

LAND TENURE, POLITICS, AND PERCEPTION:
A STUDY OF TENURE SECURITY AND HOUSING IMPROVEMENT
IN INDIAN SLUMS

by

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LIST OF ABBREVIATIONS

AEIS	Special Areas of Social Interests
ATE	Average Treatment Effect
BPL	Below Poverty Line
BSUP	Basic Services for the Urban Poor
CAA	Constitutional Amendment Act
CDSA	Centre for Development Studies and Activities
CI	Confidence Interval
EWS	Economically Weaker Section
GIS	Geographic Information System
INC	Indian National Congress
IPW	Inverse Probability Weighting
JNNURM	Jawaharlal Nehru Urban Renewal Mission
KCB	Khadki Cantonment Board
MASHAL	Maharashtra Social Housing and Action League
MHADA	Maharashtra Housing and Area Development Authority
MNS	Maharashtra Navnirman Sena
MPCE	Monthly Per Capita Expenditure
MSM	Marginal Structural Model
NCP	Nationalist Congress Party
NGO	Non-governmental Organization
NOC	Non-objection Certificate
NSSO	National Sample Survey Organisation
OBC	Other Backward Class
OR	Odds Ratio
PCB	Pune Cantonment Board
PIL	Public Interest Litigation
PMC	Pune Municipal Corporation
RAY	Rajiv Awas Yojana
RCM	Rubin Causal Model
SC	Scheduled Caste
SD	Standard Deviation
SRA	Slum Rehabilitation Authority
SRS	Slum Rehabilitation Scheme
ST	Scheduled Tribe
ZEIS	Special Zones of Social Interests

ABSTRACT

Throughout its stand-alone but closely interrelated three chapters, this dissertation examines the link between the tenure security of slum dwellers and their housing investment behaviors in India by disentangling the interaction between land tenure, politics, and the perception of slum dwellers.

Chapter 2—*Impact of Slum Formalization on Self-help Housing Construction: A Case of Slum Notification in India*—investigates the extent to which slum notification, a tenure formalization policy that officially recognizes settlements as slums and ensures the occupancy rights of the residents, has stimulated housing investment by the households in India. This chapter hypothesizes that households with greater tenure security are more encouraged to invest in their houses, and that slum notification significantly improves their tenure security. In using a nationally representative dataset, this chapter employs propensity score methods that adjust for the anticipated selection bias problem. This chapter finds that, with the differences in observed household characteristics adjusted, slum notification will increase the average amount of money spent on housing construction. On the other hand, the proportion of households who would improve their houses is estimated to be higher in non-formalized settlements. The findings suggest that not only formalizing slums but also supporting self-help efforts by the residents of non-formalized slums would be effective for improving their housing conditions.

Chapter 3—*Impact of Slum Legalization without Title Provision on Housing Transformation: A Case of Slum Declaration in Pune, India*—offers empirical evidence that the legalization of land tenure has, even without the provision of full property rights, stimulated housing transformation in slums in the long run in Pune, India. This chapter analyzes Pune's slum declaration policy, by which the local and state government agencies legally ensure the slum dwellers' occupancy of the land. The data for this study is a primary survey data that contains panel information at the household and slum levels. This chapter assesses the effects of slum declaration through the estimations of marginal structural models. This chapter finds that

households in legalized slums are 47% more likely to improve their housing structures with better materials and 78% more likely to expand their houses by adding a second floor. This chapter also unfolds that the influence of this legalization is heterogeneous, depending on the degree of tenure security enjoyed by slum dwellers prior to the legalization. The findings of this chapter illuminate the critical role of tenure security in households' housing investment behaviors in slums.

Chapter 4—*Revealing Invisible Rules in Slums: The Nexus between Perceived Tenure Security and Housing Investment*—examines the link between the tenure security of slum dwellers and their housing investment behaviors in Pune, India. Previous studies have emphasized one aspect of tenure security over the others, and fail to disentangle three aspects' interactions. This chapter unravels the interplay of legal, *de facto*, and perceived tenure security by formulating the perceptions of slum dwellers about their property rights as invisible rules. Using new survey data, a statistical analysis reveals that such beliefs reasonably reflect the level of tenure security under the influence of key legal and *de facto* factors. A particularly strong association was found between slum dwellers' political patronage and confidence about building better housing. This chapter further delves into the politico-legal interaction by investigating the relationship between slum residents and local political actors through a case study of a slum settlement in Pune. The analysis manifests that political interventions have profoundly influenced the formation of invisible rules among slum dwellers and their housing activities, though the underlying legal and political systems have motivated, enabled, and limited such informal arrangements.

CHAPTER 1

Introduction

1.1 Background

In developing regions, more than 2.6 billion people, or 45% of the total population, currently live in urban areas (UN-Habitat, 2012). Nearly one third of those urbanites, or approximately 863 million, are estimated to reside in so-called slum¹ areas, which are characterized by inadequate access to infrastructure and basic services, substandard housing, overcrowding, and insecure tenure (UN-Habitat, 2003b). The proliferation of those slums—the “planet of slums” (Davis, 2006)—has brought about tremendous challenges for the residents and planners who are in charge of managing sustainable urban development. Many slum dwellers are struggling with undesirable living conditions and the threat of forced eviction. Planners are also facing unprecedented difficulties in managing land use by adjusting master planning and regulations to the ongoing rapid growth of the cities.

As opposed to these pessimistic descriptions, a growing number of researchers view slums as places of hope. It is in those slums that the urban poor can build or find affordable housing that neither formal housing markets nor governments provide. These slum settlements are neither a problem nor the root cause of urban poverty. Instead, they are a promise that provides affordable housing in proximity to work places, while absorbing abundant labor migrating from rural areas (Glaeser, 2011; World Bank, 2009). As manifested by the recent popularity of the term ‘inclusive city’ (e.g., UN-Habitat, 2010), researchers and policy makers have come to embrace the idea of integrating, rather than removing or isolating, slums into the formal systems of cities. The validity of this optimistic view of slums as hope, however, is predicated on the assumption that the living standard in slums continues to improve and that the residents can eventually move out into formal housing (Stokes, 1962).

¹ Despite its possible pejorative connotation, this dissertation purposely uses the word “slums” because it is a word officially used in the Indian legal and policy contexts.

More than four decades ago, John F.C. Turner argued that slum residents themselves can best improve their living conditions (Turner & Fichter, 1972; Turner, 1967, 1968, 1976, 1978). From the standpoint of his seminal self-help housing theory, slum residents are well motivated to upgrade their housing by weighing priorities that are shifting through the courses of their lives and accumulating financial resources over a long period of time. His advocacy for self-help housing matched the neoliberal ideology of the World Bank that prioritized efficiency and cost recovery, resulting in the vast implementation of sites-and-services² and *in-situ* slum improvement programs in various parts of the developing world (Buckley & Kalarickal, 2006; Pugh, 1994; Werlin, 1999). Unfortunately, we have witnessed the limitations of those program-based approaches, outpaced by a surge in slum population.

What was instead needed was to remove barriers that inhibit the efforts of slum dwellers to upgrade their living environments. Academics and professionals have increasingly come to recognize the importance of tenure security; i.e., the protection from forced eviction without due legal process and compensation (Durand-Lasserve & Royston, 2002; Durand-Lasserve & Selod, 2009; Payne, 2002b; UN-Habitat, 2008). It has been long discussed that insufficient tenure security discourages housing investment by slum dwellers. Theoretically, once people are free from the risk of forced eviction, or at least they expect so, they would embark on upgrading their living environments. In this regard, the fundamental question is, *What factors critically influence the tenure security of slum dwellers and thereby their housing investment behaviors?* This is the overarching question that runs throughout this dissertation.

1.2 Theories

1.2.1 Tenure Security and Housing Investment

Prescribing a policy to support self-help activities by the poor requires a solid understanding of how they determine to invest in their housing. Turner's classic model illuminates the changes in the priorities of the urban poor as they move up the economic ladder throughout their lifetime (Figure 1.1). Based on his observation of slum dwellers in Peru, Turner conceptualizes how households' vital needs (identity, opportunity, and security) and housing

² In a typical sites-and-services program, a government agency provides or leases the urban poor a parcel of land, often in a peripheral area, with a minimum of infrastructure and services. The residents are expected to build and upgrade housing and infrastructure mainly through their own efforts.

needs (proximity to unskilled jobs, freehold ownership, and modern standard shelter) change depending on their income level. According to the model, the priority of tenure security is low for the poorest, who are desperate to make a living. For them, living near the workplace is more critical than secure tenure and housing quality. Low or lower-middle income households who have escaped from such tough situations begin to aspire for secure tenure, with which they can gradually improve their living conditions over a period of time.

Since the theory of self-help housing somehow became an accepted norm³, a number of studies have investigated the driving (or constraining) factors of housing investment by households in slums. Drawing on the vast body of literature, I sketch out the overarching framework, as visually summarized in Figure 1.2. To consider how the tenure security of slum dwellers possibly influences their housing investment decisions, one needs to consider what motivates slum households to invest in their houses (i.e., motivation) and what allows them to do so (i.e., capacity). My argument is that the tenure security of slum dwellers influences their housing investment behaviors either directly or indirectly by changing their motivation and/or resources.

Previous studies suggest that the motivation of housing investment stems from (a) dissatisfaction and/or (b) economic motivation. Importantly, as argued by Turner, residential dissatisfaction and economic motivation of slum households are closely tied and change throughout their lives. In the theories of residential satisfaction, the degree of a household's satisfaction with his or her housing and neighborhood is measured by the difference between actual and desired (or aspired) situations (Galster & Hesser, 1981; Galster, 1987; Lu, 1999). The theory of housing adjustment posits that such dissatisfaction pushes households into adjustment activities, such as altering their houses or relocation (Bruin & Cook, 1997; Morris & Jakubczak, 1988; Morris & Winter, 1975). As with Turner who points to the importance of slum households' satisfaction in housing activities, this line of reasoning emphasizes the role of psychological aspects in explaining housing activities.

³ Nevertheless, several scholars challenge the theory of self-help housing and policies based on the theory (for example, see Mathey (1992) and Ward (1982)). In addition to questioning the effectiveness and efficiency of self-help housing approach, some critique its neoliberal ideology that justifies the retreat of governments from allocating adequate resources to the marginalized population without redressing the underlying structural inequality. Similar critique against titling programs is found in, for example, Mitchell (2009).

By contrast, economists view housing investment as an economic activity, by presupposing that households invest in their houses as long as they expect that the returns from the investment exceed the current costs (Arnot, Luckert, & Boxall, 2011; Besley, 1995; Demsetz, 1967; Sjaastad & Bromley, 2000). For instance, slum households sometimes capitalize on their houses by renting out to tenants (S. Kumar, 1996; Struyk & Lynn, 1983; UN-Habitat, 2003a), using it as a work place (Benjamin, 2004; Strassmann, 1987; Tipple, 2005), or holding them as economic assets until bequeathing them to their children. Access to infrastructure and services also influences the motivation of slum residents for housing investment. This is because lack of access to services would reduce the expected return from the investment. Strassmann (1984) stresses the importance of installing basic infrastructure in sites-and-services or slum upgrading projects in the early stages to stimulate self-help construction by the residents.

Motivated households actually invest in their houses only if they are capable of doing so. Because of the limitation of other options or their preference of minimizing bankruptcy risk, slum households often invest in their houses with their own savings or borrow from their relatives or friends (Gilbert, 2002). In India, for instance, most of the cost of housing construction in slums was paid for by households' own financial resources (70%) or their own labor (28%) (NSSO, 2010a). Thus, timing of investment by slum households predicates on when they are ready to have adequate income and savings.

Based on their motivation and resource availability discussed above, slum residents undertake a variety of housing investment. Starting from a tiny shack, they would gradually improve their houses in a various ways. Slum residents replace floors, walls, and roofs made of temporary materials (such as mud, wood, and iron sheets) into those made of permanent materials (such as bricks and cement). These improvements protect them from severe weather conditions and natural disasters and reduce the risk of health problems. Another vector of common improvement works is the expansion of housing, horizontally and/or vertically. In dense slums, residents often have only an option to build additional floors onto their existing houses. Indian people usually prefer to live together or side-by-side as a joint family, so slum residents have strong motivation to prepare rooms for their families and relatives. Renting out extra rooms to tenants is also a common income-generating practice for slum residents.

It is reasonable to assume that the level of tenure security is positively associated with the amount of housing investment. Their relationship is, however, not necessarily linear. Higher risk

of forced eviction possibly reduces the amount of housing investment by slum residents who would otherwise opt to do so. But this is not always the case. For example, even in slums amid high risk of clearance, some residents may invest in their housing with strong desire to prepare rooms for their relatives or other income-generating purposes. In addition, the level of tenure security and the amount of housing investment is not necessarily in a linear relationship because being free from the risk of forced eviction alone does not instantly lead to housing investment. One should instead regard (lack of) tenure security as a constraint and consider that removing the barrier would release housing investment by slum dwellers when they have motivation and resources to do so.

Literature in urban planning, development economics, and other related disciplines has by and large focused on three elements of tenure security. Economists emphasize the role of property rights enforced by laws in incentivizing property owners to invest in their properties (Besley, 1995; Deininger, 2003; Demsetz, 1967; World Bank, 1993). The efficient use of those properties as a whole is realized in invigorated housing markets. In addition, the provision of legal ownership to existing informal houses is expected to break financial barriers faced by slum dwellers. According to Hernando de Soto's (2000) influential argument, households with legal titles would borrow money from banks, instead of informal money lenders, by using their houses as collaterals. However, a growing number of scholars and professionals are against this titling approach, instead emphasizing the fact that slum dwellers often enjoy good *de facto* tenure security regardless of their legal status (Gilbert, 2002; Handzic, 2010; Payne, Durand-Lasserve, & Rakodi, 2009; Varley, 1987). They also raise concerns about the negative impact of titling on the poorest due to a rapid change in demographic and housing markets in slums. Finally, another line of argument insists that slum dwellers' perceptions about the risk of eviction, rather than their legal and *de facto* tenure security, eventually determine their housing activities (de Souza, 2001; Doebele, 1978; Reerink & van Gelder, 2010; van Gelder, 2009, 2012).

1.2.2 Urban Informality and Politics in India

The complexity of urban informality in India challenges the group of literature above, which I refer to as theories of tenure security and housing investment for the purposes of this discussion. Since the inception of economic liberalization and decentralization in the 1990s, the situations of slums in Indian cities have been rapidly changing. Finally recognizing urbanization

as an engine for economic growth, the central government has fueled infrastructure development in selected major cities by channeling subsidies to state and local governments through the Jawaharlal Nehru National Urban Renewal Mission (JNNURM).⁴ State and local government agencies have been eager to modernize infrastructure and facilitate urban renewal in order to lure private/foreign investment (Kennedy & Zerah, 2008). While demand for urban land soars, its supply has been restricted by, among others, tight government control of land through various planning regulations (Annez, Bertaud, Patel, & Phatak, 2010). Rising real estate values push private builders and developers, with formal and informal support from governments, to grab land for luxury residential and commercial projects (Weinstein, 2008; Whitehead & More, 2007).

While pursuing economic development, the central government has initiated a governance reform by promoting decentralization and participation. Traditionally, state governments had been the authorities in charge of urban development, while local municipal bodies as subordinates primarily executed service deliveries (Weinstein, Sami, & Shatkin, 2014). The 74th Constitutional Amendment Act (CAA) of 1992 aimed to transfer the decision-making power that had been dominated by state governments to local municipal governments (Baud & de Wit, 2008). To promote the stagnated governance reform process, the central government's JNNURM provided subsidies to state governments with the condition of undertaking the reforms recommended by the 74th CAA. The resulting governance reform in Indian cities, such as the introduction of ward committee, opened the door to citizens for their participation in the local policy-making process. In the meantime, economic growth since economic liberalization in the 1990s has brought a vast number of people in Indian cities who possess consumption power to the extent that they can aspire to the life-style of developed countries. This so-called emerging middle-class has gained a say by taking advantage of the devolution reform through, for example, the formation of residential welfare associations or non-profit organizations (Baviskar, 2003; L. Fernandes, 2006; Ghertner, 2011). Those people strongly demand better infrastructure and services and clean environments in their neighborhoods.⁵

⁴ The JNNURM was launched by the central government in 2005. It aims to accelerate the improvement of infrastructure and urban service, particularly targeting 65 major cities, including Pune (Kennedy & Zerah, 2008).

⁵ Other studies point to the increasing influence of court judgment, with the introduction of public interest litigations (PIL) (Ghertner, 2008; Zerah, 2007). PIL in India eases the requirement of traditional standing

The changes in urban contexts described above have driven the criminalization of slum dwellers as encroachers on precious land and the public nuisance that impedes the modernization of their cities. As a result, massive slum clearance incidents have been rampant in metropolises, such as Delhi and Mumbai (Bhan, 2009; Dupont, 2008; Risbud, 2009).

Interestingly, while facing soaring pressure against their occupancy, a number of slum dwellers nevertheless maintain their secure tenure. In democratic India, slum residents, who account for a significant portion of the total population in major cities, exercise *en masse* voting power. The number of slum households accounts for more than 40% of Greater Mumbai and nearly 30% of Kolkata and Chennai (Figure 1.3). Voting turnout of the poor is known to be quite high in Indian cities (Ahuja & Chhibber, 2012; Harris, 2005). Politicians and candidates are eager to, or at least promise to, cater to their demands. This results in the ad-hoc tolerance of slum dwellers' occupancy of land and, moreover, politicians can even determine which slums will be legalized. It is anecdotally well known that arrangements favoring slum dwellers, formally or informally, are synchronized with the timing of elections (Banerjee, 2002).

It is important to note that both slum dwellers and politicians have incentives to maintain such informality. It is this room for informal arrangements that allows the urban poor to seek, negotiate, and obtain secure tenure and social welfare that would otherwise be denied them. While enclosing those people as their constituency, or "vote bank" (Benjamin, 2008), politicians sustain their political presence by purposely keeping the tenure security of slum dwellers unstable while continuing to promise to improve it. Naming this politicized terrain "political society," Partha Chatterjee argues that politicians are motivated to extend protection to those marginalized populations "on a case-to case, *ad hoc*, or exceptional basis, without jeopardizing the overall structure of legality and property" (Chatterjee, 2004, p. 136). Roy (2009) further formulates the state as an informal authority that maintains a legal vacuum on purpose and uses deregulation as a tool to pursue its own interests. In this view, local politicians and officials abuse their power to demarcate the legal and illegal.

These theories on urban informality and politics in India offer valuable insights. As Roy (2005) underlines, the legality of slums is neither fixed nor exogenously given; rather, it is ever-

so that socially deprived groups can file a petition to the court in case of the violation of human rights. Although PIL cases used to be related to the rights of disadvantaged groups in the 1970s and 1980s, NGOs and lawyers began to resort to the PIL for better environment and governance in the 1990s (Deva, 2009; Rajamani, 2007).

changing, being hinged on political process with incessant negotiations among various stakeholders. This political terrain is, in return, embedded in the underlying legal and governance frameworks. Such politico-legal interaction challenges the conceptualization of tenure security based on separate legal and *de facto* elements. All the more, it must be a meaningful task to integrate the theories of urban informality and politics in India and the theories of tenure security and housing investment. On one hand, it will benefit the theories of tenure security and housing investment by helping to formulate in a more nuanced way the dynamic interplay of legal, *de facto*, and perceived tenure security elements. On the other hand, bridging the two bodies of literature will also benefit the theories of urban informality and politics in India by offering an analytical framework for housing investment behaviors by slum dwellers. In essence, this dissertation is nothing but such an ambitious endeavor.

1.3 Structure of This Dissertation

Through independent but closely interwoven three chapters, the thrust of this dissertation is to investigate the link between the tenure security of slum dwellers and their housing investment behaviors by disentangling the interaction between land tenure, politics, and the perception of slum dwellers. Figure 1.4 visually presents simplified frameworks of the three chapters. Chapter 2 and Chapter 3 quantitatively estimate the influence of land tenure formalization—slum notification in Chapter 2 and slum declaration in Chapter 3—on the amount of housing investment by slum dwellers (panel (a) in Figure 1.4). While Chapter 2 takes advantage of nationally representative dataset to capture a nation-wide cross-sectional trend, Chapter 3 investigates the effect of land tenure formalization on longitudinal changes in housing conditions in a city. Chapter 4 focuses on the role of slum dwellers' perception in their housing investment decisions (panel (b) in Figure 1.4). The chapter also encompasses the interaction between legal and *de facto* (political) factors.

Contrary to theories espoused by economists, titling programs have brought about only limited success in the enhancement of slum residents' access to formal credit (Field & Torero, 2006; Galiani & Schargrodsky, 2010; Gilbert, 2002; Payne et al., 2009). Instead of such provision of full legal property rights, the concession of use rights have emerged as an alternative approach to improving the tenure security of slum dwellers and triggering their investment in their houses, while mitigating the changes in demographic and housing market conditions that

negatively impact the poorest. For example, Payne (2001) proposes a gradual formalization approach, starting with the assurance of occupancy or use rights, instead of full property rights that allow the trading of legalized housing. Slum notification in India is such a policy that legally ensures slum dwellers' occupancy rights. In the states where a slum notification policy has been enacted, local and state government agencies legally guarantee the occupancy of slum dwellers by notifying their settlements as slums and entitling residents of those notified slums to basic services (Figure 1.5). If my hypothesis that the assurance of the tenure security of slum residents leads to the encouragement of their housing improvement efforts holds, then one must observe more housing investment in notified slums. Thus, it is of great interest to examine nation-wide evidence of the effect of slum notification. In other words, a critical question to be clarified is, *to what extent has slum notification contributed to the intensity of housing investment in slums across India?*

Chapter 2 addresses this question by tapping into a nationally representative cross-sectional dataset collected by the National Sample Survey Organisation (NSSO) between 2002 and 2003. Through propensity score methods, this chapter estimates the extent to which slum notification has increased the odds of slum households engaging in housing improvement activities and the average amount of money spent for the purpose between 1998 and 2003. To the best of my knowledge, this is the first quantitative study that systematically examines the effects of slum notification on housing investment behaviors across India.

After observing the nation-wide trend in the effects of slum notification, the remaining chapters focus on Pune, the ninth-largest Indian city (Figure 1.6). The choice of Pune for this study is strategic. First, the city faces a serious slum problem. Among its three million citizens, more than one-third reside in slum settlements. Second, despite the scale and severity, slum problems in Pune have drawn relatively moderate attention from scholars than other metropolises, such as Delhi, Mumbai, Kolkata, and Bangalore.⁶ Third, slum notification, or slum declaration in the local policy terminology, has been implemented in Pune. Roughly half the

⁶ Exceptions are a series of studies by Meera Bapat (Bapat & Agarwal, 2003; Bapat, 1981, 1983, 1985, 1987, 1988, 1990, 2004). There are some studies, such as Kapoor & Leblanc (2008), Lall, Lundberg, & Shalizi (2008), and Lall & Lundberg (2008), that used the household surveys collected by the World Bank in Pune in 2002. Another important piece of research is Sami (2013), which offers insight into the urban governance systems in the city. In addition to the scholarly works above, several local NGOs have been working on slum issues in Pune. In addition to MASHAL, Shelter Associates has also conducted valuable research on slums (Joshi, Sen, & Hobson, 2002; Sen, Hobson, & Joshi, 2003; Shelter Associates, 2007).

slum settlements have been declared, which makes it an ideal setting for the purpose of analysis. Finally, a local non-governmental organization (NGO), Maharashtra Social Housing and Action League—or MASHAL—has prepared a valuable *Pune Slum Atlas*, which contains detailed survey information about a large-scale of people in slums, as well as legal and physical information about all slums in the city. My research takes advantage of this rare dataset. For the purpose of this project, I made a preliminary trip to Pune in 2011 and engaged in field research from July 2013 to November 2013.

As suggested by the theory of self-help housing, housing upgrading takes place in the very long run. All too often, slum residents build tiny single-room shack made of temporary materials, such as woods and iron sheets, and gradually upgrade their houses into those made of permanent materials, such as cement, with a second floor (Figures 1.7, 1.8, and 1.9). Chapter 3 examines such longitudinal changes in housing conditions in slums in Pune. Specifically, it addresses the following question: *To what extent has slum declaration influenced housing transformation, from katcha to pucca, and from one-story to multi-story, in slums in Pune over the last 40 years?* This chapter recovers panel information *ex post* by asking retrospective questions in the original surveys of slum households. This chapter relies on the marginal structural models (Hernan, Brumback, & Robins, 2001; Robins, Hernan, & Brumback, 2000) to identify the causal effects of slum declaration on housing transformation by dealing with methodological challenges, such as selection bias and time-varying confounders. The statistical analysis takes account of various legal and *de facto* tenure security factors, such as land tenability⁷, land ownership, possession of residential proofs, access to individual water taps, and political patronage. It also examines how the estimated effects of slum declaration differ among households depending on the underlying legality of the land.

The analysis in Chapter 3 reveals that people are, as expected, more likely to invest in their housing in declared slums. Interestingly, those residents believe in their property rights beyond what the declaration legally ensures. For instance, while only the construction of housing made of temporary materials with a maximum height of 14 feet (4.3 meters) is permitted in declared slums, many people believe that they are permitted to build multi-story cement housing. Chapter 4 demystifies this result by formulating property rights perceived by slum dwellers as

⁷ As discussed in the subsequent chapters, I define land as tenable if the master plan of the city designates it as the area where residential use is permissible.

invisible rules that are consciously or unconsciously held in slum dwellers' minds and significantly influence their decisions about housing investments. This chapter examines how the interaction of legal and political forces contributes to the formation of those invisible rules and thereby influences slum dwellers' housing investment behaviors. In so doing, it answers the following questions: *What kinds of property rights do slum dwellers in Pune believe they have? How have those perceived rights arisen from their legal and political contexts? How have the rights perceived by slum dwellers influenced their housing investment decisions?*

To address these questions, this chapter employs a mixed-methods approach, combining quantitative and qualitative data collection and analysis (Creswell, 2009). Its survey analysis reveals the characteristics of invisible rules in slums and the factors that shape the patterns of those invisible rules. My statistical analysis of the original household survey data estimates the association of the chance of households' believing in their right to build multi-story cement housing with important legal and *de facto* tenure security factors. If my hypothesis that invisible rules reflect the level of tenure security enjoyed by slum dwellers holds, then those with strong legal and *de facto* tenure security are more likely to believe in their right to develop better housing. The estimation result confirms this hypothesis; moreover, it finds that the influence of political patronage is stronger for slum residents with lesser legal tenure security. To delve into this implication of politico-legal interaction, I conduct a case-study analysis by focusing on a slum settlement in Pune. By analytically tracing the changes in tenure security in the slum, I illuminate how slum dwellers and political actors interact with each other and what critically motivates, enables, and limits such political interventions.

Through the three chapters above, this dissertation elucidates the nexus between the tenure security of slum dwellers and their housing investment behaviors. In essence, as summarized in Chapter 5, my analysis confirms that the assurance of slum dwellers' tenure security has a great influence on their housing investment behaviors. Legalization of land tenure significantly strengthens the link, even if they guarantee only occupancy rights. At the same time, my analysis demonstrates that there are other legal and *de facto* factors that significantly contribute to the tenure security of slum dwellers, such as land factors, access to infrastructure and services, and possession of residential proofs. Importantly, these factors interact with each other, and this politico-legal interaction is particularly complex in Indian cities. My case study illuminated that the lack of legal tenure security in the slum creates opportunistic room for both

slum dwellers and political actors to leverage for their own purposes. While this quid-pro-quo relationship may benefit them in the short run, legal and governance systems pose limitation to the scope of such political interventions. Slum residents ultimately perceive their tenure security, leading to the formation of invisible rules, which constrict their housing investment. My analysis illuminates that those invisible rules are not merely inconsistent misconceptions but they systematically reflect the underlying tenure security.

1.4 Tables and Figures

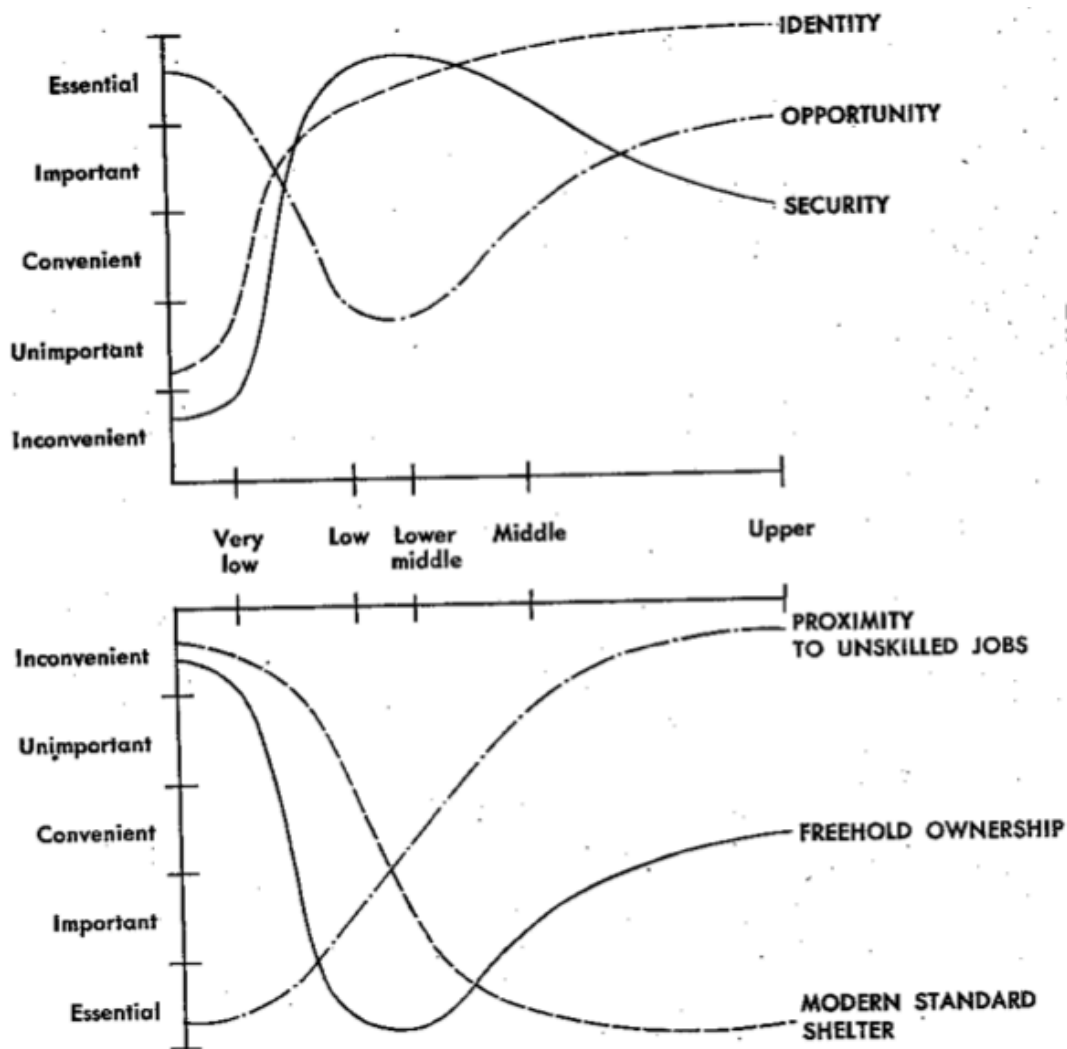


Figure 1.1 Turner's classic model of vital needs and housing needs

Source: Turner, 1972, p. 167

Note: Based on his observation of the urban poor in Lima, Turner (1972) hypothesizes that households' priorities for vital needs (identity, opportunity, and security) shift as their income levels change. Corresponding to those shifting priorities, housing demands (proximity to unskilled jobs, freehold ownership, and modern standard shelter) also shift. The upper chart illustrates the vital needs, and the lower chart illustrates housing needs that match with the shift in the vital needs. According to this model, tenure security becomes essential when households get out of extreme poverty and becomes ready to aspire for better housing.

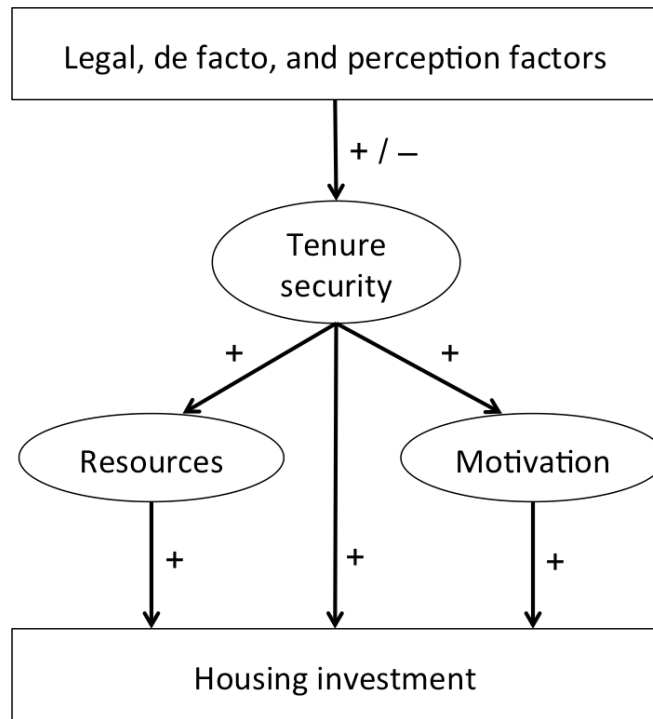


Figure 1.2 Relationship of tenure security and housing investment

Note: This figure illustrates a conceptual framework about the link between the tenure security of slum residents and their housing investment behaviors. In this framework, slum households are likely to invest in their housing when 1) they are motivated for the investment, 2) they are also financially capable of doing so, and 3) the lack of tenure security does not discourage them. There are various legal, *de facto*, and perception factors that positively or negatively contribute to the levels of slum residents' tenure security.

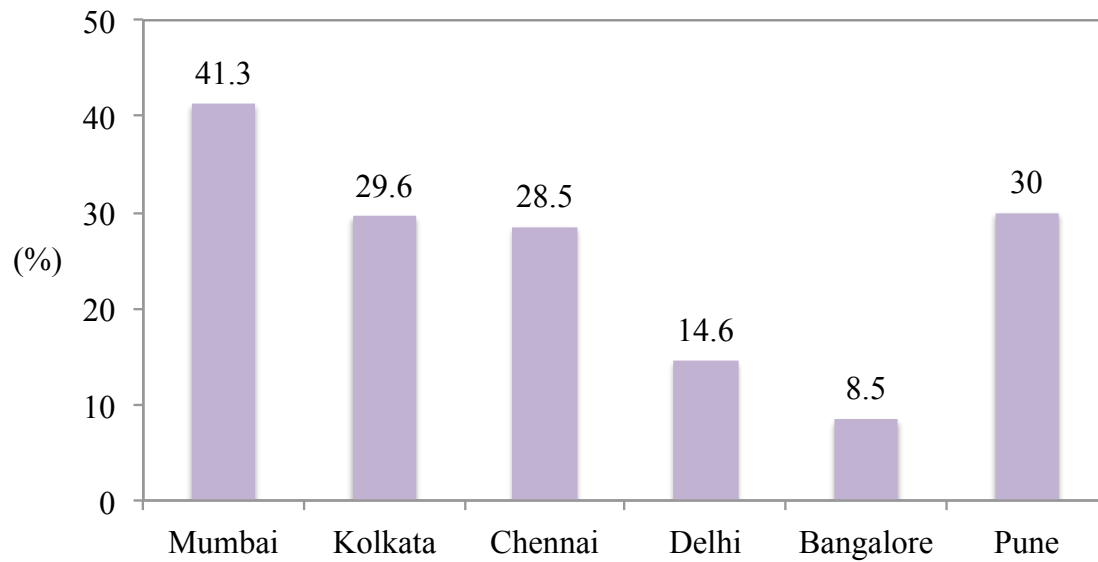


Figure 1.3 Proportion of slum households in selected cities, 2011

Note: Proportion of slum households in Mumbai, Kolkata, Chennai, Delhi, and Bangalore are calculated based on the Census of India 2011. The proportion in Pune is based on the Pune Slum Atlas.

