

Where do Property Rights Matter More? Explaining the Variation in Demand for Property Titles across Cities in Mexico

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Abstract

Existing empirical research has established that stronger legal claims to property in urban areas have significant market value, but previous studies examine this question in a single city or market. This paper is the first effort to test theories about the role of market context in the demand for property rights in urban areas (Demsetz 1967). In Mexico, properties with full title are 11 percent more valuable than those without, *ceteris paribus*, but this difference in value varies substantially across cities. In this paper, I use detailed household survey data in a multilevel regression model to examine the determinants of this variation. Characteristics of cities such as the share of the population with a college education and civic participation, as well as the regulatory environment, have a greater impact on the value of property rights than economic variables. These findings suggest the Mexican government should reconsider the purpose and targeting of subsidies for property titling.

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Where do Property Rights Matter More?

Explaining the Variation in Demand for Property Titles across Cities in Mexico

Introduction

As in much of the world, many homeowners in Mexican cities do not have clear legal title to their property. Also similar to many other countries, the types of property rights claims individuals possess are diverse. Illegal squatting on land belonging to another private party is relatively uncommon. It is common, however, for families in Mexico to legally own property that was not urbanized according to the proper legal process. Many of these families have begun but not completed regularization proceedings, and therefore have some legal claim to their home (Monkkonen 2012). Roughly one-fifth of owner-occupied houses in Mexico do not have a deed (ENIGH 2010). Another set of households, almost 10 percent (ENIGH 2010), have a deed and strong legal claim to their property, such as a contract of purchase, but have not yet changed the deed into their name. This situation is also common because many property owners do not write legal wills and consequently, those that will inherit property sit in a period of uncertainty until deeds are legally transferred.

In this paper, I investigate theories about the demand for and value of property rights that have not been empirically tested in urban areas (Demsetz 1967). In Mexico, otherwise identical houses with full title were an average of 11 percent more valuable than those without in the 78 largest cities. But this price difference varies substantially across cities. I test hypotheses about the determinants of that variation, relating it to the average value of property, some socioeconomic indicators, the economic strength of the city, the quality of legal and bureaucratic institutions, and the local political environment. To do this, I use a rich source of household-level survey data—over 25,000 observations—from 78 cities in Mexico for the years 2008, 2010, and 2012. Results show that several city-level factors are strongly related to the value of a title. However, other factors predicted to correlate strongly, including city size and various measures of a city's economic dynamism, do not.

There is an ongoing debate over the merits of land titling programs, which will benefit from empirical research on how market context shapes the demand for property rights claims. Secure property rights are widely accepted to be a necessary condition for economic development and individual prosperity (North 1981; Barro 1996), but questions remain as how to best obtain property security. The idea that programs to issue formal titles for land and property to the households that lacked them should be undertaken was embraced by the international development community in the 1990s and early 2000s, inspired in part by the work of Peruvian economist Hernando De Soto (1986; 2000). He argued that property rights for urban land are essential for the functioning of capitalism because they enable households to obtain credit, work outside the home, and invest in their house with confidence; in other words, property rights activate capital that is otherwise 'dead.' There is evidence from careful studies in Peru and Argentina that strengthening property rights in urban slums has a significant effect on residential investment (Field 2005), labor out of the house, and children's health (Galiani and Schargrodsky

2004). The international attention to this issue spurred many countries to subsidize the regularization of land, issuing full legal title to millions of households around the world.

The push to use land titling as a development strategy, however, is not universally accepted. Some scholars argue that the emphasis on full legal title to property is misplaced and many titling programs are a waste of resources (Gilbert 2002). Research by De Soto himself (2000) highlights the way informal property rights systems can function quite efficiently. In fact, the informal property rights system in Indonesia, which De Soto describes in some detail, has been argued by others to assist the housing markets' efficiency in a context of low-incomes and ineffective bureaucracy (Monkkonen 2013). Moreover, standard economic theory on the evolution of property rights suggests that policymakers should not overly subsidize land titling programs. The standard theory is that the importance of property rights varies by context because demand is greater where claims are more contested (Demsetz 1967). Land and property that are more valuable will be more contested. Therefore, as land increases in value, property rights systems become more important.

As of yet, existing work that empirically examines the demand for property rights focuses on agricultural land (Alston et al. 1999; Miceli et al. 2001). For example, Jacoby and Minten's (2007) research on land registration in sub-Saharan Africa raises the important question of cost-effectiveness of registration from the perspective of those who register property. For policymakers undertaking cost/benefit analyses of titling subsidies and modernization programs, empirical testing of hypotheses about the determinants of the value of title can assist in providing a decision-making framework. Modernizing administrative records and practices to a level that allows for an efficient land registration system can be costly. This suggests that in some contexts these costs will outweigh any benefits to individuals. Eviction is relatively uncommon in Mexico and it is normal for properties without full title to have access to public services. Thus, the main risk for the quarter of owner-occupied houses in Mexico without full title is litigation and the possibility of the loss of their property in the courts.

