The Economic Consequences of Insecure Property Rights*

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Abstract

Secure property rights are essential for efficient resource allocation and investment, yet their economic effects in affluent urban settings remain understudied. This paper examines a natural experiment in Jerusalem, where 99-year leases on church-owned land in some of the city's most expensive neighborhoods are approaching expiration. The looming lease terminations create substantial legal ambiguity: while some contracts allow for potential extension, the terms are vague, and recent government statements suggest possible intervention via eminent domain or regulatory imposition on private investors who recently acquired the land. Using a comprehensive dataset of all real estate transactions in Jerusalem from 2004 to 2024, we compare the price and transaction likelihood of properties with secure and insecure property rights within the same neighborhood blocks, controlling for location and time effects. We find that insecure property rights reduce transaction likelihood by about 20 percent and depress transaction prices by 10 to 15 percent on average, with larger effects as lease expiration draws nearer. We then use a simple present-value framework to interpret these price discounts and estimate that market participants assign a substantial but far from certain probability to the loss of rights at lease expiration. The results show that insecure property rights can impose large economic costs even in wealthy, developed housing markets.

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1. Introduction

The importance of well-defined and secure property rights for the efficient allocation of resources is well established in law and economics (Coase 1960, Demsetz 1967). Secure property rights encourage investment, improve market efficiency, and promote economic growth (North 1981; Engerman and Sokoloff 2003 ; Acemoglu and Johnson 2005; Acemoglu, Johnson and Robinson 2005). Conversely, insecure property rights can deter investment and limit market transactions.

Much of the empirical attention has been focused on investigating how, in developing economies, land rights affect economic development, particularly for the poor (De Soto 2000). Thus, Brasselle, Gaspart and Platteau (2002) focus on Burkina Faso; Besley (1995) focuses on Ghana; Field (2007) focuses on Peru; Jacoby, Li and Rozelle (2002) focus on rural China; Lanjouw and Levy (2002) focus on Ecuador; Galiani and Schargrodsky (2010) focus on poor people in Argentina; and Goldstein and Udry (2008) focus on Ghana. Others have focused on the importance of land rights for development historically (Alston, Libecap and Mueller 1998; Hornbeck 2010). The effect of insecure property rights on well-off individuals in modern developed economies remains a question that received relatively little empirical attention. One reason is that most modern developed economies have legal systems that provide secure property rights, particularly in areas where well-off individuals reside. This paper aims to fill this gap by examining the economic consequences of insecure property rights using a natural experiment in the most expensive neighborhoods of Jerusalem.

To investigate the effect of insecure property rights on prices and market activity, we leverage a unique setting in Jerusalem. In some of the city's most expensive neighborhoods, land was leased from various churches (primarily the Greek Orthodox Church) to state and private developers under 99-year contracts. Hundreds of families live in apartments on such land. As these leases approach expiration, substantial legal and political uncertainty has emerged regarding the future of these properties. While some contracts contain provisions for potential extension, their terms are vague and leave considerable discretion over both duration and pricing. At the same time, recent land sales to private investors and ongoing legislative initiatives have introduced additional uncertainty, as outcomes may depend on government intervention, including possible eminent domain or mandated lease extensions. As a result, homeowners face considerable uncertainty about what will happen when leases expire, creating a setting of fundamentally insecure property rights.

Jerusalem provides an ideal setting for investigating the consequences of insecure property

rights among well-off individuals in high-income urban areas. Israel had a GDP per capita of $52,261 in 2023, placing it among advanced economies. Within Israel, Jerusalem's central neighborhoods rank among the most expensive housing markets globally: a recent analysis of over 800,000 property listings across 73 capital cities finds that Jerusalem has the fifth highest median house price (NetCredit 2024). This makes it a particularly relevant setting for studying how property-rights insecurity affects behavior in affluent markets. Consistent with this, properties in our sample are highly valuable: the average transaction price is approximately $8,400 per square meter (about $780 per square foot) for properties with insecure rights and $9,600 per square meter (about $890 per square foot) for nearby properties with secure ownership—levels far above typical U.S. housing markets, where median listing prices are on the order of $200–$250 per square foot (Federal Reserve Bank of St. Louis 2026).

We develop a model that captures two central features of insecure property rights: sellers' risk aversion and divergent beliefs between buyers and sellers regarding the probability of property loss. The model shows that greater property-rights insecurity depresses equilibrium prices, as buyers discount for the risk of losing the property. However, the effect of greater property-rights insecurity on transaction volume depends on the relative strength of these two forces. When risk aversion prevails, greater property-rights insecurity can increase transaction volume, as more risk-averse sellers are induced to exit the market. Conversely, when belief divergence is more pronounced, greater property-rights insecurity suppresses transactions, as optimistic sellers are unwilling to accept the lower prices offered by more pessimistic buyers.

We bring this framework to the data using a comprehensive dataset of all residential real estate transactions in Jerusalem between 2004 and 2024. A key feature of our empirical setting is the coexistence, within narrowly defined geographic areas, of properties with secure ownership rights and properties subject to long-term church leases that are approaching expiration. We identify parcels located on such leased land using original lease contracts and supplementary information from experienced real estate professionals, and define nearby freehold parcels as a control group. This allows us to compare outcomes across properties that are physically close, often within the same block, and similar in observable characteristics, but differ sharply in the security of property rights.

Our empirical analysis focuses on two margins of housing market activity: transaction likelihood and transaction prices. To study market liquidity, we construct a parcel-level panel

and estimate how property-rights insecurity affects the annual probability of transaction, controlling for location and time fixed effects. To study pricing, we estimate hedonic regressions of price per square meter on an indicator for insecure property rights, controlling for detailed property characteristics as well as location and year effects. In both cases, we exploit variation in the time remaining until lease expiration, which allows us to examine how the effects of insecurity evolve as the horizon shortens and uncertainty becomes more salient.

We find that insecure property rights have economically large effects on both market activity and prices. Properties subject to insecure rights are significantly less likely to transact, with transaction probabilities approximately 20 percent lower than comparable properties with secure rights. At the same time, these properties sell at substantial discounts, on the order of 10 to 15 percent on average, with larger discounts for properties closer to lease expiration. These patterns are consistent with a setting in which belief divergence between buyers and sellers dominates seller risk aversion, leading to both lower prices and reduced market liquidity.

Finally, we use a simple present-value framework to interpret the observed price discounts and to quantify the degree of legal uncertainty perceived by market participants. If homeowners were expected to lose their properties with certainty upon lease expiration, standard discount rates would predict substantially larger price gaps than those observed in the data. Instead, the empirical price ratios are consistent with market participants assigning a substantial but incomplete probability to the loss of property rights. Our estimates suggest that this probability is on the order of 30 to 50 percent and has increased over time, particularly following heightened media attention and political developments related to the sale of church lands to private investors.

This paper relates to a growing literature that uses variation in property rights and lease durations to study asset pricing in housing markets. Most closely related is Giglio, Maggiori and Stroebel (2015), who exploit differences between leasehold and freehold properties in the United Kingdom and Singapore to infer how markets value very long-run cash flows. They show that leasehold properties trade at systematic discounts relative to otherwise comparable freeholds, which they use to estimate a relatively low long-run discount rates. Similarly, Bracke, Pinchbeck and Wyatt (2018) study variation in lease length in the United Kingdom and show that discount rates decline with maturity. Gautier and Van Vuuren (2019) use data on long term leases in Amsterdam to estimate the effect of future land-

lease payments on home prices. More recently, Bäcker-Peral, Hazell and Mian (2026) exploit quasi-experimental variation from lease extensions in the United Kingdom to estimate the expected long-term housing yield.

A key feature of these papers is that the institutional environment is well-defined: leasehold contracts specify both duration and the consequences of expiration, typically involving the reversion of ownership to the freeholder. This clarity allows observed price differences to be interpreted primarily as reflecting the present value of future cash flows. Our setting differs in an important respect. While we also exploit variation related to leasehold structures, the central feature of our context is not only finite duration but also uncertainty regarding what happens at the end of the lease. In our setting, the legal and political outcomes at lease expiration are ambiguous, introducing uncertainty over future ownership rights. This allows us to isolate the effects of insecure property rights—rather than merely contract length—on prices and market activity.

The remainder of the paper is organized as follows. In Section 2 we provide necessary background needed to understand the legal uncertainty around properties located on church-owned land. In section 3 we present a simple model that guides the interpretation of the empirical results. Sections 4 and 5 describe the data and the research design. In Section 6 we discuss the details of the estimation. Section 7 presents the empirical findings and in Section 8 we quantify the legal uncertainty.

2. Institutional Background

Much of the land in central Jerusalem, particularly in neighborhoods like Rehavia, Talbiya, and the area around the Knesset, has historically been owned by Christian churches, especially the Greek Orthodox Church, which remains the largest private real estate owner in Israel. Portions of this land were leased directly to private developers, but the majority was leased to the Keren Kayemeth LeIsrael-Jewish National Fund (KKL-JNF), a government-controlled entity. The KKL-JNF then subleased the land to developers and homeowners through the Israel Lands Administration (ILA). Some of these leases, typically for 99 years, were signed in the 1930s under British rule, but most were executed after Israel's founding, in the 1950s, 1960s, and 1970s. As these leases near expiration in the coming decades, hundreds of families living in Jerusalem's most expensive neighborhoods are facing uncertainty regarding the property rights in their homes. Importantly, when these homes were purchased

many years ago, "the homeowners then assumed their subleases from KKL would be automatically renewed, and that their homes were essentially owned." They therefore "believed [this] was a de facto home purchase" (Surkes, 2018).

