Insecure property rights and the housing market: Explaining India's housing vacancy paradox[☆]

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ABSTRACT

One housing paradox in many markets is the simultaneous presence of high costs and high vacancy rates. India has expensive housing relative to incomes and an urban housing vacancy rate of 12.4%. We show how insecure property rights in India, as a result of rent control and weak contract enforcement, increases vacancy rates. Using a two-way linear fixed effects panel regression, we exploit changes in rent control laws in the states of West Bengal, Karnataka, Gujarat, and Maharashtra to find that pro-tenant laws are positively related to vacancy rates. A pro-landlord policy change liberalizing rent adjustments could potentially reduce vacancy rates by 2.8 to 3.1 percentage points. Contract enforcement measured by density of judges is negatively related to vacancy. We estimate that a policy change in rent control laws would have a net welfare benefit and could reduce India's housing shortage by 7.5%.

1. Introduction

India had 11.1 million vacant housing units in 2011 comprising 12.4% of its urban housing stock. The fact that a large number of vacant housing units exist alongside high housing prices and an acute housing shortage of 18.8 million units is a puzzle.[1,2] India is not alone in this regard. Cities in Mexico and China also have high vacancies.[3] With cities around the world facing severe housing shortages, the issue of vacant housing – the apparent opposite of a shortage – has gained prominence.[4,5]

We show that the paradox of high vacant housing in the presence of a severe housing shortage in India is a function of insecure property rights. In an efficient market, a rental contract between the landlord and the tenant is an allocation of rights of ownership of the property determined by the two parties for a period of time. The contract's aim is to define precisely these property rights thereby reducing uncertainties, risks, and disputes. We hypothesise that institutions that undermine the certainty about the terms of these contracts lead to an inefficient outcome such as higher vacancies than would be found in efficient markets. Specifically in a world of contract uncertainty,

The Indian government has introduced a Model Tenancy Act to reduce vacancy rates. We will discuss the Model Tenancy Act later in the paper.

landlords may prefer the option of keeping the unit vacant relative to the possibility of being hampered by a low-paying and disputatious tenant.

Two phenomena could create uncertainty in this allocation of rights of ownership between the landlord and the tenant. First, rent control, whose aim is to protect tenants from rent increases and evictions, alters the allocation of ownership in favor of the tenant. Second, if courts take long to resolve disputes, the ownership of the property could *de-facto* belong to the tenant for this duration and thus increase the risks for the landlord. Lengthy judicial resolution of claims raises costs, even if the correct outcomes are eventually realized. Additionally, weak contract enforcement owing to high judicial pendency raises the incentives of tenants to renege on the contract. The presence of either of these two conditions reduces *ex-ante* incentives for the landlord to engage in a rental contract. High vacancy rates are a natural consequence of reducing the benefits and raising the costs to a landlord of renting.

Academic literature on reasons for vacant housing has looked at the impact of government housing finance (Monkkonen, 2019; Reyes, 2020), inequality (Zhang et al., 2016), restrictive regulations (Cheshire et al., 2018), rent control (Gabriel and Nothaft, 2001; Mayo et al., 1981) and investments in housing for speculative purposes (Struyk, 1988). We add to this literature by looking at how insecure property rights in India, as a result of rent control and weak contract enforcement, increase vacancy rates.

We will argue that rent control laws in India, laws which are also found in other countries, have led some owners of properties to prefer keeping units vacant to renting them out. These laws thus lead to the simultaneous reduction in housing units available for rent (and, hence, a rise in prices) and an increase in vacancy of housing units. We show that the repeal of such laws could lead to more rental units and lower vacancy. Developing countries often have overstretched judiciary systems which are unable to resolve expeditiously contract disputes, including tenant-landlord disputes (Djankov et al., 2003). We argue that weak contract enforcement, an acute problem in India, adversely affects housing markets.[6] As such, India provides an object lesson for other countries.

The negative impact of hard rent control on housing markets is well documented in the literature (see Arnott, 1988; 1995; Malpezzi, 1998; Malpezzi and Ball, 1993) but few papers (Malpezzi and Tewari, 1991; Gabriel and Nothaft, 2001; Segú, 2020), to our knowledge, document its possible impact on housing vacancy.

We exploit changes in the rent control laws in the states of West Bengal, Karnataka, Gujarat, and Maharashtra for our study. We define the treated group as districts in states where rent control laws changed and the control group as districts in states where there were no changes. We use a two-way linear fixed effects panel regression design to establish a relationship between pro-tenant rent control laws and vacancy rates in districts between 2001 and 2011.

Our results show that a pro-landlord policy move that relaxes rent revisions could potentially reduce housing vacancy by 2.8 to 3.1 percentage points and lead to a net welfare gain. Such a move, we estimate, would also reduce India's housing shortage. We estimate that the housing shortage would drop as much as 7.5% in states that liberalize their rent revision laws. This paper adds to earlier work done by Malpezzi and Tewari (1991), who look at the relationship between state level urban vacancy rates in 1981 and rent control regulations in India. They find that stringent rent control laws have no impact on housing vacancy. A lot has changed in the past few decades in housing markets in India. In particular, vacancy rates increased from 8% in 1981 to 12% in 2011

(see panel B in Fig. 1) and many states reformed their rent control laws post 1991. These changes in both vacancy rates and rent control laws make a strong case for revisiting this question. Moreover, Malpezzi and Tewari (1991) report correlations and multivariate regressions, whereas we perform panel regressions.

We also hypothesize that slow-moving judicial systems discourage property owners from renting to tenants; so far as we know, we are the first to test this hypothesis. We measure judiciary efficiency at the district level with the number of district judges per 1000 persons. We find that, a one to two standard deviation increase in judges per 1000 persons (urban) could reduce vacancy by 0.43 to 0.86 percentage points. We address possible endogeneity concerns using an instrument – distance of a district to the High Court.

This paper is divided into the following sections. Section 2 is a broad overview of the housing market in India, with a focus on rental and vacant housing. Section 3 frames the problem of renting within the property rights framework. Section 4 describes the data sources and Section 5 discusses the empirical strategy. Section 6 presents results. Section 7 looks at the welfare implications of rent control policy changes and Section 8 concludes.

2. Context

2.1. Housing in India

Formal housing supply has not kept pace with the shifting demand in Indian cities. Stringent land use regulations (see Brueckner and Sridhar, 2012; Sridhar, 2010),[7] delays in housing construction (Gandhi et al., 2021), and limits on ownership of private land (Siddiqi, 2013) have all slowed housing supply in India. The unresponsiveness of the formal market has made housing unaffordable (see Bertaud, 2010), leading to an urban housing shortage of 18.8 million units[8] and 17.4% of urban households living in slums in 2011. At the same time 11.1 million housing units are vacant (see panel A in Fig. 1).

Renting as a percentage of total units in urban India has declined from 53% in 1971 to 28% in 2011 (see panel B in Fig. 1) and ownership rates have increased. Glaeser (2022) attributes this to strict rent control laws in India that make it difficult to revise rents and evict tenants. According to the Census of India, 26.3% of those living in slums rent and 27.8% of those in the formal market rent (see Table A.1).[9] Using monthly per capita expenditure (MPCE) as a proxy for income, we see that while share of renting is the highest for households in the top quintile, renting is also an important choice for middle-income households (see Table A.2). The formal rental market in India has two types of units: those that are protected under the rent control laws with tenants paying much less than market rents and those that are outside the rent control laws where tenants are paying market or uncontrolled rents. A fraction of units under rent control pay "fair rents," which the rent controller sets.[10] Unfortunately, there are no data as to the proportion of rental housing under each of these categories.

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[6] Comparing time taken to enforce contracts across 190 countries, Greece is the lowest ranked developed country, with a rank of 145. India ranks 163. See: https://www.doingbusiness.org/en/data/exploretopics/enforcing-contracts

[7] One prevalent land use regulation in Indian cities is a floor area ratio limit. Local bodies raise considerable revenues by charging for larger floor area ratio allowances (see Gandhi and Phatak, 2016).

[8] Estimated by Ministry of Housing and Urban Poverty Alleviation, Government of India (2012).

[9] The low share of renting in slums is contrary to the popular belief that renting is the dominant tenure choice given the flux of labour and absence of formal regulations. In a study of slums in Pune, a survey finds that 15% of households were renting (Nakamura, 2016). While comparing slums across different cities in the world, Marx et al. (2013) find that 26% of the slum households in Mumbai are in rental accommodation.

[10] All Indian rent control laws have "fair rent" provisions to fix rents for controlled units. These allow the rent courts to fix rents if they are approached by a landlord or tenant, or the house rent was fixed under a previous law and a new rent contract is made. The rent controller sets the rent based on a rent setting formula which accounts for multiple factors, including year of construction, cost
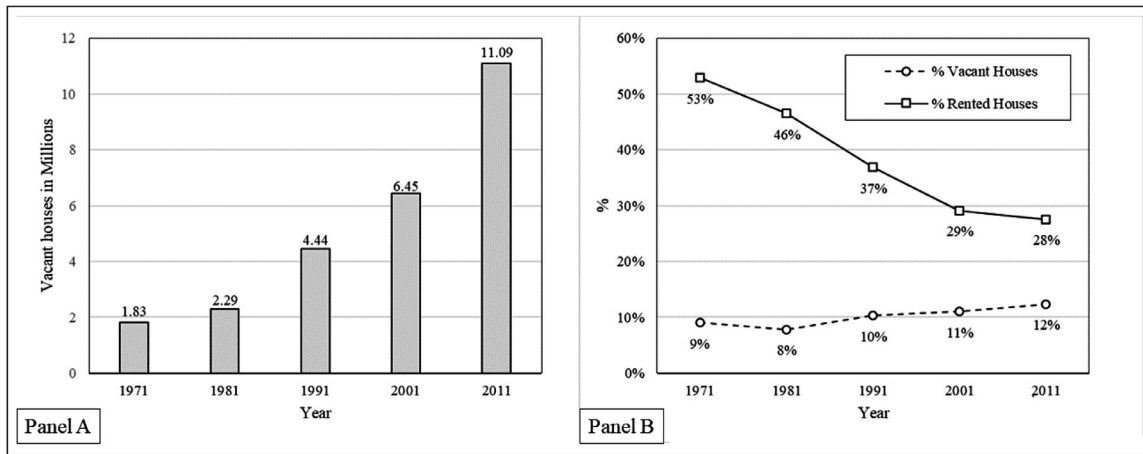
Fig. 1. Percent rental and vacant houses in urban India Note: Panel A shows the absolute number of vacant housing units in millions in urban India between 1971-2011. Panel B shows the percent rental and vacant housing in urban India during 1971-2011. Source: Authors' calculations using Census of India (various years).
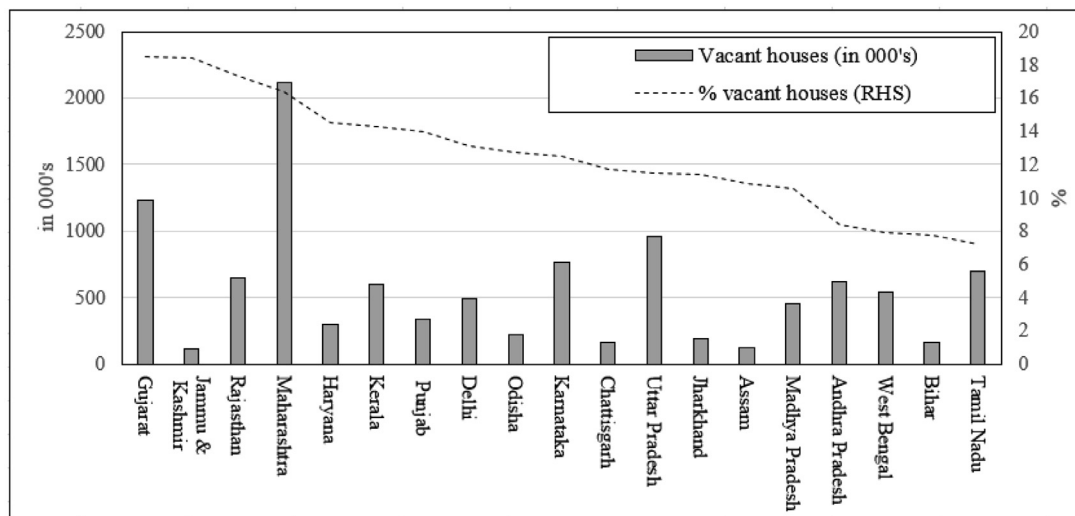