This paper is organized into three main sections following this introduction. In section two, I review existing literature on the value and demand for clear property claims to land, including hypotheses about where full property title will be more valuable. Section three describes the dataset used for the present study. In section four, I present and analyze the results of multilevel models that test the previously developed hypotheses. Finally, I conclude with a discussion of policy implications for land regularization programs in Mexico and the world.

How Valuable Are Clear Property Rights Claims?

Research on demand for and the value of land titles has not overlapped extensively. Those writing on the demand for property rights tend to focus on explaining differences in rates of registration of agricultural land using characteristics of the land and its occupants. This effort is exemplified by the work of Alston et al. (1999) and Miceli et al. (2001) who examine the demand for the registration of agricultural land in Brazil and Kenya. They consider competing factors: more valuable land with more educated and wealthier owners is found more likely to be registered, whereas registration is less common for land that is far from administrative centers as

it is more costly to register. Despite the parallels to land titling in urban areas, this is not a commonly applied research approach for cities. One exception is Monkkenen (2012), who adapts these models to the regularization¹ of urban land in Tijuana, Mexico. He finds, contrary to theoretical predictions, that there has been a higher rate of regularization in less valuable parts of the city.

Research framed as the study of the value of a land or property title is generally based on a hedonic regression model. Such models typically decompose the value of land and housing into various components, such as size, materials, infrastructure, location and the strength of property rights claims. This approach has been undertaken in cities around the world; table 1 presents a summary of results. In some cities, researchers find properties with title to be only a few percentage points more expensive than those without. In others cities, such as San Jose, Costa Rica, they are as much as 80 percent more expensive! There are multiple hypotheses that can explain this difference, summarized below.

Table 1: Summary of Results from Studies of the Property Title Premium

Author, Year	City, Country	Variable	Title Premium (%)	Notes
Friedman, Jimenez and Mayo, 1988	Manila and Davao, Philippines	Full title	23 & 58	
Struyk et al., 1991	All urban Indonesia	Certificate Tax receipts	35 – 48 9 – 21	Owner-occupied units
Dowall and Leaf, 1991	Jakarta, Indonesia	Certificate Tax receipts	45 – 60 20 – 25	Model of land prices not housing
Lanjouw and Levy, 2002	Guayaquil, Ecuador	Full title	23.5	Expected value
Kim, 2004	Ho Chi Minh City, Vietnam	Legal papers Title Both	3 8 10	For sale classified listings
Mendez, 2006	Costa Rica	Full title	69 – 85	
Dowall and Monkkenen, 2007	Brasilia, Recife and Curitiba, Brazil	Full title	0 – 39	Model of land prices not housing
Jacoby and Minten, 2007	Farmland in Madagascar	Full title	6	Farmland

¹ Registration of agricultural land is a relatively simple procedure, whereas regularization implies much more, often requiring a detailed survey, the subdivision of a larger parcel, and the change of legal status.

Other findings from the existing body of work should be considered. For example, several studies show that different levels of property rights claims, such as receipts showing proof of payment of property taxes, are valued by the market and have a significant relationship to property prices (Struyk et al. 1991). Lanjouw and Levy (2002) show that in Ecuador, the age of the community and the strength of its organization can substitute for legal title. In the context of Vietnam's emerging real estate market, possessing multiple types of property rights claims was found to have a much greater price impact than the sum of different types of claims independently (Kim 2004).

The work by Kim (2004) acknowledges the issue of endogeneity in models of the value of property title. As she writes, "owners of more valuable properties might tend to pursue the cost and trouble of obtaining title to protect their asset" (Kim 2004:294). This means that title can serve as a proxy for unobserved quality factors. However, she argues that this is not a threat in most urban contexts, as the probability of a property having title depends heavily on factors beyond a person's initiative, such as local administrative capacity, location and form of housing development, the age of the house, and the length of tenancy. Monkkonen (2012), in the case of one Mexican city, found that of those neighborhoods which were originally developed in an irregular manner, the ones located in more expensive parts of the city had less titling. This runs counter to expectations that more valuable properties will be more likely to have titles, a potential endogeneity threat to modeling exercises. If properties with title are of higher quality than those without, estimates of the value of title will be biased.

Scholars have directly studied how a title benefits different groups of people. Notably, Lanjouw and Levy (2002) examine the premium associated with property titles and informal claims in different types of communities. The main theoretical motivation for this work is the idea that in a counterintuitive manner, titles will be less important in wealthy neighborhoods as rich households can assert their claims to property without full title. They address the threat of endogeneity by using survey data that asks those *with* title to estimate their property's value *without* title and vice-versa.