Sources: Chandramouli, n.d.; MASHAL, 2011

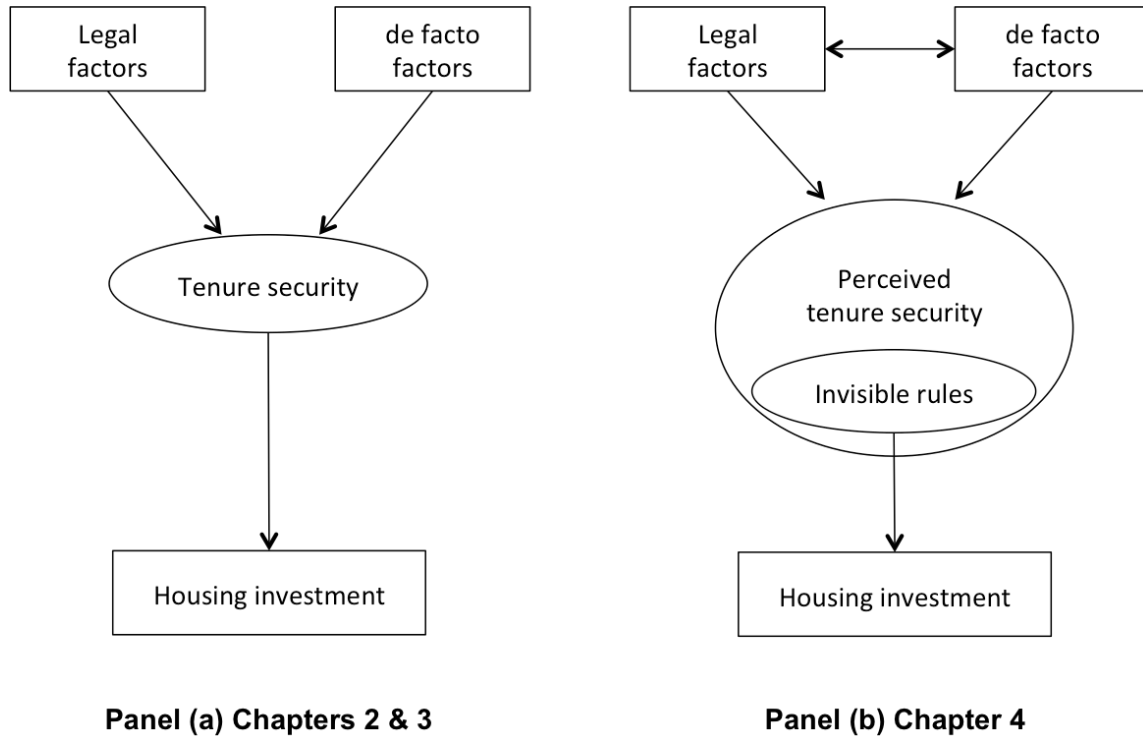


Figure 1.4 Frameworks of three chapters

Note: Panel (a) displays the framework for Chapter 2 and Chapter 3. This framework considers that some legal and de facto factors critically determine the levels of the tenure security of slum dwellers and thereby influence their housing investment decisions. Chapter 4 extends this framework by formulating invisible rules. Legal and *de facto* factors affect households' perceptions about the risk of forced eviction. Those households come to develop specific beliefs about their rights to develop housing (i.e., invisible rules), which ultimately influence their housing investment behaviors.

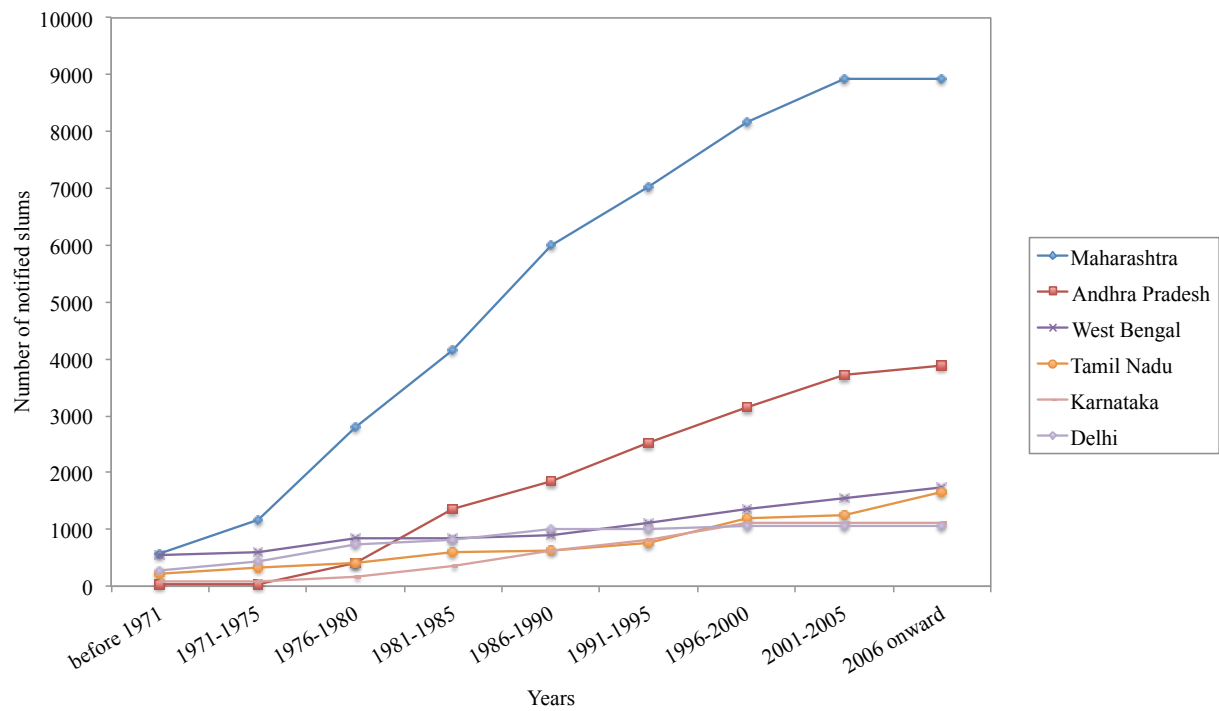


Figure 1.5 Number of notified slums in selected states

Note: Notified slums with unknown notification years are not included.

Source: NSSO, 2010



Figure 1.6 Location of Pune in India
Source: Google Maps



Figure 1.7 Examples of *katcha* housing in a slum in Pune

Note: *Katcha* housing refers to housing made of temporary materials, such as wood and iron sheets.

Source: Author



Figure 1.8 Examples of *pucca* housing in a slum in Pune

Note: *Pucca* housing refers to housing made of permanent materials, such as bricks and cement.

Source: Author



Figure 1.9 An example of self-help housing improvement

Note: An old woman is painting the walls of her house by herself in a slum in Pune.

Source: Author

CHAPTER 2
Impact of Slum Formalization on Self-Help Housing Construction:
A Case of Slum Notification in India

2.1 Introduction

In rapidly urbanizing and developing countries, it is imperative to improve the living conditions of the urban poor in settlements with substandard housing and inadequate infrastructure, or those areas commonly known as slums.⁸ In particular, their informal land tenure keeps them vulnerable to forcible eviction without due legal process and compensation. Recent discussions among academics and professionals have emphasized the importance of enhancing the tenure security of slum dwellers in stimulating the investment in their houses and living facilities (Durand-Lasserve & Royston, 2002; Durand-Lasserve & Selod, 2009; Payne, 2002b; UN-Habitat, 2008). As reviewed in the literature cited above, integrating their informal land-tenure status into formal systems, which is often referred to as tenure formalization or regularization, is becoming a common practice to achieve this objective in various parts of the developing world.

There is a body of literature, however, that questions the idea of whether tenure formalization enhances the tenure security of slum households, and thereby expedites *in-situ* physical consolidation. Some argue that it is not land tenure status, formal or informal, but the perception of the risk of forcible eviction or *de facto* security that influences housing investment by slum households (Doebele, 1987; Gilbert, 2002; Kiddle, 2010; Payne et al., 2009; Payne, 2001; Reerink & van Gelder, 2010; Roy & AlSayyad, 2004; Sjaastad & Bromley, 2000; van Gelder, 2009; Varley, 1987). Given the opposing theoretical arguments, we need systematically examined evidence on the link between tenure formalization and tenure security and housing

⁸ Slums and informal settlements are used interchangeably in this chapter.

investment. Unfortunately, mainly due to methodological challenges, such quantitative studies have been rare.

In the Indian context, state and local government agencies have implemented slum notification⁹, which is a type of tenure formalization policy that provides certain levels of property rights to slum dwellers for their protection (Banerjee, 2002; Risbud, 2009; Sharma & Barman, 2006). Slum settlements that are notified by state and local government agencies are called *notified slums*, while other slums are referred to as *non-notified slums*. The rules about how to select slum settlements to be notified vary from area to area. Households in notified slums are supposed to be legally protected from eviction without due process for a certain period, and entitled to infrastructure and urban services provided by local municipalities. Available data sources indicate that living conditions in notified slums are better overall than non-notified slums (Edelman & Mitra, 2006; NSSO, 2010b), though it is unclear to what extent, and how slum notification has contributed to the difference.¹⁰

This chapter aims to fill a critical research gap by investigating the impact of slum notification as a tenure formalization policy for protecting occupancy rights, by using a nationally representative dataset. This study assesses the extent to which slum notification facilitates housing investment by residents who would otherwise not be so inclined conditional on observed characteristics, including their socio-economic characteristics, housing types, and infrastructure access. To detect the causal influence through reducing selection bias, propensity score methods are employed. Based on the statistical analysis, this study finds that when the differences in observed household characteristics are adjusted, slum notification will increase the average amount of money spent for new house building and housing improvement by 53% and 34%, respectively. By contrast, the proportion of households who would improve their houses is estimated to be 3.4 percent point higher in non-notified slums. In other words, the odds of investing for housing improvement are 36% higher in non-notified slums. Once housing types and infrastructure access are additionally controlled for, the influence of slum notification on both the cost and proportion of investment become statistically insignificant.

This chapter is structured as follows. Section 2.2 reviews relevant theories on the interaction of tenure security, housing investment, and tenure formalization. Section 2.3

⁹ Slum notification is also referred to as slum declaration in some parts of India.

¹⁰ In addition, reverse causality may exist if slums in better living environments are more likely to be notified.

introduces slums and slum notification in light of the Indian context. Section 2.4 explains the data and methods used in this chapter. In section 2.5, estimation results are presented. Section 2.6 concludes with a brief summary, policy implications, and the limitations of this chapter.

2.2 Theory

2.2.1 Self-Help Housing Construction

John F. C. Turner gave his influential argument four decades ago (Turner, 1967, 1968, 1972, 1976), and since that time it has become popular to positively regard the efforts of the urban poor in the construction and improvement of their houses in informal settlements. The underlying idea of his theory for self-help housing is that urban poor are capable of both accumulating and making adequate use of various assets in order to improve their living environments (Mathey, 1992; Turner & Fichter, 1972; Ward, 1982). The theory projects self-construction by the urban poor as a solution to government failure in ensuring the availability of affordable housing in rapidly growing cities. Through this view, poor people strategically upgrade their housing and living facilities, while weighing their changing priorities throughout the course of their lives.

The nexus between tenure security and housing construction has been one of the primary topics in the literature on informal settlements because this link rationalizes the approach of enhancing tenure security for the urban poor as a means of upgrading their living conditions over the long run. Economic theory generally views self-help housing construction as an economic activity, and assumes that people invest in their properties as long as the expected future benefits exceed the cost (Arnot et al., 2011; Besley, 1995; Demsetz, 1967; Sjaastad & Bromley, 2000). Higher tenure security is supposed to encourage investment by reducing the uncertainty with regards to whether they will be able to fully receive the expected benefits in the future. Economists often associate such tenure security with individual freehold property rights. India's slum notification policy, which is the focus of this chapter, provides quasi-legal security. By contrast, an increasing number of researchers in other fields suggest that improving *de facto* (i.e. security brought by means other than legal protection, such as social or political protection) and perceived tenure securities of the urban poor are more effective in promoting self-help housing construction (Doebele, 1987; Gilbert, 2002; Kiddle, 2010; Payne et al., 2009; Reerink & van Gelder, 2010; Sjaastad & Bromley, 2000; van Gelder, 2009; Varley, 1987). According to their

observations and reasoning, slum households invest in their houses, regardless of their legal status, as long as they feel secure.

2.2.2 Tenure Formalization

Tenure formalization, by integrating informal tenure into a system recognized by the public authorities, is a common practice adopted to improve the tenure security of slum dwellers (Durand-Lasserve & Selod, 2009). In practice, a set of property rights are provided to slum households, ranging from the provision of occupancy rights to freehold land tenure with the right to sell, sublet, bequeath, mortgage, etc. Even granting a minimum level of legal tenure, such as occupancy rights for a specified period, might greatly enhance perceived tenure security of slum residents (Payne, 2001). Slum notification in India is one such policy that legally ensures the occupancy of residents for a specified period of time (Banerjee, 2002; Risbud, 2009; Sharma & Barman, 2006).

Such tenure formalization is expected to facilitate the investment of slum households in their houses by working on their motivation and capacity. Formalizing a slum settlement is often followed by the installation of infrastructure and services by government agencies that would otherwise be reluctant to do so for illegal squatters. In India, for instance, households in notified slums are entitled to infrastructure and services provided by local municipalities. Assurances of security and the expectation for the provision of services in the future may perhaps rush construction activities by slum households who aspire to rent out the space for the purpose of a steady income, as observed in Bhopal and Visakhapatnam, India (Banerjee, 2007). In addition, some argue that the provision of individual property rights for slum households would expand their financial capacity by enabling them to capitalize on their assets through accessing formal credit sources (Besley, 1995; de Soto, 2000; Deininger, 2003; Demsetz, 1967; World Bank, 1993). A body of literature, however, offers a counter-argument and contrasting evidence (Field & Torero, 2006; Galiani & Schargrotsky, 2010; Gilbert, 2002; Payne et al., 2009). Gilbert (2002), for example, observed in Bogota that low-income households with a legal title still borrow from informal credit sources because a legal title alone is not credible enough evidence for normal lending agencies, and the poor are not willing to risk their property.

If self-help housing construction is to be encouraged for physical consolidation in slums, and tenure security also plays a critical role there, the important question is: would formalizing

slum settlements in the form of the provision of occupancy rights, rather than full property rights, be enough to encourage households to invest in their houses? More specifically, *to what extent has slum notification, as a formalization policy, contributed to the intensity of housing construction in slums across India?* Unfortunately, answering such empirical questions has been methodologically challenging.

Simply comparing the intensity of housing construction behaviors by households in formalized and other slums would result in a biased estimation, since households in formalized slums will undoubtedly have characteristics that differ from households in non-formalized slums. Experimental design, including natural and quasi-experiment, is a powerful approach that can detect causal influence, as demonstrated by Field and Torero (2006) and Field (2005) in Peru, and Galiani and Schargrotsky (2010) and van Gelder (2009) in Rio de Janeiro. It is, however, very difficult to conduct such studies on a large scale in the setting of an urban slum. This chapter aims to present an alternative approach that allows one to estimate the impact of tenure formalization on housing investment in the setting of an observational study. The method will be explained after introducing the Indian context.

2.3 Background: Slum Notification in India

Although definitions vary in India, the National Sample Survey Organisation (NSSO), a government agency in charge of nation-wide sample surveys, defines a slum settlement as “a compact area with a collection of poorly built tenements, mostly of temporary nature, crowded together usually with inadequate sanitary and drinking water facilities in unhygienic conditions” (NSSO, 2004, p. 11). Among the slums, “notified slums” are those which have been notified “by the respective municipalities, corporations, local bodies or development authorities” (NSSO, 2004, p.11), while other slums, if at least 20 households live in the location, are referred to as “non-notified” slums. The legal status of the settlement, such as landownership, is not stipulated as a defining criterion. Slum notification has a statutory basis on the Model Slum Areas (Improvement and Clearance) Act of 1956, though its implementation rules vary from one state to another and from city to city.¹¹ According to the Central Government Properties Act of 1948,

¹¹ In India, urban development is traditionally the responsibility of state governments. The role of the central government is limited to guidance and financial support, and it is up to state governments to decide whether to follow the central government’s guidance and support. In terms of the Slum Act, each

slum notification does not apply to land owned by the central government. In order to notify or install basic services to a slum on the central government land, local and state governments need to obtain permission from the central government agency that owns the land. Thus, living conditions in those areas tend to be worse (Subbaraman et al., 2012).

As of 2002, 26,154 out of 51,688 settlements were notified across India and represent 5.8 million households lived (NSSO, 2003, 2004).¹² More than 70 percent of slums exist in the following eight major states and one national territory: Maharashtra, West Bengal, Andhra Pradesh, Tamil Nadu, Uttar Pradesh, Madhya Pradesh, Karnataka, Delhi, and Gujarat.¹³ The proportion of notified slums in these states vary and range from 83% in Andhra Pradesh to 9% in Delhi. The proportion of households living in notified slums has declined from 67% in 2002 to 54% in 2008, indicating the rapid increase in the number of households living in non-notified slums, from 1.9 million to 2.9 million (NSSO, 2004, 2010a). The biggest contribution to this increase came from Maharashtra, where the state government has suspended the notification of new slums since 1995.

Although the implementation of slum notification varies locally, a nation-wide sample survey has captured some typical characteristics of notified slums. According to the slum survey collected by the NSSO in 2008, notified slums tend to be located on land owned by local municipalities and/or surrounded by slums (NSSO, 2010b).¹⁴ Local governments tend to notify slums on public land because compensation for landowners is not legally required. Those lands may have been acquired and/or reserved by the governments for public facilities, infrastructure, housing to the poorest population—Economically Weaker Sections (EWS) in Indian policy terms—or other public purposes. The fact that notified slums tend to be surrounded by other

state government has enacted their own state laws, such as the Maharashtra Slum Areas (Improvement, Clearance and Redevelopment) Act, 1971, in which the rules of slum notification are stipulated.

¹² The reported numbers of households in slum settlements differ widely among government documents. The number of slum households estimated by the NSS 58th round housing condition survey 2002–3 (5.8 million) is smaller than the figures in the 58th round slum survey (8.2 million) and 2001 Census (10.2 million). See Bhan and Jana (2013), Government of India (2010), and Kumar (2010) for a discussion regarding the count of slum settlements and households.

¹³ The numbers of slum settlements in the nine States/National Territory and their shares in the country are as follows: Maharashtra (16,700, 32%), West Bengal (8,100, 16%), Andhra Pradesh (7,700, 15%), Tamil Nadu (3,200, 6%), Uttar Pradesh (2,600, 5%), Madhya Pradesh (2,200, 4%), Karnataka (2000, 4%), Delhi (1,800, 4%), and Gujarat (1,500, 3%).

¹⁴ In cases in which the NSSO sample survey datasets are used in this chapter, sampling weights are always applied.

slums tells two possible stories: one, government agencies tend to notify settlements that are located near slums, and/or two, new slums tend to form in the vicinity of or by surrounding notified slums. Local governments are reluctant to notify slums surrounded by commercial or industrial areas because it will confine the land in preferable locations to underuse¹⁵ and bring a negative connotation to the real estate values in proximity. People choose to settle near notified slums because there is the expectation that their settlements will be notified in future as well.

Because it is not possible to match the slum-level information described above in the slum survey with household-level information in the housing condition survey collected by the NSSO, this study mainly relies on the latter to predict whether households live in notified or non-notified slums. Some households in notified slums had settled prior to the notification of their settlements; others moved to the settlements after notification. In the next section, it is investigated how the background and living conditions of these households differ from other households in non-notified slums, and with the difference controlled, how their housing investment behaviors differ.

2.4 Data and Methods

2.4.1 Data

This study uses the 58th round housing condition survey unit data collected by the NSSO, which contains information on households who resided in slums across India as of 2002. The NSSO has conducted slum surveys and housing conditions surveys in 1993 (49th round), 2002–3 (58th round), 2008–9 (65th round), and 2012 (69th round). While the slum surveys focus on settlement-level living conditions, the housing condition surveys encompass detailed information with regards to housing quality and construction activities in slum and non-slum areas. The 58th round housing condition survey was carried out based on a two-stage stratified sampling, covering the entire nation.

The sample for this study consisted of 5,647 households who resided in slums at the time of the survey. Among them, 2,171 households were reported to live in non-notified slums and 3,476 households lived in notified slums. As for housing tenure, 3,807 households were

¹⁵ The economic liberalization and decentralization reforms have driven local governments to pursue economic development. Those governments may view slums in commercial and industrial areas as hindrance to their goals.

identified as housing owners and 1,840 households were tenants. The survey recorded a dwelling as owned when the household has owner-like possession of the dwelling as opposed to a dwelling with payable rent. In addition, I further segment the sample into a subgroup of lower-income households, whose average monthly per capita expenditure (MPCE) is lower than its median value (2,500 Indian Rupees¹⁶).

Household Characteristics and Living Conditions

Households in non-notified and notified slums have quite different characteristics, and are summarized as such in Table 2.1. Overall, households in non-notified slums are poorer and their living conditions are worse. Average monthly per capita expenditures are slightly higher for households in notified slums (Rs. 2,800) than those in non-notified slums (Rs. 2,600). While 6% experienced a flood during the last 5 years in non-notified slums, only 1% did so in notified slums. A larger proportion of households have better access to infrastructure and services in notified slums than in non-notified slums, such as tap water, electricity, and paved approach roads with streetlights. In addition, 16% of households received a benefit in the form of land or tenement allotment from the government in notified slums, while only 6% did in non-notified slums. This is because living in notified slums is often a requirement to be eligible for government programs.¹⁷ Housing structure is also overall better in notified slums than in non-notified slums. In the dataset, housing structure is classified based on the material into *pucca* (permanent materials for both roof and walls), *semi-pucca* (permanent material for either roof or walls), and *katcha* (temporary materials for both roof and walls). While 83 % of housing is pucca housing in notified slums, only 65% percent is in non-notified slums.

A comparison of housing owners and renters points to the difference in their living conditions. The average MPCE of renters (Rs. 2,500) is lower than that of owners (Rs. 2,900), though renters enjoy better living conditions in the form of available tap water, connection to electricity, and access to paved approach roads with streetlights. Approximately 44% of renters,

¹⁶ 2,500 rupees are equal to approximately 41 US dollars at the present exchange rate (1 USD = 61 INR).

¹⁷ A possible reason as to why households in non-notified slums received benefits is that they were able to tap special arrangement from local politicians. This implies that *de facto* tenure security might be critical for slum households.

however, possess no voter card, ration card, or passport, while half of owners possess more than two of these documents.

Housing Investment

As illustrated in the descriptive statistics (Table 2.1), households in non-notified slums invested in their houses as enthusiastically as others in notified slums. The NSSO data contains information with regards to housing construction undertaken by slum households during the last 5 years. This chapter classifies these activities into (1) *new buildings* and (2) *improvements*, the latter includes the extension of existing houses or any type of remodeling, renovation, or major repair work. As long as the proportion of households engaged in the two types of housing investment are concerned, no stark differences are observed between non-notified slums and notified slums. While the proportion of households that improved their houses is slightly larger in non-notified slums (11%) than in notified slums (9%), the average investment cost for housing improvement is larger in notified slums (Rs. 15,400) than in non-notified slums (Rs. 12,800). These costs are roughly 5 times as large as the average MPCE in non-notified and notified slums. The cost of new housing construction is much higher in notified slums (Rs. 58,400) than in non-notified slums (Rs. 36,400).

The primary interest of this chapter is in the extent to which the differences in the proportion of households who engaged in housing construction and the amount of money spent for the investment stem from slum notification, taking into account the differences in household backgrounds, housing types, and access to infrastructure and services. The next section explains the methodology for the analysis.

2.4.2 Methods

Propensity Score Matching

In estimating the causal effect of slum notification on housing investment, one challenge is how to deal with selection bias. There could be a variety of factors that systematically direct some households into notified slums and others into non-notified slums. To mitigate a bias stemming from the existence of such confounding factors, this chapter employs a propensity score method.

Following the so-called Rubin Causal Model (RCM) (Rubin, 1974), it is analytically useful to distinguish observed outcomes and *potential outcomes*. Let Z denote a binary indicator, as $Z = 1$ if an individual receives treatment (i.e., slum notification) and $Z = 0$ if otherwise. Each individual is assumed to have potential outcome Y_1 and Y_0 , corresponding to the counterfactual outcomes (i.e., housing investment) if he or she would receive treatment or not. If we define Y as the observed outcome, the relationship between potential outcomes and observed outcomes is written as

$$Y = Y_1Z + (1 - Z)Y_0 \quad (2.1)$$

Although the observed outcome of an individual who is actually treated is only Y_1 , counterfactual Y_0 is assumed as well. The average effect of treatment for the outcome at the population level, or commonly referred to as the average treatment effect (ATE), is defined as

$$ATE = E(Y_1 - Y_0) = E(Y_1) - E(Y_0) \quad (2.2)$$

According to Rosenbaum and Rubin (1983), ATE can be estimated by observable $E(Y | Z = 1) - E(Y | Z = 0)$ if the treatment assignment is *conditionally ignorable*. With a propensity score $P(Z = 1 | X) = e(X)$, which is the probability of each individual receiving treatment based on observed characteristics X , the required conditions are given as (a) $(Y_1, Y_0 \perp Z | e(X))$ and (b) $0 < e(X) < 1$. The first condition means that potential outcomes are independent of treatment assignment conditional on the propensity score. A critical assumption here is the “no unmeasured confounders”; that is, all the variables that affect the treatment assignment and outcome are measured. The second condition requires that everyone needs to have probability of being assigned to the program, bounded by zero and one.

Taking advantage of the rich information in the survey collected by the NSSO helps to fulfill the aforementioned “unconfoundedness” assumption. This chapter aims to estimate the influence of slum notification on housing investment behaviors by slum households. The analysis focuses on the proportion of households who improved existing houses and the cost of housing investment, the latter including both new housing construction and improvements to existing houses. To compare housing investment behaviors in non-notified and notified slums,

this study uses information regarding various factors that potentially affect both the notification status of their residence and their propensity for housing investment, such as household characteristics, housing type, and access to infrastructure and services in the dataset.

Once propensity scores are estimated, there are various methods to estimate ATE. This study resorts to propensity score matching for the analysis of the proportion of housing investment, and inverse probability weighting (IPW) for the cost of investment. The essence of non-parametric matching is to select subsamples of treated and control groups so that their observed covariates distributions become the same, or in other words, balanced. This study uses a one-to-one matching method that chooses a pair of treated and control units that have the closest propensity scores (Rosenbaum & Rubin, 1983). The proportions for housing investment of the matched units are then compared. On the other hand, IPW weights the sample with the inverse of the propensity score (Bang & Robins, 2005; Hirano, Imbens, & Ridder, 2003; Robins & Rotnitzky, 1995; Rosenbaum, 1987). The weight is calculated as

$$w_i = \frac{Z_i}{e_i} - \frac{1 - Z_i}{1 - e_i} \quad (2.3)$$

For the weighted sample, ATE can be simply estimated by regressing outcome Y on the indicator of treatment assignment Z and covariates X .

Estimation Strategy

Based on the framework discussed above, the estimation proceeds as follows. First, the propensity score is estimated through a logit model with notification status Z as dependent variable and baseline covariates X (i.e., characteristics of households, housing, and the access to infrastructure and services listed in Table 2.1) as independent variables. To capture the variation among states, 19 dummy variables indicating each state are also added in the matching analysis.

Next, one-to-one matching is applied for the analysis of the proportion of households that improved their housing. The pairs of treated and control units are chosen based on the propensity score estimated above by using an algorithm of nearest neighbor with caliper and without replacement in Stata's *psmatch2* command (Leuven & Sianesi, 2012). Standard errors for the averaged difference in the proportion of investment are estimated by bootstrapping 500 times.

For the analysis of the investment costs, the following linear regression model is applied to the sample weighted with w in equation (2.3):

$$\log(Y) = \alpha + \beta_1 Z + \beta_2 X + \varepsilon \quad (2.4)$$

where the log of the cost of housing investment Y is the dependent variable; notification status of residence Z and covariates X are independent variables; α is the constant; and ε is the error term. All the computations in this chapter are carried out with Stata/IC version 11 (StataCorp, 2009).

2.5 Results

2.5.1 Estimation of Propensity Score

Three propensity score models are estimated with independent variables of household characteristics (model 1), household and housing characteristics (model 2), and household, housing, and infrastructure characteristics (model 3). These three models are applied for samples (a) all households, (b) housing owners and renters, and (c) lower-income households. Figure 2.1 illustrates the distributions of estimated propensity scores for the sample of all households before and after matching. The baseline covariates adjusted by estimated propensity score have similar distributions between non-notified and notified slums, indicating that they are orthogonal to notification status as required (see Appendix A).¹⁸ The cases with propensity scores less than 0.1 or greater than 0.9 are dropped to avoid bias and gain efficiency (Crump, Hotz, Imbens, & Mitnik, 2009). Table 2.2 summarizes the estimation results (see Appendix B for details on the IPW estimation results).

Proportion of Investment

Before the matching, no significant difference in the proportion of households which engaged in construction work to improve their houses was observed between non-notified and

¹⁸ Several interaction terms are added so that baseline covariates adjusted by IPW have as close of a distribution as possible. Whether the balancing property of propensity score holds can be confirmed by examining the first and second order statistics of weighted covariates (Austin, 2011). Specifically, the standardized mean difference (i.e., difference in the means divided by standard deviation) should be less than 2.5, and the variance ratio should be confined between 0.5 and 2.0 (Stuart & Rubin, 2007).

notified slums (Table 2.2). For the matched households based on their observed characteristics (model 1), slum notification on average leads to a 3.4 percent point reduction in the proportion of investment, which is statistically significant at the 5% level. In other words, the odds of investing for housing improvement is 36% higher in non-notified slums. This is probably because the model controls for the household characteristics that motivated or allowed those in notified slums to engage in the aforementioned investment. As a result, a larger proportion of households invest in non-notified slums, and the manner in which these results should be interpreted is discussed in the next section. Further controlling for the housing types (model 2) and infrastructure access (model 3) renders the influence of notification insignificant. The estimated differences are 2.6 percent point in model 2 and 1.2 percent point in model 3 (i.e. the odds of investing are 23% and 3% higher in non-notified slums, respectively). For lower-income households, the gap is estimated to be smaller (−2.5 percent point in model 1).

Stratifying the sample into housing owners and renters leads to different estimated results. The estimation results for owners are found to be similar to the full sample above. The difference in the proportion of owners who improved their houses between non-notified and notified slums is estimated to be −4.4 percent point in model 1, which is statistically significant at the 5% level. Once the imbalance in the other covariates is adjusted, the gap is reduced to 1.5% (not statistically significant). By contrast, renters are found to be insensitive to notification status in the three models.

Cost of Investment

Originally, the average cost of building new houses in notified slums (Rs. 58,400) was approximately 1.6 times higher than in non-notified slums (Rs. 36,400) (Table 2.1). According to the estimated results for IPW models in Table 2, slum notification is found to increase the cost of building new houses by 52.6 percent on average when the household characteristics are controlled (model 1). Given the average cost above, the result is worth more than the 7-month average MPCE (Rs. 19,100). Additional control of housing types and infrastructure access reduces the impact to 16.5% (model 2) and 9.2% (model 3), neither of which is statistically significant at the 5% level. The results also suggest that housing types, rather than household backgrounds, are the critical determinant for the cost of new housing construction.

Without regression adjustment, the average cost of housing improvements was about 1.2 times higher in notified slums (Rs. 15,400) when compared to non-notified slums (Rs. 12,800) (Table 2.1). When their backgrounds are held equal in model 1, households in notified slums spend 34.1% more money for housing improvement than those in non-notified slums (Table 2.2). This is equivalent to 1.5 times of the average MPCE (Rs. 4,400). The impact of slum notification is reduced to be statistically insignificant in model 2 (10.1%) and model 3 (0.2%). In the analyses above, the estimated effects of slum notification are similar in the IPW models and the models with no weights, implying that the selection bias may not be much of an influential. The sensitivity analysis below assesses the extent to which the estimated results are robust to the bias.

Sensitivity Analysis

Propensity score estimation is valid as long as the assumption of conditional ignorability is satisfied. If there are unobserved covariates that influence both the notification status of the settlements where the sample households live and their housing investment behaviors, the matching and IPW estimators might not be reliable due to a hidden bias (Rosenbaum, 2002). As it is impossible to statistically test the unconfoundedness, this study instead aims to assess the robustness of the estimated results based on the bounding approach (Rosenbaum, 2002), which statistically examines the extent to which unobserved confounders need to be influential in order to change the significance of the estimated results. Becker and Caliendo (2007) devise a method for this, which compares the successful number of units in the treatment group with the same expected number when the treatment effect is zero.

According to the sensitivity analysis based on the bounding approach, the estimated result for the full sample of model 1 is found to be robust even if an unobserved covariate doubles or triples the odds of living in notified slums. On the other hand, the estimation results of models 2 and 3 are sensitive to a bias that would increase the odds by 1.2 times. What might cause this selection bias are, among others, the land ownership and political affiliation of slum households or settlements, which could strongly influence *de facto* and perceived tenure security. As slum settlements on the land owned by local or state governments are more likely to be notified, households in these areas might perceive their security as very high and tend to invest in their houses regardless of the notification status. If households know local politicians who can protect them from the threat of eviction, they will also feel more secure when it comes to

investing in their own housing. If these omitted variables increase the odds of living in notified slums by 1.2 times, the estimated negative effects of slum notification on the likelihood of housing investment turns to be statistically significant at the 5% level.

2.6 Discussion and Conclusion

In the developing world, self-help housing construction by slum households has been a critical component of upgrading living conditions. Theoretical arguments are divided regarding the effects of tenure formalization as a driver of housing investment by enhancing tenure security. Clarifying the influence of India's slum notification on housing investment behaviors is particularly meaningful because it presents evidence as to whether ensuring occupancy rights for slum dwellers is enough to facilitate their investment in housing.

Taking advantage of the nationally representative dataset and relevant propensity score methods, this study reveals that when the differences in observed household characteristics are adjusted, slum notification will increase the average amount of money spent for new housing buildings and housing improvements by 53% and 34%, respectively. These increased costs are worth 7 times and 1.5 times the amount of the average monthly per-capita expenditure, respectively. By contrast, the proportion of households which would improve their houses is estimated to be 3.4 percent point higher in non-notified slums. Once housing types and infrastructure access are additionally controlled, the influence of slum notification on both the costs and proportion of investment become statistically insignificant.¹⁹

The reason why a larger proportion of households engage in housing improvement activities in non-notified slums is probably due to incremental housing strategies being more relevant for their situation. According to the NSSO survey, while the share of pucca housing is consistently high irrespective of duration of residence in slums, the proportion of owner households living in pucca housing rises as the duration of residence becomes longer in non-notified slums (Figure 2.2). The figure illustrates that the proportions of pucca housing in notified and non-notified slums converge in the long run. As residents in non-notified slums are

¹⁹ This finding is sensitive to the sample selection. For example, limiting the sample to the owner households with their duration of residence in slums less than 20 years yields the opposite conclusion that households in notified slums are more likely to invest in their houses but spend less amount of money for the investments.

usually not eligible for government projects, the gradual improvement of housing structure must be attributed to their self-help construction.²⁰

The empirical findings of this chapter suggests that there is a need for more nuanced theorizing on the link between tenure security and housing investment, rather than the discussion on the dichotomy of legal and *de facto* tenure security. This chapter finds that a large proportion of households in non-notified slums invested in their houses even if they lack the legal assurance of their occupancy rights in India. They are inclined to improve their houses because incremental development is in their best strategy, even when faced with the potential discouragement due to the lack of legal tenure security. Regarding the average cost of investment, however, households in notified slums will spend a larger amount of money even if slum notification does not guarantee them to formal credit. Indeed, when aggregated, only 2% of the housing investment cost was financed by borrowing from banks, whereas households' own resources and the borrowings from informal money lenders account for 59% and 29%, respectively (NSSO, 2004).

The findings of this chapter have important implications for policy. It is outside the scope of this chapter as to whether the Indian government agencies *should* notify more settlements in order to promote the physical consolidation of slums. To answer this question requires the clarification of additional issues. The formalization of informal settlements needs to be carried out in accordance with city- and state-wide planning schemes. Instead, the findings of this chapter imply that supporting self-help housing construction by households in non-notified slums would be effective for achieving the objective. It is not wise to disregard the self-help efforts of motivated slum residents. Based on their case study of a non-notified slum in Mumbai, Subbaraman et al. (2012) describe that how the lack of tenure security and access to basic services due to the legal exclusion result in the deficiencies in health and social outcomes. Expanding social policies to those who have been excluded in non-notified slums would be an alternative approach if legalizing slums is politically difficult.

Finally, with regards to the limitations of this study, this chapter capitalizes on a valuable nationally representative dataset by employing a propensity score method to reduce selection bias. However, the reliability of the causal inference based on the data is still limited when compared with randomized controlled trials. As propensity score methods cannot deal with

²⁰ Housing quality is overall better in notified slums because a majority of households build pucca housing from the outset probably due to enhanced tenure security, or, government agencies have notified settlements that have relatively good physical environments.

unobserved confounders, the reliability depends on the availability of key factors that influence treatment assignment and outcomes. In this regard, encapsulating more variables, for example, households' educational attainment, religion, age, location of houses, and land ownership, would improve the estimation. In particular, the effects of slum notification may have been overestimated if households who tend to live in notified slums are also highly likely to invest in their houses even if they lived in non-notified slums after taking into account their observed characteristics. What might cause this positive selection bias are the land ownership and political affiliation of slum households or settlements, which could strongly influence *de facto* and perceived tenure security. There is a growing body of qualitative literature on informality and *de facto* tenure security in urban India (for example, Benjamin, 2008; Roy, 2009). I expect future quantitative studies to encompass this perspective in exploring its link to housing outcomes.