Fig. 2. Percent urban vacant houses in major states Source: Adapted from Gandhi and Munshi (2017) and IDFC Institute (2018) using Census of India 2011.

While the share of rental housing has been falling, the annual growth rate of vacant houses between 1971 and 2011 was 12.7% – 75% faster than the growth of urban households in the same period. Given that the average urban household size in India is 4.66 people, the vacant stock of 11.1 million units could house almost 50 million people or around 13% of the urban Indian population.

Housing vacancies can be of two types: "frictional' and quasi-permanent (Segú, 2020, pp. 2-3). Frictional vacancy arises from the searching and matching of housing associated with the mobility of people. Quasi-permanent vacancies happen when landlords keep their properties out of the rental market due to low risk-adjusted returns.

Fig. 2 shows the share and number of vacant urban houses for 19 major states and union territories in India. They constitute 96.5% of the

total of 11.1 million vacant houses in urban India. Among the larger states, Gujarat has the highest vacancy rate (around 19%), followed by Jammu and Kashmir, Rajasthan, and Maharashtra.[11] Almost all of western India has higher residential vacancy rates as compared to the average of 12.4% (see Fig. A.1).[12]

Fig. 3 shows the vacant housing situation in Indian cities, each having more than 30,000 vacant houses. Towns on the outskirts of major cities have the highest proportion of their residential stock vacant.[13] Greater Mumbai has the highest *number* of vacant houses (comprising 15% of its residential housing stock), followed by Delhi and Bangalore.

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of construction, inflation, prevailing rents in the neighborhood, taxes owed to the municipality etc. Often, these laws also allow the rent controller's discretion in the rent setting process. Thus, rent setting is also a product of more nebulous characteristics such as the circumstances of the case, agreements between landlords and tenants, and the rent controller's assessment of the prevailing rent. However, the acts are quite clear about when and how rents can be increased. This is why we use these rent revision clauses specified in the acts to define one of our variables of interest.

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[11] Among all the states and union territories of India, Goa has the highest vacancy rate at 31.3%.

[12] The median vacancy rate at district level is around 12%. The distribution is right-skewed, with 77 out of 637 districts having more than 20% of their residential stock vacant.

[13] Greater Noida, in the periphery of Delhi, has the highest vacancy rate (61%). Greater Noida is classified as a census town. Census towns are areas that have urban characteristics but lack an urban local body. In practice, Greater Noida was created as an industrial development area, and is governed by an industrial development authority. Vasai Virar in the outskirts of Mumbai has the second-highest vacancy rate at 28%.
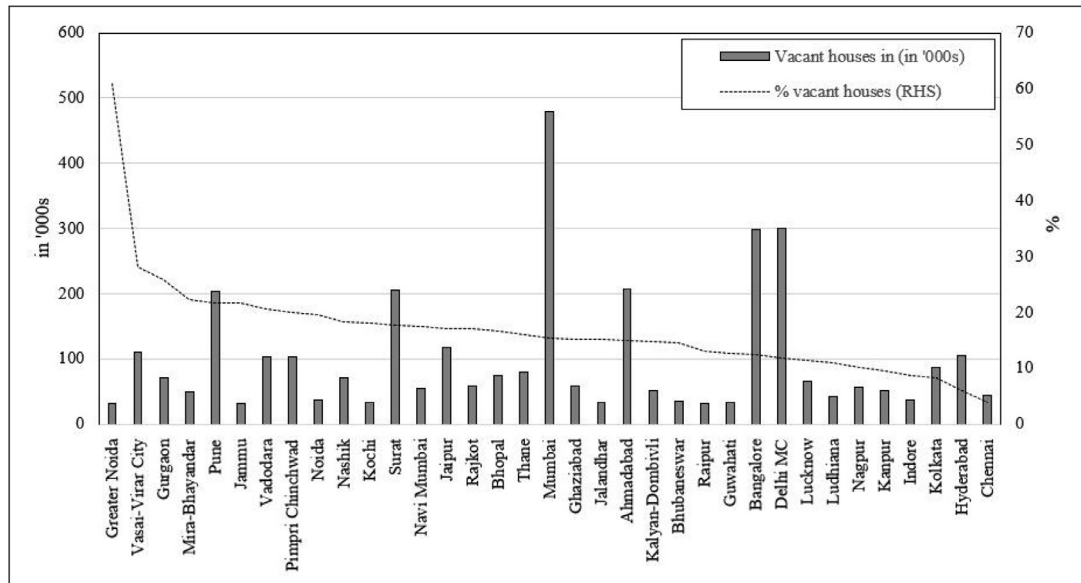
Fig. 3. Vacant houses in major cities Source: Adapted from Gandhi and Munshi (2017) and IDFC Institute (2018) using Census of India 2011.
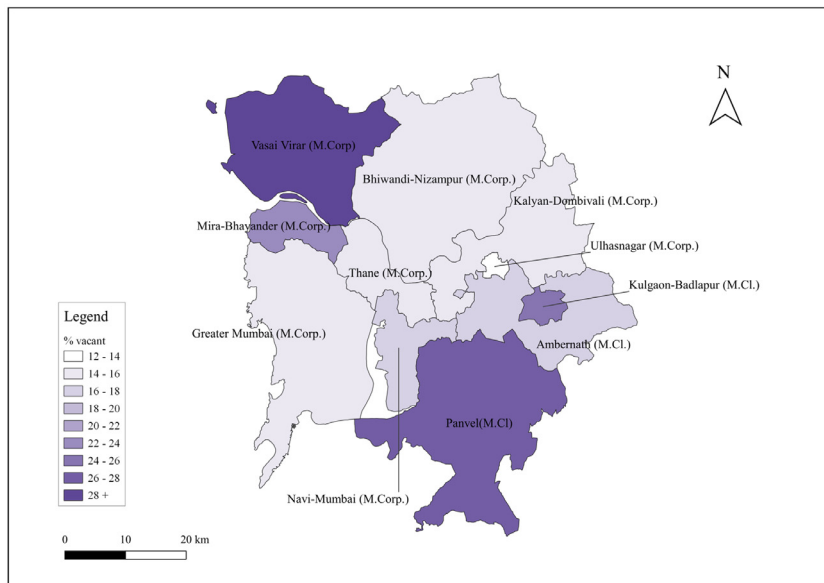

Fig. 4. Vacancy rates for cities in Mumbai Metropolitan Region Source: Authors' mapping using data from Census of India, 2011. Note: M. Corp is Municipal Corporation, M. Cl is Municipal Council, and MCGM is Municipal Corporation of Greater Mumbai.

The state of Maharashtra has the highest number of vacant houses (2.1 million), which make up around 19% of vacant houses in urban India. The Mumbai metropolitan region makes up 44% of the vacant houses in Maharashtra.[14] From Figs. 4 and 5, we can affirm that non-primate cities in the periphery of the metropolitan cities of Mumbai and Delhi have much higher vacancy rates. This may reflect investors deciding to purchase a large number of housing units that they opted not to rent out, adding to the count of quasi-permanent vacancies.

There are very few studies that look at vacancy rates in private housing markets in India. Gandhi and Munshi (2017) study vacancy rates in India by looking at both public and private housing markets. They find high vacancy rates in the Government of India's sponsored public housing schemes, a finding also noted by Pande (2017). These high va-

cancy rates may owe to households' fear of losing their social networks. Households are thus reluctant to move from slums in cities' core areas to government housing in the peripheries (see Barnhardt et al., 2017). Gandhi and Munshi (2017) also find that the low returns on investments in the private rental market are a possible reason for high vacancy rates in urban India. They find gross rental yields range between 2%-4% in most Indian cities.

Another potential explanation for high vacancies is the existence of rampant black money flowing through real estate in India. An important source of black money is the partial payment (a fixed proportion of the price of the property) made by property buyers from off-the-books sources of money. Thus, one reason for buying property is to park money that has not been declared to tax authorities. These properties are often kept vacant.[15] Prima facie, neither low rental yields nor black money

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[14] Fig. 4 shows the vacancy rate for all towns and cities in the Mumbai metropolitan region. Vasai Virar, Mira Bhayandar, Panvel, and Badlapur have more than 20% of their residential stock vacant, which is much more than Greater Mumbai's.

[15] Kapur and Vaishnav (2015) argue that builders use the black money to fund election campaigns, in exchange for favors and exemptions. They establish the relationship between black money and real estate by looking at trends in de-
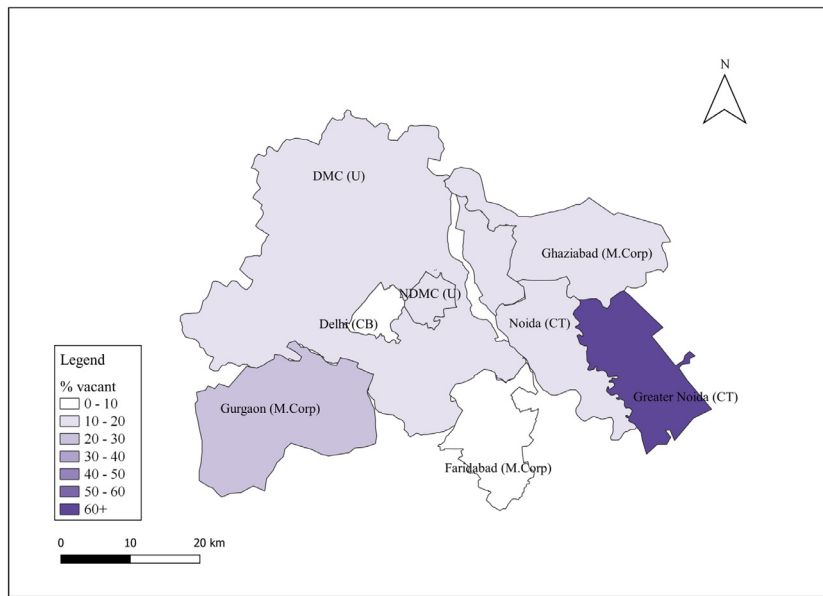
Fig. 5. Vacancy rates for cities in Delhi Region Source: Authors' mapping using data from Census of India, 2011. Note: CB is Cantonment Board, CT is Census Town, DMC is Delhi Municipal Corporation, NDMC is New Delhi Municipal Corporation, and OG is Outgrowth.

purchases should dissuade a rational agent from renting out their property. However, in section 3, we hypothesize that the nature of rent control laws and weak contract enforcement in India could discourage property rental.

