

The function and credibility of urban slums: Evidence on informal settlements and affordable housing in Chile

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ABSTRACT

In recent decades, governments and international organizations have made strong efforts to promote homeownership among low-income households. However, in many countries, informal housing arrangements persist. A strong reason for this is emphasized in the “credibility thesis” which posits that informal settlements play a functional role and serve informal dwellers by supplying other valuable attributes that formal housing may not provide. Based on a comprehensive survey of 1588 households living in 69 irregular settlements and 32 subsidized housing projects in Santiago, Chile, we analyze the functionality of informal settlements by examining two hitherto under-researched indicators for credibility: residents’ perceptions on location and neighborhood security. Results show that in the low-income housing sector some individuals may prefer to live in an informal settlement because these places are more functional with respect to some relevant urban attributes to which they give more weight. In effect, households living in informal settlements are less willing to move from their current municipal district, are closer to jobs, and report lower rates of neighborhood vandalism relative to those living in formal subsidized housing projects. This is related to the fact that in Chile many individuals who have had access to affordable housing have moved to segregated urban areas. The results show that even within well-functioning urban areas where there is strong protection to private property rights, urban informality may still provide a better geography of opportunities than formal homeownership.

1. Introduction

The dream of becoming a homeowner has deep cultural roots in Chile, as elsewhere around the globe. Indeed, until the creation of a rental subsidy program a few years ago, historically all housing assistance government programs have subsidized the acquisition of a housing unit with full property rights. In the country, the goal of promoting homeownership among low-income households has constituted a pervasive political narrative that has been used even among radically opposed administrations. The relevance of that policy goal is not unique to Chile, however. Actually, in recent decades, the idea of expanding homeownership among low-income families has been broadly disseminated partly because of the influential work of Hernando de Soto, who has proposed that property formalization could serve as an important vehicle for economic development (De Soto, 2000). Governments and international organizations have spent millions of dollars implementing titling programs

and other policies aimed at promoting homeownership in the developing world.

The relationship between formal, titled property rights and better economic outcomes is, however, less straightforward than what De Soto’s theory predicts, which has led many authors to cast serious doubts about the impact of policies that focus primarily on transforming low-income households in homeowners (Dyal-Chand, 2007; Gilbert, 2002; Lanjouw & Levy, 2004; Payne, 2001; Payne, Durand-Lasserve, & Rakodi, 2009; Trebilcock & Veal, 2008). Against this backdrop, Peter Ho (2014, 2017) has proposed an alternative theory to examine the relationship between formal property rights and socio-economic development. According to Ho’s “credibility thesis”, the performance of a certain property regime depends on its function, not its form. This implies that in some settings, homeownership may not necessarily lead to a better economic situation among low-income households. The credibility theory may explain better the persistence of informal settlements or slums in many countries around the world,

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where households do not enjoy full tenure security over the dwelling unit or territory where they live.¹ According to this line of argument, the significant presence of slums in many urban areas may occur because of the interests they serve to low-income individuals and the economy relative to the functions provided by a formal housing system with full property rights.

In this paper, we examine the functions that slums may provide for low-income households in urban settings. The main question we ask is whether informal settlements may offer better social and economic opportunities than formal, affordable housing for low-income families living in cities. If holding formal property rights should make a strong difference for low-income individuals regarding their opportunities to improve their disadvantaged situation, then we should expect better socioeconomic outcomes in households living in formal, affordable housing that they own relative to those living in informal settlements. If that is not the case, then informal settlements may be serving better the needs of the urban poor at least with respect to some relevant indicators.

We examine this question with data from Santiago, the capital of Chile. For the last four decades, this country has implemented a large-scale affordable housing policy that has provided access to formal housing to millions of eligible households, significantly reducing its housing deficit (Gilbert, 2004; Salcedo, 2010). However, there are still a significant number of eligible households that live in irregular settlements. Moreover, it seems that in the last years the number of total irregular settlements and families living in them has increased.² Such growth in informal settlers suggests that at least some groups of individuals prefer to live in irregular settlements, even though many of them could potentially have access to formal housing, almost for free, through different subsidized housing programs offered by the government.

Our study makes a dual contribution to the burgeoning literature on credibility. One, whereas previous studies have validated the credibility thesis in Mexico (Levy, 2016; Monkkonen, 2016), this is the earliest study on Chile, thereby expanding its application in Latin America. Chile provides an interesting setting to analyze Ho's credibility thesis, because, as we examine in the next section, two of the primary explanations for the persistence of slums or extra-legal housing in the developing world are not applicable to Chile. First, studies suggest that an important role of these places is to provide access to housing in an affordable way, because formal public policies are not able to do so. Yet in Chile, affordable

housing is available through formal public policies. Second, given the substantial number of people living in housing informality in some cities around the world, the persistence of these informal arrangements is often attributed in part to some political dynamics. Yet in Chile, this political dimension does not seem to be the case given the relatively small number of individuals living in these places, and their dispersion among many urban districts. Therefore, it would seem that informal settlements in Chile perform other functions, which have not been systematically estimated and examined by the literature.

The second contribution of this paper is methodological: we propose two new indicators or proxies to assess credibility, namely social actors' perceptions on location and crime security. Credibility has been defined as "the perception of endogenously, autonomously shaped institutions as a common arrangement" or institutions' "perceived social support at a given time and space" (Ho, 2014: 14 and 16). The definition stems from studies on the perceptions of property rights by Pero and Smith (2008) and Van Gelder (2010, 2013). Building on these studies, credibility has been operationalized through different indicators, including but not limited to actors' perceptions of institutions along formal, actual, and targeted dimensions (Nor-Hisham & Ho, 2016; Sun and Ho, this volume); the level, incidence, source, timing, involved actors, and nature of conflict (Yang & Ho, 2019); and the endogenous transaction costs (Fan, Yang, Liu, & Wang, 2019). In line with this literature, in this paper we operationalize the concept of credibility into two variables that are critically important in the low-income housing sector: households' perception of location and neighborhood quality, especially in relation to crime.