Mendez (2006) examines whether some groups value legal titles more than others. He distinguishes between three types of gains that legal titles impart to those that hold them: security of tenure and protection from eviction; the ability to use the property as collateral; and an increase in exchange value due to lowering transactions costs when selling the property. He identified a subset of the population who would stand to benefit most from full title by examining responses to questions about evictions, housing investments, and residential moves. He then tested whether titles added more value to their properties than the rest of the population. The premium on a title for the high-value group was roughly twice that of the low-value group.

The present study combines insights from the two areas of research described above in order to develop—and test—hypotheses that explain why a higher value is placed on full title in certain cities. Only one prior effort similar was identified in the literature. Struyk and colleagues (1991) examine differences in the premium for properties with full and partial title in different sizes of city in Indonesia, but lack an explicit theoretical motivation for doing so. Nor do they discuss the interesting inconsistency in their results. They find that the weaker property claim (tax receipts)

is more valuable in larger cities whereas the stronger claim (a certificate) is more valuable in smaller cities.

Based on the literature discussed, there are four areas in which the context of a specific housing market is expected to influence the importance of property titles: (1) the property market itself; (2) the local economy; (3) the legal or bureaucratic context; and (4) the political environment. First and foremost, the context of the property market itself will be a primary factor in differences between cities. The basic insight of early theories on the evolution of property rights is that in where property has greater value—be it due to agricultural productivity, natural resources, or its location relative to employment in an urban area—titles will have a greater value (Demsetz 1967). Both Alston and colleagues (1999) and Miceli and colleagues (2001) consider land value to be a primary determinant of demand for property rights. Thus, markets in larger cities and places with more expensive housing are expected to place greater value on property rights.

Second, titles are expected to be related to levels of economic development and dynamism beyond the property market connection. Other socio-economic characteristics of a place are also hypothesized to increase demand for property rights. Knack and Keefer (1997), in an analysis of the impacts of social capital on economic growth, find that countries with higher levels of social capital have more secure property rights. A population that is more educated and civically engaged is likely to have a higher collective demand for titles. Education in particular is expected to affect demand for titles, as more educated individuals can take advantage of formal property rights—for example, by using it to obtain credit. Moreover, they will be able to obtain a title with less cost because they can better navigate the bureaucratic system (Alston et al. 1999).

Third, a more cumbersome court system and slow and costly local bureaucratic processes should lead to titles being more valuable (because it becomes more costly to obtain them). The extra time and money required to obtain permits and register property is one of the main reasons regulations are argued to increase housing prices (Monkkonen 2013). Thus, the value of a title is hypothesized to vary according to the difficulty in obtaining it, as it can represent a lesser or greater effort and expense.

Finally, the political environment is hypothesized to impact the importance of property rights. According to the specific context, political instability might affect demand for property rights positively or negatively. Volatile political environments might be associated with more risk of eviction in some places, but in Mexico this is not the expectation. Evictions are not common in Mexico. More commonly, titling programs and informal housing development have been used as patronage by local politicians (Varley 1998; Shuetz 2008). Therefore, more competition is expected to reduce the possibility of eviction, increase the probability of property rights being granted, and make titles less valuable.

Data from Household Surveys of Income and Expenditures in Mexico

The National Household Income and Expenditure Survey (*Encuesta Nacional de Ingresos y Gastos de Hogares* or ENIGH) contains detailed data on housing and households and is the

primary data source for the analysis. The ENIGH is a national survey conducted according to a stratified multi-phase design for maximum statistical validity. Until 2012, over 25,000 households were surveyed every two years. In 2012, that number dropped to roughly 9,000. The analysis in this study is limited to owner-occupied houses in the 78 largest cities in Mexico², primarily due to the availability of data for city-level indicators. Rental housing is considered because renters are not asked about the status of their property deeds in the ENIGH. A much smaller number of properties, less than one percent, are eliminated as well based on the type of structure—dwellings on rooftops or those that are in spaces not intended for habitation. Finally, observations with missing data on the important variables were excluded, including the roughly one percent of houses that are listed as in litigation, or “*en litigio*”³. This leaves a sample size of over 10,000 housed in both 2008 and 2010, and over 3,000 in 2012.

The majority of questions in the survey focus on the structure and distribution of household incomes and expenditures, including detail on housing expenditures. It is an ideal source of data for housing market analyses because it includes an estimate of the house’s value. Sobrino (2014) used this in a recent analysis of housing sub-markets in Mexico City. The present analysis relies heavily on two variables in the ENIGH: a self-estimate of house value and the status of a house’s deed. The former variable has the standard caveat about self-reported housing values: they tend to be overestimates, but the bias is not correlated with other variables and thus usable in hedonic analyses (Kain and Quigley 1972).