The uncertainty is both legal and political. The legal framework surrounding these leases is ambiguous. Some leases contain options for renewal, but the terms and conditions for such extensions are unclear. For example, one of the main JNF-KKL leases with the Greek Orthodox Church notes that if the 99-year period ends, and no agreement for extension of the leased is reached, a person will be appointed by the President of the Supreme Court of Israel, and that person will decide on the rent and the duration of an extended lease.[1] It is unclear what such a person will decide. It is nevertheless clear that if the lease expires and the land is returned from the leaseholders to the freeholders, no payment has to be made by the freeholders for the buildings that were constructed on the land by the leaseholders.[2]

In addition to the legal uncertainty, political factors play a role. Since much of the land was leased through the government-controlled KKL-JNF, there is a widespread belief that the government will intervene to protect homeowners. As noted by (Steinberg, 2004): "There are two different kinds of leases. In one, homeowners lease the land directly from the Greek Orthodox Church. In the other, more common, homeowners sub-lease the land through the Israel Lands Administration (ILA), which has in turn leased it from the Church. The difference between the two is crucial. The general belief among most real estate experts is that the Church will renew its leases with the government. The cost of leasing, based on market value, is likely to rise dramatically, but the ILA protects the Israeli owner, and the government will almost definitely take responsibility for leases in which the Administration is involved. Land leased directly from the Church may be more problematic, says Alan Deco, a Jerusalem real estate broker who co-owns Capital Property Consultants. With many of the leases due to expire in 48 years, no one is quite sure what will happen come 2052. Whatever the Church decides, it seems unlikely that any Israeli homeowner will be thrown out on the street. Deco explains that the government could enact a law allowing those on Church-owned land to buy the freeholds of their property for a symbolic or substantially discounted

[1]The contract notes the following: "KKL shall be entitled to extend the period of the Lease by such further period and at such rent as will be agreed upon by the parties hereto but otherwise subject to all the terms and conditions of these presents, and failing such agreement the period of extension and the amount of the rent shall be fixed by a person to be nominated by the parties hereto, or failing agreement by the parties here to as to such person, by a person to be appointed by the President of the Supreme Court of Israel at his discretion, and the rent and period fixed by any such person shall be final and binding on the parties hereto."

[2]The main contract with Greek Orthodox Church notes that "No compensation whatsoever should be paid by the Patriarchate for any building or other structures then existing on the said immovable property."

sum. Another possibility is that the ILA will negotiate extensions to all the leases." Again, what will actually happen politically when the 99-year period ends is not totally clear. For example, just recently a bill has been introduced in the Knesset aimed at protecting residents living in these properties. The bill, which lists 41 sponsors from both the government and opposition, requires the leaseholder to extend the lease contract under the same terms as the current one, caps leasing fees at 5.5 percent of the value of the unimproved land, and ensures that lease extensions do not carry development levies as a land sale would. Identical legislation was put forward in 2022, but failed to move forward after former the government declined to back the measure (Surkes, 2024).

Although the leased lands were originally owned by churches, primarily the Greek Orthodox Church, recently these lands were sold to investors. In 2013 and 2016 the Greek Orthodox Church sold much of its holdings of leased lands in Jerusalem to investors. In 2023 the largest part of the land was resold for $216 million to Extell, a company controlled by the American real estate businessman Gary Barnett (Nagler, 2023), who is known as "The Man Behind Billionaires' Row" on Manhattan's 57th street (Clarke and Taylor, 2019). These sales further complicate the situation for homeowners, as private investors may have different intentions regarding lease extensions or land use, raising concerns about potential redevelopment or increased costs. Interestingly, though the lands are no longer owned by churches, in 2018, when a Knesset committee considered a bill that would allow the state to expropriate lands sold by churches to those private investors, Christian leaders closed the Church of the Holy Sepulchre, which drew worldwide attention and resulted in the suspension of the bill (Lieber and Jones, 2018). This sensitivity adds to the uncertainty surrounding those lands.

3. Theory: The Effect of insecure property rights

In this section, we develop a simple model that incorporates two realistic features of markets with insecure property rights: (1) seller risk aversion, and (2) divergent beliefs between buyers and sellers regarding the probability of property loss. The model shows that greater property-rights insecurity depresses prices and that its effect on transaction volume depends on the relative importance of these two forces.

3.1. Model Setup

Consider a market with buyers and sellers. Sellers' risk preference is modeled by the parameter $\alpha \geq 0$, where $\alpha = 0$ corresponds to risk neutrality and higher values indicate greater risk aversion. Seller's property value, v, is distributed uniformly on the interval $[0, 1]$. This reflects the personal value that each sellers assigns to the property.

For simplicity assume that buyers are risk neutral, and that they all value the property at $v' \in (0, 1)$. This would be the case if there are many well diversified investors who are willing to purchase the property for investment purposes. In Appendix A we extend the model and consider heterogeneous buyers, with different valuations of the property, who are also risk averse, and show that the comparative statics we present in this simple model hold in such a setting.

The property, which is owned by sellers, has a value v to sellers if nothing happens, but with probability p it is taken away. The parameter p therefore reflects the insecurity of property rights. A higher p reflects greater insecurity.

For simplicity, assume that the seller's certainty equivalent utility from the property is given by

$$u_s = (1 - p)v - \alpha\, p\, v,$$

where the risk aversion "penalizes" the property's value by an amount proportional to the probability p. Intuitively, a greater risk aversion (a higher α), and a greater probability of losing the property (a higher p), lead to a lower certainty equivalent utility from the property.

Buyers can be more pessimistic than sellers and believe that there is a higher probability that the property will be taken away. This gaps in beliefs could explain why the buyers own the property in the first place, since in markets with heterogeneous beliefs ownership is concentrated among investors with the most optimistic assessments of future payoffs (Harrison and Kreps 1978). This gap in beliefs could also be driven by sellers' endowment effect (Kahneman, Knetsch and Thaler 1990). Formally, from the buyers' perspective, the probability of losing the property is $p_b = (1 + g)\, p$, with $g \geq 0$. Thus, the parameter g reflects the gap between buyers and sellers in their beliefs about the likelihood of losing the property.

It is worth clarifying the difference between risk aversion, captured by α, and the gap in beliefs about the likelihood of losing the property, captured by g. Risk aversion reflects the disutility from bearing a given lottery: more risk-averse individuals experience a larger

utility loss from exposure to the same probabilistic outcome. In contrast, the belief gap reflects disagreement about the probability distribution itself—that is, about what the lottery actually is. Two individuals with identical levels of risk aversion may nevertheless hold different beliefs about the likelihood of property loss, leading them to evaluate the same asset differently.

3.2. Equilibrium

Buyer are willing to buy properties at their expected value. Thus, equilibrium price is set at buyer's expected value of the property:

$$P^* = [1 - p(1+g)]v' \tag{1}$$

A seller will choose to sell if the utility from holding on to the property is lower than the market price. Formally, a seller sells if

$$(1-p)v - \alpha\, p\, v < P^* = [1 - p(1+g)]v'.$$

This inequality simplifies to:

$$v < \frac{1-(1+g)p}{1-(1+\alpha)p}v' \equiv \bar{v}$$

Thus, sellers who assign a relatively low personal valuation to the property, that is those for whom $v < \bar{v}$, sell the property. Those who assign a relatively high personal valuation to the property, that is those for whom $v > \bar{v}$, do not sell the property.

Since v is uniformly distributed on $[0, 1]$, the fraction of sellers willing to sell is given by:

$$Q^* = \frac{1-(1+g)p}{1-(1+\alpha)p}v' \tag{2}$$

This is also the number of transaction (or trading fraction) in the market.

3.3. Comparative Statics

Let us begin by analyzing at the effect of property-rights insecurity on equilibrium price. Looking at Expression 1, one can see that as property-rights insecurity increases, that is as p increases, the equilibrium price of properties P^* goes down. This is because the risk neutral buyers, who are setting the price, assign a lower value to the property given this increased risk of losing the property.

Now, let us analyze at the effect of property-rights insecurity on the number of transactions. Looking at Expression 2, we can derive the effect of greater property-rights insecurity, that is an increased p, on the number of transactions Q^*:

$$\frac{\partial Q^*}{\partial p} = \frac{\alpha - g}{[1 - (1 + \alpha)p]^2} v' \tag{3}$$

Looking at Expression 3, one can see that when $\alpha > g$, the expression is positive, which means that greater property-rights insecurity increases the number of transactions. When $\alpha < g$ the expression is negative, which means that greater property-rights insecurity reduces the number of transactions. This can be summarized in the following proposition.

Proposition 1. *The insecurity of property rights results in lower equilibrium prices. The effect of property-rights insecurity on transaction volume depends on the relative strength of seller risk aversion and belief divergence. When risk aversion dominates ($\alpha > g$), property-rights insecurity increases the number of transaction, as risk-averse sellers sell to exit the market, thereby boosting market turnover. When belief divergence dominates ($\alpha < g$), property-rights insecurity reduces the number of transaction, due to a mismatch in valuation between buyers and sellers.*

4. Data

To distinguish between parcles of land with insecure property rights and those with secure property rights, we first identified which homes are located on long-term leaseholds – commonly referred to as *church land* – and which are located on freeholds. Our primary source was the set of lease contracts we were able to obtain from the relevant parties. These contracts allow us to pinpoint, at the parcel level, whether the homes are held under a long lease and, if so, the exact year of lease termination. In the few cases where contracts were not fully accessible, we supplemented the data by consulting experienced Jerusalem realtors,

who have become adept at identifying church land due to growing buyer awareness of the issue. While this approach ensures comprehensive coverage, we acknowledge that realtor classification may introduce some measurement error. Such misclassification would likely attenuate the estimated treatment effects toward zero, rendering our results conservative.

In Israel, land is registered at the block-parcel level. Within a given block, parcels can be either fully owned or subject to long leases. This institutional structure generates a unique empirical setting: in some blocks, physically adjacent homes -— built at the same time and otherwise nearly identical – differ only in whether they rest on secure or insecure property rights. Figures 1 and 2 illustrate this contrast, which motivates our within-block research design.

We define the treatment group as all parcels with insecure property rights (church land), and the control group as nearby parcels with secure property rights located within 500 meters of a treated parcel. This ensures geographic comparability and reduces concerns about unobserved location heterogeneity. Later robustness checks vary the control group radius, and results remain stable.

For outcome data, we obtained transaction records from the Israeli Tax Authority covering all residential real estate sales in Jerusalem between 2004 and 2024. Each record includes the parcel and block identifiers, transaction date, sale price, property size (square meters), number of rooms, floor level, and whether the transaction involved multiple buyers. We merged these data with municipality records on the number of apartments per parcel and neighborhood boundaries. For parcels under lease, we also have data on the year of lease termination, allowing us to examine heterogeneity by remaining lease duration.

Our final dataset therefore combines: (i) a treatment–control definition at the parcel level, (ii) rich transaction-level detail, and (iii) variation in lease termination timing. Descriptive statistics are presented in Table 1. These show that treatment parcels transact at substantially lower average prices per square meter than comparable control parcels, despite being newer on average and having more rooms. This suggests that price differentials might not be driven by observable housing quality differences, but rather by the insecurity of property rights.

5. Research Design

Our empirical strategy evaluates the impact of property-rights insecurity on two key margins of housing market activity: (i) the likelihood that a transaction occurs (the extensive margin), and (ii) the price per square meter conditional on a transaction (the intensive margin).