Our findings suggest that there is a tradeoff between housing formality — owning a house — and some relevant variables associated with location and neighborhood quality. In other words, some individuals may prefer to live in an informal settlement — despite the fact that they will always face the risk of eviction, that their housing quality standards are lower, and that they do not receive some basic services — because the settlements are still more functional with respect to other urban attributes to which they give more weight. Our findings should be seen as another layer of evidence that casts doubt on policies that focus primarily on moving low-income individuals from urban informality to formal housing with full property rights, without regard to location attributes and other features of the community. In Chile, the large-scale implementation of a market-based housing policy that promotes homeownership among the poor has had an important negative consequence, which is the concentration of low-income housing built in the periphery of the country's urban areas (Ducci, 2000; Gil Mc Cawley, 2019; Rodríguez & Sugranyes, 2005; Sabatini, Cáceres, & Cerda, 2001; Simian, 2010; Tokman, 2006). These places provide a secure home to people that cannot afford one by their own means, but they lack access to some important attributes of urban life. Therefore, even in urban areas that are relatively developed and where institutions are fairly stable — settings in which tenure security would likely be relatively valuable and reliable — urban informality may provide better geography of opportunities than formal homeownership.

The paper is organized as follows: Section 2 discusses the theories that aim to explain the relationship between property regimes and socioeconomic development. Section 3 describes the data and matching methods we use to analyze differences between informal and formal housing dwellers and presents the results for the main outcomes examined. These are further discussed and put into context in Section 4.

2. Form versus function of property rights in the low-income housing sector

In the context of the massive migration from rural to urban areas that the world has seen in the past decades, irregular settlements have constituted one of the main mechanisms through which low-income families have obtained access to housing. In many cities across the globe, these places host a significant portion of the urban population. According to data from UN-Habitat from 2014, around 880 million people live in

¹ In the academic and policy literature, the terms "slums" and "informal settlements" are often used as synonyms. However, the two concepts are analytically distinguishable. The term "slums" has a more negative connotation, referring to neglected spatial areas where low-income households live in dense and inadequate housing and with low provision of public services. On the other hand, the term "informal settlements" refers mainly to areas where individuals live without tenure security, without necessarily implying that these are neglected zones. The lack of tenure security was not historically associated with the term slums. However, in the reality of many countries those terms overlap. Tenure insecurity is an additional variable characterizing some areas that are considered as slums (UN-Habitat, 2010). In this paper we decided to use both terms interchangeably because the urban areas we study, that in Chile are popularly known as "campamentos", meet with the criteria of both concepts: these are places created by land invasions on public or private land, where therefore people lack tenure security, where households do not have access to at least one important basic service, and where a number of low-income families are agglomerated in inadequate housing. That is actually the way one of the most important NGOs in Latin America that works with informal settlements in the region defines them. See <http://chile.techo.org/cis/monitor/monitor.php>.

² In 2018, the government of Chile registered all irregular settlements in the country. They counted 822 irregular settlements, where 46,423 families live. The last time the government counted all irregular settlements was in 2011, and they reported the existence of 165 fewer settlements that year. It is likely that this increase is related to the significant growth of low-income migrants entering the country in the last couple of years, which is a variable that we do not analyze in this paper considering that the data we use is from 2008. See http://admminvuv57.minvu.cl/opsite_det_20181226162151.aspx.

irregular settlements in the developing world. In absolute numbers, there has been an increase from 689 million to 880 million people over the period 1990 to 2014, in line with the continued trend towards urbanization that is particularly prominent in many developing countries (UN-Habitat, 2016).³ Many governments are not able to provide formal housing to those individuals who, for multiple reasons, decide to migrate to a city; and irregular settlements, therefore, become an alternative for shelter. UN-Habitat has stated that “despite the progress made in reducing the proportion of the urban population residing in slums, the time has come to deal with the *unfinished business* of slums” (UN-Habitat, 2016, p. 58), and has called to all stakeholders involved to “enhance a better understanding of the slum challenge” (UN-Habitat, 2016, p. 57).

One response to the proliferation of irregular settlements that has gained significant attention in recent decades has been to regularize the legal status of individuals living in these places by providing them with full property rights on the piece of land they occupy in an informal or illegal way. The rationale of this policy approach comes from the idea that associates the formalization of property rights with economic development and poverty reduction. This link was popularly advocated by De Soto (2000). He argues that living in informality prevents low-income families from using their homes as assets. Therefore, their participation in formal market transactions is significantly restricted. For instance, a family cannot mortgage their home to get a loan from the banking system to finance entrepreneurial activities. Conversely, if the family holds property rights on their physical space, they may use it as collateral in the formal financial system. This, in turn, may have broader consequences for the economy if it stimulates the securities market. The notion that homeownership is a promoter of economic growth is aligned with the economic statement that stable property rights are a critical factor for the operation of market economies because they constitute the structure of economic incentives and transactions (Demsetz, 1967). In light of this view, the development of institutional designs to register and enforce property rights was a critical component of the Washington Consensus agenda (Trebilcock & Veel, 2008).

Since De Soto's theory was proposed and implemented in many developing countries, several criticisms have emerged. One criticism has to do with the diagnosis that the main problem low-income households living in irregular settlements face is the lack of tenure security they have on the place they inhabit. Several authors have argued that tenure security does not operate in reality as a dichotomous variable, but rather as a continuum of different possibilities. Informal settlers may have different perceptions about their property situation. Therefore, the main problem affecting informal housing settlers may not necessarily be an uncertain property status. On the contrary, regularizing the property status of informal settlements may produce bad outcomes if that area becomes more attractive to higher-income groups, who may then start displacing the informal settlers (Gilbert, 2002; Payne, 2001; Payne et al., 2009).