2.2. Distortions in the housing market

Frictions in demand and supply within the housing market lead to some level of "natural" or "structural" vacancies– referred to as frictional vacancy – even in equilibrium. The natural vacancy rate is akin to the natural unemployment rate – it is the product of a matching problem. For cities in the United States, Rosen and Smith (1983) show that when actual vacancy rates diverge from the natural vacancy rate, price adjustments in the housing market bring vacancy back to its natural rate. The natural rate is not zero because the housing market contains frictions.

Search and match issues increase with turnover – when people move from one housing unit to another, they create, at minimum, a short period of vacancy, as units rarely fill the instant they become vacant. A series of papers (eg. Rosen and Smith, 1983; Eric and John, 1996; Amy et al., 2000; Komai, 2001) show that a higher turnover rate leads to higher natural vacancy. Therefore, one would expect that a well-functioning housing market would have higher vacancy among renters, whose leases are finite, than owners, whose "leases" are effectively in perpetuity. Indeed, American Community Survey (ACS) Data and Current Population Survey data show that (1) length of tenure in owner-occupied houses is much longer than in rental units[16] and (2) vacancy rates among rental units are much higher than among owner-occupied units.[17] Hence, it would follow that places that relied more on rental housing would have higher overall housing vacancy rates than those that relied on owning. This relationship between vacancy and rental

share is evident for USA (Panel A in Fig. 6)[18] but not for India (Panel B in figure 6). Table A.4 presents regression results looking at the covariation of rental share and vacancy by district and cities in India. We find a negative correlation between rental share and vacancy.[19] This could reflect the fact that renters protected by the rent control laws in India have strong tenure security, and hence, lower turnover. While these policies provide stability to those in rental units, it also reduces the appeal to property owners for renting out their units. Stringent rent control policies may explain the decline in the share of units available for rent in India over the past five decades.[20]

2.3. History of rent control in India

During the First World War, food price inflation in India (particularly in Bombay) led landlords to increase rents steeply, causing a rise in evictions.[21,22] In order to curb rising rents and evictions, a rent control law was introduced for the first time in Bombay in 1918, followed by in Calcutta in 1920 (Tembe, 1976). Other states introduced rent control after the Second World War (Jauhar, 1995). While these acts protect tenants, they also permit landlords to evict tenants and increase rents under certain conditions.

For instance, nearly all rent control laws allow landlords to evict tenants if rent is not paid for a period of time that is stipulated in the law. This varies across states, ranging between 0.5 months to 7 months.

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mand for cement. They find that demand follows a political business cycle – contracting before elections and expanding right after.

[16] The median renter in the U.S. in 2018 had lived in their unit for less than three years, while the median owner had lived in their unit for considerably more than 9 years. The categories in the ACS questionnaire prevent us from expressing the difference more precisely.

[17] See https://www.census.gov/housing/hvs/index.html, accessed July 19, 2020

[18] The correlation between total vacancy rates and rental share for USA is 0.18 when weighted by population.

[19] In column (1) in A.4, at the district level with no controls, we find no relationship between rental share and vacancy, and in column (4), at the city level with no controls, we find a negative relationship significant at the 10% level. In columns (2) and (5), with controls, we find that a 1% increase in rental housing is associated with 0.11% fall in vacancy rates, with coefficients that are statistically significant at the 1% level. When we add state dummies in columns (3) and (6), the coefficient is insignificant for districts but the negative relationship remains for cities. These results are contrary to the expected positive relationship between rental share and vacancy.

[20] For the USA, Fetter (2016) finds an increase in home ownership due the stringent rent controls.

[21] Caru (2013) provides a history of the introduction of the rent control act in Bombay in 1918.

[22] We refer to cities and states as they were named at the time of the law.
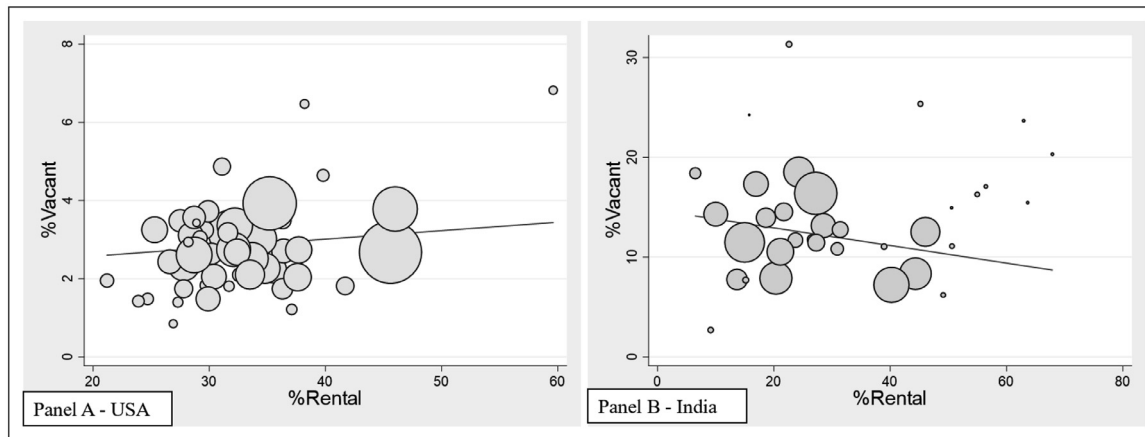
Fig. 6. Percent rental and vacant in the USA and India Note: Panel A is for USA and Panel B is for India. Both panels show the relationship between percent vacant and percent rental for states in USA and India using the latest census data at the time of writing the paper. For USA the vacancy data is for the first quarter in 2021 and for India it is 2011. Both figures are population weighted and the size of the circle represents the population size. Source: Authors' own using Census of India and Housing Vacancies and Homeownership data for USA.

We found cases of such evictions in many states.[23,24,25,26] In these cases the Supreme Court ordered the eviction of tenants for non-payment of rents. Further, the Supreme Court noted that while the rent control acts are made to protect tenants, it is the responsibility of the tenant to pay rent in the stipulated time to remain under these acts' protection. Hence, these cases demonstrate that eviction clauses have teeth. That said, these cases did take nine to ten years to adjudicate.

Some states are relatively pro-landlord in allowing rent revisions. Tenants have challenged the rights of landlord to raise rents even when such rent increases are permitted under rent control laws. Tenants have lost such challenges. In another court case,[27] the landlord increased rents as per the law and the tenant refused to pay the increased rent and challenged the increase. The High Court found the increase in rent acceptable and evicted the tenant on the grounds of non-payment of rent.

Landlords have adapted to the rent control laws and have found ways to work around them. Table A.3 shows that a considerable share of rental contracts in formal housing are unwritten. Written rental contracts only comprise 18.1% of all rental agreements (see Table A.3).[28] There is a growing preference among landlords for short-term (typically 11 month) license arrangements with tenants (Tandel et al., 2016). Landlords are reluctant to formally register these contracts for fear that the government may, at the stroke of a pen, be able to bring these leases under the

rent control law, as it has done in the past.[29] However, the legacy of the rent control law still has a bearing on housing outcomes as it has affected several properties. For example in 2010, the city of Mumbai had 17% of all formal units under rent control, with several pockets of the island city having more than 50% (Tandel et al., 2016). Recognising, the adverse impact of the strict rent control laws on housing markets in India, the government of India has introduced a Model Tenancy Act in 2021 for states to adopt. One of the main objectives of this act is to reduce vacancy across cities.[30] To achieve this, the act strongly suggests that states liberalize the rents landlords can set when drafting an agreement. It further proposes an alternate judicial setup at the district level for all rental litigation, which is mandated to provide a decision within 60 days.

3. Property rights framework applied to renting

Coase (1960) discusses resolving an externality through allocation of property rights between two parties – determining, say, who has the right to pollute or the right to stop someone from polluting. He argues that irrespective of initial entitlements, in the absence of transaction costs, negotiations between the two parties will bring about an efficient outcome. However, in the presence of transaction costs, efficient outcomes require the presence of property or liability rules. Calabresi and Melamed (1972) provide an analysis of when Coasean bargaining does not produce an efficient *ex-post* outcome. Bebchuk (2001) argues that rules allocating rights may affect *ex-ante* actions also.[31] Neither

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[23] The cases cited here are well cited by other judgements and/or are a part of the judicial precedent on the particular clause(s) of interest.

[24] *Madan Mohan and Anr. v. Krishan Kumar Sood* (1993) SCR (1) 107 from Himachal Pradesh. In Himachal Pradesh, the landlord may not evict tenants until they are three months behind in rent. In this case, the Rent Controller provided the tenant two separate opportunities to pay their dues. Aggrieved by this leniency, the landlord appealed to the High Court, which rejected his appeal. Therefore, the landlord appealed to the Supreme Court to evict the tenant and prevailed.

[25] *E. Palanisamy v. Palanisamy (Dead)* (2003) 1 SCC 123 from Tamil Nadu.

[26] Some other key Supreme Court judgements with respect to evictions in favor of the landlord are in the states of Uttar Pradesh (1978 AIR 287) and Rajasthan ((2003) 2 SCC 577).

[27] *Ujwalabai alias Meena Shantaram Apte v. Namdeo Dnyanoba Shingare* 2002 (2) BomCR 76.

[28] Only 14.1% and 18.6% of households in slums and formal rental housing have written contracts, respectively. See Krishna et al. (2020) for more details on written rental agreements in slums. The low share of written contracts in slums is expected given their informal nature, whereas the rather low share in formal housing could be because landlords want to evade rent control laws or save on time and monetary costs associated with formal contracts (Sharma, 2017).

[29] Given the strict rent control laws and shortage of housing in Bombay in the mid 1900's, landlords (or tenants) started renting (or subletting) out their property for a period of 11 months, which would not come within the purview of the rent control law. However, the Government of Maharashtra, with a small amendment in 1973 (Maharashtra Act XVII of 1973), made it very difficult to evict tenants under these agreements, granting these tenants *de-facto* rent control.

[30] The background note for the Model Tenancy Act starts with "As per Census 2011 around 110 lakh houses were lying vacant in urban areas. One of the main reasons for non-availability of these houses for rental purpose is the existing rental laws of the States/UTs, which discourage renting." Background note available here http://mohua.gov.in/upload/uploadfiles/files/1%20Background%20Note%20on%20MTA%20(English).pdf.