We define the treatment group as parcels subject to long-term church leases and the control group as freehold parcels with secure ownership rights located within 500 meters of a treated parcel. This proximity-based definition ensures geographic comparability, as parcels with secure and insecure property rights are often located within the same blocks and were developed in the same periods. The designation of parcels as leased or owned reflects historical contracting decisions made by churches and state agencies decades earlier, not contemporary economic conditions, which supports the plausibility of treating ownership status as exogenous.

To address concerns about unobserved neighborhood-level heterogeneity, we include location fixed effects (at the block or neighborhood level) and year fixed effects. The location fixed effects account for time-invariant local characteristics such as architectural style, proximity to amenities, or neighborhood prestige, while the year effects capture common shocks to the Jerusalem housing market (such as changes in interest rates or macroeconomic conditions). This design ensures that comparisons are made within narrowly defined spatial units and across the same time periods.

A potential concern is that uncertainty may spill over into nearby markets: for example, buyers might generalize risk perceptions from insecure parcels to secure parcels in the same block. Such spillovers, if present, would attenuate the estimated treatment effects toward zero, rendering our estimates conservative.

Beyond the binary classification of secure and insecure property rights, our design leverages variation in the time remaining until lease contract termination. Because contracts expire at different dates, the level of property-rights insecurity varies across parcels and becomes more salient as expiration approaches. We exploit this variation to estimate heterogeneous effects by remaining lease duration. This feature allows us to capture anticipatory behavior: market participants may discount properties well before expiration, reflecting forward-looking assessments of risk.

In sum, by comparing transaction likelihood and prices across parcels with secure and insecure property rights within narrowly defined neighborhoods, while exploiting variation in

lease expiration horizons, our design isolates the causal impact of insecure property rights on market outcomes.

6. Estimation

6.1. Likelihood of Transaction

we estimate the impact of property rights insecurity on the likelihood of transaction using the following baseline specification:

$$Prob.\ Transaction_{it} = \alpha_i + \gamma_t + \beta \cdot Insecure\ Property\ Rights_i + \epsilon_{it} \tag{4}$$

where an observation is parcel land i on year t. The dependent variable is the ratio of the number of transactions in properties located in parcel i during year t and the total number of properties in that parcel. The main variable of interest, insecure property rights, takes the value 1 for land parcels under lease contracts, and 0 otherwise. We include location (α_i) and year (γ_t) fixed effects to control for other factors that could influence the likelihood of transaction. Year fixed effects capture temporal changes affecting the residential real estate market equilibrium (e.g., interest rate or the state of the economy). The locations considered are block or neighborhood, both encompassing parcels of land. Location fixed effects control for time-invariant local conditions, such as the character of the neighborhood, proximity to commercial areas or to notable landmarks like the residences of the prime minister or president. The main parameter of interest is β, which represent the effect of insecure property rights on the likelihood of transaction. Our identification strategy relies on the assumption that after accounting for time-invariant local conditions and location-invariant temporal effects, any systematic differences in the likelihood of transaction between parcels with secure and insecure property rights can be attributed to property rights insecurity.

Since lease contracts terminate at different times, the degree of property rights insecurity varies across parcels and overtime. We exploit this variability to estimate heterogeneous effects of property rights insecurity. Specifically, we focus on parcels with active lease contracts and estimate how transaction likelihood changes with the time remaining until lease contract termination. We extend equation (4) by replacing the insecure property rights variable with a set of dummy variables each indicating whether the lease contract terminates in less than 20 years, 20-29 years, 30-39 years, and 40-49 years.

6.2. Transaction Price

To analyze how property rights insecurity affects transaction prices, we use transaction-level data and estimate the following hedonic pricing specification:

$$log(Price\,per\,Sq.\,Meter)_i = \alpha_l + \gamma_t + \delta \cdot Property\,Char._i + \beta \cdot Insecure\,Property\,Rights_i + \epsilon_i \tag{5}$$

where the dependent variable is the logarithm of the price per square meter for transaction i. The fixed effects (α_l) and (γ_t) are defined as in equation (4). The vector Property Char. includes characteristics such as the number of rooms, an indicator for a new apartment and a second-degree polynomial for the age of the property at the time of transaction. As in the likelihood of transaction analysis, we account for differential effects of property rights insecurity by allowing the its effect to vary with the time remaining until lease contract termination.

7. Results

7.1. Likelihood of Transaction

Figure 3 plots the yearly probability of transaction for land parcels with secure and insecure property rights. While both series fluctuate with market-wide conditions such as interest rates, parcels with insecure rights generally display a lower transaction probability. The gap between the two groups widens over time, indicating growing market sensitivity to property rights insecurity in the later years of the sample.

Table 2 confirms this pattern in a regression framework. After controlling for year and location fixed effects, parcels with insecure rights exhibit transaction probabilities that are 0.9-1.2 percentage points lower. To put these magnitudes in perspective, the baseline transaction probability for secure parcels is about 5 percent (Table 1, Panel B). Thus, the estimates imply a reduction of roughly 19-25%. That insecure property rights lead to fewer transaction indicates that property rights insecurity has efficiency costs, as it results in misallocation of resources.

Figure 4 and Table 3 explore heterogeneity by remaining lease duration. The graphical ev-

idence shows that transaction probability rises as the termination date recedes further into the future. The regression estimates reinforce this finding: relative to secure parcels, transaction probabilities are 1.4 percentage points lower for parcels with 35–43 years remaining and about 1 percentage point lower for those with 10–34 years remaining (though the latter effect is statistically imprecise). Even parcels with 44+ years to termination display a negative, though statistically insignificant, effect.

Taken together, Figure 3, Figure 4, and Tables 2–3 demonstrate that insecure property rights significantly depresses housing market liquidity. Importantly, the effect materializes well before lease expiration approaches and becomes more pronounced as the termination date draws nearer.

7.2. Transaction Price

Figure 5 shows the evolution of average transaction prices per square meter for secure and insecure parcels. While prices track each other closely until around 2013, a widening gap emerges thereafter, consistent with increased awareness of church land sales and the associated property rights insecuritytainty.

Table 4 translates these descriptive differences into regression estimates. Column (1) suggests that properties with insecure property rights sell at a discount of about 9 percent relative to those with secure property rights. Adding controls for apartment characteristics, year, and location fixed effects increases the estimated discount to more than 14 percent (Column (5)). This pattern indicates that raw comparisons understate the true effect, as properties with insecure property rights tend to be newer and larger—characteristics that are typically associated with higher prices.

To examine how the time until lease contract termination affects property prices, Figure 6 presents average prices per square meter, grouped into four-year bins for properties with either secure or insecure rights. Properties with insecure rights are further divided into terciles based on the remaining years until lease contract termination. The figure shows that insecure properties in the top tercile – those with more than 51 years remaining – are priced similarly to secure properties. However, as the termination date approaches, average prices decline.

Table 5 formalizes this analysis in a regression framework, yielding results consistent with the

graphical evidence. After controlling for confounders, properties with more than 51 years until termination sell at prices only about 3 percent below those of secure properties. In contrast, properties with 41–51 years remaining transact at discounts of roughly 10 percent, while those with 11–40 years remaining sell at prices that are about 30 percent lower. These effects are both economically meaningful and statistically significant, indicating that the market begins discounting properties with insecure rights well before expiration, and that the discount deepens sharply as the lease horizon shortens.

In sum, Figures 5–6 and Tables 4–5 show that the insecurity of property rights not only reduces housing market liquidity but also depresses prices, with effects that grow stronger as the contract horizon shortens.

8. Quantifying Legal Uncertainty

We argue in Section 2 that property rights in homes built on church land are insecure because of the legal and political uncertainty. In particular, it is not clear what will happen when the leases expire. Will homeowners lose their homes, or will they get to keep them because of some options in the lease contract or some political intervention? In this section we attempt to provide direct evidence of this legal uncertainty, and to quantify it.

The price discount for homes built on church land documented above reflects the degree to which market participants discount properties with insecure property rights. We now investigate whether the observed price gaps are consistent with market participants believing that homeowners will lose their homes with certainty upon lease expiration, or whether the data suggest a more moderate assessment of homeowners' risk of losing their home.

To address this question, we develop a simple present value framework. In this framework the value of home ownership is the present value of the future stream of rent. Accordingly, the value of ownership depends on three factors: (1) The number of years the home owner can enjoy the home; (2) the real growth in rent over time (g); (3) the discount rate of future streams (r).

When an individual has full ownership of his home (freehold), the property's value at time t equals the present value of the rental stream from year t to infinity: $V_t^{\text{freehold}} = PV(\text{rents from } t \to \infty)$. Now, consider a property whose lease contract expires in year T, at which point the homeowner loses all rights to the property. This means that the

property's value at time t equals the present value of the rental stream between t and T: $V_t^{\text{leasehold}} = PV(\text{rents from } t \to T)$. The ratio between the price of the latter property (leasehold) and the former property property (freehold) is therefore:

$$\text{Price Ratio}(r, g, t) = \frac{V_t^{\text{leasehold}}}{V_t^{\text{freehold}}} = 1 - \left(\frac{1+g}{1+r}\right)^{T-t} \tag{6}$$

which is a function of the discount rate r, the expected rate of rent growth g, and the time remaining until lease expiration $(T - t)$. Note that this ratio is smaller than 1, since a leasehold property is worth strictly less than a freehold one. As you move closer to lease expiration (as t increases) there are fewer remaining rents for the leasehold, so price ratio falls.

To parameterize the expected rent growth rate g, we use data from the Israeli Central Bureau of Statistics (CBS) on Jerusalem rents over the 2005–2024 period, yielding an estimate of $\hat{g} = 2.13\%$.[3] Our estimate of annual rent growth may seem high, since Giglio, Maggiori and Stroebel (2015) estimate long-run real rent growth of approximately 0.62% for the United Kingdom as a whole. However, evidence from large high-demand urban housing markets, like Jerusalem, suggests that rent growth can be substantially higher in such markets. Amaral et al. (2024) report that, between 1950 and 2018, real rents grew on average by 1.86% across 27 major agglomerations, well above the national average in their sample.

We focus on properties located in the Rehavia, Talbiya, and Nayot neighborhoods whose lease contracts expire in 2051, the modal expiration year in our sample. We estimate yearly treatment effects for church land properties relative to their neighboring control properties, derive the corresponding yearly price ratios, and treat this series as our empirical target. Given $\hat{g}$, we then estimate the discount rate r that makes the present value framework best fit the observed price gap sequence.