Moreover, the evidenced that has been collected so far to evaluate the impact of titling programs and other policies that fit with De Soto's proposal does not provide clear support to his theory. One of the core arguments that De Soto proposes is that property titles, or homeownership more in general, triggers a set of positive market dynamics among the low-income sector. Low-income families holding title to their property have stronger incentives to invest in their housing, which leads to an increase in the value of their homes. Also, they can use their properties as assets, which should increase their possibilities of accessing the formal credit system. That may lead them to start new businesses. Indeed, some studies conducted in different developing countries have found a relationship between property rights and housing investment; however, that link seems to be mediated by a decrease in the risk of eviction or

other factors, and not with access to credits from the banking system (Besley, 1995; Field, 2005; Van Gelder, 2013; Ward, de Souza, Giusti, & Larson, 2011). Other authors have argued that the delivery of property titles is not the only way to incentivize housing investment (Gilbert, 2002; Payne, 2001; Payne et al., 2009). Concerning the use of property titles as collateral for obtaining credits from the formal banking system, there is less evidence. The fear of losing their homes may prevent low-income households from getting a formal loan (Payne et al., 2009). On the other hand, formal credit institutions tend to be uninterested in small loan markets and potentially riskier borrowers (Gilbert, 2002).

In sum, it is highly questionable whether implementing policies that focus primarily on providing low-income households with full property rights over a small piece of land or a housing unit will make them better participants in the formal market and will lead them to a better socioeconomic situation. The “form” of property rights does not trigger, just by itself, a series of socioeconomic advantages to the new property holder. The relationship between property rights and poverty reduction is much more nuanced and context-dependent than what De Soto proposes. The impact of property rights does not occur in isolation (Dyal-Chand, 2007; Lanjouw & Levy, 2004; Trebilcock & Veel, 2008).

Ho (2014, 2017) has proposed an alternative theory to the relationship between property and development that may fit better with the evidence that has been accumulated on the topic. According to his “credibility thesis”, institutions persist because they perform certain functions in society that are considered credible by the relevant stakeholders. Therefore, it is their function, not their form, that explains the stability of certain property regimes. The theory builds on research work by, among others, Grabel (2000), Chang (2007), and Dixon (2012), and advocates a refocusing from institutional form to function. In this regard, Agrawal, Wollenberg, and Persha (2014, p. 277) duly notes that studies on the effects of institutional form “demonstrate the difficulty of meaningfully interpreting interventions or their effects from their form alone” and “highlight the importance of focusing on how interventions function in specific contexts.”

Initially, the credibility thesis was mooted to explain the alleged “insecurity” of China's property rights (Ho, 2014, 2017). Over time, the thesis has been extended and applied to other sectors such as ecological conservation (Fan et al., 2019), artisanal mining (Fold, Allotey, Kalvig, & Moeller-Jensen, 2018), water management (Gomes & Hermans, 2018), labor organizations (Miyamura, 2016), and financial institutions (Marois & Güngen, 2016), as well as to different geographical regions, including Europe, Latin America, Africa and Asia.

Informal settlements may serve better the needs of some low-income individuals relative to formal housing. From a legal perspective, homeownership offers an advantageous position in comparison to informal housing, because of the permanent risk of eviction that slums dwellers face. However, the credibility thesis argues that if slums do have some degree of protection from eviction, and they do offer low-income households some attributes that better serve their interests than a subsidized or public housing unit, it could be expected that some individuals would prefer to live there. In this case, the function would defeat the form.

Recent studies that provide evidence in favor of the credibility theory show that in many developing countries the presence of irregular settlements is related to macro social and political factors. Zhang (2018) argues that the incidence of informal settlements in Mumbai, India, is related to the lack of affordable formal housing for a significant portion of the population, to the fact that these places host important business activities for the city's economy, and to their electoral importance which influences the politicians' lenient approach towards them. In this sense, her argument partly resonates with Holland's (2016) notion of “forbearance”, an approach where politicians do not promote the eviction of informal settlers as a way of capturing votes and basic services are provided to settlements in a context where formal policies are insufficient to fully address the problems facing individuals living in urban informality. Similarly, Sun and Ho (2018) argue that the prevalence of extra-legal housing in several cities in China is associated

³ In terms of percentage, there has been a reduction in the proportion of the urban population living in irregular settlements: from 46% in 1990 to 30% in 2014. See UN-Habitat, 2016, p. 14.

with: their affordability for low-income groups *vis a vis* privately constructed housing; the fact that buyers consider the housing as property despite the absence of formal title; and the settlements' better provision of public services and other urban opportunities.

Our study aims to contribute to the literature that has examined the origins and persistence of irregular settlements in urban settings through the lens of the credibility theory. Investigating this phenomenon with data from Chile has some advantages. The three studies cited in the previous paragraphs were conducted in countries where the government is not able to provide low-income formal housing to all people in need, mainly because of the gigantic social pressure that exists for access to housing, especially in urban areas. On the contrary, Chile is a relatively small country that for the past couple of decades has implemented a large-scale housing policy that provides low-income housing almost for free through means-tested social programs. Therefore, the direct costs of accessing formal housing in Chile are low. Moreover, as we mentioned above, the country has reduced dramatically the housing deficit in the country in the past decades, at a rate that is, to our knowledge, not comparable to any other developing country. This evidence negates the hypothesis that it is the state's lack of capacity and political will that explains the persistence of slums in cities. Also, Chile is considered a middle-income country with a relatively well functioning democratic system and widespread respect for the rule of law (World Justice Project, 2019). Private property rights are strongly protected, which in principle should have a strong negative influence on the preference for living in an irregular settlement. Lastly, although slums are not usually evicted with the use of force, they are not actively promoted by politicians, at least since the return to democracy in 1990. All these conditions should make less likely for slums to serve better the interests of low-income households in comparison with formal housing with full property rights.