2.7 Appendices

Appendix A. Baseline covariates after adjustment

	Model 1		Model 2		Model 3	
	Std. diff.	Var. ratio	Std. diff.	Var. ratio	Std. diff.	Var. ratio
Housing tenure (1=owned)	0.012	0.992	-0.049	1.028	0.014	0.992
log(MPCE)	0.040	0.949	0.005	0.922	-0.027	0.931
<i>Possession of document</i>						
Ration card	-0.010	0.990	0.007	1.007	-0.012	0.989
Voter card	-0.020	0.922	-0.040	0.849	-0.062	0.752
Passport	-0.030	0.676	-0.010	0.900	-0.022	0.759
More than two of above	0.017	1.004	-0.029	0.991	0.035	1.008
Female head	0.017	1.028	-0.022	0.935	0.019	1.054
<i>Social groups</i>						
Scheduled caste	0.045	1.049	0.013	1.015	0.051	1.060
Scheduled tribe	0.007	1.031	-0.034	0.856	-0.026	0.889
Other backward caste	-0.044	0.960	-0.010	0.991	0.001	1.000
log(Distance to work)	0.005	0.895	0.026	0.885	-0.016	0.838
Experience of flood	0.041	1.301	-0.024	0.871	0.002	1.010
<i>Population of town/city</i>						
<0.1M	0.047	1.040	0.008	1.007	0.023	1.020
0.1M–0.5M	-0.022	0.970	0.006	1.008	0.033	1.051
>1M	-0.010	0.997	-0.012	0.996	-0.062	0.982
<i>Housing structure</i>						
Semi-pucca			0.029	1.038	0.029	1.039
Pucca			-0.034	1.028	-0.019	1.017
<i>Housing types</i>						
Independent			-0.004	1.000	0.037	0.995
Flat			0.003	1.011	-0.013	0.954
Residential use			-0.012	1.057	-0.021	1.109
No other dwelling			0.008	0.989	0.049	0.934
Benefit					-0.018	0.947
Tap water					-0.084	1.116
Water sufficiency					-0.060	1.102
<i>Water facility</i>						
Exclusive					0.002	1.004
Common					-0.038	0.913
Electricity					-0.010	1.017
<i>Approach road</i>						
Motorable with lights					-0.045	1.001
Motorable without lights					-0.005	0.986
Others without lights					0.043	1.048

Note: Figures are standardized mean difference and variance ratio of baseline covariates between non-notified and notified slums.

Appendix B. Estimation results of IPW models

	New buildings					
	Unweighted			Weighted		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Notification	0.578*	0.155	0.091	0.526***	0.165	0.092
	(0.239)	(0.125)	(0.138)	(0.145)	(0.129)	(0.136)
Housing tenure	-0.182	0.232	0.343	0.247	0.181	0.034
	(0.331)	(0.229)	(0.232)	(0.329)	(0.288)	(0.298)
log(MPCE)	1.316***	0.859***	0.703***	1.336***	0.856***	0.678***
	(0.263)	(0.119)	(0.115)	(0.149)	(0.130)	(0.154)
Ration card	0.651	0.058	0.005	0.342	0.067	0.047
	(0.407)	(0.193)	(0.184)	(0.241)	(0.209)	(0.232)
Voter card	0.957	0.078	-0.027	0.473	0.070	0.138
	(0.512)	(0.245)	(0.252)	(0.349)	(0.279)	(0.366)
More than two of above	0.866*	0.213	0.166	0.625**	0.199	0.115
	(0.371)	(0.177)	(0.171)	(0.219)	(0.197)	(0.212)
Female head	-0.021	0.268	0.165	0.063	0.113	0.202
	(0.331)	(0.194)	(0.192)	(0.272)	(0.293)	(0.276)
Scheduled caste	-0.300	-0.269	-0.187	-0.246	-0.272	-0.136
	(0.313)	(0.163)	(0.158)	(0.188)	(0.184)	(0.217)
Scheduled tribe	0.140	-0.378	-0.248	-0.241	-0.541	-0.176
	(0.371)	(0.256)	(0.242)	(0.341)	(0.342)	(0.313)
Other backward caste	0.156	-0.022	0.062	0.031	-0.041	0.150
	(0.269)	(0.145)	(0.139)	(0.181)	(0.162)	(0.165)
log(Distance to work)	-0.129	0.016	0.015	-0.107	-0.005	0.032
	(0.117)	(0.061)	(0.057)	(0.073)	(0.064)	(0.078)
Experience of flood	0.046	0.085	0.202	-0.249	0.123	-0.082
	(0.352)	(0.213)	(0.239)	(0.285)	(0.230)	(0.386)
Size(<0.1M)	0.155	-0.390	-0.377	-0.576*	-0.188	-0.299
	(0.333)	(0.244)	(0.238)	(0.268)	(0.288)	(0.296)
Size(0.1M–0.5M)	-0.026	-0.231	-0.176	-0.426	0.026	0.025
	(0.342)	(0.260)	(0.255)	(0.273)	(0.306)	(0.317)
Size(>1M)	-0.703*	-0.844***	-0.842***	-0.562*	-0.601*	-0.733*
	(0.326)	(0.253)	(0.241)	(0.274)	(0.288)	(0.285)
Semi-pucca		1.235***	1.079***		1.076***	1.416***
		(0.223)	(0.238)		(0.261)	(0.358)
Pucca		2.230***	1.915***		2.135***	2.332***
		(0.190)	(0.209)		(0.228)	(0.330)
Independent		0.087	0.000		0.141	0.164
		(0.150)	(0.145)		(0.174)	(0.200)
Flat		1.066***	0.951***		1.268***	1.371***
		(0.209)	(0.221)		(0.207)	(0.271)
Residential use		0.237	0.396		0.141	0.328
		(0.296)	(0.293)		(0.295)	(0.340)
No other dwelling		0.155	0.125		0.138	-0.177
		(0.139)	(0.136)		(0.157)	(0.175)
Benefit			-0.133			0.058
			(0.159)			(0.254)

Appendix B. (Continued)

	New buildings					
	Unweighted			Weighted		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Tap water			0.162 (0.155)			0.348 (0.179)
Water sufficiency			-0.025 (0.164)			-0.116 (0.197)
Exclusive water use			0.254 (0.193)			0.217 (0.210)
Common water use			-0.034 (0.169)			-0.132 (0.186)
Electricity			0.461* (0.179)			0.429 (0.261)
Motorable with lights			0.495** (0.172)			0.402* (0.193)
Motorable without lights			0.283 (0.233)			0.338 (0.339)
Others without lights			-0.045 (0.182)			-0.063 (0.225)
Constant	-0.632 (2.069)	1.216 (1.004)	1.802 (0.996)	-0.538 (1.255)	1.273 (1.070)	1.901 (1.327)
<i>N</i>	331	331	331	329	319	275
adj. <i>R</i> ²	0.454	0.554	0.588	0.315	0.547	0.583

Note: Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Appendix B. (continued)

	Improvements					
	Unweighted			Weighted		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Notification	0.351** (0.116)	0.115 (0.113)	0.069 (0.111)	0.341** (0.117)	0.101 (0.116)	0.002 (0.115)
Housing tenure	0.264 (0.199)	0.241 (0.196)	0.262 (0.194)	0.332 (0.219)	0.249 (0.216)	0.112 (0.217)
log(MPCE)	0.685*** (0.121)	0.368** (0.112)	0.271* (0.116)	0.661*** (0.129)	0.342* (0.135)	0.173 (0.128)
Ration card	0.410* (0.204)	0.216 (0.180)	0.228 (0.187)	0.316 (0.205)	0.056 (0.186)	0.035 (0.205)
Voter card	0.389 (0.284)	0.227 (0.264)	0.219 (0.269)	0.414 (0.287)	0.085 (0.290)	0.168 (0.294)
Passport	0.785 (0.489)	0.269 (0.590)	0.346 (0.613)	1.080** (0.401)	0.254 (0.546)	0.179 (0.586)
More than two of above	0.580** (0.189)	0.380* (0.163)	0.430* (0.173)	0.543** (0.192)	0.284 (0.179)	0.308 (0.194)
Female head	-0.088 (0.181)	0.037 (0.175)	0.047 (0.170)	-0.131 (0.182)	0.159 (0.181)	0.104 (0.211)
Scheduled caste	-0.569*** (0.139)	-0.422** (0.135)	-0.330* (0.135)	-0.531*** (0.147)	-0.372* (0.156)	-0.279 (0.154)
Scheduled tribe	-0.330 (0.303)	-0.136 (0.309)	-0.013 (0.340)	-0.136 (0.316)	0.125 (0.304)	0.298 (0.337)
Other backward caste	-0.233 (0.154)	-0.078 (0.146)	-0.042 (0.146)	-0.211 (0.157)	-0.040 (0.166)	-0.053 (0.164)
log(Distance to work)	0.015 (0.056)	0.070 (0.052)	0.074 (0.052)	-0.002 (0.056)	0.072 (0.055)	0.081 (0.055)
Experience of flood	-0.327 (0.219)	-0.026 (0.223)	0.097 (0.229)	-0.344 (0.265)	0.050 (0.301)	0.416 (0.305)
Size(<0.1M)	0.157 (0.207)	0.246 (0.201)	0.208 (0.204)	0.167 (0.225)	0.312 (0.253)	0.274 (0.268)
Size(0.1M–0.5M)	0.105 (0.203)	0.257 (0.197)	0.193 (0.201)	0.147 (0.223)	0.354 (0.248)	0.246 (0.262)
Size(>1M)	0.426* (0.204)	0.329 (0.194)	0.236 (0.200)	0.474* (0.228)	0.400 (0.256)	0.234 (0.273)
Semi-pucca		0.427** (0.150)	0.442** (0.153)		0.383* (0.156)	0.511** (0.161)
Pucca		1.299*** (0.154)	1.158*** (0.172)		1.359*** (0.152)	1.277*** (0.181)
Independent		0.056 (0.126)	0.024 (0.128)		0.011 (0.136)	-0.031 (0.143)
Flat		-0.300 (0.267)	-0.322 (0.277)		-0.011 (0.312)	0.036 (0.437)
Residential use		-0.435 (0.354)	-0.316 (0.361)		-0.421 (0.381)	-0.486 (0.399)
No other dwelling		-0.071 (0.162)	-0.142 (0.164)		-0.005 (0.168)	-0.074 (0.175)
Benefit			-0.239 (0.150)			-0.127 (0.164)

Appendix B. (continued)

	Improvements					
	Unweighted			Weighted		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Tap water			0.078 (0.137)			0.216 (0.164)
Water sufficiency			-0.059 (0.138)			0.074 (0.176)
Exclusive water use			0.418** (0.157)			0.575** (0.181)
Common water use			0.318 (0.190)			0.465* (0.205)
Electricity			0.008 (0.143)			0.023 (0.162)
Motorable with lights			0.416** (0.138)			0.435** (0.166)
Motorable without lights			0.212 (0.194)			0.157 (0.211)
Others without lights			0.236 (0.164)			0.227 (0.189)
Scheduled tribe × Size(<0.1M)					0.0201 (0.802)	
Flat × Motorable with lights						0.184 (0.640)
Constant	2.530* (1.049)	4.707*** (0.992)	5.088*** (1.069)	2.708* (1.115)	4.839*** (1.163)	5.823*** (1.196)
<i>N</i>	528	528	528	527	496	483
adj. <i>R</i> ²	0.178	0.283	0.301	0.172	0.285	0.321

2.8 Tables and Figures

Table 2.1 Descriptive statistics

	Full sample (N=5,647)	By notification status		By housing tenure		
		Non-notified (N=2,171)	Notified (N=3,476)	Rental (N=1,840)	Owned (N=3,807)	
Notification status of the slum settlement (1 = notified; 0 = non-notified)	0.666 (0.472)			0.697 (0.460)	0.650 (0.477)	
Housing tenure (1 = owned; 0 = rental)		0.699 (0.459)	0.652 (0.476)			
<i>Housing investment</i>						
Whether the household built new housing during the last 5 years (1 = yes; 0 = no)	0.100 (0.300)	0.114 (0.318)	0.093 (0.290)	0.014 (0.117)	0.142 (0.349)	***
Whether the household improved their houses during the last 5 years (1 = yes; 0 = no)	0.076 (0.265)	0.080 (0.272)	0.074 (0.261)	0.018 (0.133)	0.105 (0.306)	***
<i>Investment cost</i>						
Construction cost of new housing (in Rs. thousands)	49.996 (96.683)	36.357 (83.960)	58.421 (103.047)	31.778 (44.174)	50.877 (98.458)	
Construction cost of housing improvement (in Rs. thousands)	14.538 (25.500)	12.812 (22.327)	15.403 (26.934)	17.040 (29.277)	14.262 (25.062)	
Household background						
Average MPCE of the household (in Rs. thousands)	2.749 (1.580)	2.602 (1.472)	2.823 (1.626)	**	2.513 (1.574)	2.866 (1.570) ***
<i>Possession of document</i>						
Whether the household head possess a ration card (1 = yes; 0 = no)	0.301 (0.459)	0.307 (0.461)	0.297 (0.457)		0.219 (0.414)	0.341 (0.474) ***
Whether the household head possess a voter card (1 = yes; 0 = no)	0.052 (0.221)	0.059 (0.236)	0.048 (0.213)		0.072 (0.259)	0.041 (0.199) *
Whether the household head possess a passport (1 = yes; 0 = no)	0.008 (0.090)	0.003 (0.052)	0.011 (0.103)	*	0.001 (0.032)	0.012 (0.107) **
Whether the household head possess more than two of the cards above (1 = yes; 0 = no)	0.416 (0.493)	0.401 (0.490)	0.424 (0.494)		0.248 (0.432)	0.500 (0.500) ***
Whether the household head possesses none of the cards above (1 = true; 0 = false)	0.211 (0.408)	0.216 (0.411)	0.208 (0.406)		0.442 (0.497)	0.096 (0.294) ***
Gender of the household head (1 = female; 0 = male)	0.095 (0.293)	0.096 (0.295)	0.094 (0.292)		0.056 (0.231)	0.114 (0.318) ***

Table 2.1 (Continued)

	Full sample (N=5,647)	By notification status			By housing tenure		
		Non-notified (N=2,171)	Notified (N=3,476)		Rental (N=1,840)	Owned (N=3,807)	
<i>Social groups</i>							
Whether the household head belongs to scheduled caste (1 = yes; 0 = no)	0.266 (0.442)	0.295 (0.456)	0.252 (0.434)		0.182 (0.386)	0.308 (0.462)	***
Whether the household head belongs to scheduled tribe (1 = yes; 0 = no)	0.039 (0.194)	0.045 (0.207)	0.037 (0.188)		0.029 (0.168)	0.044 (0.206)	
Whether the household head belongs to other backward caste (1 = yes; 0 = no)	0.287 (0.453)	0.280 (0.449)	0.291 (0.454)		0.275 (0.447)	0.293 (0.455)	
Whether the household head belongs to none of above (1 = true; 0 = false)	0.407 (0.491)	0.380 (0.486)	0.421 (0.494)		0.514 (0.500)	0.354 (0.478)	***
Distance travelled by the household to work (in km)	6.995 (16.139)	7.442 (15.980)	6.770 (16.216)		7.043 (11.902)	6.971 (17.878)	
Whether the household experienced flood from sea or river during the last 5 years (1 = yes; 0 = no)	0.026 (0.159)	0.059 (0.235)	0.010 (0.098)	**	0.013 (0.113)	0.033 (0.177)	*
<i>Population of town/city</i>							
Less than 100,000 (1= yes; 0 = no)	0.253 (0.435)	0.322 (0.467)	0.219 (0.413)	***	0.209 (0.407)	0.275 (0.446)	**
100,000 to 500,000 (1= yes; 0 = no)	0.186 (0.389)	0.137 (0.344)	0.211 (0.408)	***	0.166 (0.372)	0.197 (0.397)	
500,000 to 1 million (1= yes; 0 = no)	0.057 (0.231)	0.023 (0.151)	0.074 (0.261)	***	0.042 (0.201)	0.064 (0.245)	
Greater than 1 million (1= yes; 0 = no)	0.504 (0.500)	0.518 (0.500)	0.497 (0.500)		0.583 (0.493)	0.465 (0.499)	***
Housing types							
<i>Housing structure</i>							
Whether the house is structured with katcha materials (1= yes; 0 = no)	0.076 (0.265)	0.133 (0.340)	0.047 (0.211)	***	0.068 (0.253)	0.079 (0.270)	
Whether the house is structured with semi-pucca materials (1= yes; 0 = no)	0.153 (0.360)	0.217 (0.413)	0.121 (0.326)	***	0.102 (0.302)	0.179 (0.383)	***
Whether the house is structured with pucca materials (1= yes; 0 = no)	0.771 (0.420)	0.649 (0.477)	0.833 (0.373)	***	0.830 (0.376)	0.742 (0.438)	***

Table 2.1 (Continued)

	Full sample (N=5,647)	By notification status			By housing tenure		
		Non-notified (N=2,171)	Notified (N=3,476)		Rental (N=1,840)	Owned (N=3,807)	
<i>Housing types</i>							
Detached single-unit house (1= yes; 0 = no)	0.456 (0.498)	0.520 (0.500)	0.424 (0.494)	***	0.263 (0.440)	0.552 (0.497)	***
Attached multi-unit house (1= yes; 0 = no)	0.095 (0.293)	0.052 (0.223)	0.116 (0.320)	***	0.149 (0.356)	0.068 (0.252)	***
Other housing types (1= yes; 0 = no)	0.448 (0.497)	0.427 (0.495)	0.459 (0.498)		0.587 (0.492)	0.379 (0.485)	***
Whether the house is used only for residential use (1= yes; 0 = no)	0.927 (0.261)	0.952 (0.213)	0.914 (0.281)	**	0.876 (0.330)	0.952 (0.214)	***
Whether the household possesses no other dwelling (1= true; 0 = false)	0.844 (0.363)	0.832 (0.374)	0.849 (0.358)		0.768 (0.422)	0.881 (0.324)	***
Infrastructure access							
Whether the household received benefit (allotment of tenement or land) as a slum dweller (1= yes; 0 = no)	0.124 (0.330)	0.063 (0.243)	0.155 (0.362)	***	0.012 (0.110)	0.180 (0.384)	***
Whether the household's major source of drinking water is tap (1= yes; 0 = no)	0.820 (0.384)	0.744 (0.436)	0.858 (0.349)	***	0.843 (0.364)	0.808 (0.394)	***
Whether availability of water is sufficient throughout year (1= yes; 0 = no)	0.830 (0.375)	0.758 (0.428)	0.867 (0.340)	***	0.911 (0.285)	0.790 (0.407)	***
<i>Water facility</i>							
Whether the household's major source of drinking water is for its exclusive use (1= yes; 0 = no)	0.172 (0.378)	0.136 (0.342)	0.191 (0.393)	**	0.133 (0.340)	0.192 (0.394)	**
Whether the household's major source of drinking water is for common use of households in the building (1= yes; 0 = no)	0.176 (0.381)	0.094 (0.292)	0.218 (0.413)	***	0.276 (0.447)	0.127 (0.333)	***
Whether the household's major source of drinking water is for community use (1= yes; 0 = no)	0.651 (0.477)	0.770 (0.421)	0.592 (0.492)	***	0.590 (0.492)	0.682 (0.466)	***
Whether the primary energy source for lighting is electricity (1= yes; 0 = no)	0.854 (0.353)	0.781 (0.414)	0.891 (0.311)	***	0.890 (0.313)	0.837 (0.370)	**

Table 2.1 (Continued)

	Full sample (N=5,647)	By notification status			By housing tenure		
		Non-notified (N=2,171)	Notified (N=3,476)		Rental (N=1,840)	Owned (N=3,807)	
<i>Approach road</i>							
Whether the house has a direct opening to a motorable approach road with street lights (1= yes; 0 = no)	0.586 (0.493)	0.489 (0.500)	0.635 (0.481)	***	0.667 (0.471)	0.546 (0.498)	***
Whether the house has a direct opening to a motorable approach road without street lights (1= yes; 0 = no)	0.052 (0.221)	0.038 (0.190)	0.059 (0.235)	*	0.048 (0.214)	0.053 (0.225)	
Whether the house has a direct opening to an unmotorable approach road without street lights (1= yes; 0 = no)	0.211 (0.408)	0.256 (0.436)	0.188 (0.391)	**	0.168 (0.374)	0.232 (0.422)	**
Whether the house has no direct opening to any approach road (1 = true; 0 = false)	0.151 (0.359)	0.218 (0.413)	0.118 (0.323)	***	0.117 (0.322)	0.169 (0.374)	**

Note: Standard errors in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ for the statistical test of the difference between non-notified and notified slums or owners and renters.

Table 2.2 Summary of estimation results

	Unmatched	Model 1	Model 2	Model 3
Proportion of investment^a				
<i>Improvements</i>				
Full sample	-0.003 [-0.034, 0.028] (0.971)	-0.034** [-0.058, -0.011] (0.738)	-0.026 [-0.052, 0.001] (0.814)	-0.012 [-0.039, 0.014] (0.971)
Lower income	-0.015 [-0.051, 0.022] (0.828)	-0.025 [-0.057, 0.008] (0.758)	-0.009 [-0.043, 0.024] (0.936)	-0.015 [-0.051, 0.020] (0.882)
Owner	0.008 [-0.035, 0.050] (1.062)	-0.044** [-0.077, -0.011] (0.701)	-0.030 [-0.067, 0.006] (0.801)	-0.015 [-0.053, 0.024] (0.953)
Renter	-0.006 [-0.046, 0.034] (0.812)	-0.008 [-0.036, 0.021] (0.578)	-0.007 [-0.034, 0.020] (0.878)	-0.008 [-0.036, 0.020] (0.804)
Cost of investment^b				
<i>New buildings</i>				
Weighted		0.526** [0.241, 0.811]	0.165 [-0.088, 0.419]	0.092 [-0.177, 0.360]
Unweighted		0.517** [0.225, 0.808]	0.155 [-0.091, 0.400]	0.091 [-0.180, 0.362]
<i>Improvements</i>				
Weighted		0.341** [0.112, 0.570]	0.101 [-0.127, 0.330]	0.002 [-0.224, 0.229]
Unweighted		0.351** [0.124, 0.579]	0.115 [-0.107, 0.337]	0.069 [-0.149, 0.286]

Note: 95% confidence intervals in square brackets. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

a. Figures above are the percent point difference in the proportion of households who improved their houses during the last 5 years between notified slums (treated) and non-notified slums (control). Figures in parentheses are the odds ratio of investing.

b. Figures are the estimated coefficients for the indicator of notification status.

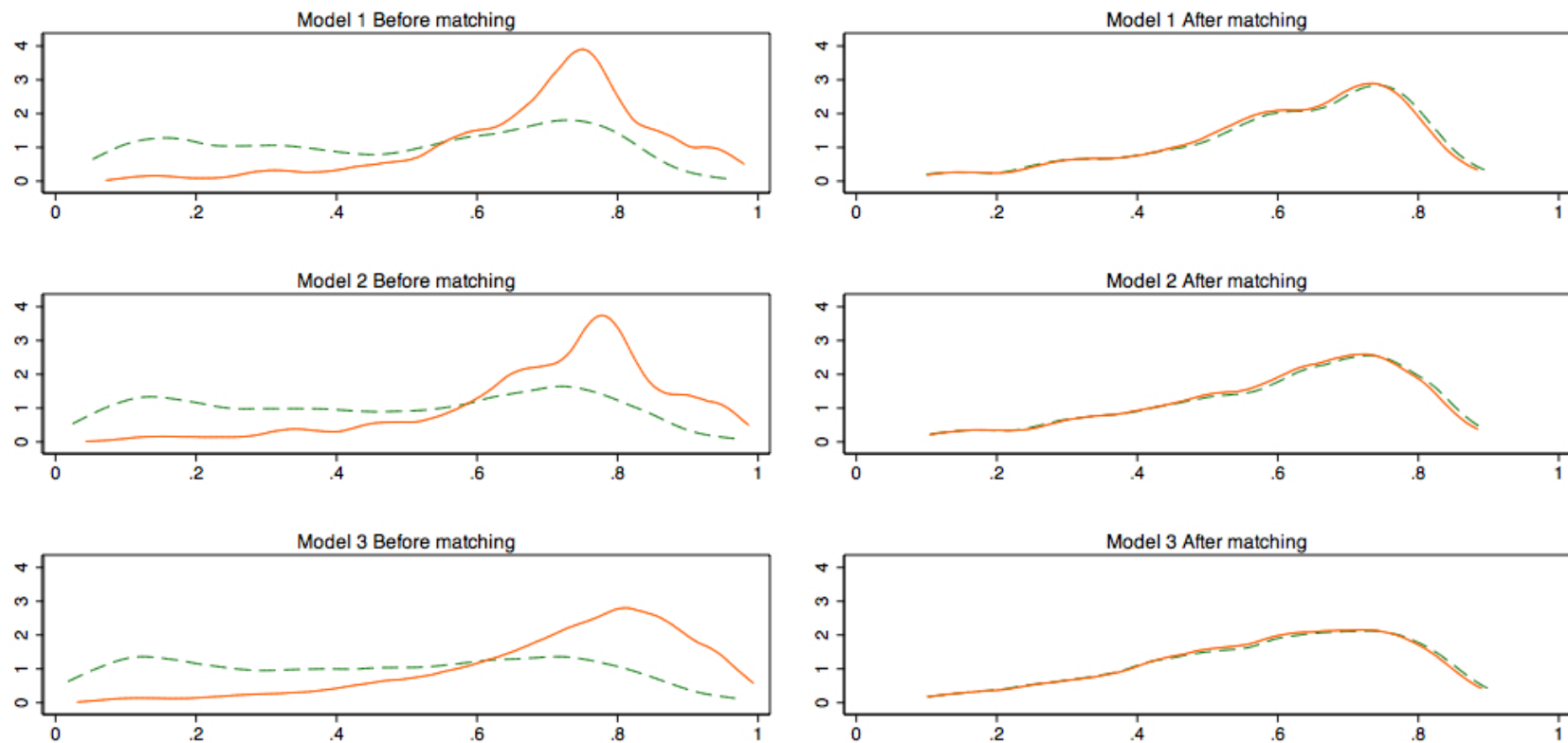


Figure 2.1 Estimated propensity scores

Note: X-axis and y-axis represent propensity score and kernel density, respectively. Solid orange line and green dashed line indicate the households in notified slums (treated group) and non-notified slums (control group), respectively. Estimated on the full sample.

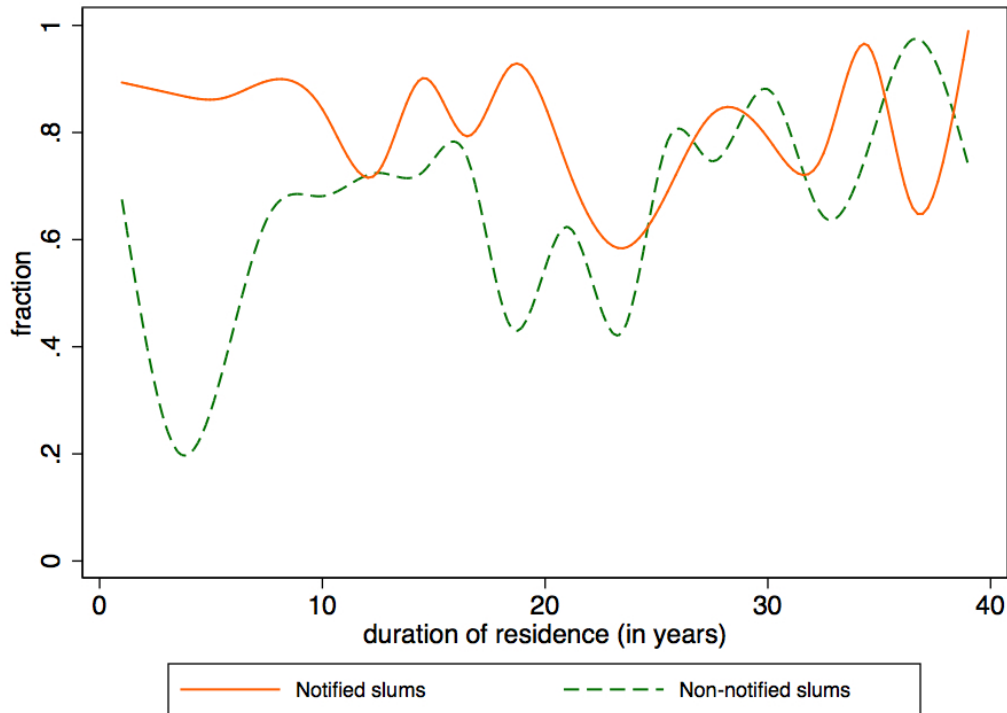


Figure 2.2 Proportion of *pucca* housing in slums

Note: *Pucca* housing refers to as housing made of permanent materials, such as bricks and cement. x-axis indicates households' duration of residence in the current address as of 2002 (in years). Only owner-occupied housing units are included. This figure illustrates that the proportions of pucca housing in notified and non-notified slums converge in the long run. As residents in non-notified slums are usually not eligible for government projects, the gradual improvement of housing structure must be attributed to their self-help construction.

CHAPTER 3
Impact of Slum Legalization Without Title Provision
on Housing Transformation:
A Case of Slum Declaration in Pune, India

3.1 Introduction

Much attention has been paid to the role of tenure security in stimulating housing improvement in slums in the developing world (Durand-Lasserve & Royston, 2002; Durand-Lasserve & Selod, 2009; Payne, 2002b; UN-Habitat, 2008). The risk of housing demolition and/or forcible eviction discourages households from investing in their housing, despite their willingness and capability to do so (Turner, 1976). What could bring the assurance of tenure security—i.e., the degree of risk/protection from forcible eviction without due legal process and compensation—in effective and efficient ways is, however, debatable. Economics literature often focuses on the role of legal protection through the provision of individual property rights in order to prompt housing investment (de Soto, 2000; Deininger, 2003; Field, 2005; Galiani & Schargrodsky, 2010). However, quantitative evidence of the effect of land tenure legalization on housing investment has been scarce (Marx, Stoker, & Suri, 2013; Payne et al., 2009). By contrast, a growing body of literature emphasizes the fact that many slum dwellers enjoy good tenure security despite their illegal status, and discern various factors that influence their *de facto* tenure security (Gilbert, 2002; Handzic, 2010; Lanjouw & Levy, 2002; Razzaz, 1993; van Gelder, 2009; Varley, 1987). This line of literature often focuses on rapid changes brought by titling programs in housing markets, which can result in the collapse of social capital that the poorest rely on.

A proposed approach emerging through the debate above is the gradual formalization of slums through the concession of use rights. The legalization of slums without instant provision of full property rights is expected to remove barriers that inhibit households from upgrading their housing while mitigating its social impacts on the poorest segment of the residents (Payne, 2001). The declaration of the Special Areas of Social Interests (AEIS) in Port Alegre, Brazil (E.

Fernandes, 2002) and the Special Zones of Social Interests (ZEIS) in Recife, Brazil (de Souza, 2001) are the examples of such policy. What is of great concern from both research and policy perspectives is how and to what extent the legalization of land tenure without title provision can enhance tenure security and thereby stimulate housing improvement, while taking account of other influential factors that contribute to *de facto* tenure security.

This chapter fills the critical research gap by estimating the effect of slum legalization without title provision on housing transformation in India. Some local and state government agencies in India implement slum notification policy, which is a type of slum legalization policy that legally ensures the occupancy rights of slum dwellers without the provision of full property rights. The previous chapter quantitatively investigates the influence of slum notification on the intensity of housing investment in Indian slums. The study finds that the average amount of money spent for housing improvement is larger in notified slums, yet households in non-notified slums more frequently improve their housing. While the previous chapter offers valuable insight into the cross-sectional evidence about the effect of slum notification, it does not tell about the longitudinal changes in slum notification status and housing conditions. This chapter offers another evidence of the impact of slum notification in Pune, or “slum declaration,” on transformation of slum housing in the long run. Pune is the ninth-largest Indian city, where more than one million people out of three million live in a total of 477 slums. Nearly half of those slum settlements have been legalized (or “declared” as slums in the local policy terminology) by the state government (MASHAL, 2011; Pune Municipal Corporation, 2006).

This chapter estimates the impact of slum declaration on housing transformation by addressing methodological problems in identifying the causal effect. A methodological challenge stems from the fact that the timing of the implementation of slum declaration in Pune differs from slum to slum. In the terminology of experimental studies, this is a case of time-varying treatment. In addition, attributing the difference in housing quality to the slum declaration status can be misleading if households who are capable of housing investment or are motivated to invest tend to settle in declared slums or non-declared slums that are likely to be declared. To overcome the difficulty that arises from these time-varying treatment and selection biases due to residential self-sorting problems, I construct panel data with longitudinal information of 562 slum households in 56 settlements by collecting surveys with retrospective questions, resulting in a total of 14,680 household-year observations. In addition, I reduce selection bias with a

propensity score method that reweighs the sample with the inverse of each household's probability of living in a declared slum. When this inverse-probability-weighting method is applied to longitudinal data with time-varying treatment and confounders, it is referred to as a marginal structural model (MSM) (Hernan et al., 2001; Robins et al., 2000).

My survey data confirms that households have gradually improved their houses in Pune slums. My survey shows that slum residents tend to start replacing walls and/or roofs made of temporary materials with those made of permanent materials once they have stayed in declared slums for longer than 10 years. Building housing with a second floor takes more time than building housing with a permanent structure. The households who have improved their houses have spent on average 187,000 rupees in declared slums and 112,000 rupees in non-declared slums, respectively. These amounts are respectively worth 11 and 19 times as large as the average household monthly expenditure in today's Pune slums.

My analysis detects the positive effects of slum declaration on the improvement of housing quality and the heterogeneity of these effects among different groups of households. The estimation results of the marginal structural models reveal that slum declaration increases the odds of households' building housing with better materials and housing with a second floor by 47% and 78%, respectively. These effects of slum declaration are very different between slums on the land whose zoning conforms to residential use—or, tenable land in an Indian policy terminology (Kundu, 2013)—and untenable land. The effects of slum declaration on both types of housing improvement are estimated to be stronger in slums on untenable land than on tenable land. In untenable areas, slum declaration doubles the chance of building housing structured with permanent materials, and it raises the chance of living in multi-story housing by 3.6 times. The results above are robust against measurement errors and selection bias.

The findings of this chapter are important for two reasons. First, the estimated positive effect of slum declaration in Pune indicates that the assurance of occupancy rights, instead of full property rights, can encourage slum residents to upgrade their housing. The other side of the coin is that the paucity of tenure security critically inhibits housing investment by slum residents. In fact, the possibility of vertical expansion is found to be very limited in non-declared slums on untenable land in Pune. One of the primary rationales of the titling approach is the expansion of slum residents' financial capacity by allowing them to use their housing as collateral in accessing formal credit. The finding, however, suggests that although it does not provide formal titles,

government's guarantee of slum dwellers being free from forced eviction can be an effective policy to start facilitating physical consolidation in slums.

Second, that the effects of slum declaration vary among those who live on tenable and untenable land points to the heterogeneity in the effects of slum legalization depending on the current level of tenure security enjoyed by slum dwellers prior to the legalization. Slum households who had enjoyed the least tenure security could benefit the most from the legalization. By contrast, ensuring occupancy rights alone is not enough to boost housing investment by those who have already enjoyed a higher level of *de facto* tenure security. As the review of the literature by Payne and others (2009) shows, this is often the case in the real world. They find that people who participate in tenure legalization programs tend to have already enjoyed a certain level of *de facto* tenure security.

The remainder of this chapter is structured as follows. Section 3.2 introduces the slum situations in Pune. Section 3.3 discusses the theoretical background for the link between tenure security and housing investment in slums, and explains potential factors that significantly influence the tenure security of slum dwellers and their housing investment decisions in Pune. Section 3.4 describes methodological challenges and my strategy to deal with those problems. Then, the identification strategy for the causal effect of slum declaration on housing transformation and statistical models are explained. Section 3.5 shows data for this study. Section 3.6 reports estimation results of the marginal structural models. Section 3.7 discusses the results and concludes with a brief summary, policy implications, and the limitations of this study.

3.2 Background of Pune

With a population of more than 3 million, Pune is the second largest city in the state of Maharashtra—Mumbai is the first—and the ninth largest city in India (Government of India, 2013). By 2030, Pune's population is projected to reach 5.6 million (Pune Municipal Corporation, 2006). While the city has thrived as a regional hub for the information technology industry, the living conditions of the lower segment of Pune's society remain poor (Bapat, 2004, 2009; Pune Municipal Corporation, 2006, 2013). A Pune-based non-governmental organization (NGO), Maharashtra Social Housing and Action League (MASHAL), recently conducted a citywide household survey with financial support from an international NGO as well as from state and local government agencies. Their *Pune Slum Atlas* identifies approximately 160,000

households living in 477 slums (MASHAL, 2011). Over a fifty-year period beginning in 1961, the population of slum dwellers has continually increased from 92,101 to the current 1,150,000.

Pune Municipal Corporation (PMC), the local municipal government in Pune, and the Government of Maharashtra identify and declare areas to be slums according to the Maharashtra Slum Areas (Improvement, Clearance, and Redevelopment) Act. Among the total 477 slums in Pune, 238 slums have been declared: approximately 13% of those slums were declared before 1980, 68% were declared in the 1980s, and 18% in the 1990s (MASHAL, 2011). Since 1995, however, the declaration of new slums in Pune has been suspended by the state government. An exception is that a state government agency can still declare slums when implementing the Slum Rehabilitation Scheme (SRS) in the slums. The SRS has been implemented in Pune, as well as Mumbai, since the late 1990s (Bapat, 2012; Mukhija, 2003; Nijman, 2008). Households that possess valid legal documentation proving their residence in the slums as of January 1, 1995 are eligible to participate in the scheme. The state government agency in charge of the SRS, the Slum Rehabilitation Authority (SRA), has provided each slum household with a photo-pass, which certifies their eligibility to the SRS. Under the SRS, 1,745 households have been rehoused (Bapat, 2012). The PMC has also implemented various relocation and *in situ* slum improvement projects (Pune Municipal Corporation, 2013), though the scale of those projects has been very limited given the size of the slum population in the city.