Figure 8 plots the yearly empirical price ratios. Moreover, using Equation 6 we plot the theoretical price gap curves under four candidate gross discount rates (r = 3%, 5%, 7%, 9%). We find that the gross discount rate that minimizes the distance between the predicted and observed price gaps is $\hat{r} = 5.84\%$ (s.e. = 0.196%). This estimate is substantially higher

[3]Rent growth is estimated using CBS data on average monthly rents in Jerusalem, available at the CBS price index archive (in Hebrew), covering the period 2005Q2-2024Q4. Although our transaction data begin in 2004, 2005Q2 is the earliest date for which the CBS reports rental prices for Jerusalem. Nominal rental prices in Jerusalem grew at an annualized rate of 3.42% over this period. To obtain a real growth rate, we subtract the 1.29% annualized increase in the overall CPI excluding its housing component, yielding $\hat{g} = 2.13\%$. We use this real rate as our baseline estimate of expected rent growth.

than standard measures of the risk-free discount rate. In a similar setting to ours, Giglio, Maggiori and Stroebel (2015) estimate a discount rate of 2.6%, and Bracke, Pinchbeck and Wyatt (2018) estimate a long term discount rate of 3.62%.[4]

Looking at Figure 8, the observed price ratio is considerably higher than what one would expect if market participants believed with certainty that homeowners will lose their homes at lease expiration. In other words, under a standard discount rate of about $r = 3\%$, we would have expected the price of apartments on church land to be lower than it actually was, if people believed that their homes will be lost once the lease ends. This discrepancy implies that market participants do not believe that homeowners are certain to lose their home once the lease expires.

To quantify the probability that market participants assign to the event of homeowners losing their homes at the end of the lease, we assume $r = 3\%$ as the appropriate discount rate, and estimate the probability of homeowners losing their homes $\hat{p}$ that, when incorporated into the expected present value of the property, reproduces the observed price gap. This procedure yields an estimate $\hat{p} = 0.377$ (s.e. $= 0.034\%$). In other words, the data are consistent with market participants believing that homeowners will lose their homes at lease expiration with a probability of approximately 38%, rather than with certainty.

We further explore how this implied probability has evolved over time. The observed price ratio is substantially smaller in more recent years than the present value framework, calibrated on the full sample, would predict. This pattern is consistent with a shift in perceived risk of losing the property following heightened media and political attention to the church-land issue. Figure 9 documents the intensity of media coverage, measured as the yearly count of articles related to church land sales in the *Jerusalem Post* and *Yediot Ahronoth* archives. Coverage was relatively subdued throughout the 2005-2015 period, before surging sharply in 2017. This spike in coverage coincides with the sale of church properties to private investors in 2016 and the ensuing legislative debates. Splitting the sample at 2017, we find that the implied risk of losing the property at the end of the lease differs markedly across sub-periods: $\hat{p} = 0.274$ (s.e. $= 0.019\%$) for years prior to 2017, and $\hat{p} = 0.517$ (s.e. $= 0.045\%$) for 2017 and later. This increase in perceived risk of losing the property aligns closely with the spike in media salience: as public awareness of the church-land issue intensified, market participants

[4] Bracke, Pinchbeck and Wyatt (2018) estimate a higher short-term discount rate, of around 5%. Looking at Equation 6, this would mean applying that higher short term-discount rate in calculating $V_t^{\text{leasehold}}$, and the lower long-term discount rate in calculating V_t^{freehold}. This will result in an even lower predicted price gap curve, indicating again that our estimate price curve reflects a discount rate that is substantially higher than standard measures.

appear to have revised upward their assessment of the risk, consistent with the decreasing price ratio documented above.

Taken together, these findings suggest that while the insecurity of property rights exerts a meaningful negative effect on housing prices, market participants do not treat the loss of property rights as a foregone conclusion. Rather, they assign a substantial but partial probability to the loss of property rights, a probability that has grown over time as legal and political uncertainty has deepened.

8.1. Extensions

8.1.1. Control Group Definitions

Our baseline specification defines the control group as properties located within 500 meters of parcels with insecure property rights. To verify that our findings are not sensitive to this definition, we re-estimate Equations 4 and 5 using alternative distance thresholds. The results, reported in Tables A.1 - A.4, confirm that the estimated effects remain highly consistent across thresholds ranging from 25 to 2,500 meters. For ease of comparison, one of the columns in each table reproduces the baseline estimates from Tables 2 and 4. The robustness of the results to alternative control group definitions underscores that our conclusions are not an artifact of the chosen threshold.

8.1.2. Yearly-Specific Effects

The impact of property rights insecurity may evolve over time, both as lease expiration dates draw nearer and as awareness of the issue becomes more widespread. To explore such dynamics, we estimate year-specific treatment effects on both the probability of transaction and transaction prices.

Figure 7 summarizes these results. The negative effect on the probability of transaction is concentrated in the later years of the sample, suggesting that market participants became more responsive as the insecurity of property rights grew more salient. In contrast, the effect on transaction prices emerges earlier: already by 2012, properties with insecure rights sell at a discount relative to comparable secure properties, and this discount deepens steadily over

time. These findings indicate that prices began to reflect the insecurity of property rights well before its effect on transaction volumes became visible.

8.1.3. Neighborhood-Specific Effects

Because parcels with insecure property rights are distributed across several central Jerusalem neighborhoods, it is important to test whether the overall results are driven by a single area that may have received disproportionate media or political attention. We therefore replicate the analysis separately for Neve Sha'anan (Nayot), Talbiya–Rehavia, and Baqa, the three neighborhoods with the largest number of parcels with insecure property rights.

Appendix Figures A.1 and A.2 feature the yearly probability of transaction and average price per square meter in each of the neighborhoods together with their respective control group. Appendix Tables A.5 and A.6 present the main parameter of interest from a neighborhood-specific regression analysis on the likelihood of transaction and the transaction price, respectively. While the magnitude of the effects varies somewhat across neighborhoods, the overall patterns are consistent: insecure property rights are associated with lower transaction probabilities and lower prices. These results demonstrate that our main findings are not driven by any single neighborhood, but rather reflect a broader citywide phenomenon.

9. Conclusions

TBC

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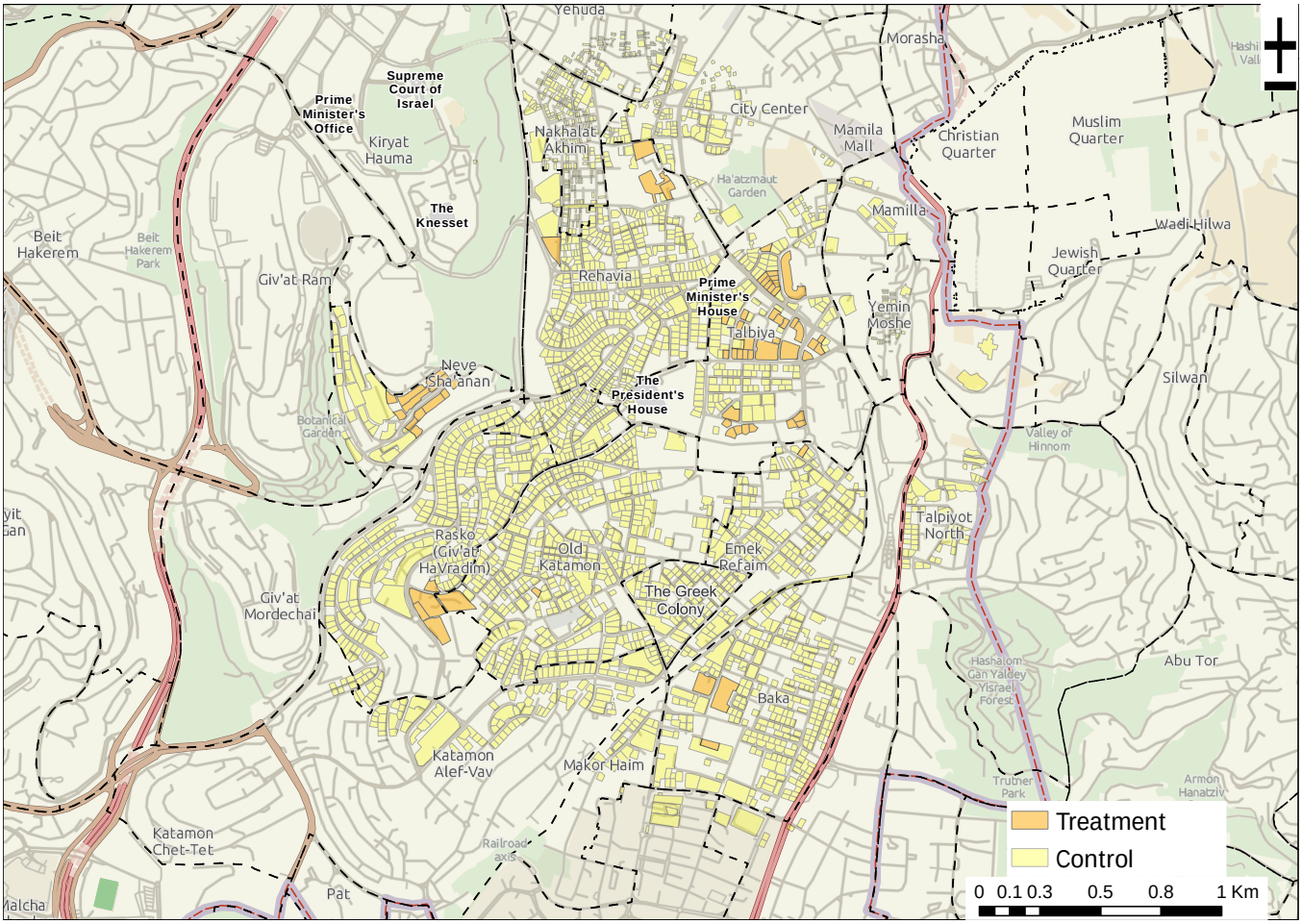


Figure 1: Map of Central Jerusalem Land Parcels with secure and insecure Property Rights

Note: This map displays the location of land parcels in our main sample, which includes (i) all parcels with insecure property rights and (ii) parcels with secure rights located within 500 meters of them that contain residential properties. Block boundaries are indicated by thick black lines, and parcel boundaries by thin gray lines. Parcels with certain rights appear in light yellow, while parcels with insecure rights are shaded in a darker yellow. Neighborhood boundaries are delineated with dashed black lines, and neighborhood names are labeled directly on the map. Four neighborhoods emphasized in the analysis are Neve Sha'anan (south of the Knesset), Rehavia-Talbiya (surrounding the Prime Minister's House), Rasko (southwestern part of the shaded area), and Baka (southeastern part of the shaded area).