3. Credibility of informal settlements in Chile: comparing informal and formal housing dwellers

3.1. Data and method

In this section, we explore different indicators to support the assumption that informal property rights in Chile serve some important functions for the low-income population. We do this by comparing outcomes of households that are similar in several socioeconomic dimensions but differ in that a group of them lives under informal arrangements while the other lives under formal housing provided by the government. In particular, we explore two dimensions to describe the functionality of slums: actors' perceptions on location and crime security. Better location and more neighborhood security — as perceived by dwellers in informal housing settlements — are consistent with the credibility of informal arrangements as these dimensions can in part explain the persistence of slums as a means to access the benefits of urban growth; at the expense of sacrificing housing quality and value, which we also test. To explain pathways of persistence we also explore whether economic expectations are better for households living in informal settlements.

We analyze data from a unique household survey of a representative sample of informal settlement dwellers and subsidized housing dwellers conducted in 2008 in Santiago, the capital of Chile.⁴ The sample

consists of 812 households in 69 informal settlements (informal housing) and 776 households residing in 32 subsidized housing projects (formal housing). The questionnaire contains information about the residential history of each household, location preferences, housing quality, income, perception of neighborhood economic opportunities, neighborhood security, expectations, and full socio-demographic characterization of household members. The survey was implemented by interviewers in the field who visited each household in the sample. The interviewee was the household head as defined after enlisting household members and their relation to the household head. In the case of informal settlements, each unit was selected from an official list of slums kept by TECHO, an NGO dedicated to providing informal settlers with better housing conditions and assisting them in the transition to formal housing. The sample of 69 informal settlements is a random sample of the total number of informal settlements within the Metropolitan Region of Santiago as recognized by the NGO. Each settlement was then visited, and households within these settlements were all interviewed. Households in these settlements lack tenure on their property and as such are not legal owners of their houses. However, within each settlement each housing unit has a recognized informal owner and their unit is respected under informal arrangements.

The sample of formal housing dwellings comes from the list of housing projects kept by the Ministry of Housing and Urbanism of Chile. In the first stage a random sample of housing projects was selected from the list. Within each project, a random sample was taken from a list of all dwellers. With these two samples, we compared two different groups of dwellers, one from a representative sample of informal settlements and another from a representative sample of public housing projects in the Metropolitan Region of Chile. Table 1 shows that 92% of households in formal housing dwellings are owners, while the remainder consists of renters.

Although the survey was implemented in 2008, to our knowledge, it is a unique instrument as it allows the comparison of informal housing dwellers with formal subsidized housing dwellers using representative data of one of the major cities in Latin America. Also, it is isolated from the recent trend in migration that could confound the results and change the composition of informal housing settlements. Informal housing settlements have recently increased in part due to the massive flows of immigrants into Chile in the past years. In Fig. 1 we show the distribution of residency period (year of the household's arrival to its current residence); one could expect that informal settlements persist because they have existed for many years and remain within the city limits while the city is expanding outwards. On average we find that there is no difference in the mean of the residency period between informal and formal dwellers, which indicates that, for a myriad of reasons, informal settlements continue to be a residential alternative for low-income individuals in the country.

We first present simple mean differences between these two groups. However, informal and formal housing dwellers may differ in many dimensions so that simple differences of outcomes may confound factors such as income, age, risk aversion, or time since they first arrived to the present residence. To adjust simple mean differences for factors that confound the relation between housing property status and functionality dimensions we implement a propensity score matching method (see Caliendo & Kopeinig, 2008; Dehejia & Wahba, 2002; Rubin, 1973). Succinctly, propensity score matching compares each household in one group (e.g., informal housing) to a comparison unit that is constructed

(footnote continued)

used the same database that we use in this paper, which is Brain, Prieto, & Sabatini, 2010. Their study is primarily descriptive. Although they reach some similar conclusions, our paper relies on a more sophisticated methodological strategy to analyze the data, uses different variables to compare the situation between living in informal settlements and in formal housing, and engages with a different theoretical framework.

⁴ Although time has passed since the survey was conducted, we still consider it provides an interesting picture about the function and credibility of informal settlements in Chile. Actually, as we mentioned in *supra* note 2, the number of informal settlements in the past decade seems to be growing. Therefore, the tradeoffs between living in an informal settlement and living in subsidized formal housing are still present in the country. Using data from 2008 has another advantage. There has been massive migration to the country in the last 5 years, which adds new and complex variables to this topic. Therefore, using data from before that phenomenon occurred allow us to isolate better the variable we are interested, which is accessing formal housing with full property rights. To our knowledge, there is only one published academic article that has

Table 1
Descriptive statistics of informal and formal housing dwellers.

Variables	Formal housing dwellers		Informal housing dwellers		Diff. formal vs. informal	p-Value
	N	Mean	N	Mean		
Basic housing utilities						
External tap water	776	1	813	0.82	0.18	0.00
Internal tap water	776	1	813	0.67	0.33	0.00
Sewage	776	1	813	0.55	0.45	0.00
Sewage	776	1	813	0.72	0.28	0.00
Housing quality						
Solid walls	776	0.89	813	0.46	0.43	0.00
Solid floor	776	0.97	813	0.49	0.48	0.00
Solid roof	776	0.95	813	0.48	0.47	0.00
Property status						
Owner	776	0.92	n.a.	n.a.	n.a.	n.a.
Renting	776	0.06	n.a.	n.a.	n.a.	n.a.
Demographics						
Women head of household	776	0.42	813	0.42	0.00	0.94
Household's income (\$CLP)	776	\$75,457	813	\$65,865	\$9592	0.00
Years of schooling of HH Head	776	7.17	813	7.19	-0.02	0.90
Age of HH Head	776	45.31	813	41.88	3.44	0.00
HH head was born in a slum	742	0.07	801	0.15	-0.08	0.00
HH head Employment	595	0.92	618	0.94	-0.02	0.23
Father of HH head had basic education	776	0.59	813	0.70	-0.11	0.00
Mother of HH head had basic education	776	0.52	813	0.65	-0.13	0.00
Location						
Wants to stay in the same residence	761	0.42	776	0.30	0.12	0.00
Would move in the same county	761	0.29	776	0.60	-0.32	0.00
Would move to another county	761	0.29	776	0.10	0.20	0.00
HH head commuting time (min.)	527	51.16	543	39.71	11.45	0.00
Security						
Victimization	770	0.76	812	0.58	0.17	0.00
Poor police service	608	0.48	643	0.33	0.15	0.00
Suffers regular vandalism	767	0.62	805	0.43	0.19	0.00
Home robbed in the last year	773	0.14	810	0.14	0.00	0.90
Expectations						
Good expectations for Y2009	749	0.41	793	0.54	-0.12	0.00
Good expectations about Y2008	774	0.27	806	0.29	-0.02	0.34
Housing valuation						
Home's self-estimated value	653	\$10,742	584	\$243	\$10,450	0.00
Home's self-appraisal	772	5.65	796	4.32	1.32	0.00