In Maharashtra, municipal bodies are required to prepare master plans every 20 years (Kulabkar, 2002). The last Development Plan of Pune designates areas for various uses between 1987 and 2007, and the plan is currently under the revision process. According to the Development Control Rules that stipulate building regulations under the Development Plan, housing construction is permitted only in residential and commercial zones (Pune Municipal Corporation, 1987). The Development Plan also reserved land for the accommodation of the poorer population, which is in India referred to as the Economically Weaker Section, or EWS. By contrast, housing construction is not permitted in industrial and green zones. The government also does not permit residential activities in areas reserved for public purposes. Therefore, I classify residential, commercial, or EWS zones as tenable areas and all the other zones as untenable areas for the purpose of this chapter.

Despite the lack of reliable statistics, involuntary relocation and forcible eviction of slum dwellers happen in Pune. The Pune Municipal Corporation attempted to relocate 10,600

households who squatted on Parvati Hill in the 1980s, though the attempt failed due to the residents' resistance (Bapat, 1988, 2009). Unlike Mumbai and Delhi where notorious massive eviction is rampant (for example, see Bhan, 2013; Dupont, 2008; Zerah, 2007), large-scale eviction has not been observed in Pune since the attempted eviction of Parvati Hill. Nevertheless, small-scale housing demolition and eviction are still prevalent. In my survey of 562 households in slums in Pune, 49 households (9%) have moved to their current residence due to eviction from previous residences; 47 households (8%) have been asked to move from their current residence; 43 households (8%) recognize litigation filed by landowners against their occupation; and 21 households (4%) have witnessed their neighbors being forcibly evicted during the last 10 years.²¹ Therefore, the tenure security of slum residents is still a relevant issue in Pune.

3.3 Tenure Security and Housing Investment

3.3.1 Housing Investment and Transformation

It has been widely observed in the developing world that households incrementally improve their housing in slums. Structure and space often substantially determine the quality of those houses. In India, housing is commonly classified into *katcha*, *semi-pucca*, or *pucca* based on the types of material. For example, the National Sample Survey Organisation (NSSO) defines housing with both roof and walls made of temporary material (e.g., corrugated iron sheets) as *katcha* housing; housing with either roof or walls made of permanent material (e.g., cement) as *semi-pucca* housing; and housing with both roof and walls made of permanent material as *pucca* housing (NSSO, 2004). The data collected by the NSSO shows that households have gradually upgraded their housing from *katcha* to *pucca* housing in non-notified slums (Nakamura, 2013). Another aspect that determines housing quality is space for living inside housing. When they are in need of more space, households expand their houses horizontally and/or vertically. Given the high density in major Indian cities, however, building additional floors is often the only available option. Thus, the number of floors that household can build significantly influences the quality of their houses.

²¹ By analyzing the difference in housing price between slum and non-slum housing, Kapoor and Leblanc (2008) reveal that investors perceive the annual destruction probability of slum housing as 1-2% in Pune. It is noted, however, that they include in the category of informal housing unauthorized colonies, which are usually not considered slums.

Various factors influence households' decisions to improve their housing by using their limited resources. Typically, households' need for space increases as their children grow up and marry, because Indian people usually prefer to live together as joint families. Since moving to new housing is neither feasible nor preferable for many slum residents, their primary strategy is to expand their houses.²² Because most slum households rely on their own savings for housing construction in India (Nakamura, 2013), they must save money for a long time before they can afford the improvements. A primary rationale of the provision of full property rights through titling programs is to enhance households' access to formal credit (de Soto, 2000). Contrary to the popularity of this argument, few empirical studies have supported the hypothesis (Payne et al., 2009). In addition to slum residents' financial capacity, a body of literature maintains that tenure security plays a critical role in their investment decisions. Because housing improvement requires a sizable amount of money, households are not willing to invest if they anticipate the demolition of their houses in the future.

3.3.2 Tenure Security and Housing Investment Factors

Slum Declaration and Land Tenability

In principle, the governments' declaration of a slum improves the tenure security of that slum's residents, because they become legally protected from arbitrary eviction under the Slum Act. Provision of basic services and implementation of government programs succeeding the declaration further improve the residents' *de facto* tenure security as I discuss later on. Although slum declaration itself does not grant land ownership for the residents, the assurance of being free from eviction may provide sufficient motivation to invest in their housing. According to a rule set by the government of Maharashtra, the construction of katcha housing with a maximum height of 14 feet is permitted in declared slums. Residents in declared slums can register their housing to the PMC and obtain a non-objection certificate (NOC) if their housing conforms to this rule.

In tandem with the slum declaration status, the tenability of the land on which slums spread also influences the level of tenure security. Construction activities in contravention of master plans and zoning regulations in not only slum areas but also other non-slum areas are

²² A study shows that more than 90% of slum households are satisfied with the location of their current residence in Pune (Lall et al., 2008).

rampant in Indian cities as argued by, for example, Bhan (2009, 2013), Roy (2009), Zimmer (2012). These studies emphasize that governments arbitrarily tolerate some of those buildings while razing the others. Nevertheless, I hypothesize that slum residents' occupancy of untenable land is, compared with the occupation of tenable land, is less likely to be tolerated, because government agencies are relatively eager to evict them from land that is reserved for public use or that occupies environmentally sensitive areas. If households in slums on untenable land anticipate such eviction, then they are discouraged from investing in their housing.

It is important to consider a potential interaction effect between slum declaration and land tenability. The effect of slum declaration on tenure security and housing investment may be significantly moderated by the tenability of the land. In Pune, 44% of the slums on untenable land (44 slums) have been declared, and 52% of the slums on tenable land (191 slums) have been declared (MASHAL, 2011). This matrix gives us the following four types of slums: (i) declared slums on tenable land, (ii) declared slums on untenable land, (iii) non-declared slums on tenable land, and (iv) non-declared slums on untenable land. If households in non-declared slums on tenable land have already enjoyed great tenure security, then declaration of the slums should not affect their tenure security much. If this is the case, then the influence of land tenability is as important as or maybe more important than slum declaration status. Another important point is that the effect of slum declaration must be greater in untenable land, because the gap in tenure security before and after the declaration is expansive. For example, Banerjee (2007) observes that the provision of non-transferable leasehold rights (*patta*) spurred housing construction in the slums of Bhopal and Visakhapatnam, where the risk of housing demolition had been high.

Land Ownership

Slum land is owned by either private parties or the government, and the latter includes local, state, and central government agencies. The ownership of slum land possibly influences the residents' level of tenure security. The attitude of private landowners regarding slum dwellers varies from tolerance to eviction. While accepting their residence in return for rent payment has been a common practice, rising real estate values in major Indian cities increasingly motivates them to recover their land through, for example, the Slum Rehabilitation Scheme (SRS) in Mumbai and Pune. Whether the SRS improves the welfare of slum dwellers remains

controversial, though slum dwellers who are not eligible to the scheme are sometimes forced to move out of the slums (Bapat, 2012).

It depends on local situations whether households in slum on government land enjoy greater tenure security than those living on privately owned land. On one hand, government agencies may tolerate slum housing in tenable areas for social purposes. People living on untenable government land, however, might have lower tenure security because of the government's severe actions to retrieve the land. For instance, public land ownership is strongly and negatively associated with housing quality in slums in Ahmedabad (Mahadevia, 2011). Several state and local governments have classified virtually all slum settlements on government land as untenable (Kundu, 2013). Because slum notification does not apply to the land owned by central government agencies, including the railway and defense authorities, people in those areas tend to face lower security and worse living conditions (Subbaraman et al., 2012).

Housing Ownership

Housing tenure (owner-occupied or rented housing units) is conceptually distinguished from land tenure. Although it is practically difficult to differentiate housing owners and tenants, government surveys, such as the National Sample Surveys (NSSO, 2010a), identifies housing owners by the lack of rent payment and their own recognition of themselves as housing owners. Compared with renters, housing owners have a stronger incentive to improve their housing because they have more controls of their housing and they are the direct beneficiaries of the returns from the investment. Only 13% of slum households are currently renters in Pune (MASHAL, 2011).

Cut-off Date and Residential Proof

Possession of documents as identity proof is often required for slum households to assert claim to their residence and to receive benefits from governments (Benjamin, 2004; Chandrasekhar & Mukhopadhyay, 2011). This is particularly important in Mumbai and Pune, where households who came to slums prior to January 1, 1995 (which is commonly referred to as the “cut-off date”) are eligible to receive new rooms under the SRS or other relocation schemes,

free of cost.²³ To participate in those projects, households need to possess valid document(s) that prove their residence prior to the cut-off date. Although government agencies issue photo-passes to prove their eligibility, the agencies sometimes accept other documents, such as ration cards, voter ID cards, tax receipts, utility bills, birth certificates, etc. Slum dwellers often resist against forced eviction by asserting their claims to land based on these documents.²⁴ The possession of documents issued by governments will enhance the tenure security of slum residents and thereby encourage them to invest in their housing. Some households who strongly opt for the SRS or other relocation schemes, however, may withhold spending money for housing improvements. Government agencies do not usually take account of the quality of housing in calculating the amount of compensation.

Duration of Residence

A household's duration of residence at the current address both reflects and influences the degree of its tenure security (Durand-Lasserve & Selod, 2009; Mahadevia, 2011). Slum dwellers who stay in their residence for a long period without eviction experience *ex post*, which demonstrates the fact that they enjoy a certain level of *de facto* tenure security, regardless of their legal status. This long duration of residence, in turn, makes them less concerned about the risk of eviction. As slum households continue to reside in slums for a longer time, they also obtain certain legal rights, including cut-off date qualification in Pune. In addition, as I discussed, households' duration of residence is closely associated with their motivation of housing investment.

Access to Infrastructure and Services

Having access to infrastructure and basic services provided by municipal agencies also improves *de facto* tenure security and expedites housing development in slums (Strassmann, 1984). People in declared slums are legally entitled to basic amenities, such as water, sewerage,

²³ The state government has extended the cut-off date multiple times and has set different cut-off dates for some projects.

²⁴ This proof of eligibility could discourage slum residents from investing in their current housing when they expect future relocation because governments do not usually take account of the quality of the current housing in calculating the amount of compensation for the loss.

drainage, public toilets, pavement, and streetlights. While their provision by non-profit organizations or residents themselves is possible, a national sample survey data shows that the improvement of basic amenities in slums has been mostly driven by governments (NSSO, 2010b). Although a government's provision of basic services to slums does not necessarily mean the guarantee of their occupancy, residents often perceive the installation of services as a sign of a government's acceptance of their status. Among various basic services, individual tap water is often the most awaited one in slums (Bapat & Agarwal, 2003). In Pune, while PMC shares the installment costs of pipelines and taps, slum residents are required to pay water tax (1 Rupee per day, or 365 Rupees per annum). Possession of this water tax bill also improves their legal and *de facto* tenure security, because it also serves as residential proof in some cases.

Political Patronage

Finally, local politicians play a key role in influencing tenure security and living conditions in slums. Literature on political patronage in slums is rich and especially thorough in the Indian context (Appadurai, 2001; Benjamin, 2008; Chatterjee, 2004; Roy, 2009). Informal help from politicians looms over every aspect of the lives of slum dwellers in India. Politicians help slum dwellers to obtain ration cards, negotiate with government agencies to declare slums and/or to provide basic amenities, and protect slum dwellers from eviction even in non-declared slums. The politicians benefit by catering to the needs of slum dwellers, whose number often accounts for the half of the population in major cities, because assisting them is an effective way to gain political support, resulting in the prevalence of vote-bank politics. In Pune, a pair of male and female representatives is elected from each of the 76 electoral wards. The relationship between local politicians and slum residents seems to be individualistic in Pune. According to my survey of 562 slum households in Pune, 471 respondents (88%) contacted local councilors directly when they had problems, while only 29 households reached politicians via community leaders.

The question of to what extent informal protection brought by local politicians actually contributes to the tenure security of slum dwellers is also an empirical matter. Slum dwellers often complain about the unrealized promises made by local politicians during election times.

From a political economy perspective, it may even be strategic for politicians to keep slum dwellers insecure while keep pretending to offer help (Fox, 2014; Roy, 2009).²⁵

In sum, potential factors that can significantly influence the tenure security of slum dwellers and their housing investment decisions include slum declaration, land tenability, land ownership, housing ownership, cut-off date and residential proof, duration of residence, infrastructure and basic services, and political patronage. Of primary interest among them is the declaration of a slum that potentially improves the tenure security of slum dwellers through the legal assurance of their occupancy of the land. Slum declaration also helps slum residents to access to infrastructure and basic services and residential proof, which further enhance their tenure security. The next section explains the strategy to identify and estimate the effects of slum declaration while taking into account other influential factors.

3.4 Methods

3.4.1 Methodological Challenges and Strategy

There are several methodological challenges in assessing the influence of slum declaration on slum residents' housing investment behaviors. The two main challenges for this study are the lack of panel data and selection bias. I explain why they can be problematic and how I deal with them below.

Lack of Panel Data

Since my interest is in the long-term transformation of slum housing, the longitudinal information of households and slums is essential. The timing of households' arrival in slums, the declaration of their slums, and housing investment vary among households. For example, I must distinguish whether households came to slums prior to or after the declaration of the slums and

²⁵ My survey asks respondents to assess the risk of eviction of a household who lacks support from local politicians. Out of 562 surveyed households, 56 households (10%) answered "very risky" and 168 households (31%) answered "risky," while 229 households (42%) answered "it depends." Respondents were also asked whether they agree with the following statement: "Local politicians will help me when I face serious problems." Their answers include "disagree very much" (11%), "disagree" (14%), "agree" (40%), and "agree very much" (8%). Also, 27% of respondents answered "yes and no," which means that they cannot tell whether local politicians will help them or not.

whether housing improvement took place before or after the declaration. In addition, because the households' duration of residence in the current address is closely tied with the levels of their tenure security and motivation for housing improvement, time aspects need to be explicitly incorporated in the analysis. Such panel data are, however, rarely available in urban slums. Therefore, I collect surveys from slum residents at one time point that asked retrospective questions. With those surveys, I construct panel data in a person-period format. In this data, as many observations as the number of years of a household's duration of residence in the current address are recorded for each household. The reliability of the respondents' answers about past information is predicated on the precision of their memory, even though my survey asks mainly about changes in housing and basic amenities, which is expected to be less susceptible to measurement errors. To check the robustness of my estimation results against measurement errors, I alternatively recode the data in three-year intervals and compare estimation results with the original one-year interval data to examine if the conclusion of this study remains unchanged.

In this method, only households who live in slums at the time of survey collection are included. Failing to include households who have already moved out of slums, voluntarily or involuntarily, could cause a bias in estimating the effect of slum declaration on housing investment. There are three possible types of omission: 1) households who moved out of slums to non-slum residences; 2) households who moved from slums to other slums outside Pune; and 3) households who moved from slums to other slums in Pune. The omission of the first type of household could cause a downward bias if people in declared slums are more likely to move to non-slum residences. However, a previous longitudinal study suggests that such movement is limited in Pune (Bapat, 2004). The omission of the second and third types of household could cause an upward bias, because households must be more likely to be evicted in non-declared slums. However, the second case may be rare, because those who are evicted tend to stay near the original settlements. I posit that the bias from the omission of the third type of households is also at a minimum, because my survey covers the entire city and thereby includes households who have been evicted from original slums and moved to other slums in Pune. In my survey, 49 households out of 562 households have moved to the current residence because of eviction from previous settlements.²⁶

²⁶ Among the 49 households, 24 households currently live in non-declared slums and 25 households in declared slums. My survey did not ask declaration status of their previous settlements.

Selection Bias

Selection bias due to self-sorting of slum residents is a critical problem for this study. It is possible that households who chose to settle in declared slums and those in non-declared slums have inherently different characteristics. Even if their observed difference is statistically controlled for, unobserved confounders could still cause a bias in estimating the effect of slum declaration on housing quality. Missing variables that powerfully drive households who are more motivated to improve their homes and are more capable of housing improvement into declared slums could cause an upward bias in estimation.

To reduce the selection bias that arises from the self-sorting of slum residents, I employ a propensity score method—inverse probability weighting (IPW) (Hirano et al., 2003; Robins & Rotnitzky, 1995; Rosenbaum, 1987). As I discuss more details of my identification strategy later on, the propensity score approach allows one to estimate the causal effect of slum declaration conditional on the assumption that the selection of households into declared slums can be predicted by observed information. In order to apply the IPW method to my panel data, I take advantage of the marginal structural model (MSM), which utilizes inverse probability weighting for time-varying treatment and confounders. The essence of MSM is to create a pseudo-population by reweighting the sample with the inverse of the probability of each household's living in a declared slum (Hernan et al., 2001; Robins et al., 2000). Although MSM has been developed in epidemiology, it has been used in various social science fields (Do, Wang, & Elliott, 2013; Hong & Raudenbush, 2008; Sampson, Laub, & Wimer, 2006; Sampson, 2008; Sharkey & Sampson, 2010).

3.4.2 Discrete Time Analysis

Given the binary outcomes of interest (i.e., whether housing is structured with permanent materials and whether housing has second floor), a standard approach is the estimation of discrete time analysis models. This is a common method for analyzing the occurrence of events or changes in status of interest when the time period has been recorded in discrete time intervals as opposed to recorded continuously (Allison, 1982; Singer & Willett, 2003). In my data, the event is the change in housing structure from katcha to pucca or the change from single-story

housing to multiple-story housing. The analysis time is the household's duration of residence (in years) at the current address. Let $Y_{i(t)}$ denote the housing condition of the i th household at year t , and $Y_{i(t)} = 0$ for katcha (or single-story housing) and $Y_{i(t)} = 1$ for pucca (or multi-story housing). The discrete-time hazard $h_{i(t)}$ is the conditional probability of an event occurring at a given time point when it has not already occurred:

$$h_{i(t)} = \Pr(Y_{i(t)} = 1 | Y_{i(t-1)} = 0) \quad (3.1)$$

The discrete-time logit model is expressed as follows:

$$\text{logit}[h_{i(t)}] = \log \left[\frac{h_{i(t)}}{1-h_{i(t)}} \right] = \alpha_{(t)} + \beta_1 Z_{i(t)} + \beta_2 X_{i(t)} \quad (3.2)$$

where $\alpha_{(t)}$ is some baseline hazard function; $Z_{i(t)}$ is a binary indicator of the declaration status of the slum where i th household resides; $X_{i(t)}$ include the characteristics of i th household and the characteristics of slums where i th household resides; β_1 and β_2 are the vectors of parameters to be estimated. The changes in $h_{i(j)}$ are captured by some baseline hazard function $\alpha_{(t)}$, which can be a group of dummy variables for discrete time periods or a polynomial function, such as a quadratic form $\alpha_{(t)} = \alpha_0 + \alpha_1 t + \alpha_2 t^2$. It is noted that β_1 in Equation (3.2) is not an estimate of the causal effect of slum declaration yet.

An extension of the model above is multilevel discrete-time analysis (Barber, Murphy, Axinn, & Maples, 2000), which can account for unobserved heterogeneity at the slum level. Expanding Equation (3.1), the discrete-time hazard of the i th household in j th slum, $h_{ij(t)}$, is

$$h_{ij(t)} = \Pr(Y_{ij(t)} = 1 | Y_{ij(t-1)} = 0) \quad (3.3)$$

The level-1 (i.e., household-level) model of the multilevel discrete-time logit model is expressed as follows:

$$\text{logit}[h_{ij(t)}] = \alpha_{(t)} + \beta_{0j} + \beta_1 X_{HH,ij(t)} + r_{ij} \quad (3.4)$$

where $h_{ij(t)}$ represents the hazard of i th household in j th slum living in pucca housing or multi-story housing at year t ; $\alpha_{(t)}$ is some baseline hazard function; $X_{HH,ij(t)}$ includes various household characteristics; and r_{ij} is an error term in the standard logistic distribution. β_{0j} is a random intercept, as described below.

$$\beta_{0j} = \gamma_{00} + \gamma_{01}Z_{j(t)} + \gamma_{01}X_{SLM,j(t)} + u_{0j} \quad (5)$$

In this level-2 (i.e., slum-level) model, γ_{00} is the intercept, $Z_{j(t)}$ is the binary indicator of the declaration status of j th slum; $X_{SLM,j(t)}$ contains slum characteristics, and u_{0j} is a normally distributed error term at the slum level. Combining the level-1 and level-2 models in Equations (3.4) and (3.5) derives the following mixed model:

$$\text{logit}[h_{ij(t)}] = \alpha_{(t)} + \gamma_{00} + \gamma_{01}Z_{j(t)} + \gamma_{01}X_{SLM,j(t)} + \beta_1 X_{HH,ij(t)} + r_{ij} + u_{0j} \quad (3.6)$$

3.4.3 Identification of Causal Effect

Based on the potential outcome framework (Rosenbaum & Rubin, 1983; Rubin, 1974), I consider counterfactuals in identifying the causal effect of slum declaration on housing improvement; that is, I consider housing investment behaviors by each household if it were living in a declared slum or non-declared slum, regardless of the actual declaration status of their slums. Let Y_{i1} and Y_{i0} denote these potential outcomes of i th household, where Y_{i1} in a declared slum and Y_{i0} in a non-declared slum. The average treatment effect (ATE) of slum declaration on housing outcome is thus written as $E[Y_{i1} - Y_{i0}] = E[Y_{i1}] - E[Y_{i0}]$. However, the fundamental problem of causality is that only one of the potential outcomes can actually be observed for each household. The ATE can be recovered if the assignment of the treatment (i.e., the slum declaration status) is random. Among several types of propensity score methods that have been proposed to deal with this problem in observational study settings, the IPW method replicates the random experiment situation by reweighing the sample with the inverse of the probability that each household lives in a declared slum, given their observed characteristics. Robins and

colleagues' MSM (Hernan et al., 2001; Robins et al., 2000) extend this framework for longitudinal data with time-varying treatment and covariates.

The MSM approach weights a sample by the inverse of probability of receiving treatment for each subject at each time. Let $Z_{i(t)}$ denote the declaration status of i th household's slum at year t . Let V_i denote a subset of the baseline values of all covariates, and let $L_{i(t)}$ denote the values of the covariates at year t for i th household. In addition, let $\bar{Z}_{i(t)}$ denote the history of slum declaration up to year t (i.e., $Z_{i(k)}$ from $k = 0$ to $k = t - 1$), and let $\bar{L}_{i(t)}$ denote the history of time-dependent confounders. The weight for household i at year t is calculated as follows:

$$W_{i(t)} = \prod_{k=0}^t \frac{1}{f\{Z_{i(k)} | \bar{Z}_{i(k-1)}, \bar{L}_{i(k)}\}} \quad (3.7)$$

In practice, the inverse probability weights can be obtained by estimating a pooled logistic regression model with the slum declaration status as the dependent variable. Instead of the weights above, I use stabilized weights as recommended by Robins et al. (2000) in order to improve precision by reducing the variability of the weights.

$$SW_{i(t)} = \prod_{k=0}^t \frac{f\{Z_{i(k)} | \bar{Z}_{i(k-1)}, V_i\}}{f\{Z_{i(k)} | \bar{Z}_{i(k-1)}, \bar{L}_{i(k)}\}} \quad (3.8)$$

Causal effect of slum declaration is estimated by applying the following pooled logistics regression model to the sample weighted by $SW_{i(t)}$ in Equation (3.8):

$$\text{logit pr}\{Y_{i(t)} = 1 | Y_{i(t-1)} = 0, \bar{Z}_{i(t-1)}, V_i\} = \gamma_{0(t)} + \gamma_1 Z_{i(t-1)} + \gamma_2 V_i \quad (3.9)$$

where $Y_{i(t)} = 1$ if the household engages in housing improvement at year t and $Y_{i(t)} = 0$ otherwise, and $\gamma_{0(t)}$ is some baseline hazard function. I use *Stata* version 11 (StataCorp, 2009) for these computations. To account for the serial correlation of error terms at the household level, cluster-robust standard errors are estimated (Rogers, 1993).

A critical assumption in this estimation is no unmeasured confounders, which satisfies that the potential outcome Y_i is independent of treatment assignment $Z_{i(t)}$ given all treatment history \bar{z} and the history of confounders. One can interpret this assumption as if $Z_{i(t)}$ is sequentially randomized given the past treatment and covariate history.

$$Y_{i\bar{z}} \perp Z_{i(t)} | \bar{Z}_{i(t-1)}, \bar{L}_{i(t)} \quad (3.10)$$

To make this assumption hold, statistical models in Equations (3.8) and (3.9) include a variety of covariates, such as land tenability, land ownership, religion, caste, educational attainment, possession of ration cards and photo-passes, access to individual water taps, average monthly expenditure, housing ownership, political patronage, and years of arrival in slums.

3.5 Data

3.5.1 Data Collection

I collected household surveys during my field research in Pune from July to November 2013. The population of the survey is the households who lived in slums, both declared and non-declared, in the city of Pune. The Pune Slum Atlas identified 160,000 households in 477 slums (MASHAL, 2011). The sample for the survey was chosen based on the following two-stage cluster-sampling scheme. First, 56 slums were randomly chosen from 477 slums (Figure 3.1). As shown in Table 1, the selected slums and all 477 slums have similar characteristics in terms of the proportion of declared slums, land ownership, zoning, and administrative wards. Then, 10 households were randomly chosen from each of the 56 slums, amounting to the total of 562 households. Nine surveyors randomly visited households by referring to the geographic information system (GIS) maps in the Pune Slum Atlas. After obtaining oral consent from respondents for their participation in the survey, surveyors read out the questionnaires either in Marathi (a local language in the state of Maharashtra) or Hindi, and wrote down answers from the respondents on the forms. Appendix C presents the questionnaire in English. Collecting a survey typically took 20 to 30 minutes, and the response rate in the slums ranged between 70 and 80%. The comparison of household characteristics in my data with MASHAL's survey ensures that I randomly chose respondents (see Appendix D).

3.5.2 Descriptive Statistics

In addition to addressing baseline household characteristics, my survey investigates both the current and previous conditions of the housing structure, possession of documents, and access to basic services, as well as the years when those changes occurred. I retrieve slum-level information from the Pune Slum Atlas (MASHAL, 2011) and combine it with my survey data. Based on the information, I then transform the data into a person-period data format, in which each household contains as many observations as the number of years of their duration of residence in the current address since 1980.²⁷ This panel data contains 14,680 household-year observations in total.

Figure 3.2 depicts the accumulated numbers of sample households in declared and non-declared slums. As more and more slums have been declared, the number of households in declared slums has been steadily increasing. By contrast, the number of households in non-declared slums has been stable due to the conversion of non-declared slums into declared slums and the influx of new households. Slum declaration status is recorded as a time-varying variable, because the timing of slum declaration varies in Pune. Among the total of 237 declared slums in Pune, 13% of them were declared before 1980; 68% were declared between 1981-1990; 18% were declared between 1991-2000; and 1% were declared after 2001 (MASHAL, 2011). Approximately 46% of the observations in my data are counted as in declared slums.

Housing Investment

Table 3.1 reports summary statistics. The dependent variables in this study are binary indicators of housing structure (pucca or katcha)²⁸ and the number of floors (single-story or multi-story). Approximately 22% of the pooled 14,680 observations are recorded as living in pucca housing. Approximately 79% of the households who currently live in pucca housing converted their housing from katcha, while the rest built pucca housing from the outset. As for the vertical development of slum housing, 16% of the total observations are recorded as living in housing with a second floor. About 85% of the households who currently live in multi-story

²⁷ I set 1980 as the origin of analysis time because few pucca housing and multi-story housing had existed earlier.

²⁸ Semi-pucca housing is included in katcha housing in my study.

housing have incrementally built up their housing by adding extra floors. Figure 3.3 implies that people become more inclined to build additional floors once their duration of residence reaches 15 years. My statistical analysis will show how this trend changes once other factors are controlled for.

The longitudinal information recovered by the survey shows a difference in the trend of housing improvement between declared and non-declared slums. The proportion of households living in pucca housing constantly increases as their duration of residence becomes longer than 10 years (Figure 3.3). The gap in the proportion of multi-story housing between declared and non-declared slums widens once households' duration of residence passes 15 years. The proportions of pucca housing and multi-story housing are significantly higher in declared slums (28% and 22%, respectively) than in non-declared slums (17% and 11%, respectively) (Table 3.1).

The survey data also contains information about the amount of money households spent for improving their houses. The housing improvements include the expansion of housing, vertically and/or horizontally, and the replacement of the floor, walls, and roof. In my data, 113 and 139 households spent some amount of money on housing improvements in non-declared and declared slums, respectively. Figure 3.4 illustrates the distribution of the amount of housing investment costs. The average amounts of housing investment are respectively 112,000 rupees and 187,000 rupees in non-declared and declared slums. Only 18 and 7 households respectively borrowed money from banks for the housing investment, which is not surprising, because slum declaration itself, unlike titling programs, does not make the properties mortgageable. My data shows that 91% of households who invested in their housing used their own savings with or without other resources, such as financial assistance from relatives (23%), community savings (10%), and informal moneylenders (8%).

Time-varying Covariates

Time-varying covariates in this study include households' possession of ration cards and photo-passes, as well as their access to individual water taps. Approximately 75% and 17% of observations report the possession of a ration card and photo-pass, respectively (Table 3.1). The proportions of observations with these documents are higher in declared slums than in non-declared slums. In addition, approximately 55% of observations in declared slums have

individual water taps, while 35% of observations have the access in non-declared slums. Figure 3 illustrates how these time-varying variables have changed as households continue to stay in slums. The proportions of households who possess ration cards and/or photo-passes have been increasing as their duration of residence in declared or non-declared slums becomes longer. As for water access, virtually all households have had access to either community/common (20%) water or individual water taps (80%).²⁹

Time-invariant Covariates

Another group of variables are time-invariant variables. Land tenability and land ownership are recorded as time-invariant variables in my data. Observations are recorded as living on tenable land if their residential activities are permitted in the areas of their residence according to the Development Plan. Approximately 75% of the observations are recorded as living in such tenable areas. Land ownership is classified into private (69%), local or state governments (21%), and central governments (11%). The central government agencies include the railway and defense authorities. Other time-invariant variables that describe household social characteristics include religion (Hindu, Muslim, or others), caste (open category³⁰, scheduled caste [SC], scheduled tribe [ST], other backward class [OBC], or others), and the educational attainment of the household heads (primary, secondary, higher, or none). This chapter assumes that these characteristics of a household rarely change.

Some variables are recorded as time-invariant variables in my data, though they are inherently time varying. My data contain information about whether households have participated in government programs, such as relocation or *in-situ* housing improvement projects. In relocation projects, government agencies provided land with or without housing. Although selling those properties is prohibited, residents can expand their housing without permission. In *in-situ* slum improvement projects (Basic Services for the Urban Poor, or BSUP), NGOs appointed by the government rebuilt katcha housing into pucca housing. Residents are required to share 10% of the construction cost. In my data, 7% of the observations participated in

²⁹ Estimation results of multilevel discrete-time analysis models (Appendix E) indicate the positive statistical associations between the probability of housing improvements and time-varying variables (ration cards, photo-passes, and individual water taps), when other factors are controlled for.

³⁰ Open category in this study refers to the people who do not belong to any of the following caste groups: SC, ST, OBC, or other socially disadvantaged classes.

these programs. The indicator of their participation is recorded as time-invariant, because it is difficult to know the exact date that they decided to participate. My survey asks households to report how helpful the local politicians have been. Their answers include “Not at all” (22%), “A little” (31%), “Neutral” (13%), “Well” (31%), and “Very well” (3%). I recoded these responses into a three-scale indicator (no–neutral–yes) for the sake of analysis. Average household monthly expenditure is measured by directly asking respondents about the current amount of expenditure on food and other items. The reported average household monthly expenditure is 9,949 rupees in declared slums and 9,752 rupees in non-declared slums. Since this is susceptible to measurement errors, this study divides observations into quintiles for the purpose of analysis. My survey identifies households as housing owners if they do not pay rent and regard themselves as owners. It is common for tenants to acquire ownership when they stay for a long time, though it is difficult to identify the exact timing of the change through retrospective survey questions. Thus, my survey records only the current ownership status. Approximately 91% of observations are recorded as housing owners.

3.6 Results

3.6.1 Stabilized Weights

As discussed in Section 3.4, I first estimate the stabilized weights and then apply marginal structural models to the weighted sample. I calculate stabilized weights in Equation (3.8) through logistic regression models with slum declaration status as the dependent variable. The logit models for the denominator in Equation (3.8) include time-varying covariates (possession of ration card, photo-pass, and individual water tap) at the year of household’s arrival in a slum (year 0), t and $(t-1)$, baseline covariates (land tenability, land ownership, religion, caste, and education), and other variables that are recorded as time-invariant (household expenditures, housing ownership, and political patronage). In addition, the denominator model includes the dummy indicators of the years of arrivals and duration of residence in years. The model for the numerator in Equation (3.8) does not include time-varying covariates except for those at year 0. Table 3.2 reports the estimation results.

The estimation results show what kinds of households tend to live in declared/non-declared slums. Compared with open-category households, household who belong to scheduled tribe or other backward class tend to live in non-declared slums. Possession of ration cards and

housing ownership are strongly correlated with the probability of households living in declared slums. Because declaration of new slums has been suspended for a while, households who came to slums later than 1990 are less likely to live in declared slums. In addition, slums on tenable land and/or the land owned by local or state government agencies are more likely to be declared than slums on untenable land and/or privately owned land. Slums on tenable land are more likely to be declared than those on untenable land probably because governments are less reluctant to tolerate their occupancy. A possible reason why slums on the land owned by local or state government agencies are more likely to be declared is that government agencies have lesser degree of control of privately owned land. Declaring slums on privately owned land requires legal procedure and tend to face resistance by landowners.

I then calculate the stabilized weights based on the estimation results above. To improve precision by reducing the influence of outliers, I truncate the stabilized weights at the first and 99th percentiles as recommended by Cole and Hernan (2008). Figure 3.5 illustrates the distribution of the calculated stabilized weights. It shows that means are reasonably centered around zero.

3.6.2 Marginal Structural Models

Finally, the pooled logistic regression model in Equation (3.9) is applied to the samples weighted by the estimated stabilized weights. Table 3.3 summarizes the estimated causal effects of slum declaration on housing improvements. For the sake of comparison, the estimation results of multilevel discrete-time analysis models in Equation (3.6) are also reported.³¹ Appendix E presents the detailed results. The estimated odds ratios are 1.470 [95% CI=0.981, 2.203] for pucca housing and 1.781 [95% CI=1.094, 2.900] for multi-story housing. These estimation results suggest that slum declaration increases the chance of living in pucca and multi-story housing by 47% and 78%, respectively. To check the influence of the time-variant covariates that are recorded as time-invariant (household expenditure, housing ownership, and political patronage), I estimate alternative models without them. The estimation results of these models do not differ very much from the results of the models with all covariates.

³¹ It is noted that estimated odds ratios in marginal structural models and discrete-time analysis models are not directly comparable because the former recovers a marginal estimate while the latter recovers a conditional estimate (Kaufman, 2010).

In order to examine the heterogeneity of the effects of slum declaration due to the difference in the level of tenure security previously enjoyed based on the tenability of the land, I segment the sample households into those who lived in slums on tenable land and those who lived on untenable land. Then, I separately estimate stabilized weights and MSMs to them. The results show that the effects of slum declaration differ widely between slums on tenable land and untenable land. As expected, slum declaration has greater impact on housing improvement in slums on untenable land. The estimated odds ratios for pucca housing are 1.482 [95% CI=0.901, 2.438] on tenable land and 2.003 [95% CI=0.767, 5.228] on untenable land. The odds ratios for multi-story housing are estimated to be 1.497 [95% CI=0.846, 2.652] on tenable land and 3.591 [95% CI=1.081, 11.933] on untenable land. Thus, declaring slums on untenable land would increase the chance of a household's living in pucca housing and multi-story housing by 2 times and 3.6 times, respectively.

Figure 3.6 illustrates the fitted hazard of households' building pucca and multi-story housing. The charts clearly illustrate that the hazard, which is defined as the probability of living in pucca/multi-story housing at year t given that the household does not live in pucca/multi-story housing at year $t-1$, is increasing as the household's duration of residence becomes longer. When looking at the fitted hazards of living in pucca housing, the curves are almost identical between households in declared slums on tenable land and those on untenable land, which means that once slums are declared, land tenability does not matter to the households' decision to improve the housing structure. The chart also illuminates the difficulty of building pucca housing in non-declared slums on untenable land, because the hazard curve remains low.

The fitted hazards of building multi-story housing manifest different trends. The hazards for households in declared slums on tenable and untenable land are not identical this time; instead, their gap is widening as the length of residence becomes longer. Moreover, the hazard for households in non-declared slums on tenable land catches up to the hazard for households in declared slums on tenable land, which indicates that slum residents on tenable land enjoy good security as long as it is measured by the number of housing floors, even if their settlements are not declared. Finally, it is quite visible that households in non-declared slums on untenable land face enormous obstacles when they try to expand their housing, no matter how long they continue to live in the slums.

3.6.3 Robustness Check

It is possible that the households do not remember exactly when they improved their housing, obtained ration cards, and/or installed water taps. To achieve the robustness of the estimation results of the MSM against such measurement errors due to incorrect memory of surveyed households, I recode my person-period data with three-year intervals instead of one-year intervals. This process reduces the total number of observations from 14,680 to 5,240. The estimated causal effects of slum declaration on housing quality turn out to be smaller than the original results with one-year intervals (Table 3.3). For example, the odds ratio for pucca housing is now estimated to be 1.279, which is slightly lower than the original estimate (1.470). Nevertheless, these estimation results are not substantially different from the original estimates.

