Tenant Rights, Eviction, and Rent Affordability *

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Abstract

We use state-level differences in the legal relationship between landlords and tenants to estimate the impact of these differences on housing markets. We construct a search-theoretic model of landlord and tenant search and matching, which predicts that an increase in the cost of eviction reduces the number of evictions but raises rents and homeless rates and lowers housing supply and vacancy rates. To test these predictions, we construct an annual index to measure the level of the legal protection of tenant rights in each state. Our instrumental variable results indicate while a one-unit increase in the Tenant-Right Index reduces eviction rates by 0.32 percentage points, rental housing is 1.8 percent more expensive in areas where tenants have more protections against landlords. A higher Tenant-Right Index is also associated with an increase in households. There is also an increase in the homeless rate and a decrease in vacancy. Taken together, our findings highlight a significant trade-off between tenant protections and rent affordability and the negative effects of the increased demand for rental housing.

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1 Introduction

"Eviction isn't just a condition of poverty; it's a cause of poverty."

–Matthew Desmond, *Evicted*

Every year, approximately 2.3 million evictions are filed in the U.S. Every minute, four renters in the U.S. are forced out of their homes.[1] Research has established considerable evidence that eviction-related residential mobility leads to many negative social and economic consequences, including adolescent violence (Sharkey and Sampson, 2010), poor school performance (Pribesh and Downey, 1999), and damages on the physical and psychological well-being (Dong et al., 2005 and Oishi, 2010). Moreover, these eviction-induced consequences are especially severe for the poor, minorities, women, and children (Desmond, 2012, Desmond, 2016, South and Crowder, 1998, Sampson and Sharkey, 2008). As eviction becomes an increasingly pressing issue across the nation, growing tenant movements have been pushing for stronger tenant protections and restrictions on no-cause evictions as part of the fight against the housing affordability crisis (Desmond, 2012, Desmond, 2016). Borsch-Supan (1986) and Bennett (2016) demonstrate that appropriate housing policy and statutory regulations are vital in ensuring the security of tenure for tenants. These issues gained particular salience in the United States during the COVID-19 pandemic amid calls for eviction moratoria at the federal and state level.

However, overly strict regulations may impose unintended negative outcomes for tenants such as higher rents or stricter screening by landlords (Ambrose and Diop, 2018, Been et al., 2019, Molloy, 2020, and Miron, 1990). Ambrose and Diop (2018) develop a model in which landlords in high-regulation areas invest more in tenant screening because the return on screening out bad applicants exceeds its costs. They empirically show that tenant default rates are lower and rents are higher in these states, consistent with landlords imposing stricter screening and passing the cost of regulations to tenants. After surveying the literature,

[1] Gross, Terry. 2018. "First-Ever Evictions Database Shows: We're In the Middle Of A Housing Crisis", *NPR*, April 18, `https://www.npr.org/2018/04/12/601783346/first-ever-evictions-database-shows-were-in-the-middle-of-a-housing-crisis`.

Molloy (2020) reports that the effect of landlord-tenant regulations on housing affordability is not well understood, and therefore more research is needed.

It is essential for policymakers to understand the delicate balance between the strictness of landlord regulations, evictions, and rent affordability, to achieve their goal of increasing tenants' welfare. The extant economics literature has been silent on the direct impact of evictions on rent affordability due to the absence of a comprehensive database on landlord regulations and eviction outcomes. In this study, we bridge this gap in the literature by studying the relationship between tenant rights, evictions, and other rental housing market outcomes. We develop a simple search model in which it is costly to evict tenants. In this model, we show that a decrease in eviction cost will lead to greater numbers of households entering the rental market, and thus higher rent, lower vacancy rate, higher homeless rate, and a higher eviction rate in equilibrium. We then empirically test these predictions using two new databases: an eviction database released by the Eviction Lab in May 2018 and a hand-collected Tenant-Right Index database as a proxy for state-level landlord regulations.

To proxy for the cost of eviction, we survey more than 15 years of landlord-tenant laws in 50 states across the U.S and the District of Columbia and create a yearly index to measure the level of the legal protection of tenant rights in each state. Following the classic legal studies literature on tenant eviction protections (Bennett, 2016, Manheim, 1989), we identify the top twelve legal provisions that are most important in landlord-tenant relationships. For each provision, we assign a score of 1 if a state is more friendly towards tenants than the average state. We then take the sum of all twelve provisions to construct our Tenant-Right Index. The index thus ranges from 0 to 12, with a higher index value indicating more legal protection for tenants than for landlords, which means a higher cost of eviction for landlords.

We first use this index to test the effect of tenant rights on rent affordability. Consistent with our theoretical prediction, we find that rental houses are less affordable where tenants have better legal protection. However, one may argue that this observation is spurious: local authorities in areas with overwhelmingly high rental costs may have more incentives to

increase tenant protections against landlords. In addressing this concern, we are unable to find observables that are both credible in the sense of being uncorrelated with the error term and/or sufficiently highly correlated with the Tenant-Right Index. We, therefore, employ the method of Lewbel (2012), which creates instruments from the cross-product of "first stage" error terms and exogenous variables. In this estimation, we find that a one-unit increase in the Tenant-Right Index reduces evictions by 0.32 percentage points (which is sizable given the sample mean of 3.1 percent) and is associated with a 1.8 percent increase in the median rent. A one-unit increase in the Tenant-Right Index also increases the number of households by 1.8 percent. Although their precision is much reduced in the IV model, the empirical predictions for other housing market outcomes (vacancy rate and homeless rate) also conform precisely with the predictions of the theory model in the OLS regressions.

Understanding the tension between these opposite effects is essential to guide policymaking in this area. Our study supports the use of stringent landlord regulations in tackling the eviction crisis, a proposition often put forward by advocates of tenant rights if the main objective is preventing eviction and the substantial social and economic costs it entails. At the same time, policymakers need to balance this goal against the negative impacts on rent and supply to avoid exacerbating the housing affordability problem that many cities are already struggling with. To the extent that they can even increase homelessness, overly burdensome regulations only counteract the stated welfare-enhancing goal of the laws. For a complete policy evaluation, it is necessary to compare the benefits enjoyed by tenants avoiding eviction to the loss of consumer surplus for others. Still, such analysis is beyond the scope of this paper.

The rest of the paper is organized as follows. We introduce the theoretical motivation in Section 2. We detail the construction method of the Tenant-Right Index in Section 3. We describe the empirical methodology and present the descriptive statistics of the supporting data in Section 4. We report our empirical findings in Section 5. Section 6 concludes the paper.

2 Theoretical Motivation

In this section, we construct a search model in the manner of Pissarides (2000) applied to the rental housing market. In parallel to labor market models of wage and unemployment determination, a search model allows us to model rent, vacancy, and homelessness simultaneously in an equilibrium framework. Landlords seek renters and vice-versa to match and bargain over rents. Landlords and tenants then observe whether the tenants are good or bad, in the sense that bad tenants create extra costs for the landlord through bothersome acts, poor care of the unit, or similar misbehavior.[2] We extend the standard search model by allowing landlords to evict bad tenants, but they incur a cost in the attempt. Although we do not model the source of this cost explicitly, in our empirical tests later, we posit that eviction cost depends on the degree of statutory regulations imposed on landlords by the state.

2.1 Landlords

Landlords own a single unit, which is characterized by one of two states, occupancy (O) or vacancy (V). If the unit is currently vacant, the landlord pays carrying costs, c, each period of vacancy. They match with tenants at rate λ, to be determined endogenously, and bargain over nominal rent, R. As standard in search models, the matching rate will depend on the relative number of potential renters to vacant units. With r as the discount rate, and π_i, where $i \epsilon \{O, V\}$, denoting the present value of future net income, the flow value function of the landlord in the vacancy state is given by the Bellman equation:

$$r\pi_V = -c + \lambda(\mathbb{E}\pi_O - \pi_V). \tag{1}$$

Once the unit becomes occupied, the tenant's quality is revealed as either good or bad.

[2]We assume that tenants do not gain from this act, and they pay their rent regardless. This eliminates strategic behavior on the part of the tenants. We discuss the implication of relaxing this assumption in Section 2.5.

If the tenant is bad, the landlord must pay y in extra maintenance costs each period while a good tenant imposes no such costs. We assume that no eviction is attempted in the case of good tenant and the flow value of utility of the landlord is then:

$$r\pi_O(y; good) = R + \delta(\pi_V - \pi_O(y; good)), \tag{2}$$

where δ is the exogenous probability that the tenant and landlord become mismatched and separate at any point in time. Note that Equation (2) becomes:

$$\pi_O(y; good) = \frac{R + \delta\pi_V}{r + \delta}. \tag{3}$$

If instead the tenant is revealed as bad, the landlord may choose to evict them or not. The period utility when no eviction is chosen is:

$$r\pi_O(y; keep) = (R - y) + \delta(\pi_V - \pi_O(y; keep)). \tag{4}$$

Alternatively, the landlord may try to evict a bad tenant by paying a per period fee of d, thereby raising the separation rate by an exogenous amount ε:

$$r\pi_O(y; evict) = (R - y - d) + (\delta + \varepsilon)(\pi_V - \pi_O(y; evict)). \tag{5}$$

Rewriting Equation (4) and Equation (5) respectively yields:

$$\pi_O(y; keep) = \frac{R - y + \delta\pi_V}{r + \delta}, \tag{6}$$

and

$$\pi_O(y; evict) = \frac{R - y - d + (\delta + \varepsilon)\pi_V}{r + \delta + \varepsilon}. \tag{7}$$

Eviction will occur when the present value of profits from eviction is greater than that of keeping the bad tenant. Combining Equation (6) and Equation (7), this condition can be

written as:

$$R - y < r\pi_V - \frac{d(r+\delta)}{\varepsilon}. \tag{8}$$

The left hand side is net rent. The right hand side is a parameter cluster that represents the net flow benefit of eviction (not including the lost rent on the left hand side). This net benefit is higher when the probability of successful eviction is higher, or when the value of a vacancy is higher, and is lower when the cost of eviction is higher, or when the detachment rate is higher. In the latter instance, a higher probability that the (bad) tenant will leave anyway lowers the value of deliberately evicting them.