Notes: This table presents descriptive statistics for the groups of dwellers in formal housing and the group of dwellers in informal housing. We show the mean and number of observations for each group, the difference between groups and the *p*-values of the test of simple mean differences. Victimization includes shootout, drug traffic, vandalism and robbery. House's quality in the self-appraisal variable is graded in a 1 to 7 scale where 1 is the lowest grade and 7 the highest.

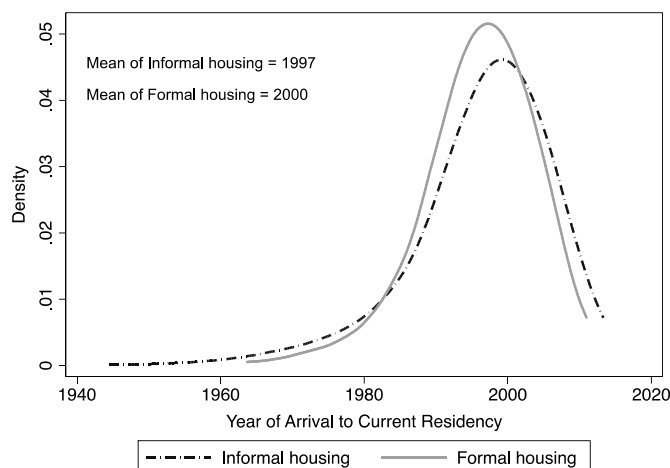


Fig. 1. Distribution of year of arrival to current residency by type of dwelling. Note: This Figure shows the distribution of year of arrival to the current residency by type of dwelling. Each household head is asked in the residential history module about the year that they arrived to the current place. We regress year of arrival on age and use the predicted values to adjust by age differences between formal and informal housing dwellers.

as the weighted average of households in the other group (e.g., formal housing) where the number of units in the comparison group and weights may vary in different specifications. Weights are constructed as the inverse of the predicted probability of being in one group or the other using a binary choice model.

The variables we use to adjust the simple mean differences in the propensity score matching are: the age of the household head, completed years of schooling of the household head, marital status, income per capita, and the number of household members. These are canonical demographic characteristics included in these types of analysis. To improve these adjustments we take advantage of the unique information in the survey about the residential history of each household and their self-reported socioeconomic status as children. First, we include a binary indicator that is equal to one for whether households' head were born in an informal settlement, which proxy for factors that are usually unobserved to researchers in other data and that closely relate to the propensity of living currently under informality. Second, we also add a binary indicator for whether parents of the individual had any kind of formal education, which relates to socioeconomic status at birth and poverty persistence across generations.

We ran several tests to measure the quality of the matching method including standardized bias reduction tests of different specifications, the goodness of fit, and tests of balance in different variables after matching.

All these are available on Web Appendix A. We present results using an Epanechnikov kernel and a linear specification of income. We also tested specifications using nearest neighbor matching and a second-degree order polynomial of household income. All results remain robust to this specification and are available in the Web Appendix B.

3.2. Results

The main hypothesis tested in this study is that informal housing arrangements are credible institutions in that they provide a means to access better opportunities in the city. Fig. 2 illustrates this idea. We constructed a map of the Metropolitan Region and computed the percentage of households in informal settlements and households in formal settlements that are located in each municipality. Panel A shows the concentration of informal settlements and Panel B does the same for formal housing projects in the Metropolitan Region. Darker colors illustrate a higher percentage of households while lighter colors represent a lower percentage of households in the municipality. In particular, we observe that the density of informal dwellers in municipalities located in central districts in Santiago and in the surrounding municipalities is, while small, noticeable. This is not the case for formal housing dwellers, whose spatial density is observed mostly in municipalities that are out of the inner-city limits, especially in the southwest quadrant, which is the poorest area of Chile's capital.

Next, we compare different outcomes reported by informal housing and subsidized housing dwellers in the survey. Table 1 shows descriptive statistics for formal and informal housing dwellers. Informal housing dwellers, relative to their formal counterparts, are younger, more likely to have been born in a slum, and more likely to have had parents or caregivers with completed primary education or more. To the extent that these variables are related to the outcomes of interest, any difference between formal and informal housing dwellers should adjust for such factors.

The first set of outcomes we look at are those related to preferences for a better location. Column 1 in Table 2 shows that while informal housing dwellers are less likely to report preferences to stay in their actual residence, they are 29 percentage points more likely to report that they would like to move within the same district (see Column 2). The results are mirrored when respondents are asked if they are willing to move to another district (see Column 3). While 30% of formal housing dwellers are willing to move outside their current district, informal housing dwellers are 21 percentage points less likely to do so. These results suggest that informal housing dwellers have strong preferences to stay in the same area where settlements are located, as compared to formal housing dwellers who are more willing to move outside their current location. The large differences suggest that a better location is a valuable attribute that can be reached through informal housing arrangements.

