm's length to list a rental property for a "low-effort-price" at which the property "almost rents itself" requiring only a standard amount of search effort from the agent (e.g., create the listing, show it a couple of times, screen applicants, etc...). When I examine differences across landlords in the initial asking rents, I find that the initial asking rent of properties owned by landlords at arm's length are lower than those of agent-owned and agent-related properties but not by an economically meaningful amount. Similarly, real estate agents could exert less effort when bargaining rent with tenants for non-agent, arm's-length landlords. However, I do not find economically significant differences the spread between the contract rent and asking rent to suggest that rental contracts are actively negotiated differently depending on whether the landlord holds a real estate license or personal affiliation with someone who does.

Second, the real estate agent may shirk on the tenant search process or marketing efforts in a way that exacerbates turnover vacancy (e.g., hold fewer open houses). Delays in finding a tenant are more costly to the landlord than to the real

estate agent. While the landlord may lose one month of rent, the real estate agent merely loses the opportunity cost of consuming or investing the commission amount one month sooner. However, examining differences in the days a rental property stays on the market, I find that agent-owned and agent-related properties stay on the market about one day less than arm's-length properties, which is not much of a difference.

Third, an agent may be more willing to repeatedly list and de-list properties on the MLS at high prices until obtaining a desired price. Lopez (2021), for example, finds that agent-owned and agent-related listings in the ownership market are delisted more frequently than other properties. Using additional data from the MLS on rental properties that were withdrawn or expired, I examine the likelihood that a property is successfully leased but find no evidence suggesting that agent-owned or agent-related rental property listings are used to test the market more frequently than other listings.

Finally, the agent may not screen tenants or hedge against the likelihood of rent default and costly eviction proceedings for unaffiliated clients in the same way as for him or herself. Although post-rental performance data are not available in the MLS, information on deposits and application fees is available, which may proxy the hedge against default risk. I find that landlords who hold a real estate license ask for a slightly higher amount of about 1% in deposits than other landlords. However, I do not see any differences in application fees, which may correlate with the costs associated with carrying out background and/or credit checks. Overall, the results imply that even along other dimensions beyond rent, the differences in the market performance of agent-owned, agent-related, and arm's-length owned rental properties are minor at best.

This paper contributes to the literature that examines the role of intermediaries in housing markets (e.g., Ondrich et al., 2003; Han and Hong, 2016; Jia and Pathak, 2010; Barwick et al., 2017). Whereas other studies rely on differences in the purchase price or sales price in property ownership markets to study the agency problem with real estate agents (e.g., Rutherford et al., 2005, 2007; Levitt and Syverson, 2008; Liu et al., 2019; Agarwal et al., 2019; Hayunga and Munneke, 2021; Hendel et al., 2009; Lopez, 2021), this paper presents novel empirical evidence from price disparities in the rental market and other outcomes such as the rental bargaining effort and tenant screening effort. More broadly, this paper contributes to studies on the compensation structure and contract design between a principle and agent. For example, while agents may exert greater effort in market transactions for themselves than they do for others, the findings provide supportive evidence of the benefits of correctly crafted incentives discussed in the compensation/management literature (e.g., Holmström, 1979; Yinger, 1981; Zorn and Larsen, 1986; Holmström, 2017). Furthermore, the findings I present introduce a new puzzle for real estate research. Although the modest agent-owned and agent-related effects may suggest that any potential bias in agent-provided advice is less of a concern in the rental market than in the ownership market, households seem more likely to use a real estate agent in the ownership market than in the rental market.[2]

[2] For instance, Lopez and Yoshida (2021) point out that about one out of every five non-commercial residential units in Las Vegas show up in the rental MLS platform, suggesting that many homeowners lease property without using a real estate agent. On the other hand, the National Association of Realtors, 2016 reports that more than 88% of buyers purchased their homes using a real estate agent.

How do real estate agents impact rental income?

Although landlords could find tenants on their own using on-line rental platforms (e.g., Redfin, Trulia, and Zillow), landlords who hire a real estate agent likely expect to find tenants more efficiently than without a real estate agent. For example, once a landlord signs an exclusive listing agreement with a real estate agent, the real estate agent will typically advertise the rental property on the local multiple listing service (MLS). The MLS is a data repository that potential tenants can view through another real estate agent's access to the MLS or on-line rental platforms with an MLS feed. Real estate agents with membership to a local Realtor association typically advertise properties for rent in the MLS. Individuals without membership cannot place a property for rent in the local MLS without a Realtor even if they hold a real estate license. Hence, by using a real estate agent, landlords may economize on tenant search efforts by avoiding the transaction costs of individually listing their properties on various on-line rental platforms and traditional venues such as local newspapers.[3]

Additionally, at the beginning of the rental process, real estate agents may provide advice on how much to lease the property, what utilities to require tenants to pay or not, and how much to collect for refundable (or nonrefundable) deposits. Allen et al. (2009), for example, show that asking for too much rent can reduce rental income by increasing the likelihood of vacancy but asking for too little rent ensures low rental income. Real estate agents could help a landlord decide on the trade-off between asking rent and vacancy. Real estate agents may further enhance the search process by providing assistance with staging a property for rent, hosting a series of open houses, or facilitating individual showings to prospective tenants. Another service real estate agents may provide is the retrieval and interpretation of credit reports, criminal background checks, and references to screen prospective tenants. Finally, real estate agents can help negotiate and craft a legally binding rental contract between a landlord and tenant.

Will a real estate agent provide the same level of effort when leasing a home for a client as if he or she owns the home? Other studies rely on differences in the purchase price or sales price in property ownership markets to show evidence of a potential disadvantage for homeowners. While some studies compare the sale price of agent-owned and non-agent-owned properties (Rutherford et al., 2005, 2007; Levitt & Syverson, 2008; Liu et al., 2019), others compare the purchase price of properties bought by agent buyers and non-agent buyers (e.g., Agarwal et al., 2019; Hayunga and Munneke, 2021). These studies find that agents sell their own properties at a premium that ranges from 1 to 4 percent, and buy properties for themselves at a discount that falls within the same range. However, while there is an extensive literature on the relation between property prices and whether an agent owns or purchases a property, to my knowledge no research in this area exists on whether a principle-agency problem extends to the rental market. One reason for the dearth of empirical research on the service flows of residential properties is the difficulty of collecting comprehensive data on residential lease agreements. Contemporary studies recognize the importance of

[3] Private platforms such as Redfin do not send data on rental listings to other competing platforms like Zillow. Moreover, rental platforms may require landlords to sign exclusive rental listing agreements that bar landlords from using multiple rental platforms simultaneously, and therefore, constrain the number of potential tenants viewing the property.

understanding disparities in rental prices but admit that data scarcity of rental transactions constrains empirical analyses (e.g., Favilukis et al., 2017; Smith et al., 2021; Goldsmith-Pinkham and Shue, 2022).[4]

One key distinction between the rental market and ownership market that makes it difficult to generalize the results on the principle-agency problem from the ownership market is that the commission structure in the residential rental market for finding a tenant is different from the standard 6% rate for selling a property in the ownership market. For example, conversations with market participants in Las Vegas, indicate that the owner pays a commission of about $600, which is split with the brokerage that finds the tenant, after fully executing a lease agreement. Bar-Isaac and Gavazza (2015) note that in New York City the commission is equivalent to one month's rent or 15% of the annual rent, and it is often paid by the tenant. If owners in the rental market are more likely to negotiate the commission and create an incentive-compatible contract for an observable effort level (as in the canonical models by Holmström, 2017) than in the ownership market, the incentives between the landlord and real estate agent are more likely to be aligned in the rental market. A second distinction is that in contrast to owners in the ownership market, landlords in the rental market are *de facto* investors who arguably share a strong incentive to maximize cash flows.[5] Hence, a focus on price disparities in the rental market mitigates concerns that Kurlat and Stroebel (2015) and D'Lima and Schultz (2020) point out about idiosyncratic shocks (e.g., getting a new job out of town) driving the underlying mechanism of price differences.

Unfortunately, MLS data repositories do not report the total commission amount that is negotiated between the landlord and real estate agent, making it difficult to test the impact of the compensation structure on the market outcome of rental properties. Moreover, data on non-MLS rental contracts are costly to collect, which strains the opportunity to compare and contrast the performance of rentals arranged by owners vs rentals arranged by brokers in a similar manner that Hendel et al. (2009) evaluate the value of real estate agents in the ownership market. However, if the agent's compensation is a fixed amount and agents generally use an industry norm to define the commission rate, the agent may not undertake the additional search effort when he or she does not own the property since the additional search effort will not be compensated (Zorn & Larsen, 1986). In contrast, when the agent rents her own property, the additional search effort makes economic sense and may choose to list and subsequently lease the rental property at a higher price, since it generates a positive net benefit for the agent-owner. A similar argument can be made when real estate agents represent a family member or their own firm/trust. Therefore, one resulting hypothesis is that agent-owned and agent-related properties are likely to be leased at a higher price than non-agent owned properties if the negotiated commission is not enough to motivate an agent to act as if he or she owned the property. We may observe similar outcomes with other measures of market performance.

[4] The few studies that examine residential rental transactions examine the allocation of broker costs (Ben-Shahar, 2001; Bar-Isaac & Gavazza, 2015) or trade-off between the rental rate and search costs (Benjamin & Lusht, 1993; Allen et al., 2009).

[5] Exceptions may include landlords who are temporarily relocating or are in other situations in which they may be less concerned absolute getting the absolute highest rent possible and more interested in shielding against homeownership costs. However, over 94% of the rentals in the sample are vacant or tenant occupied and not owner occupied, suggesting that most rentals were placed on the market for investment purposes.

Data

Data Sources

I gather data from the Las Vegas Realtors' MLS, which contains information on residential lease contracts for properties placed on the market for rent from 2009Q3 to 2019Q3 in the Las Vegas metropolitan area in Nevada.[6] After a landlord hires a real estate agent and signs an exclusive listing agreement with a real estate agent, the real estate agent will typically advertise the rental property on the local MLS. When uploading the property to the MLS, the real estate agent inputs information about what contract terms the landlord requests such as the monthly rent and term length. The real estate agent may also state what services the tenant will be expected to pay (water, gas, power, and so on). The MLS further populates fields in the listing sheet with information about the property, which is automatically drawn from the local tax assessor records. The real estate agent may adjust the property characteristics and even add tweet-size textual descriptions. Additionally, the real estate agent inputs information into the MLS about the final terms about the lease contract that arise after finding a tenant and fully executing a lease agreement.

I merge the MLS data with additional information from the Clark County Tax Assessor Office to gather information on prior sales and ownership records. I also merge the MLS data with real estate licensee records from the Nevada Real Estate Division to add to the analysis, information about the experience of real estate agents.

Sample Selection

I focus on rental contracts of one-to-four unit residential properties including single-family residences, condominiums, townhouses, duplexes, and triplexes. I exclude observations with missing fields in addition to observations of properties with a living area square footage above 6,000 or below 400, with a lot square footage above 50,000 (over an acre), with more than six bedrooms or bathrooms, with a garage that has five or more car spaces, and with more than four fireplaces. Lease contracts in which the monthly rate exceeds $10,000 or falls below $300 are also excluded along with listings offering a referral commission amount greater than $7,000. The final sample has a size above 270,000, which accounts for 93% of the original sample of rental contracts. Approximately 68% of the rental contracts in the final sample are for single-family properties, 23% are for condominiums, and 9% are for two-to-three unit properties (e.g., townhouse, duplex, triplex, etc...).

Table 1 reports the mean and standard deviation of the contract, agent, property, and neighborhood characteristics for the full sample. The most common rental contract has a twelve-month term with an average rent of $1,290 per month, or about $0.80 per square-foot per month. The landlord commonly provides the tenant with a dishwasher, clothes washer, and clothes dryer. However, tenants are

[6] The Las Vegas Realtors were previously known as the Greater Las Vegas Association of Realtors (GLVAR). The rental MLS dataset contains about 150,000 unique rental properties, representing about 22% of all the unique non-commercial residential properties recorded in the Clark County Assessor Office as of March 2019. Lopez and Yoshida (2021) also examine these data on rental contracts from the MLS.