[31] Bebchuk (2001, p. 603) focuses on, "*how ex ante decisions are affected by allocations of entitlements. By ex ante decisions [he means] throughout [the] Article those decisions that (i) take place before decisions whether to undertake externality-producing actions are made, and (ii) influence the parties' potential payoffs with or without these externality-producing actions.*"

Calabresi and Melamed (1972) nor Bebchuk (2001) speak directly to renting or vacant housing, but their frameworks are useful for thinking about how suboptimal levels of rental shares and vacancy happen.

The Blackstonian conception of property rights views ownership of property as owning bundle of rights, which includes the right to possess, the right to exclude, the right to sell, or transfer, for short periods, and the right to alter use (Ellickson, 1992). These rights are perpetual but can be sold for smaller time blocks to a tenant who values the property more than the owner for that period (Ellickson, 1992, pp. 1372-1373). The property reverts to the owner at the end of the time block and a contract between the owner and tenant lays down conditions clearly stating the rights each party has over the property for this duration (the pre-decided time block) and after.

These conditions generally include passing on temporary ownership rights (with no rights to alter use) to the tenant with conditions for terminating the contract before the end of the tenancy period.[32] The conditions could also include terms for extending the contract for a longer time block with the possibility of price changes. In cases of disputes, the parties would need to approach the courts. If the probability of getting into disputes is high or the time taken to resolve disputes is costly, owners *ex-ante* might be less likely to sell time blocks. Typically, transaction costs to make and enforce rental contracts are lower than an outright transfer of ownership (Ellickson, 1992).

While a contract between the owner and tenant clearly defines the allocation of rights, government regulations like rent control change these allocations and have *ex-post* implications because they change the incentives for both the landlord and tenant. Rent control protects the tenant from eviction and sets limits on rent increases while simultaneously allowing the tenant to unilaterally extend the time block of the contract. If this is extendable to the next generation, then in effect it could mean that the tenant has perpetual ownership of property at controlled rent increases. A vast literature shows how rent control leads to misallocation and over-consumption of housing. Glaeser and Luttmer (2003) estimate that almost 20% of housing in New York City is occupied by households that would reside elsewhere in an unregulated market because of rent control. As landlords cannot increase rents to market levels, they have very little incentive in undertaking repairs and maintenance, leading to deterioration of rent-controlled properties (Wheaton, 1981; Moon and Stotsky, 1993; Sims, 2007; Tandel et al., 2016).

Rent control would also affect *ex-ante* decisions of the owner to sell time blocks of the property. If the owner attaches any probability to the likelihood that more than agreed upon ownership rights could be transferred to the tenant after entering into a contract, then the owner *ex-ante* could decide against renting out. Diamond et al. (2019a,b) study the impact of the expansion of rent control in San Francisco and find that rent control affects landlords' incentives such that they reduce their supply of rental housing. As the risks for landlords rise, rational landlords would keep their units out of the rental market (see Segú, 2020; Gabriel and Nothaft, 2001).[33] For example, Egypt's strict rent control laws incentivised homeowners to hold units vacant (see Mayo et al., 1981).[34] Asquith (2019) investigates how landlords in San Francisco actively create vacancy through eviction. He finds, within that rent stabilized city, landlords have a greater tendency to evict tenants when rents/prices are rising.

In developing countries, weak judicial systems increase the transaction costs of enforcing contracts (Behrer et al., 2021; Djankov et al., 2003).[35] In cases of disputes, delays and high judicial pendency could result in tenants continuing to occupy units for very long periods. Hence, weak contract enforcement could *ex-ante* discourage property owners from selling their time blocks.[36]

Rent control and weak contract enforcement have straightforward impacts on the availability of units for rent, but may not, on their own, explain vacancy. Owners of property have the ability to sell to someone who might occupy the property. But consider occupancy an embedded call option. An investor in a house has a property right to reversion and an option to occupancy. The option to occupy may be more valuable than the cash flow coming from potential rental income, particularly in a place with very low rental yields, such as India (Gandhi and Munshi, 2017; IDFC Institute, 2018).[37] Investors frequently wait to exercise in the money options. Once an owner rents a property out, however, the value of the occupancy option goes to zero. This explains why owners may keep properties vacant rather than renting them out.

We hypothesize that rent control and weak enforcement of contracts make property rights insecure and are partially responsible for the high rate of vacancy in India.

4. Data

4.1. Vacant housing and tenure data

The primary source of data on vacant housing is the Census of India. For the censuses of 2001 and 2011, the instruction manual for Houselisting and Housing census enumerators defines vacant houses as:

> "If a Census house is found vacant at the time of House listing i.e., no person is living in it, and it is not being used for any other non-residential purpose(s) write 'Vacant'."

The Census of India also provides data on tenure, categorizing occupied houses as rented or owned.[38] Neither vacant housing nor tenure data are available at the individual household level but are aggregated at the city and district levels. Unlike the United States, vacant houses in the Census of India are not classified by tenure status. For this study, we utilize data from 2001 and 2011 to develop panel analyses across 24 states, using percent vacant houses of urban housing stock as the dependent variable. For cross-sectional analyses of contract enforcement, we use data from 29 states.

Our main dependent variable is an aggregation of vacant housing counts in the urban parts of districts, as released by the Census of India. One data concern is that published census data do not reveal the cause of vacancy, even though enumerators record cause (see Fig. A.2).[39] In

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[32] This also includes a period for the tenant to look for an alternative property.

[33] We see no reason why weak contract enforcement with respect to issues such as non-payment would discourage tenants from renting. We therefore are limiting our analysis to the impact of weak contract enforcement on landlord behaviour.

[34] A study by Rapaport (1992) finds no relationship between rent control and vacancy in New York. The data in that paper prevent the author from performing a panel analysis.

[35] Weak contract enforcement in India has affected how firms structure production and has led to high resource inefficiencies (Boehm and Oberfield, 2020). For example, in states where contract enforcement is weakened by overburdened courts, industries move away from relationship-specific contracts or market-based contracts to a more hierarchical and vertical production process. The rationale for this is that disputes in market-based contracts are difficult to resolve in states with weak contract enforcement.

[36] Weak contract enforcement in India has increased the amount of litigation against real estate projects through NIMBYism, which has increased construction times by 20% (Gandhi et al., 2021).

[37] Interest rates on fixed deposits in India are much higher than rental yields in most cities in India (see IDFC Institute, 2018).

[38] There is also a third category, "other," that refers to premises that are neither owned nor rented. This category includes houses provided by an employer rent-free, houses constructed on encroached land, unauthorized buildings, and natural shelters used as housing. Only 3.30% of houses in urban India are classified thus.

[39] Census enumerators are government employees, and are generally residents of the community they survey. They cover between 5-8 households in a day, and make multiple visits to each house in case it is locked

section 5 we discuss conditions under which the aggregation of the data would not bias our estimates.

4.2. Rent control variables

Under the Indian federal system, only state legislatures have the power to impose rent control laws. There would be a lag between passing the law and the change in the behaviour of the landlords and thus on the effect on housing outcomes. We consider a lag period of two years. For the data from 2001 and 2011 we use rent control variables up until the years 1999 and 2009, respectively.[40] We first collect historical rent control laws that would impact housing markets in 2001. For the rent control variables for 2011 we look at the Dev and Dey (2006) catalogue of rent control laws in India. There were no changes to the rent control laws between Dev and Dey (2006) and 2011.[41]

In our database, four states made changes to their rent control laws. We consider districts in these four states as the treatment group and the others as the control group. Fig. 7 shows the districts (2001 boundaries) according to this classification.[42] It also shows districts dropped from our analysis due to various issues.[43]

Our variables are:

Number of months of non-payment allowed: This is calculated by adding two elements of tenant-landlord law: the minimum number of months of non-payment before a landlord can begin eviction proceedings, and the number of months the tenant has to vacate after the landlord or the rent controller issues a notice for eviction. This period of minimum non-payment varies from a fortnight to seven months.[44] Laws with longer minimum periods before eviction can begin are more pro-tenant than laws with shorter periods. West Bengal and parts of Maharashtra increased the months of non-payment allowed within our time period.

Rent revision dummy: All rent control laws restrict adjustment of rents by the landlords. However, there exists variance across states in India in how strict these conditions are. Landlords in some states may raise rents annually or when the properties' market value increases. In

other states they are subject to much stricter restrictions where they are allowed to increase rents only when they make physical additions to the property. In 2001, of the 24 states considered, there was no requirement for a physical addition to raise rents in 18 states containing 287 districts. We assign these places a value of zero for the rent revision dummy. In six states consisting of 169 districts, rent increases were allowed only if the landlord made a physical addition to the premises. We assign these districts a value of one. A rent revision dummy with a value of one reflects a state with pro-tenant policy. Karnataka moved from a pro-tenant rent revision clause to a pro-landlord one.

We also use two non-binary measures of rent control (see Table A.5).[45] There, we account for the different conditions under which rents are revised in states, ordering them from the strictest to the most lenient. We also estimate specifications where we test dummy variables for each condition individually and jointly, reflecting the different conditions for rent revisions (see Table A.6).

Non-occupancy dummy: This variable looks at whether the landlord can evict the tenant if they do not occupy the unit. It takes the value 0 if it is pro-landlord, i.e., the landlord can evict the tenant in case of non-occupancy. In 2001, 15 states, or 236 districts, had a value of 0. The dummy has the value 1 if it is pro-tenant. i.e., if the landlord cannot evict tenants if they do not occupy the unit. Nine states, or 220 districts, take the value of one. For pro-landlord states, the time stipulated for no occupancy varies from one month to 12 months. West Bengal changed its non-occupancy clause from pro-tenant to pro-landlord.

Coverage: We control for coverage of rent control laws as they do not apply to all properties and areas. The three most common coverage types are geographical, age, and value of rent. We use a dummy variable for each, wherein the law gets a value of 1 if the clause has greater scope and hence is pro-tenant and 0 if it has limited scope and thus pro-landlord. The age dummy takes the value 1 if the law does not exclude any premises based on age and takes the value 0 if it excludes certain properties. West Bengal and Gujarat moved from pro-tenant to pro-landlord age coverage. The rent dummy takes the value 1 if higher rent properties receive no exemption from rent control and takes the value 0 if there is such an exemption. The geographical dummy takes the value 1 if the law has jurisdiction over all urban areas and takes the value 0 if it excludes some urban areas. The geographical dummy and the rent dummy do not change between the two time periods.

Table B.1 in the online appendix shows vacancy rates by rent control variables. Vacancy rates have grown more in districts that have pro-tenant rent revision and non-occupancy dummies.