Figure 2: Adjacent Houses in the Neve Sha'anan Neighborhood

Note: The house on the left has insecure property rights. The house on the right has secure property rights.



Figure 3: Probability of Transaction

Note: The figure presents a time series showing the yearly probability of transaction for properties with with secure (solid line) and insecure (dashed line) property rights. The figure demonstrates that the probability of transaction is usually lower for parcels with insecure property rights, with bigger difference for later years.

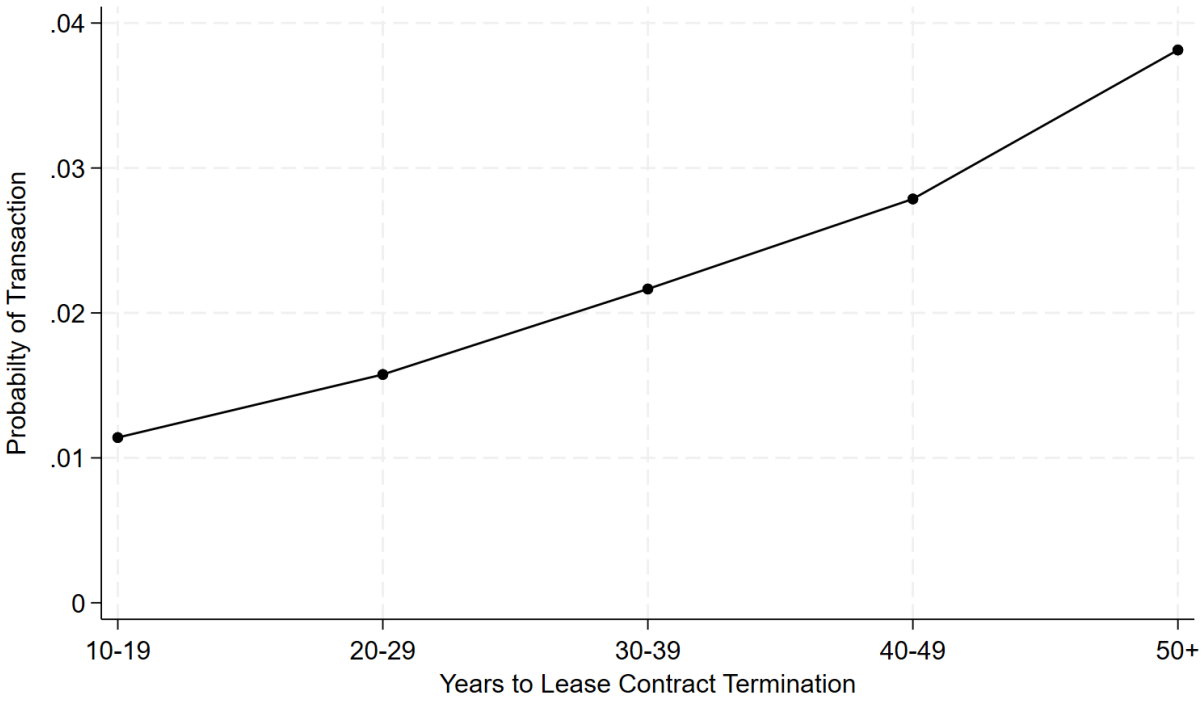


Figure 4: Probability of Transaction by Proximity to Contract Termination

Note: The figure presents the yearly probability of transaction in land parcels with insecure property rights, segmented by the number of years remaining until lease contract termination. The probabilities are calculated for parcel-year pairs grouped into the following time intervals: 11-19 years, 20-29 years, 30-39 years, 40-49 years, and 50 years or more. The figure shows that the probability of transaction increases as the time to contract termination extends, indicating a higher likelihood of transaction when more time remains on the lease.

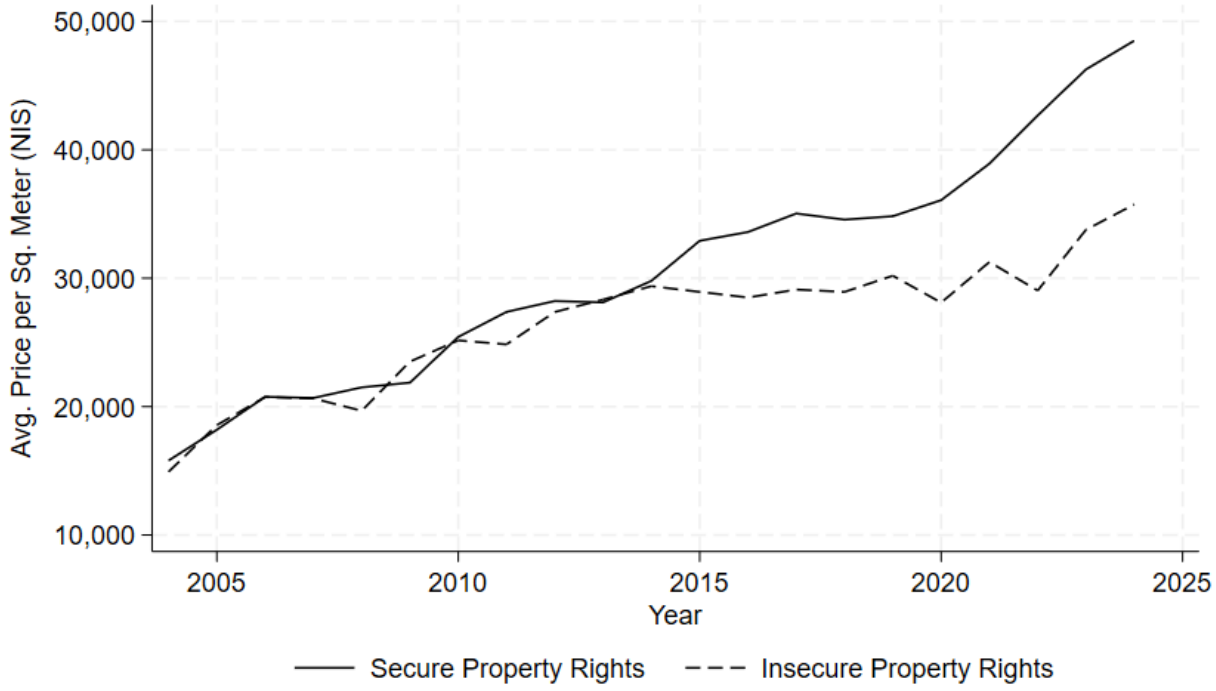


Figure 5: Price per Square Meter

Note: The figure shows a time series of yearly prices per square meter for land parcels with secure property rights (solid line) and insecure property rights (dashed line). The data shows that while prices are similar until 2013, there is an increasing price gap since then. This widening price gap may reflect growing market sensitivity to insecure property rights.

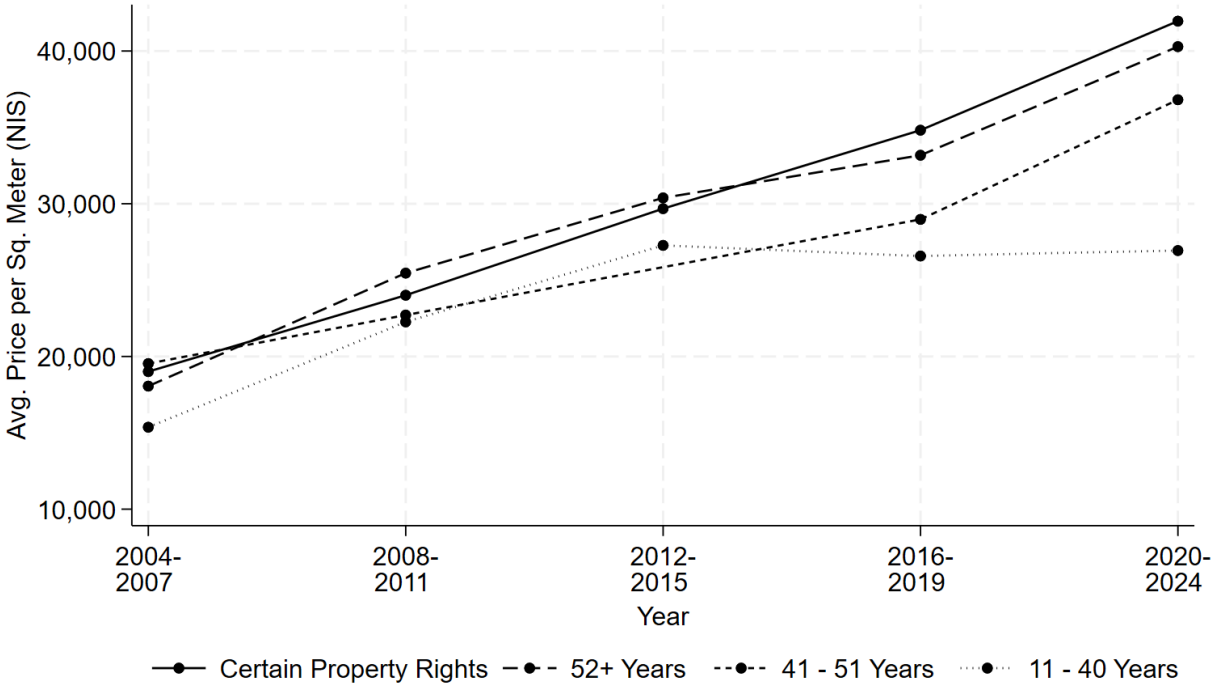


Figure 6: Price per Square Meter by Proximity to Contract Termination

Note: The figure presents a time series of the footage price, grouped into four-year bins. It includes four series: properties located in land parcels with secure property rights (solid line), and properties in leased parcels with insecure property rights, where the lease contract terminate 52+ years (dashed line), 41-51 years (short-dashed line) and 11-40 years (dotted line) after the transaction date. The figure shows that properties with secure property rights and those with lease contract terminating more than 50 years from the transaction date are transacted at higher footage prices compared to properties with lease contract terminating sooner. Furthermore, the footage prices are lower for properties whose lease contracts terminate earlier.