The latter variable is based on a question added in 2008, which asks respondents whether they have a deed (*escritura*) for their house and whether the owner’s name is on the deed. This variable is available only for owner-occupied units, which make up about 71 percent of all houses. It is not uncommon for a house to have a deed in a name other than that of the owner. There are two common anecdotal reasons for this. Individuals often wait after purchasing a house to change the name on the deed because recording a property transaction and obtaining a new deed is costly—and the penalties for not doing so are not immediate. Many property transactions are conducted without bank financing and therefore changing the name on the deed is not a condition of sale. Secondly, in the case of a death, it is not uncommon for inheritors of a property to delay the transfer of ownership due to the cost.

In the 2008–2012 period, more than a quarter of owners in large urban areas either did not have a title to their house (21 percent) or the title they do have is under the name of someone else (eight percent). These shares changed very slightly over the four year period in question; the proportion with no title decreased from 23 to 20 percent whereas the share with a title under another name increased from seven to nine percent.

Properties with a full deed are expected to differ from those without in a number of ways. In order to report on these differences, Table 2 presents summary characteristics of residential infrastructure (water, electricity, and method of trash disposal), the physical condition of the house (the type of materials used for the walls, floor, and roof), the age of the house, its mode of acquisition (i.e. whether it was self-built or purchased already built) a proxy for the location

² The smallest has over 100,000 residents. There are 91 cities in Mexico with over 100,000 residents.

³ Unfortunately, there is no indication as to whether these properties, or others, are on former *ejido* land (Piña et al., 2003).

within the city, and a proxy for size (the number of rooms) for the combined sample.⁴ Some variables, such as construction materials and infrastructure, were simplified by combining categories with very few observations.

Table 2: Housing Characteristics Summarized by Property Rights Status

Variable	Full title	Deed in other name	No deed
Average estimated monthly rent (thousands of pesos)	2.6	1.9	1.5
Year of sample			
2008 (%)	70.2	7.1	22.7
2010 (%)	72.6	7.3	20.1
2012 (%)	71.8	8.6	19.6
Apartment (%)	5.9	4.2	5.4
Size of locality			
> 100,000 (%)	76.1	71.9	56.9
15,000 – 100,000 (%)	10.4	12.0	13.1
2,500 – 15,000 (%)	6.4	7.7	10.5
< 2,500 (%)	7.1	8.4	19.5
Type of walls			
Wood (%)	2.7	2.9	5.2
Clay /Adobe (%)	3.4	4.3	4.2
Brick, cement, or stone (%)	93.3	91.9	87.8
Improvised (%)	0.6	0.9	2.8
Type of roof			
Metal (%)	4.6	6.1	9.2
Asbestos (%)	3.4	5.6	6.9
Wood (%)	2.7	3.6	3.3
Tile (%)	0.8	1.3	1.4
Cement slab (%)	86.7	80.2	74.1
Improvised (%)	1.8	3.3	5.2
Type of floor			
Earth (%)	1.8	1.9	5.4
Cement or concrete (%)	38.9	50.9	60.2
Wood, tile, or other (%)	59.2	47.2	34.4
Kitchen			
Yes (%)	96.8	94.7	92.0
No (%)	3.2	5.3	8.0

⁴ Distance to the city center is not available in the data, but there is a variable that indicates the size of the locality in which houses are located. Localities are defined by the census of Mexico and correspond to districts of cities, with more centrally located localities always being larger.

Variable	Full title	Deed in other name	No deed
Water supply			
Tap inside (%)	87.8	80.2	67.0
Tap outside but on property (%)	9.3	15.4	21.4
Public tap (%)	0.1	0.2	0.6
From another house (%)	0.5	1.1	2.4
Truck (%)	0.8	0.7	4.1
Well, river, lake or other (%)	1.6	2.6	4.6
Existence of toilet/latrine			
Yes (%)	98.7	97.8	94.9
No (%)	1.3	2.2	5.1
Electricity source			
Public grid (%)	99.5	99.4	98.2
Private source (%)	0.1	0.0	0.1
Solar panel (%)	0.0	0.0	0.1
Other source (%)	0.2	0.2	1.0
No electricity (%)	0.2	0.4	0.6
Method of garbage disposal			
Garbage truck or cart (%)	93.3	93.7	88.1
Public landfill (%)	0.8	0.9	1.1
Dumpster (%)	2.5	2.1	1.5
Burn it (%)	3.1	3.0	8.2
Bury it (%)	0.1	0.1	0.3
Other (%)	0.3	0.3	0.9
Type of tenancy			
Owned with payments (%)	10.8	7.4	21.1
Owned outright (%)	89.2	92.6	78.9
Average age of house	14.3	14.7	9.7
Method of acquisition			
Purchased already built (%)	33.0	24.7	23.8
Built by current owner (%)	23.6	24.6	33.2
Owner hired a builder (%)	38.7	41.7	38.7
Other (%)	4.6	8.9	4.1
Average number of rooms	4.6	4.2	3.7

Source: Encuesta Nacional de Ingresos y Gastos de Hogares (ENIGH), 2008, 2010, 2012

The second level of data used in the analysis is cities. I follow the definition of cities developed by federal government agencies in Mexico⁵. Several measures for the four areas of hypothesis