4.3. Data for contract enforcement

We consider the number of judges per 1000 people at the district level as an indicator of effectiveness of courts. Data describing district courts was collected from the National Judicial Data Grid in December 2019. We used state-level totals of district level judge strength (available for 2012) to deflate the 2019 values, estimating the 2011 judge strength with these totals as a base.[46]

(Office of the Registrar General & Census Commissioner, 2011b). The enumerators do not categorise a house as vacant if the household has gone on a journey or pilgrimage (Office of the Registrar General & Census Commissioner, 2011a). In such cases it is recorded as house locked. The census has been taken every ten years since 1872. The procedure for taking the census has been refined each decade and takes advantage of community ties to ensure accuracy. Therefore, we think census measurement errors in India are no larger than in other countries.

[40] West Bengal amended its act in 1997 and it came into effect on 28th December 1998. We are treating this as if it is 1999. This act would have no impact on housing vacancy in 2001.

[41] The Jawaharlal Nehru National Urban Renewal Mission in 2005 mandated changes to the rent control laws to receive transfers from the centre. Many states amended their laws after 2011. Between 2011 and 2020, nine states have passed new rent control laws or amended them.

[42] The count of districts is 593 in 2001 and 640 in 2011. New districts formed between 2001 and 2011 are mostly the result of one district being broken into two or more. Complete data on vacancy is not available below the district level in both 2001 and 2011 censuses. Therefore, in order to create a balanced panel, we had to merge 2011 districts to recreate 2001 boundaries. In the end, we dropped 29 districts from 2001 that had no counterpart in 2011.

[43] Assam underwent a complex reorganisation of districts in 2003, when the Bodoland Territorial Council was formed. We drop the state from our analysis because the boundaries of the districts changed significantly. We could not find the texts of current or past rent control laws of Andaman and Nicobar Islands, Dadra and Nagar Haveli, Himachal Pradesh, Lakshadweep, parts of Maharashtra (districts under the erstwhile Central Provinces and the princely states of Hyderabad and Berar), Manipur, Mizoram, and Rajasthan. Nagaland has not passed a rent control law, and Arunachal Pradesh passed its first rent control act in 2014. These states were also dropped from the analysis.

[44] These time periods are given in months and fortnights. The variable, number of months of non-payment, takes the values of 0.5,1,2,3,4,5, and 7.

[45] We set the first non-binary rent revision variable equal to one if the law allows revisions when market prices increase or for periodic revisions, two if rent revision is allowed when taxes increase, and three if rent revision is allowed only when physical improvements are made. In the second non-binary rent revision variable, we assign a value of one if rent increase are allowed when market value increases, two if periodic increases are allowed, three if increases in tax increase rents, and four if rent is revised only when a physical improvement is made.

[46] The vacant housing data are from the Census of India 2011. For 2019, we do not have data for Arunachal Pradesh, Nagaland and parts of Meghalaya. We make use of 2012 state-level data on the number of tertiary level judges to create deflators. The number of judges for 2012 with and without the above mentioned three states are 14,432 and 14,393 respectively. The number of judges for the year 2019 omitting the three states is 15,873. We used data on the number of
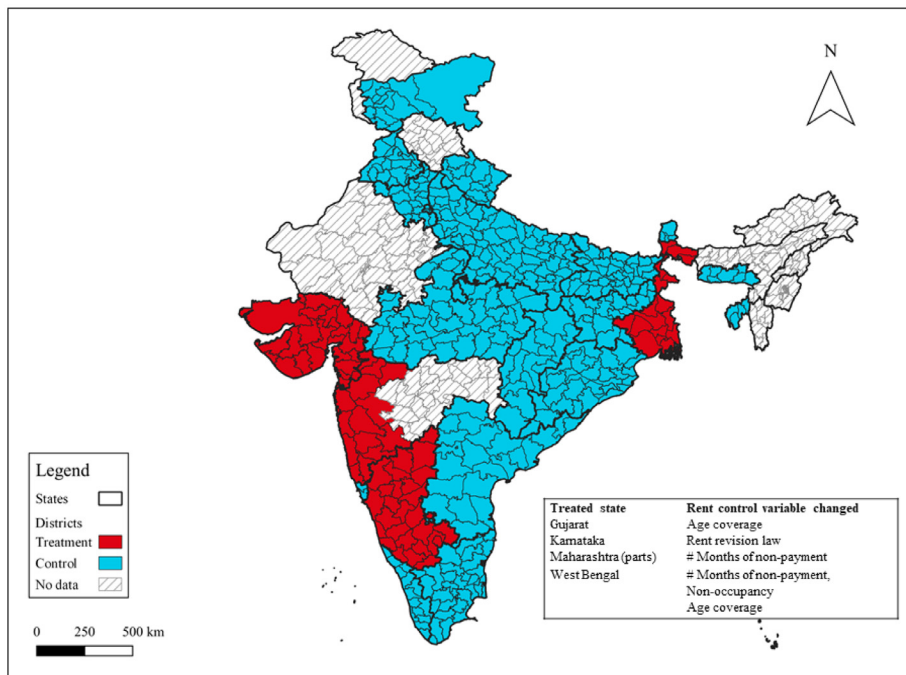
Fig. 7. Treated and control districts for rent control analysis Note: All district boundaries as represented in Census of India, 2001

5. Empirical strategy

The paper looks at two possible reasons for urban vacant housing in India: pro-tenant rent control, and weak state capacity for contract enforcement. Our unit of observation is the district. Districts are small sub-geographies of states in India and are akin to counties in the United States.

We first implement a two-way linear fixed effects panel regression design to establish a relationship between pro-tenant rent control laws and vacancy rates by estimating the following linear model:

$$VH_{ist} = \beta_0 + \beta_1 \cdot \mathbf{RC_{st}} + \gamma \cdot \mathbf{X_{ist}} + \theta_i + \delta_t + \epsilon_{ist} \qquad (1)$$

The dependent variable VH_{ist} in eq. 1 is the percent urban vacant housing in district i, state s, and year t. The years refer to 2001 and 2011.[47] $\mathbf{RC_{st}}$ is a vector of variables denoting the pro-tenant or pro-landlord nature of the rent control law. The vector of variables includes the number of months of non-payment allowed, rent revision dummy, non-occupancy dummy, and coverage of the law. We describe these variables in section 4.2. Treated districts had changes in these clauses and control districts had no changes (see Fig. 7). $\mathbf{X_{ist}}$ is a vector of time-varying district characteristics. This vector includes proportion of scheduled castes and scheduled tribes, marriage, religion, workforce participation, female population share, mean household size, and the share of households with access to banking services. We also control for the per capita number of shops, and offices, as well as the number of good, live-able, and dilapidated buildings per person.[48] θ_i and δ_t are district and year fixed effects, and ϵ_{ist} is the error term. The parameters of interest

are within β_1, the vector of treatment effects of different rent control clauses on percent vacant housing in the district. We cluster standard errors at the district level. We also cluster at the state level for one specification.

We use OLS regression as shown in eq. 2 to look at the impact of state capacity for contract enforcement on vacancy rates in 2011.

$$VH_{is} = \beta_0 + \beta_1 \cdot \mathbf{Judges_{is}} + \gamma \cdot \mathbf{X_{is}} + \epsilon_{is} \qquad (2)$$

State capacity for contract enforcement is measured by the number of judges per 1000 persons at the district level. To control for state-level variations, we use state dummies. $\mathbf{X_{is}}$ is a vector of district controls. We also add $\mathbf{RC_s}$ for the year 2011 to this cross section analysis for a few specifications. Data limitations prevent us from using panel techniques for studying the effects of judicial density on vacancy.

An issue with trying to establish this relationship is the possibility of endogeneity. The issue is similar to that found in the relationship between police and crime ' because police are stationed in high crime areas, they may appear not to be very effective in reducing crime (Marvell and Moody, 1996). If higher vacancy is a reflection of inadequate judicial capacity, places with high vacancy might be assigned more judges. This would bias coefficients on judges in the positive direction, the opposite of the expected vacancy reduction impact of judges. This positive correlation means that the absolute value of the observed negative coefficient, β_1, in eq. 2, on judges will be lower than the true value. There are also omitted variables that could bias β_1 in eq. 2. For example, places with high crime rates could be assigned more judges and could have higher vacancy rates. In section 6.3, we use an instrumental variable to address these possible endogeneity and omitted variable issues.

Given the nature of census data discussed in section 4.1, the dependent variable in equations 1 and 2 includes all types of vacancy, frictional and quasi-permanent vacancy, as well as ownership and rental vacancy. The all inclusive nature of our left hand side variable should make it more difficult to identify the effects of policy on quasi-permanent vacancy.

Consider that we may break our vacancy measure, VH in equations 1 and 2, into two pieces: VH_q and VH_f, where the subscripts

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judges by state in 2012 to deflate the 2019 dataset to create an estimate of number of judges for each district in 2012. Our strong assumption is that within each state, the proportion of judges by district remains constant between 2012 and 2019.

[47] As we only have district level data for two years we are unable to perform pre-trend tests.

[48] Detailed descriptions of how these control variables are enumerated can be found in the Metadata for Census of India 2011. See: https://censusindia.gov.in/2011census/HLO/Metadata_Census_2011.pdf

Table 1

Relationship between percent vacant housing and clauses in rent control laws

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	Dep. variable = % vacant					
# Months of non-payment allowed	-0.35			-1.02	-1.11	-1.11*
	(0.63)			(0.78)	(0.78)	(0.58)
Rent revision dummy (1=pro-tenant)		2.78***		3.11***	3.03***	3.03***
		(0.90)		(0.92)	(0.91)	(0.94)
Non-occupancy dummy (1=pro-tenant)			-0.88	-0.11	-1.36	-1.36
			(0.91)	(1.05)	(1.29)	(1.26)
Age coverage dummy (1=pro-tenant)	0.43	0.81	1.09		1.07	1.07
	(0.64)	(0.51)	(0.77)		(0.75)	(0.78)
Constant	21.4***	20.1***	20.0***	24.6***	24.6***	24.6***
	(3.69)	(2.92)	(2.94)	(3.98)	(3.92)	(4.15)
Observations	912	912	912	912	912	912
R-squared	0.57	0.58	0.57	0.58	0.58	0.58
Number of districts	456	456	456	456	456	456
Controls	Y	Y	Y	Y	Y	Y
Standard error cluster	District	District	District	District	District	State

Note: Dependent variable is percent vacant housing at the district level. We have a balanced panel with 456 districts in 2001 and 2011. All data is matched to year 2001 district boundaries. All specifications include district and year fixed effects. Geographical coverage and rent coverage dummies get dropped as there were no changes in these clauses. Controls include mean household size, the share of households with access to banking services, the population proportions by scheduled castes and tribes, marital status, religion, age groups, level of education, workforce participation, and gender. We also control for the number of shops and offices, along with the number of good, livable, and dilapidated buildings per person. All regressions are for urban areas and population weighted at the district level. Robust standard errors in parentheses are clustered at the district level for columns (1)-(5) and at the state level for column (6). *** p<0.01, ** p<0.05, * p<0.1.

denote quasi-permanent and frictional vacancy, respectively. Frictional vacancy is not affected by policy variables, whereas quasi-permanent vacancy is, meaning that frictional vacancy is orthogonal to policy. Frictional vacancy in each district is thus $\overline{VH_f} + \epsilon_{VH_{f_i}}$ where $\overline{VH_f}$ is the mean frictional vacancy across districts and $\epsilon_{VH_{f_i}}$ is an i.i.d. term that is distributed with a mean of 0 and a standard deviation of σ_{VH_f}. Under these circumstances, the expected value of all coefficient estimates, save the intercept term, is the same for a regression using the true dependent variable of interest, VH_q, and our measured dependent variable, VH.