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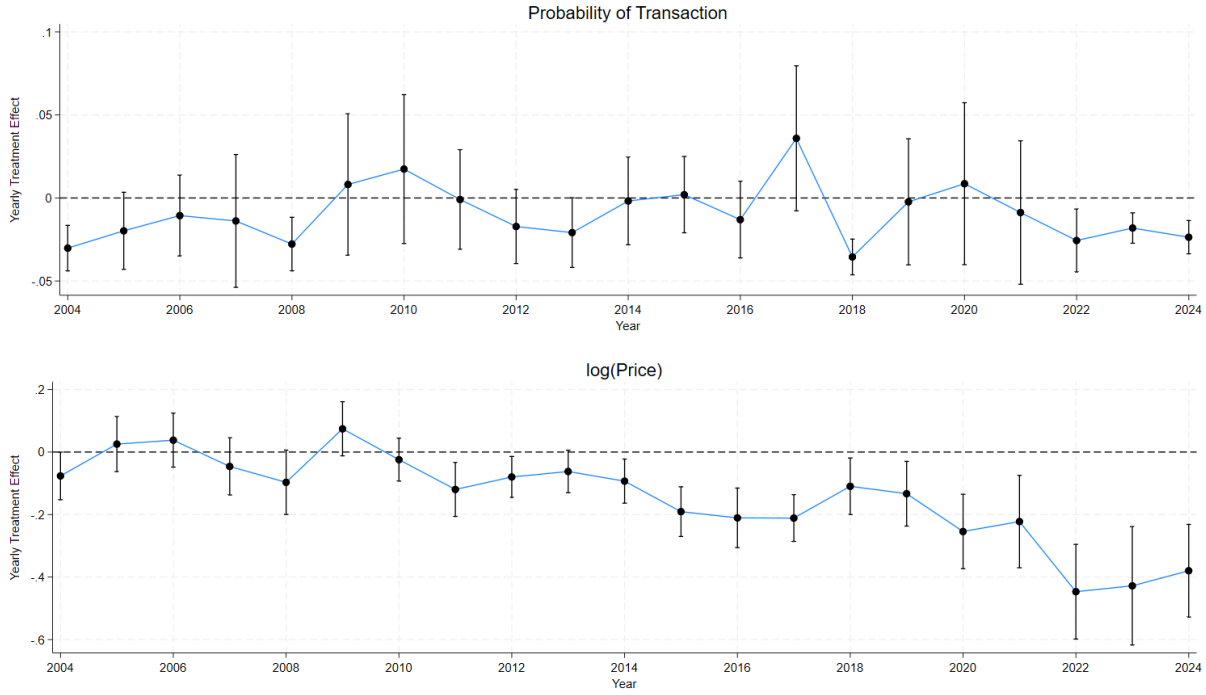


Figure 7: Yearly Treatment Effects

Note: The figure presents the yearly treatment effects obtained from estimating variants of Equations 4 and 5, where the coefficient on the *Insecure Property Rights* variable, β, is allowed to vary by year. Each point estimate is shown with its corresponding 95% confidence interval. The **top panel** displays the estimated effect on the **probability of transaction** while the **bottom panel** shows the effect on the **log of the transaction price**. The results indicate that the treatment effect on transaction probability is generally negative but statistically distinguishable from zero only toward the end of the sample period. In contrast, the effect on log prices becomes statistically significant starting in 2012, and grows in magnitude (in absolute value) in subsequent years—suggesting a deepening negative impact of insecure property rights on transaction prices over time.

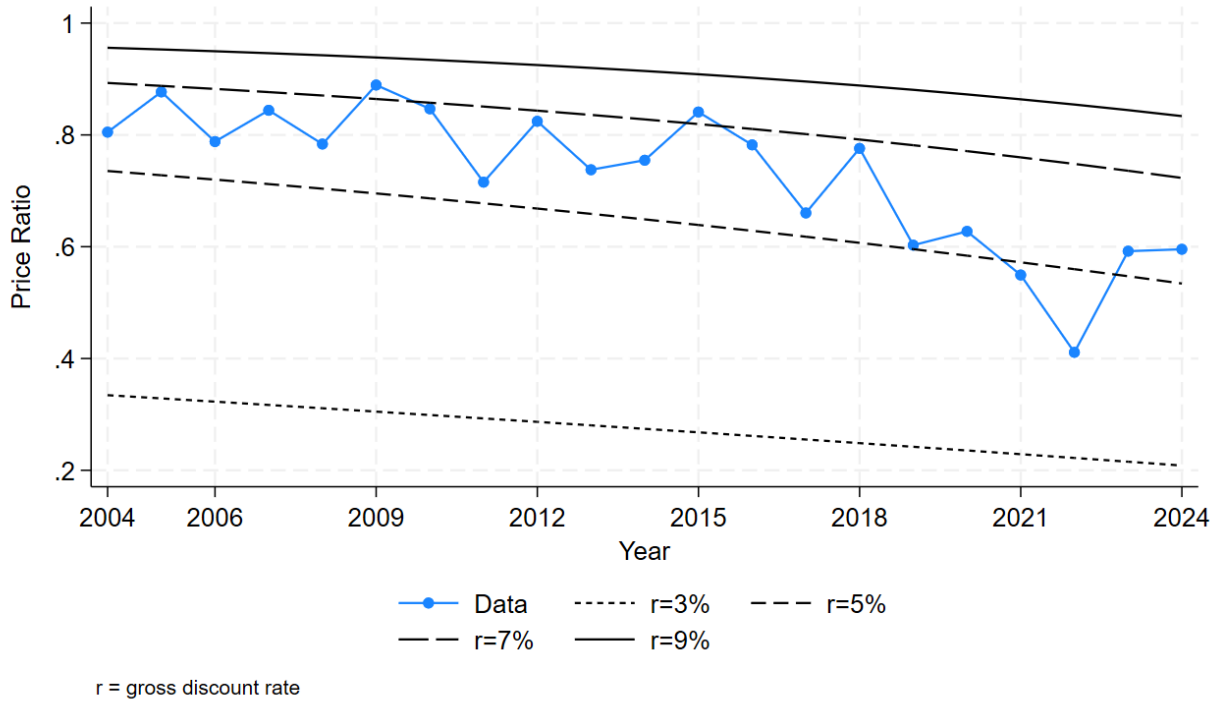


Figure 8: Estimated Gross Discount Rate

Note: The figure plots the yearly empirical price ratios $V_t^{\text{insecure}}/V_t^{\text{secure}}$ between properties with insecure property rights and those with secure property rights (solid line with dots), together with the theoretical price ratio curves implied by the present value framework under four candidate gross discount rates: $r = 3\%$ (dotted line), $r = 5\%$ (short-dashed line), $r = 7\%$ (long-dashed line), and $r = 9\%$ (solid line). The empirical series is obtained from yearly treatment effect estimates for properties whose lease contracts expire in 2051, the modal expiration year in our sample, relative to neighboring properties with secure property rights, located in the Rehavia, Talbiya, and Neve Sha'anan (Nayot) neighborhoods. The theoretical curves are computed using the present value framework described in Section 8, with rent growth fixed at $\hat{g} = 2.13\%$. The gross discount rate that minimizes the distance between the predicted and observed price gaps is $\hat{r} = 5.76\%$ (s.e. $= 0.192\%$).

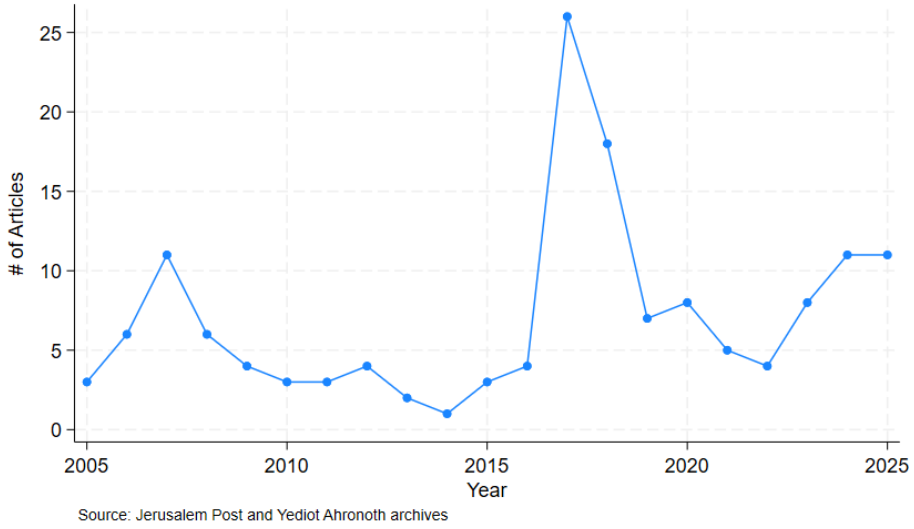


Figure 9: Yearly count of newspaper articles related to church land sales in Jerusalem, based on the *Jerusalem Post* and *Yediot Ahronoth* archives. The sharp spike in 2016-2017 coincides with the sale of church properties to private investors and the surrounding legislative debates.

Table 1: Descriptive Statistics of Treatment and Control Groups

Panel A: Unit of Observation – Transaction

	Control	Treatment
Price per Sq. Meter (NIS)	30,157.19	26,141.91
	(14,793)	(9,297)
# Rooms	3.45	4
	(1.26)	(1.27)
New Apartment	0.13	0.14
	(0.34)	(0.35)
Building Year	1971.79	1977.96
	(25.78)	(21.79)
Floor	2	2.26
	(2.56)	(2.61)
Multiple Buyers	0.18	0.16
	(0.38)	(0.36)
Transaction Year	2013.75	2013.42
	(6.03)	(5.66)
Property Age on Transaction	41.92	35.45
	(25.25)	(21.32)
Distance to Treated Parcel (meter)	276.79	.
	(124.02)	
Lease Contract Expiration Year	.	2065.51
		(26.91)
Main Neighborhoods		
Neve Sha'anan (Nayot)	346	84
Talbiya-Rehavia	3,840	495
Rasko	3,408	156
Baqa	1,920	124
N	15,865	876

Panel B: Unit of Observation – Land Parcel × Year

	Control	Treatment
Probability of Transaction	0.051	0.035
	(0.209)	(0.118)
N	47,674	1,232

Note: Panel A reports transaction-level characteristics for properties located on parcels with insecure property rights (treatment) and parcels with secure rights within 500 meters (control). Prices are expressed in NIS per square meter; values are nominal. Panel B aggregates to the parcel–year level and reports the annual probability of transaction, defined as the ratio between the yearly number of transactions and the number of apartments in the parcel. Standard deviations are in parentheses.