Table 1 Summary Statistics

	All		Arms-Length		Agent-Related		Agent-Owned		t-Statistics		
Variables	Mean	SD	Mean	SD	Mean	SD	Mean	SD	AR-AL	AO-AL	AO-AR
Contract Characteristics											
Contract Rent ($)	1,290	557	1,285	553	1,389	669	1,333	583	12.3	10.0	-4.8
Asking Rent ($)	1,296	601	1,291	601	1,393	669	1,336	585	10.6	8.9	-4.8
DOM	36.2	43.1	36.4	43.3	32.7	42.1	34.9	40.8	-4.8	-4.5	2.8
Rent per SQFT	0.803	0.275	0.802	0.276	0.839	0.248	0.818	0.269	12.6	7.7	-3.0
Cap Rate	9.317	5.369	9.225	5.241	10.104	5.95	10.251	6.484	8.3	7.2	-4.1
Commission ($)	319.68	110.24	318.09	107.52	333.97	158.28	335.61	129.57	25.7	8.4	1.1
Contract Term (Months)	12.3	2.5	12.3	2.5	12.2	3.2	12.3	2.8	2.1	-1.5	1.9
Contract Term: 1-3 Months	0.01	0.09	0.01	0.09	0.02	0.14	0.01	0.11	5.8	6.4	-3.2
Contract Term: 4-6 Months	0.02	0.14	0.02	0.14	0.04	0.19	0.02	0.15	4.9	6.9	-4.2
Contract Term: 7-12 Months	0.01	0.11	0.01	0.11	0.02	0.13	0.02	0.13	7.5	3.2	-0.3
Contract Term: 12 Months	0.86	0.35	0.86	0.35	0.79	0.41	0.82	0.38	-15.8	-11.2	4.5
Contract Term: 12+ Months	0.10	0.30	0.10	0.30	0.14	0.34	0.12	0.33	11.5	6.6	-2.0
Occupancy: Owner	0.02	0.15	0.02	0.14	0.04	0.20	0.03	0.16	3.5	7.9	-5.6
Occupancy: Tenant	0.06	0.24	0.06	0.24	0.10	0.30	0.09	0.28	14.6	8.2	-2.1
Occupancy: Vacant	0.92	0.28	0.92	0.27	0.86	0.35	0.89	0.31	-14.6	-11.3	4.8
Dishwasher	0.98	0.15	0.98	0.14	0.97	0.16	0.97	0.18	-11.5	-2.5	-1.4
W/D: Washer and Dryer	0.87	0.33	0.88	0.33	0.86	0.35	0.81	0.39	-29.6	-4.0	-5.7
W/D: Dryer Only	0.00	0.05	0.00	0.05	0.00	0.05	0.00	0.04	-0.6	0.9	-1.1
W/D: None	0.12	0.33	0.12	0.32	0.14	0.35	0.19	0.39	29.9	3.6	6.1
W/D: Washer Only	0.00	0.04	0.00	0.04	0.00	0.06	0.00	0.04	0.7	2.6	-2.0
Cable Available	0.92	0.27	0.92	0.27	0.93	0.26	0.91	0.29	-6.9	1.0	-3.2
Tenant Pays: Cable	0.80	0.40	0.80	0.40	0.85	0.36	0.83	0.37	12.9	6.6	-1.8
Tenant Pays: Gas	0.91	0.29	0.91	0.29	0.88	0.32	0.90	0.31	-5.2	-3.9	1.8
Tenant Pays: Power	0.98	0.13	0.99	0.12	0.98	0.14	0.98	0.14	-5.4	-2.3	0.3

Table 1 (continued)

Variables	All		Arms-Length		Agent-Related		Agent-Owned		t-Statistics		
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	AR-AL	AO-AL	AO-AR
Tenant Pays: Sewer	0.55	0.50	0.56	0.50	0.50	0.50	0.55	0.50	-1.7	-6.1	5.2
Tenant Pays: Water	0.77	0.42	0.77	0.42	0.75	0.44	0.77	0.42	-2.3	-3.2	2.3
Tenant Pays: Garbage Pickup	0.63	0.48	0.63	0.48	0.53	0.50	0.59	0.49	-11.1	-11.5	6.8
Tenant Pays: Other Services	0.63	0.48	0.64	0.48	0.54	0.50	0.60	0.49	-9.8	-10.5	6.4
Broker Characteristics											
Experience (Years)	13.1	8.2	13.1	8.2	11.4	7.7	12.8	8.8	-5.9	-11.3	8.2
Property Manager License	0.6	0.5	0.7	0.5	0.3	0.5	0.5	0.5	-49.7	-40.8	20.0
Broker License	0.3	0.5	0.3	0.5	0.2	0.4	0.3	0.5	-10.7	-16.6	12.5
Broker-salesperson License	0.1	0.3	0.1	0.3	0.1	0.3	0.1	0.4	15.3	1.2	3.9
Salesperson License	0.4	0.5	0.4	0.5	0.5	0.5	0.4	0.5	2.3	11.9	-10.4
Observations	270,071		245,220		2,836		22,015				
Property Characteristics											
Building Age	16.2	11.1	16.0	11.0	17.8	13.0	17.9	12.4	24.1	8.5	0.5
Living Area Square Footage	1687	693	1684	689	1719	731	1710	727	5.2	2.6	-0.6
Lot Square Footage	3932	3417	3891	3380	4265	3530	4340	3766	18.7	5.9	1.0
Bedrooms	2.9	0.9	2.9	0.9	3.0	0.9	3.0	1.0	4.8	1.6	0.2
Bathrooms	2.5	0.7	2.5	0.7	2.5	0.7	2.5	0.8	-4.3	-0.3	-1.2
Fireplaces	0.45	0.58	0.44	0.58	0.50	0.60	0.49	0.60	11.4	5.4	-1.0
Private Pool	0.09	0.28	0.08	0.28	0.10	0.30	0.11	0.31	13.2	3.5	1.2
Private Spa	0.06	0.24	0.06	0.24	0.09	0.28	0.08	0.28	12.6	5.2	-0.4
Garage Car Spaces	1.60	0.93	1.59	0.93	1.65	0.94	1.63	0.96	5.7	3.4	-1.2
Unit Level: One	0.50	0.50	0.49	0.50	0.51	0.50	0.51	0.50	5.1	1.9	0.0
Unit Level: Two	0.37	0.48	0.38	0.48	0.31	0.46	0.35	0.48	-7.4	-6.6	3.7

Table 1 (continued)

	All		Arms-Length		Agent-Related		Agent-Owned		t-Statistics		
Variables	Mean	SD	Mean	SD	Mean	SD	Mean	SD	AR-AL	AO-AL	AO-AR
Unit Level: Three	0.01	0.08	0.01	0.08	0.01	0.08	0.01	0.07	-2.5	-0.3	-0.6
Unit Level: Unknown	0.13	0.33	0.12	0.33	0.17	0.37	0.13	0.34	3.9	7.0	-5.1
Building Stories: One	0.50	0.50	0.49	0.50	0.54	0.50	0.52	0.50	8.1	5.1	-2.0
Building Stories: One and a Half	0.01	0.07	0.01	0.07	0.01	0.09	0.01	0.09	6.0	1.9	0.3
Building Stories: Two	0.48	0.50	0.48	0.50	0.44	0.50	0.45	0.50	-8.2	-4.8	1.7
Building Stories: Three	0.02	0.14	0.02	0.14	0.01	0.12	0.02	0.13	-3.1	-2.0	0.9
Building Stories: Unknown	0.00	0.02	0.00	0.02	0.00	0.03	0.00	0.03	2.0	0.3	0.3
Heating Fuel: Electric	0.12	0.32	0.12	0.32	0.15	0.35	0.13	0.33	5.0	4.7	-2.5
Heating Fuel: Gas	0.88	0.33	0.88	0.33	0.85	0.36	0.87	0.34	-6.6	-4.9	2.2
Heating Fuel: Mixed	0.00	0.05	0.00	0.05	0.01	0.07	0.00	0.07	4.7	2.6	-0.6
Heating Fuel: Other	0.00	0.03	0.00	0.03	0.00	0.00	0.00	0.05	9.5	-1.5	2.8
Cooling Fuel: Electric	0.99	0.12	0.99	0.12	0.98	0.13	0.98	0.14	-7.5	-2.1	-0.6
Cooling Fuel: Gas	0.01	0.12	0.01	0.12	0.02	0.13	0.02	0.14	6.4	2.2	0.2
Cooling Fuel: Other	0.00	0.02	0.00	0.01	0.00	0.00	0.00	0.03	9.5	-0.6	1.8
Quality: Low	0.14	0.35	0.14	0.35	0.15	0.36	0.17	0.38	11.6	1.9	2.1
Quality: Fair	0.48	0.50	0.48	0.50	0.44	0.50	0.45	0.50	-7.3	-4.5	1.7
Quality: Average	0.33	0.47	0.33	0.47	0.36	0.48	0.33	0.47	-1.5	3.7	-4.0
Quality: Good	0.03	0.17	0.03	0.17	0.03	0.17	0.03	0.18	4.5	0.4	1.1
Quality: Very Good	0.02	0.15	0.02	0.15	0.02	0.13	0.02	0.13	-3.9	-1.4	0.0
Quality: Excellent	0.00	0.02	0.00	0.02	0.00	0.02	0.00	0.03	2.9	-0.4	1.1
2-3 Unit Single Family	0.09	0.29	0.09	0.28	0.10	0.30	0.10	0.30	5.6	2.2	-0.1
Condominium	0.23	0.42	0.23	0.42	0.21	0.40	0.20	0.40	-8.8	-3.0	-0.3

Table 1 (continued)

Variables	All		Arms-Length		Agent-Related		Agent-Owned		t-Statistics		
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	AR-AL	AO-AL	AO-AR
Neighborhood Characteristics											
Age Restriction	0.06	0.24	0.06	0.24	0.11	0.31	0.08	0.27	11.6	11.5	-5.8
Gated Community	0.31	0.46	0.31	0.46	0.33	0.47	0.30	0.46	-4.4	1.7	-3.2
Community Pool	0.36	0.48	0.36	0.48	0.37	0.48	0.34	0.47	-5.8	1.1	-3.1
Community Spa	0.19	0.39	0.19	0.39	0.19	0.39	0.18	0.39	-3.6	-0.4	-1.0
Community Park	0.07	0.25	0.07	0.25	0.12	0.33	0.08	0.27	7.9	11.7	-7.4
Community Golf	0.04	0.19	0.04	0.19	0.04	0.20	0.04	0.20	1.4	1.1	-0.6
Community Basketball	0.03	0.17	0.03	0.17	0.05	0.21	0.03	0.18	4.2	5.5	-3.4
Community Clubhouse	0.16	0.37	0.16	0.37	0.18	0.39	0.16	0.37	1.0	3.8	-3.2
Community Gym	0.13	0.34	0.14	0.34	0.13	0.34	0.13	0.34	-2.6	-0.1	-0.8
Community Rules (HOA)	0.75	0.44	0.75	0.43	0.69	0.46	0.69	0.46	-21.9	-7.9	-0.2

This table provides summary statistics of lease contract arranged in Las Vegas from 2009 to 2019 by whether the property is agent-owned, agent-related, or arms-length. The far right panel provides t-statistics for the mean difference between agent-related and arms-length properties (AR-AL), between agent-owned and arms-length properties (AO-AL), and between agent-owned and agent-related properties (AO-AR). SD stands for standard deviation

often expected to pay for cable (80 percent), gas (91 percent), power (98 percent), sewer (55 percent), water (77 percent), and garbage pickup (63 percent). Compared to the most recent purchase price found in the assessor records, the annual rent is generating an average capitalization rate of about 9.3% per year, assuming no vacancy or operating expenses. It is noteworthy to mention, however, that when properties are listed for rent about 92% are vacant, 2% are occupied by the owner, and 6% are occupied by a tenant.[7] Moreover, the typical rental property stays on the market about 36 days or a little over a month, which implies a vacancy rate of approximately 8.3%.[8] Hence, the true capitalization rate is likely slightly lower than 9.3%.[9]

The typical rental property in the sample is a single-family residence that is 16 years old with 1,687 square feet, three bedrooms, two-and-a-half bathrooms, and a one or two car garage. About half of the properties are single-story, 1% have one-and-a-half stories, 48% have two-stories, and 2% have three stories. About 88% of the properties use gas as the preferred heating fuel, and 99% use electricity as the preferred cooling fuel. The most common property quality reported by tax assessors in the assessor records is "Fair" (48 percent), followed by "Average" (33 percent), and "Low" (14 percent). Fewer than 5% of the properties receive a rating of "Good," "Very Good," or "Excellent." About 31% of the properties are in a gated community. There are also many properties with community amenities that include a pool (36 percent), spa (19 percent), park (7 percent), golf course (4 percent), basketball court (3 percent), clubhouse (16 percent), gym (13 percent), or rules often related to property maintenance or street-view decor (75 percent).