On the other hand, the variance matrix, $\sigma^2 X'X^{-1}$, of the regression we estimate will have elements at least as large and almost certainly larger than a regression that could use the true dependent variable of interest. This means the t-statistics we observe in this paper are smaller than the true t-statistics, and reduce the chance that we will reject the null hypotheses tested (see Hausman, 2001).

Now let us consider further the quasi-permanent term, taking into account that policy can affect both landlord and tenant behavior. Tenant protections reduce tenant mobility (Munch and Svarer, 2002; Glaeser and Luttmer, 2003), and hence tend to suppress vacancy – i.e., lower VH_f. This assumption about tenant behavior implies that our coefficient estimates are a lower bound of how diminutions in property rights affects landlord behavior.

Of particular concern are houses that are not yet complete. For instance, higher vacancies in peripheries of large metros as seen in section 2.1 could be a result of unfinished houses. Such houses are counted as vacant, but do not reflect the policy concern we are discussing within this paper. Should we have evidence, however, that the distribution of such vacancy is random across districts, we need not be concerned that it is affecting our coefficient estimates. The distribution of the vacancy variable suggests that this error is not systematic. Change in vacancy between 2001 and 2011 is well distributed across observations and only 4.4% of the observations lie beyond two standard deviations from the mean. Further, the change in vacancy between 2001 and 2011 is not correlated (-0.07) with vacancy in 2001. This is consistent with the possibility that $\epsilon_{VH_{f_i}}$ is i.i.d.

6. Results

6.1. Rent control

Table 1 presents how changes in various rent control measures, individually and collectively, influence housing vacancy by district in India as shown in eq. 1. Columns (1), (4), and (5) demonstrate that pro-tenant increases in the months of non-payment allowed have no significant effects on vacancy when standard errors are clustered at the district level. When standard errors are clustered at the state level, months of non-payment allowed is negative and statistically significant at 10% (column 6). The sign and the weakness of the months of non-payment coefficient may be a reflection of how long it takes for courts to enforce landlords' claims.[49] Columns (2), (4), (5), and (6) show that a limitation on landlords' ability to raise rent freely significantly increases vacancy. In the states where rent revision clauses remained pro-tenant, the vacancy rate increased by 2.78 percentage points (column (2)). When other changes in rent control are accounted for, this estimate increases to 3.03 to 3.11 percentage points (columns (4), (5), and (6)).[50] The coefficient for the non-occupancy dummy is negative and not statistically significantly different from zero in every specification we test. Changes in age coverage have no significant impact on vacancy. Unlike treated districts which added pro-landlord clauses, districts where landlords could not revise rents experienced an increase in vacancy.[51,52]

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[49] For example, the *Madan Mohan and Anr. v. Krishan Kumar Sood* (1993) and *E. Palanisamy v. Palanisamy (Dead)* (2003) cases took ten years each to be resolved.

[50] An F test of column (5) finds that the rent control variables are jointly significant. F(3, 455) = 4.56; Prob > F = 0.0037.

[51] We ran columns (5) & (6) with two alternative rent revision variables (see A.5). There, we account for the different conditions under which rents are revised in states. We order the laws to measure how pro-tenant they are, providing more detail than our main binary variable. Our conclusions remain the same when using these alternative definitions.

[52] We also estimate specifications where we test individually and jointly dummy variables reflecting the different conditions for rent revisions seen in A.5. Our conclusions remain unchanged (see A.6).

Table 2

Relationship between vacancy and judge to population ratios

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	Dep. variable = % vacant					
Judges per 1000 (total)	-66.2**	-62.9***	-72.7***			
	(30.3)	(17.6)	(24.2)			
Judges per 1000 (urban)				-10.7**	-3.20	-10.7**
				(4.75)	(3.10)	(4.72)
Constant	-138**	-83.4	-109.3*	-145.7**	-84.3	-112*
	(66.5)	(57.3)	(61.1)	(65.7)	(58.1)	(63.0)
Observations	580	580	571	580	580	571
R-squared	0.74	0.84	0.76	0.73	0.84	0.76
Controls	Y	Y	Y	Y	Y	Y
State dummies	N	Y	N	N	Y	N
Rent control variables	N	N	Y	N	N	Y

Note: Dependent variable is percent vacant housing for the year 2011. Rent control variables include number of months of non-payment allowed, rent revision dummy, non-occupancy dummy, age coverage dummy, geographical coverage dummy and rent coverage dummy. District level controls include mean household size, the share of households with access to banking services, the population proportions by scheduled castes and tribes, marital status, religion, age groups, level of education, workforce participation, and gender. We also control for the number of shops, and offices, along with the number of good, livable, and dilapidated buildings per person. All regressions are for urban areas only with population weights at the district level. There are 60 missing districts in columns (1), (2), (4), and (5); there was no data available for districts in Andaman and Nicobar Islands (3), Arunachal Pradesh (16), Bihar (1), Chhattisgarh (2), Dadra and Nagar Haveli (1), Gujarat (1), Himachal Pradesh (2), Lakshadweep (1), Maharashtra (3), Manipur (1), Meghalaya (7), Mizoram (6), Nagaland (11), Puducherry (4), and West Bengal (1). The judicial districts of Andaman and Nicobar Islands, Puducherry, and Mumbai have been dropped since the data are unavailable at the census district level. There are nine additional districts from which rent control data are missing from the union territory or state of Chandigarh (1) and Manipur (8). These districts were removed from columns (3) and (6). Robust standard errors clustered at the state-level in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

6.2. Enforcement of contracts

According to the World Bank's *Ease of Doing Business Index*, it took an average of 1,445 days to enforce a contract in India in 2019.[53] An efficient judiciary is able to resolve contractual disputes quickly, creating an enabling environment to enter into formal contracts; an inefficient judiciary reduces the frequency of contracting (Voigt, 2016). One of the ways to improve the efficiency of the judiciary system is by increasing the number of judges (Voigt, 2016).[54] Hazra and Micevska (2004) look at the Indian legal system and find that the number of judges at the district level has a significant impact on case resolution in India and thus reduces congestion in the system.[55] Rao (2020) provides further evidence, finding that every additional judge reduces backlog by 6%. Without enough judges, the judiciary is burdened with high caseloads, affecting state capacity to enforce contracts. This makes it expensive and time-consuming to enforce a rental contract, and hence landlords prefer to avoid renting out their properties, leading to higher vacancy rates.

In this section, we use judge to population ratio at the district-level tertiary court as our main explanatory variable as shown in eq. 2. As these courts serve both urban and rural jurisdictions, we create two different variables – the number of judges per 1000 urban population in the district and the number of judges per 1000 total (urban and rural) population in the district. We add all rent control variables to the specifications and these results are in columns (3) and (6) of Table 2. In columns (1) through (4) and column (6) of table 2, we find a significant

and negative coefficient of the number of judges per 1000 population on percent vacant housing.

This result is consistent with the hypothesis that an absence of capacity to enforce contracts undermines the working of a rental market and incentivizes owners/landlords to keep their properties vacant. Even if judges uphold landlords' rights, but take several years to do so, potential landlords might prefer to keep their housing units vacant and avoid the problem of any legal dispute with their tenants. The Model Tenancy Act, 2021 specifically proposes a parallel judicial system focused exclusively on landlord-tenant disputes. Our findings imply that such a system, if well-staffed, could reduce vacancy. In 2012, the average number of judges per 1000 persons (urban) was 0.04 (see Table A.7). A one to two standard deviation increase in judges per 1000 persons (urban), could reduce vacancy by 0.43 to 0.86 percentage points (according to column (6) in table 2).[56]

6.3. Instrumental variable estimates

We use an instrumental variable to address potential biases in the negative relationship of judges on vacancy. The instrument measures the "distance to High Court" of each district i to the nearest principal or subordinate bench of the High Court of the state that i belongs to in 100 kilometers.[57],[58] For example, the High Court of the state of Maha-

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[53] See: https://www.doingbusiness.org/en/data/exploretopics/enforcing-contracts

[54] Voigt (2016) lists several factors that can improve judicial productivity, one of them being the total number of judges. Some of the other factors include characteristics of the judges, the complexity of the law, and the complexity of the judicial system itself.

[55] Increasing the number of judges does not increase in the efficiency of the courts in all countries (Voigt, 2016), but it does in India (Rao, 2020).

[56] The fall in vacancy due to an increase in judges per 1000 (total) would be similar to an increase in judges per 1000 (urban). See column (3) in 2 and A.7.

[57] An average district in India is approximately 3,400 km² in area. Therefore, the average distance between the centroids of two districts is in the 100s of kilometers. To ensure that a unit change in our instrument reflects a real world change in the district court, we measure the distance to bench in 100s of kilometers.

[58] A bench refers to a collection of judges. The Indian judiciary has two types of benches – principal and subordinate. The principal bench operates from the headquarters of the High Court. Subordinate benches are located in other cities

Table 3
IV results: Vacancy and judge to population ratio

Variables	(1)	(2)
Panel A: First Stage – Dep. variable: Judges per 1000 (urban)		
Distance to High Court (in 100 kms)	-0.003***	-0.004***
	(1.19e-03)	(9.91e-04)
Panel B: Second stage – Dep. variable = %Vacant		
Judges per 1000 (instrumented)	-150**	-114**
	(71.45)	(53.58)
Effective F statistic	8.12	16.3
Kleibergen-Paap rk LM statistic	5.76	7.06
p-values	0.016	0.008
Anderson-Rubin test		
p-values	0.0017	0.0075
95% confidence intervals	[-429.77, -50.67]	[-272.97, -31.14]
Rent control variables	No	Yes
District controls	Yes	Yes
Observations	580	571
R-squared	0.260	0.510

Note: Robust standard errors clustered at state level in parentheses.*** p<0.01, ** p<0.05, * p<0.1. This table presents the first stage (panel A) and second stage (panel B) results of the impact of number of judges (urban) on percent vacant housing. Column (1) reports results after instrumenting distance to the High Court with all controls reported in column 4 in 2. Column (2) reports results with all controls reported in column 6 in 2.

rashtra has one principal bench, located in Mumbai, and two subordinate benches in the districts of Nagpur and Aurangabad. Our instrument takes the distance from the centroid of the district to the nearest High Court bench that adjudicates the district. The rationale for distance to nearest High Court bench in predicting the number of district judges per 1000 persons is as follows. According to the Constitution of India, the judges in the High Court decide the assignment of district judges in a state. There is no prescribed formula for this process.[59] In this framework, the decision makers' preference for districts closer to their place of work could influence their decision of how many judges to place in various districts. As High Courts in India tend to be located in major cities (Mumbai, Delhi, Bangalore, Kolkata, etc.), we would expect distance from High Courts to explain *urban* judicial density better than overall judicial density. This expectation will prove to be correct, so we use urban judicial density in our two-stage specification.