Table 2: The Effect of Insecure Property Rights on Housing Liquidity

	(1)	(2)	(3)
Insecure Property Rights	-0.012***	-0.010**	-0.009*
	(0.003)	(0.003)	(0.005)
Year F.E.	✓	✓	✓
Neighborhood F.E.	✗	✓	✗
Block F.E.	✗	✗	✓
R^2	0.004	0.007	0.013
N	46683	29862	46683

Notes: An observation is a parcel–year pair. The coefficient on Insecure Property Rights compares parcels with insecure rights to nearby parcels (within 500m) with secure rights. The sample covers 2004–2024. Year, neighborhood, and block fixed effects included as indicated. Robust standard errors in parentheses.
* p<0.05, ** p<0.01, *** p<0.001

Table 3: Effect of Time to Lease Contract Termination on Housing Liquidity

	Probability of Transaction		
	(1)	(2)	(3)
44+ Years to Lease Contract Termination	-0.009	-0.008	-0.006
	(0.006)	(0.006)	(0.007)
35-43 Years to Lease Contract Termination	-0.013**	-0.010*	-0.012*
	(0.005)	(0.005)	(0.006)
10-34 Years to Lease Contract Termination	-0.013*	-0.011	-0.011
	(0.006)	(0.006)	(0.007)
Year F.E.	✓	✓	✓
Neighborhood F.E.	✗	✓	✗
Block F.E.	✗	✗	✓
R^2	0.004	0.007	0.013
N	46683	29862	46683

Notes: An observation is a parcel–year pair. Observations of land parcels with insecure property rights were divided into terciles based on the time between the year corresponding to the observation and the year of lease contract termination (10-34, 35-43, and 44-146 years). The omitted group consists of land parcels with secure property rights. The sample covers 2004–2024. Year, neighborhood, and block fixed effects included as indicated. Robust standard errors in parentheses.
* p<0.05, ** p<0.01, *** p<0.001

Table 4: The Effect of Insecure Property Rights on Housing Price

	log(Price per Sq. Meter)				
	(1)	(2)	(3)	(4)	(5)
Insecure Property Rights	-0.097***	-0.073***	-0.080***	-0.127***	-0.156***
	(0.012)	(0.012)	(0.011)	(0.017)	(0.013)
Apartment Characteristics	✗	✓	✓	✓	✓
Year F.E.	✗	✗	✓	✓	✓
Street F.E.	✗	✗	✗	✓	✗
Block F.E.	✗	✗	✗	✗	✓
R^2	0.002	0.100	0.435	0.595	0.557
N	15669	15584	15584	15422	15581

Notes: An observation is a transaction. The sample includes transactions in properties with insecure property rights and transactions in properties with secure rights located within 500 meters of parcels with insecure rights. The time period is 2004–2024. Apartment characteristics include the number of rooms, a new-apartment indicator, an indicator for whether the transaction involves more than one buyer or seller, and a quadratic in the property's age at the year of transaction. Robust standard errors are reported.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 5: The Effect of Insecure Property Rights on Housing Price

	log(Price per Sq. Meter)				
	(1)	(2)	(3)	(4)	(5)
52+ Years to Lease Contract Termination	-0.008	-0.011	-0.016	0.032	-0.031*
	(0.023)	(0.023)	(0.017)	(0.024)	(0.016)
41-51 Years to Lease Contract Termination	-0.210***	-0.182***	-0.033*	-0.080***	-0.117***
	(0.021)	(0.019)	(0.019)	(0.021)	(0.019)
11-40 Years to Lease Contract Termination	-0.079***	-0.034*	-0.176***	-0.326***	-0.366***
	(0.018)	(0.019)	(0.019)	(0.024)	(0.022)
Apartment Characteristics	✗	✓	✓	✓	✓
Year F.E.	✗	✗	✓	✓	✓
Street F.E.	✗	✗	✗	✓	✗
Block F.E.	✗	✗	✗	✗	✓
R^2	0.004	0.101	0.436	0.599	0.561
N	15669	15584	15584	15422	15581

Notes: An observation is a transaction. The sample includes transactions in properties with insecure property rights and transactions in properties with secure rights located within 500 meters of parcels with insecure rights. Transactions with insecure property rights were divided into terciles based on the time between the year of transactions and the year of lease contract termination (11-40, 41-51 and 52-137 years). The omitted group consists of properties with secure property rights. The time period is 2004–2024. Apartment characteristics include the number of rooms, a new-apartment indicator, an indicator for whether the transaction involves more than one buyer or seller, and a quadratic in the property's age at the year of transaction. Robust standard errors are reported.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

A. Appendix: Heterogeneous Buyers

This appendix extends the baseline model by allowing for heterogeneity on *both sides* of the market. Buyers, like sellers, differ in their valuations and are risk averse. As a result, demand is downward sloping. We show that the main comparative statics of the baseline model are preserved.

Assume a unit mass of sellers and a unit mass of buyers. Each seller owns one property and has a personal valuation $v \sim U[0,1]$. Property rights are insecure: with probability p the property is lost. Sellers have a risk-aversion parameter $\alpha \geq 0$.

Seller certainty-equivalent utility from holding the property is

$$u_s = (1-p)v - \alpha p v = \Big[1 - (1+\alpha)p\Big]v.$$

Each buyer has valuation $w \sim U[0,1]$ for the property. Buyers perceive a higher probability of loss, $p_b = (1+g)p$, with $g \geq 0$, and have risk-aversion parameter $\beta \geq 0$.

The buyer's certainty-equivalent value is

$$u_b = (1-p_b)w - \beta p_b w = \Big[1 - (1+\beta)(1+g)p\Big]w.$$

At price P, a buyer purchases if $u_b \geq P$, i.e.

$$w \geq \frac{P}{1-(1+\beta)(1+g)p}.$$

Since $w \sim U[0,1]$, aggregate demand is

$$Q_d(P) = 1 - \frac{P}{1-(1+\beta)(1+g)p}.$$

Equivalently, inverse demand is

$$P = \Big[1 - (1+\beta)(1+g)p\Big](1-Q). \tag{7}$$

A seller sells if $P \geq u_s$, i.e.

$$v \leq \frac{P}{1-(1+\alpha)p}.$$

With $v \sim U[0,1]$, aggregate supply is

$$Q_s(P) = \frac{P}{1-(1+\alpha)p}. \tag{8}$$

An interior equilibrium satisfies $Q_d(P) = Q_s(P) = Q^*$. Let us define, for simplicity, $A \equiv 1-(1+\alpha)p$ and $B \equiv 1-(1+\beta)(1+g)p$. Using (7) and (8), equilibrium is given by

$$Q^* = \frac{B}{A+B}, \qquad P^* = \frac{AB}{A+B}.$$

Prices. Both A and B are decreasing in p, implying that equilibrium prices P^* strictly decrease as property-rights insecurity increases.[5]

Transaction volume. Differentiating equilibrium volume yields

$$\frac{\partial Q^*}{\partial p} = \frac{\alpha - [g(1+\beta)+\beta])}{(A+B)^2}. \tag{9}$$

Thus, the numerator, which determines the effect of property-rights insecurity on transaction volume, depends on the how large is seller risk aversion (α) relative to buyer risk aversion (β) and the belief divergence (g).

Proposition 2. *When buyers differ in valuation and are risk averse, property-rights insecurity continues to depress equilibrium prices. The effect on transaction volume is positive if seller risk aversion dominates buyer pessimism and buyer risk aversion* ($\alpha > g(1+\beta)+\beta$, *and negative otherwise.*

Relative to the baseline model, introducing heterogeneity and risk aversion on the buyer side does not alter the core economic forces. Seller risk aversion encourages exit in response to the insecurity of property rights, while buyer pessimism and risk aversion reduce willingness to pay. The sign of the volume response reflects which force dominates, consistent with the intuition and comparative statics of the main text.

[5] Since $\frac{dP^*}{dp} = \frac{A'(p)B(p)^2 + A(p)^2B'(p)}{(A(p)+B(p))^2} < 0$ if $A'(p) < 0$ and $B'(p) < 0$.

B. Additional Figures

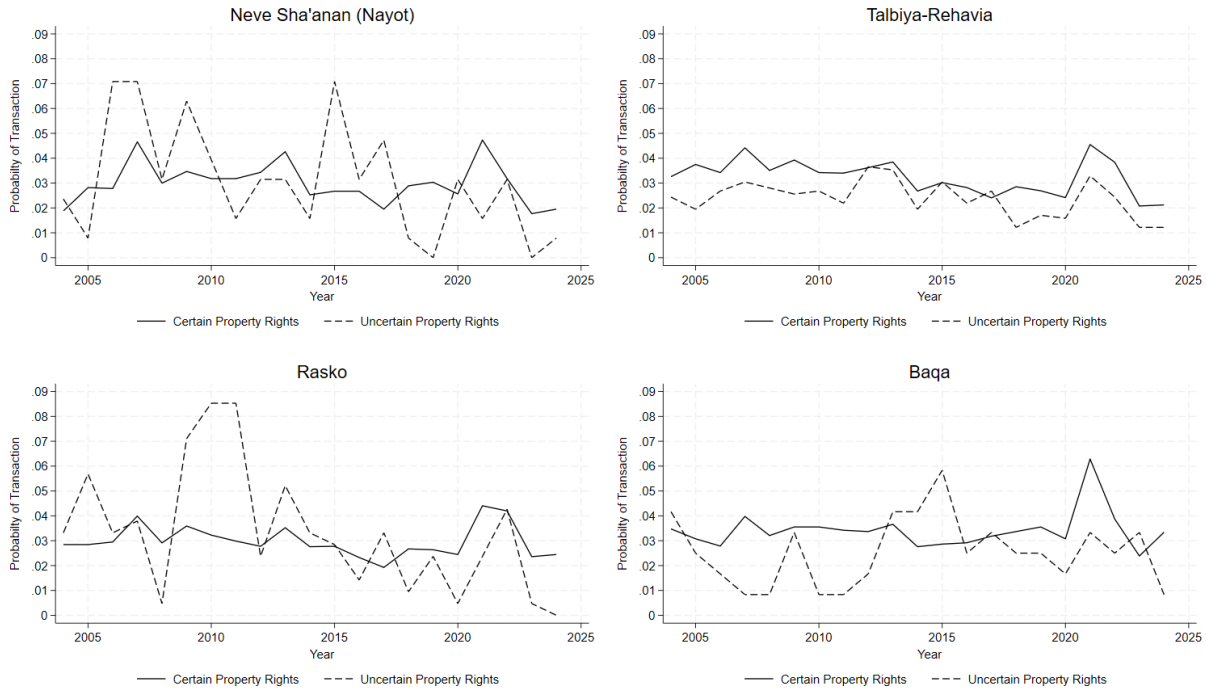


Figure A.1: Neighborhood-Specific Probability of Transaction

Note: The figure presents time series showing the yearly probability of transaction for land parcels with secure (solid line) and insecure (dashed line) property rights. The top-left sub-figure corresponds to the full data set, whereas each of the other sub-figures correspond to a distinct neighborhood. While the neighborhood-specific figures are naturally noisier than the sub-figure based on all the neighborhoods, they still demonstrate a tendency for a lower probability of transaction for parcels with insecure property rights.