⁵ Three federal agencies in Mexico (CONAPO, SEDESOL and INEGI) work together to define urban areas. They define cities as urban areas with more than 15,000 residents and divide them into three categories – metropolitan areas, urban conurbations, and urban centers – depending on the spillover of urbanized land across administrative boundaries. Details can be found in *Comisión Nacional de la Población* (2012).

testing are based as the work of the Mexican Institute of Competitiveness (IMCO), which develops indices of competitiveness for cities and states and disseminates the data used to create them. Data are taken from a variety of sources to serve as direct measures or proxies for these four areas. Table 3 presents variables with sources and summary statistics. All variables except for the three indices of the legal and bureaucratic environment are available for 78 cities, which together have over 25,000 housing units with data. Data for these three indices are available only for 31 cities, the biggest city in each state, and thus analysis is reported separately for these variables.

Table 3: Descriptive Statistics of City Characteristics, 78 Largest Cities in Mexico

Variable	Source	Definition	Mean	Std Dev
<i>Property Market</i>				
Population	CONAPO	Log of city population	13.12	0.89
House price	ENIGH	Quality controlled average price	0.30	0.26
<i>Local economy</i>				
Incomes	INEGI	Median household income, 2010	8.36	0.15
University	INEGI	Percent of adults with university	0.09	0.03
Inequality	ENOE	Gini coefficient for salaries	0.35	0.05
<i>Legal and bureaucratic context</i>				
Enforcing contracts	DB	Index of steps, days, and cost to enforce contract	0.00	2.13
Property registration	DB	Index of steps, days, and cost to register property	-0.02	2.08
Construction permits	DB	Index of steps, days, and cost to obtain construction permit	-0.02	1.87
<i>Local Political Environment</i>				
Citizen participation	IFE	Percent population registered to vote	0.43	0.09
Electoral competition	IFE	Difference between 1 st and 2 nd place in federal elections	0.14	0.11

Sources: Comisión Nacional de Población (CONAPO), Instituto Nacional de Estadísticas e Información Geográfica (INEGI), Encuesta Nacional de Ingresos y Gastos de Hogares (ENIGH), Comisión Nacional Bancaria y de Valores (CNBV), Encuesta Nacional de Ocupación y Empleo (ENOE), Doing Business (DB), and Instituto Federal Electoral (IFE).

A full property title is hypothesized to have a greater value in larger cities with more valuable property, and a more dynamic local economy. Demand for property rights increases with competition for and claims on property. Similarly, in more economically dynamic places, the

greater rule of law and formality overall should create an environment in which titles are more important. Inequality is widely assumed to reduce the security of property rights (Keefer and Knack 2002). Therefore, greater levels of income inequality are hypothesized to be associated with lower values for titles.

Titles are expected to be more valuable in cities with more onerous bureaucracies, because as transactions costs increase, the value of completed paperwork will also be higher. Additionally, the local political environment in Mexico is closely connected to irregular and illegal urban development as property rights have traditionally been used as a form of patronage. Therefore, more competition is hypothesized to negatively affect the value of titles. Although the research on patronage and access to land and housing in Mexico emphasizes political competition (Shuetz 2008), Cleary (2007) makes a compelling argument and provides empirical evidence that citizen participation in local politics is a better measure of the local political environment and the responsiveness of local governments. The impact of civic participation on the demand for titles, however, is expected to be positive, as greater levels of compliance with formal rules is expected to make non-compliance increasingly costly.

Analysis and Results

A standard hedonic framework is used to test the hypotheses about city level relationships to the value of full title. This is usually an ordinary least squares (OLS) regression using the logged value of property price in the form:

$$\log(H) = \beta_0 + \beta_1 X + \beta_2 T + \varepsilon$$

Where H is the value of the house, X is a vector of house characteristics, and T is a dummy variable that indicates if the owner of the house has a deed. In some of the models presented, there are two T variables, one indicating if there is a deed in the name of the owner and the other indicating if there is a deed in another person's name.

Cities' housing markets are expected to differ from one another in various ways. On account of pooling data from different cities in the analysis, I use a multi-level model (Rabe-Hesketh and Skrondal 2008). I interact different city characteristics and the dummy variable for full title in order to test hypotheses about their impact on the value of title. This is expressed as the following:

$$\text{Level 1: } \log(H_{ij}) = \beta_{0j} + \beta_1 * X_{ij} + \beta_{2j} * T_{ij} + \varepsilon_{ij}$$

$$\text{Level 2: } \beta_{0j} = G_{00} + G_{01} * C_j + u_{0j}$$

$$\text{Level 2: } \beta_{2j} = G_{10} + G_{11} * C_j$$

Where C is the city characteristic in question, i indexes houses, and j indexes cities.