We test for the validity of the instrument by examining whether there are any obvious correlations between the distance to the High Court and other variables that may determine vacancy rate in 2011. The correlation of distance to closest High Court/bench and vacancy rates is 0.03. In Table A.8, we find that variables that statistically affect vacancy in table 2 have almost no correlation to the instrument – distance to the High Court. One variable, proportion of households with banking, is negatively correlated to the distance to the High Court and this could violate the exclusion restriction. We confront this exclusion restriction issue with our test statistics.

We present the results from the 2SLS specifications in table 3. The instrument has a negative and significant first stage for both specifications, as is expected.[60] The second stage results have the expected sign. The coefficients are at least 10 times the estimates in columns (4) & (6) in table 2. This is in tune with the omitted variables being positively correlated to number of judges and vacancy rates.

It is also possible, as noted earlier, that the instrument violates the exclusion restriction, producing imprecise estimates.[61] The reduced form of our IV estimation shows that the relationship between distance to high court and vacancy is a positive one. Even if the exclusion restriction were violated to some degree, it would bias our coefficient of interest in a positive direction. Thus, our estimate is an upper bound. Therefore, we may reasonably hold that the relationship between the judge to population ratio and vacancy is negative.

The effective F-statistic is less than 10 for column (1), indicating that our instrument is weak in the specification without controlling for rent control variables, and more than 10 for column (2), showing that our instrument is not weak for the latter specification.[62] The Kleibergen-Paap ranked Lagrange Multiplier test statistic has a p-value 0.008 for the second specification, indicating that it is not underidentified. We further obtain a confidence interval for our coefficients by inverting the Anderson-Rubin (AR) test statistic, as recommended by Andrews et al. (2019) in the case of a just identified specification. In both cases, the instrument is significant at 1%. From the Anderson-Rubin test inversion, we may cautiously infer that the impact of a one standard deviation increase in judges per 1000 (urban) population on percent vacancy should lie somewhere between -10.9 and -1.24 percentage points,[63] supporting our hypothesis that a low capacity of the state to implement the law leads to higher vacancy rates.[64]

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[61] Distance from High Court benches are negatively correlated with proportion of households that have access to banking, one of our controls. However, this instrument has only a very weak, positive correlation with vacancy (0.03).

[62] This test of the effective F-statistic > 10 (Andrews et al., 2019) is a popular heuristic for 2SLS specifications, proposed by Olea and Pflueger (2013).

[63] We use the confidence intervals from the AR statistic in 3 multiplied by the standard deviation of judges per 1000 (urban) from A.7.

[64] While the AR confidence intervals are robust to weak instruments, they are known to be wider than intervals produced by conventional t-statistics (Lee et al., 2021). Angrist and Kolesár (2021) argue that in just-identified specifications, the traditional confidence intervals' bias is small enough to be used for inference. However, this result holds only if there is low endogeneity, and the instrument is sufficiently strong. They define a test statistic, the 'degree of endogeneity' (ρ) which we calculate to be 0.69 for the specification in column (2), table 3. This falls within the acceptable region ($|\rho|<0.76$) as proposed by Angrist and Kolesár (2021). The effective F statistic for this specification is 16.3 indicating that the instrument is reasonably strong. This give us some reassurance that the true confidence interval is narrower than the interval we report.

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to make them accessible for litigants who may live a long distance from a High Court. The Chief Justice of the High Court, who sits at the principal seat, assigns District court judges.

[59] The 245th Law Commission report admits "it is difficult to suggest any appropriate method for planning and computing additional resources." (Resources here refer to additional judges) (Law Commission of India, 2014). While the Law Ministry has requested the judiciary to codify this process, there has been no success so far. This power to assign judges is an important part of the independence of the judiciary. Therefore, more subjective measures regarding the needs of districts have guided the hand of the High Courts in India.

[60] The first stage for judges per 1000 population (total) was not significant.

7. Welfare implications and housing shortage

Ministry of Housing and Urban Poverty Alleviation, Government of India (2012), estimated the housing shortage to be 18.8 million units. We have found that the elimination of rent revision could potentially reduce vacancy by 2.8 to 3.1 percentage points. We make use of the conservative estimate of 2.8 percentage points as our preferred coefficient in this section. Moving to a pro-landlord clause in rent revision would bring vacant units into the rental market, which could reduce the housing shortage. We estimate that the housing shortage would drop as much as 7.5% in states that liberalize their rent revision laws.

We now compute the welfare gains from the elimination of rent control. The average vacancy rate in India as per the Census of India 2011 is 12.4%, meaning that the occupancy rate is 87.6%. Reducing vacancy in India by 2.8 percentage points is the same thing as increasing the number of occupied units by .028/.876, or 3.2 percentage points.

Dutta et al. (2021) find that the ten-year supply elasticity for housing in India is 1.62. From this, we may pin down the increase in price that will bring us to equilibrium 'rents would rise by .032/1.62, or 1.97 percent. Using the standard formula for deadweight loss:

$$DWL = (P_2 - P_1) \cdot (Q_1 - Q_2) * 0.5 \tag{3}$$

where DWL is deadweight loss and the prices and quantities subscripted with one are market outcomes and the prices and quantities subscripted with two are rent controlled outcomes, we find that the welfare gain is .0197*.032*.5 = .00031% of housing consumption. There are some caveats to this calculation. Our calculations underestimate the resultant welfare gains from the elimination of rent control. Our estimate of welfare gain is static, and only takes into account vacancy of the current housing stock. It does not consider housing that was never, or might never be, built because of rent control laws. Further, it does not consider the complete relaxation of rent restrictions in India. The gains would be larger if we considered the dynamic implications and the full freedom for landlords to adjust rents.

8. Conclusion

This paper examines the characteristics and possible explanations for urban vacant housing in India. The U.S. experience would lead us to expect places which relied more on rental housing to have higher overall housing vacancy rates than those that relied on owning. However, this is not the case in India.

We find two explanations for vacancy rates: pro-tenant rent control laws and the size of the contract enforcement infrastructure. We exploit changes in the rent control laws in the Indian states of West Bengal, Karnataka, Gujarat, and Maharashtra to establish a relationship between pro-tenant rent control laws and vacancy rates in districts between 2001 and 2011. Our results show that a pro-landlord policy move that relaxes rent revisions could potentially reduce housing vacancy by 2.8 to 3.1 percentage points. Poor contract enforcement, measured by number of judges normalized by population, is negatively related with vacancy rates.

The findings of our paper indicate that rent control reform and judicial capacity are two areas in need of urgent attention from policymakers. The Model Tenancy Act, approved in June 2021 by the Government of India, aims to address both issues. It allows for setting rents at market rates and requires separate fast track courts to resolve disputes between tenants and landlords. If states adopt this Act then our findings suggest that vacant housing will decline.

We estimate that a policy change in rent control laws would have a net welfare benefit and could reduce the housing shortage in India by 7.5%. Given that it simultaneously has a small number of formal housing units per family by world standards and a high vacancy rate, India can almost surely allocate its housing resources more efficiently and equitably.

CRediT authorship contribution statement

Sahil Gandhi: Conceptualization, Methodology, Investigation, Formal analysis, Writing – original draft, Writing – review & editing, Project administration, Supervision, Funding acquisition. **Richard K. Green:** Conceptualization, Methodology, Formal analysis, Writing – original draft, Writing – review & editing. **Shaonlee Patranabis:** Methodology, Formal analysis, Writing – original draft, Writing – review & editing.

Appendix

Table A.1
Tenure of housing by formal and informal (slums) in urban India in 2011

Tenure	Number of units (in mil.)			% units by type		
	All	Slums	Formal	All	Slums	Formal
Ownership	54.5	9.7	44.9	69.2	70.2	68.9
Rented	21.7	3.6	18.1	27.6	26.3	27.8
Any other	2.6	0.5	2.1	3.3	3.5	3.3
Total	78.9	13.8	65.1	100	100	100

Note: Any other refers to premises that are neither owned nor rented. This category includes houses provided by an employer rent-free, houses constructed on encroached land, unauthorized buildings, and natural shelters used as housing. Source: Census of India (2011).

Table A.2
Tenure status and income quintile (MPCE) in urban India

Tenure	Income quintiles					
	0-20	20-40	40-60	60-80	80-100	Total
Owned	24.0	20.5	20.6	17.7	17.2	100
Rented	13.2	16.1	22.8	23.0	24.8	100

Note: MPCE is defined as the total expenditure in the last 30 days divided by the size of a given household. Consumption expenditure classes (quintiles) calculated using MPCE for urban households, weighted by sampling weights. Source: Authors' calculations based on NSSO 69th Round (2012).

Table A.3
Contracts in slums and non-slum dwellings (%)

Type of tenure	Formal	Slum	Total
Rented: Employer quarter	11.6	2.4	10.7
Rented: With written contract	18.6	14.1	18.1
Rented: Without written contract	69.8	83.5	71.1

Source: Authors' calculations based on NSSO 69th Round (2012).

Table A.4
Relationship between % rental and % vacant housing

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
	Dep. Variable = % vacant					
% rented	-0.03	-0.11***	-0.02	-0.05*	-0.11***	-0.04***
	(0.06)	(0.02)	(0.02)	(0.03)	(0.02)	(0.01)
Constant	13.1***	-132**	-77.5	14.3***	27.8*	4.24
	(1.55)	(59.4)	(58.4)	(1.88)	(15.1)	(14.1)
Administrative unit	Districts	Districts	Districts	Cities	Cities	Cities
Observations	637	637	637	496	494	494
R-squared	0.01	0.74	0.84	0.08	0.68	0.76
Controls	N	Y	Y	N	Y	Y
State dummies	N	N	Y	N	N	Y

Note: Dependent variable is percent vacant housing. District controls for columns (2) and (3) include mean household size, the share of households with access to banking services, the population proportions by scheduled castes and tribes, marital status, religion, age groups, level of education, workforce participation, and gender. We also control for the number of shops, offices, along with the number of good, livable, and dilapidated buildings per person. Mean household size and marriage data were unavailable at the city level - these controls are not included for columns (5) and (6). All regressions are for urban areas only with population weights at the administrative unit level. Missing districts are Lahul & Spiti, and Kinnaur (Himachal Pradesh), and Nicobars (Andaman). Vacancy data was available for only 497 of the 7935 cities/towns in Census 2011. Imphal (Manipur) does not have rental housing data in a neat form and hence the dependent variable could not be computed for it. Control variables were unavailable for the cities of Kapurthala (Punjab), Faizabad (Uttar Pradesh) and Imphal (Manipur). The 496 cities cover 57.0% of the urban population. The suppressed categories for gender, religion, age group, and education are the share of men, Hindus, people aged 0-4, and illiterates respectively. Robust standard errors clustered at the state-level in parentheses. *** $p<0.01$, **$p<0.05$, * $p<0.1$.