3.7 Discussion and Conclusion

Despite the prolonged debate over the role of tenure security in slum improvement, quantitative evidence has been scarce due to various methodological challenges (Marx et al., 2013; Payne et al., 2009). It has been of research and policy interest whether the legalization of slums without the provision of full property rights can facilitate housing improvements. This study constructs panel-data based on a new survey with retrospective questions. Doing so allows me to analyze explicitly the time aspect of incremental development of slum housing. To estimate the causal effect of slum declaration, I employ an inverse probability weighting approach that can be applied to longitudinal data with time-varying covariates under the framework of the marginal structural models.

This chapter finds the positive effects of slum declaration on housing transformation in slums in Pune, as well as the heterogeneity of the effects. Slum declaration increases the odds of households' building housing with better materials and housing with a second floor by 47% and 78%, respectively. These results suggest that even if full property rights are not provided, the guarantee of slum dwellers' occupancy can prompt housing improvements by enhancing the tenure security of slum dwellers. Moreover, this chapter shows that the effects of slum declaration vary depending on the degree of tenure security enjoyed by slum dwellers prior to the legalization. According to my estimations, land tenability significantly moderates the effect of slum declaration. People on tenable land may have tenure security that is compelling enough to persuade them to build multi-story housing even in non-declared slums. Slum residents who face

a persistent risk of eviction in untenable areas would benefit the most from the declaration of their slums, though in practice governments tend to be reluctant to declare such slums.

It is also noted that slum declaration and land tenability are found to be more influential on the construction of multi-story housing, compared with pucca housing. There are several possible reasons for this. First, adding a second floor is more costly than replacing a katcha structure with a pucca structure. Thus, people need to be more confident about their tenure security. Another reason is the government agencies or landowners who are less tolerant of the construction of multi-story housing than of pucca housing. The construction of multi-story housing is very visible, and it sends a promising signal to other residents that construction activities are becoming possible.

From a policy perspective, the guarantee of slum dwellers' occupancy rights is only a starting point. Payne (2001) advocates the gradual formalization of slum housing, starting from the provision of occupancy permits to full property rights. In fact, the assurance of occupancy rights through slum declaration has led to the development of various informal, or *de facto*, rights in Pune. For example, 72% of the sampled households in my survey answered that they can inherit their houses; 77% of households think that they can sell their houses; and 83% of respondents said that they can sublet their rooms. The proportions of households who provided these positive answers are higher in declared slums than those in non-declared slums. The policy question in the next step is whether, and how, these rights need to be legalized.

There are several limitations to my study. First, although constructing panel data through household surveys with retrospective questions is a powerful approach, the amount of reliable information that can be obtained through the survey is still limited. My data, for example, lack information about the history of household expenditures and housing ownership. Second, I did not consider the spillover effect of slum declaration. Declaration of a slum could affect the tenure security of residents in neighboring slums if they come to expect the declaration of their slums in the future. This expectation does not necessarily stimulate housing improvement, because poorer migrants also come to form slums surrounding recently declared slums. Third, my analysis did not take account of the perception of slum residents. Recent literature maintains that slum households' perception of eviction risk is a better predictor than legal and *de facto* tenure security (van Gelder, 2009, 2012). Including a proxy of perceived tenure security is, however,

problematic, because such measured perception has already been affected by their past investment.

Finally, a concern often mentioned in the literature is the impact of the increase in rent price on renters in formalized slums. According to my survey, renters account for only 10% of slum households in Pune: 33 households in declared slums and 23 households in non-declared slums. Six of the 56 renters have moved to their current location due to eviction from the previous residence. This proportion of renters who have experienced eviction is not significantly different from that of housing owners. Average monthly rent is higher in declared slums (2,383 rupees) than in non-declared slums (1,603 rupees), though the scatter plot in Figure 3.7 reveals that the mean difference is mainly due to the households who pay lower rent even if they have lived in the non-declared slums for more than 40 years. Those households do not exist in declared slums probably because households stopped paying rent to tenant owners, who are also landowners in many cases, when their slums were declared. On the contrary to the concern about the impact of tenure formalization on renters, this possibility alludes to the positive effect of slum declaration on tenure security and housing ownership. This issue needs to be further examined in future studies.

3.8 Appendices

Appendix C. Questionnaire

HOUSING CONDITION SURVEY (ENGLISH)

[BEFORE STARTING THIS SURVEY, MAKE SURE YOU READ OUT THE CONSENT FORM TO SURVEYEE. INSTRUCTION FOR SURVYOR IS WRITTEN IN CAPITAL IN THIS FORM.]

Starting time: _____

Part I. Household Characteristics

First of all, I am going to ask you about your family.

[Q1. DURATION OF RESIDENCE]

(a) When did your family, including your grand parents, start living here?

[FILL IN YEAR] _____

(b) Where did your family live before coming to this place? _____

(1) non-slum in Pune, (2) slum in Pune, (3) non-slum outside Pune (urban area),

(4) slum outside Pune (urban area), (5) rural areas.

(c) Why did you move out of the previous residence? Choose all answers applied. _____

(1) evicted, (2) for better housing, (3) for better education, (4) proximity of job place, (5) lack of job, (6) for security, (7) marriage, (9) others.

[IF THE ANSWER IS (9), PLEASE ASK TO SPECIFY] _____

[Q2. HOUSEHOLD MEMBERS]

(a) How many people currently live in this house? _____

(b) Please tell me their ages.

1. _____ 2. _____ 3. _____ 4. _____ 5. _____ 6. _____ 7. _____
8. _____ 9. _____ 10. _____ 11. _____ 12. _____ 13. _____

(c) Who is the person primarily earning income in your family [=HOUSEHOLD HEAD]? [FILL IN A NUMBER ABOVE] _____

(d) [IS THE HOUSEHOLD HEAD FEMALE?] (1) yes, (0) no. _____

[Q3. LANGUAGE]

What is the primary language of the household head? (1) Hindi, (2) Marathi, (9) others. _____

[Q4. RELIGION]

What is your religion? _____

(1) Hinduism, (2) Islam, (3) Christianity, (4) Sikhism, (5) Jainism, (6) Buddhism, (7) Zoroastrianism, (9) others.

[Q5. EDUCATION]

What is the highest education your household head completed? _____

(1) primary, (2) secondary, (3) higher or technical, (0) none.

[Q6. SOCIAL GROUP]

Do you belong to any of the following groups? _____

(1) scheduled caste, (2) scheduled tribe, (3) other backward class, (9) others (e.g. NT), (0) open category.

[Q7. COMMUNITY ACTIVITY]

Does anyone in your household participate in saving group? (1) yes, (0) no. _____

[Q8. POSSESSION OF DOCUMENT]

(a) 1. Do you think you have legal rights to build these houses? (1) yes, (0) no.

2-story (G+1) katcha housing: _____

1-story (G) pucca housing: _____

2-story (G+1) pucca housing: _____

How about these rights?

2. inherit _____

3. sell _____

4. sublet _____

5. access to services, such as water and drainage. _____

6. mortgage [**BORROW MONEY FROM BANK WITH YOUR HOUSE AS COLLATERAL**] _____

(b) 1. Does anyone in your household have a ration card? (1) yes, (0) no. When did you obtain it?

_____ (year: _____)

How about these documents?

2. voter ID card _____ (year: _____)

3. photo pass [**WHICH PROVES ELIGIBILITY TO SLUM REHABILITATION SCHEME AND
RESIDENTIAL PROOF AS OF 1.1.95**] _____ (year: _____)

4. tax or electricity bill _____

5. receipt of rent _____

Part II. Settlement Characteristics

Next, I am going to ask you about this settlement.

[Q9. PERIOD SINCE FORMATION]

When did people start living in this area? [FILL IN YEAR] _____

[Q10. LAND OWNERSHIP]

(a) Who owns the land of this area? _____

- (1) PMC, (2) State government, (3) railway authority, (4) other central government, (5) private, (9) I don't know.

(b) How much do you pay monthly rent to the landowner [NOT TO HOUSING OWNER]? [IN RUPEES. IF NO PAYMENT, FILL IN ZERO] _____

[Q11. SLUM STATUS]

Is this slum declared by the government or not declared yet? _____

- (1) declared, (2) not declared, (3) I don't know.

[Q12. NPO/NGO]

Have any organizations worked for this settlement? Please tell me their names. _____

(1) yes, (0) no, (9) I don't know.

1. _____

2. _____

3. _____

4. _____

Part III. Living Conditions

Next, I am going to ask you about your house and living conditions. If you do not mind, could you please show me inside? [IN THIS SECTION, PLEASE ALSO CHECK ANSWERS WITH YOUR EYES.]

[Q13. HOUSING TENURE]

(a) Do you own your house? (1) yes, (0) no, I am a tenant (renter). _____

(b) [FOR RENTER] How much do you pay monthly rent? (in Rs.)

[FOR OWNER] How much do you think people would pay monthly for renting your house? _____

[Q14. NUMBER OF ROOMS]

(a) How many rooms are there in your house? [EXCLUDE BATHROOM] If it has changed since you moved to this house, please also tell me about the previous conditions and when it changed.

Now: _____ Before: _____ (year of change: _____)

[IF NO CHANGE OCCURRED, JUMP TO Q15]

(b) How much did it cost? _____

How did you finance the construction(s)? Please choose any applied answers. _____

(1) own source, (2) borrowing from relatives/friends, (3) community savings,

(4) money lenders, (5) banks, (6) government institutions, (9) others.

[Q15. CARPET AREA]

What is the total carpet area of your house? [SURVEYOR MAKES A ROUGH MEASURE IN SQUARE FEET] If it has changed since you moved to this house, please also tell me about the previous conditions and when it changed.

Now: _____ square feet Before: _____ square feet (year of change: _____)

[Q16. FLOOR TYPE]

(a) What is the type of the main floor of your house? If it has changed since you moved to this house, please also tell me about the previous conditions and when it changed.

- (1) mud/*shen*, (2) bamboo/log, (3) wood/plank, (4) brick/lime stone/stone,
(5) cement/*koba*, (6) mosaic/tiles, (9) others.

Now: _____ Before: _____ (year of change: _____)

[IF NO CHANGE OCCURRED, JUMP TO Q17]

(b) How much did it cost? (in rupees) _____

How did you finance the construction(s)? Please choose any applied answers. _____

- (1) own source, (2) borrowing from relatives/friends, (3) community savings,
(4) money lenders, (5) banks, (6) government institutions, (9) others.

[Q17. WALL TYPE]

(a) What is the material of the main walls of your house? If it has changed since you moved to this house, please also tell me about the previous conditions and when it changed.

- (1) grass/straw/leaves/reeds/bamboo, (2) mud/unburnt brick, (3) canvas/cloth,
(4) other temporary materials, (5) timber, (6) burnt brick/stone/lime stone/clay,
(7) iron or other metal sheet, (8) cement/RBC/RCC, (9) other permanent materials.

Now: _____ Before: _____ (year of change: _____)

[IF NO CHANGE OCCURRED, JUMP TO Q18]

(b) How much did it cost? (in rupees) _____

How did you finance the construction(s)? Please choose any applied answers. _____

- (1) own source, (2) borrowing from relatives/friends, (3) community savings,
(4) money lenders, (5) banks, (6) government institutions, (9) others.

[Q18. ROOF TYPE]

(a) What is the type of the roof of your house? If it has changed since you moved to this house, please also tell me about the previous conditions and when it changed.

- (1) grass/straw/leaves/reeds/bamboo, (2) mud/unburnt brick, (3) canvas/cloth,
- (4) other temporary materials, (5) tiles/slate, (6) burnt brick/stone/lime stone,
- (7) iron/zinc/other metal sheet/asbestos sheet, (8) cement/RBC/RCC,
- (9) other permanent materials.

Now: _____ Before: _____ (year of change: _____)

[IF NO CHANGE OCCURRED, JUMP TO Q19]

(b) How much did it cost? (in rupees) _____

How did you finance the construction(s)? Please choose any applied answers. _____

- (1) own source, (2) borrowing from relatives/friends, (3) community savings,
- (4) money lenders, (5) banks, (6) government institutions, (9) others.

[Q19. CONSTRUCTION DECISION]

When you decided to engage in the construction, were these issues important for you? (1) yes, (0) no.

- 1. Cost _____
- 2. Finance _____
- 3. Possibility of eviction _____
- 4. Access to services, such as water, drainage, street lights, etc. _____
- 5. Lack of legal document (such as voter ID card) _____
- 6. Declaration status of your settlement as a slum _____

[Q20. WATER ACCESS]

(a) What is the major source of drinking water for your family? If it has changed since you moved to this house, please also tell me about the previous conditions and when it changed.

- (1) tap, (2) tube well/hand pump, (3) well, (4) tank/pond (reserved for drinking),
- (5) other tank/pond, (6) river/canal/lake, (7) spring, (9) others.

Now: _____ Before: _____ (year of change: _____)

(b) What is the type of the facility of drinking water for your family? If it has changed since you moved to this house, please also tell me about the previous conditions and when it changed.

(1) community use, (2) shared with neighbors, (3) household's exclusive use

Now: _____ Before: _____ (year of change: _____)

(c) How many minutes does it take for your family to get to the source of drinking water? If it has changed since you moved to this house, please also tell me about the previous conditions and when it changed.

[IF THE HOUSEHOLD HAS WATER SOURCE INSIDE HOUSE, FILL IN (0). IF NOT, FILL IN MINUTES]

Now: _____ Before: _____ (year of change: _____)

(d) How many hours per day is the water available on average? [FILL IN HOURS] If it has changed since you moved to this house, please also tell me about the previous conditions and when it changed.

Now: _____ Before: _____ (year of change: _____)

[Q21. LATRINE]

(a) What is the type of toilet for your family? If it has changed since you moved to this house, please also tell me about the previous conditions and when it changed.

(1) shared (2) public/community (3) own, (0) none.

Now: _____ Before: _____ (year of change: _____)

(b) What is the type of toilet for your family? If it has changed since you moved to this house, please also tell me about the previous conditions and when it changed.

(1) pit, (2) septic tank/flush, (0) none.

Now: _____ Before: _____ (year of change: _____)

[Q22. ELECTRICITY]

Is electricity available in your house? If it has changed since you moved to this house, please also tell me about the previous conditions and when it changed.

(1) yes, (0) no.

Now:____ Before.____ (year of change: _____)

[Q23. DRAINAGE]

What is the drainage arrangement for your family? If it has changed since you moved to this house, please also tell me about the previous conditions and when it changed.

(1) open katcha [clay, wood, etc], (2) open pucca [brick, concrete, etc],

(3) covered pucca, (4) underground, (0) none.

Now:____ Before.____ (year of change: _____)

[Q24. GARBAGE COLLECTION]

Who collects garbage in this area? If it has changed since you moved to this house, please also tell me about the previous conditions and when it changed.

(1) by residents, (2) by municipality/corporation, (3) others, (0) no arrangement,

(9) I don't know.

Now:____ Before.____ (year of change: _____)

[Q25. PATH]

What is the type of the path in front of your house? If it has changed since you moved to this house, please also tell me about the previous conditions and when it changed.

(1) mud, (2) bamboo/log, (3) wood/plank, (4) brick/lime stone/stone, (5) cement/tar,

(6) mosaic/tiles, (9) others.

Now:____ Before.____ (year of change: _____)

[Q26. PURCHASED OR BUILT]

Did your family purchase this house or build?

(1) purchased, (2) built, (3) tenant, (4) rehabilitated, (9) I don't know. _____

[Q 27. HOUSING INVESTMENT]

(a) Do you *want* to conduct any housing construction or improvement works in the next 5 years?

(1) yes, (0) no _____

(b) Do you have any specific plan to do so? For example, have you started to save money for it?

(1) yes, (0) no _____

Part IV. Tenure Security

In addition to your family and housing, I have questions about security. I would appreciate it if you would answer these questions.

[Q28. ESTIMATED RISK]

(a) Do you agree with the following statement? "I fear being forced to move out someday." You disagree very much, disagree, agree, or agree very much? Or neutral? Please choose one answer.

(1) disagree very much, (2) disagree, (3) neutral, (4) agree, (5) agree very much. _____

(b) Do you think that somebody, such as landowner, housing owner, government, or builder, will try to move you out of this house, very likely, likely, unlikely, or very unlikely? Or neutral?

Please choose one answer. _____

(1) very likely, (2) likely, (3) neutral, (4) unlikely, (5) very unlikely.

(c) Do you agree with the following statement? "I have the right to stay here." You disagree very much, disagree, agree, or agree very much? Or neutral? Please choose one answer. _____

(1) disagree very much, (2) disagree, (3) neutral, (4) agree, (5) agree very much.

(d) Do you agree with the following statement? "I can assert claim to my occupancy to others when I am forced to move out." You disagree very much, disagree, agree, or agree very much? Or neutral? Please choose one answer. _____

(1) disagree very much, (2) disagree, (3) neutral, (4) agree, (5) agree very much.

(e) Do you agree with the following statement? “When I am facing the threat of eviction, somebody will come to help us.” You disagree very much, disagree, agree, or agree very much? Or neutral? Please choose one answer. _____

(1) disagree very much, (2) disagree, (3) neutral, (4) agree, (5) agree very much.

(f) Do you agree with the following statement? “I will be provided new housing if I have to move out.” You disagree very much, disagree, agree, or agree very much? Or neutral? Please choose one answer. _____

(1) disagree very much, (2) disagree, (3) neutral, (4) agree, (5) agree very much.

(g) 1. Please imagine a family living in housing with metal sheets. What do you think about their risk of eviction compared with a family living in concrete housing? _____

(1) very risky, (2) risky, (3) neutral, (4) safe, (5) very safe. _____

How about the risk of these families?

2. A household who does not possess documents issued by government, such as voter ID card or tax bill. [vs with document] _____

3. A household who has stayed in the current location for *a short time*. [vs longer time] _____

4. A household who lives on the land owned by government. [vs private land] _____

5. A household who does not have water access provided by the PMC. [vs water access] _____

6. A household who lives in an area surrounded by natural areas. _____

7. A household who lives in an area surrounded by slum areas. _____

8. A household who lives in a slum not declared yet. _____

9. A household who lives in a smaller size of settlement. _____

10. A household who lives in a community in which people cooperate with each other very well. _____

11. A household who lives in a settlement in which NGO or other organization is actively working for residents. _____

12. A household who does not have support from local councilors. _____

13. A household who pay bribe for police officers/bureaucrats/politicians. _____

[Q29. EXPERIENCE OF EVICTION]

(a) Have you been told to move out of this place? (1) yes, (0) no. _____ (year: _____)

(b) Have you ever experienced any litigation against your occupancy in this place? For example, litigation from landowner or government?

(1) yes, (0) no. _____ (year: _____)

(c) How many people in your neighborhood have been involuntarily moved out during the last 10 years? _____ (year: _____)

(d) Have you been informed about the rehabilitation plan in this slum (SRS or SRA)? [**Under the SRS, each household who possess a residential proof as of 1.1.95 or 2000 is rehabilitated to a room in a new middle-rise building.**] (1) yes, (0) no. _____

Part V. Household characteristics again

Finally, I am finishing this survey with a couple of more questions about your family.

[Q30. JOB AND EXPENDITURE]

(a) What is the job your family's primary earner doing? If it has changed since you moved to this house, please also tell me about the previous conditions and when it changed.

(1) self-employed, (2) regular wage/salary earning, (3) casual labor, (9) others.

Now: _____ Before: _____ (year of change: _____)

(b) How much do your family usually spend for food every month? How much in total, including other items, such as clothes, electronic appliances, transportation, school fees, medical fees (**but except for rent and tax**)? (in Rs.) How about the expenditure 10 years and 20 years ago? [IN RUPEES]

1. Food current: _____ 10 years ago: _____

2. Total current: _____ 10 years ago: _____

[Q31. POLITICAL AFFILIATION]

(a) Do you know the names of local councilors representing this area? (1) yes, (0) no. _____

(b) How often have local councilors come to listen to your problems? Please choose one of the following answers.

(1) only election times, (2) sometimes, (3) often, (4) never. _____

(c) Have local councilors helped to solve your problems? Please choose one of the following answers.

(1) Not at all, (2) a little, (3) neutral, (4) well, (5) very well. _____

(d) Do you agree with the following statement? "Local councilors will help me when I face serious problems." Please choose one of the following answers.

(1) disagree very much, (2) disagree, (3) neutral, (4) agree, (5) agree very much. _____

(e) When you face problems, how would you contact local councilors?

(1) contact directly, (2) contact via community leaders, (3) contact via PMC staff,
(4) contact with other persons. _____

[Q32. HAZARDOUS STATUS]

Is this house located on the following hazardous area? _____

(1) riverbank, (2) along railway, (3) canal, (4) hills, (9) other hazardous areas, (0) no.

Part VI. Identification of Sample Household
[THIS PAGE WILL BE STORED SEPARATELY]

Thank you very much. This survey is over. If you don't mind, please tell me about your family's information.

Q33. May I have your name? _____

Ending Time: _____

[SURVEYOR FILLS IN ITEMS BELOW] -----

Q34. Name of surveyor: _____

Q35. Date: _____

Q36. Slum number: _____

Q37. Slum name: _____

Q38. Household ID: _____

Appendix D. Sample comparison

	My survey	MASHAL	Diff.	
Household-level				
Religion				
Hindu	0.809	0.819	-0.010	
Muslim	0.107	0.114	-0.007	
Others	0.084	0.067	0.017	
Caste				
Open category	0.412	0.564	-0.152	***
Scheduled caste	0.235	0.288	-0.053	
Scheduled tribe	0.031	0.010	0.021	
Other backward class	0.258	0.138	0.120	
Others	0.065	-	0.065	
Household expenditure (Rupees)	9858	7556	2302***	
	(205.1)	(29.2)	(294.2)	
Household size	5.525	5.542	-0.018	
	(0.112)	(0.018)	(0.178)	
Duration of residence				
< 1 yr	0.011	0.058	-0.047	***
[1-3)	0.025	0.033	-0.008	
[3-8)	0.061	0.049	0.012	
[8-13)	0.071	0.056	0.015	
> 13 yrs	0.833	0.805	0.028	
Pucca/semi-pucca	0.778	0.632	0.146***	
	(0.018)	(0.002)	(0.020)	
Carpet area (square feet)	138.5	141.3	-2.804	
	(2.698)	(0.523)	(4.213)	
Ownership	0.872	0.866	0.005	
	(0.014)	(0.001)	(0.014)	
Individual water tap	0.804	0.775	0.029	
	(0.017)	(0.002)	(0.018)	

Note: Standard errors in parentheses. * <0.1 , ** <0.05 , *** <0.01 for t-test and chi-square test. PMC; Pune Municipal Corporation. MHADA: Maharashtra Housing and Area Development Authority. EWS; Economically Weaker Section. A distinct difference is observed in the mean values of the average household monthly expenditure: the mean is 30% higher in my data. This is probably due to measurement error and/or the difference in the timing of the two surveys, as the MASHAL collected surveys between 2008 and 2012. In addition, the proportion of pucca/semi-pucca housing is also higher in my survey (77.8%) than in MASHAL's survey (63.2%).

Appendix D. (continued)

	My survey	MASHAL	Diff.
Slum-level			
Slum declaration	0.518 (0.067)	0.499 (0.023)	0.019 (0.071)
Land ownership			
Private	0.696	0.746	-0.050
PMC	0.036	0.017	0.019
State	0.143	0.153	-0.010
MHADA	0.018	0.006	0.012
Railway	0.107	0.069	0.038
Central	0.000	0.084	-0.084
Zoning			
Residential	0.625	0.683	-0.058
Commercial	0.018	0.011	0.007
Industrial	0.018	0.017	0.001
Railway	0.036	0.036	0.000
Defense	0.018	0.015	0.003
Natural	0.089	0.094	-0.005
EWS	0.089	0.082	0.007
Agricultural	0.036	0.023	0.016
Public	0.071	0.021	0.050
Others	0.000	0.017	-0.017
Administrative ward			
1 Aundh	0.071	0.071	0.000
2 Kothrud	0.018	0.048	-0.030
3 Ghole Road	0.089	0.105	-0.016
4 Warje Karvenagar	0.054	0.057	-0.003
5 Dhole Patil	0.125	0.130	-0.005
6 Hadapsar	0.107	0.117	-0.010
7 Nagar Road	0.036	0.027	0.009
8 Sangamwadi	0.161	0.111	0.050
9 Bhavani Peth	0.089	0.130	-0.041
10 Kasaba Vishrambaugwada	0.018	0.025	-0.007
11 Sahakarnagar	0.054	0.057	-0.003
12 Tilak Road	0.125	0.088	0.037
13 Bibvewadi	0.018	0.023	-0.005
14 Dhanakawadi	0.036	0.011	0.025
N: households	562	55645	
N: slums	56	477	

Appendix E. Estimation results of multilevel discrete-time analysis models

	Dependent variable: pucca housing						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Slum declaration	1.443 ^{***} (0.187)	1.412 ^{***} (0.182)	1.403 ^{***} (0.183)	1.389 ^{**} (0.182)	1.402 ^{**} (0.187)	1.978 ^{***} (0.478)	2.012 ^{***} (0.498)
Land tenability	1.039 (0.533)	1.042 (0.535)	0.888 (0.460)	0.859 (0.437)	0.916 (0.492)	0.953 (0.526)	1.218 (0.679)
Land ownership (local/state)	3.195 [*] (1.967)	3.198 [*] (1.971)	2.969 [*] (1.849)	2.919 [*] (1.781)	2.468 (1.587)	3.860 ^{**} (2.587)	4.151 ^{**} (2.795)
Land ownership (central)	0.351 (0.314)	0.350 (0.313)	0.389 (0.351)	0.435 (0.384)	0.419 (0.390)	0.426 (0.399)	0.404 (0.381)
Religion (Muslim)			1.222 ^{**} (0.121)	1.214 [*] (0.121)	1.092 (0.119)	1.095 (0.119)	1.108 (0.121)
Religion (others)			0.996 (0.087)	0.926 (0.082)	0.928 (0.088)	0.927 (0.088)	0.924 (0.088)
Caste (Scheduled caste)			1.173 [*] (0.085)	1.116 (0.082)	0.960 (0.075)	0.956 (0.074)	0.939 (0.074)
Caste (Scheduled tribe)			2.287 ^{**} (0.335)	2.057 ^{***} (0.304)	1.657 ^{***} (0.249)	1.675 ^{**} (0.252)	1.941 ^{**} (0.295)
Caste (Other backward class)			0.840 ^{**} (0.060)	0.884 [*] (0.063)	0.739 ^{***} (0.056)	0.738 ^{***} (0.056)	0.743 ^{***} (0.057)
Caste (Others)			0.773 ^{**} (0.098)	0.729 ^{**} (0.092)	0.460 ^{***} (0.062)	0.460 ^{***} (0.062)	0.491 ^{***} (0.067)
Education (primary)			2.410 ^{***} (0.223)	2.331 ^{***} (0.217)	2.408 ^{***} (0.242)	2.408 ^{***} (0.242)	2.356 ^{***} (0.238)
Education (secondary)			1.853 ^{***} (0.131)	1.750 ^{***} (0.125)	1.802 ^{***} (0.138)	1.808 ^{***} (0.139)	1.845 ^{***} (0.143)
Education (higher)			1.280 ^{**} (0.137)	1.138 (0.123)	0.972 (0.114)	0.980 (0.115)	1.017 (0.120)
Ration card				1.318 ^{***} (0.091)	1.291 ^{***} (0.094)	1.283 ^{***} (0.094)	1.269 ^{***} (0.094)
Photo pass				1.421 ^{***} (0.099)	1.398 ^{***} (0.101)	1.395 ^{***} (0.101)	1.369 ^{***} (0.100)
Individual water tap				1.537 ^{***} (0.091)	1.406 ^{***} (0.087)	1.403 ^{***} (0.086)	1.393 ^{***} (0.086)

Appendix E. (Continued)

	Dependent variable: pucca housing						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Household expenditure (2nd quintile)					1.018 (0.095)	1.024 (0.096)	1.008 (0.095)
Household expenditure (3rd quintile)					1.558*** (0.123)	1.559*** (0.123)	1.510*** (0.120)
Household expenditure (4th quintile)					1.366*** (0.144)	1.365*** (0.144)	1.374*** (0.146)
Household expenditure (5th quintile)					2.066*** (0.173)	2.066*** (0.173)	1.986*** (0.168)
Housing ownership					1.451*** (0.201)	1.458*** (0.202)	1.648*** (0.234)
Government program					1.205 (0.138)	1.201 (0.137)	1.211* (0.141)
Help from politician (Neutral)					0.767*** (0.071)	0.769*** (0.071)	0.773*** (0.071)
Help from politician (Yes)					1.042 (0.063)	1.041 (0.063)	0.948 (0.143)
Declaration × Tenability						0.908 (0.296)	0.554* (0.184)
Declaration × Land ownership (local/state)						0.481** (0.139)	0.446*** (0.130)
Declaration × Help from politician (Yes)							0.852 (0.200)
Tenability × Help from politician (Yes)							0.469*** (0.086)
Declaration × Tenability × Help from politician (Yes)							5.354*** (1.445)
Baseline hazard function	Dummy	Quadratic	Quadratic	Quadratic	Quadratic	Quadratic	Quadratic
Var(intercept)	1.409	1.411	1.423	1.394	1.469	1.475	1.482
ICC	0.377	0.377	0.381	0.371	0.396	0.398	0.400
Log-likelihood	-6023	-6026	-5603	-5544	-5232	-5227	-5159
Prob>Chi2	0.000	0.000	0.000	0.000	0.000	0.000	0.000
AIC	12167	12112	11285	11172	10563	10557	10429
N	14680	14680	13827	13827	13331	13331	13331

Note: Exponentiated coefficients; Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Dummies for years of arrival and administrative wards are not shown.

Appendix E. (Continued)

	Dependent variable: multi-story housing						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Slum declaration	1.809*** (0.289)	1.755*** (0.279)	1.714*** (0.279)	1.615*** (0.265)	1.703*** (0.284)	3.206*** (1.097)	2.924*** (1.020)
Land tenability	2.642* (1.553)	2.649* (1.561)	2.890* (1.793)	2.972* (1.783)	4.014** (2.570)	4.943** (3.232)	9.914*** (6.606)
Land ownership (local/state)	2.605 (1.809)	2.601 (1.812)	3.210 (2.358)	3.223* (2.286)	3.094 (2.320)	4.989** (3.858)	5.111** (3.987)
Land ownership (central)	0.148* (0.148)	0.146* (0.147)	0.123** (0.130)	0.131** (0.134)	0.100** (0.108)	0.104** (0.111)	0.093** (0.100)
Religion (Muslim)			0.830* (0.092)	0.888 (0.100)	0.699*** (0.086)	0.703*** (0.086)	0.777** (0.096)
Religion (others)			1.189 (0.135)	1.212* (0.141)	1.072 (0.138)	1.061 (0.136)	1.010 (0.133)
Caste (Scheduled caste)			0.941 (0.080)	0.881 (0.076)	0.809** (0.074)	0.807** (0.074)	0.847* (0.079)
Caste (Scheduled tribe)			5.581*** (0.986)	5.264*** (0.940)	4.342*** (0.821)	4.441*** (0.844)	6.518*** (1.311)
Caste (Other backward class)			0.644*** (0.055)	0.674*** (0.058)	0.536*** (0.050)	0.537*** (0.050)	0.554*** (0.052)
Caste (Others)			0.666*** (0.105)	0.706** (0.111)	0.394*** (0.068)	0.396*** (0.068)	0.384*** (0.066)
Education (primary)			1.206* (0.127)	1.096 (0.117)	0.969 (0.112)	0.973 (0.113)	0.846 (0.099)
Education (secondary)			0.838** (0.067)	0.787*** (0.064)	0.724*** (0.063)	0.730*** (0.064)	0.705*** (0.063)
Education (higher)			1.642*** (0.194)	1.359** (0.162)	1.538*** (0.202)	1.547*** (0.203)	1.396** (0.187)
Ration card				2.110*** (0.196)	1.717*** (0.169)	1.715*** (0.170)	1.906*** (0.192)
Photo pass				1.342*** (0.104)	1.227** (0.100)	1.221** (0.100)	1.316*** (0.109)
Individual water tap				1.954*** (0.142)	2.043*** (0.154)	2.031*** (0.154)	1.999*** (0.152)

Appendix E. (Continued)

	Dependent variable: multi-story housing						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Household expenditure (2nd quintile)					1.112 (0.121)	1.116 (0.122)	1.172 (0.130)
Household expenditure (3rd quintile)					0.847* (0.083)	0.848* (0.083)	0.822* (0.082)
Household expenditure (4th quintile)					1.866*** (0.236)	1.856*** (0.234)	2.185*** (0.282)
Household expenditure (5th quintile)					1.878*** (0.191)	1.878*** (0.191)	1.869*** (0.193)
Housing ownership					4.153*** (0.802)	4.155*** (0.802)	5.184*** (1.058)
Government program					1.099 (0.186)	1.084 (0.183)	0.919 (0.158)
Help from politician (Neutral)					0.835* (0.090)	0.837* (0.090)	0.816* (0.088)
Help from politician (Yes)					0.509*** (0.038)	0.510*** (0.038)	1.401 (0.343)
Declaration × Tenability						0.611 (0.257)	0.470* (0.202)
Declaration × Land ownership (local/state)						0.484** (0.166)	0.503** (0.176)
Declaration × Help from politician (Yes)							1.275 (0.408)
Tenability × Help from politician (Yes)							0.107*** (0.031)
Declaration × Tenability × Help from politician (Yes)							3.226*** (1.183)
Baseline hazard function	Dummy	Quadratic	Quadratic	Quadratic	Quadratic	Quadratic	Quadratic
Var(intercept)	1.552	1.557	1.642	1.582	1.673	1.653	1.667
ICC	0.423	0.424	0.450	0.432	0.460	0.454	0.458
Log-likelihood	-4684	-4694	-4243	-4132	-3858	-3853	-3787
Prob>Chi2	0.000	0.000	0.000	0.000	0.000	0.000	0.000
AIC	9491	9447	8563	8349	7815	7809	7684
N	14680	14680	13827	13827	13331	13331	13331

3.9 Tables and Figures

Table 3.1 Descriptive statistics

	Total	Declared slums	Non-declared slums	Mean difference
Pucca housing	0.222 (0.015)	0.276 (0.022)	0.171 (0.019)	0.105 ^{***} (0.028)
Multi-story housing	0.160 (0.013)	0.219 (0.019)	0.105 (0.016)	0.114 ^{**} (0.024)
Land tenability	0.747 (0.019)	0.836 (0.022)	0.666 (0.028)	0.170 ^{**} (0.033)
<i>Land ownership</i>				
Private	0.686 (0.021)	0.629 (0.030)	0.738 (0.025)	-0.109 ^{***} (0.036)
Local/state government	0.206 (0.018)	0.293 (0.028)	0.126 (0.018)	0.167 ^{**} (0.030)
Central government	0.108 (0.014)	0.078 (0.015)	0.136 (0.021)	-0.058 ^{**} (0.023)
<i>Religion</i>				
Hindu	0.809 (0.018)	0.816 (0.024)	0.803 (0.023)	0.013 (0.031)
Muslim	0.104 (0.014)	0.115 (0.019)	0.093 (0.016)	0.023 (0.023)
Others	0.086 (0.013)	0.069 (0.016)	0.102 (0.018)	-0.033 (0.023)
<i>Caste</i>				
Open category	0.395 (0.022)	0.457 (0.031)	0.338 (0.028)	0.119 ^{***} (0.038)
Scheduled caste	0.218 (0.019)	0.211 (0.025)	0.224 (0.025)	-0.013 (0.033)
Scheduled tribe	0.031 (0.008)	0.015 (0.007)	0.046 (0.013)	-0.031 ^{**} (0.015)
Other backward class	0.236 (0.019)	0.220 (0.025)	0.025 (0.026)	-0.030 (0.034)
Others	0.062 (0.011)	0.064 (0.015)	0.061 (0.014)	0.003 (0.019)
<i>Education</i>				
None	0.228 (0.019)	0.227 (0.026)	0.229 (0.025)	-0.003 (0.034)
Primary	0.148 (0.016)	0.139 (0.021)	0.156 (0.022)	-0.017 (0.028)
Secondary	0.533 (0.023)	0.550 (0.031)	0.518 (0.029)	0.032 (0.040)
Higher	0.089 (0.013)	0.084 (0.017)	0.094 (0.017)	-0.010 (0.022)
Ration card	0.752 (0.016)	0.812 (0.019)	0.698 (0.023)	0.114 ^{***} (0.028)
Photo pass	0.168 (0.014)	0.230 (0.022)	0.111 (0.016)	0.119 ^{**} (0.026)
Individual water tap	0.445 (0.016)	0.552 (0.020)	0.347 (0.022)	0.205 ^{***} (0.029)
Government program	0.073 (0.012)	0.063 (0.016)	0.082 (0.017)	-0.019 (0.022)

Table 3.1 (Continued)

	Total	Declared slums	Non-declared slums	Mean difference
<i>Help from politician</i>				
Not at all/a little	0.527 (0.023)	0.551 (0.031)	0.506 (0.030)	0.045 (0.040)
Neutral	0.129 (0.015)	0.118 (0.020)	0.139 (0.021)	-0.022 (0.027)
Well/very well	0.330 (0.021)	0.327 (0.029)	0.333 (0.028)	-0.006 (0.038)
<i>Household expenditure</i>				
1st quintile	0.238 (0.019)	0.232 (0.026)	0.244 (0.025)	-0.011 (0.034)
2nd quintile	0.142 (0.015)	0.157 (0.022)	0.129 (0.019)	0.027 (0.027)
3rd quintile	0.273 (0.020)	0.271 (0.027)	0.275 (0.026)	-0.003 (0.035)
4th quintile	0.106 (0.014)	0.111 (0.020)	0.103 (0.018)	0.008 (0.025)
5th quintile	0.212 (0.019)	0.198 (0.025)	0.225 (0.025)	-0.027 (0.033)
Housing ownership	0.910 (0.013)	0.956 (0.011)	0.867 (0.021)	0.089 ^{**} (0.023)
<i>Year of arrival</i>				
Earlier than 1970	0.380 (0.023)	0.357 (0.030)	0.401 (0.030)	-0.045 (0.039)
[1970, 1975)	0.164 (0.018)	0.172 (0.024)	0.158 (0.022)	0.014 (0.030)
[1975, 1980)	0.079 (0.013)	0.081 (0.018)	0.077 (0.016)	0.003 (0.022)
[1980, 1985]	0.135 (0.016)	0.156 (0.023)	0.117 (0.019)	0.039 (0.028)
[1985, 1990)	0.067 (0.011)	0.064 (0.014)	0.070 (0.014)	-0.006 (0.019)
[1990, 1995)	0.069 (0.010)	0.077 (0.015)	0.062 (0.013)	0.016 (0.020)
[1995, 2000)	0.054 (0.008)	0.051 (0.011)	0.057 (0.011)	-0.007 (0.016)
[2000, 2005)	0.032 (0.005)	0.027 (0.007)	0.036 (0.007)	-0.009 (0.010)
[2005, 2010)	0.014 (0.003)	0.011 (0.003)	0.017 (0.004)	-0.006 (0.005)
Later than 2010	0.005 (0.001)	0.006 (0.002)	0.005 (0.001)	0.001 (0.002)

Note: Cluster-robust standard errors in parentheses. * <0.1 , ** <0.05 , *** <0.01

Table 3.2 Estimation results of denominator and numerator models

	Denominator (1)	Numerator (2)
<i>Baseline covariates</i>		
Land tenability	1.601** (0.370)	1.590** (0.365)
Land ownership (local/state)	2.751*** (0.587)	2.793*** (0.595)
Land ownership (central)	0.948 (0.272)	0.877 (0.249)
Religion (Muslim)	1.470 (0.411)	1.448 (0.405)
Religion (others)	0.893 (0.289)	0.977 (0.314)
Caste (scheduled caste)	0.716 (0.176)	0.696 (0.171)
Caste (scheduled tribe)	0.232* (0.174)	0.212** (0.159)
Caste (other backward caste)	0.638* (0.150)	0.611** (0.144)
Caste (others)	0.906 (0.320)	0.914 (0.320)
Education (primary)	0.939 (0.269)	0.994 (0.283)
Education (secondary)	1.016 (0.227)	1.042 (0.233)
Education (higher)	0.988 (0.359)	0.993 (0.359)
<i>Time-varying covariates</i>		
Ration card	3.737*** (1.330)	
Photo pass	2.465 (1.887)	
Individual water tap	2.123 (1.167)	
<i>Other covariates</i>		
Household expenditure (2nd quintile)	1.515 (0.454)	1.537 (0.458)
Household expenditure (3rd quintile)	1.099 (0.272)	1.126 (0.277)
Household expenditure (4th quintile)	1.092 (0.335)	1.176 (0.356)
Household expenditure (5th quintile)	1.030 (0.268)	1.075 (0.276)

Table 3.2 (Continued)

	Denominator (1)	Numerator (2)
Housing ownership	5.150 ^{***} (2.693)	5.510 ^{***} (2.874)
Help from politicians (neutral)	1.106 (0.303)	1.061 (0.289)
Help from politicians (yes)	0.917 (0.182)	0.933 (0.184)
Years of arrival (1970–1975)	1.262 (0.296)	1.267 (0.295)
Years of arrival (1975–1980)	0.927 (0.280)	0.931 (0.280)
Years of arrival (1980–1985)	0.986 (0.258)	1.020 (0.266)
Years of arrival (1985–1990)	0.778 (0.273)	0.874 (0.301)
Years of arrival (later than 1990)	0.182 ^{***} (0.112)	0.210 ^{**} (0.128)
Time	1.139 ^{***} (0.054)	1.145 ^{***} (0.052)
Time ²	0.991 ^{***} (0.002)	0.991 ^{***} (0.002)
Log-likelihood	-654.0	-662.5
Prob>Chi2	0.000	0.000
N	6940	6940

Note: Exponentiated coefficients; Standard errors in parentheses.