Note that the eviction rate ε, when it is not zero, is exogenous, so that the comparative static response of evictions to changes in d is limited to the case where d rises by enough to flip the inequality of (8). Nevertheless, the model delivers the expected result that a rise in the cost of eviction can lower the number of evictions. In order to obtain other comparative static impacts of eviction cost d, it is now necessary to assume that Equation (8) holds so that landlords always choose to evict bad tenants. Using p as the share of bad tenants in the market, the expected gains for landlord from matching with a tenant then becomes:

$$\mathbb{E}\pi_O - \pi_V = (1-p)\,\frac{R+\delta\pi_V}{r+\delta} + p\frac{R-y-d+(\delta+\varepsilon)\,\pi_V}{r+\delta+\varepsilon} - \pi_V \tag{9}$$

$$= \frac{(R-r\pi_V)\,(r+\delta+(1-p)\,\varepsilon) - p(d+y)(r+\delta)}{(r+\delta)(r+\delta+\varepsilon)}. \tag{10}$$

We can now replace $r\pi_V$ with its value from Equation (1) and rearrange Equation (10) to get:

$$\mathbb{E}\pi_O - \pi_V = \frac{(R+c)\,(r+\delta+\varepsilon\,(1-p)) - p(d+y)(r+\delta)}{(r+\delta)\,(r+\delta+\varepsilon) + \lambda((r+\delta+\varepsilon\,(1-p))} \tag{11}$$

$$= \frac{(R+c)\,\theta_2 - \theta_3}{\theta_1 + \theta_2 \lambda}. \tag{12}$$

where $\theta_1 = (r+\delta)\,(r+\delta+\varepsilon)$, $\theta_2 = r+\delta+\varepsilon\,(1-p)$ and $\theta_3(d) = p(d+y)(r+\delta)$.

2.2 Tenants

We now turn to the derivation of the tenant's utility functions in their respective states, housed (H) and unhoused (U). Recalling that their draw of y is unknown to them before they are housed, we let J describe their lifetime utility from any given state and write the flow value of being unhoused:

$$rJ_U = m + \mu(\mathbb{E}J_H - J_U), \tag{13}$$

where m is the flow utility of an unhoused person. Similar to landlords, we let μ designate the (endogenous) matching rate of tenants to landlords, which again will be seen as a function of the ratio of unhoused tenants to vacant units in the market. Once they are housed, their draw of y is revealed and they observe whether the landlord is trying to evict them. With Z notating the benefit of being housed, we have:

$$rJ_H(y; stay) = (Z - R) + \delta(J_U - J_H(Y; stay)). \tag{14}$$

$$rJ_H(y; evict) = (Z - R) + (\delta + \epsilon)(J_U - J_H(y; evict))$$

(15)

Recall that we assume that tenants pay full rent and does not receive any benefit if they

are revealed to be bad. This prevents tenants from strategically acting like bad tenants in no-eviction markets. An assumption to justify this would be that y represents lack of care, but that the tenant receives no (leisure) benefit from this lack. We will return to this assumption in Section 2.5 to discuss the impact of its relaxation on our model.

To determine the expectation of lifetime utility from being housed, first write, using Equation (14) and Equation (2.2) respectively:

$$J_H(y; stay) = \frac{(Z - R) + \delta J_U}{r + \delta}, \tag{16}$$

and

$$J_H(y; evict) = \frac{(Z - R) + (\delta + \varepsilon) J_U}{r + \delta + \varepsilon}, \tag{17}$$

so that, as long as eviction is undertaken by landlords, and remembering that the tenant does not know their quality ahead of the match, we have:

$$\mathbb{E}J_H - J_U = p\frac{(Z - R) + (\delta + \varepsilon) J_U}{r + \delta + \varepsilon} + (1 - p)\frac{(Z - R) + \delta J_U}{r + \delta} - J_U \tag{18}$$

$$= \frac{(r + \delta + (1 - p)\varepsilon)((Z - R) - rJ_U)}{(r + \delta)(r + \delta + \varepsilon)}. \tag{19}$$

Insert Equation (18) and Equation (19) into Equation (13) to get the net value of being housed:

$$(\mathbb{E}J_H - J_U) = \frac{\theta_2(Z - R - m)}{\theta_1 + \theta_2 \mu}. \tag{20}$$

2.3 Rents

Rents are determined in a Nash Bargain which (by assumption of equal bargaining power) equates the gains from agreement obtained by landlord and tenant:

$$\frac{(R+c)\,\theta_2 - \theta_3}{\theta_1 + \theta_2\lambda} = \frac{\theta_2(Z-R-m)}{\theta_1+\theta_2\mu}, \tag{21}$$

which yields rent as a function of the two endogenous contact rates:

$$R = \frac{(\theta_3 - c\theta_2)(\theta_1+\theta_2\mu) + (Z-m)(\theta_1+\theta_2\lambda)\theta_2}{\theta_2(2\theta_1+\theta_2\,(\lambda+\mu))} = R(\lambda,\mu), \tag{22}$$

The derivative of R with respect to λ is positive and with respect to μ is negative, under the condition that $(\theta_3 - c\theta_2) < 0$. A sufficient condition for this is $p\,(d+y) < c$ which from Equation (12) is easily seen to be a sufficient condition for landlord entry into the market. These are standard results from search and bargaining models, since an increase in one's contact rate raises one's bargaining power and tilts the rent in a favorable direction.

There is a free entry condition for households into this market, such that the value of being unhoused (upon entry) is equal to the world utility level:

$$rJ_U = \rho \tag{23}$$

From (13), (22) and (23) we obtain an equilibrium entry condition for consumers which is upward sloping in (λ,μ) space:

$$\frac{r\rho - m}{\mu} = \frac{\theta_2\,(Z - R\,(\lambda,\mu))}{\theta_1+\theta_2\mu} \tag{24}$$

It is upward sloping because a rise in the landlord contact rate necessitates a rise in the tenant contact rate to keep utility at the default level.

There are L landlords whose units are vacant or occupied, and T tenants, housed or unhoused, measured on a continuum:

$$L = L_V + L_O, \tag{25}$$

$$T = T_H + T_U. \tag{26}$$

Note that L is assumed to be exogenous in order to anchor the model, but T is determined endogenously, as the number of households must satisfy the utility constraint (23). The number of matches in any given period is generated by a standard matching function:

$$\lambda L_V = \mu T_U = AM\left(L_V, T_U\right) \tag{27}$$

The matching function M is assumed to be constant returns to scale (with scale parameter A) so that:

$$\lambda = AM(1, \lambda/\mu) \tag{28}$$

where λ/μ is "market tightness". It is straightforward to see that Equation (28) implicitly defines a downward sloping function in the (μ, λ) space, which we refer to as the matching condition.

Given certain mild conditions on the matching function (Coulson et al., 2001), there exists a unique solution to the zero-profit condition and the matching condition that establishes the equilibrium values of the two contact rates. The comparative statics of the model are intuitive to establish (Figure 1). A change in any of the model's parameters implies a shift in the zero-profit function that re-equilibrates μ and λ.

Our main interest is in the comparative static responses to changes in d, the cost of eviction. For ease of presentation we eschew comparative static analysis of changes in ε. We can therefore interpret d as the cost of obtaining the given eviction rate. Examination of Equation (24) indicates that an increase in d will shift up the zero-profit line. For any given μ, a higher d requires an increase in λ to maintain zero profits. As Figure 1 therefore shows, a rise in d implies both higher λ and lower μ. This in turn implies from Equation (22) a higher equilibrium rent.

2.4 Quantities in the Rental Market

In order to define quantities in the rental market we invoke a steady state condition on the movement of landlords/units into and out of the matched state:

$$(\delta + p\varepsilon)\, L_O = \lambda L_V. \tag{29}$$

and likewise with tenants:

$$(\delta + p\varepsilon)\, T_H = \mu T_U. \tag{30}$$

The vacancy rate is the percentage of units that are unmatched. From Equation (29):

$$Vacancy\ rate = \frac{L_V}{L_V + L_O} = \frac{\delta + p\varepsilon}{\delta + p\varepsilon + \lambda}, \tag{31}$$

Using (30) the homeless rate is the percentage of households that are "unmatched":

$$Homeless\ rate = \frac{T_U}{T_U + T_H} = \frac{\delta + p\varepsilon}{\delta + p\varepsilon + \mu}, \tag{32}$$

The endogenous number of households includes those who are housed and those that are homeless:

$$T = T_U + T_H, \tag{33}$$

Using the steady state condition for households and the matching flow condition (27), we have:

$$T = (\frac{\delta + p\varepsilon + \mu}{\delta + p\varepsilon + \lambda})(\frac{\lambda}{\mu})L \tag{34}$$

which is falling in μ and rising in λ. The model is anchored to an exogenous housing stock, L. The intuition of the model is then clear. A rise in the cost of eviction is good for tenants,

and tenants enter the market, causing a lower tenant matching rate and a higher landlord matching rate. From (31) the vacancy rate falls, and from (32) the homeless rate rises. This is all the result from the increased demand for housing represented by (34), the rise in the number of tenants, T.

Finally, note that the eviction rate itself, ε, is invariant to d because it is exogenous. Nevertheless our model does deliver the fact that a higher cost of d can lower evictions to zero when d rises by a sufficient amount to overturn inequality (8).

2.5 Nonpayment

As noted earlier in this section, we view y as merely a cost to the landlord, without these extra costs bestowing any benefit to the tenant. This eliminates any strategic behavior on the part of tenants. One of the common reasons for eviction, of course, is nonpayment of rent. Nonpayment does not necessarily mean that the tenant never pays: they might be late, or may be able to pay some months and not others. A wide variety of behaviors are observe (Kim, 2018). In any case, we can treat y not as extra maintenance costs, but (average) rent nonpayment over the course of the residence spell. This might not entail strategic behavior by the tenant. Just as there is a distinction between ruthless default and default that is really not under the control of the homeowners (Gerardi et al., 2018 and Cunningham et al., 2020), there can be a distinction between "forced" nonpayment of rent due to sudden unemployment, and more strategic conduct. This distinction gained considerable salience at the emergence of the COVID-19 pandemic, when widespread and sudden unemployment led to led to equally widespread calls for rent forgiveness and subsequent moratoria on evictions at both the federal and state levels.

Whichever regime we consider, we can reinterpret y not as the extra costs imposed by a bad tenant, but as the reduction in rent paid. Under the"forced" view of nonpayment, almost nothing in the model changes. The cost parameter, y, becomes the (average) reduction in rent, and the probability p is now the probability that the tenant loses their job. Tenants do

see a reduction in rent paid, but under this interpretation of nonpayment it is hard to see this as an improvement in utility. One might take the view that Z is income, $Z-R$ is nonhousing consumption (i.e. linear utility) under full rental payment. In this case $Z-(R-y)$ is utility under partial rental payment. With sudden unemployment, we might conveniently assume that Z and y are coincidentally reduced together dollar for dollar. Then nothing in the model changes and all of our results go through.