The rental contracts in the sample were crafted by 7,767 real estate agents. Table 2 tabulates the frequency of unique real estate agents by groups of agents. Each group is defined by how many different rental contracts each real estate agent arranged (e.g., 1 to 5 rental contracts, 6 to 10 rental contracts, 11 to 15 rental contracts, and so on). About 55% of the unique real estate agents in the sample crafted five or fewer rental contracts, 13% crafted between six and ten rental contracts, and a handful (8 percent) crafted more than 100 rental contract. Table 2 also reports the total number of rentals arranged by each group of agents. Interestingly, approximately 8% of the real estate agents account for about 70% of the rental agreements crafted in the MLS. Experience and years in the rental market likely play a role in the frequency of rental contract arrangements per agent. For example, as Table 2 reports, the rentals among agents who have a history of arranging few rentals are more likely to be agent-owned or agent-related than the rentals by high performers, indicating that many agents who enter the rental market do so for personal reasons. Moreover, agents with ample experience in the rental market likely operate in professional property management brokerage firms.

[7] The reason that vacancy is at 92% is an empirical fact whose determinants will be left for future research.

[8] Note that time-on-market and the cap rate are winsorized at the 1% tails.

[9] Unfortunately, I do not observe operating expenditures or revenue ex-post lease, which makes it difficult to estimate the actual capitalization rate without using ad hoc assumptions.

Table 2 Unique Real Estate Agents by Rental Contracts

Group	Agents		Rentals		Rentals Share (%)	
Rentals per Agent	Count	Share (%)	Count	Share (%)	Agent-Owned	Agent-Related
1-5	4,225	54.4	9,262	3.4	22.6	5.9
6-10	1,012	13.03	7,759	2.9	20.3	4.2
11-15	447	5.76	5,753	2.1	16.3	4.6
16-20	315	4.06	5,630	2.1	17.9	3.9
21-25	200	2.57	4,604	1.7	14.9	3.1
26-30	151	1.94	4,200	1.6	13.5	2.4
31-35	135	1.74	4,482	1.7	12.7	1.4
36-40	110	1.42	4,171	1.5	8.3	4.1
41-45	79	1.02	3,384	1.3	8.7	2.7
46-50	71	0.91	3,399	1.3	11.4	0.5
51-55	69	0.89	3,639	1.3	9.3	3.4
56-60	61	0.79	3,529	1.3	9.6	1.7
61-65	49	0.63	3,135	1.2	6.8	1.3
66-70	36	0.46	2,374	0.9	8.6	0.5
71-75	30	0.39	2,197	0.8	7.0	1.0
76-80	38	0.49	2,961	1.1	10.9	1.3
81-85	39	0.5	3,241	1.2	8.3	1.4
86-90	30	0.39	2,639	1.0	7.0	0.5
91-95	37	0.48	3,444	1.3	7.7	1.6
96-100	26	0.33	2,551	0.9	6.9	1.0
100+	607	7.8	187,717	69.5	5.9	0.2
Total	7,767		270,071			

This table provides the frequency and share of unique real estate agents and rentals by group of agents in Las Vegas from 2009 to 2019. Each group of agents is defined by the total number of lease contracts that each agent arranged. The first row captures the group of real estate agents who arranged 1 to 5 rental contracts, the second row captures the group of real estate agents who arranged 6 to 10 contracts, and so on. The Agent-Owned and Agent-Related columns report the share of agent-owned or agent-related rentals out of the total number of lease contracts arranged by that group of real estate agents, respectively

Agent-Owned and Agent-Related Rental Properties

Regulations on real estate transactions in Nevada require every real estate licensee to disclose in advertisements for rental properties whether they or "any member of his or her immediate family, his or her firm, or any member thereof, or any entity in which the licensee has an interest as owner" holds a real estate license (NAC.645.640). In practice, real estate agents comply with the disclosure requirements by specifying on the rental listing sheet whether the owner holds a license, or whether the owner of the property is immediately related to someone who holds a real estate license (even when the owner is an entity or firm). Real estate agents who fail to comply may face penalties and/or fines,

and non-compliance is risky because a tenant or another broker could easily determine whether the owner is a licensee holder using publicly available information.[10] Hence, whenever the real estate agent enters into the MLS that the owner holds a real estate license, I flag the property as "agent-owned." Whenever the real estate agent enters into the MLS that the owner is personally affiliated with a licensee, I flag the property as "agent-related." The two categories are mutually exclusive. A personal affiliate may be a relative (e.g., spouse, sibling, parent) or a firm or entity (i.e., trust). Agent-owned properties and agent-related properties account for about 8% (or 22,015) and 1% (or 2,836) of all the lease contracts in the sample, respectively. I label all other rental properties as "arm's-length."[11]

Although no other study provides a comparison of agent-owned or agent-related properties in the rental market, other studies provide comparable statistics from the ownership market. For example, Lopez (2021) finds that agent-owned properties and agent-related properties represent about 3.8% and 1.3% of the properties sold by households in the Las Vegas Valley from 2008Q1 to 2018Q2; Rutherford et al. (2005) find that agent-owned properties represent 3.2% of sales in Texas counties from 1999 to 2002; Levitt and Syverson (2008) reports that 3.4% of the Chicago suburb sales from 1992 to 2002 are agent-owned; and Liu et al. (2019) document that 2% of the property sales in Atlanta, GA from 2007 to 2016 are agent-owned, and 6% of the property sales in Phoenix, AZ from 2000 to 2013 are agent-owned. Hence, there appears to be a larger share of agent-owned properties in the rental market (8 percent) than in the ownership market. One explanation for the fact that the share of agent-owned properties in rental markets is twice the share of agent-owned properties in the ownership market is that real estate investors are more likely to seek licensing or additional training in property management than the typical household that might not ever choose to enter the rental market as a landlord.[12] Another explanation is that real estate agents who own rental properties are over-represented since real estate agents have easy access to the MLS and other landlords may choose non-MLS rental platforms to find tenants (e.g., Craigslist, Newspapers, Word-of-Mouth).[13] Nonetheless, the larger share of agent-owned properties in the rental market than in the ownership market suggests that owners do not systematically under-report whether they hold a real estate license.

[10] See https://addictedrealty.com/wp-content/uploads/2018/01/GLVAR-MLS-Policies-August-2016.pdf. An individual may look up a Nevada real estate license using the following website: https://red.prod.secure.nv.gov/Lookup/LicenseLookup.aspx

[11] Landlords who are unrelated to the real estate agent but personally affiliated to another real estate licensee perhaps under-report the said affiliation in which case fewer than the true number of agent-related rental properties would be identified and bias the analysis towards finding little differences in the market outcomes between agent-related and arm's-length rental properties.

[12] Later in the analysis, agent-owned or agent-related properties are matched to arm's-length properties using propensity score matching to reduce concerns about examining unbalanced groups of properties.

[13] Sections 4 and 5 discuss strategies to reduce plausible concerns about the underlying mechanism driving variation in the share of agent-owned and agent-related properties.

Summary Statistics on Rent

Table 1 reports the summary statistics of the lease terms and other variables for agent-owned, agent-related, and arm's-length properties along with t-statistics for the mean differences between groups. The average contract rent of agent-owned properties is $1,333, or about 3.7% more than the average contract rent of arm's-length properties, which is statistically significant at the 1% level. The average contract rent of agent-related properties is about 4.2% more than the average contract rent of agent-owned properties, and 8.1% more than the average contract rent of arm's-length properties. Both mean differences are statistically significant at the 1% level.

Viewed differently, the rent per square foot is $0.82 per month for agent-owned properties, $0.84 for agent-related properties, and $0.80 for arm's-length properties. Figure 1 plots the kernel density of the monthly rent per square foot for agent-owned, agent-related, and arm's-length properties. As Fig. 1 shows, the normalized rent distribution of arm's-length properties sits to the left of the normalized rent distribution for both agent-owned and agent-related properties. The figure is consistent with the summary statistics on contract rent in Table 1.

The differences in rent suggest that agent-owned and agent-related properties perform differently than arm's-length properties in the rental market. However, as shown in Table 1, there are a number of observable differences that perhaps contribute to the heterogeneity in rent. For example, agent-owned and agent-related properties tend to be older and larger in terms of living area square

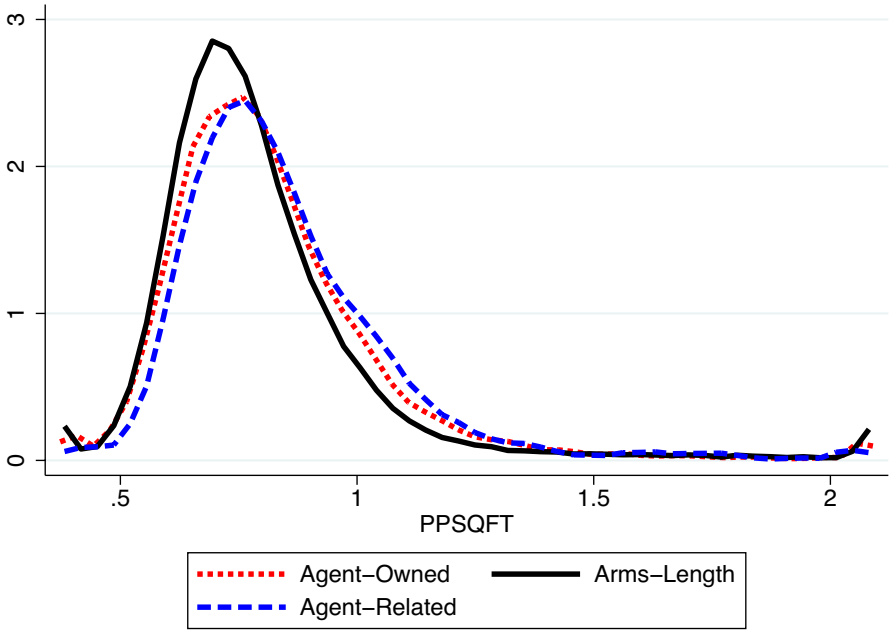

Fig. 1 Kernel Density of Rent per Square Foot

footage than arm's-length properties. In the following section, therefore, I take a multivariate approach to analyze differences in the market outcomes.