Before these interactions between city characteristics and title are considered, however, three hedonic regressions are run: one using traditional OLS and clustered standard errors; one

random-intercept multilevel model; and one random-intercept and slope multilevel model. Both multilevel models are estimated via maximum likelihood. The random-slope model assesses the variation in the effect of title on price across cities. Table 4 presents the results of these three models.

Table 4: Results from OLS and multilevel models of log housing price

Variables	OLS regression	Random-intercept	Random-intercept and slope
Housing type			
Apartment	0.263*** [-0.075]	0.048*** [-0.017]	0.045*** [-0.017]
Wall material			
Wood (ref)			
Adobe	-0.100* [-0.053]	0.063** [-0.029]	0.063** [-0.029]
Cement	0.070** [-0.030]	0.142*** [-0.022]	0.143*** [-0.022]
Roof material			
Metal (ref)			
Wood	0.147* [-0.085]	0.086** [-0.034]	0.085** [-0.034]
Cement slab	0.160*** [-0.043]	0.202*** [-0.018]	0.202*** [-0.018]
Floor material			
Earth (ref)			
Cement	0.159*** [-0.028]	0.126*** [-0.025]	0.126*** [-0.025]
Wood	0.463*** [-0.047]	0.493*** [-0.026]	0.493*** [-0.026]
Age	0.001 [-0.001]	0.001*** [-0.000]	0.001*** [-0.000]
Number of rooms	0.176*** [-0.010]	0.163*** [-0.002]	0.163*** [-0.002]
Water availability			
Inside house (ref)			
On property	-0.139*** [-0.022]	-0.170*** [-0.013]	-0.170*** [-0.013]
Public tap	-0.160* [-0.082]	-0.233*** [-0.081]	-0.222*** [-0.081]
Another house	-0.133*** [-0.046]	-0.161*** [-0.039]	-0.160*** [-0.039]
Truck	0.034 [-0.059]	-0.0799*** [-0.030]	-0.0734** [-0.030]
Well or stream	-0.049	-0.100***	-0.101***

	[-0.059]	[-0.026]	[-0.026]
Bathroom inside house	0.132**	0.056**	0.0581**
	[-0.051]	[-0.026]	[-0.026]
No electricity	-0.103	-0.137**	-0.140**
	[-0.074]	[-0.068]	[-0.068]
Trash disposal			
City collects (ref)			
Dumpster	-0.057	0.103***	0.103***
	[-0.095]	[-0.030]	[-0.03]
Burn it	-0.215***	-0.158***	-0.160***
	[-0.049]	[-0.020]	[-0.020]
Other	-0.292***	-0.183***	-0.184***
	[-0.077]	[-0.058]	[-0.057]
Locality size (residents)			
100,000 (ref)			
15,000-100,000	-0.186***	-0.168***	-0.168***
	[-0.052]	[-0.013]	[-0.013]
2,500-15,000	-0.289***	-0.301***	-0.299***
	[-0.058]	[-0.016]	[-0.016]
< 2,500	-0.390***	-0.389***	-0.389***
	[-0.053]	[-0.015]	[-0.015]
Self-built	-0.072***	-0.195***	-0.195***
	[0.018]	[0.012]	[0.012]
Owner hired builder	-0.038***	-0.079***	-0.079***
	[0.011]	[0.010]	[0.010]
Title status			
None (ref)			
In owner's name	0.105***	0.112***	0.097***
	[-0.017]	[-0.009]	[-0.012]
In other name	0.055***	0.041***	0.043***
	[-0.016]	[-0.016]	[-0.016]
Constant	5.802***	5.813***	5.822***
	[-0.085]	[-0.052]	[-0.052]
Observations	25,885	25,885	25,885
Number of groups	NA	78	78
R-squared	0.464		
SD of intercept		0.254***	0.250***
		[.021]	[.021]
SD of slope (full title)			0.042***
			[0.012]
SD of slope (partial title)			0.000***
			[0.000]
Model chi-square		22,927.08	21,591.33

Notes: Standard errors in brackets. *, **, and *** indicates significance at the 0.1, 0.05 and 0.01 levels. Includes controls for year, kitchen, and whether the house is owned outright or payments still being made. Coefficients for categories of infrastructure and materials not significantly associated with price are not reported. This includes walls of improvised material; roof of asbestos, tile or improvised material; trash collection in a public landfill or buried; and electricity from a private source, solar panel or other.

Controlling for the multitude of factors associated with higher property prices, properties with a deed in the owner's name were found to be 11 percent more valuable than those with no deed. Properties with a deed in someone else's name were four percent more valuable. This is as expected. A deed in the current owner's name represents a much stronger property rights claim than a deed in the name of someone else, but any deed, even one in a different name than the current owner, is of some value. In an interesting aside, an identical regression model that included an interaction term between full title and whether the house was self-built revealed that having a fully legal deed only adds value to properties that are not self-built⁶.