Under strategic behavior by the tenant, the tenant considers their options under fully payment or partial payment (which can include zero payment). While Equation (14) remains unchanged, Equation (2.2) becomes:

$$rJ_H(y;evict) = (Z-(R-y)) + (\delta+\varepsilon)(J_U - J_H(Y;evict)). \tag{35}$$

The tenant then considers the relative merits of fully and partially paying rent. Assuming, as before, that Equation (8) holds, he compares lifetime utility when the landlord tries to evict and when she does not. Full payment of rent (and no eviction) is optimal when:

$$Z - R > rJ_U + \frac{y(r+\delta)}{\varepsilon}. \tag{36}$$

That is, the tenant will pay full rent when net value from renting is high enough, when the value of being homeless is low, when the reduction in rent is low, and the probability of eviction is high. However, it is easy to see at this point that the model either degenerates or becomes intractable. If Equation (30) holds then $p = 0$ and landlords never evict. If the reverse inequality holds then no tenant pays (full) rent, and landlords evict everyone. A modeling alternative would be to introduce heterogeneity by specifying a distribution of y, the draw of which is revealed after the lease is signed. If this is designed as a two-point distribution where one of the values satisfies Equation (30) (call it $y*$) and one does not (y),

the first part of Equation (19) becomes:

$$EJ_H - J_U = p\frac{(Z-(R-y))+(\delta+\varepsilon)J_U}{r+\delta+\varepsilon} + (1-p)\frac{(Z-R)+\delta J_U}{r+\delta} - J_U, \tag{37}$$

which would induce more complex versions of equation (24) without adding much in the way of additional insight (Gallin and Verbrugge, 2019). For this reason, we choose to eschew this alternative model.

2.6 Model Predictions

To summarize, our model predicts that an increase in d, or as we will interpret it in the empirical work below, an increase in tenant rights, has the following effects which work through the increase in tenant bargaining power, in turn leading to an increased demand for housing:

1. A rise in rents.
2. A rise in the number of households.
3. A lower vacancy rate.
4. A higher homeless rate.
5. A potentially lower eviction rate.

We now turn to the empirical testing of these hypotheses using the Tenant-Right Index described in the next section.

3 Tenant-Right Index

Central to our theory is the idea that it is costly for landlords to evict unwanted tenants. In the most narrow sense, we can measure this cost as the various monetary expenses landlords have to incur in the process, which often include legal fees, constable fees, and most importantly lost rent. In addition, since tenants at risk of eviction most likely neglect or even maliciously damage the properties, repair and cleaning bills can be substantial cost

items for landlords in many cases. In this paper, however, we define eviction cost in a more general sense to include the strictness of statutory regulation imposed on landlords. We argue that when the laws provide stronger protections for tenants, it is more difficult and costly for landlords to remove troublesome tenants. Thus, we use state laws to construct a proxy for the degree of tenant protection in each state in the U.S., which we refer to as the Tenant-Right Index.[3] It is worth noting at this point that we do not imply that safeguarding tenant rights is undesirable. In fact, there is little doubt about the importance of tenant protection in maintaining a healthy and functioning rental market. However, to the extent that we are interested in eviction costs, we interpret tenant protection as a cost to landlords in this paper's context.

3.1 Index Construction

Landlord-tenant laws govern the rental of residential property in the U.S. It is composed primarily of state statutes that are guided by the Uniform Residential Landlord and Tenant Act (URLTA).[4] We conduct a comprehensive survey of landlord-tenant laws in each of the 50 U.S. states and the District of Columbia from 1997 to 2016, and hand collect data on twelve statutes that we identify as important for tenant protection.[5]

Table 1 provides a summary of their definitions and examples. We then develop a simple, binary scoring system to measure whether a particular state offers more protection to tenants than landlords in each of these twelve aspects: we assign a score of 1 if a state favors tenants compared to the average state in the sample. For each state in each year, we take the sum of all twelve categories as its Tenant-Right Index for that year. Our index ranges between 0 and 12, and the higher the index value, the more tenant-friendly a state is. The details of

[3]Ambrose and Diop (2018) conducted a landlord regulation index for a single year that focuses on four statutes: Termination for Lease ViolationRight to Withhold Rent, Security Deposit Return, Small-Claims Court Limit. Our index proxy for twelve tenant-rights related legal statutes for twenty years.

[4]Landlord-Tenant Law, Cornell Law School, `https://www.law.cornell.edu/wex/landlord-tenant_law` and the Uniform Law Commission's Uniform Residential Landlord-Tenant Act `https://d1unatz8mcf3a5.cloudfront.net/uploads/Uniform-Residential-Landlord-and-Tenant-Act.pdf`

[5]Although the Index is constructed from 1997 to 2016, we limit our analysis to the period from 2005 to 2016 to accommodate the other data used in our empirical analysis.

our index calculation are as follows.

Maximum Deposit. This is the state rule on the maximum security deposit landlords can collect from tenants to cover potential property damages or unpaid rent.[6] It ranges from one to three months' rent in our sample, with an average of 1.5 months. Any state with a limit lower or equal to the average receives a score of 1. If a state does not have any statute governing this aspect, we assume that it gives landlords more discretion and assigns 0.

Deposit Interest. This category takes the value of 1 for states that require landlords to pay tenants the interests due on their security deposit.

Deposit Return. Landlords are required to return the security deposit within a certain time after the tenants move out.[7] The average deadline is 30 days, but it can range from 10 days to 60 days. We code this provision as 1 if a state has a deadline of 30 days or less. Again, states with no statute are considered to be more landlord-friendly, thus receiving no points for this provision.

Regular Termination. Landlords can end a month-to-month tenancy by giving tenants a notice, typically 30 days in advance. The shortest notice allowed is 3 days in Connecticut, while the longest is 60 days in Georgia and Delaware. States that require at least 30 days or more receive a score of 1.

Rent Increase Notice. Landlords are also required to provide advance notice in order to increase rent in a month-to-month tenancy. The amount of notice varies between 7 and 60 days. This provision equals 1 if a state requires 30 days or more.

Rent Withholding. When landlords fail to perform proper maintenance to keep the property habitable, many states allow tenants to withhold rent payment until the problem is fixed. Generally, tenants are not allowed to do so if there are no statute that explicitly permit this action. We give one point for the existence of this statute.

[6]The limit may vary depending on various factors, such as the age of the tenants, whether the unit is furnished, whether the tenant has pets. We use the deposit limit for the most general case of an unfurnished apartment with no pets.

[7]Some states have different deadlines depending on whether there are deductions made. In our calculation, we use the deadline applied to the case of no deductions.

Repair and Deduct. This is similar to the provision above, except that instead of withholding rent, tenants can make the repair themselves and deduct the cost from rent.

Nonpayment Termination. For nonpayment of rent, on average, landlords need to give tenants a 7-day notice to vacate before they can file an eviction lawsuit with the court.[8] Legally, landlords in Alabama can start the eviction proceeding as soon as rent is due. At the same time, at the other end of the spectrum, those in the District of Columbia must wait for 30 days.[9] A notice requirement of 7 days or more equals 1 point.

Lease Violation Termination. Similar to nonpayment, landlords must give proper notice if they want the tenants to vacate due to a major lease violation, which can range from 0 to 30 days. We assign one point to states requiring a notice more than the average of 12 days.

Self-help Eviction. This provision deals with the penalty for landlords engaging in illegal self-help eviction, such as locking out tenants or utility shutoff. In most cases, tenants can sue for at least the actual damages they suffer, but several states allow more severe penalties up to 3 times that amount. These states are assigned a score of 1. We treat states with no statute on this issue as leaning towards landlords rather than tenants.

Right to Stay. We add one point if state law gives tenants the right to remain in the property after an illegal self-help eviction.

Rent Control Preemption. This category takes the value of 1 if a state does not have legislation preventing local governments from passing rent control laws.

3.2 Descriptive and Validation Statistics

Table 2 reports the average score over our study period (2005-2016) for each of the twelve law provisions, as well as the total Tenant-Right Index for each state. We regard the 22

[8]In addition to the notice requirement, some states also have a statutory grace period. For example, in Maine, landlords must wait until the rent is at least 7 days late, upon which they can issue a 7-day notice to the tenants. Effectively, the total wait period for landlords is 14 days. We, therefore, use the sum of the grace period and notice requirement in our calculation.

[9]Note that filing a lawsuit with the court is just the beginning of the eviction process. Landlords must then wait for the court to schedule a hearing (if the tenants do not already leave voluntarily), which may take anywhere from a few days to several weeks or months in big cities with a huge backlog. Only after they are granted a judgment can they have law enforcement remove the tenants.

states with index values higher than 6 as tenant-friendly states in the sense that they offer more protection to tenants in more than half of the aspects that we consider important. There are 23 states with index values lower than 6, which are considered landlord-friendly, and the remaining are neutral states. The average index for all states over our sample period is 5.54, implying that state laws favor landlords to tenants on average. We also map the average index of each state in Figure 2. Consistent with general expectations, states on the West and East coasts tend to be more tenant-friendly, whereas Southern states provide more protection to landlords. Rhode Island has the highest index value of 11, followed by Massachusetts, Hawaii, and Vermont. On the contrary, Utah and Colorado are the most landlord-friendly states with an index lower than 1, followed by Louisiana and Georgia.

Figure 3 traces the average Tenant-Right Index over our study period from 2005 to 2016. The small increase observed in this figure is driven by seven states,[10] each having a one-point increase at some time during this period, except for Alabama which rose by three points. North Carolina is the only state that registered a lower index value, but it is only by one point. The indexes remain the same over our sample period for the rest of the states. Overall, we observe that state laws are consistent over time except for a handful that seems to move towards slightly more tenant protections.

Next, we examine the twelve legal provisions used to construct the index. Our goal is to show that every one of these statutes is necessary and reflects a unique aspect of the landlord-tenant relationship, and our index does not contain redundant information. We first present their pairwise correlations in Table 3. The low correlations between them indicate that each of the twelve legal provisions likely contributes unique information to the final index. To further test whether we can reduce the number of contributors to the index, we report each component's eigenvalues from our Principal Component Analysis (PCA) in Figure 4.

Although the general rule of thumb suggests that we should focus on the first four components whose eigenvalues are greater than 1, they explain only 61% of the variation in

[10]They are Alabama, Colorado, Georgia, Illinois, New Hampshire, Texas, and Utah.

our Tenant-Right Index. This result is not surprising given the low pairwise correlations observed earlier. It implies that we will discard a large amount of information using only these four leading components in our index. Table 4 further reports the loading of the four components on the original twelve variables. For readability, we only display absolute values higher than 0.3. The first component seems to load heavily on rent-related factors, while the second component correlates strongly with legislation regarding deposits and termination notice. It is less clear for the third and fourth components as they include a wide range of provisions. In conclusion, our PCA analysis results validate the importance of every statute used to construct the Tenant-Right Index as a proxy for tenant protection.

4 Data and Methodology

4.1 Empirical Models

We test the relationship between landlord-tenant laws and various housing outcomes by estimating the following equation:

$$\begin{aligned} OutcomeVar_{c,t} = \alpha + \beta TenantRightIndex_{s,t} + \lambda DemographicsControls_{c,t} + \\ + \theta PropertyControls_{c,t} + \delta Y_t + \varepsilon_c \end{aligned} \tag{38}$$

where c and t denote city and year, respectively. All regressions include a set of year fixed effects Y_t, and standard errors are clustered at the city level, except in the homeless rate regression where it is clustered at the state level. Given that the Index does not contain a lot of time series variation for any state, we eschew the use of state fixed effects. We return to the question of unobserved state-level variables below.