Empirical Analysis

Baseline Model

I examine the market outcome of agent-owned and agent-related properties relative to arm's-length properties using the following multivariate hedonic model:

$$Y_{it} = \delta_1 Agent\text{-}Owned_{it} + \delta_2 Agent\text{-}Related_{it} + X_{it}\beta + \tau_t + \zeta_s + \alpha_a + \varepsilon_{it} \quad (1)$$

where Y_{it} stands for the natural log of the final monthly contract rental rate of property i put on the market for rent at time t, and ε_{it} is an error term. δ_1 and δ_2 stand for the coefficients of the independent variables of interest: $Agent\text{-}Owned_{it}$ and $Agent\text{-}Related_{it}$. $Agent\text{-}Owned_{it}$ is equal to one if the owner of property i holds a real estate license at time t; it is zero otherwise. $Agent\text{-}Related_{it}$ is equal to one if the owner of property i is personally affiliated with a real estate licensee at time t; it is zero otherwise.[14]

β is a vector of coefficients, and X_{it} stands for a matrix of observable characteristics. The controls in X_{it} include an array of characteristics about the lease contract, real estate agent, property structure, and neighborhood. The lease contract characteristics specify the term of the lease contract (3 months, 6 months, 12 months, 18 months or more) in log form, whether the landlord will provide a dishwasher, clothes washer, or clothes dryer, and what utility services the tenant will have to pay (cable, gas, power, sewer, water, garbage pickup, and other). Another variable in this category is whether cable is available at the property instead of satellite dish. Lastly, I include the flat rate referral commission amount paid to the agent who finds the tenant. Jia and Pathak (2010) and Barwick et al. (2017) show that the commission sellers offer to the buyer's real estate agent impacts the transaction price of home sales. A similar outcome could occur in the rental market.

I obtain agent characteristics from the NRED dataset and include indicators for the active real estate license type that the real estate agent holds when listing the property for rent. A real estate agent in Nevada may hold a broker license, broker-salesperson license, or a salesperson license. While all three license types allow the licensee to the right to represent buyers, sellers, tenants, or landlords in real estate transactions, each has different implications about whether the licensee may operate a real estate brokerage, manage a real estate brokerage on behalf of a broker, or only facilitate real estate transactions. Another flag indicates whether the real estate agent holds an active property management license. Although anyone who holds a real estate license may represent a landlord when looking for a tenant, management of the property may only be carried out by the property owner or a licensed property manager.[15] One notable control is the agent's experience in terms of the number

[14] If the agent-owned or agent-related status is under-reported, then coefficient estimates of δ_1 and δ_2 would be biased towards zero since the control sample would include rentals that are truly agent-owned and agent-related. However, this bias is unlikely as discussed in Section 3.

[15] See http://red.nv.gov/Content/Licensing/Initial_Requirements/.

of years from the agent's first real estate license's issuance date and the rental listing date. The number of photos uploaded to the MLS is also included as a proxy for the agent's effort in finding a tenant on behalf of the landlord. While the number of photos may capture a level of initial effort an agent exhorts in the tenant search process, the agent's experience may capture the agent's average efficiency in performing other tasks of the search.

The property structure characteristics include the building's age, log living area square footage, log lot area square footage, number of bedrooms, number of bathrooms, number of fireplaces, indicators for whether the property has a private pool or private spa, and the number of car spaces in the garage. They also include a set of categorical variables: the unit level, building stories, heating fuel type, cooling fuel type, assessed property quality (low, fair, average, good, very good, and excellent), and property type (single-family, condominium, other). Neighborhood characteristics include an indicator for whether the property is in an age restricted community (generally 55+), and another indicator for whether the property is in a gated community. Other indicators in the neighborhood characteristics flag whether the property is in a community that has a pool, spa, park, golf course, basketball court, clubhouse, gym, or rules.[16] As school quality has been found to affect rent Beracha and Hardin (2018), the neighborhood characteristics also include categorical variables for the high school and jr high school zone. The school variables flag the respective school a child at the property would be assigned to attend. These variables may vary within subdivisions and over time.

Lastly, the parameters τ_t, ζ_s, and α_a stand for fixed effects that calibrate the model to account for the year-quarter listing date t, subdivision location s, and real estate agent a, respectively.[17] Note that there are 40 quarters, almost 9,000 subdivisions (that include more than one property), and more than 5,900 real estate agents in the sample (with two or more observations in each cell). The objective of the fixed effects is to control for constant unobservable characteristics that the observable controls in the model do not capture but may correlate with the agent-owned, agent-related, and contract rent variables. In particular, the time fixed effects control for temporal changes in the market conditions, location fixed effects capture time in-variant geographical differences across neighborhoods, and agent fixed effects exploit within-agent heterogeneity to control for in-variate agent specific characteristics such as bargaining skills or abilities.

In principle, property fixed effects could also enter the set of covariates in Eq. 1. However, adding parcel fixed effects in addition to agent, time, and location fixed effects may be too taxing on the variation of the data since few rental properties switch ownership; often the same property will not be agent-owned or agent-related in some periods and arm's-length in other periods. Moreover, including property fixed effects would require excluding properties from the sample that lease only once, and properties that lease more than once may not be representative of the local population of rental properties (see McMillen, 2003; Cannaday et al., 2005; McMillen and Thorsnes, 2006).[18] However,

[16] Note that for categorical variables, the largest class is set as the base category.

[17] Year-quarter-zip fixed effects do not materially affect the principal results. Subdivisions are more granular delineation of neighborhoods than census tracts and zip codes, including condominiums.

[18] For example, as discussed and examined in Section 5, rental properties that generate multiple rental contracts in the sample tend to be held by large or corporate landlords, while properties with one rental contract in the sample tend to be owned by small or individual landlords.

I use propensity score matching to reduce concerns about sample selection, property heterogeneity, and the comparison of unbalanced groups of properties, which is a common approach (e.g., McMillen, 2012; Agarwal et al., 2019).

Results

Table 3 reports coefficient estimates of δ_1 and δ_2 in Eq. 1 using ordinary least squares (OLS) and the log of the monthly contract rent as the dependent variable. Each column reflects coefficients estimates retrieved using a different set of controls. Column (1) includes only fixed effects for the year-quarter listing date. Each subsequent column successively adds controls until reaching the full specification of Eq. 1. Specifically, column (2) adds the baseline set of controls, column (3) adds subdivision fixed effects, and column (4) adds agent fixed effects. The standard errors in each column are clustered by subdivision.

Table 3 Baseline Regressions

Dep. var.: ln(Rent)	(1)	(2)	(3)	(4)	(5)
Agent-Owned	0.030***	0.012***	0.012***	0.007***	0.008***
	(0.005)	(0.002)	(0.001)	(0.001)	(0.001)
Agent-Related	0.057***	0.017***	0.020***	0.011***	0.013***
	(0.011)	(0.004)	(0.003)	(0.003)	(0.003)
Observations	270,071	270,071	268,312	266,513	42,640
Adjusted R^2	0.069	0.877	0.927	0.937	0.941
Singletons	0	0	1,759	3,558	1,944
Controls		✓	✓	✓	✓
Year-Quarter FE	✓	✓	✓	✓	✓
Subdivision FE			✓	✓	✓
Agent FE				✓	✓
PS Matching					✓

This table reports OLS estimates using the natural log of property's contract rent as the dependent variable. The sample consists of residential lease contracts arranged in Las Vegas from 2009 to 2019. "Agent-Owned" is a dummy variable that equals one when the owner holds a real estate license; it is zero otherwise. "Agent-Related" equals one when the owner is related to a real estate licensee; it is zero otherwise. Each column uses a different set of controls. Controls include commission, log contract term, occupancy, dishwasher, washer/dryer, cable available, tenant pays dummies (cable, gas, power, sewer, water, garbage pickup, other), real estate agent experiences in years, real estate agent property manager license, real estate agent broker license, real estate agent broker-salesperson license, building age, log living area square feet, log lot square feet, bedrooms, bathrooms, fireplaces, private pool, private spa, garage car spaces, unit level, building stories, heating fuel type, cooling fuel type, quality (low, fair, average, good, very good, excellent), 2-3 unit single family, condominium, age restriction, gated community, community amenities dummies (pool, spa, park, golf, basketball, clubhouse, gym, rules), high school, and middle school. Robust standard errors clustered by subdivision are in parentheses. The stars ***, **, * denote statistical significance at the 1, 5, and 10 percent level, respectively.

In addition, each column removes "singleton" observations to mitigate the concern that the large sample size drives the significance of the results.[19]

Column (1) suggests that once controlling for year-quarter fixed effects, agent-owned and agent-related properties lease at a 3% and 5.7% premium above arm's-length properties. According to a Wald test, the difference in the coefficient estimates in agent-owned and agent-related properties is statistically significant at the 1% level, too (f-value of 6.65; $Prob > F = 0.01$). However, once adding the baseline controls in column (2) the coefficient estimates on *Agent-Owned* and *Agent-Related* decrease to 1.2% and 1.7%, respectively; moreover, the coefficient estimate of *Agent-Related* is no longer statistically different from the coefficient estimate of agent-owned (f-value of 1.67; $Prob > F = 0.196$). Hence, the price differential between agent-owned and agent-related properties can be attributed to differences in contract, agent, property, or neighborhood characteristics. Similar coefficient estimates arise when controlling for neighborhood characteristics using subdivision fixed effects in column (3). Once adding real estate agent fixed effects in column (4), the coefficient estimates on *Agent-Owned* and *Agent-Related* further adjust to 0.7 and 1.1%, respectively. The coefficient estimates, however, remain positive and statistically significant at the 1% level.[20] Given that the average monthly rent is $1,290 and most rental contracts have a term of 12 months, the results suggest that agent-owned properties lease at a rate that is $108.36 per year greater than arm's-length properties, holding all else constant. Agent-related properties generate an average premium of $170.28 per year, holding all else constant. A couple of back-of-the-envelope direct capitalization calculations using the annual rent premiums for agent-owned and agent-related properties imply a value-added of $1,165 and $1,831 in the capital market, respectively.

Propensity Score Matching

If the rental MLS sample is not representative of the entire (non-commercial) residential rental market, landlords who hold a real estate license and landlords personally affiliated with a licensee may differ from other landlords in a way that introduces bias to the baseline results. For example, landlords might only seek help from a real estate agent when they were unsuccessful in finding a tenant themselves from their own network or online resources such as Craig's List. Consequently, the distributions of the explanatory variables may not be similar across the treatment (i.e., agent-owned/agent-related) and control samples (McMillen, 2012), and hence, bias the effects of agent-owned or agent-related rental properties.

[19] I use the "reghdfe" package in Stata, which iteratively identifies and removes singleton observations (see Correia, 2014, 2016). An observation that uniquely makes up a class in a categorical variable is a singleton observation (e.g., an observation of a single property in a subdivision).

[20] In the appendix, Table A.1 controls for the rental contract term length non-linearly; the results are identical to the baseline estimates. Table A.2 shows that the main results hold within property type subsamples. Consistent results also arise when using the monthly rent per square foot as the dependent variable (see Table A.3). Furthermore, the results remain unchanged when using listing year-month fixed effects instead of listing year-quarter fixed effects, suggesting that the baseline estimates of the agent-owned and agent-related premiums are robust to possible within-quarter seasonal effects.

To mitigate sample selection concerns, I follow (Agarwal et al., 2019) and use a doubly-robust approach that involves (i) propensity score matching to construct balanced treatment and control groups and (ii) an outcome regression.[21] Specifically, I first estimate the likelihood that a property belongs to an individual who holds a real estate license or a personal affiliation with a licensee (i.e., the likelihood of treatment) using the following Probit regression model:

$$Pr(\text{Treatment}_{it} = 1 | Z_{it}, \tau_t) = \Phi(Z_{it}\gamma + \tau_t + \epsilon_{it}) \quad (2)$$

where Treatment_{it} is equal to one if the property is agent-owned or agent-related, and zero if otherwise; Φ is the cumulative density function, Z_{it} is a matrix of structural and neighborhood characteristics; τ_t stands for year-quarter fixed effects; and ϵ_i is an error term.[22]

Table A.5 in the appendix displays the coefficient estimates for the Probit model. We observe in Table A.5 that agent-owned/related properties are more likely to be older, have more bedrooms, and have lower property conditions than other rental properties. Using the coefficient estimates of Eq. 2 in Table A.5, I compute the predicted values of the dependent variable for each observation, which are more commonly known as the propensity scores. I then match each agent-owned and agent-related property in the treatment group with a rental property in the control group (i.e., arm's-length) to the closest propensity score or nearest neighbor. Matching is forced at the subdivision level (which is much more granular than at the ZIP code level and census tract level), and replacement of matched observations is allowed. The sample decreases to 42,640 observations. Table A.6 reports the mean differences between the treatment and control groups. The table also reports the corresponding t-statistics and Cohen's (1977) d-statistics. Table A.6 shows that mean differences between the two groups are either statistically insignificant or economically meaningless (with a small d-statistic below |0.2|), which confirms that the sample of rental properties in the treatment group and control group are balanced after the propensity score matching procedure.[23]

Finally, I estimate the baseline model for each outcome variable using the balanced treatment and control groups obtained from propensity score matching. Column (5) of Table 3 reports the results. The results are slightly larger in magnitude but similar in direction and significance to prior estimates. These findings reduce concerns that arm's-length rental properties are substantially different from agent-owned or agent-related rental properties. Since results do not change substantially after matching, I use the non-match sample of rental contracts for the rest of the analysis to retain a larger sample size.