Baseline and previous status of time-varying covariates are not shown.

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

Table 3.3 Estimated causal effects of slum declaration

	All sample				By land tenability			
	Selected covariates		All covariates		Tenable land		Untenable land	
	(1)		(2)		(3)		(4)	
<i>Multilevel discrete-time analysis models</i>								
Pucca housing	1.438 ^{***} (0.189)	[1.112, 1.860]	1.476 ^{***} (0.197)	[1.137, 1.917]	1.332 [*] (0.208)	[0.981, 1.809]	1.458 (0.700)	[0.569, 3.734]
Multi-story housing	1.777 ^{***} (0.288)	[1.293, 2.441]	1.919 ^{***} (0.316)	[1.390, 2.649]	1.552 ^{**} (0.289)	[1.078, 2.236]	3.025 [*] (1.917)	[0.874, 10.472]
<i>Marginal structural models: 1-year intervals</i>								
Pucca housing	1.304 (0.255)	[0.889, 1.912]	1.470 [*] (0.303)	[0.981, 2.203]	1.482 (0.376)	[0.901, 2.438]	2.003 (0.980)	[0.767, 5.228]
Multi-story housing	1.757 ^{***} (0.411)	[1.111, 2.780]	1.781 ^{**} (0.443)	[1.094, 2.900]	1.497 (0.437)	[0.846, 2.652]	3.591 ^{**} (2.200)	[1.081, 11.933]
<i>Marginal structural models: 3-year intervals</i>								
Pucca housing	1.279 ^{**} (0.154)	[1.010, 1.619]	1.279 ^{**} (0.154)	[1.010, 1.619]	1.252 [*] (0.149)	[0.991, 1.580]	1.387 (0.536)	[0.650, 2.959]
Multi-story housing	1.606 ^{***} (0.196)	[1.264, 2.041]	1.592 ^{***} (0.192)	[1.258, 2.016]	1.362 ^{**} (0.165)	[1.074, 1.728]	2.777 ^{***} (0.785)	[1.595, 4.832]

Note: Coefficients as odds ratio. Cluster-robust standard errors in parentheses. 95% confidence intervals in square brackets. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Single-level discrete-time analysis models are applied to the sample on untenable land.

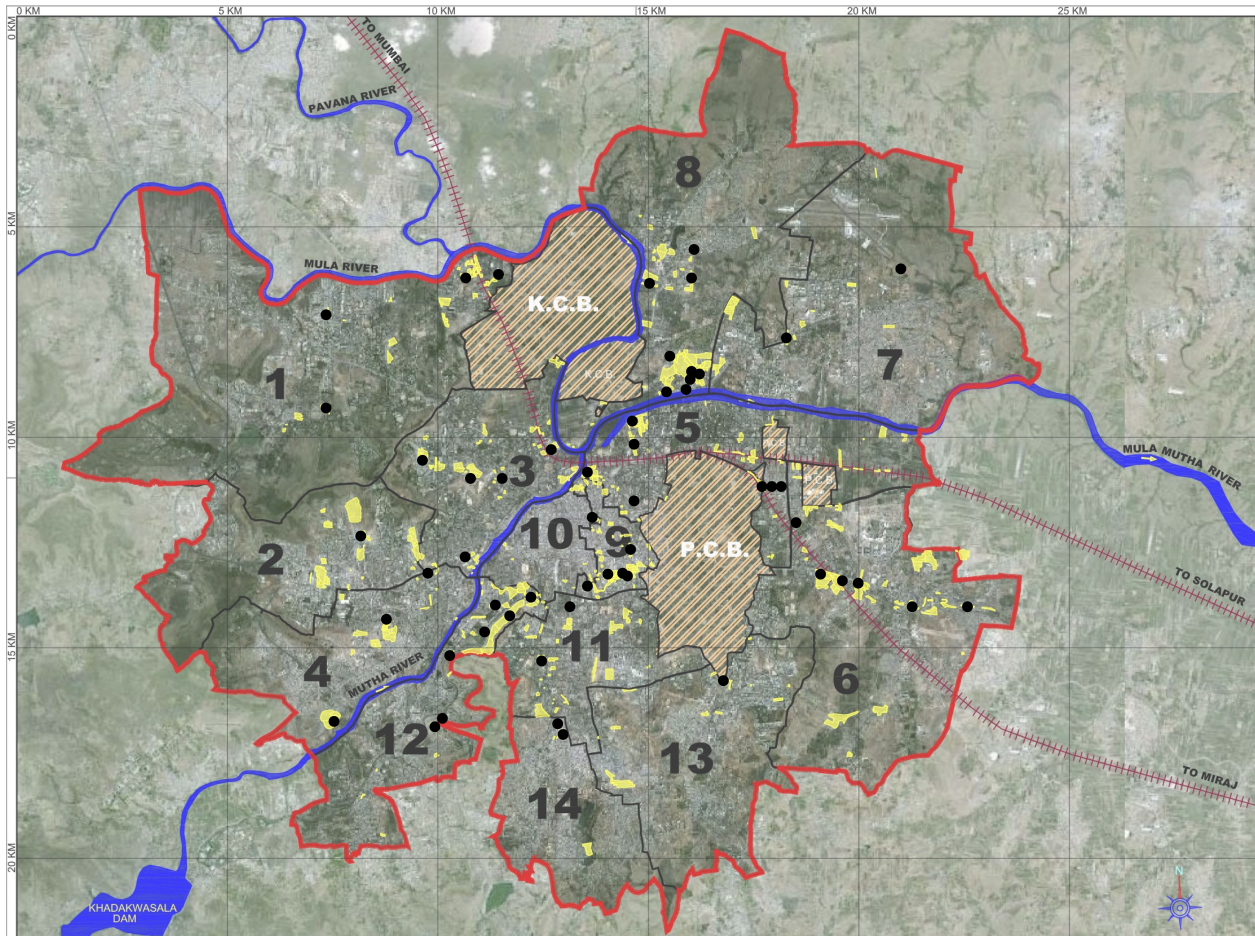


Figure 3.1 Location of slums in Pune

Note: Areas in yellow indicate slum areas. Black dots were added by the author to indicate surveyed 56 slums. Pune and Khadki Cantonment Boards (P.C.B. and K.C.B.) are not included in study area.

Source: MASHAL, 2011



Figure 3.2 Number of households in sample

Note: This figure exhibits the numbers of surveyed households in declared and non-declared slums in Pune between 1980 and 2013. The number of households for each year was calculated based on the arrival years of surveyed households.

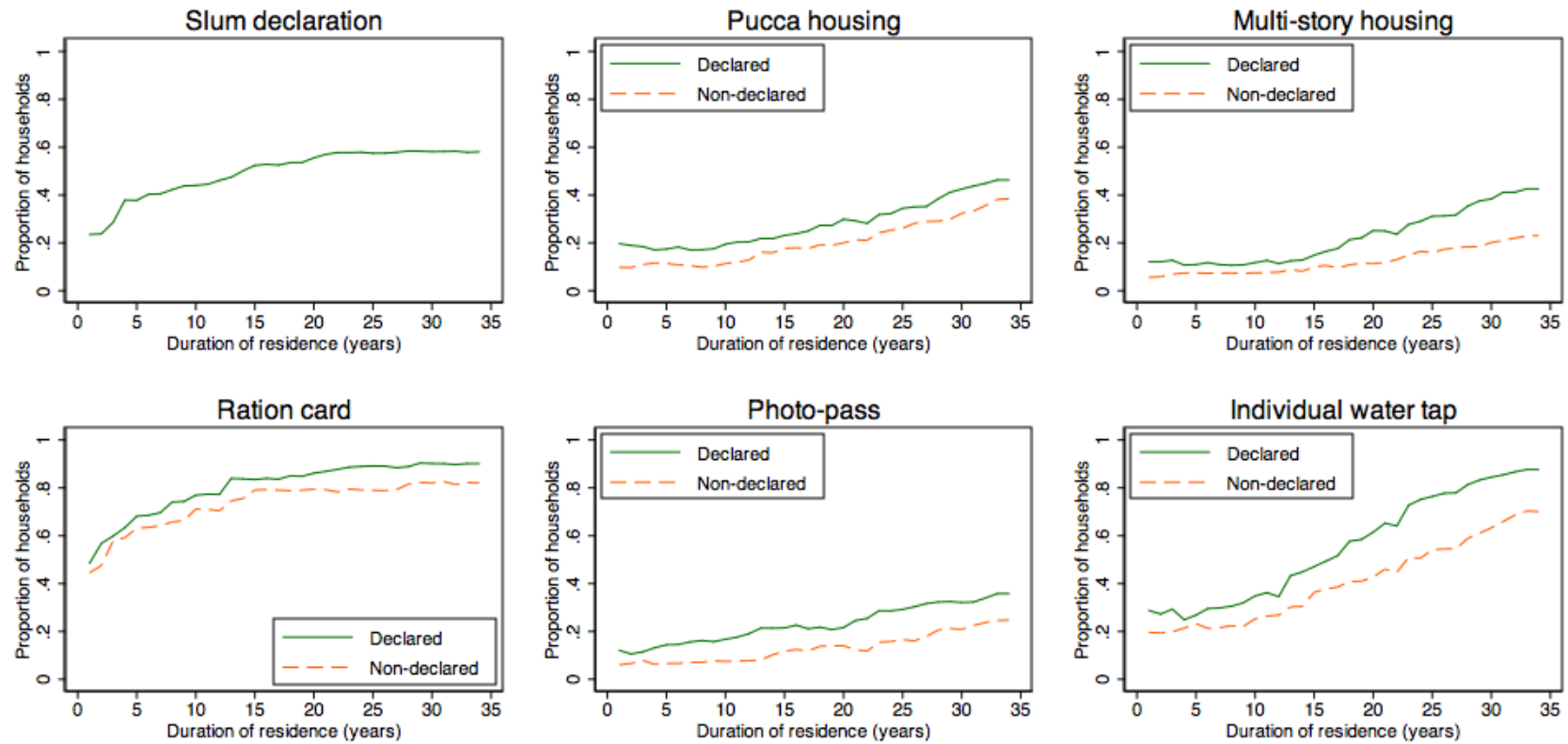


Figure 3.3 Plots of time-varying variables

Note: *Pucca* housing refers to housing made of permanent materials, such as bricks and cement. x-axis represents households' duration of residence in the current address (in years).

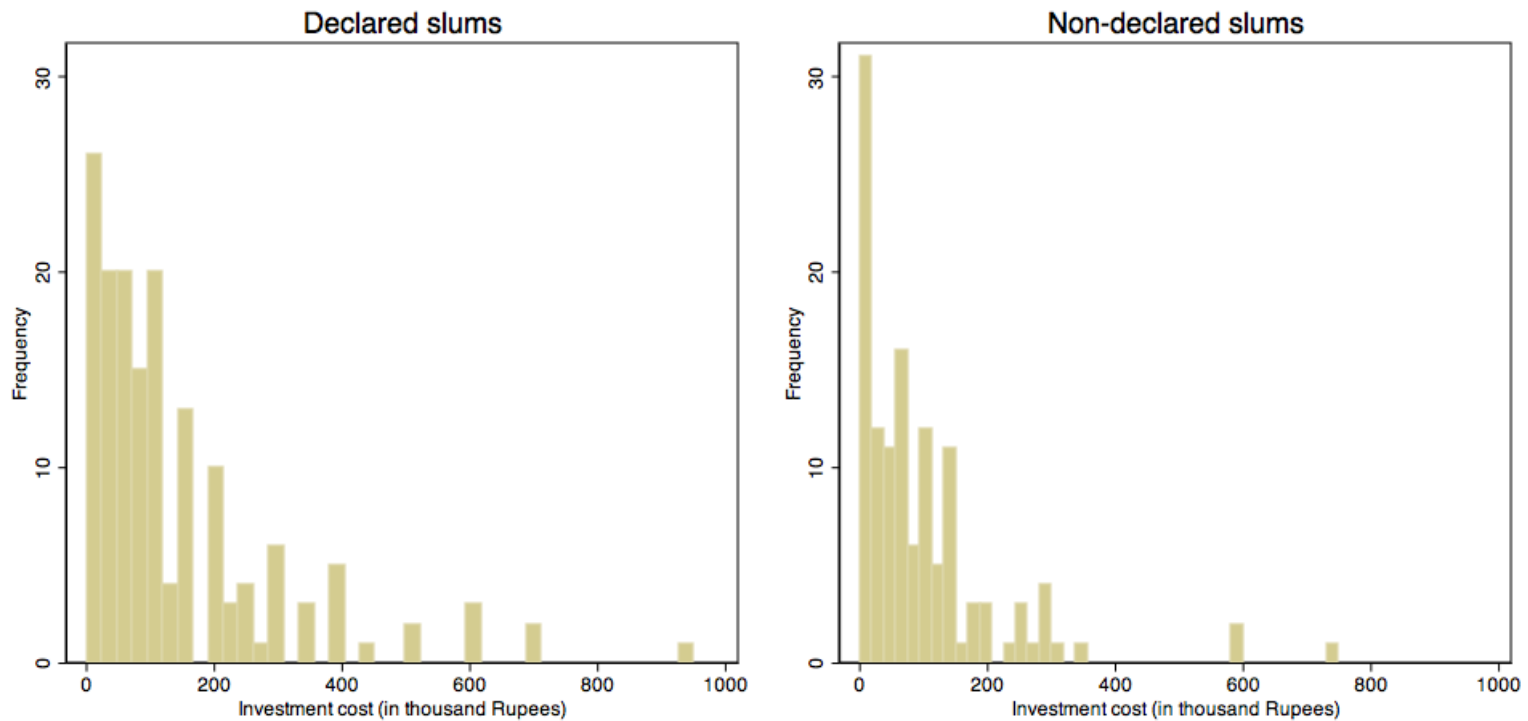


Figure 3.4 Histograms of housing investment costs

Note: Histograms above illustrates the distribution of the amount of housing investment costs in declared slums (on the right) and non-declared slums (on the left). Housing improvements include the expansion of housing, vertically and/or horizontally, and the replacement of the floor, walls, and roof. In my data, 113 and 139 households spent some amount of money on housing improvements in non-declared and declared slums, respectively. The mean values of housing investment costs are respectively 112,000 rupees and 187,000 rupees in non-declared and declared slums.

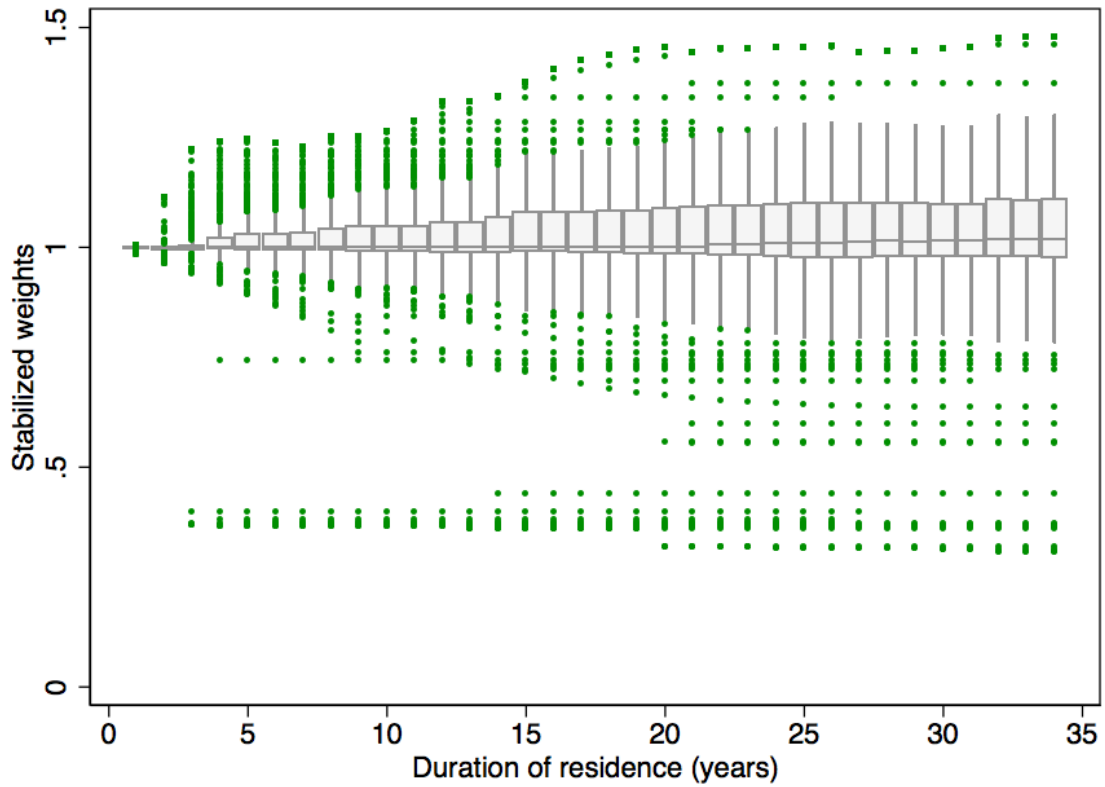


Figure 3.5 Distribution of stabilized weights

Note: This figure illustrates the distribution of the calculated stabilized weights, depending on households' duration of residence in the current places. The boxes indicate the range from 25% quartile to 75% quartile. The horizontal lines within the boxes indicate the mean values of stabilized weights. Dots outside the whiskers represents outliers. This figure shows that means are reasonably centered around zero.

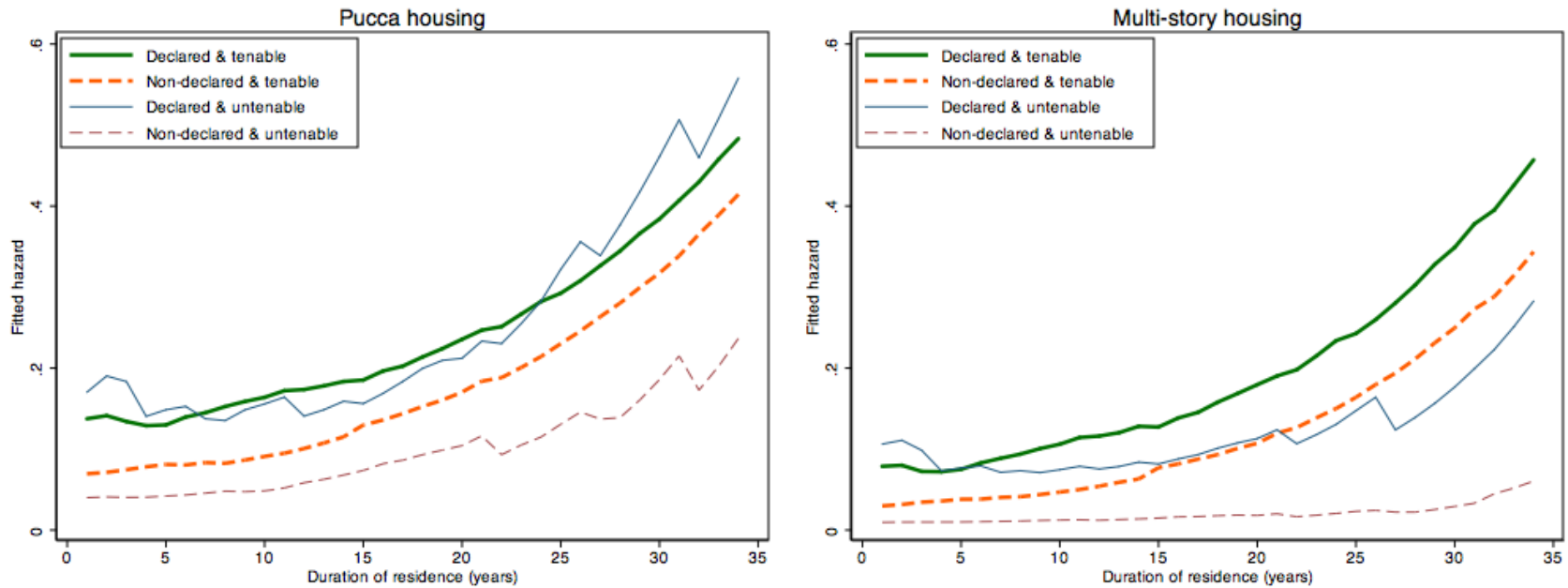


Figure 3.6 Fitted hazard of housing investment

Note: *Pucca* housing refers to housing made of permanent materials, such as bricks and cement. The bold solid lines (green) indicate the fitted hazard of housing investment in declared slums on tenable land; the bold dashed lines (orange) indicate fitted hazard in non-declared slums on tenable land; the solid lines (blue) indicate the fitted hazard in declared slums on untenable land; the dashed lines (purple) indicate fitted hazard in non-declared slums on untenable land.

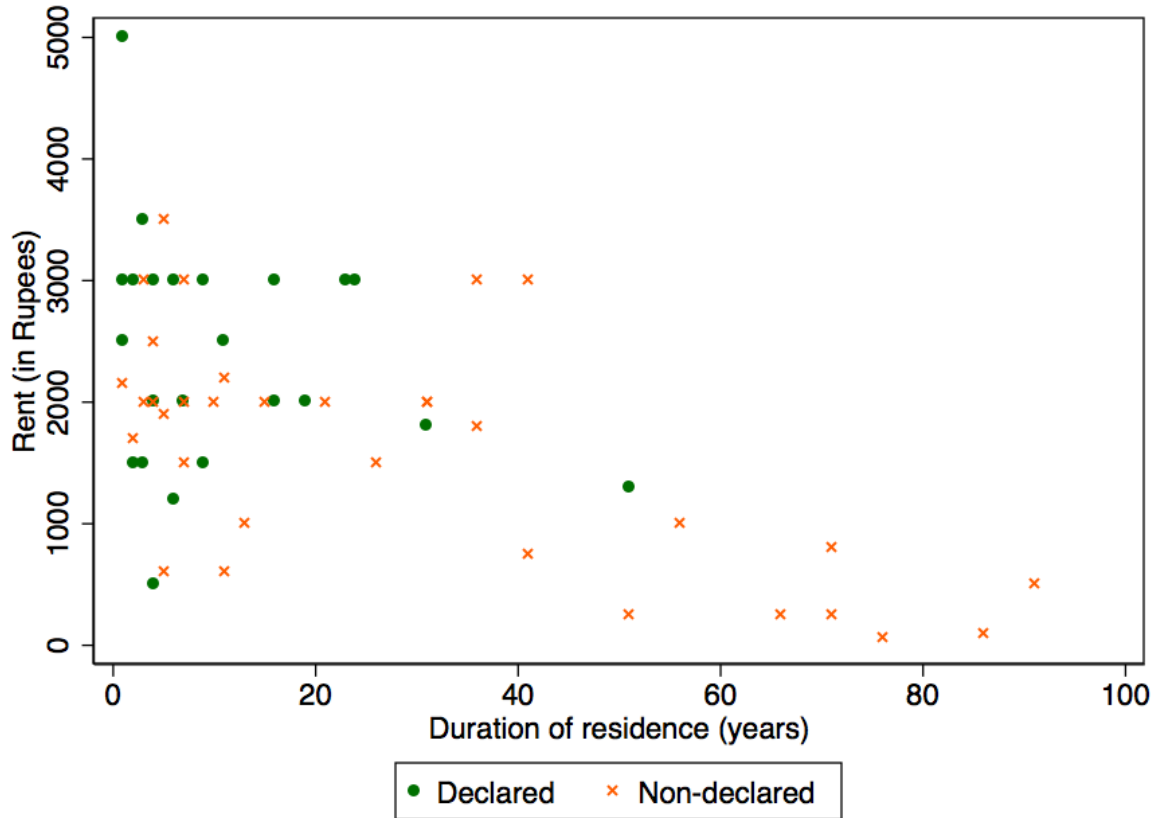


Figure 3.7 Monthly rent by duration of residence

Note: This figure shows the relationship between the amount of monthly housing rents paid by slum residents and their duration of residence in the houses. Dots in green represent houses in declared slums; x-marks in orange represent houses in non-declared slums.

CHAPTER 4
Revealing Invisible Rules in Slums:
The Nexus Between Perceived Tenure Security
and Housing Investment

4.1 Introduction

A daunting number of people currently live in so-called slum areas in rapidly urbanizing countries. Alongside the poor housing conditions and inadequate access to infrastructure and basic services, the persistent risk of forcible eviction threatens the lives of slum dwellers (UN-Habitat, 2008). This lack of tenure security, i.e., the low level of protection from forcible eviction without due legal process and compensation, also slows the improvement of living conditions in slums. Anticipating forced eviction or housing demolition discourages housing improvement efforts by slum residents, who would otherwise gradually upgrade their housing by accumulating financial resources for such an investment over a period of time.

An extensive body of literature has discussed what could effectively and efficiently enhance the tenure security of slum dwellers. As reviewed by Durand-Lasserve and Selod (2009), Payne (2002), and van Gelder (2010), the literature has focused on three dimensions in land tenure security: legal, *de facto*, and perceived tenure security. A strand of economic literature maintains the need for legal protection through the provision of individual property rights (de Soto, 2000; Field, 2005; Galiani & Scharfrodsky, 2010; World Bank, 1993). A growing body of literature in other fields calls instead for attention to the fact that slum residents often enjoy good tenure security regardless of their legal status. The studies point out various factors that shape such *de facto* tenure security (Aristizabal & Gomez, 2004; Gilbert, 2002; Payne, 2001; Razzaz, 1993; Varley, 1987). Furthermore, others argue that slum residents' perception of their tenure security, rather than their legal or actual tenure security, influences

their housing investment decisions (de Souza, 2001; Doebele, 1978; Reerink & van Gelder, 2010; van Gelder, 2009, 2012).³²

Unfortunately, the diverging views of tenure security discussed above, in emphasizing one aspect over the others, overlook the interactions among the legal, *de facto*, and perceived aspects of tenure security. In an ideal situation, the three aspects of tenure security converge: people are legally protected, remain without threat of eviction, and perceive themselves to be secure. As van Gelder (2010) points out, however, the three types of tenure security often diverge in slums, and indeed the detachment among them is a defining characteristic of informal settlements in the developing world. Thus, the lack of analytical framework for the interplay of the legal, *de facto*, and perceived tenure security remains a serious problem.

Focusing on Indian slums, this chapter fills this critical research gap by shedding light on how legal, *de facto*, and perceived tenure security factors interact and thereby influence housing investment decisions. Specifically, the present study addresses the following research questions: *What kinds of property rights do people in slums believe they have? How have those perceived rights arisen from their legal and political contexts? How have the rights perceived by slum dwellers influenced their housing investment decisions?* To address these questions, this chapter employs a mixed-methods approach that combines quantitative and qualitative data and analyses (Creswell, 2009). This research focuses on Pune, where more than one-third of a population of three million reside in slums. Despite the remarkable size and severity of this population, slum problems in Pune have attracted less attention from scholars than other Indian metropolises, such as Delhi and Mumbai.

The household surveys I collected from 562 respondents in 56 slums in Pune reveal that slum dwellers believe that they are permitted to construct some types of houses in their slums and are prohibited from constructing other types. I conceptualize this belief as “invisible rules” that are consciously or unconsciously held in slum dwellers’ minds and significantly influence their decisions about housing investments. My analysis of the survey data demonstrates that these are indeed rules, rather than slum dwellers’ inconsistent misconceptions—rules that have been shaped under the influence of various legal and *de facto* tenure security factors. The invisible rules also differ from informal property rights that are enforced by means other than

³² Some literature equates perceived tenure security with *de facto* tenure security (for example, Payne, 2001), but, as this chapter shows, distinguishing these concepts is important.

legal. What is revealing in my conceptualization of invisible rules is that even if they are not necessarily enforceable, such beliefs still bind slum households' housing investment decisions. In particular, my statistical analysis find that political patronage is strongly associated with slum households' confidence about their rights to build better housing in a situation of low legal tenure security.

Analyzing the politico-legal interaction that influences the formation of invisible rules in Indian slums is a particularly complicated endeavor. The literature on urban informality and politics in India offers a diversity of views as to how the urban poor seek secure tenure. A common perspective is to regard the urban poor as dependent on a “patron-client” relationship (de Wit & Berner, 2009; Jha, Rao, & Woolcock, 2007). In seeking secure tenure and basic amenities, the urban poor passively rely on intermediaries or brokers who dominate contact with local politicians and officials. An opposing view is to deem slum dwellers as more actively engaged in claim-makings through negotiations with local politicians. Benjamin (2008) argues, for example, that the urban poor strategically engage in asserting their claims to tenure by leveraging their voting power. This line of literature also directs attention to the increasing influence of local politicians and officials on the day-to-day survival of the urban poor. Some scholars emphasize that local politicians and officials arbitrarily determine whether to tolerate slum housing or other illegal constructions for their own purposes (Roy, 2009; Zimmer, 2012).

The case study of a slum in this chapter illuminates that the ways slum dwellers interact with local political actors change in tandem with the shift in their tenure security. Among various legal and *de facto* factors that influenced perceived tenure security and invisible rules among the residents of this slum, a social activist and a local politician (municipal councilor) have played a critical role. In the early period amid the high risk of forced eviction, slum dwellers and the social activist were in a patron-client relationship. With his personal connection with the ruling political party, the social activist brought *de facto* tenure security to the slum. As the residents have gradually gained confidence of their tenure security, their demands have shifted from the protection from the imminent threat of eviction to the access to basic amenities. A municipal councilor successfully won a constituency by bringing those amenities to this non-declared slum. My analysis shows how prevailing legal and political systems—such as the slum declaration and cut-off date policy, local governance structures, and the changing relationship between

municipal, state, and central government agencies—motivated, enabled, and limited such interventions by local political actors in the slum.

From a theory perspective, the particular relevance of this research lies in its endeavor to bridge the theories of tenure security and housing investment and the theories of urban informality and politics in India by shedding light on perceived tenure security with politico-legal interaction as its hinge. In his recent work, Shatkin (2014) points to the lack of communication between the theory of globalization and cities and postcolonial theory in Indian academics. This chapter aims to widen the theoretical horizon by filling the similar lacuna between the literature on tenure security and urban informality in India.

The remainder of this chapter is structured as follows. Section 4.2 develops a conceptual framework through a review of the pertinent literature. I first develop an analytical framework for the interplay of legal, *de facto*, and perceived tenure security. Then, I integrate the theories of informal politics in Indian cities into the analytical framework. Section 4.3 introduces the background of the urban governance and political systems in Pune. Section 4.4 explains the mixed-methods approach used in this study. Analyzing primary survey data, Section 4.5 examines what kinds of property rights (invisible rules) slum dwellers believe in, and what legal and *de facto* tenure security factors are associated with these rights/rules. Section 4.6 presents a case study, which illustrates the process of the formation of invisible rules by analytically tracing the changing tenure security and interaction between slum residents and political actors in a slum. Section 4.7 concludes with a summary and policy implications.

4.2 Conceptual Framework

4.2.1 Property Rights, Tenure Security, and Housing Investment

Property rights, formal or informal, determine the scope of potential housing activities. A property right is “a claim to a benefit (or income) stream that the state will agree to protect through the assignment of duty to others who may covet, or somehow interfere with, the benefit stream” (Bromley, 1991, p. 2). This definition highlights that property rights are enforceable, meaning that the holder can command the state or other authority structures to exclude others. Property rights involve a bundle of rights, including the rights to use, occupy, develop, inherit, lease, sell, and mortgage. Aside from the formal property rights backed up by the law, people often enjoy informal property rights that are enforced by means other than legal. For instance,

Jha et al. (2007) note that housing transactions in slums take place in front of a group of neighbors who serve as witnesses. A study of slums in Delhi by Kundu (2004) observes, though his assessment is only anecdotal, that slum residents somehow hold the right to occupy, inherit, dispose of, develop, sublet, and mortgage housing, yet the availability of these *de facto* rights considerably vary from slum to slum.

Literature often theorizes that the bundles of those formal and informal property rights available in slums correspond to the level of residents' tenure security (Durand-Lasserve & Selod, 2009; Payne, 2001). People with higher levels of protection from (or lower risk of) forced eviction tend to hold more control of their properties. And, in return, holding more control over their own properties may strengthen the tenure security of slum dwellers by allowing them to consolidate their housing.

The formulation of tenure security as a composite of legal, *de facto*, and perception elements in Van Gelder (2010) is a distinct approach from the previous literature. Providing legal property rights is a direct means of improving legal tenure security, whereas *de facto* tenure security may be shaped by various non-legal factors, such as the size of settlements, the cohesion of communities, political support, and the access to infrastructure and services, to name a few (Durand-Lasserve, 2006; Gilbert, 2002; Payne, 2001; van Gelder, 2010). The usefulness of van Gelder's tripartite conceptualization comes from the fact that, as he points out, the three elements can be separated from one another, and this detachment is indeed a defining characteristic of developing countries. His conceptualization of tenure security as a composite of legal, *de facto*, and perception elements, however, still leaves unclear the ways in which the three elements are interrelated with each other. For example, Van Gelder's (2012) empirical work on slums in Buenos Aires argues that households' perceptions mediated the effect of titling on housing investment behaviors. His statistical analysis of the mediation effect, however, does not fully explain how underlying legal and *de facto* tenure security factors shaped perceptions and housing investment behaviors.