We are interested in five outcomes as the dependent variables in Equation (38). Our first quantity of interest is the median gross rent in city c in year t, defined by the Census Bureau as the contract rent plus the estimated average monthly cost of utilities. As a robustness test, we also verify our results using the lowest 30th percentile rent in place of median rent to

address the concern that eviction costs likely affect the lowest segment of the rental market. Our independent variable of interest is the state-level $TenantRightIndex_{s,t}$ that we describe in Section 3 above. If more protection for tenant rights leads to higher rent as predicted by our theoretical model earlier, we will observe a positive β coefficient. The regression controls for a set of local demographics variables, including population, population density, median household income, and homeownership rate. We also account for property characteristics at the city level, namely the median number of rooms, median property age, and median property tax paid. In addition, we include two state-level control variables: the real GDP output of the tourism industry,[11] and the land regulation index. Following Ganong and Shoag (2017), we hand-collect the number of legal cases that include the phrase "land use" to create a land use regulation index for each state in each year.

Our second outcome of interest is the demand for rental housing as measured by the number of households in a city. We have shown in Section 2 above that better tenant protection encourages rental housing demand, thus a positive β coefficient on the Tenant-Right Index variable is expected. Next, we test for the impact of landlord regulation on vacancy rate, defined as the number of vacant units divided by the total number of rental units and multiplied by 100. The β coefficient, in this case, is expected to be negative. The fourth dependent variable is the homeless rate, calculated as the number of persons in homeless shelters divided by total population and multiplied by 100. We expect β to carry a positive sign as predicted by our theory. We use data at the state-year level in this regression due to the availability of the homeless population data. Again, our regressions accounts for year fixed effects and a set of controls at the city and state levels that likely affect these housing outcomes: median household income, unemployment rate, median property tax paid, share of the minority (non-white) population, tourism GDP output, and land regulation index.

Our final regression tests the hypothesis that more substantial tenant protection results

[11] We use the Accommodation and Food industry as defined by the Census

in a lower eviction rate, or in other words, a negative β coefficient on the Tenant-Right Index. We employ two measures for the dependent variable, the eviction filing rate and eviction rate. The eviction filing rate is the ratio of the number of eviction lawsuits filed in a city over the number of renter-occupied homes in that city. This measure counts all eviction cases filed in an area, including multiple lawsuits filed against the same address in the same year. On the other hand, the eviction rate is the subset of those homes that received an eviction judgment in which renters were ordered to leave, which only counts the number of unique addresses that received eviction judgments in a year. The list of control variables includes population density, homeownership rate, rent burden (median rent as a percentage of median household income), and share of the minority (non-white) population. All standard errors are clustered at the city level, except in the homeless rate regression where it is clustered at the state level.

4.2 Instrumental Variable Model

Although the estimated OLS models include many control variables, there remains a concern that our empirical findings could be spurious. For example, a large population of renters will likely drive rents up and at the same time demand stronger legal tenant protection against landlords, whereas a city with low demand for rental housing will have both lower rent levels and little need to pass such laws. As a result, looking across communities, we could observe that cities with expensive rental houses also have a higher Tenant-Right Index without causality running from the index to higher rents.

In our case, identification requires an instrument that predicts the degree of tenant protection in a state while having no direct influence on rents and other housing market outcomes of interests. In the absence of a traditional instrument that can satisfy these two requirements, we turn to the estimator developed by Lewbel (2012) that makes use of heteroskedasticity to construct instrumental variables. This method has been employed in recent literature to achieve identification when no reliable external instruments are available (see, for example,

Emran and Hou, 2013; Schlueter et al., 2015).

We briefly describe the intuition and application of this approach in our context here. The equations we wish to estimate are as follows:

$$Y_1 = X'\beta + Y_2\gamma + \varepsilon_1, \tag{39}$$

$$Y_2 = X'\alpha + \varepsilon_2, \tag{40}$$

where the errors ε_1 and ε_2 are correlated. Y_1 and Y_2 are the endogenous housing market outcomes and the Tenant-Right Index. In addition to the standard assumptions about the vector X of exogenous variables,[12] the key assumptions required for applying the Lewbel (2012) estimator are that $Cov(Z, \varepsilon_2^2) \neq 0$ (assumption A1) and $Cov(Z, \varepsilon_1\varepsilon_2) = 0$ (assumption A2), where Z includes all or a subset of the elements of X. The Lewbel method is implemented in two stages. In the first stage, we estimate equation (40) using the ordinary least squares method and obtain the estimated residual $\hat{\varepsilon}_2$. Using X and $(Z - \bar{Z})\hat{\varepsilon}_2$ as instruments, we can estimate equation (39) using the traditional two stage least squares method.

To obtain an unbiased estimate of γ, it is necessary to show that the two conditions mentioned above are likely to hold in our case. Assumption A1 is essentially equivalent to the presence of heteroskedasticity in the first stage equation (40), and can tested using the standard Breusch-Pagan test. Although not reported, we confirm that the null hypothesis of homoscedasticity is rejected at the 1% level in all the first stage regression estimations. We turn to the Hansen's J test in the second stage regressions to provide evidence supporting assumption A2, which ensures that the constructed instruments $(Z - \bar{Z})\hat{\varepsilon}_2$ are uncorrelated with ε_1 and therefore are valid instruments. It is again reassuring that the Hansen's J statistics reported in Table 9 suggest the null of exogeneity of our constructed instruments

[12] See Lewbel (2012) for details

cannot be rejected, and in turns, imply assumption A2 is likely satisfied.

4.3 Data and Summary Statistics

Our sample covers the period from 2005 to 2016. Unless otherwise noted, our data come from the American Community Survey estimates by the Census Bureau. Table 5 presents their summary statistics. As a first look at the correlation between our Tenant-Right Index and rent, Figure 5 shows the (average) median gross rent for each state and the size of the circles increases with the average Tenant-Right Index. Without controlling for other confounding factors, there is a weak positive correlation coefficient (0.37) between the two series, as our theory suggests.

Two other important housing market measures in our empirical tests are rental demand and vacancy rate. As shown in Table 5, the average city in our sample has 73,470 housdholds, and a vacancy rate of 9.96%. Our fourth variable of interest is the homeless rate. We obtain estimates of the homeless population from the Annual Homeless Assessment Report provided by the Department of Housing and Urban Development. The data are available at the state level and cover from 2007 to 2016. Notably, the District of Columbia registered the highest homeless rate during this period at 1.23%.

Turning to our eviction measures, we employ a novel database recently released by the Eviction Lab at Princeton University. This is the first comprehensive national eviction database compiled using more than 80 million formal eviction records, including eviction requests from landlords and eviction orders from judges, collected from the courts. The Eviction Lab data contain all the known information on the number of evictions filed in the United States and made publicly available by municipalities.[13]

The average filing rate and eviction rate across all sample cities from 2005 to 2016 are 7.72% and 3.61%, respectively. The city with the highest eviction filing rate of 62.13% is East Orange (New Jersey) in 2006, which also has the highest supply of rental housing per

[13]For more details, see `https://evictionlab.org/methods/#more-questions`

capita in our sample, and the highest eviction rate of 20.98% is observed in Flint (Michigan) in 2006. Figure 6 shows the average eviction rates over our study period, together with the average Tenant-Right Index for each state. Albeit weak, we observe a negative correlation coefficient between them that is consistent with our model prediction.

5 Empirical Results

In this section, we empirically test the model predictions detailed in Section 2. Recall that our theoretical model predicts that with an increase in the Tenant-Right Index, rent, rental housing demand, and the homeless population will increase, while vacancy rate and eviction rate will decrease.

5.1 Rent Affordability

We begin with relating the Tenant-Right Index to rent affordability by estimating Equation (38). We hypothesize that landlords may perceive higher costs associated with rental activities in areas where the landlord regulation is strict, implying a positive relationship between the index and rent levels. The results presented in Table 6 strongly support this hypothesis. Using the median gross rent from the Census Bureau, we estimate that a one-unit increase in our Tenant-Right Index is associated with a 4.6% rent increase in column (1). Given that the average median rent in our sample is $994 per month, this is equivalent to a $46 increase in rents. More notably, it amounts to an approximately $1,200 difference in rent costs when we compare the most tenant-friendly state (index value of 11) to the most landlord-friendly state (index value of 0.42), holding all other factors constant.

Turning to the coefficient estimates of other control variables, we find that they are largely consistent with prior expectations. Cities with denser populations, higher income, and higher property taxes tend to have higher rent. Rent levels are also higher where rental units have more rooms. In addition, places with high home-ownership rates are less costly

to rent.

In the second column, we add two more control variables measured at the state level, the Land Regulation Index as described in Ganong and Shoag (2017), and the GDP output of the tourism industry. Land-use regulation is associated with lower rent, while rent is higher in states with more significant tourism industries. Most importantly, the inclusion of these additional controls does not significantly alter our point estimates of the landlord-tenant regulation index and other controls.

Many cities have enacted rent control policies to combat fast-rising rents. Although such laws may keep rents below market levels for tenants in controlled units, the uncontrolled sector may see increased rents as a result of constrained supply (Early, 2000; Diamond et al., 2019) and therefore distort the rent observed in these cities. In the third column of Table 6, we exclude 38 cities with active rent control policies in our sample. It is reassuring that eliminating these cities has little effect on our index's coefficient.

Since eviction and its associated costs most likely matter more to landlords and tenants in the lower-priced segment of the rental market, we re-run our baseline model using the lowest 30th percentile rent in place of median rent as the dependent variable in column (4). Note that our sample is reduced to 1,937 city-year observations due to the lack of data for smaller cities. Again, we do not observe any notable change in the coefficient estimate on the Tenant-Right Index. Hence, we find no evidence that tenant protection is more critical for the lower-income segment than the average market.

Finally, we test whether specific law provisions among the twelve included in our index have more significant effects on rent by grouping them into four sub-indexes. The first sub-index is the sum of four statutes that directly govern the eviction process: Nonpayment Termination, Lease Violation Termination, Self-help Eviction, and Right to Stay. The second group includes three statutes related to the deposit money that landlords can collect from tenants: Maximum Deposit, Deposit Interest, and Deposit Return. The third sub-index has two provisions regarding maintenance requirements: Rent Withholding and Repair and

Deduct. The remaining three statues make up the fourth group and serve as the base case: Rent Increase Notice, Regular Termination, and Rent Control Preemption. As shown in the last column, eviction law provisions have the largest coefficient estimate, each inducing a 26.4% increase in median rent. The two maintenance statutes have a smaller but still sizeable impact at 9.2%, while the coefficient on the laws regarding deposit money is too imprecisely estimated to be statistically significant.

5.2 Rental Housing Demand, Vacancy, and Homeless Rates

In this section, we discuss our empirical estimates for the relationship between landlord-tenant laws and several other housing outcomes addressed in our theoretical model[14]. Using the number of households as a proxy for rental demand, column (1) of Table 7 shows that demand increases with the level of tenant protection, consistent with our hypothesis earlier. A one-unit increase in our index is associated with a 3.2% increase in the number of households, all else constant.