[21] Sant'Anna and Zhao (2020) argue that a doubly robust approach for causal inference is useful since the propensity score model or outcome regression could be misspecified. King and Nielsen (2019) point out potential pitfalls of using propensity score matching.

[22] I use PSMATCH2 command in STATA to compute Eq. 2. King and Nielsen (2019)

[23] Cohen's d-statistic is measured as the mean difference between the treatment group and control group divided by the pooled standard deviation. Generally, a d-statistic is considered small and economically meaningless if its absolute value is (or less than) 0.2 (see Cohen, 1977).

Unobesrvable Heterogeneity

One concern is that differences in rent over look differences in the price agents or personal affiliates of agents may have paid as buyers when first purchasing the property. Agent-owned and agent-related properties could include those properties that are purchased or owned by landlords who have better information regarding potential rents. For example, information may reflect idiosyncratic elements that affect the value of real estate such as whether a property is believed to be "haunted" (e.g., Bhattacharya et al., 2021). Indeed, Agarwal et al. (2019) find that real estate agents in Singapore purchase property for themselves at a discount of about 2.5%. Hayunga and Munneke (2021) and Allen et al. (2016) likewise observe similar discounts when agents buy real property for themselves in Texas and Florida, respectively. Thus, to control for possible sources of unobservable heterogeneity, I account for differences in the acquisition price by focusing on capitalization rates. In theory, the purchase price should reflect the value of both observable and unobservable qualities of a property when the market is efficient.

Focusing on properties that were acquired regularly, outside of foreclosure, and from a seller at arm's-length of the buyer, I estimate the effect of *Agent-Owned* and *Agent-Related* on the capitalization rate. The capitalization rate is estimated as the ratio of the annual potential rent to previous purchase price (available in the tax assessor records). To account for price appreciation of individual properties, I provide estimates with and without controls for the holding period, purchase year fixed effects, and interactions of the aforementioned variables. I also repeat the analysis using properties that were leased within one year of acquisition to reduce concerns about other changes in the property or neighborhood that may occur over time. I also examine differences in the rental rate using the same two samples but while controlling for the natural log of the purchase price. Table 4 shows the coefficient estimates of *Agent-Owned* and *Agent-Related* for each case. The results in columns (1) to (4) reveal that real estate agents and personal affiliates of agents retrieve a cap rate that is 30 to 67 basis points higher than the average cap rate of other landlords; that imply a value between $499 to $1,115 per year, which are greater than the economic estimates of the rent premium values in Section 4.2.[24] However, columns (5) and (6) show that the coefficients on *Agent-Owned* and *Agent-Related* are similar to before, indicating that the differences in cap rates are largely driven by discounts that the agents secured when purchasing the property. Together, these findings support the assessment that disparities between agent-owned and non-agent owned properties are small in the rental market but larger in the ownership market.

Another concern is that landlords of agent-owned and agent-related properties perhaps invest more in capital improvements than other landlords and therefore command a larger amount of rent than other landlords. While the baseline model includes a set of controls for quality from the tax assessor records, the categorical variable of quality could be a coarse proxy for the physical conditions of the property. To circumvent the lack of information on capital improvements, I exploit public remarks in the listing sheets. Liu et al. (2019) point

[24] $\$499 = 0.003 \times \$1,290 \times 12/9.3\%; \$1,115 = 0.0067 \times \$1,290 \times 12/9.3\%$

Table 4 Capitalization Rate

	(1)	(2)	(3)	(4)	(5)	(6)
Dep. var.:	CapRate	CapRate	CapRate	CapRate	ln(Rent)	ln(Rent)
Sample:	All	All	Going-in	Going-in	All	All
Agent-Owned	0.298***	0.406***	0.641***	0.666***	0.008***	0.009***
	(0.050)	(0.032)	(0.088)	(0.085)	(0.001)	(0.001)
Agent-Related	0.334**	0.416***	0.506**	0.553***	0.010***	0.011***
	(0.133)	(0.083)	(0.225)	(0.210)	(0.003)	(0.003)
ln(Purchase Price)					0.012***	0.038***
					(0.001)	(0.005)
Observations	175,780	175,780	29,080	29,080	175,780	175,780
Adjusted R^2	0.258	0.742	0.690	0.717	0.940	0.941
Singletons	3,797	3,797	3,806	3,806	3,797	3,797
Controls	✓	✓	✓	✓	✓	✓
Year-Quarter FE	✓	✓	✓	✓	✓	✓
Subdivision FE	✓	✓	✓	✓	✓	✓
Agent FE	✓	✓	✓	✓	✓	✓
Holding Time, Buy Year, Interaction FE		✓		✓		✓

This table reports OLS estimates using the property's capitalization rate (in percentage form) as the dependent variable. The sample consists of residential lease contracts arranged in Las Vegas from 2009 to 2019 for properties that were purchased outside of foreclosure and from a seller at arm's-length of the buyer in columns (1), (2), (5), and (6). The sample in columns (3) an d(4) is restricted to rental properties purchased within a year of the least contract date. "Agent-Owned" is a dummy variable that equals one when the owner holds a real estate license; it is zero otherwise. "Agent-Related" equals one when the owner is related to a real estate licensee; it is zero otherwise. Each column uses a different set of controls. Controls include commission, log contract term, occupancy, dishwasher, washer/dryer, cable available, tenant pays dummies (cable, gas, power, sewer, water, garbage pickup, other), real estate agent experiences in years, real estate agent property manager license, real estate agent broker license, real estate agent broker-salesperson license, building age, log living area square feet, log lot square feet, bedrooms, bathrooms, fireplaces, private pool, private spa, garage car spaces, unit level, building stories, heating fuel type, cooling fuel type, quality (low, fair, average, good, very good, excellent), 2-3 unit single family, condominium, age restriction, gated community, community amenities dummies (pool, spa, park, golf, basketball, clubhouse, gym, rules), high school, and middle school. Robust standard errors clustered by subdivision are in parentheses. The stars ***, **, * denote statistical significance at the 1, 5, and 10 percent level, respectively.

out that the public remarks in the MLS generally have a wealth of information about the property characteristics as agents can freely describe the property outside of the constraints of a listing sheet template. To identify properties with capital improvements, following a similar textual analysis strategy seen in Ben-David (2011), I flag rental properties with listing remarks that contain the following words: "new," "renovated," "remodel," "upgrade," or "update." Approximately 36% of the rental properties in the sample appear to have some form of capital improvement. Table A.4 in the appendix examines the impact of capital improvements (*CapEx*) on prices under various specifications. I find that controlling for capital improvements does not affect the *Agent-Owned* and

Agent-Related effects along the extensive margin. However, when interacting the *CapEx* indicator with the *Agent-Owned* indicator, agent-owned properties with capital improvements appear to lease at a slightly higher rate (of about 0.5%) than other agent-owned properties without capital improvements. The results are consistent with the main findings that the market outcome differences between agent-owned and non-agent owned properties are statistically significant but economically small.

Potential Mechanisms

The results so far suggest that agent-owned and agent-related properties are leased at a monthly rent that is slightly higher than the average monthly rent of arm's-length properties, holding all else constant. The results are robust to alternative specifications and subsamples including one constructed using propensity score matching. In this section, I examine potential mechanisms that could explain variation in the price premiums on agent-owned and agent-related rental properties.

Tenant Search Effort

The effort necessary to find a tenant for a luxury rental property may differ from the tenant search process for the marginal rental property. The *Agent-Owned* and *Agent-Related* effects may differ along the rent distribution if the difficulty of finding a tenant changes with rent level. Thus, to allow the coefficients of *Agent-Owned* and *Agent-Related* to vary non-linearly over the entire rent distribution, I estimate the effect of *Agent-Owned* and *Agent-Related* on the natural log of rent at quantile q in iterations of .02 such that $q = (.02, .04, .06, \cdots, .98)$.[25] This exercise results in two sets of $T = 49$ coefficient estimates: one for *Agent-Owned*, and another for *Agent-Related*. McMillen (2012a) applies a similar model and notes that the resulting quantile estimates for each vector of length T are best summarized graphically. Figure 2 shows the coefficient estimates of agent-owned and agent-related on various quantiles of log rent (with 95% confidence bands). *Agent-Owned* and *Agent-Related* positively and significantly affect the log rent across the entire rent distribution. Moreover, the *Agent-Owned* and *Agent-Related* effects are higher at the right-side of the rent distribution than the left, providing evidence of the search effort effects on price disparities. However, the variance of the *Agent-Related* coefficient estimate widens drastically, often including the *Agent-Owned* coefficient estimate in the confidence interval suggesting that the differences between the *Agent-Owned* and *Agent-Related* quantile coefficients are often not statistically significant.[26] Moreover, the largest agent-owned effect is less than 2% (or about $18 per month), implying that other mechanism may also be at play.

[25] Lopez (2021) employs a similar strategy.
[26] The small sample size of agent-related listings introduces volatility to the point estimates of the agent-related premium.

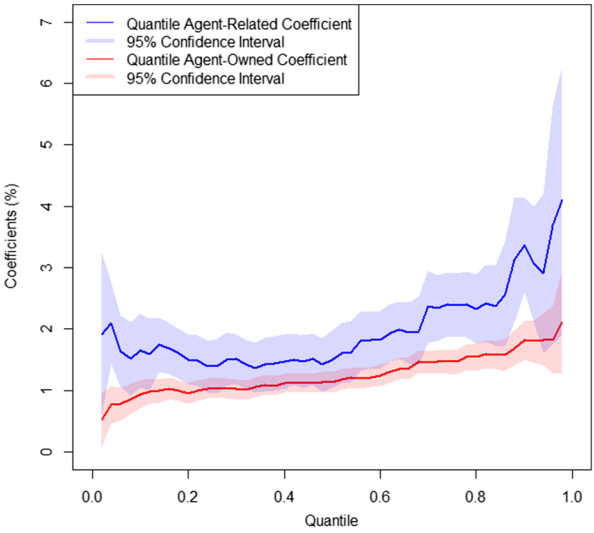

Fig. 2 Quantile Coefficient Estimates

Competing Rental Listings

Holmström (2017) shows that the principle can better design an incentive-compatible contract (i.e., negotiate a commission) when she knows the distribution of the outcome (i.e., price) and better evaluate the effort of the agent. This is a source of asymmetric information between landlords and real estate agents similar to what the canonical studies on agency problems with real estate agents in ownership markets investigate (e.g., Levitt and Syverson, 2008). Put differently, the premium on agent-owned and agent-related properties may decrease with the number of competing properties in the market if those properties convey information to the landlords about the possible rental rates that they could secure depending on how much effort the listing agent puts into the process of finding a tenant. For example, although a landlord may not have access to the MLS, they will likely have access to online resources such as Zillow and Trulia, which broadcast information on current rental listings. To test this hypothesis, I measure the number of competing listings for each rental property as the total number of rental properties put for rent in the same ZIP code during the same quarter as the subject property, including listings that were leased and those that were withdrawn from the market. The mean number of competing listings is 205 and the standard deviation is 105 listings. I then interact the number of competing listings (in hundreds) with the *Agent-Owned* and *Agent-Related* variables in Eq. 1.