How do these preferences for location translate into other related outcomes? In what dimensions is location better? One of the main reasons to choose a particular location within a city is its closeness to socioeconomic opportunities. To test for whether informal housing dwellers take over land that is closer to these areas we look at differences in time commuting to work as a test for location quality. The results from the matching estimates in Column 4 of Table 2 show that informal housing individuals report 11 minutes less in their time commuting to work; which represents a difference of 21.5% compared to formal housing dwellers' reported average commuting time. As a reference, the mean commuting time for formal housing dwellers is very close to the overall average commuting time in Santiago of 50 minutes (CASEN, 2015). The differences in commuting time are related to the finding that informal housing dwellers are no less likely to be employed than formal housing dwellers (see Column 5). The data show slightly higher employment rates for informal housing dwellers but the difference is not statistically significant. These results support the conclusion that location choices of informal housing dwellers are far from random and are related to a search process for better

socioeconomic opportunities.

Additionally, we look at variables related to neighborhood security. Table 3 shows that while 77% of individuals in formal housing reported exposure to some level of crime (e.g., shootout, drug traffic, vandalism, and robbery), informal housing individuals are 18 percentage points less likely to report similar exposure. The next columns corroborate this finding. While informal and formal housing settlers show a similar probability of being robbed in the past year, informal housing dwellers are less likely to report poor quality police services or frequent episodes of vandalism in the neighborhood. The results from neighborhood security are also consistent with informal settlements as being functional to their residents. Formal housing solutions may be perceived not only as a worse alternative due to location but also a choice related to lower neighborhood quality, at least in terms of exposure to crime and police protection. Whether this is the result of better social capital within slums or actual lower crime rates in areas where these settlements are located is beyond the scope of this paper. However, the fact that informal dwellers are closer to jobs and feel safer, compared to similar households in formal dwellings, suggest that informal settlements provide goods that make such informal arrangements more attractive and stable.

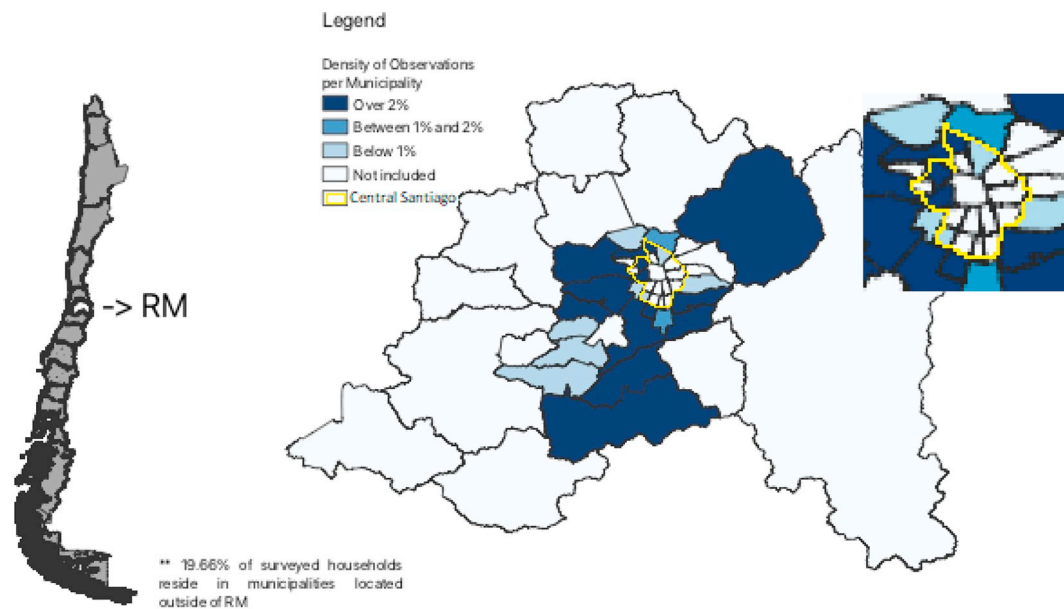
What are the costs of slums' functionality? Informal settlements are usually composed of lower than average housing quality. When we study self-reported home value and how individuals grade their homes, the differences between informal and formal housing groups are large. It is worth mentioning that the value of these homes is obtained after asking interviewees about their estimated value, similar to a willingness-to-pay exercise. Column 3 of Table 4 shows that there is a 40-fold negative difference in self-reported value between formal and informal housing dwellers. The difference is mainly driven by the fact that informal housing dwellers have practically no market where they can sell their property. That is why, when we look at the probability of receiving a purchase offer for their property, formal housing dwellers are 2.6-fold more likely to have received one. In terms of self-evaluation of home quality, on a scale from 1 to 7, informal housing dwellers grade their homes 1.24 points lower, which represents a 22.1% decrease relative to the mean of the grade formal housing dwellers assign to their dwellings.

Despite lower housing quality, how do informal and formal housing dwellers perceive their economic opportunities? The survey asks respondents about their perceptions of the economic evaluation of the present year and economic expectations in the coming year compared to their present circumstances. The survey also measures household income, which is included as a control variable for the matching/regression models. We believe that perception about future economic outcomes is an interesting variable to study as it proxies beliefs of prosperity that a priori, under the traditional belief that slum dwellers are trapped in poverty, should be lower for informal housing dwellers than households in formal housing. The results are shown in Table 4. On average there are no differences between groups in their evaluation of the current year. However, when we look at economic expectations for the next year, informal dwellers are 26.2% more likely to report that next year will be better than the current year. These results suggest that although informal housing dwellers, in fact, live in lower quality housing, they have higher expectations about their economic well-being. If economic expectations are determined not only by idiosyncratic characteristics but also environmental factors (e.g., closeness to jobs, social capital), informal settlements endure and may even react to such positive events creating a virtuous cycle that promotes their existence and growth.