Next, the negative coefficient on our Tenant-Right Index in the second specification suggests that vacancy rates tend to be lower in areas with stronger tenant protections. In our model, this effect follows from increased rental demand with the assumption of a fixed rental supply, at least in the short run. Our empirical result provides strong support for this prediction as well as assumption. For every one-unit increase in the index, the vacancy rate reduces by 1.13 percentage points, equivalent to a 13% decrease given that the average vacancy rate is 9.96%.

We turn to examine homelessness in the third regression. Contrary to common expectations but consistent with our theoretical prediction, we observe a positive relationship between the Tenant-Right Index and the homeless rate in a city. In other words, our results indicate that tenant-favorable laws inadvertently lead to more homelessness, resulting from increased demand, higher rent, and lower vacancy.

[14]For brevity, we only report selected control variables that are more relevant in all the following tables.

To eliminate the concerns that our results might be driven by cities with rent control policies, we repeat the above estimations excluding these cities and present the results in the last three columns. Again, all coefficients remain robust and comparable in magnitude to the full sample estimates.

5.3 Evictions

Thus far, our analysis points to the conclusion that more stringent landlord regulation can be paradoxically, but unsurprisingly, damaging to tenants in terms of higher rent, lower vacancy, and more homelessness. Meanwhile, advocates of tenant rights have argued for its benefits in the fight against the eviction crisis in the U.S. Table 8 presents our empirical results on the relationship between evictions and the Tenant-Right Index. We use the full sample and exclude rent-control cities in columns (1) and (2), respectively. Both coefficients are statistically significant at the 1% level, and their magnitudes are comparable. Increasing the Tenant-Right Index by one unit reduces the eviction rate by approximately 0.26 percentage points, which translates to an 8.4% decrease considering that the average eviction rate across all cities over our study period is 3.1%.

We also split the Tenant-Right Index into four sub-indexes in a similar manner to the rent regression specified in column (5) of Table 6. Although only statistically significant at the 10% level, the coefficient on the law provisions relating to eviction indicates that they have the most considerable effect on eviction rate at 34.2% percentage points. On the other hand, the other two sub-indexes for Deposit Laws and Maintenance Laws are not statistically significant, albeit carrying the correct negative sign.

The last three specifications in Table 8 use eviction filing rate as the dependent variable. The filing rate includes multiple filings against the same address as described in the data section. In contrast, the eviction rate variable only counts unique eviction judgments and is a more accurate measure of evictions. We do not find any evidence for a relationship between tenant protection and eviction filing rate: landlords seem to file for eviction as often in

landlord-friendly states as they do in more tenant-friendly regions. However, our findings of lower eviction rates indicate that landlords are less likely to obtain eviction judgments with strong protection for tenant rights successfully. Overall, these findings imply that pro-tenant laws prove to be effective in reducing the eviction problem.

These results are all consistent with predictions by the theoretical model described above. A higher tenant rights index attracts household entry into the rental market (as manifested in the positive coefficient of the index in the households regression) and raises rents. Thus, there is a trade-off to landlords between the higher demand for housing and the higher cost of evictions. The greater number of households seeking shelter in a market with a fixed number of units necessarily implies a lower vacancy rate and a greater rate of families without shelter.

Note that this is in contrast to an alternative model with a fixed number of households and an elastic supply of housing. Such a model would predict a lower supply of houses in response to more tenant rights. The exit of supply engenders the same comparative static predictions for the other housing market outcomes but is inconsistent with the data.[15]

5.4 Instrumental Variable Estimation

To address the endogeneity concern regarding our OLS results, and in the absence of a good external instrument, we employ the IV method developed in Lewbel (2012) that makes use of heteroskedasticity to construct instruments. We describe this method in detail in section 4.2 above. Table 9 presents our IV results. Again, we find that the instrumented Tenant-Right Index is positively and significantly correlated with rent, but the magnitude of the coefficient estimate (1.8%) is approximately 40% of the corresponding OLS specification (4.6%). Both the reported K-Paap F-statistics and the Hansen-J statistics suggest that our constructed instruments are valid and the model is well-specified.[16]

[15]We regress the number of housing units on the identical set of regressors as in Table 7 but find a positive coefficient on the index, which is inconsistent with the prediction of reduced supply.

[16]Note that in this specification we include the Land Regulation Index and Tourism variables only in the second stage regression. In an unreported robustness test, we include them in both stages and obtain similar estimations; however, the model fails the Hansen-J test.

Turning to other housing market outcomes, our OLS result regarding the effect of landlord-tenant laws on rental demand still holds with the instrumented Tenant-Right Index, but its magnitude almost halves. Similarly, we again find that protecting tenant rights helps lower eviction rates. The IV point estimate is even more prominent at 0.32 percentage points compared to 0.26 percentage points reported by the OLS model. On the other hand, coefficients for vacancy and homeless rates are no longer statistically significant. All specifications satisfy the traditional K-Paap and Hansen J-statistics thresholds, indicating that the instruments are likely valid.

Our empirical results in this section suggest that while tenant-friendly cities, on average, have lower eviction rates than landlord-friendly areas, the former has worse rent affordability than the latter. It is important for policymakers to recognize the delicate trade-off between tenant protections and rent affordability: imposing strict landlord regulations may protect tenants from potential hardships associated with eviction, but at the cost of higher overall rent levels, and potentially lower vacancy and higher homeless rates in the long run. The welfare effects of tenant rights depend on the presumably large benefits for those who avoid eviction versus a loss of consumer surplus for other housing consumers.

6 Conclusion

Every minute, four renters are evicted from their rental homes. Policymakers are seeking solutions to reduce the level of eviction-triggered residential mobility.

This study provides economic analyses that shed light on the net impact of landlord-tenant laws on eviction and rent affordability. Our paper offers three major contributions to the literature on affordable rent. First, we estimate the net impact of landlord-tenant laws on housing affordability using both ex-ante regulations and ex post-eviction judgments. Second, we construct a novel state-level index to proxy for the level of tenant protections. Third, we provide theoretical suggestions and empirical evidence showcasing the relationship

between tenant rights, eviction rates, and rent prices.

In our OLS models, we find that the empirical outcomes correspond precisely with the predictions of the theory model. In the IV regressions, we find that rent levels, number of households, and evictions are strongly correlated with the extent of tenant protection. A one-unit increase in the Tenant-Right Index is responsible for a 1.8 percentage point increase in both rents and the number of households and a 0.32 percentage point decrease in the number of evictions. Hence, our findings highlight an important trade-off between tenant protections and rent affordability: imposing strict landlord regulations may protect tenants from potential hardships associated with eviction in the short run, but at the cost of higher overall rent levels for everyone in the long run. This has important implications for landlord-tenant regulations that should be of great interest to policymakers.

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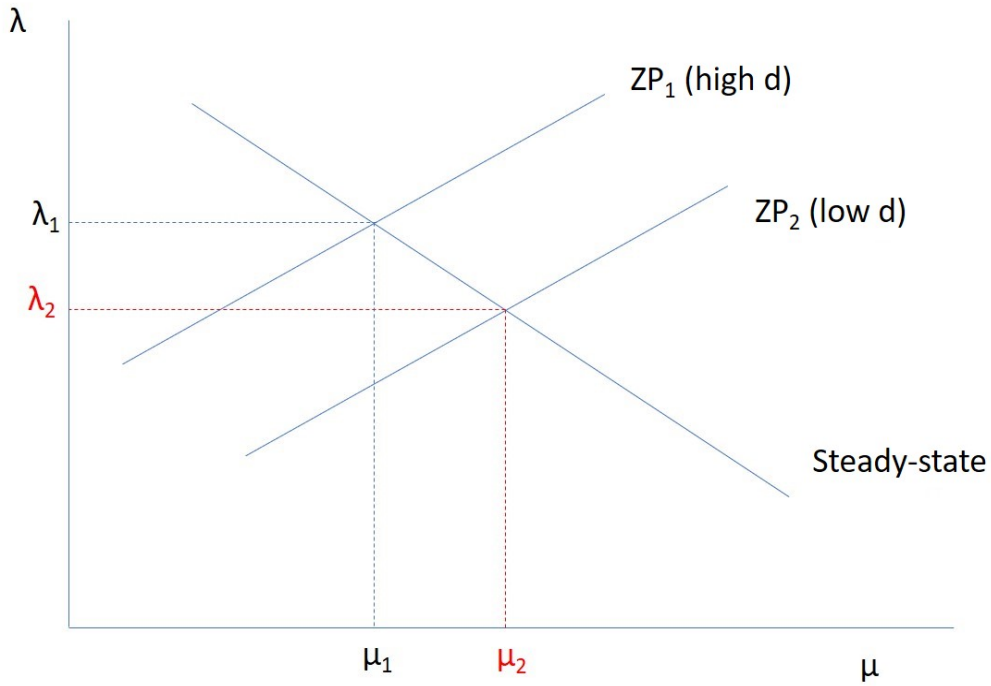
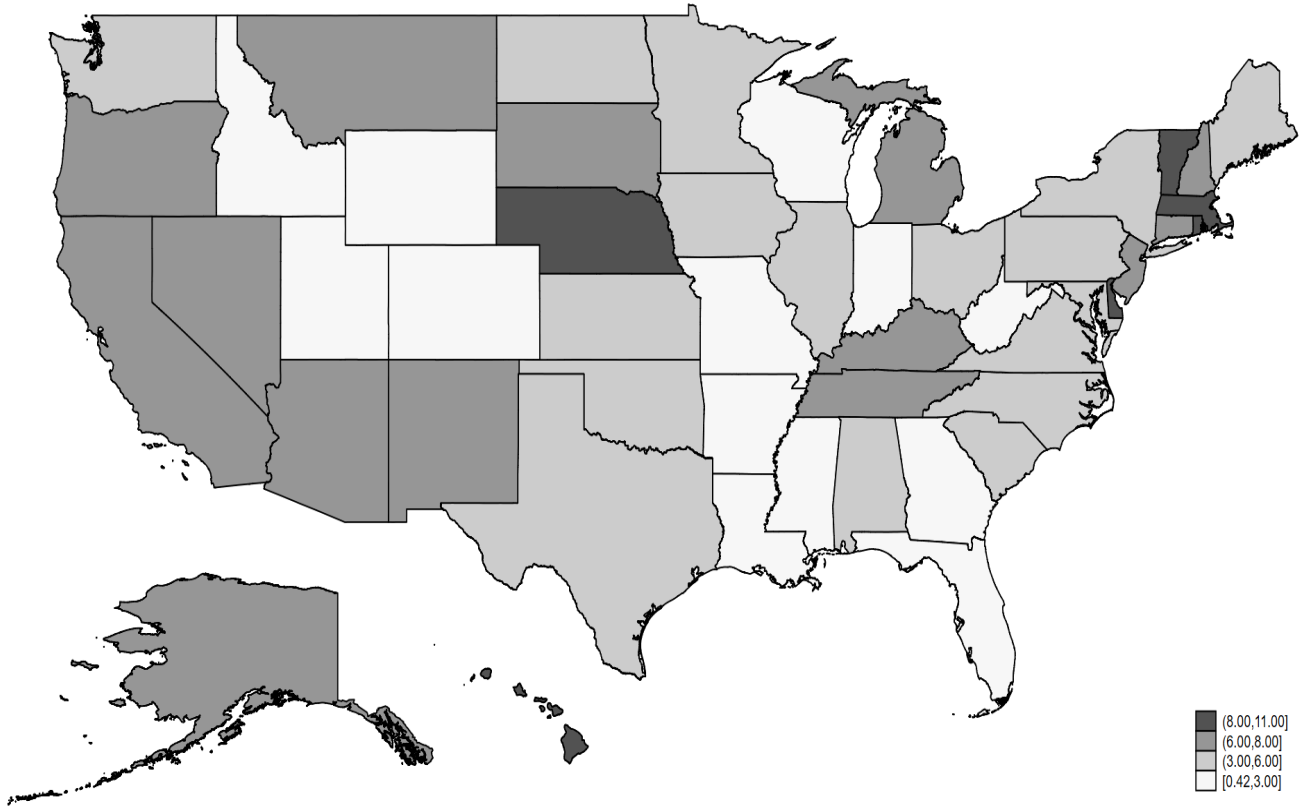
Figure 1: Effect of a Rise in Eviction Cost on Contact Rates