This chapter instead emphasizes the interaction between legal and *de facto* tenure security factors and its influence on the formation of people's conceptions of tenure security and property rights. I name these perceived property rights "invisible rules" because they critically determine households' housing activities, along with motivation, aspiration, and financial capability. Invisible rules are "rules" because they are not merely inconsistent misconceptions made by

slum dwellers, but are, according to my hypothesis, formed based on tenure security. Invisible rules are “invisible” because they are not written laws but perceived rules intuited by slum dwellers. Differentiating such invisible rules from perceived tenure security is analytically useful for several reasons. Previous studies by and large conceptualize perceived tenure security as the probability of forced eviction estimated by slum dwellers (van Gelder, 2010). Beyond such estimated risk of eviction, however, slum residents have beliefs about specific types of housing activities that are permitted and not permitted in their communities. By navigating attention to such beliefs, invisible rules more directly illuminate how slum residents’ perceptions are related to their housing investment decisions.

In addition, invisible rules differ from informal property rights. While informal property rights are enforced by means other than legal, invisible rules are not necessarily enforceable. Slum residents do not have established means to resist against the forced demolition of their houses even in slum where those households believe that they are permitted to building and improving housing. Also, a violation of invisible rules, such as building housing made of cement in a slum where residents believe that such construction is prohibited, does not always result in the redress of those activities. Nevertheless, I argue, invisible rules are not merely inconsistent misconceptions but rather systematically reflect the tenure security of slum dwellers and influence their housing investment behaviors.

The analysis of the formation of those invisible rules requires a closer look at legal and *de facto* tenure security factors. Legal land tenure arrangements and the factors that shape *de facto* tenure security—in particular, political arrangements—in slums are, in reality, inextricably tied. This politico-legal interaction is highly context-specific, and necessitates in-depth understanding of urban informality in India.

4.2.2 Informality in Indian Slums

The definition of a slum varies in India, though government agencies typically regard as slums residential areas with undesirable living conditions (Risbud, 2009). Each state enacts Slum Acts, such as the Maharashtra Slum Areas (Improvement, Clearance, and Redevelopment) Act in Maharashtra, where Mumbai and Pune are located. Chapter II of the Slum Act defines a slum as any area that “is or may be a source of danger to the health, safety or convenience of the public of that area or of its neighborhood, by reason of the area having inadequate or no basic

amenities, or being insanitary, squalid, overcrowded or otherwise” (Government of Maharashtra, 1971). This definition itself does not explicitly mention the legal status of the settlement as a criterion for the classification of slums.

In fact, simply associating slums with illegality masks the complexity of this issue. An extensive ethnographic work by Bjorkman (2014), for example, traces how a settlement in Mumbai that was originally prepared as a municipal colony for relocated households has turned into a settlement widely recognized as a slum. According to her analysis, the state government’s new policy that limits water distribution to only households with valid proof of their residence in the current address prior to January 1, 1995, illegalized this slum, despite the legal origin of the settlement as a planned settlement. This cut-off policy has also limited the eligibility of slum dwellers to the Slum Rehabilitation Scheme (SRS). Through this slum redevelopment policy, the state government has promised new housing units free of charge to slum households that possess valid residential proof (Bapat, 2012; Mukhija, 2003; Nijman, 2008).

Thus, it is important to look at the variation in legality, rather than the dichotomy of legal/illegal, across slums and slum residents. There are three major legal factors that influence Indian slums: land ownership, land tenability, and slum declaration status. Land ownership is tied to the illegality of slum housing not only by the lack of official titles, but also by the types of landowners, such as private, local or state government agencies, or central government agencies. In addition, a master plan of the city and planning and building regulations determine the illegality of slums. In Pune, the Development Plan and the Development Controls designate areas for non-residential activities. These areas are often referred to as untenable land in policy terminology (Kundu, 2013). Slum housing on this untenable land is particularly vulnerable to forcible eviction. Finally, slum declaration status ultimately determines whether slum dwellers’ occupancy of the land is officially guaranteed. The Slum Act enables local and state government agencies to legalize slums under the slum declaration policy.³³ The government’s declaration of a slum legally ensures the occupancy of residents and entitles them to basic amenities and government programs. Although slum declaration itself does not provide legal titles, it significantly supports the legality of slums.

³³ Slum declaration and declared slums are referred to as slum notification and notified slums, respectively, in some parts of India.

The legal status of slums as defined as above is by no means exogenously given and associated with the tenure security of the residents. A rich body of literature discusses the increasing role of informal arrangements through negotiation in the survival of the urban poor in Indian cities. While the emerging middle-class is gaining a say in the policy-making process, the lives of the underprivileged increasingly hinge on extralegal arrangements for secure tenure and social welfare. Naming this politicized terrain “political society,” Partha Chatterjee argues that politicians extend protection to those marginalized populations “on a case-to case, *ad hoc*, or exceptional basis, without jeopardizing the overall structure of legality and property” (Chatterjee, 2004, p. 136). Roy (2009) further formulates the state as an informal authority that maintains a legal vacuum on purpose and uses deregulation as a tool to pursue its own interests. In this view, local politicians and officials exercise their power to demarcate the legal and illegal. Even in declared slums, however, residents’ access to basic services is not guaranteed, as described by Anand & Rademacher (2011, p. 1759):

Yet the services that accompany “declaration” are not instantaneous or even wholly assured. These entitlements, including postal service, water, electricity, toilets, and drainage, are provided very slowly. Ultimately, declaration is consolidated by politicians with connections to the municipal administration, so securing the entitlements of declaration depends in part on election cycles as well. A full experience of housing formality thus depends on the effectiveness of the politicians and NGO workers who effect pressure on the city administration to turn policy into action.

According to the perspective above, slum declaration itself does not automatically guarantee secure tenure and access to basic amenities.

Such informal land management is not limited to slums. For instance, Zimmer (2012) reports that aside from 2.1 million slum residents, 8.1 million people, or 49% of the residents in Delhi live in areas that have been developed in contravention of planning and building regulations. She argues that local politicians have been manipulating the regularization of those buildings. Nevertheless, I maintain that the informal arrangements for secure tenure in slums pose critical differences. This is mainly because slums are increasingly criminalized in rapidly developing Indian cities, amidst governments’ aspirations for transforming their cities into global

cities, the advocacy of the emerging middle-class for a clean environment, and rising real estate values. In Delhi, for example, Ghertner (2008) finds that court judgments have increasingly come to identify slums as public nuisances. Secure tenure is critically important for slum dwellers because this status also determines their eligibility for basic amenities and various social programs.

Different theories exist on the ways in which the urban poor seek secure tenure in India. On the one hand, traditional “patron-client” theories see slum dwellers as reliant on intermediaries or brokers to seek secure tenure and better amenities. Such patronage is defined as “the informal, personal and face-to-face relationships between actors of unequal status and power that persist over time and involve the exchange of valued resources” (de Wit & Berner, 2009, p. 931). Those intermediaries, often referred to as *pradhan*, have connections with political parties and dominate access to local politicians and officials. These middlemen have more influence on securing the survival of slum dwellers in newer and/or ethnically heterogeneous settlements (Jha et al., 2007). As described by G. Kumar & Landy, (2009) and Rao (2013), brokers often help slum dwellers obtain ration cards or other documents that function as residential poofs. On the other hand, Benjamin (2008) warns against depicting slum dwellers as merely passive and exploited. He emphasizes that the urban poor seek secure tenure and better amenities through actively pressuring local politicians and officials by leveraging their voting power. It is widely known that voter turnout is highest among the poor in India (Harris, 2005).

The discussion above indicates the complexity of the politico-legal interaction in the survival of slum dwellers in Indian cities. My argument is that such interaction is not static but dynamic because of the fluid legality of slums and the variation of local political actors with different motivations and capacity. It is important to recognize the changes in the way that slum dwellers and local politicians interact in tandem with the shifting tenure security of slum dwellers. Initially, the legality of slums determines how slum dwellers and local political actors interact. In slums that are recently formed and/or with high illegality, slum dwellers may be more reliant on the patron-client relationship, seeking secure tenure through the support from middlemen. As those residents gradually gain legal or *de facto* tenure security, the types of local political actors involved in the slums and the ways they interact with the residents may change. At this stage, politicians may be more motivated to cater to the needs of slum dwellers in order to maintain them as a vote-bank. With their diverse demands, however, slum dwellers do not

necessarily engage in collective actions by explicitly leveraging their voting power. As my survey shows in the next section, the communication between municipal councilors and slum dwellers in Pune occurs on an individual basis. My case study also shows that even in the small slum, residents rely on different political actors, depending on the different levels of tenure security.

Given the diversity of ways that slum dwellers engage in claim-makings for secure tenure, it is of research interest to empirically investigate how slum residents come to form perception about their tenure security. Before moving into the analysis, it is useful to look at the urban governance system in Pune.

4.3 Urban Governance in Pune

With a population of more than three million, Pune is the second largest city in the state of Maharashtra and the ninth largest city in India. It is a rapidly growing city, with a population projected to reach 5.6 million by 2030 (Pune Municipal Corporation, 2006). While the city has thrived as a regional hub for the information technology industry, the living conditions of the least privileged among Pune's society remain poor (Bapat, 2004, 2009; Pune Municipal Corporation, 2006, 2013). A Pune-based non-governmental organization (NGO), the Maharashtra Social Housing and Action League (MASHAL), recently conducted a citywide household survey with financial support from an international NGO and state and local government agencies. Their *Pune Slum Atlas* identifies approximately 160,000 households living in 477 slums (MASHAL, 2011). Over a fifty-year period beginning in 1961, the population of slum dwellers has continually increased from 92,101 to the current 1,150,000.

Despite a lack of reliable statistics, the involuntary relocation and forcible eviction of slum dwellers does occur in Pune. The municipal government attempted to relocate 10,600 households squatting on Parvati Hill, though the attempt failed due to the resistance of the residents (Bapat, 1988, 2009). Unlike Mumbai and Delhi, where mass eviction is rampant (for example, see Bhan, 2013; Dupont, 2008; Zerah, 2007), large-scale eviction has not yet been observed in Pune. Nevertheless, small-scale housing demolitions and evictions are still prevalent. As the previous chapter shows, 49 households out of 562 surveyed households in Pune slums (or, 9% of respondents) had moved to their current residence as a result of eviction from a previous residence; 47 households (8%) had been asked to move out of their current residence; 43

households (8%) recognized litigation filed by landowners against their occupation; and 21 households (4%) had witnessed their neighbors being forcibly evicted during the last 10 years.

In India, urban development, housing, and land are in the functional domain of the state governments. The role of municipal governments in these areas had been, traditionally, limited. The central government provides guidelines, but it is up to state governments to adopt them in accordance with the Indian Constitution. The real influence of the central government comes from its provision of conditioned grants for the state governments through, for instance, the Jawaharlal Nehru National Urban Renewal Mission (JNNURM).³⁴ The 74th Constitutional Amendment Act (CAA) of 1992 aims for democratic decentralization by empowering municipal governments. However, it is still up to state governments to determine how to transfer power and financial resources to municipal governments. The Bombay Provincial Municipal Corporation Act, enacted by the state government of Maharashtra in 1949, as well as the 74th CAA, has determined the list of obligatory and discretionary functions of the Pune Municipal Corporation (PMC), the municipal government in the city of Pune. As a result of devolution reform, slum improvement is now included as a discretionary function.

The PMC consists of an elected wing and an administrative wing (Pune Municipal Corporation, 2013). The administrative wing is headed by the Municipal Commissioner, who is appointed by the state government. It is responsible mainly for infrastructure and developmental work in the city. The elected wing is responsible for financial deliverance and approvals for the various developmental works undertaken by the administrative wing. In the elected wing, the mayor is the head of the office and is also subordinated and supported by the ward committee. A total of 152 municipal councilors, who are commonly referred to as “corporators” or *nagarsewak*, represent 76 electoral wards in the city of Pune. A man-and-woman pair is elected from each electoral ward every five years. As required by the 74th CAA, some seats are also reserved for socially disadvantaged caste groups, such as scheduled caste (SC), scheduled tribe (ST), and other backward class (OBC). An important task of elected councilors is to identify problems in their own ward, *prabhag samiti*, and suggest remedies to the ward committee.

³⁴ The JNNURM was launched by the central government in 2005. It aims to accelerate the improvement of infrastructure and urban service, particularly targeting 65 major cities, including Pune (Kennedy & Zérah, 2008). The fund is provided to state governments with the condition of implementing decentralization reforms by following the 74th CAA.

Municipal councilors also have a certain amount of money at their disposal under the discretionary fund.

Because the number of people living in slums accounts for more than one-third of the total population in Pune, catering to the needs of slum dwellers is vital for local politicians or candidates. As my survey shows later, more than 90% of households in Pune slums possess voter ID cards, and their turnout is known to be quite high. For instance, a recent local newspaper article with the title “Slum Areas Witness Steady Flow of Voters” says: “The slum areas have nine lakh³⁵ voters. Political parties have been wooing these voters by promising houses, water connections, better infrastructure and other freebies” (Kulkarni, 2014).

With the above background of Pune in mind, this chapter first aims to examine invisible rules in slums. I investigate what kinds of property rights slum dwellers believe they have. Of particular interest is whether they think they are permitted to build better housing, because the lack of such a right would severely constrain their housing investment. Second, I attempt to explore whether the formation of such invisible rules among slum dwellers is linked to the level of their tenure security. This investigation is two-fold. I intend to find out the extent to which legal and *de facto* tenure security factors are associated with belief of the right to build better housing. At the same time, I intend to explain how exactly politico-legal interaction contributes to the formation of invisible rules. Finally, I aim to clarify how invisible rules influence the housing investment decisions of slum dwellers.

4.4 Methodology

Addressing the issues above requires the employment of a mixed-methods approach, combining quantitative and qualitative data collection and analysis (Creswell, 2009). Quantitative analysis is suitable for investigating the strengths of the associations between the characteristics of invisible rules and various tenure security factors based on a large sample of slum residents. By contrast, qualitative analysis has an advantage in analytically tracing the trajectory of changing invisible rules and legal and political factors. In the first stage, my quantitative analysis examines what kinds of beliefs (invisible rules) people have regarding the types of permitted construction based on the survey data I collected from 562 households in 56

³⁵ One lakh equals to one hundred thousand.

slums in Pune. The analysis also examines what legal and *de facto* tenure security factors are associated with the characteristics of such invisible rules. The second-stage case study analysis of a slum settlement takes a closer look at the way slum dwellers and political actors interact, and what factors determine their relationship. Triangulating the findings from both stages, this paper answers the following research questions: *What kinds of property rights do people in slums believe they have? How have those perceived rights arisen from their legal and political contexts? How have the rights perceived by slum dwellers influenced their housing investment decisions?*

4.4.1 Quantitative Data and Analysis

I rely on primary survey data to identify invisible rules in slums in Pune. I collected household surveys during my field research in Pune from July to November 2013. The population of the survey is the households who lived in slums, both declared and non-declared, in the city of Pune. The sample for the survey was chosen based on the following two-stage cluster-sampling scheme. First, 56 slums were randomly chosen out of 477. Then, 10 households were randomly chosen from each of the 56 slums, amounting to a total of 562 households. Nine surveyors visited households via a random walk method, referring to the geographic information system (GIS) maps in the Pune Slum Atlas. After obtaining oral consent from respondents for their participation in the survey, surveyors read out the questionnaires either in Marathi (a local language in the state of Maharashtra) or Hindi, and wrote down answers from the respondents on the forms. Collecting a survey typically took 20 to 30 minutes, and the response rate in slums ranged between 70% and 80%.

The survey identifies invisible rules by asking respondents whether they think they can build the given list of housing: (i) single-story housing made of cement or other permanent materials (*pucca* housing in the local terminology), (ii) two-story housing made of metal sheets or other temporary materials (*katcha* housing), and (iii) two-story housing made of permanent materials. Their belief about the potential for these types of housing is critically important given the current situation in which more than half the households live in one-story *katcha* housing. In order to examine what factors have influenced the formation of such invisible rules, I analyze the association between various legal and *de facto* tenure security factors and the probability of a

respondent believing that s/he can build the given types of housing. Specifically, I estimate the following logit model:

$$\ln\left(\frac{P}{1-P}\right) = \alpha + \beta_1 X + \beta_2 W + \beta_3 Z \quad (4.1)$$

where P denotes the probability that i th respondent believes that s/he can build multi-story *pucca* housing; α is a constant; X includes legal tenure security factors; W includes *de facto* tenure security factors; Z includes other control variables; and β_1 , β_2 , and β_3 are parameters to be estimated. Cluster-robust standard errors are estimated in order to account for the within-correlation at the slum level. Descriptive statistics of key variables are reported in Table 4.1.

I include in the statistical model above the following legal indicators that are retrieved from the Pune Slum Atlas: slum declaration status, land tenability, and types of landowners. The PMC and the state government identify and declare areas to be slums according to the Slum Act. Among the total 477 slums in Pune, 238 slums have been declared (MASHAL, 2011). Since 1995, however, the declaration of new slums has been suspended by the state government. People in declared slums have the legal right to occupy the land and build housing with temporary materials to a maximum height of 14 feet.³⁶ In Maharashtra, municipal bodies are required to prepare master plans every 20 years (Kulabkar, 2002). The last Development Plan of Pune designates areas for various uses between 1987 and 2007, and the plan is currently under the process of revision. According to the Development Control Rules that stipulate building regulations under the Development Plan, housing construction is permitted only in residential and commercial zones (Pune Municipal Corporation, 1987). The Development Plan also reserves land for the accommodation of the poorer population, which is in India referred to as the Economically Weaker Section, or EWS. By contrast, housing construction is not permitted in untenable areas, such as industrial and green zones and other areas reserved for public purposes. Finally, the types of landowners fall into three categories: private, local or state government agency, and central government agency (i.e., the defense authority or railway authority in Pune).

³⁶ An interviewed PMC official referred to this rule as enforced by the state government, though I could not find the official document. Nevertheless, this rule is widely known among professionals and is written in photo-passes held by slum dwellers.

In addition to the legal factors above, I include variables that potentially and significantly influence *de facto* tenure security of slum dwellers and thereby the formation of invisible rules. My survey measures political patronage by asking respondents to evaluate the support that they receive from local councilors in solving problems they face. In addition, the survey asks if respondents possess ration cards. Because possession of documents issued by government agencies often functions as residential proof, I expect that households with these documents are more confident about their property rights. Having individual water taps also indicates good *de facto* tenure security, particularly in non-declared slums where people do not have legal entitlement to basic amenities.³⁷

4.4.2 Qualitative Data and Analysis

For the case study, I chose Gandhinagar³⁸, which is a small and relatively recently formed slum settlement in Pune. Approximately 110 households currently live in the slum, and most of them arrived in the early 1990s. Because of its location, the people in Gandhinagar have been under the threat of housing demolition and forcible eviction. Studying this slum has been useful to my research for several reasons. First, people in this slum have a very low level of tenure security and face a high risk of eviction. This situation, while unfortunate, has allowed me to trace the improvement of tenure security. Second, a social activist and a local politician have contributed to *de facto* tenure security in the slum. Analyzing the ways that these political actors interact with slum dwellers helps to understand politico-legal interaction and its influence on invisible rules. Third, land ownership and tenability vary within the slum, which makes possible a within-slum comparison.

During my fieldwork, I conducted 69 semi-structured interviews with residents in Gandhinagar and other slums, local councilors, local and state government staff, social activists and NGO staff, and local researchers and professionals. Appendix F lists the interviewed

³⁷ Households' access to individual water taps may reflect not only their tenure security but also their willingness to invest in housing improvement. However, I argue that this not a serious issue for the purpose of my analysis, given the situation in which approximately 80% of slum households have obtained individual water taps (Table 4.1). An alternative interpretation is that the lack of the access to individual water taps indicates a lower level of tenure security, which discourages housing investment.

³⁸ Fake names are used for the settlement, politician, and social activist in this paper to protect privacy.

professionals. Interviews were, when approved by interviewees, recorded, and later transcribed and coded for analysis.

4.5 Invisible Rules in Pune: A Survey Analysis

4.5.1 Descriptive Statistics

My survey reveals that slum residents believe they hold various property rights (Table 4.1). According to the survey, approximately 81% of respondents believe that they are permitted to build one-story *pucca* housing. Fewer households believe in their rights to build two-story housing: 74% believe they have the right to build two-story *katcha* housing and 68% two-story *pucca* housing. It is intriguing to see that so many slum dwellers believe in their rights to build better housing, even though the construction of even one-story *pucca* housing or two-story *katcha* housing is technically illegal.³⁹ In addition to the rights to develop better housing, more than two-thirds of households think that they can inherit, sell, and/or sublet their housing, while only 38% of households think their housing is mortgageable. It must be noted that these answers indicate the perceived potential for housing activities, while actual practices to date can be different. According to my survey, renting housing or rooms is not prevalent in Pune slums: tenant households account for only 13% of the total slum households.⁴⁰ By contrast, housing transaction is more common: 22% of the current owners purchased their houses, while 72% built their houses.

Looking at slum-level variations in invisible rules also provides an interesting insight. To do so, I calculated the proportion of households who believe in each type of property right for each slum, then prepared histograms that show the distribution of 56 slums according to the calculated proportions. Figure 4.1 shows that in 25 or more slums, almost all the surveyed households believe in their rights to build one-story *pucca* housing and two-story *katcha* housing, as well as the rights to inherit and sublet housing. While these slums have little uncertainty regarding tenure security, slums with a calculated proportion of less than 0.6

³⁹ This result does not necessarily mean that one-story *pucca* housing is more likely to be permitted than two-story *katcha* housing in a slum. For example, in a non-declared slum, many people told me that building two-story *katcha* housing had been permitted, while one-story *pucca* housing was prohibited. An interviewee said that building *pucca* housing required legal title of the land.

⁴⁰ Households are identified as owners in this survey if they do not pay rent and they regard themselves as the owners of the houses.

distribute as long-tails. These are the slums where people probably face tenure security constraints.

My survey also helps with understanding the relationship between slum dwellers and local politicians in Pune. Contrary to common descriptions about the presence of middlemen in Indian slums, nearly 90% of households have direct contact with municipal councilors in Pune slums. Only 5% of respondents said they usually reach municipal councilors via community leaders or other middlemen. Municipal councilors sometimes (41%) or often (25%) visit slums to listen to their constituency, while 30% of the respondents complained that municipal councilors visit them only during election times. Evaluations for the performance of municipal councilors were divided among slum dwellers. Approximately 53% of the surveyed households answered that politicians had helped them solve problems they faced well or very well. On the other hand, 33% of respondents negatively evaluated politicians' help. The remaining households (14%) were ambivalent.

4.5.2 Logit Regression Analysis

In order to examine what factors are associated with the invisible rules, I estimated the logit model in Equation (4.1) by choosing as the dependent variable the binary indicator of whether the respondent believes s/he can build two-story *pucca* housing. I focused on only the right to build two-story *pucca* housing in this chapter for the sake of presentation, though the results of estimations for the other two types of housing were not substantially different. Table 4.2 reports the estimation results in an odds ratio for the models with the perceived right to build two-story *pucca* housing as the dependent variable.

I first estimated the model using all sampled households (Model 1). As expected, slum declaration status, land tenability, and political patronage are strongly associated with invisible rules. Compared with those in non-declared slums, people in declared slums are 2.9 times more likely to believe in their right to develop two-story *pucca* housing. The odds of believing in this rights by those who live in slums on tenable land is 1.9 times higher than those in slums on untenable land. In addition, compared with households who negatively evaluated local politicians' help, those who gave positive evaluations are 2.0 times more likely to believe in their right to build well-structured housing.

Slum dwellers on land owned by central government agencies are found to be less likely to believe in their rights to develop better housing, but the estimated association is not statistically significant at the 10% level when slum declaration and land tenability status are controlled for. Approximately 7% of slums in Pune stand on land owned by the central government agencies. According to the Central Government Properties Act of 1948, state government laws do not apply to them. Local governments need to obtain Non-Objection Certificates (NOCs) from central government agencies when providing basic amenities to slums in those areas. Central government agencies, however, tend to be reluctant to provide NOCs and, moreover, they do not have any effective slum policies for those slums.⁴¹ The case study in the next section will show how landownership by a central government agency influences the tenure security of slum dwellers.

It is worthwhile to explore whether there are any substantial differences in the estimated results between declared and non-declared slums. Dividing the sample into households in declared slums and non-declared slums, I separately estimated the same model for each subsample (Model 2 and Model 3). Model 2 finds no association between land tenability and invisible rules in declared slums. The influence of tenability is, by contrast, estimated to be very strong in non-declared slums (Odds Ratio [OR]=3.3) in Model 3. This suggests that either living in declared slums or in tenable areas—not both—is sufficient to give households confidence about their tenure security. Another important finding is that the association of political patronage and invisible rules is found to be stronger in non-declared slums (OR=2.0) than in declared slums (OR=1.7 and not statistically significant at the 10% level). This result indicates that political patronage is more vital for people with less legal tenure security.

Furthermore, I estimate the influence of the possession of ration cards (Model 4) and an individual water tap (Model 5) in non-declared slums. The possession of ration cards is very strongly associated with the probability of the respondent believing in her/his right to build two-story *pucca* housing (OR=8.9). Considering that 96% of households possess ration cards in Pune slums, however, it is probably appropriate to interpret this result to note that the lack of ration cards is strongly associated with a lack of tenure security. Having individual water taps is also significantly associated with the right to build two-story *pucca* housing (OR=8.3).

⁴¹ A study of slums in Mumbai by Subbaraman et al. (2012) shows that health conditions of slum dwellers are severely bad in the land owned by the Mumbai Port Trust, a central government agency.

To sum up, the survey analysis in this section reveals several important issues. First, many people believe in their right to develop housing in Pune slums. Roughly two-thirds of slum households think they are permitted to build two-story housing made of permanent materials, even though such construction is not legally permitted. On the other hand, many people still face constraints in housing investment, thinking that they are not allowed to develop housing. These invisible rules slow incremental housing improvements in slums. Second, my statistical analysis shows that such invisible rules are not merely inconsistent misconceptions. Rather, such rules are found to be systematically associated with the level of tenure security enjoyed by slum dwellers. My estimation confirms that legal (slum declaration and land tenability status) and *de facto* tenure security factors (political patronage, possession of ration card, access to individual water taps) are strongly associated with the odds of households believing in their right to build two-story *pucca* housing.

The survey analysis also sheds light on the way slum dwellers and politicians interact with each other and how their relationship influences the tenure security of slum dwellers and the formation of invisible rules. Communication between slum residents and local councilors is found to take place on an individual basis, and many of them visit slums to listen to the problems faced by slum dwellers and slum dwellers' requests. Such activities are critically important for local politicians to maintain their political presence. Slum dwellers, who possess *en masse* voting power, strictly judge politicians' performance. Finally, my statistical analysis reveals that slum dwellers who have good political patronage tend to believe in their rights to develop better housing. The association with political patronage and invisible rules is estimated to be stronger in slums with a lesser degree of legal tenure security. This result rationalizes my choice of a slum with low legal security for a case study to investigate politico-legal interaction. The case study in the next section elucidates how exactly slum dwellers and political actors are interacting, and how their relationship is determined by the underlying legal and political systems in Indian cities.

4.6 Interaction of Legality, Politics, and Perception: A Case Study

Gandhinagar is a small community located along railway tracks, which are the property of the central government. The slum is currently composed of 115 houses in four lines, which I

refer to as blocks 1 to 4 in this chapter (Figure 4.2). Block 1 is situated farthest from the railway tracks, while block 4 stretches exactly along the tracks. People started living in this slum in the late 1980s, and most of the current residents arrived in the 1990s. A large cemetery and a factory operated by a government corporation lie adjacent to this slum. Several other slums exist near Gandhinagar; some of them have been declared and are physically well consolidated, while others have been demolished with or without the adequate relocation of residents.

Housing quality and the availability of basic amenities in Gandhinagar differ depending on the location within this slum (Figures 4.3, 4.4, 4.5, and 4.6). In block 1, the majority of houses are two-story and/or *pucca* housing. Although a couple of two-story *pucca* houses exist in block 2, most houses are made of *katcha* materials, such as wood and metal sheets. Block 3 has no *pucca* housing, though there is some *katcha* housing with a second floors. Houses on block 4, lying side-by-side with the railway tracks, mostly consist of tiny, one-story *katcha* housing. The PMC has provided a few community water taps, underground drainage, pavement, and streetlights in this slum, excluding block 4. I will show what caused this contrast in housing quality and the availability of basic services among, and within, the four blocks.

4.6.1 History of Gandhinagar

People started occupying this land in the late 1980s, and the size of the community increased in 1992 when a group of people who had been evicted from another slum on land owned by the defense authority joined them. Mr. Kumar, a social activist and the founder of a non-profit organization, Slum Security Force (SSF), supported their migration into Gandhinagar. The main office of the organization is located in a declared slum adjacent to Gandhinagar, and the organization has built a signboard at the entrance of Gandhinagar. The signboard says that the slum is under protection by the organization.

Mr. Kumar founded the SSF in 1992, advocating for better lives for slum dwellers and socially disadvantaged populations in Maharashtra. The main objectives of the organization are to bring secure tenure and rehabilitation for slum dwellers, and the social welfare of the *dalit* population. The SSF's non-violent approach is to organize agitation and to rally by mobilizing slum dwellers, and to negotiate with government officials for an assortment of arrangements favoring socially marginalized groups. While the SSF sometimes pressures governments to stop the ongoing demolishment of slum housing, its approach is also pragmatic. For example, rather

than advocating for a drastic change in policies, the SSF calls for governmental declaration of slums that were formed prior to the 1995 cut-off date and for provision of basic amenities to these slums. In other instances, the SSF insists on secure tenure for slum dwellers, emphasizing that they have remained for a long period of time without disturbing others. Calling for the provision of ration cards and caste certificates to slum dwellers are other important activities undertaken by the organization. While some organizations explicitly work for specific caste groups in Pune, the SSF does not target any specific caste, but rather aims to support all slum dwellers and the *dalit* population.⁴²

The SSF had worked in alliance with the Indian National Congress Party (INC) until recently. Except for the period of 1995-1999, dominated by the *Shiv Sena*, the INC has been the leading party in the state government of Maharashtra. The INC used to have influence in the PMC as well, in alliance with the Nationalist Congress Party. Mr. Kumar's channel with the INC allowed him to approach higher-ranked government officials. In return, he encouraged slum residents to vote for the INC. In the last election (2012), however, the number of INC seats in the PMC was surpassed by the Marathi-centric *Maharashtra Navnirman Sena* (MNS), which was founded in 2006 by the nephew of the founder of *Shiv Sena*. The electoral ward in which Rajiv Gandhi Nagar is located is also currently represented by a local councilor belonging to the MNS.

Gandhinagar is located in an area that the Development Plan designates as a public zone. Residential activities are thus not permitted in this untenable land. While blocks 3 and 4, which are within 14 feet of the railway track, belong to the railway authority, land ownership in blocks 1 and 2 is ambiguous. Some residents believe that the land belongs to the railway authority, while others think that the Jewish cemetery owns the land. Nevertheless, the railway authority made claim to the ownership of the entire land of Gandhinagar and demolished all houses on the land in 1995 and 1998. People rebuilt their housing after each demolition. After witnessing the demolition in 1998, the owner of the cemetery built boundary walls to clearly demarcate its territory and donated the remaining land outside the walls (i.e. blocks 1 and 2) to the residents.

⁴² Indian governments have identified numerous categories such as scheduled caste (SC), scheduled tribe (ST), and other backward class (OBC), and have implemented favorable policies for them. In Maharashtra, *mahar*, *matang*, and *chambhar* are the common SC groups. Their origins, ideologies, and interests sometimes conflict, and these caste groups have adopted their own strategies to improve their status (Sakate, 2010).

Because of the lack of a legal record of the donation, however, the landownership of blocks 1 and 2 remains ambiguous.

The railway authority demolished housing in blocks 3 and 4 several times in the early 2000s as well. Despite the obvious lack of tenure security, people rebuilt housing there under the protection of Mr. Kumar. He successfully negotiated with politicians and government staff to apply a relocation program to a group of residents in Gandhinagar. Nonetheless, some of these households who had obtained housing units prepared by the government in remote areas have returned to Gandhinagar for the abundant job opportunities in the area. While the legal status of Gandhinagar remains unchanged, forced eviction has not happened since then.

As time passed since the last eviction, slum dwellers' priorities shifted from the protection from imminent threat of eviction to the installation of basic services. Mr. Karade, a municipal councilor who has been representing the electoral ward in which Gandhinagar is located since 2007, plays a key role. In Pune, local councilors have a budget allocated from the PMC that they can use at their own discretion. With the money, Mr. Karade installed a couple of community water taps, a paved path, underground drainage, and streetlights in Gandhinagar, with the exception of block 4. During my interview, a PMC staff member confessed that the PMC delivers basic amenities to Gandhinagar, despite its non-declared status, only because of the politician's request. Despite such political arrangements, block 4 still lacks basic amenities. Although people in the block have asked Mr. Karade for the installation, he could not help because the block, directly adjacent to railway tracks, is outside the purview of the PMC. Streetlights built under the direction of the former councilor in block 4 were removed by the railway, and people there have only an open gutter that they themselves made.

4.6.2 Analysis

In this section, I will analyze the situation of Gandhinagar from the analytical framework of invisible rules; that is, how legal and *de facto* tenure security factors interact and thereby influence the perceived tenure security of slum dwellers and their housing investment behaviors.

Legal Tenure Security

The legal tenure security of Gandhinagar remains very low. The slum is not declared, and is located near railway tracks in an untenable area. According to my interview with a high-ranking PMC official, the PMC is planning to relocate all the people in the slum under the Basic Services for the Urban Poor (BSUP) scheme. The staff admitted that there is no plan regarding how the land will be used, but he insists that the PMC still needs to vacate the land. Moreover, he stated that relocating those slum residents would improve their welfare. According to him, the PMC does not intend to demolish housing before the relocation, yet the PMC is, as he proudly put, ready to exert its power to demolish any housing in case of resistance. Contrary to his statement, demolition of houses without the offer of relocation has happened in various parts of the city several times.

De Facto Tenure Security

Evaluations of the help offered by the social activist and the politician differ among the residents in Gandhinagar. People in blocks 1 and 2, who are making strong demands for better amenities, rather than simply protection from eviction, evaluate the politician's work very positively. Mr. Karade frequently visits Gandhinagar and other slums in his electoral ward to listen to complaints and requests by the residents. In my interview with the politician, he admitted that the most common request from slum residents is the installation of water and drainage, though he also often receives requests for financial assistance for personal use. The installation of community water taps gives slum dwellers the chance to gain legality for claim-makings. People strategically keep receipts of their water taxes so they can use them as residential proof for participating in government programs. The validity of the receipts is, however, not perfectly clear, because of the non-declaration status of the slum and cut-off date eligibility of the residents.⁴³

In contrast, people in blocks 1 and 2 doubt the work of the social activist. Mr. Kumar surely helped people by negotiating with government staff and politicians for relocation. However, a resident believes that Mr. Kumar only pretended to protect people, and kept

⁴³ The politician has also guided the PMC to implement social programs in Gandhinagar, such as the provision of schoolbags and notebooks to children. His wife, also a politician, has supported the formation of a self-help group by women in this slum.

reminding them of the persistent risk of demolition. For example, a resident in his early 20s described how the social activist declined their request to inaugurate a youth club in the slum. The resident suspects that the social activist must have thought that the club would create cohesion in the community and thereby undermine his presence in the slum. Increasing confidence about tenure security as times has passed since the last eviction has resulted in such emotional detachment from the social activist. At the same time, Mr. Kumar lost interest in this slum after he failed to be elected as a local politician, and the politician instead gained residents' appreciation.

People in block 4 have an opposing view. Because of the persistent risk of eviction by the railway authority, these people highly value help from the social activist. The politician, in contrast, disappointed them because of his failure to bring basic amenities to block 4. These residents clearly recognized that local councilors do not have power over land belonging to the central government agencies because of the hierarchy in the governing system in India.

Link Between Tenure Security and Housing Investment

The legal and *de facto* tenure security described above clearly influenced the variation in perceived tenure security and housing conditions in the slum. The level of perceived tenure security is overall higher in blocks 1 and 2. A family that built two-story *pucca* housing two years ago stated in my interview that they are 99% certain that demolition will not happen. Other households who believe that the railway authority will come to demolish housing still believe that they will be offered new housing under a relocation program. They know that people in nearby slums have recently been relocated to new housing in other areas.⁴⁴ In these areas, invisible rules do not severely constrain residents' housing investment decisions.

Despite the unchanged legal tenure security of the slum, as time passed since the last housing demolition, more and more people started rebuilding their houses from one-story *katcha*

⁴⁴ Having said that, the uncertainty in legal status has still caused mixed perception among residents even in blocks 1 and 2. One resident believes that the railway authority has acquired a large parcel of nearby land from the military, so he thinks that the railway authority is no longer interested in the land on blocks 1 and 2. This perception, however, contradicts the plans of the PMC. A family in block 1, who came to this slum in 1996, believes that the railway would come to evict them for sure even if they had never been asked to move out. Some residents know that a new railway line is planned for opening in July 2015, and the construction of boundary walls has been taking place near Gandhinagar. They believe that the railway needs the land, even on blocks 1 and 2, for the construction.

into one-story *pucca* or two-story *katcha/pucca* housing in blocks 1 and 2. During my interview, a woman on block 1 said to me, “People don’t stop living with the fear of dying. How long can we live in such tiny housing made of metal sheets?” This remark, however, needs to be interpreted by taking into account the location of her house. A family near the entrance of the cemetery in block 1 moved in 1995 by purchasing a *katcha* house for 25,000 rupees. The family rebuilt the house into two-story *pucca* housing three years ago, motivated by the son’s marriage and the need for a new room in the house. The family financed the construction cost of 500,000 rupees with their own savings. The head of the family said to me that he was not concerned about the risk of eviction when making the decision to expand his house. He recognized that the land did not belong to the railway, and he preferred to stay in the slum because of its proximity to his workplace. He communicated with Mr. Karade about the construction before its initiation.