Column (1) of Table 5 shows that the *Agent-Owned* and *Agent-Related* effects are larger than previously estimated when the number of competing listings is low. However, as the number of competing listings increases, the rental premiums on agent-owned and agent related properties decrease. For example, a one-standard deviation increase in the number of competing listings reduces the agent-owned effect by approximately 0.2 percentage points. The results suggest that as landlords have more rental properties to use as a reference point for the viable asking rent, the lower is the information advantage that may exist from holding a real estate license or being affiliated with someone who does.

Table 5 Competing Listings and Agent-Managed Properties

Dep. var.: ln(Rent)	(1)	(2)
Agent-Owned	0.011***	0.008***
	(0.002)	(0.003)
Agent-Related	0.020***	0.010**
	(0.006)	(0.005)
Managing		-0.007***
		(0.002)
Agent-Owned × Managing		-0.003
		(0.003)
Agent-Related × Managing		0.014*
		(0.008)
Competing Listings (100s)	-0.000	
	(0.001)	
Agent-Owned×Competing Listings (100s)	-0.002**	
	(0.001)	
Agent-Related×Competing Listings (100s)	-0.004*	
	(0.002)	
Observations	266,513	93,848
Adjusted R^2	0.937	0.939
Singletons	3,558	2,821
Controls	✓	✓
Year-Quarter FE	✓	✓
Subdivision FE	✓	✓
Agent FE	✓	✓

This table reports OLS estimates using the natural log of property's contract rent as the dependent variable. The sample consists of residential lease contracts arranged in Las Vegas from 2009 to 2019. The sample is restricted to observations where the "Managing" is not missing in column (2). "Agent-Owned" is a dummy variable that equals one when the owner holds a real estate license; it is zero otherwise. "Agent-Related" equals one when the owner is related to a real estate licensee; it is zero otherwise. "Competing Listings" are the number of rental properties put for rent in the same ZIP code during the same quarter as the subject property. "Managing" equals one when the owner is not self-managing the property; it is zero otherwise. Controls include commission, log contract term, occupancy, dishwasher, washer/dryer, cable available, tenant pays dummies (cable, gas, power, sewer, water, garbage pickup, other), real estate agent experiences in years, real estate agent property manager license, real estate agent broker license, real estate agent broker-salesperson license, building age, log living area square feet, log lot square feet, bedrooms, bathrooms, fireplaces, private pool, private spa, garage car spaces, unit level, building stories, heating fuel type, cooling fuel type, quality (low, fair, average, good, very good, excellent), 2-3 unit single family, condominium, age restriction, gated community, community amenities dummies (pool, spa, park, golf, basketball, clubhouse, gym, rules), high school, and middle school. Robust standard errors clustered by subdivision are in parentheses. The stars ***, **, * denote statistical significance at the 1, 5, and 10 percent level, respectively

Property Management Compensation

Besides choosing whether to employ a real estate agent to find a tenant, a landlord may also choose whether to hire a property management firm that, on behalf of the landlord, would collect rent, escrow deposits, handle maintenance claims, process fines or evictions if a tenant fails to pay rent, and a number of other ancillary responsibilities. Property managers may collect up to 8% (or more) of the monthly rent as additional compensation, according to conversations with local real estate agents. Hence, if an agent's incentive to exert high effort in the tenant search process comes from implicit contracting or a long-term arrangement of sharing revenue, then an agent that anticipates managing the property may have a higher incentive to collect a higher rent. To test whether agents respond to property management compensation incentives, I add to the baseline model (Eq. 1) a control, that is called "*Managing*," for whether the listing agent (or the listing agent's brokerage) will be managing the property, and interactions of this dummy variable and the *Agent-Owned/Related* dummy variables. Specifically, *Managing* is equal to one if the listing sheet indicates that the property will not be managed by the owner of the property; it is equal to zero if the listing sheet indicates that the property will be managed by the owner of the property; it is set to null when missing. Approximately, 77% of the listings where a managing arrangement is reported indicate that the property will not be managed by the owner.

Column (2) of Table 5 reports the OLS coefficient estimates on the natural log of rent. The coefficient on *Managing* is negative and statistically significant at the 1% level, suggesting that the average rent of properties that are managed by the listing agent/brokerage is slightly lower than the average rent of properties that are self-managed. However, it is possible that arm's-length clients that self-manage property are more aware of challenges in the rental market and may be more astute than the other arm's-length landlord. Moreover, the interaction between the *Agent-Owned* and *Managing* variables is statistically insignificant. One interpretation is that a real estate agent will provide the same effort in finding a tenant and setting up a lease contract whether she chooses a third party to professionally manage her own property. In contrast, the coefficient on the interaction of the *Agent-Related* and *Managing* variables is positive and statistically significant at the 10% level. The average rent is approximately 1.4% higher for agent-related rental properties that are managed than other agent-related rental properties. This result suggests that a connection could exist between effort and the relationship between agents and clients from a revenue-sharing, long-term contract, particularly when they are related.

Agent Experience

An experienced real estate agent may better understand several aspects about the rental process than an inexperienced agent in a way that could deferentially impact rent or rental income. For example, an agent from listing experience may see the value in staging a home with, say, a fresh coat of paint to increase the willingness that a tenant moves in. Whereas an agent who mostly works in the ownership market may not be willing to give such advise to a client, an agent with more experience in the rental market may find it worthwhile to do so. Furthermore, experience may be associated with reputation

dynamics. For example, Shi and Tapia (2016) argue that a real estate agent who believes that her client will provide referral business will exert more effort in selling her client's property. To test the impact of agent experience on the differentials in rents, I interact the *Agent-Owned* and *Agent-Related* variables with a *Little Experience* dummy variable that indicates whether a listing agent has little experience. Agents with little experience can be defined as those who arranged fewer than ten listings contracts in the sample. Column (1) of Table 6 reports the results. The results indicate that the difference between

Table 6 Agent Experience

Dep. var.: ln(Contract Rent)	(1)	(2)
Subsample:	All	Households
Agent-Owned	0.006***	0.007***
	(0.001)	(0.001)
Agent-Related	0.011***	0.010***
	(0.003)	(0.003)
Agent-Owned × Little Experience	0.008**	0.008*
	(0.003)	(0.004)
Agent-Related × Little Experience	0.004	0.006
	(0.006)	(0.007)
Observations	266,513	181,306
Adjusted R^2	0.937	0.938
Singletons	3,558	3,728
Controls	✓	✓
Year-Quarter FE	✓	✓
Subdivision FE	✓	✓
Agent FE	✓	✓

This table reports OLS estimates using the natural log of property's contract rent as the dependent variable. "Agent-Owned" is a dummy variable that equals one when the owner holds a real estate license; it is zero otherwise. "Agent-Related" equals one when the owner is related to a real estate licensee; it is zero otherwise. "Little Experience" equals one when the listing agent organized fewer than 10 listing contracts; it is zero otherwise. Controls include commission, log contract term, occupancy, dishwasher, washer/dryer, cable available, tenant pays dummies (cable, gas, power, sewer, water, garbage pickup, other), real estate agent experiences in years, real estate agent property manager license, real estate agent broker license, real estate agent broker-salesperson license, building age, log living area square feet, log lot square feet, bedrooms, bathrooms, fireplaces, private pool, private spa, garage car spaces, unit level, building stories, heating fuel type, cooling fuel type, quality (low, fair, average, good, very good, excellent), 2-3 unit single family, condominium, age restriction, gated community, community amenities dummies (pool, spa, park, golf, basketball, clubhouse, gym, rules), high school, and middle school. The sample consists of residential lease contracts arranged in Las Vegas from 2009 to 2019. Column (1) uses the full sample; column (2) restricts the sample to landlords who are households. Robust standard errors clustered by subdivision are in parentheses. The stars ***, **, * denote statistical significance at the 1, 5, and 10 percent level, respectively

agent-related and arm's-length properties remains unaffected by the agent's experience. However, the marginal difference between agent-owned and arm's-length properties more than doubles when the listing agent has little experience.

Xie (2018) finds that besides agent experience differences in the sale price of real estate agent and client homes are partly driven by whether the client is an institutional entity. Moreover, Mills et al. (2019) document a rise of institutional investors in the single-family rental market. Hence, one concern is that large landlords in the sample may influence the results since they may, for example, have greater reserves than small ("mom and pa") landlords and withstand longer vacancy spells during the tenant search process. Column (2) repeats the experience analysis but limiting the sample to properties owned by households. I identify households using the ownership data (i.e., the grantee name) from the Clark County Assessor's Tax Office. Approximately 68% of the properties in the sample are owned by households.[27] The results reinforce the findings from the first column using the full sample.

Additional Evidence

Search and Bargaining Effort

A real estate agent working with a landlord may face an incentive to complete a rental listing agreement with little effort as possible. Emmerling et al. (2020) show that a low list price can increase the arrival of bids for a property for sale. Hence, a real estate agent could quickly and perhaps effortlessly complete a rental transaction by advising a less informed landlord to underprice a rental property. A real estate agent working with a landlord may face further incentives to reduces search efforts in finding a tenant (e.g., showing the property to fewer prospective tenants), which could consequently lengthen the time a rental property remains vacant without a tenant. Likewise, arm's-length owners may require more time to rent their unit than agent-owners if less informed owners initially list their properties for a price that is too high before settling for less rent. Alternatively, real estate agents could exert less effort when bargaining rent with tenants for non-agent landlords at arm's length.

To disentangle the various channels of low effort, I first examine the impact of agent-owned and agent-related on the initial asking rent. In this regression, I control for the most recent purchase price to reduce concerns about differences in the property value across landlords. I then examine differences in liquidity, measured as the time a rental property stays on the market (TOM), i.e. the number of days between the listing date and contract date. In this regression, I add the natural log of the property purchase price as an additional control variable to account for the upfront search effort channel and set the *log TOM* as the dependent variable. I also control for the natural log of the initial asking rent because research in the ownership market shows that there is a relationship between the list price and time on market (e.g., Anglin et al., 2003). Next, I examine bargaining effort by setting the dependent variable as the percentage change in the contract rent (C) relative to the asking rent (A): $(C - A)/A$. The contract price to asking price ratio is a common

[27] I define a household as an individual or group of individuals that is not a fictitious entity such as a trust or corporation using the "grantee" variable and by flagging observations that do not have abbreviations or key words such as "LLC", "Inc", and "Trust".

proxy for bargaining effort.[28] In principle, the higher the contract rate over the asking rent, the greater the bargaining power of the landlord.

Lastly, to examine the likelihood that a property is leased successfully, I add to the sample more than 43,000 rental listings that were withdrawn or expired.[29] One benefit of being a licensed Realtor is the ability to list a property for rent without risking having to pay a commission. If flexibility makes the opportunity cost of renting higher for agent-owned landlords, agents might list their own properties for a higher rent or repeatedly list and de-list properties. An agent, for example, could be simultaneously listing a property on the rental MLS platform and sales MLS platform.

Table 7 shows in column (1) that the coefficient estimates on *Agent-Owned* and *Agent-Related* are positive and statistically significant at conventional levels in a regression with the log initial asking rent as the dependent variable. The results indicate that landlords who hold a real estate license or a personal affiliation with someone who does ask for more rent than other landlords. One interpretation is that the listing agent asks for less initial rental rate to avoid potential long-term negotiation with potential tenants when the property is not owned by the listing agent or a family member. Column (2) shows that holding asking rents fixed, the average TOM is shorter for agent-owned and agent-related properties, which suggests a lack of urgency by real estate agents to find a tenant for landlords who are at arm's length.[30] However, the effect is minor. Agent-owned and agent-related properties are leased about one day sooner (i.e., $exp(-0.025)$ or $exp(-0.054)$) than other rental properties. Column (3) of Table 7 sets the bargaining power proxy as the dependent variable. The coefficient estimate of *Agent-Owned* is not positive and the coefficient estimate of *Agent-Related* is not statistically significant. In other words, column (3) presents no evidence that real estate agents exert less bargaining effort for non-agent landlords at arm's length beyond the initial pricing decisions. Contrarily, the results suggest that real estate agents may be willing to provide a slight discount on their own listings relative to the initial list price that they advertise.