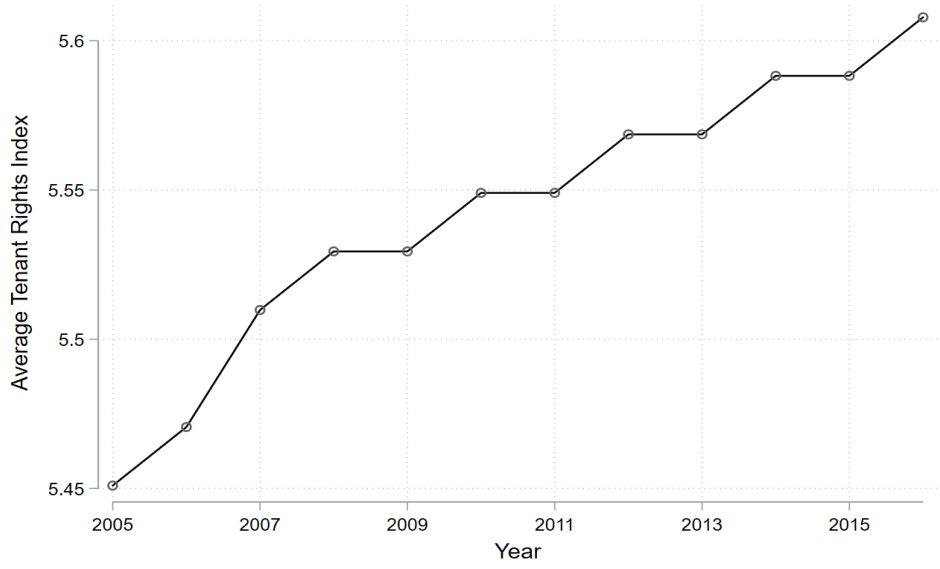
Notes: This figure demonstrates the effect of an increase in d (eviction cost) on the contact rates for tenants (μ), and landlords (λ).

Figure 2: Tenant-Rights Index by State



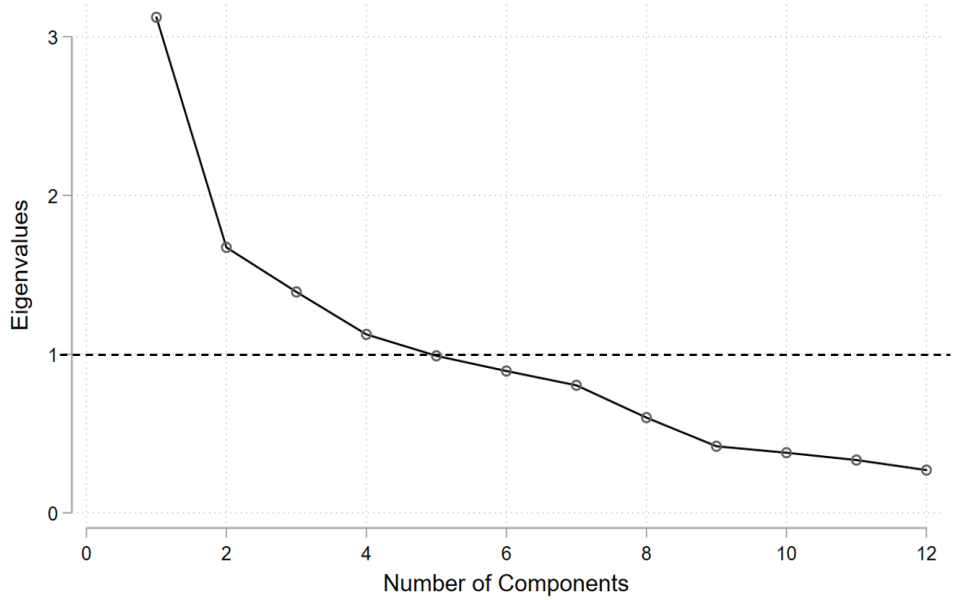
Notes: This figure features a map of the United States with color-coding to highlight the Tenant-Right Index value in each state. The data used in this map are shown in the first column of Table 2.

Figure 3: Tenant-Right Index by Year



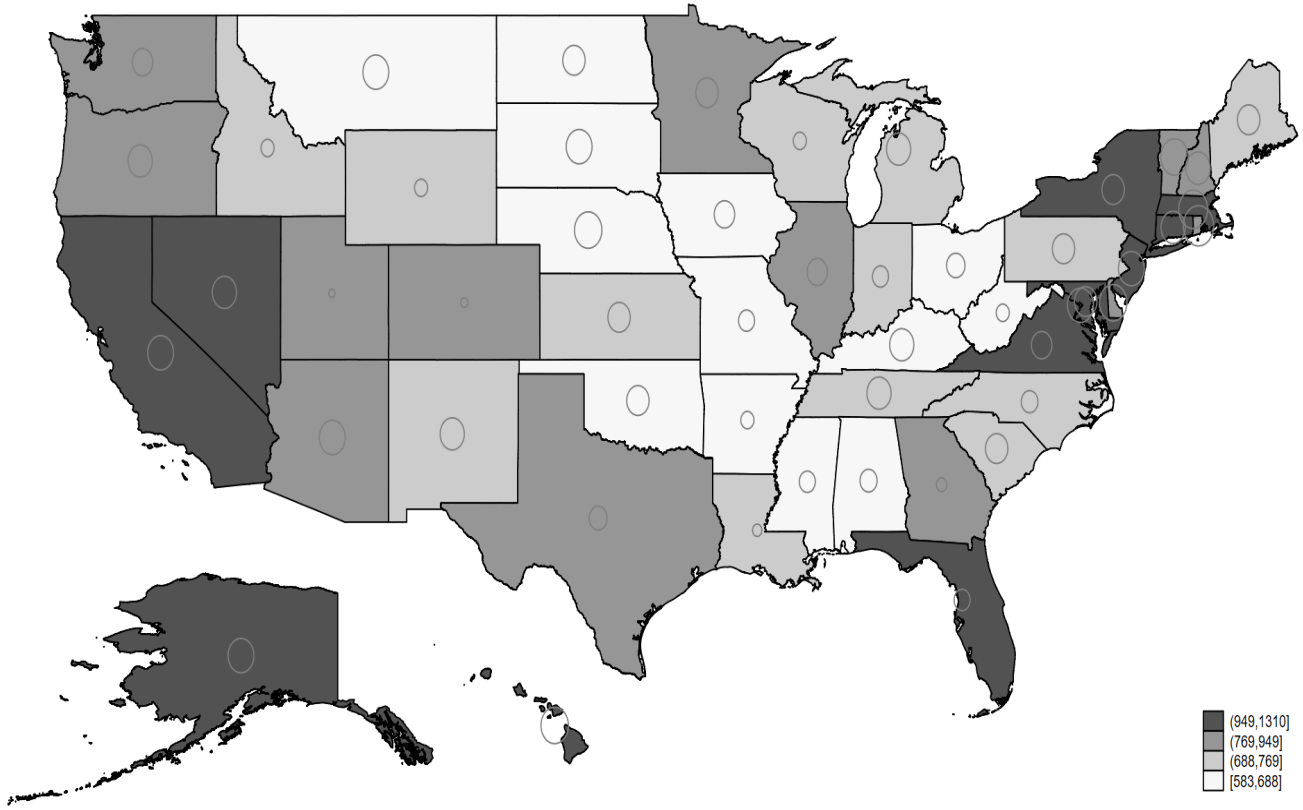
Notes: This figure shows the trend of average Tenant-Right Index by year during our sample period. The average Tenant-Right Index are steadily increasing from 2005 to 2016.

Figure 4: Tenant-Right Index: Principal Component Analysis Eigenvalues



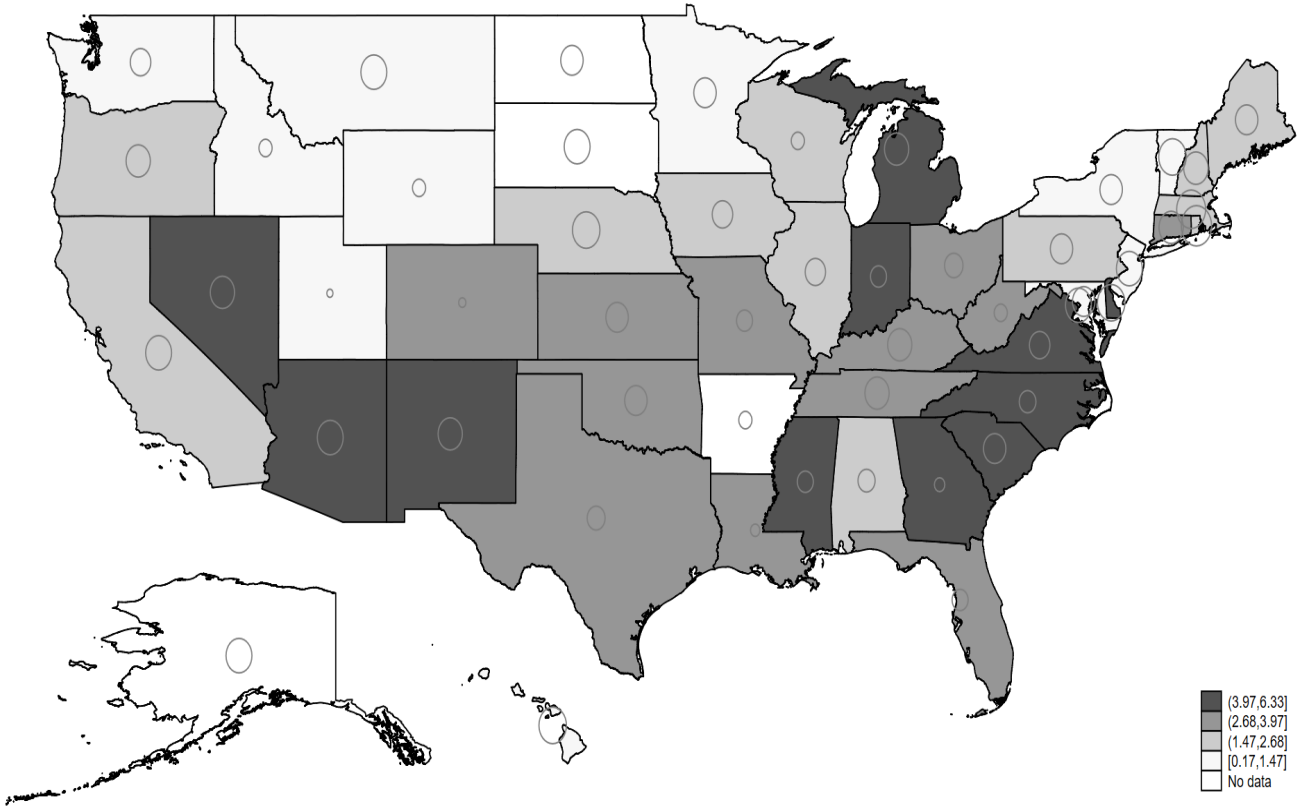
Notes: This figure features the scree plot of eigenvalues from the Principal Component Analysis. The first four principal components have eigenvalues greater than 1. These top four eigenvalues account for 61% of the variance in the Tenant-Right Index.