4. Discussion and conclusion

In recent decades, Chile has made strong efforts to eradicate all informal settlements that exist in the country, through the provision of subsidized housing units that are constructed by the private sector and financed by the government. When this policy was first created in the

(a) Informal housing



(b) Subsidized housing

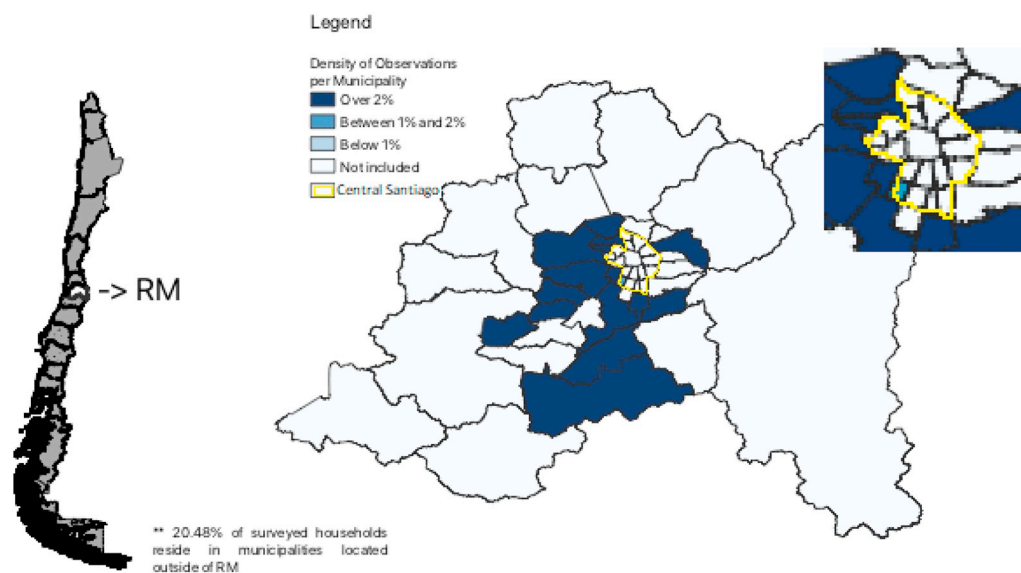


Fig. 2. Distribution of households by municipality and type of dwelling.

Note: This Figure shows the percentage of households in informal settlements and households in formal settlements that are located in each municipality. Panel A shows the concentration of informal settlements and Panel B does the same for formal settlements in the Metropolitan Region. Darker colors illustrate a higher percentage of households while lighter colors represent a lower percentage of households in the municipality.

Source: Celhay and Undurraga (2019).

late 1970s, it relied on a demand-side housing voucher that eligible families had to complement with savings and a credit from the banking system. Since the late 1990s and early 2000s, for the most vulnerable families the subsidy finances the housing unit almost entirely, with a very small percentage that has to be covered with personal savings (Simian, 2010). Under the policy, hundreds of thousands of low-income households have obtained access to formal housing with full property

rights almost for free. According to recent official data, the number of families living in irregular settlements reaches a total of 46,423 households, which for a developing country with a total population of around 17 million is a relatively small number.⁵ But it is still puzzling

⁵ See *supra* note 2.

Table 2

Matching estimates of differences between informal and formal housing dwellers in location preferences and employment.

Dependent variable	Wants to stay in current place	Would move in same district	Would move to another district	Commute time to work	Employ. rate
	(1)	(2)	(3)	(4)	(5)
Informal housing	−0.08*** (0.03)	0.29*** (0.03)	−0.21*** (0.02)	−10.98*** (2.69)	0.02 (0.02)
Formal housing mean	0.38	0.32	0.30	50.84	0.92
Observations	1485	1485	1485	1036	1171

Note: This table presents the matching results after adjusting differences between informal and formal housing dwellers using an epanechnikov Kernel for the home improvement variables. We use observations in the common support only. The coefficient of interest (“Informal housing”), refers to the average treatment on the treated effect of living in an informally owned place instead of a formal subsidized home. Every outcome is measured as a dummy that equals one when the household made any of the respective investments. The covariates used in the Probit regression to calculate the propensity score for each observation are: head of household's age, completed years of scholarship, a dummy variable equal to 1 if he/she was born in a slum, a dummy variable equal to 1 if married, a dummy that indicates if his/her parents have any kind of academic degree, household's income per capita, and number of members. Standard errors in parentheses.

* $p < 0.10$.** $p < 0.05$.*** $p < 0.01$.**Table 3**

Matching estimates of differences between informal and formal housing dwellers regarding security issues.

Dependent variable	Victimization	Evaluates police poorly	Sees frequent vandalism	Robbed in past year
	(1)	(2)	(3)	(4)
Informal housing	−0.18*** (0.03)	−0.15*** (0.03)	−0.19*** (0.03)	0.01 (0.02)
Formal housing mean	0.77	0.49	0.62	0.14
Observations	1530	1184	1520	1531

Note: This table presents the matching results after adjusting for differences between informal and formal housing dwellers using an epanechnikov Kernel for the home improvement variables. We use observations in the common support only. The coefficient of interest (“Informal housing”), refers to the average treatment on the treated effect of living in an informally owned place instead of a formal subsidized home. Every outcome is measured as a dummy that equals one when the household made any of the respective investments. The covariates used in the Probit regression to calculate the propensity score for each observation are: head of household's age, completed years of scholarship, a dummy variable equal to 1 if he/she was born in a slum, a dummy variable equal to 1 if married, a dummy that indicates if his/her parents have any kind of studying degree, household's income per capita, and number of members. Victimization includes shootout, drug traffic, vandalism and robbery. Standard errors in parentheses.

* $p < 0.10$.** $p < 0.05$.*** $p < 0.01$.

that many low-income individuals seem to prefer living in an urban slum rather than having access to a home that they can call their own property. Moreover, the number of slums seems to have increased in the last few years, although still in low numbers in comparison to other developing countries.

Chile's large-scale effort to provide massive access to formal housing has been inspired by the neoclassical economic idea that a property title can trigger a set of positive social dynamics that may improve the disadvantage situation of low-income households. It is far from accidental that the core architecture of the current housing policy regime was designed during the neoliberal transformation that occurred during Pinochet's dictatorship. Until very recent years, subsidized housing policy did not take into account issues related to where and how the families would live in the newly delivered housing units. It was assumed, explicitly or implicitly, that a roof with some minimum quality standards and with the full tenure security represented by formal property title would be enough to improve the lives of low-income people.