The third regression shows variation in the value of full title across cities. There is substantial variation in the value of full title, with a standard deviation of four percent. Although the variation in the value of a deed in another's name is statistically significant, it is of trivial importance (0.0000002).

Using data from the three time periods separately, identical regressions⁷ revealed that the value of full title increased substantially from 2008 to 2012; it was associated with a ten percent increase to the value of a house in 2008, 11 percent in 2010, and 14 percent in 2012. Given the economic dynamics of the time period, this is as anticipated; an increasingly robust economy is thought to increase competition for and thus the value of property rights. This disaggregated analysis also reveals that a deed in another's name was only significantly associated with property price in 2010. This—along with the lack of important variation across cities—led me to drop this variable describing this weaker property rights claim from further analysis.

In order to assess the importance of different city-level characteristics on the property rights premium, I use a multi-level model with interactions across levels; between full title and the various city characteristics. Table 5 reports the results from two models, one using the full sample of 78 cities and one using a limited sample. The measures of the legal and bureaucratic environment from the Doing Business Survey (enforcing contracts, property registration, and construction permits) only have data for 31 cities. These are the largest cities in each state; therefore, the limited sample still had 19,107 observations, with an average of over 100 observations per second level group. The larger models had an average of 332 observations in each of the 78 cities.

⁶ Results of this model available upon request.

⁷ Results are not reported here but available upon request. Coefficients on the vast majority of control variables do not vary substantially.

Table 5: Results from multi-level models of log housing price

Variable	Full sample: 78 cities		Partial sample: 31 cities	
	Coefficient	Interaction	Coefficient	Interaction
Full title	-0.105 [0.167]		-0.294 [0.254]	
<i>Property market</i>				
Population	0.004 [0.006]	-0.001 [0.007]	0.009 [0.009]	-0.004 [0.010]
House price index	0.938*** [0.031]	0.035 [0.036]	0.896*** [0.048]	0.069 [0.054]
<i>Local economy</i>				
University	-0.542 [0.332]	0.955** [0.385]	0.066 [0.740]	0.209 [0.818]
Inequality	0.028 [0.154]	-0.020 [0.185]	-0.349 [0.263]	0.647** [0.306]
<i>Legal and bureaucratic context</i>				
Enforcing contracts ±			0.010 [0.007]	-0.013* [0.008]
Property registration ±			0.012** [0.006]	-0.010 [0.007]
Construction permits ±			-0.007 [0.005]	0.010* [0.006]
<i>Local political environment</i>				
Citizen participation	-0.144 [0.095]	0.249*** [0.109]	-0.317** [0.141]	0.458*** [0.162]
Electoral competition	-0.120* [0.070]	0.080 [0.083]	-0.107 [0.114]	-0.016 [0.129]
Constant			6.183*** [0.264]	
Observations			18,449	
Number of groups			31	
SD of intercept			0.566*** [0.033]	
Model chi-square			21,323.65	

Notes: Coefficients not reported for the following house-characteristic controls; year of sample, housing type, materials of wall, roof, and floor, age, kitchen, number of rooms, availability of water, electricity, and trash service, kitchen in house, whether money is owed on house, and the mode of acquisition. Standard errors in brackets. *, **, and *** indicates significance at the 0.1, 0.05 and 0.01 levels.

The coefficients of control variables only showed trivial changes from those reported in table 4 so they are not included in table 5. Instead, the table only reports the coefficient for the city characteristic itself and the interaction between the city-level variable. It is this interaction term that is most relevant, as it indicates whether there is significant variation in the value of a title along the city-level variable. Due to a relatively high correlation between a city's average income and education (a Spearman correlation coefficient of 0.51) and a lack of significant bivariate association on the interaction between average incomes and full title, education is used in lieu of income. There is limited correlation between the other city characteristics.

Of the ten city characteristics tested, there is a significant association between their interaction with the full title dummy for five—the share of the city with a college degree, the level of income inequality, indices describing the difficulty to enforce contracts and obtain a construction permit, and the degree of citizen participation in the political process. One caveat is that income inequality is only significantly associated with the value of title in the second model with a smaller sample of cities, thus perhaps should not be interpreted as a clear test of the hypothesis.

Surprisingly, a quality-controlled average housing price is not significantly associated with higher values for full titles, nor is average income, as mentioned above. Rather, the two strongest and most significant relationships are the interaction between title and a city's share of college educated residents and the share registered to vote. These two variables do partly reflect the economic dynamism of a city, but also the importance of the social side of socio-economics. Housing markets in cities with more highly educated residents likely place a greater value on formality because their residents are better able to capitalize on formality and have an easier time navigating the system. Further, those places with more voters also have a population that is more actively engaged with other formal systems and thus not surprisingly is more willing to pay for a full title to their house.