Column (4) shows the effect of *Agent-Owned* and *Agent-Related* on the likelihood that a listing results in a successful lease. The coefficients on *Agent-Owned* and *Agent-Related* are statistically insignificant from zero, suggesting that agent-landlords, or landlords who have an affiliation with an agent, do not list and de-list properties at a significantly different rate that other landlords. Overall, the results suggest that landlords at arm's length ask for slightly less rent initially and are more likely to experience longer vacancy spells by about a day (conditional on the asking rent) but their listing agents do not necessarily bargain or de-list at a rate that is less than that of landlords of agent-owned or agent-related properties.

[28] See for example Agarwal et al. (2019) who use the sales price to listing price ratio as a proxy for bargaining effort.

[29] For expired/withdrawn listings, I set a similar set of filters to those reported in Section 3 for leased listings.

[30] Following concerns that TOM may be constructed differently depending on whether withdrawn or expired listings are in the sample (Benefield & Hardin, 2015), I find similar results when measuring TOM as the number of days between the "off-the-market" date and listing date and including withdrawn or expired listings in the sample.

Table 7 Search and Bargaining Effort

	(1)	(2)	(3)	(4)
Dep. var.:	ln(Asking Rent)	ln(TOM)	(C-A)/A	1[Leased]
Agent-Owned	0.007***	-0.025***	-0.001***	-0.004
	(0.002)	(0.007)	(0.000)	(0.003)
Agent-Related	0.008**	-0.054***	0.001	0.001
	(0.004)	(0.020)	(0.001)	(0.008)
ln(Asking Rent)		0.518***		
		(0.031)		
ln(TOM)			-0.023***	
			(0.000)	
ln(Purchase Price)	0.005***	0.009***	0.000	
	(0.001)	(0.002)	(0.000)	
Observations	237,213	237,213	237,213	311,784
Adjusted R^2	0.803	0.238	0.254	0.153
Singletons	3,637	3,637	3,637	3,678
Controls	✓	✓	✓	✓
Year-Quarter FE	✓	✓	✓	✓
Subdivision FE	✓	✓	✓	✓
Agent FE	✓	✓	✓	✓

This table reports OLS estimates using the variable reported in each column heading as the dependent variable. "ln(Asking Rent)" is the natural log of the initial asking rent for the rental property. "ln(TOM)" is the days on market winsorized at the 1 percent tails. "(C-A)/A" is a proxy for bargaining power measured as the difference between the contract rent (C) and asking rent (A) divided by the asking rent, and winsorized at the 1 percent tails. "1[Leased]" is one if the rental listing was leased; it is zero if the rental listing expired or was withdrawn. "Agent-Owned" is a dummy variable that equals one when the owner holds a real estate license; it is zero otherwise. "Agent-Related" equals one when the owner is related to a real estate licensee; it is zero otherwise. Controls include commission, log contract term, occupancy, dishwasher, washer/dryer, cable available, tenant pays dummies (cable, gas, power, sewer, water, garbage pickup, other), real estate agent experiences in years, real estate agent property manager license, real estate agent broker license, real estate agent broker-salesperson license, building age, log living area square feet, log lot square feet, bedrooms, bathrooms, fireplaces, private pool, private spa, garage car spaces, unit level, building stories, heating fuel type, cooling fuel type, quality (low, fair, average, good, very good, excellent), 2-3 unit single family, condominium, age restriction, gated community, community amenities dummies (pool, spa, park, golf, basketball, clubhouse, gym, rules), high school, and middle school. The controls in column (4) exclude the log contract term since it is missing for non-leased listings. The sample consists of residential lease contracts arranged in Las Vegas from 2009 to 2019 in columns (1) - (3); the sample excludes observations for which the purchase price of the rental property is missing. The sample in column (4) consists of rental property listings that leased, expired, or withdrawn in Las Vegas from 2009 to 2019. Robust standard errors clustered by subdivision are in parentheses. The stars ***, **, * denote statistical significance at the 1, 5, and 10 percent level, respectively.

Tenant Screening Effort

The tenants that real estate agents find for landlords may be of a lower risk than the tenants real estate agents find for themselves. On the other hand, the real estate agents may exert more effort into screening tenants for their rental properties than those of other landlords. In either case, an ownership interest in the property may affect the quality of the tenant matched with the landlord, and in turn affect the rental price.

Table 8 Tenant Screening Effort

Dep. var.:	(1) ln(Deposit)	(2) ln(Rent)	(3) ln(Fees)	(4) ln(Rent)
Agent-Owned	0.010***	0.006***	-0.009	0.007***
	(0.002)	(0.001)	(0.005)	(0.001)
Agent-Related	0.000	0.011***	-0.003	0.011***
	(0.005)	(0.003)	(0.017)	(0.003)
ln(Deposit)		0.141***		
		(0.006)		
ln(Fees)				-0.000
				(0.000)
Observations	266,513	266,513	266,513	266,513
Adjusted R^2	0.769	0.943	0.930	0.937
Singletons	3,558	3,558	3,558	3,558
Controls	✓	✓	✓	✓
Year-Quarter FE	✓	✓	✓	✓
Subdivision FE	✓	✓	✓	✓
Agent FE	✓	✓	✓	✓

This table reports OLS estimates using the variable reported in each column heading as the dependent variable. "Agent-Owned" is a dummy variable that equals one when the owner holds a real estate license; it is zero otherwise. "Agent-Related" equals one when the owner is related to a real estate licensee; it is zero otherwise. Deposit includes all funds that the landlord requires from the tenant upon signing a lease agreement and refundable at the termination of the rental agreement. Fees include the per person application fee of a rental contract. Controls include commission, log contract term, occupancy, dishwasher, washer/dryer, cable available, tenant pays dummies (cable, gas, power, sewer, water, garbage pickup, other), real estate agent experiences in years, real estate agent property manager license, real estate agent broker license, real estate agent broker-salesperson license, building age, log living area square feet, log lot square feet, bedrooms, bathrooms, fireplaces, private pool, private spa, garage car spaces, unit level, building stories, heating fuel type, cooling fuel type, quality (low, fair, average, good, very good, excellent), 2-3 unit single family, condominium, age restriction, gated community, community amenities dummies (pool, spa, park, golf, basketball, clubhouse, gym, rules), high school, and middle school. The sample consists of residential lease contracts arranged in Las Vegas from 2009 to 2019. Robust standard errors clustered by subdivision are in parentheses. The stars ***, **, * denote statistical significance at the 1, 5, and 10 percent level, respectively

While the MLS data does not provide information on the performance of rental contracts, there is information about the amount of the (refundable) deposits and (non-refundable) fees that are part of the rental process. The deposits and fees proxy the default risk associated with different tenants. Deposits may include a security deposit that is often equivalent to one month's worth of rent, a pet deposit, a key deposit, a cleaning deposit, an administration deposit, and other ancillary deposits that the landlord may wish to collect. In principle, rental contracts with a large deposit may pose less risk than an identical

rental contract with a smaller deposit since the size of the deposit may discourage tenants from defaulting on rental payments because missing rent payments can result in a forfeit of the deposit to the landlord. Application fees function as a quality proxy too if application fees correlate with the costs associated with screening tenants (e.g., ordering credit reports or background checks). Therefore, a rental contract with higher application fees may have undergone a higher level of tenant screening than a rental contract with lower application fees.

The average deposit in the sample is about $1,760, which is 36% more than the average rent. In other words, for every dollar of monthly rent, the landlord on average holds on to $1.36 to discourage default and motivate the tenant to not mistreat the property. About 36% of the rental applications collected application fees; and when application fees were collected, the fees were $75 per adult applicant/tenant, on average.

Table 8 provide an analysis of tenant quality and rent. Column (1) sets the natural log of the deposits as the dependent variable. Column (2) includes the deposit as an additional control variable in the baseline log rent regression. The results indicate that landlords who hold a real estate license require tenants to pay a deposit that is about 1% more than what other landlords require. In other words, non-agent landlords at arm's length are slightly more likely to be exposed to rent default risk than landlords of agent-owned properties. However, controlling for deposits in the log rent regression, does not materially affect the baseline results. Column (3) examines the effect of *Agent-Owned* and *Agent-Related* on the natural log of the application fees, while column (4) sets the log of fees as a control in the baseline log rent regression. I do not observe any statistically significant differences across the fees of agent-owned, agent-related, and arm's-length rental properties. Fees also do not appear to affect the rent or the *Agent-Owned*/*Agent-Related* premiums.

Conclusion

This paper analyzes novel administrative data on rental properties in Las Vegas from 2009Q3 to 2019Q3 that allow for detailed observation of information on rental contracts, properties, neighborhoods, and real estate agents. Exploiting the within agent price variation of rental contracts, agent-owned properties are found to be leased at a premium of approximately 0.7% (about $9 per month), holding constant a battery of controls. Likewise, agent-related properties are found to be leased at a premium of approximately 1.1% (about $14 per month), holding all else constants. The results are robust to alternative specifications. Both effects are insignificantly different from each other and economically small when compare to similar effects in the ownership market. The disparities between agent-owned and arm's-length owned rental properties are significantly smaller when the landlord observes many competing rental listings on the market, when the listing agent is experienced, and the property is in the lower end of the lease rate distribution. The marginal disparities between agents and clients that could signal a potential principle-agency problem are low in the rental market when compared to the ownership market. Potential reasons could be due to incentive-compatible contracting success but also efficiencies that reduce the tenant search costs in the rental market.

Appendix

Table A.1 Controlling for Contract Term Non-linearly

Dep. var.: ln(Rent)	(1)
Agent-Owned	0.007***
	(0.001)
Agent-Related	0.011***
	(0.003)
Term Length (months): [1-3]	0.154***
	(0.009)
Term Length (months): [4-7)	0.055***
	(0.004)
Term Length (months): [7-12)	0.021***
	(0.003)
Term Length (months): 12+	-0.004***
	(0.001)
Observations	266,513
Adjusted R^2	0.937
Singletons	3,558
Controls	✓
Year-Quarter FE	✓
Subdivision FE	✓
Agent FE	✓

This table reports OLS estimates using the natural log of property's contract rent as the dependent variable. "Agent-Owned" is a dummy variable that equals one when the owner holds a real estate license; it is zero otherwise. "Agent-Related" equals one when the owner is related to a real estate licensee; it is zero otherwise. "Term Length" is the number of months of the rental contract; the 12 month term is set as the reference group. Controls include commission, occupancy, dishwasher, washer/dryer, cable available, tenant pays dummies (cable, gas, power, sewer, water, garbage pickup, other), real estate agent experiences in years, real estate agent property manager license, real estate agent broker license, real estate agent broker-salesperson license, building age, log living area square feet, log lot square feet, bedrooms, bathrooms, fireplaces, private pool, private spa, garage car spaces, unit level, building stories, heating fuel type, cooling fuel type, quality (low, fair, average, good, very good, excellent), 2-3 unit single family, condominium, age restriction, gated community, community amenities dummies (pool, spa, park, golf, basketball, clubhouse, gym, rules), high school, and middle school. The sample consists of residential lease contracts arranged in Las Vegas from 2009 to 2019. Robust standard errors clustered by subdivision are in parentheses. The stars ***, **, * denote statistical significance at the 1, 5, and 10 percent level, respectively