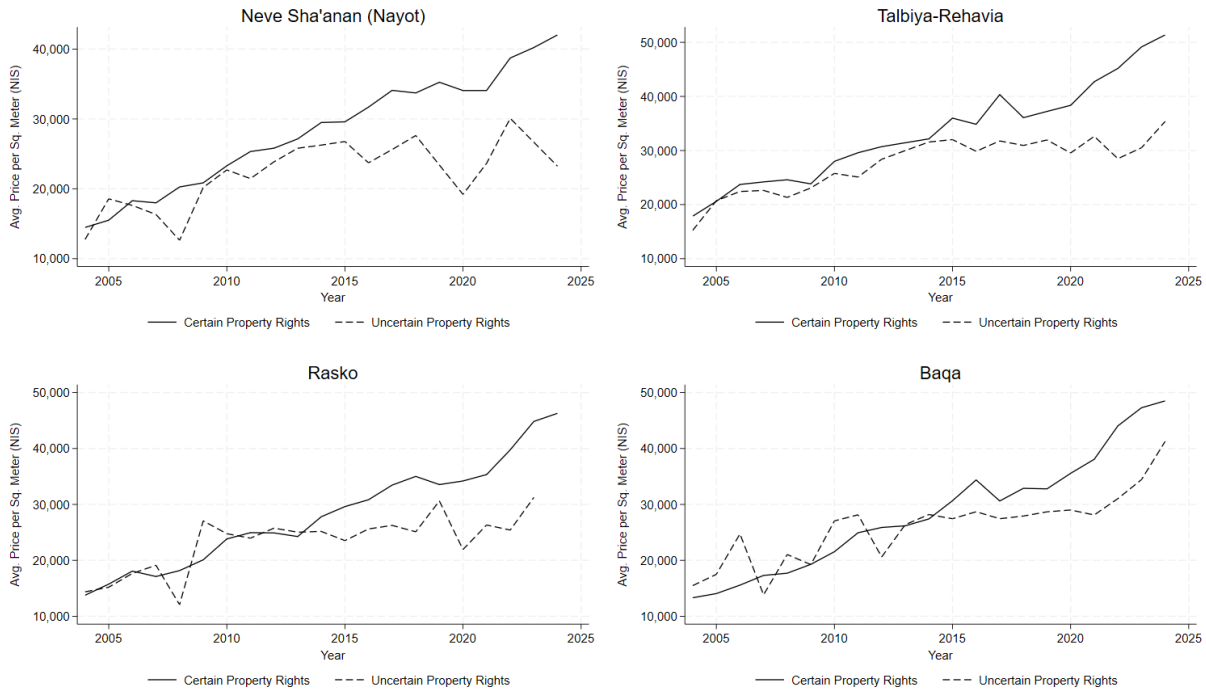


Figure A.2: Neighborhood-Specific Price per Square Meter

Note: The figure presents time series showing the average yearly price per square for land parcels with secure (solid line) and insecure property rights (dashed line). The top-left sub-figure corresponds to the full data set, whereas each of the other sub-figures correspond to a distinct neighborhood. The neighborhood-specific sub-figures demonstrate a price gap between the secure and insecure property rights time series that increase over time.

C. Additional Tables

Table A.1: The Effect of Insecure Property Rights on Housing Liquidity - Alternative Control Group Thresholds

	25m	50m	100m	150m	250m	500m
	(1)	(2)	(3)	(4)	(5)	(6)
Insecure Property Rights	0.07453*	-0.01380*	-0.01215***	-0.00908	-0.00970*	-0.00942*
	(0.03052)	(0.00617)	(0.00355)	(0.00474)	(0.00464)	(0.00463)
Avg. Transaction Prob.	0.082	0.044	0.046	0.049	0.049	0.048
R^2	0.154	0.044	0.021	0.013	0.018	0.013
N	147	1491	4830	9030	19740	46683

Notes: The unit of observation is a parcel–year pair. The coefficient on Insecure Property Rights compares parcels with insecure rights to nearby parcels with secure rights. Columns vary the maximum distance threshold (25m–500m) used to define the nearby control group. Column (6) reproduces the estimates from Table 2, column (3) for ease of comparison. To improve comparability between land parcels with insecure and secure rights, the estimation includes only land parcels with insecure rights that have land parcels with secure rights within the maximum distance therhold and land parcels with secure rights that have land parcels with insecure rights within that threhold. All regressions include year and block fixed effects. The sample covers 2004–2024. **Avg. Transaction Prob.** is the average transaction probability in a given year. Robust standard errors are reported. * p<0.05, ** p<0.01, *** p<0.001

Table A.2: The Effect of Insecure Property Rights on Housing Liquidity - Alternative Control Group Thresholds

	500m	1000m	1500m	2000m	2500m
	(1)	(2)	(3)	(4)	(5)
Insecure Property Rights	-0.00942*	-0.00942*	-0.00942*	-0.00942*	-0.00942*
	(0.00463)	(0.00462)	(0.00462)	(0.00462)	(0.00462)
Avg. Transaction Prob.	0.048	0.048	0.046	0.043	0.042
R^2	0.013	0.013	0.014	0.016	0.017
N	46683	69615	96453	120918	134589

Notes: The unit of observation is a parcel–year pair. The coefficient on Insecure Property Rights compares parcels with insecure rights to nearby parcels with secure rights. Columns vary the maximum distance threshold (500m–2500m) used to define the nearby control group. Column (1) reproduces the estimates from Table 2, column (3) for ease of comparison. All regressions include year and block fixed effects. The sample covers 2004–2024. **Avg. Transaction Prob.** is the average transaction probability in a given year. Robust standard errors are reported.
* p<0.05, ** p<0.01, *** p<0.001

Table A.3: The Effect of Insecure Property Rights on Housing Price - Alternative Control Group Thresholds

	25m	50m	100m	150m	250m	500m
	(1)	(2)	(3)	(4)	(5)	(6)
Insecure Property Rights	-0.078	-0.170***	-0.177***	-0.166***	-0.159***	-0.156***
	(0.088)	(0.026)	(0.015)	(0.014)	(0.013)	(0.013)
R^2	0.794	0.444	0.525	0.485	0.532	0.557
N	51	772	2280	3504	7175	15581

Notes: An observation is a transaction. The dependent varialbe is the log of the price per sq. meter. The coefficient on Insecure Property Rights compares properties with insecure rights to nearby properties with secure rights. Columns vary the maximum distance threshold (25m–500m) used to define the nearby control group. Column (6) reproduces the estimates from Table 4, column (5) for ease of comparison. To improve comparability between properties with insecure and secure rights, the estimation includes only properties with insecure rights that have properies with secure rights within the maximum distance therhold and properties with secure rights that have properties with insecure rights within that threhold. All regressions include year and block fixed effects. Apartment characteristics include the number of rooms, a new-apartment indicator, an indicator for whether the transaction involves more than one buyer or seller, and a quadratic in the property's age at the year of transaction. The time period is 2004–2024. Robust standard errors are reported.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table A.4: The Effect of Insecure Property Rights on Housing Price - Alternative Control Group Thresholds

	500m	1000m	1500m	2000m	2500m
	(1)	(2)	(3)	(4)	(5)
Insecure Property Rights	-0.156***	-0.143***	-0.135***	-0.126***	-0.124***
	(0.013)	(0.014)	(0.014)	(0.014)	(0.014)
R^2	0.557	0.567	0.586	0.599	0.615
N	15581	25783	37730	50892	59023

Notes: An observation is a transaction. The dependent varialbe is the log of the price per sq. meter. The coefficient on Insecure Property Rights compares properties with insecure rights to nearby properties with secure rights. Columns vary the maximum distance threshold (500m–2500m) used to define the nearby control group. Column (1) reproduces the estimates from Table 4, column (5) for ease of comparison. All regressions include year and block fixed effects. Apartment characteristics include the number of rooms, a new-apartment indicator, an indicator for whether the transaction involves more than one buyer or seller, and a quadratic in the property's age at the year of transaction. The time period is 2004–2024. Robust standard errors are reported.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table A.5: The Effect of Insecure Property Rights on Housing Liquidity

	Neve Sha'anan	Talbiya-Rehavia	Baqa
	(1)	(2)	(3)
Insecure Property Rights	-0.008	-0.012*	-0.025***
	(0.007)	(0.005)	(0.006)
Avg. Transaction Prob.	0.049	0.048	0.049
Year F.E.	✓	✓	✓
Neighborhood F.E.	✗	✗	✗
Block F.E.	✗	✓	✓
R^2	0.004	0.013	0.013
N	45759	46263	45549

Notes: The unit of observation is a parcel–year pair. Each column reports results for a different neighborhood (see Figure 1 for neighborhood boundaries). The coefficient on Insecure Property Rights compares parcels with insecure rights to nearby parcels (within 500m) with secure rights from the same neighborhoods. Column (1) includes year fixed effects (FEs) only; columns (2)–(3) additionally include block FEs. Block FEs are omitted in column (1) due to the small number of blocks in Neve Sha'anan. **Avg. Transaction Prob.** is the neighborhood mean annual transaction probability (reported as a fraction). Robust standard errors are reported.
* p<0.05, ** p<0.01, *** p<0.001

Table A.6: The Effect of Insecure Property Rights on Housing Price

	Neve Sha'anan	Talbiya-Rehavia	Baqa
	(1)	(2)	(3)
Insecure Property Rights	-0.088	-0.168***	-0.109***
	(0.055)	(0.023)	(0.034)
Apartment Characteristics	✓	✓	✓
Year F.E.	✓	✓	✓
Street F.E.	✓	✓	✓
Block F.E.	✗	✗	✗
R^2	0.655	0.542	0.679
N	1995	7919	3181

Notes: An observation is a transaction. The dependent varialbe is the log of the price per sq. meter. Each column reports results for a different neighborhood (see Figure 1 for neighborhood boundaries). The coefficient on Insecure Property Rights compares properties with insecure rights to nearby properties (within 500m) with secure rights from the same neighborhoods. All columns include year and street fixed effects. Robust standard errors are reported.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$