The relationship between bureaucratic procedures and the value of property rights is somewhat surprising. Although it is not strong overall, given the limited number of second level observations, it is not trivial. The main surprise is that there is no clear association with the difficulty in registering property, which was expected to have an impact on the supply side. The value of a title should partly reflect the cost of obtaining it, which is higher where bureaucracy is more complicated. However, delays and higher costs of construction permit regulations are associated with higher value for full title, which also reflects how onerous regulation is in a given city. It should not be surprising that in cities where it is more difficult to enforce legal contracts, full titles have lower values.

Figure 1: Predicted average prices of properties with and without title for cities with different shares college educated

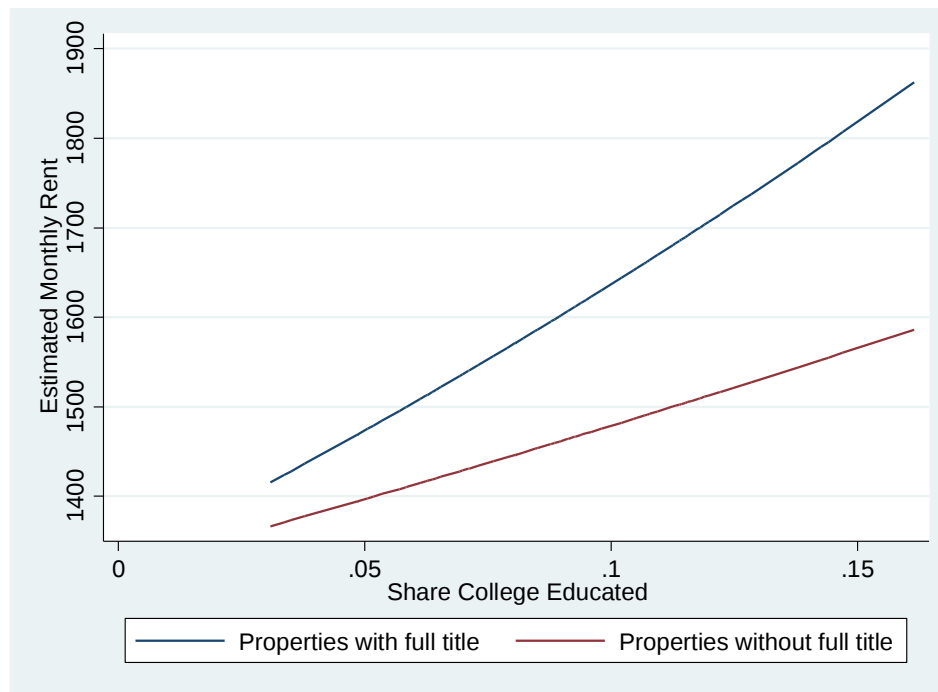


Figure 1 presents a visual representation of the relationship between the average value of title and the share of the population that is college educated by estimating values of average houses with and without title in cities with varying levels of college education. Houses with title are slightly more than 15 percent more expensive at most, in the most educated cities. In the least educated cities, houses with title are roughly four percent more valuable.

Conclusions

This paper is the first effort to study the variation in the value of property title across cities in a systematic manner, and to test hypotheses about the impact of city-level characteristics on the premium for properties with full title. The results of multi-level models show that houses with full title are more valuable in cities with a population who is more educated and more actively involved in civic life. Additionally, titles are more valuable in cities with higher transactions costs in construction permitting and where enforcing contracts is easier. It is surprising that houses with full title are not more expensive on average in larger, higher income cities than in smaller cities with lower average incomes. This is counterintuitive. It may be a feature unique to Mexico, but merits further study.

The findings in this paper shed some empirical light on heretofore untested hypotheses of institutional economic theory on the evolution of property rights. The idea that demand for and value of property rights increase as the property's ownership becomes more contested is partly rejected (Demsetz 1967). Instead, the most important finding is that social or cultural factors like

education, inequality, and civic participation are much more strongly correlated to the value of full property rights. Additionally, institutional factors like the difficulty in obtaining a construction permits and enforcing contracts are also significant.

The findings also have policy implications in respect to the program design for subsidizing regularization. The fact that property titles are worth more in some cities suggests that the Mexican Secretariat of Social Development would do well to channel the subsidies from its property regularization subsidy program, PASPRAH, to the cities where titles are worth more. This would increase the cost effectiveness of the program. Moreover, this subsidy program is currently structured as a poverty alleviation program, but it should also be understood as an urban development program. Full property rights facilitate property transactions. Governments often overlook the importance of property formality for the development of markets and the negative impact of informality on affordability in urban areas (Smolka 2003).

A second policy implication of the analysis relates to the transaction of property registration. In Mexico, as in many countries, the current cost of obtaining a deed or transferring a deed from one individual to another is in part based on the price of the property (Monkkonen 2014). The simple fact that almost 10 percent of owner-occupied houses have a deed in another person's name suggests that the cost of transferring a deed exceeds the benefit for many people. Changing the pricing mechanism for property registration and transfer could improve the system and reduce the disincentives to formalize property.

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