Table A.2 Property Type

	(1)	(2)
Subsample:	SFR	CONDO
Dep. var.:	ln(Rent)	ln(Rent)
Agent-Owned	0.006***	0.008***
	(0.001)	(0.002)
Agent-Related	0.006**	0.023***
	(0.003)	(0.006)
Observations	205,193	60,099
Adjusted R^2	0.927	0.943
Singletons	3,441	1,338
Controls	✓	✓
Year-Quarter FE	✓	✓
Subdivision FE	✓	✓
Agent FE	✓	✓

This table reports OLS estimates using the natural log of property's contract rent as the dependent variable. The sample consists of residential lease contracts arranged in Las Vegas from 2009 to 2019. Column (1) restricts the sample to single-family properties, while column (2) restricts the sample to condominium properties. "Agent-Owned" is a dummy variable that equals one when the owner holds a real estate license; it is zero otherwise. "Agent-Related" equals one when the owner is related to a real estate licensee; it is zero otherwise. Controls include commission, log contract term, occupancy, dishwasher, washer/dryer, cable available, tenant pays dummies (cable, gas, power, sewer, water, garbage pickup, other), real estate agent experiences in years, real estate agent property manager license, real estate agent broker license, real estate agent broker-salesperson license, building age, log living area square feet, log lot square feet, bedrooms, bathrooms, fireplaces, private pool, private spa, garage car spaces, unit level, building stories, heating fuel type, cooling fuel type, quality (low, fair, average, good, very good, excellent), 2-3 unit single family, condominium, age restriction, gated community, community amenities dummies (pool, spa, park, golf, basketball, clubhouse, gym, rules), high school, and middle school. Robust standard errors clustered by subdivision are in parentheses. The stars ***, **, * denote statistical significance at the 1, 5, and 10 percent level, respectively

Table A.3 Price per Square Foot

	(1)
Dep. var.:	Rent/sqft
Agent-Owned	0.101***
	(0.013)
Agent-Related	0.158***
	(0.036)
Observations	266,513
Adjusted R^2	0.849
Singletons	3,558
Controls	✓
Year-Quarter FE	✓
Subdivision FE	✓
Agent FE	✓

This table reports OLS estimates using the property's contract rent measured as the price per square foot of living area as the dependent variable. The price per square foot is winsorized at the 1 percent tails. "Agent-Owned" is a dummy variable that equals one when the owner holds a real estate license; it is zero otherwise. "Agent-Related" equals one when the owner is related to a real estate licensee; it is zero otherwise. Controls include commission, log contract term, occupancy, dishwasher, washer/dryer, cable available, tenant pays dummies (cable, gas, power, sewer, water, garbage pickup, other), real estate agent experiences in years, real estate agent property manager license, real estate agent broker license, real estate agent broker-salesperson license, building age, log lot square feet, bedrooms, bathrooms, fireplaces, private pool, private spa, garage car spaces, unit level, building stories, heating fuel type, cooling fuel type, quality (low, fair, average, good, very good, excellent), 2-3 unit single family, condominium, age restriction, gated community, community amenities dummies (pool, spa, park, golf, basketball, clubhouse, gym, rules), high school, and middle school. The sample consists of residential lease contracts arranged in Las Vegas from 2009 to 2019. Robust standard errors clustered by subdivision are in parentheses. The stars ***, **, * denote statistical significance at the 1, 5, and 10 percent level, respectively

Table A.4 Capital Expenditures

	(1)	(2)	(3)	(4)	(5)	(6)
Dep. Var.:	ln(Rent)	ln(Rent)	ln(Rent)	ln(Rent)	ln(Rent)	ln(Rent)
Subsample:	No CapExp	CapExp	All	All	Agent-Owned	Agent-Related
Agent-Owned	0.004***	0.010***	0.005***	0.007***		
	(0.001)	(0.002)	(0.001)	(0.001)		
Agent-Related	0.010***	0.011***	0.010***	0.010***		
	(0.004)	(0.004)	(0.003)	(0.003)		
CapExp			0.015***	0.015***	0.015***	0.014
			(0.001)	(0.001)	(0.002)	(0.009)
Agent-Owned × CapExp			0.005***			
			(0.002)			
Agent-Related× CapExp			0.001			
			(0.004)			
Observations	169,710	92,998	266,513	266,513	18,654	1,386
Adjusted R^2	0.938	0.938	0.937	0.937	0.948	0.963
Singletons	3,622	3,741	3,558	3,558	3,361	1,450
Controls	✓	✓	✓	✓	✓	✓
Year-Quarter FE	✓	✓	✓	✓	✓	✓
Subdivision FE	✓	✓	✓	✓	✓	✓
Agent FE	✓	✓	✓	✓	✓	✓

This table reports OLS estimates using the natural log of property's contract rent as the dependent variable. "Agent-Owned" is a dummy variable that equals one when the owner holds a real estate license; it is zero otherwise. "Agent-Related" equals one when the owner is related to a real estate licensee; it is zero otherwise. Controls include commission, log contract term, occupancy, dishwasher, washer/dryer, cable available, tenant pays dummies (cable, gas, power, sewer, water, garbage pickup, other), real estate agent experiences in years, real estate agent property manager license, real estate agent broker license, real estate agent broker-salesperson license, building age, log living area square feet, log lot square feet, bedrooms, bathrooms, fireplaces, private pool, private spa, garage car spaces, unit level, building stories, heating fuel type, cooling fuel type, quality (low, fair, average, good, very good, excellent), 2-3 unit single family, condominium, age restriction, gated community, community amenities dummies (pool, spa, park, golf, basketball, clubhouse, gym, rules), high school, and middle school. The full sample consists of residential lease contracts arranged in Las Vegas from 2009 to 2019. Column (1) excludes observations without capital expenditures, whereas column(2) restricts the samples to observations with capital expenditures. Columns (3) and (4) use the full sample. Columns (5) and (6) restrict the sample to agent-owned and agent-related properties, respectively. Robust standard errors clustered by subdivision are in parentheses. The stars ***, **, * denote statistical significance at the 1, 5, and 10 percent level, respectively

Table A.5 Propensity Score Probit Regression

Variables	(1)	Variables (Continued)	(2)
ln(Living Area Square Footage)	-0.003	Heating Fuel: Mixed	0.223***
	(0.020)		(0.056)
ln(Lot Square Footage)	0.001	Heating Fuel: Other	0.473***
	(0.003)		(0.094)
Age of Building	0.005***	Cooling Fuel: Gas	0.163***
	(0.000)		(0.027)
Beds Total	0.014**	Cooling Fuel: Other	0.782***
	(0.007)		(0.174)
Baths Total	-0.018**	Quality: Low	0.033***
	(0.009)		(0.011)
Fireplaces	0.023***	Quality: Average	0.026***
	(0.007)		(0.008)
Private Pool	0.010	Quality: Good	0.096***
	(0.016)		(0.022)
Private Spa	0.103***	Quality: Very Good	-0.015
	(0.018)		(0.028)
Garage Car Spaces	0.051***	Quality: Excellent	0.168
	(0.007)		(0.124)
2-3 Unit Single Family	0.088***	Age Restriction	0.179***
	(0.015)		(0.014)
Condominium	-0.012	Gated Community	-0.008
	(0.029)		(0.009)
Unit Level: Two	-0.010	Community Pool	-0.013
	(0.014)		(0.012)
Unit Level: Three	0.170***	Community Spa	0.006
	(0.059)		(0.012)
Unit Level: Unknown	0.046***	Community Park	0.152***
	(0.013)		(0.013)
Building Stories: One and a Half	0.023	Community Golf	-0.095***
	(0.043)		(0.020)
Building Stories: Two	-0.029*	Community Basketball	0.104***
	(0.015)		(0.020)
Building Stories: Three	-0.229***	Community Clubhouse	0.054***
	(0.038)		(0.012)
Building Stories: Unknown	-0.064	Community Gym	-0.002
	(0.126)		(0.013)
Heating Fuel: Electric	0.053***	Community Rules	-0.108***
	(0.012)		(0.008)

This table reports Probit coefficient estimates using "1[Treatment]" as the dependent variable. "1[Treatment]" equals one when the owner holds a real estate license or is personally affiliated with a real estate licensee; it is zero otherwise. The Probit regression uses 270,071 observations and includes year-quarter fixed effects. The sample consists of residential lease contracts arranged in Las Vegas from 2009 to 2019. Standard errors are in parentheses. The stars ***, **, * denote statistical significance at the 1, 5, and 10 percent level, respectively

Table A.6 Post Matching Summary Statistics

Variables	Treatment	Control	Difference	t-stat	d-stat
Living Area Square Footage	1691.82	1702.48	-10.66	-1.5	-0.01
Lot Square Footage	4150.49	4108.92	41.58	1.2	0.01
Building Age	17.57	17.3	0.27	2.4	0.02
Bedrooms	2.94	2.95	-0.01	-1.3	-0.01
Bathrooms	2.48	2.49	-0.02	-2.1	-0.02
Fireplaces	0.48	0.48	-0.01	-1.3	-0.01
Private Pool	0.1	0.1	0	0.5	0.00
Private Spa	0.07	0.07	0	0.6	0.01
Garage Car Spaces	1.61	1.62	-0.01	-1.2	-0.01
Unit Level: One	0.51	0.5	0.01	1.7	0.02
Unit Level: Two	0.35	0.36	-0.01	-2.3	-0.02
Unit Level: Three	0.01	0.01	0	-1.3	-0.01
Unit Level: Unknown	0.13	0.13	0	1.0	0.01
Building Stories: One	0.52	0.51	0.01	2.1	0.02
Building Stories: One and a Half	0.01	0.01	0	1.6	0.02
Building Stories: Two	0.46	0.47	-0.01	-2.3	-0.02
Building Stories: Three	0.02	0.02	0	-0.3	0.00
Building Stories: Unknown	0	0	0	-0.2	0.00
Heating Fuel: Electric	0.13	0.12	0.01	2.6	0.03
Heating Fuel: Gas	0.87	0.88	-0.01	-2.9	-0.03
Heating Fuel: Mixed	0	0	0	1.1	0.01
Heating Fuel: Other	0	0	0	1.3	0.01
Cooling Fuel: Electric	0.98	0.98	0	-0.8	-0.01
Cooling Fuel: Gas	0.02	0.02	0	0.9	0.01
Cooling Fuel: Other	0	0	0	-0.1	0.00
Quality: Low	0.16	0.16	0.01	1.7	0.02
Quality: Fair	0.46	0.47	-0.01	-1.4	-0.01
Quality: Average	0.33	0.33	0	-0.6	-0.01
Quality: Good	0.03	0.03	0	1.8	0.02
Quality: Very Good	0.02	0.02	0	0.3	0.00
Quality: Excellent	0	0	0	0.7	0.01
2-3 Unit Single Family	0.1	0.1	0	1.3	0.01
Condominium	0.21	0.22	0	-0.7	-0.01
Age Restriction	0.07	0.06	0.01	3.4	0.03
Gated Community	0.31	0.31	-0.01	-1.7	-0.02
Community Pool	0.35	0.35	0	0.5	0.00
Community Spa	0.19	0.18	0	0.8	0.01
Community Park	0.08	0.08	0	0.8	0.01
Community Golf	0.04	0.04	0	1.7	0.02
Community Basketball	0.03	0.03	0	0.9	0.01
Community Clubhouse	0.17	0.16	0	1.1	0.01
Community Gym	0.13	0.13	0.01	1.8	0.02

Table A.6 (continued)

Variables	Treatment	Control	Difference	t-stat	d-stat
Community Rules (HOA)	0.7	0.72	-0.02	-4.9	-0.05
Observations	22,640	20,000			

This table compares the mean differences in structural and neighborhood characteristics between properties in the Treatment and Control groups after propensity score matching. The Treatment group includes rental properties whose owner holds a real estate license or is personally affiliated to a real estate licensee. The Control group includes matched rental properties whose owner does not hold a real estate license and is not personally affiliated to a real estate licensee. The far right columns provide t-statistics and Cohen's d-statistics for the corresponding mean differences

Declarations

Conflicts of interest None.

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