Even though the land may not belong to the railway, people in block 2 feel a lesser degree of tenure security than those in block 1. As a result, there are fewer *pucca* and/or two-story houses in block 2. A family with two children, who arrived in block 2 about 20 years ago, added the second floor to their housing made of wood and iron sheets last year. They knew that they would have to move out someday and that the railway authority would demolish even two-story housing, but they engaged in the investment because of the strong need for a larger space. The head of the family said that if he had extra money, he would move to another location instead of building *pucca* housing in the current location. Thus the risk of eviction discouraged the family from building *pucca* housing. Another family who built two-story *pucca* housing two years ago said they believe that they will be offered new housing in case of relocation, because they have been paying all their taxes. They also mentioned, although they are very aware that it will not happen, that the PMC should pay extra money to compensate for their second floor. In case of relocation and redevelopment, however, government agencies provide only one housing unit of the same size to each household, irrespective of the size of the household and of previous housing.

People in blocks 3 and 4 estimate eviction risk to be high. Their concern about the risk of forced eviction shapes the invisible rules in these blocks. People in block 3 believe that building *pucca* housing is not permitted in the area because the land belongs to the railway authority. Some residents recently received a notice from the railway authority about planned clearance of the block. In the meantime, however, *de facto* tenure security has been increasing. It has been

more than 10 years since the last housing demolition on the block. Thanks to negotiations by the politician, the PMC has provided basic amenities to this block as well as blocks 1 and 2. As people grew to feel more confident in their tenure security, they started adding second floors to their dwellings, starting about 3-4 years ago. One family who settled in block 3 in the late 1980s added a second floor to their *katcha* structure two years ago. A respondent in this family said she still thinks that the railway can come to demolish her housing at any time.

Tenure security is lowest in block 4. Unlike the other blocks, people in block 4 do not have access to basic amenities. During my interview, a man in block 4 pointed to a pile of construction materials and debris placed there by the railway authority. He explained to me that the railway put them in front of his house in order to make its landownership visible. People believe that building neither *pucca* nor two-story housing is permitted on this block. One respondent in his 40s interviewed for this study had been living in a tiny one-room *katcha* house on block 4 since 1990. His family could not join the relocation program arranged by Mr. Kumar because his mother accidentally burned the required residential proof. He thinks that if he builds two-story housing, the railway authority will come to demolish it. Lamenting his situation, he told me that if he owned the land—i.e., if he had been able to stay here without disturbance—he would have already built two-story housing. There is another family that continues to stay in block 4 despite having experienced housing demolition multiple times. The family currently lives in a poorly structured one-room house because they no longer have the money to rebuild better housing. Although the family has received a notice of planned demolition, they remain in the precarious place expecting relocation by the PMC. Although the PMC is planning to relocate these people to remote areas, nobody knows whether it will actually happen.

To summarize, the case study in this section disentangles how legal and *de facto* tenure security factors interact and thereby form invisible rules. In particular, it sheds light on the way slum dwellers interact with political actors, and the critical determinants of their relationships. I wish to particularly emphasize the following three important issues. First, the case study clearly demonstrates that the low level of legal tenure security of slum settlements creates room for informal arrangements for secure tenure and basic amenities. Second, urban governance and political systems in urban India motivate, enable, and limit such political interventions. The ward committee and *prabhag samiti* systems in the elected wing of the PMC motivate local politicians and candidates to cater to the needs of slum dwellers, who share a significant portion of votes in

the city. While local politicians exercise their power to install basic amenities even to non-declared slums, against the will of the PMC, their power is limited. Declaration of Gandhinagar has been impossible because the state government has suspended the declaration of new slums. Installing basic services to block 4 in Gandhinagar has not been realized because it is in the purview of the central government. Finally, and most importantly, the case study analysis clearly demonstrates that people ultimately perceive their risk of facing forced eviction under the influence of legal and *de facto* factors, and this perceived tenure security affects their housing activities.

4.7 Conclusion

This chapter has examined the link between the tenure security of slum dwellers and their housing investment behaviors. It focuses particularly on slum residents' perceptions about their property rights, or more precisely what I conceptualize as invisible rules. My analysis of new survey data from slum households in Pune reveals that those beliefs are neither inconsistent nor a mere misconception; rather, they are the "rules" that systematically reflect the level of tenure security enjoyed by slum dwellers. I identify key legal and non-legal factors that have influenced the formation of invisible rules, such as slum declaration, land tenability, political patronage, and possession of ration cards and access to individual water taps. Importantly, this research suggests that political patronage is more strongly associated with households' confidence about their rights to develop better housing in situations with a lesser degree of legal tenure security.

Understanding the politico-legal interaction that contributes to the formation of invisible rules requires further analysis by taking into account the grounded reality. My case study analysis of a slum settlement in Pune analytically illustrates how slum inhabitants who experienced forced evictions multiple times have gained confidence about their tenure security and obtained access to basic amenities. A social activist and a municipal councilor have been playing a key role in this situation. My analysis reveals how legal and political systems motivated, enabled, and limited their interventions in the slum. Slum dwellers are neither merely passive nor wholly active in negotiating with the social activist and politician. On the other hand, these political actors neither coerced slum dwellers nor dedicated themselves to slum dwellers without expecting returns. As far as the Gandhinagar case is concerned, slum dwellers and political actors operate in a quid-pro-quo relationship. This aligns with the perspective that

Benjamin (2008) refers to as vote-bank politics, but what my case study particularly illuminates is that the relationship between slum dwellers and local political actors changes in tandem with the shift in tenure security in slums.

If such a relationship remains in equilibrium and impairs slum dwellers' welfare in the long run, some policy interventions are required. Legalization of land tenure in slums is such a policy. For example, Payne (2001) proposes an approach to incrementally legalizing property rights so as not to jeopardize the existing *de facto* tenure security. Indeed, slum declaration, which legally ensures the occupancy rights of slum dwellers but does not provide titles, can be a starting point for such an approach. The second and third chapters of this dissertation show that slum declaration (or slum notification in other parts of India) has stimulated housing improvement by enhancing the tenure security of slum dwellers in Pune and throughout India. Adding to this evidence, the findings of the present chapter suggest that a governmental guarantee of occupancy rights would give slum dwellers confidence about their right to build better housing. At the same time, it highlights the need to pay attention to the relationships between slum dwellers and political actors and see that these relationships are changing in tandem.

4.8 Appendix

Appendix F. List of interviewees

Name	Position
Ms. Aneeta Benninger	Executive Director, the Centre for Development Studies and Activities (CDSA)
Dr. Meera Bapat	Independent researcher
Mr. Sharad Mahajan	Executive Director, MASHAL
Ms. Pratima Joshi	Executive Director, the Shelter Associates
Mr. Vivek Chavan	Leader of Bharatiya Dalit Cobra
Ms. Poonam Mehta	Deputy Collector, Government of Maharashtra State
Mr. Lahu Mali	Additional Chief Executive Officer, Slum Rehabilitation Authority (SRA)
Mr. Dnyaneshwar Molak	Joint Commissioner, Pune Municipal Corporation (PMC)
Mr. Madhukand Garad	Deputy Commissioner, Pune Municipal Corporation (PMC)
Mr. Sandip Dhole	Assistant Municipal Commissioner, Pune Municipal Corporation (PMC) Dhole Patil Ward Office
Mr. Vijay Thanwal	Engineer, Pune Municipal Corporation (PMC) Aundh Ward Office
Mr. Ajay Taide	Local Councilor
Mr. Shrikant Jagtap	Local Councilor
Mr. Sanjay Bhosle	Local Councilor

4.9 Tables and Figures

Table 4.1 Descriptive statistics

	Obs.	Mean	SD
Housing tenure (1=owner; 0=tenant)	561	0.872	0.335
<i>Housing structure</i>			
One-story katcha	562	0.569	0.496
One-story pucca	562	0.096	0.295
Two-story katcha	562	0.036	0.185
Two-story pucca	562	0.299	0.458
<i>Invisible rules</i>			
One-story pucca	531	0.812	0.391
Two-story katcha	530	0.742	0.438
Two-story pucca	551	0.675	0.469
Inherit	545	0.679	0.467
Sell	554	0.684	0.465
Sublet	554	0.752	0.432
Mortgage	522	0.375	0.485
Slum declaration (1=declared; 0=non-declared)	562	0.537	0.499
Land tenability (1=tenable; 0=untenable)	562	0.712	0.453
<i>Land ownership</i>			
Private	562	0.698	0.460
Local or state government	562	0.196	0.397
Central government	562	0.107	0.309
Duration of residence (years)	561	33.67	20.73
<i>Evaluation of local politicians</i>			
Not at all/little	562	0.516	0.500
Neutral	562	0.139	0.346
Well/very well	562	0.322	0.468
Possession of voter ID card	561	0.943	0.232
Possession of ration card	562	0.956	0.206
Possession of photo-pass	511	0.419	0.494
Access to individual water tap	562	0.804	0.397
<i>Religion</i>			
Hindu	562	0.808	0.394
Muslim	562	0.107	0.309
Others	562	0.084	0.277
<i>Caste</i>			
Open category	562	0.384	0.487
Scheduled caste [SC]	562	0.219	0.414
Scheduled tribe [ST]	562	0.028	0.166
Other backward caste [OBC]	562	0.240	0.428
Others	562	0.060	0.239

Note: SD, standard deviation; Pucca, permanent materials; katcha, temporary materials.

Table 4.2 Summary of estimation results of logit models

	All	Declared		Non-declared	
	sample	(2)	(3)	(4)	(5)
	(1)				
Slum declaration (1=declared; 0=non-declared)	2.943*** (1.041)				
Land tenability (1=tenable; 0=untenable)	1.945* (0.754)	0.940 (0.504)	3.251** (1.772)	3.513** (1.896)	5.580*** (2.555)
<i>Land ownership</i>					
Local or state government	0.952 (0.464)	0.816 (0.470)	1.893 (1.687)	1.853 (1.637)	2.046 (1.388)
Central government	0.743 (0.307)	0.653 (0.342)	0.935 (0.688)	0.832 (0.598)	0.740 (0.541)
Housing tenure (1=owner; 0=tenant)	7.643*** (4.028)	8.241*** (5.240)	8.846*** (6.754)	8.857*** (7.112)	7.953*** (4.975)
Duration of residence (years)	1.016 (0.017)	1.045 (0.031)	1.007 (0.021)	0.995 (0.023)	1.003 (0.028)
Duration of residence (years squared)	1.000 (0.000)	1.000 (0.000)	1.000 (0.000)	1.000 (0.000)	1.000 (0.000)
<i>Evaluation of local politicians</i>					
Neutral	2.258** (0.800)	1.686 (0.696)	2.245 (1.215)	2.495 (1.433)	2.678* (1.482)
Well/very well	2.096*** (0.514)	1.691 (0.726)	1.974** (0.639)	2.087** (0.679)	2.103** (0.762)
Possession of ration card				8.944*** (7.578)	
Possession of photo-pass					8.329*** (3.646)
Access to individual water tap					
Log-likelihood	-243.7	-113.5	-118.9	-115.9	-104.1
Prob>Chi2	0.000	0.000	0.000	0.000	0.000
N	491	259	216	216	216

Note: Exponentiated coefficients; Cluster-robust standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. *Religion, Caste, Education* and *Household income* are not reported. Reference groups are private for *land ownership*, open category for *caste*, and not at all/little for *political patronage*.

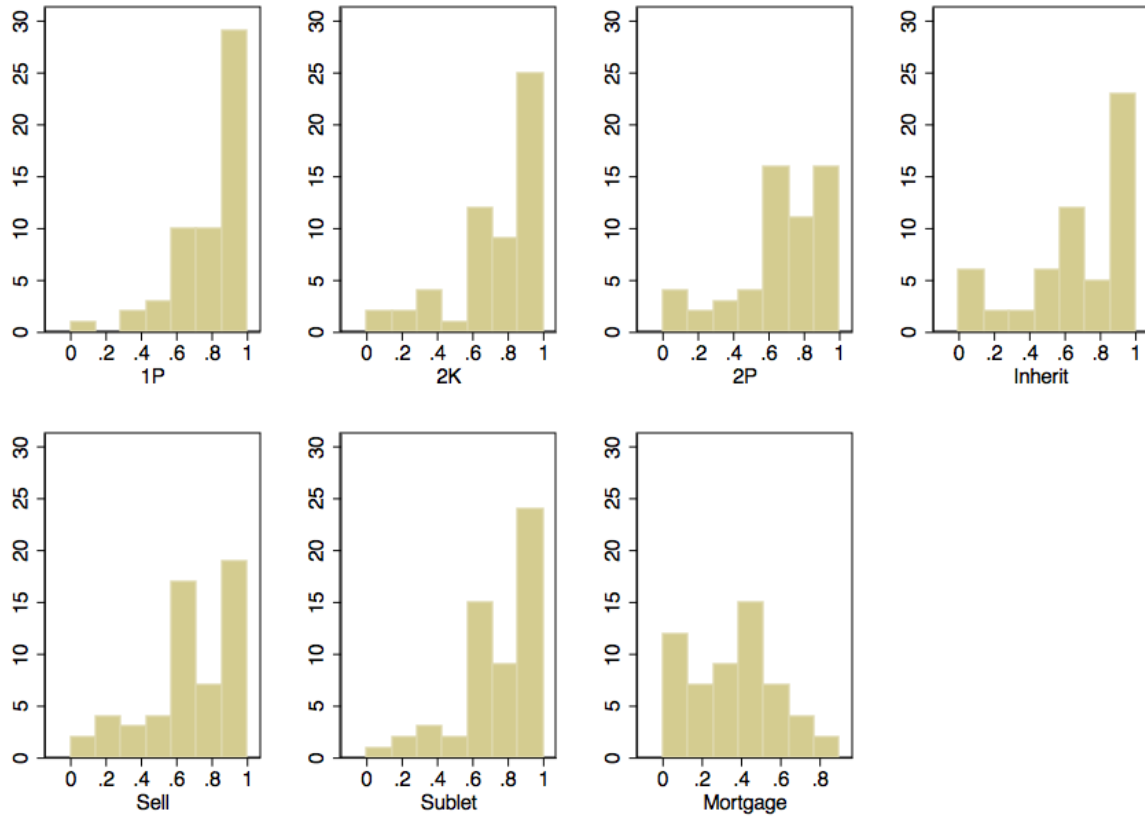


Figure 4.1 Slum-level histograms of invisible rules

Note: The histograms above illustrate how the proportions of households who believe in their property rights vary among slums. y-axes represent frequency. x-axes represent the proportions of households. 1P, one-story *pucca* housing (i.e., housing made of permanent materials, such as bricks and cement); 2K, two-story *katcha* housing (i.e., housing made of temporary materials, such as wood and iron sheets); 2P, two-story *pucca* housing.

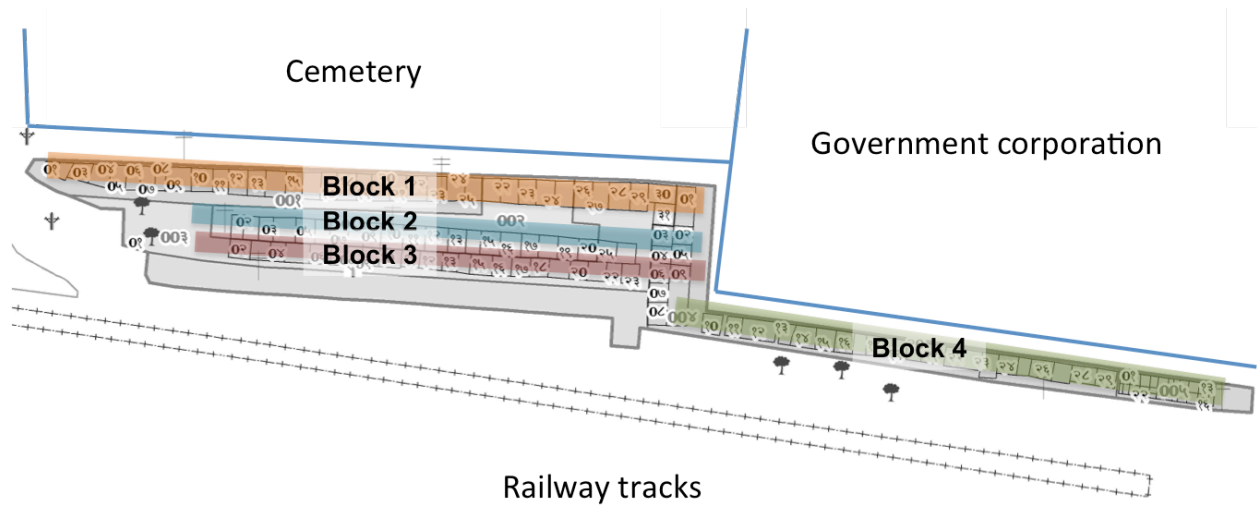


Figure 4.2 Map of the slum for case study

Source: MASHAL, 2011.

Note: The author created this figure by modifying a base map in MASHAL (2011).



Figure 4.3 Housing quality in Block 1

Source: Author



Figure 4.4 Housing quality in Blocks 1 and 2
Source: Author



Figure 4.5 Housing quality in Block 3
Source: Author



Figure 4.6 Housing quality in Block 4
Source: Author

CHAPTER 5

Conclusion

5.1 Tenure Security and Housing Investment: The Interplay of Land Tenure, Politics, and Perception

Throughout the preceding three chapters, this dissertation has elucidated the theoretical and empirical link between the tenure security of slum dwellers and their housing investment behaviors. As laid out in Chapter 1 (see Figure 1.4), the three chapters shed light on the link with different sets of focuses and methodologies.

Tapping into a nationally representative cross-sectional dataset, Chapter 2 examined the influence of slum notification on slum dwellers' housing investment in slums across India. The statistical analysis, based on propensity score methods, finds that with the differences in household characteristics adjusted, the average amount of money spent by households for housing improvement is estimated to be larger in notified slums than in non-notified slums. This result supports my hypothesis that slum notification enhances the tenure security of slum dwellers and thereby induces their investment in their houses. This does not necessarily mean, however, that households in non-notified slums are totally discouraged from improving their houses. My statistical analysis instead shows that, as long as only the frequency of improvement is examined, households in non-notified slums are more likely to invest in their housing for improvements than those who reside in notified slums. Thus, although the amount of spending is limited, households in non-notified slums are still motivated to improve their houses. Further adjustment of the differences in housing conditions and infrastructure access renders statistically insignificant the estimated effect of slum notification on the amount of money spent for housing improvements. This result implies the important role of infrastructure access in motivating slum residents to invest in their housing.

After observing the nation-wide trend, the remaining chapters focused on Pune. Chapter 3 investigated the longitudinal change in housing quality in slums in Pune. I collected surveys with retrospective questions from 562 households in 56 slums in the city. According to my survey,

slum residents started upgrading their houses into those made of permanent materials and/or with a second floor once their duration of residence reached 10 years. The statistical analysis of the data finds that slum declaration increases the odds of household building using permanent materials (e.g., cement) by 47%. Similarly, slum declaration increases the odds of building housing with a second floor by 78%. These results confirm that the assurance of tenure security brought by slum declaration stimulates housing improvements. In addition, the analysis finds that the estimated effects of slum declaration are heterogeneous among slum dwellers, depending on the underlying legality of the land they occupy. This finding points out that households who face a higher risk of eviction would benefit the most from tenure formalization.

An intriguing issue in the findings of Chapter 3 is that due to enhanced tenure security, a larger proportion of households have built housing made of permanent materials and/or with a second floor in declared slums. The declaration of slums itself, however, does not permit the construction of such houses. Chapter 4 reveals that slum dwellers believe in various types of property rights, such as the right to develop, inherit, sell, and sublet their houses. Those perceived property rights, which I referred to as invisible rules, do not necessarily correspond to the property rights prescribed by laws, yet those invisible rules are found to still systematically reflect the legal and *de facto* tenure security enjoyed by the slum dwellers. The statistical analysis in this chapter identifies the positive association of the probability of slum households believing in their rights to build multi-story housing made of permanent materials with various legal and *de facto* tenure security indicators, such as slum declaration status, land tenability, political patronage, possession of ration card, and access to individual water taps. A particularly important finding is that the influence of political patronage, which I measured by slum dwellers' evaluation of the support from municipal councilors, is estimated to be stronger in slums with less legal tenure security. The survey finds that most slum dwellers contact municipal councilors individually rather than via community leaders or middlemen. In non-declared slums, the chance of believing in the right to develop better housing for households with good political patronage is estimated to be more than twice as large as the chance for those who have received unsatisfactory support from local politicians. The findings above imply the existence of politico-legal interaction.

Through the case study of a slum settlement in Pune, the remaining part of Chapter 4 further investigates how slum dwellers interact with local political actors in seeking secure

tenure and basic amenities, and how their interaction shapes invisible rules and housing activities in the slum. The case study shows that political actors are very motivated to cater to the needs of slum dwellers in return for their voting support. In earlier days when the residents of the slum were facing the imminent threat of forced eviction, they relied on a social activist with close ties to the then-ruling political party. Once a certain amount of time has passed since the last eviction, residents started enjoying *de facto* tenure security and began to turn their face from the social activist to a newly elected local politician, who exercised power to install basic amenities to even this non-declared slum. The legal and governance systems, however, still limit the scope of such political intervention. The slum remains undeclared because of the order from the state government of Maharashtra, and the risk of forced eviction has started to surge again. Neither the municipal government nor the politician has power to install basic services to residents in a block lying side-by-side with railway tracks, which is in direct purview of the central government. Against this backdrop, different invisible rules have been formed based on each household's perception about the risk of housing demolition, leading to the variety of housing outcomes within the slum settlement.

To sum up, I recapitulate the contribution of this research project from the theoretical and empirical perspectives. Theoretically, this project proposes a new formulation of the link between the tenure security of slum dwellers and their housing investment behaviors. Unlike previous studies that emphasize one aspect of tenure security over others, I develop a theoretical model in which legal and *de facto* tenure security factors influence the tenure security perceived by slum dwellers and thereby influence their housing activities. My conceptualization of property rights perceived by slum dwellers as invisible rules sheds light on the fact that legal, *de facto*, and perceived tenure security can be different from each other, and that perceived tenure security reflects the underlying legal and *de facto* tenure security factors. It is also analytically useful to differentiate invisible rules from perceived tenure security. Previous studies by and large conceptualize perceived tenure security as the probability of forced eviction estimated by slum dwellers (van Gelder, 2010). Beyond such estimated risk of eviction, however, slum residents tend to have beliefs about specific types of housing activities that are permitted and not permitted in their communities. By directing attention to such beliefs, invisible rules more directly illuminate how slum residents' perceptions are related to their housing investment decisions.

In addition, my theoretical model emphasizes that legal and *de facto* tenure security factors are inextricably tied. This is especially true in India, where extra-legal arrangements are rampant in every sphere of the society. The urban poor who are denied access to secure tenure and basic amenities in the legal realm make claims to those rights through day-to-day negotiations with the local government and political actors (Chatterjee, 2004). While limiting the legal citizenship of slum dwellers, informality of slums allows slum dwellers to make claims to secure tenure and amenities and, at the same time, motivates local political actors to correspond to their demands. The continuum of legality of slums are, while historically embedded, determined by a intricate set of parameters, such as land tenure, land tenability, land ownership, and households' duration of residence and possession of residential proofs. As illuminated by my work in Pune, slums with a lesser degree of legality attract political interventions, and local political actors and their interaction with slum dwellers change in parallel with the shift in legal, *de facto*, and perceived tenure security. Disentangling such complicated and shifting politico-legal interaction is a key to theoretical and empirical inquiries.

Empirically, this dissertation offers strong evidence that the tenure security of slum dwellers plays a critical role in their decisions to invest in their housing. As I explained in Chapter 1, the assurance of slum dwellers' tenure security, alongside their motivation and financial resources, is expected to increase the amount of housing investment. Systematically investigated empirical evidence has been rare to date, mainly because of several methodological challenges (Durand-Lasserve & Selod, 2009; Payne et al., 2009). Some exceptions are, for example, Field (2005) and Galiani & Schargrodsky (2010), which take advantage of experimental design settings in Peru and Buenos Aires, respectively. Most empirical studies of the effect of titling programs on investment have focused on rural areas (Arnot et al., 2011). For this project, I constructed an original dataset based on my large-size survey with arrays of household and housing information, which is rare in this kind of survey (Marx et al., 2013). The retrospective questions of the survey make it possible to estimate the causal effects of slum declaration by taking account of time-varying treatments and confounders through marginal structural models. The findings in the second and third chapters indicate that tenure formalization without title provision can still stimulate housing improvements in slum settlements.

It is also worthwhile pointing out that Chapter 4 demonstrates the usefulness of a mixed-methods approach, combining quantitative and qualitative data collection and analysis (Creswell,

2009). This mixing of two types of methods equipped me to pursue both breadth and depth in my analysis. The statistical analysis of the cross-sectional information in my survey, which reasonably represents slum households in Pune, detected systematic trends in the link between legal and *de facto* tenure security factors and the characteristics of invisible rules. The subsequent case study of a slum settlement helped to demonstrate the way the politico-legal interaction actually shapes invisible rules and housing outcomes.

5.2 Why is Housing Important?

Now that this dissertation has articulated the link between the tenure security of slum households and their housing investment behaviors, I am ready to speculate a little bit about the meaning of housing investment and improvement in slums from a broader context.

I argue that it is crucial for planners to regard the improvement of housing conditions in slums not only as an end but also as a means to achieve urban poverty reduction. Improved housing conditions would contribute to the upward mobility of slum dwellers in several ways. Extra space in their houses help slum residents engage in arrays of income-generating activities, such as grocery, manufacturing, and other small-scale businesses. Enhanced health conditions of slum residents facilitate the development of human capital (Currie & Vogl, 2013; Lopez-Casasnovas, Rivera, & Currais, 2005). Also, economic gains from housing trading allow slum dwellers to invest in business or education.

Potential benefits of housing improvements mentioned above, however, do not automatically justify the government intervention to direct public resources into the support of housing improvements in slums. Allocating public resources into housing improvements in slums would be strategic if those interventions are more effective and efficient than other economic and social policies or strong synergistic effects. A plethora of top-down government interventions that exclusively aimed at the improvement of physical environments in slums have failed. As I mention in Chapter 1, the eradication of slum settlements should not be an ultimate policy goal. The proliferation of slums in developing countries is not a root cause of urban poverty; rather, it reflects the prevailing impoverishment. Therefore, planners should prescribe housing policy and modify institutional arrangements in tandem with other economic and social reforms.

I also point out that slum residents are not always poor, and that the poor do not always reside in slums. On the one hand, simply equating slum dwellers with the destitute could be misleading. My survey of slum residents in Pune finds their expenditure levels varying widely (Figure 5.1). Setting the threshold of poverty, or below poverty line (BPL), is a highly contentious and politicized issue in India, yet a bulk of these surveyed households are not mired in extreme poverty as long as their expenditure levels are concerned. People sometimes choose to live in slums in order to save money by avoiding high rent and evading tax payment, even if they have steady income enough to live outside slum areas. On the other hand, the urban poor do not necessarily live in slum areas. In India, for instance, Baud et al. (2009) and Baud, Sridharan, and Pfeffer, (2008) perform spatial analyses of urban deprivation, which they measure based on the indexes of social capital, human capital, financial capital, and physical capital. Their analyses reveal that the concentration of such deprivation does not exist exclusively in slums in Delhi, Mumbai, and Chennai. Thus, unless spatial poverty trap is evident, exclusively targeting slums is not an adequate approach to tackle urban poverty problems.

Moreover, that improved housing conditions lead to the upward mobility of slum dwellers does not automatically endorse the effectiveness of the policies that aim to direct slum dwellers' resources into housing investment. As Turner (1976) rightly pointed out decades ago, planners should respect for what slum residents prioritize and allocate their limited resources to. Of course, following such self-help housing approach does not mean that planners should regard slum dwellers always make rational decisions whether to, and when to, invest in their housing. Nor does it mean that planners should leave entirely housing improvement decisions to the slum dwellers. So, what kinds of policy interventions can be justified to support self-help housing constructions in slums?

5.3 Policy Implications

Simple generalization of the findings beyond the context of this research—i.e., slums in India or Pune—should be avoided. To be modest, the most fundamental message to take away from the findings of this research is that the government's guarantee of slum dwellers' occupancy can foster housing improvement activities in the slums. If the policy goal is to facilitate housing improvement in slums while mitigating a rapid change in demographic and housing markets there, then the formalization of slums without title provisions would be

effective. In addition to slum notification and slum declaration in India, other examples include the declaration of the Special Areas of Social Interests (AEIS) in Port Alegre, Brazil (E. Fernandes, 2002) and the Special Zones of Social Interests (ZEIS) in Recife, Brazil (de Souza, 2001).

In introducing such tenure formalization policies, planners and policy makers need to address several issues. First, they need to consider how to ensure that the occupancy of slum dwellers is guaranteed in formalized slums. Just a government's announcement of formalizing a slum can sometimes spark housing constructions by raising residents' expectations (Payne, 2001). Nevertheless, it is recommended to establish a legal framework to enforce the occupancy rights of slum dwellers so that they can lay claim in a dispute with other parties. For example, slum dwellers in Pune well recognize the importance of the declaration status of their settlements. My survey asked them to assess the risk of forced eviction in a slum with different hypothetical attributes (Table 5.1). Approximately 72% of respondents regarded living in a non-declared slum either risky or very risky, and they perceive slum declaration status as the most important risk/security factor next to the possession of residential proofs.

Legal disputes can also take place between government agencies, and the enforcement of legalized occupancy right often turns out to be challenging in such cases. The case of a slum that was declared 30 years ago in Pune illustrates how this issue becomes important (Figure 5.2). The local military authority recently started to assert its claim to the landownership of the slum and has asked the PMC to de-notify the slum (i.e., remove its declared slum status) in order to vacate houses. People have lived in this slum for more than 25 years and have never faced the risk of eviction until recently. On the basis of the declaration status of their settlement—and the PMC has confirmed it—the residents have sought help from the court, resulting in the court order of temporary suspension of the forced eviction by the military authority.⁴⁵ This incidence demonstrates the fact that it is critically important for the survival of slum dwellers to what extent the legal assurance of their occupancy penetrates the different layers of government agencies.

Second, it can be a formidable task for local governments to choose slums to be formalized. One naive approach is to formalize slums based on a simple criterion, such as the

⁴⁵ Another interesting point in this case is that the local military authority has tried to vacate the houses in the slum not for defense purposes but to begin residential projects.

cut-off date policy in Maharashtra that solely gauges households' duration of residence. A potential benefit of such a systematic approach is that planners can execute formalization of slums without being meddled with by politics. In reality, however, there remains room for political manipulation as embodied by a series of extensions of cut-off dates in Maharashtra: from 1980 to 1985, 1990, and 1995. A more appropriate approach is, as Kundu (2013) reminds, to carefully review the current master plans and designate areas as tenable or untenable, and then move to formalizing slums on the tenable land. The third concern is how to deal with politics. Formalization of slums means the loss of a vote bank for politicians who maintain their political presence by promising secure tenure to slum dwellers. Those politicians may resist the formalization of "their" slums.⁴⁶ In such cases, governments can still improve *de facto* tenure security through the issue of documents that can function as residential proofs and through the provision of infrastructure and services. However, it should be reminded that those instruments, as well as the cut-off policy implemented by the state government of Maharashtra, are in fact equivalent to integrating some slum dwellers into the formal sphere while excluding the rest.

Finally, how to incrementally upgrade the formality of slums is a key policy issue. A rapid provision of legal property rights beyond occupancy rights may cause negative influences on the lives of the poorest. After the initial legalization of occupancy rights, planners need to monitor the development of *de facto* tenure security and property rights enjoyed by slum dwellers. This is also an issue that requires rigorous empirical evidence.

5.4 Directions for Future Studies

I close this chapter with a suggestion of directions for future studies. As stated above, it still remains unclear how the different bundles of property rights are associated with the different levels of tenure security and housing investment. It is of particular interest how the incremental legalization of property rights affects slum residents' housing activities. The second and third chapters of this dissertation investigate the influence of the legal assurance of slum dwellers' occupancy rights on their housing investment behaviors. If government authorities provide them additional legal rights, such as the right to sell and mortgage housing, how would it change their tenure security and their motivation and resources for housing improvement actions?

⁴⁶ This is an expression local professionals frequently mentioned during my interviews.

The findings of this dissertation suggest that the effects of such additional legalization would depend on the underlying legal, *de facto*, and perceived tenure security conditions. If the legal assurance of occupancy rights have already resulted in the development of functioning *de facto* property rights, such as the right to sell housing, then the additional legalization of such rights would not significantly alter housing activities in the slums. On the other hand, in slums where people are still constrained by invisible rules, the legalization of additional property rights could dramatically change their housing investment behaviors. Thus, in assessing the impact of such legalization, future research first needs to examine the prevailing tenure security conditions, and the theoretical model this dissertation develops will be instrumental for such endeavors.

Recently, the Maharashtra state assembly passed a bill that extends the cut-off date from 1995 to 2000 and permits the transfer of housing in those slums (Bagri, 2014; TNN, 2014). Under this new policy, people who purchase housing in those slums can obtain eligibility to the Slum Rehabilitation Scheme by paying extra fee. This policy change in Maharashtra is a rare opportunity for researchers to examine how such additional provision of the right to transfer affects housing investment behaviors in slums. The survey I collected from slum households in Pune contains their identity information, which helps to conduct a follow-up survey with the same sample and assess the effect of this additional legalization.

A comparative study of slum situations in Mumbai and Pune would also be useful to identify key legal and *de facto* tenure security factors and the way they interact. As neighboring cities in Maharashtra, Mumbai and Pune have a lot in common, including the state government's application of cut-off date policy and the Slum Rehabilitation Scheme. However, scholars have reported much severity in the challenges faced by slum dwellers in Mumbai in seeking secure tenure and basic amenities. Few studies have systematically examined what city-level parameters have contributed to the differences between the two cities. I expect future studies to explore this issue.

5.5 Tables and Figures

Table 5.1 Slum dwellers' assessment of risk factors

	Very risky	Risky	Neutral	Safe	Very safe	No answer
Possession of no document	16	60	15	5	0	3
Not declared	20	52	22	4	–	3
Katcha housing	20	47	24	6	–	4
Short duration of residence	15	51	24	7	0	3
Lack of access to services	7	40	40	9	0	3
Green area	21	23	49	4	–	3
Political patronage	5	30	46	16	1	3
Small slum	9	33	30	25	–	3
Government land	6	28	35	27	0	4
Surrounded by slums	2	30	30	34	1	3
Paying bribe	2	13	64	16	2	3
Cohesive community	1	1	8	84	4	3
Support from NGO	–	3	54	38	1	3

Note: Figures in percentage of households (N=562).

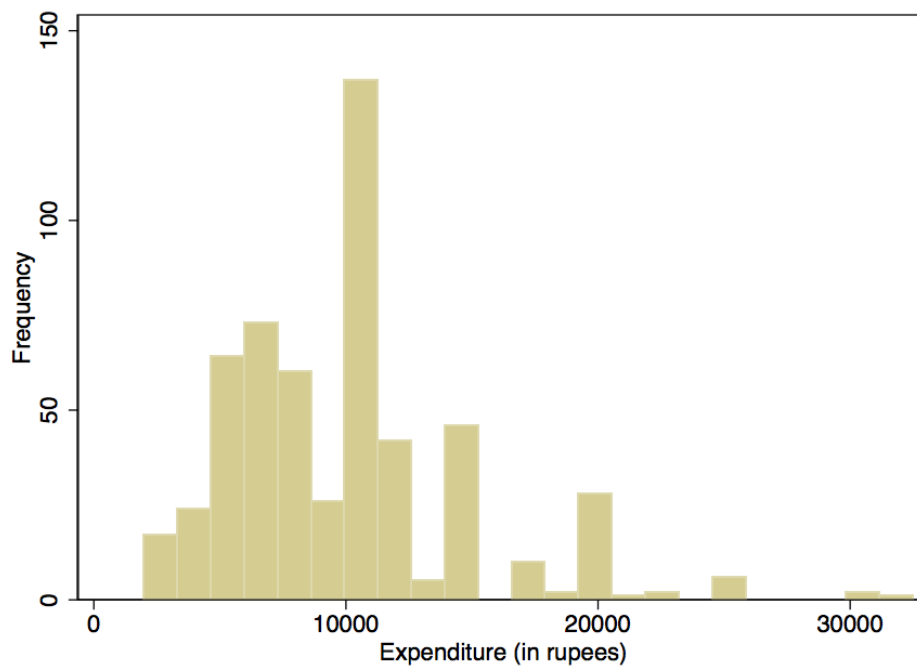


Figure 5.1 Distribution of average household monthly expenditure in Pune slums
 Note: In my survey, respondents answered the amounts of average household monthly expenditure in Indian rupees.



Figure 5.2 A slum in dispute with the military authority in Pune

Source: Author

Note: A declared slum where residents have been living for 25 years (on the right) and a high-rise luxury condominium that is under construction on the land owned by the local military authority (on the left). The military has asked the Pune Municipal Corporation to remove the declaration status of this slum in order to extend this residential project over the slum area.

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