Irregular settlements have proven to be more difficult to eradicate than expected, especially given the country's expansive housing policy and strong protection of private property rights. Our findings provide some explanations. Despite all the incentives that exist to obtain a low-income housing, it is not always true that ownership of a subsidized housing unit serves better the interests of disadvantaged families in comparison with the opportunities that slums offer. Indeed, according to our analyses, in Santiago, irregular settlements offer a better connection to the geography of opportunities in the city and provide better neighborhood security than living in a subsidized housing unit. Informal housing dwellers have shorter commutes to work, have the same access to labor opportunities, and have less exposure to crime. They are willing to sacrifice the fact that owning a house constitutes a commodity that has formal market value for better access to urban opportunities.

A little bit of context about Chile's housing policy and urban market dynamics may provide more insights about our findings. Chile's policy regime has relied strongly on the private sector, which ultimately organizes and constructs the housing units with government funding. One of the main problems of these subsidy programs is that they tend to incentivize the private sector to construct dense low-income housing projects in cheap land, often located at the periphery of Chile's urban areas (Gil Mc Cawley, 2019). Many low-income families have been moved from relatively well-located irregular settlements to isolated formal housing projects (Rodríguez & Sugranyes, 2005; Sabatini et al., 2001; Simian, 2010; Tokman, 2006). This may explain the differences between the two groups we analyzed concerning neighborhood satisfaction and access to urban opportunities.

The theoretical insights provided by the credibility thesis are helpful to understand the findings we present in this paper. In certain contexts, irregular settlements, despite their insecure property status, may still serve the interests of much of the low-income population of a country. In other words, the function presides over the form. Slums may persist if they perform relevant functions and are deemed credible by the relevant social agents (Ho, 2014, 2017). To perform their function, irregular settlements should provide some level of tenure security, albeit not total. Indeed, we know from anecdotal information that, at least since the return to democratic government, the forced eviction of informal settlements is not a common pattern in Chile. Usually, when an attempt to close a settlement is made, the government and other stakeholders help the communities living in these places to find a solution through the housing programs that the government offers. Likely, low-income households living in housing informality are not frightened by the chances of a sudden eviction from the land they are occupying illegally. However, they do know that at some point they will have to move from the settlement and that they cannot take advantage of the value of the place where they have been living. Despite this situation,

Table 4

Matching estimates of differences between informal and formal housing dwellers in expectations and home value.

Dependent variable	Economic expectations are good for next year	Economic evaluation is good for current year	Home's self-reported monetary value	Has been offered to buy their home	Home's self-appraisal grade
	(1)	(2)	(3)	(4)	(5)
Informal housing	0.11*** (0.03)	0.02 (0.03)	− 10,027*** (210)	− 0.20*** (0.02)	− 1.24*** (0.09)
Formal housing mean	0.42	0.28	10,269	0.32	5.57
Observations	1492	1528	1192	1516	1517

Note: This table presents the matching results after adjusting differences between informal and formal housing dwellers using an epanechnikov Kernel for the home improvement variables. We use observations in the common support only. The coefficient of interest (“Informal housing”), refers to the average treatment on the treated effect of living in an informally owned place instead of a formal subsidized home. Every outcome is measured as a dummy that equals one when the household made any of the respective investments. The covariates used in the Probit regression to calculate the propensity score for each observation are: head of household's age, completed years of scholarship, a dummy variable equal to 1 if he/she was born in a slum, a dummy variable equal to 1 if married, a dummy that indicates if his/her parents have any kind of academic degree, household's income per capita, and number of members. Standard errors in parentheses.

* $p < 0.10$.** $p < 0.05$.*** $p < 0.01$.

some low-income households still prefer to live in an irregular settlement given the urban advantages that these locations provide.

This paper contributes to the literature that has applied the credibility theory to understand the persistence of slums in the developing world. From a methodological and empirical perspective, it advances the literature by confirming some important claims through the quantitative analysis of rich microdata from representative samples of low-income individuals living under different property arrangements in a highly institutionalized urban setting. Moreover, we have put forward new indicators or proxies that may be used to assess the credibility of property rights of housing: actors' perceptions on location and perceptions of neighborhood security. Through the use of a propensity score matching strategy we ascertained that these new indicators can be meaningfully applied for the measurement of credibility while controlling for factors that may influence the relationship between property status and socioeconomic outcomes.

From a theoretical perspective, this paper highlights a critical dimension that may explain the credibility of slums; this dimension relates to the access that they may offer to some important urban benefits. Previous studies have revealed the importance of irregular settlements as a strategy to obtain affordable housing for families that do not have other ways to find a home. Our study adds that there are other aspects in which informal slums may offer comparative advantages vis-à-vis formal, affordable housing, namely aspects of location and neighborhood safety. In that sense, our findings provide further insight into the apparent paradox of why social actors would favor informal, “irregular” institutional arrangements over formal, state-subsidized and state-protected ones; because “the key to understanding the enigma might be ascertained from analyzing the credibility of institutions: a refocusing of our analysis from form to function, detached from any normative, political, or theoretical assumptions about form” (Ho, 2017, p. 85).

Our findings should not be interpreted as a claim in favor of urban informality. Rather, our claim is for a better understanding of the life and opportunities surrounding the people that live in housing informality, or what has become known as “opening the black box of institutions” (ibid, p. 8). That understanding should inform sound public policies aimed at providing access to formal housing that will consider the social needs covered by some informal settlements in addition to the benefits already offered by government housing programs.

CRediT authorship contribution statement

Pablo Celhay: Conceptualization, Methodology, Writing - original draft, Formal analysis, Validation. **Diego Gil:** Conceptualization, Methodology, Writing - original draft, Formal analysis, Writing - review & editing, Data curation, Validation.

Declaration of competing interest

The authors declare that they have no financial or material interests in the results of this paper.

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Appendix A. Supplementary data

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