Figure 5: Tenant-Right Index and Median Gross Rent



Notes: This figure features a map of the United States with color-coding to highlight the levels of Median Rent in each state. The size of the circles corresponds to the value of Tenant-Right Index in that state.

Figure 6: Tenant-Right Index and Eviction Rate



Notes: This figure features a map of the United States with color-coding to highlight the eviction rate in each state. The size of the circles increases with the value of the Tenant-Right Index in that state.

Table 1: Definition of Landlord-Tenant Law Provisions

Abbreviation	Definition	Example
Max Deposit	Maximum security deposit for an unfurnished apartment on a one year lease	One month's rent
Deposit Interest	Whether landlord must keep security deposits in an interest-bearing account	Yes/No
Deposit Return	Deadline for returning security deposit when no deductions are imposed by landlord	45 days
Regular Termination	Minimum notice to change terms or terminate a month-to-month tenancy	30 days
Rent Increase Notice	Minimum notice to increase rent for a month-to-month tenancy	30 days
Rent Withholding	Tenant has the option to withhold rent for failure to provide essential services	Yes/No
Repair and Deduct	Tenant is allowed to repair and deduct costs from rent	Yes/No
Nonpayment Termination	Termination notice required for nonpayment of rent	5 days
Lease Violation Termination	Termination notice required for lease violation	10 days
Self-help Eviction	Amount tenant can sue landlord for self-help eviction	Actual damage
Right to Stay	Whether tenant has the right to stay after illegal eviction	Yes/No
Rent Control Preemption	Whether state laws explicitly pre-empt local governments to control rent	Yes/No

Notes: This table provides the definition of the twelve law provisions regarding landlord-tenant relationships used to construct our Tenant-Right Index.

Table 2: Tenant-Right Index by States (2005-2016)

State	Tenant Rights Index	Max Deposit	Deposit Interest	Deposit Return	Regular Termination	Rent Increase Notice	Withhold Rent	Repair Deduct	Nonpayment Termination	Lease Violation Termination	Self-help Eviction	Right to Stay	Rent Control Preemption
Alabama	3.42	0.83	0	0	0.83	0	0.75	0	0.17	0.83	0	0	0
Alaska	8.00	0	0	1	1	1	1	1	0	0	1	1	1
Arizona	8.00	1	0	1	1	1	1	1	0	0	1	1	0
Arkansas	2.00	0	0	0	1	0	0	0	0	1	0	0	0
California	8.00	0	0	1	1	1	1	1	0	0	1	1	1
Colorado	0.58	0	0	0	0	0	0.58	0	0	0	0	0	0
Connecticut	7.00	0	1	0	0	0	1	1	1	1	1	1	0
Delaware	8.85	1	0	1	1	1	1	1	0	0	0.85	1	1
District of Columbia	8.00	1	1	0	1	0	1	0	1	1	1	0	1
Florida	2.65	0	0	1	0	0	1	0	0	0	0.65	0	0
Georgia	1.25	0	0	0	1	0	0	0.25	0	0	0	0	0
Hawaii	9.00	1	0	1	1	1	1	1	0	0	1	1	1
Idaho	2.00	0	0	1	1	0	0	0	0	0	0	0	0
Illinois	4.92	0	1	0	1	1	1	0.92	0	0	0	0	0
Indiana	3.00	0	0	0	1	1	0	0	1	0	0	0	0
Iowa	5.00	0	0	0	1	1	1	1	0	0	0	1	0
Kansas	6.00	1	0	0	1	0	1	0	1	1	0	1	0
Kentucky	7.00	0	0	0	1	1	1	1	0	1	1	1	0
Louisiana	1.00	0	0	0	0	0	0	1	0	0	0	0	0
Maine	6.00	0	0	0	1	1	1	1	1	0	0	0	1
Maryland	6.00	0	1	0	1	1	1	0	0	1	0	0	1
Massachusetts	10.00	1	1	0	1	1	1	1	1	1	1	1	0
Michigan	6.85	1	0	0	1	0	1	1	0	1	0.85	1	0
Minnesota	6.15	0	1	1	1	0	1	1	0	0	0.15	1	0
Mississippi	3.00	0	0	0	1	0	0	1	0	1	0	0	0
Missouri	3.00	0	0	0	1	0	1	1	0	0	0	0	0
Montana	8.00	0	0	1	1	0	1	1	0	1	1	1	1
Nebraska	9.00	1	0	1	1	0	1	1	0	1	1	1	1
Nevada	7.00	0	0	0	1	1	1	1	0	0	1	1	1

Table 1: Tenant-Right Index by States (2005-2016) (Continue)

State	Tenant Rights Index	Max Deposit	Deposit Interest	Deposit Return	Regular Termination	Rent Increase Notice	Withhold Rent	Repair Deduct	Nonpayment Termination	Lease Violation Termination	Self-help Eviction	Right to Stay	Rent Control Preemption
New Hampshire	7.08	1	1	0	1	1	1	0	0	0.08	1	1	0
New Jersey	8.00	1	1	0	1	1	1	1	1	0	0	0	1
New Mexico	7.00	1	1	0	1	1	1	0	0	0	1	1	0
New York	5.90	0	1	0	1	0	1	1	0	0	0.9	0	1
North Carolina	3.25	1	0	0	0	0	0.25	0	1	0	0	1	0
North Dakota	5.85	1	1	0	1	1	0	1	0	0	0.85	0	0
Ohio	4.00	0	1	0	1	0	1	0	0	0	0	0	1
Oklahoma	6.00	0	0	0	1	0	1	1	0	1	1	1	0
Oregon	7.00	0	0	0	1	0	1	1	1	1	1	1	0
Pennsylvania	6.00	0	1	0	0	0	1	1	1	1	0	0	1
Rhode Island	11.00	1	0	1	1	1	1	1	1	1	1	1	1
South Carolina	6.00	0	0	0	1	0	1	1	0	1	1	1	0
South Dakota	8.00	1	0	1	1	1	1	1	0	0	1	1	0
Tennessee	7.00	0	0	0	1	0	1	1	1	1	1	1	0
Texas	3.45	0	0	0	1	0	0	1	0	0	0.45	1	0
Utah	0.42	0	0	0	0	0	0	0.42	0	0	0	0	0
Vermont	9.00	0	0	1	1	1	1	1	1	1	0	1	1
Virginia	5.00	0	1	0	1	0	1	0	0	1	0	1	0
Washington	5.00	0	0	1	0	1	1	1	0	0	0	1	0
West Virginia	2.00	0	0	0	1	0	0	0	0	0	0	0	1
Wisconsin	2.00	0	0	1	0	0	1	0	0	0	0	0	0
Wyoming	2.00	0	0	0	0	0	1	0	0	0	0	0	1
Average	5.54	0.31	0.27	0.29	0.80	0.41	0.78	0.64	0.26	0.39	0.46	0.55	0.35

Notes: This table reports the individual scores for the twelve legal provisions as well as the final Tenant-Right Index in each state. All are average values over 2005-2016. For the twelve legal provisions, a score of 1 means a state favors tenants to landlords. The Tenant-Right Index is the sum of all twelve provisions.

Table 3: Principal Component Analysis: Correlation Matrix

	Max Deposit	Deposit Interest	Deposit Return	Regular Termination	Rent Increase Notice	Withhold Rent	Repair Deduct	Nonpayment Termination	Lease Violation Termination	Self-help Eviction	Right to Stay	Rent Control Preemption
Maximum Deposit	1.000											
Deposit Interest	0.157	1.000										
Deposit Return	0.125	-0.301	1.000									
Regular Termination	0.229	0.087	-0.001	1.000								
Rent Increase Notice	0.300	0.110	0.247	0.318	1.000							
Rent Withholding	0.174	0.225	0.243	0.125	0.258	1.000						
Repair and Deduct	-0.010	-0.094	0.217	0.212	0.290	0.257	1.000					
Nonpayment Termination	0.185	0.139	-0.184	-0.061	0.053	0.111	0.055	1.000				
Lease Violation Termination	0.064	0.056	-0.164	0.198	-0.255	0.229	0.107	0.354	1.000			
Self-help Eviction	0.366	0.0181	0.234	0.288	0.224	0.357	0.403	-0.035	0.194	1.000		
Right to Stay	0.282	-0.149	0.326	0.255	0.278	0.427	0.419	0.069	0.254	0.565	1.000	
Rent Control Preemption	0.037	0.097	0.244	0.163	0.216	0.298	0.128	0.127	-0.003	0.104	-0.073	1.000

Notes: This table reports the correlation matrix of the twelve variables included in the construction our Tenant-Right Index. The correlation between different variables are low because each of them represents a unique legal aspect of tenant rights.

Table 4: Principal Component Analysis: Eigenvectors

Variable	(1) Comp1	(2) Comp2	(3) Comp3	(4) Comp4	(5) Unexplained
Maximum Deposit				-0.428	0.466
Deposit Interest		0.433	0.457		0.369
Deposit Return		-0.479			0.339
Regular Termination				-0.333	0.603
Rent Increase Notice	0.320		0.438		0.345
Rent Withholding	0.369			0.325	0.425
Repair and Deduct	0.339				0.547
Nonpayment Termination		0.492			0.483
Lease Violation Termination		0.497	-0.430		0.224
Rent Control Preemption	0.426				0.373
Right to Stay	0.434				0.245
Rent Control Preemption			0.428	0.566	0.273

Notes: This table reports eigenvectors of the four leading components. In these results, the first principal component primarily loads on rent related factors. The second component primarily loads on deposits and termination related factors. The third component and the fourth component include a wide range of tenant right proxies. Blanks are abs(loading)$<$ 0.3.