Table A.5
Relationship between percent vacant housing and alternative rent revision variables.

VARIABLES	(1)	(2)	(3)	(4)
	Dep. variable = % vacant			
Rent revision alternative 1[i]	3.03***	3.03***		
	(0.91)	(0.94)		
Rent revision alternative 2[ii]			2.98***	2.98***
			(0.85)	(0.92)
# Months of non-payment allowed	1.92	1.92	1.98*	1.98
	(1.18)	(1.36)	(1.19)	(1.39)
Non occupancy dummy (1 = pro-tenant)	-1.36	-1.36	-1.19	-1.19
	(1.29)	(1.26)	(1.30)	(1.27)
Age coverage dummy (1 = pro-tenant)	1.07	1.07	1.00	1.00
	(0.75)	(0.78)	(0.75)	(0.78)
Constant	9.82*	9.82	6.64	6.64
	(5.93)	(7.64)	(6.58)	(8.62)
Observations	912	912	912	912
R-squared	0.58	0.58	0.58	0.58
Number of districts	456	456	456	456
Controls	Y	Y	Y	Y
Coverage	Y	Y	Y	Y
Cluster	District	State	District	State

Notes: i. This variable is set as one if the law allows revisions when market prices increase or for periodic revisions, two if rent revision is allowed when taxes increase, and three if rent revision is allowed only when physical improvements are made. Thus a higher value denotes a more pro-tenant law. ii. In this variable, we ordered rent revision conditions from pro-landlord, where the value is one to pro-tenant, where its value is four. Thus, this variable takes the value one if the rent increases when market value increases, two if periodic increases are allowed, three if increase in tax increase rents, and four if rent is revised only when a physical improvement occurs. We consider these four terms as they appear frequently in the laws of different states. iii. Dependent variable is percent vacant housing at the district level. We have a balanced panel with 456 districts in 2001 and 2011. All data is matched to year 2001 district boundaries. All specifications include district and year fixed effects. Geographical coverage and rent coverage dummies get dropped as there were no changes in these clauses. Controls include mean household size, the share of households with access to banking services, the population proportions by scheduled castes and tribes, marital status, religion, age groups, level of education, workforce participation, and gender. We also control for the number of shops and offices, along with the number of good, livable, and dilapidated buildings per person. All regressions are for urban areas and population weighted at the district level. Robust standard errors in parentheses are clustered at the district level for columns (1) & (3) and at the state level for columns (2) & (4). *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table A.6

Relationship between percent vacant housing and individual rent revision clauses.

VARIABLES	(1)	(2)	(3)	(4)	(5)
	Dep. variable = % vacant				
Rent revision dummies					
Market value change	-3.11**				-6.71***
	(1.52)				(2.04)
Periodic revision		-0.24			-3.85***
		(0.63)			(1.16)
Change in taxes			-0.30		-3.13***
			(0.52)		(0.90)
Physical improvement				2.78***	
				(0.90)	
Age coverage dummy (1 = pro-tenant)	0.57	0.48	0.76	0.81	0.47
	(0.50)	(0.63)	(0.63)	(0.50)	(0.63)
Constant	20.0***	20.3***	20.0***	20.1***	24.1***
	(2.97)	(2.98)	(2.94)	(2.92)	(3.06)
Observations	912	912	912	912	912
R-squared	0.57	0.56	0.56	0.58	0.58
Number of districts	456	456	456	456	456
Controls	Y	Y	Y	Y	Y

Notes: Dependent variable is percent vacant housing. District controls for include mean household size, the share of households with access to banking services, the population proportions by scheduled castes and tribes, marital status, religion, age groups, level of education, workforce participation, and gender. We also control for the number of shops, offices, along with the number of good, livable, and dilapidated buildings per person. Each rent revision dummy is set to 1 if the corresponding term applies to the district and 0 otherwise. They are ordered from most pro-landlord (market value change) to most pro-tenant (physical improvement). Robust standard errors clustered at district level in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table A.7

Descriptive statistics.

VARIABLES	(1) Obs.	(2) Mean	(3) St. dev.	(4) Min	(5) Max
Panel A: Pooled data for 2001 and 2011					
% vacant	912	10.8	4.59	3.25	44.1
# Months of non-payment allowed	912	2.95	1.68	0.5	7
Rent revision dummy (1 = pro-tenant)	912	0.37	0.48	0	1
Non-occupancy dummy (1 = pro-tenant)	912	0.50	0.50	0	1
Age coverage dummy (1 = pro-tenant)	912	0.31	0.46	0	1
Rent coverage dummy (1 = pro-tenant)	912	0.55	0.50	0	1
Geo coverage dummy (1 = pro-tenant)	912	0.91	0.28	0	1
Panel B: Cross-section data for 2011					
% vacant	637	12.2	4.80	1.86	48.7
Judges per 1000 (urban)	580	0.04	0.04	0.005	0.59
Judges per 1000 (total)	580	0.01	0.01	0.002	0.14
# Months of non-payment allowed	598	3.09	1.66	0.5	7
Rent revision dummy (1 = pro-tenant)	598	0.23	0.42	0	1
Non-occupancy dummy (1 = pro-tenant)	598	0.39	0.45	0	1
Age coverage dummy (1 = pro-tenant)	598	0.33	0.47	0	1
Rent coverage dummy (1 = pro-tenant)	598	0.46	0.50	0	1
Geo coverage dummy (1 = pro-tenant)	598	0.86	0.34	0	1

Note: In panel A, we have a balanced panel with 456 districts from 24 states in 2001 and 2011 for all rent control variables, medical institutions, and educational institutions. The density of paved roads could not be calculated for a total of 19 observations – 16 districts from 2001 and 3 from 2011. There were 593 districts in 2001 and 640 districts in 2011. All data is matched to year 2001 district boundaries. We were unable to map 29 districts that had no counterpart in 2011 due to reorganisation. We also dropped all districts from the state of Assam due to a complex reorganisation of districts in 2003, when the Bodoland Territorial Council was formed. Prevailing rent control variables for both years could not be coded for Andaman and Nicobar Islands, Dadra and Nagar Haveli, Himachal Pradesh, Lakshadweep, parts of Maharashtra (districts under the erstwhile Central Provinces and the princely states of Hyderabad and Berar), Manipur, Mizoram, and Rajasthan. Nagaland has not passed a rent control law, and Arunachal Pradesh passed its first rent control act in 2014. These states were also dropped from the analysis. In panel B, data on vacant housing was not available for 3 districts, Nicobar, Lahul & Spiti and Kinnaur. The number of judges was unavailable for 60 districts from the states of Andaman and Nicobar Islands Arunachal Pradesh, Bihar, Chhattisgarh, Dadra and Nagar Haveli, Gujarat, Himachal Pradesh, Lakshadweep, Maharashtra, Manipur, Meghalaya, Mizoram, Nagaland, Puducherry, and West Bengal. The judicial districts of Andaman and Nicobar Islands, Puducherry, and Mumbai were dropped from the cross-section since the judicial data are unavailable at the census district level. Rent control variables were not available for the states of Arunachal Pradesh, Chandigarh, Dadra and Nagar Haveli, Lakshadweep, Manipur, and Nagaland.

Table A.8
Testing for instrument validity.

	Quartile 1	Quartile 2	Quartile 3	Quartile 4	Correlation with the instrument
Proportion of married persons	0.470	0.468	0.476	0.474	0.033
Proportion of shops or offices	0.035	0.036	0.033	0.033	-0.075
Proportion of factory	0.003	0.003	0.003	0.003	-0.025
Literate persons with a technical diploma	0.009	0.008	0.009	0.009	0.045
Persons aged 20-24	0.100	0.098	0.098	0.099	-0.023
HHs with access to banking	0.700	0.662	0.662	0.649	-0.168

Notes: This table presents tests for instrument validity. The table reports means of the variables listed by quartiles of distance to the High Court (instrument). The table reports means of proportion of married persons, proportion of shops and offices, proportion of factory, proportion of literate persons with technical diploma, proportion of persons aged 20-24, and proportion of households with access to banking. The table also reports the correlation of the instrument and the variables listed.
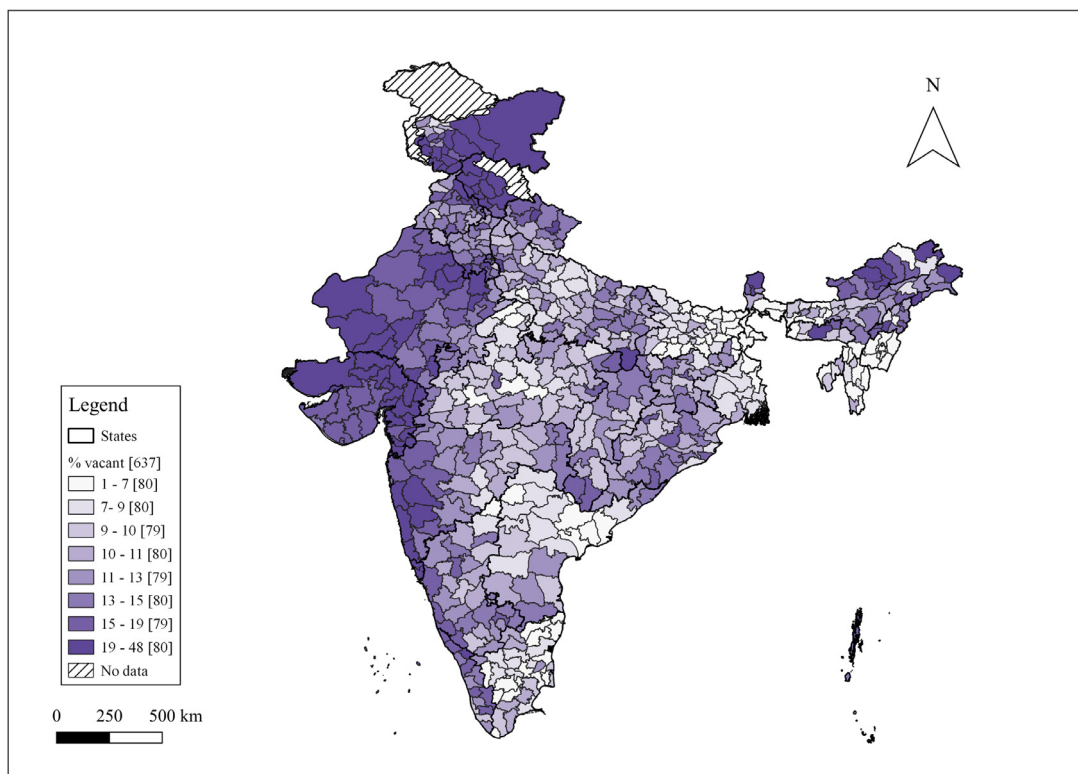
Fig. A.1. Percent urban vacant houses across districts Source: Authors' mapping using data from Census of India, 2011.

Fig. A.2. House-listing and Housing Census Schedule, Census 2011

Supplementary material

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.jue.2022.103490.

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