Table 5: Descriptive Statistics

Variables	(1) N	(2) Mean	(3) Std. Dev.	(4) Min	(5) Max
	City Level Data				
Population ('000)	6,532	197.09	446.30	55.41	8550.41
Density (persons/square miles)	6,532	4201.96	3928.19	156.21	54026.60
Median Household Income ('000)	6,532	53.93	19.11	18.01	151.37
Share of Minority Population (%)	6,365	33.79	17.65	3.02	96.86
Median Number of Rooms	6,532	4.20	0.43	1.30	8.20
Median Property Age (years)	6,532	36.13	14.13	4.00	77.00
Median Property Tax	6,532	2637.77	1508.93	181.00	10000.00
Homeownership Rate (%)	6,532	56.83	12.26	16.55	96.71
Rent Burden (gross rent as % of income)	6,532	22.67	4.66	11.00	63.62
Unemployment Rate (%)	6,482	7.59	3.91	1.04	50.63
Median Gross Rent ($)	6,532	983.56	296.52	466.00	3042.00
Gross Rent - 30th Percentile ($)	2,954	795.40	250.44	330.00	2160.00
Number of Households ('000)	6,438	73.47	165.09	12.54	3,148.07
Vacancy rate (%)	2,785	9.96	4.19	1.10	33.14
Eviction filing rate (%)	5,296	6.62	7.12	0.00	62.13
Eviction rate (%)	5,296	3.10	2.56	0.00	20.98
	State Level Data				
Tenant Rights Index	612	5.54	2.65	0.00	11.00
Land Regulation Index	612	5.99	10.00	0.00	78.00
Tourism Industry - GDP Output ('000)	612	8.97	10.73	0.85	68.03
Share of Homeless Population (%)	500	0.17	0.09	0.05	0.55

Notes: This table reports the summary statistics of variables used in the empirical tests.

Table 6: Tenant-Right Index and Rent Affordability

Dependent Variable:	(1) Median Rent	(2) Median Rent	(3) Median Rent	(4) 30th Percentile Rent	(5) Median Rent
Tenant Right Index	0.046***	0.045***	0.044***	0.043***	
	(0.007)	(0.006)	(0.006)	(0.011)	
Eviction Law Provisions					0.264***
					(0.034)
Deposit Law Provisions					0.030
					(0.074)
Maintenance Law Provisions					0.092***
					(0.021)
Population	0.001	0.001	-0.001	-0.010	0.001
	(0.005)	(0.005)	(0.006)	(0.018)	(0.005)
Population Density	0.004*	0.004*	0.009***	0.016***	0.004*
	(0.002)	(0.002)	(0.002)	(0.005)	(0.002)
Median Income	0.559***	0.547***	0.550***	0.587***	0.546***
	(0.022)	(0.023)	(0.023)	(0.055)	(0.023)
Median Number of Rooms	0.103***	0.101***	0.108***	0.117***	0.101***
	(0.008)	(0.008)	(0.008)	(0.021)	(0.008)
Share of Houses Built after 2010	0.075*	0.056	0.035	-0.090	0.055
	(0.041)	(0.042)	(0.041)	(0.119)	(0.042)
Property Tax	0.135***	0.137***	0.136***	0.160***	0.137***
	(0.014)	(0.014)	(0.014)	(0.029)	(0.014)
Homeownership Rate	-0.004***	-0.004***	-0.004***	-0.005***	-0.004***
	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)
Land Regulation Index		-0.001***	-0.001***	-0.001**	-0.001***
		(0.000)	(0.000)	(0.000)	(0.000)
Tourism		0.004***	0.004***	0.002*	0.004***
		(0.000)	(0.001)	(0.001)	(0.000)
Observations	6,532	6,532	6,079	1,937	6,532
R-squared	0.883	0.885	0.886	0.849	0.885
State FE	Yes	Yes	Yes	Yes	Yes
Include rent control cities	Yes	Yes	No	Yes	Yes
Adj-R	0.882	0.884	0.885	0.845	0.884

Notes: This table reports our OLS estimation results of Equation 38 in Section 4. The dependent variables are rent measures. Standard errors are calculated at the city level. Clustered standard errors are shown in parentheses (*** p<0.01, ** p<0.05, * p<0.1)

Table 7: Housing Supply, Vacancy, and Homeless Rate

VARIABLES	(1) Households	(2) Vacancy Rate	(5) Homeless Rate	(3) Households	(4) Vacancy Rate	(6) Homeless Rate
Tenant Right Index	0.032*	-1.131***	0.008**	0.032*	-1.115***	0.009**
	(0.019)	(0.358)	(0.004)	(0.019)	(0.362)	(0.004)
Median Income	-0.007***	-0.004	3.625**	-0.009***	0.002	4.587**
	(0.003)	(0.014)	(1.738)	(0.002)	(0.015)	(1.792)
Unemployment rate	-0.008	0.153***	0.008**	-0.006	0.149***	0.009***
	(0.006)	(0.055)	(0.003)	(0.006)	(0.057)	(0.003)
Median Property Tax	0.028	-0.157	-0.026*	0.069*	-0.204	-0.030*
	(0.041)	(0.151)	(0.014)	(0.038)	(0.187)	(0.015)
Share of Minority Population	0.008***	0.008	0.000	0.007***	0.008	0.000
	(0.002)	(0.008)	(0.001)	(0.002)	(0.009)	(0.001)
Land Regulation Index	0.001*	0.052***	0.003	0.001	0.050**	0.004**
	(0.001)	(0.017)	(0.002)	(0.001)	(0.020)	(0.002)
Tourism	0.000	-0.217***	0.002	0.002	-0.256***	0.001
	(0.003)	(0.034)	(0.001)	(0.003)	(0.039)	(0.001)
Observations	6,292	2,761	500	5,843	2,525	460
State FE	Yes	Yes	No	Yes	Yes	No
Adjusted R-squared	0.150	0.282	0.353	0.181	0.266	0.375
Include rent control cities	Yes	Yes	Yes	No	No	No

Notes: This table reports our OLS estimation results of Equation 38 in Section 4. The dependent variables are logged number of households in thousands, vacancy rate (%), and homeless rate (%). Standard errors are calculated at the city level. Clustered standard errors are shown in parentheses. (*** p<0.01, ** p<0.05, * p<0.1)

Table 8: Tenant-Right Index and Eviction (OLS)

Dependent Variable:	(1) Eviction Rate	(2) Eviction Rate	(3) Eviction Rate	(5) Eviction Filing Rate	(6) Eviction Filing Rate	(7) Eviction Filing Rate
Tenant Rights Index	-0.261**	-0.267**		0.258	0.241	
	(0.130)	(0.132)		(0.290)	(0.294)	
Eviction Laws			-0.342*			0.534
			(0.178)			(0.337)
Deposit Laws			-0.240			-1.140
			(0.385)			(0.791)
Maintenance Laws			-0.261			0.394
			(0.281)			(0.631)
Rent Burden	0.044*	0.053**	0.044*	-0.004	0.001	-0.004
	(0.023)	(0.025)	(0.023)	(0.052)	(0.052)	(0.052)
Share of Minority Population	0.039***	0.044***	0.039***	0.109***	0.107***	0.109***
	(0.005)	(0.005)	(0.005)	(0.014)	(0.014)	(0.014)
Population density	-0.074**	-0.157***	-0.074**	-0.208***	-0.306***	-0.209***
	(0.037)	(0.027)	(0.037)	(0.048)	(0.062)	(0.048)
Homeownership Rate	0.007	0.003	0.007	-0.018	-0.021	-0.018
	(0.007)	(0.008)	(0.007)	(0.018)	(0.019)	(0.018)
Observations	5,296	4,958	5,296	5,389	5,051	5,389
State FE	Yes	Yes	Yes	Yes	Yes	Yes
Include rent control cities	Yes	No	Yes	Yes	Yes	Yes
Adjusted R-squared	0.463	0.466	0.463	0.633	0.614	0.633

Notes: This table reports our OLS estimation results of Equation 38 in Section 4. The dependent variables are eviction rate (%) and eviction filling rate (%). Standard errors are calculated at the city level except for the homeless regressions in which standard errors are clustered at the state level. Clustered standard errors are shown in parentheses. (*** p<0.01, ** p<0.05, * p<0.1)

Table 9: IV Results using Lewbel (2012) Method

Dependent Variable:	(1) Rent	(2) Households	(3) Vacancy Rate	(4) Homeless Rate	(5) Eviction Filing Rate	(6) Eviction Rate
Tenant Rights Index	0.018***	0.018*	-0.245	-0.014	0.482	-0.322**
	(0.005)	(0.010)	(0.394)	(0.028)	(0.392)	(0.146)
Median Number of Rooms	0.054***					
	(0.008)					
Median Age	0.289***					
	(0.036)					
Population	0.239***					
	(0.036)					
Population Density	0.007				-0.564***	-0.314***
	(0.006)				(0.203)	(0.084)
Homeownership Rate	-0.007***				0.004	0.031***
	(0.000)				(0.017)	(0.008)
Median Income	0.416***	0.002***	-0.058**	3.984*		
	(0.017)	(0.000)	(0.027)	(2.242)		
Median Property Tax	0.194***	0.020***	-0.108	-0.006		
	(0.014)	(0.004)	(0.400)	(0.024)		
Land Regulation Index	-0.000	-0.000*	0.049***	0.001		
	(0.000)	(0.000)	(0.017)	(0.002)		
Tourism	0.002***	0.003***	-0.214***	0.002		
	(0.000)	(0.000)	(0.040)	(0.002)		
Unemployment Rate		0.002***	0.055	0.010**		
		(0.001)	(0.039)	(0.004)		
Share of Minority Population		0.000	-0.056***	0.001	0.011	-0.005
		(0.000)	(0.021)	(0.002)	(0.007)	(0.004)
Rent Burden					-0.057**	-0.021
					(0.024)	(0.013)
K-P F Stats	91.63	65.73	29.79	0.206	34.63	34.63
Hansen J	1.04	16.03	9.77	4.622	3.65	3.7
Observations	6,532	6,292	2,762	500	5,389	5,296
R-squared	0.705	0.120	0.063	0.056	0.010	0.030
State FE	Yes	Yes	Yes	No	Yes	Yes

Notes: This table reports our second stage IV estimation results of our main results using the Lewbel (2012) method. The control variables include population, population growth, population density, median household income, growth of household income, poverty rate, and the share of the minority (non-white) population. Standard errors are calculated at the city level except for the homeless regressions in which standard errors are clustered at the state level. Clustered standard errors are shown in parentheses. (*** p<0.01, ** p<0.05, * p<0.1)