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

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**Summary.** — This paper examines the variation in the value of property rights to housing in Mexico, focusing specifically on differences between urban housing markets. Roughly 30% of owner-occupied houses in Mexico do not have a proper deed. Houses with no deed are estimated to be five percent less valuable than otherwise similar houses with a full deed, yet this premium varies widely across cities. I match data from the 2012 and 2014 National Survey of Household Incomes and Expenditures to different sources of city-level data in order to examine hypotheses explaining this variation in a multilevel regression framework. I find that deeds are valued more in cities with more highly educated residents, more political competition, and more voting. Measures of local economic activity, degree of informality, and the regulatory bureaucracy are not associated with higher value to full property rights. Additionally, I find that more educated households value deeds more, and having a deed is more valuable for larger houses in neighborhoods with less vacancy and higher infrastructure quality. Based on these results, I suggest funds to subsidize titling should be redirected to places where titles are worth more. More broadly, I suggest policymakers reconsider framing property-titling programs as poverty alleviation. Low-income households would benefit more from subsidies for improvements to housing and residential infrastructure. At the same time, the federal government should further push to reduce the costs of transferring property.

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*Key words* — property rights, housing deed, housing demand, hedonic model, Mexico

## 1. INTRODUCTION

Land-titling programs are a common component in a standard set of urban and economic development policies internationally, in spite of continued debate over their usefulness and importance. Secure property rights are argued to be a necessary condition for economic development and individual prosperity by many (Barro, 1996; North, 1981), but questions remain as how to best obtain tenure security. One reason for the continued debate is that research on the way in which local context shapes the demand for and the importance of full legal title is limited.

The debate over land titling as a development strategy is inspired in part by De Soto (1986, 2000), who argues that property rights for urban land are essential for capitalism to function. Moreover, they are thought to empower the poor by enabling them to obtain credit, work outside the home, and invest in their house with confidence. In other words, property rights are seen as activating capital that is otherwise inaccessible. Evidence from studies in Peru, Argentina, and Mexico suggests that strengthening property rights in urban slums has a significant effect on residential investment (Field, 2005; Puig, 2012), labor outside of the home, and children's health (Galiani & Schargrodsky, 2004).

Yet, many scholars argue that the emphasis on full legal title to property is misplaced and titling programs are a waste of resources (Gilbert, 2002). Research by De Soto himself (2000) highlights the way informal property rights systems can be quite effective in providing security of tenure. In fact, the informal property rights system in Indonesia, which De Soto describes in some detail, is actually found to improve housing affordability by facilitating elastic supply in a context of low-incomes, strict regulations, and ineffective bureaucracy (Monkkonen, 2013).

Standard economic theories of the evolution of property rights raise questions about the degree to which policymakers should subsidize land titles. One of the central theories of

property rights developed by Demsetz (1967: 350) is that they develop “to internalize externalities when the gains of internalization become larger than the cost of internalization.” Although Demsetz is primarily referring to the shift from open access to individual rights, the perspective raises the important question of the costs and benefits to individuals and society in maintaining a system of land titles and deeds. The value of legal property rights claims is thus expected based on their importance for both market transactions and tenure security.

Existing research examining the variation in demand for and value of property rights claims focuses primarily on agricultural land (Alston, Libecap, & Mueller, 1999; Miceli, Sirmans, & Kieyah, 2001), with one notable exception (Kim, 2007). Jacoby and Minten's (2007) research on land registration in sub-Saharan Africa raises the important question of the cost-effectiveness of registration for those who register property. For policymakers undertaking cost/benefit analyses of titling subsidies and modernization programs, empirical evidence about the determinants of the value of title can assist in providing a decision-making framework. Modernizing administrative records and practices can be costly, and in some contexts these costs will outweigh their benefits to individuals.

Kim (2007) focuses on a more difficult to measure explanation for variation in the demand for property rights. She argues that the differences in the market premium associated with property rights security in two cities in Vietnam stems

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from local civic and political culture, rather than differences in bureaucratic efficiency or the value of the property itself.

In this paper, I investigate the variation in the value of one property rights claim—deeds for houses—across cities in Mexico. As in much of the world, many homeowners in Mexico do not have full legal title to their property. The types of property rights claims many individuals possess are diverse. Illegal squatting on land belonging to another private party is relatively uncommon in contemporary Mexico, but many families' property that was not urbanized according to the formal legal process. In addition, many of these families have begun but not completed regularization proceedings, and therefore most have some legal claim to their home but not full legal title (Monkkonen, 2012).

The deed represents a final, and potentially costly step in the acquisition of full property rights claims in Mexico. More than one fifth of owner-occupied houses in Mexico do not have a deed and almost one tenth have a deed that is not in their name (INEGI, 2015). The latter situation arises in part from transactions that are never registered. Also, many people do not have wills, thus those that inherit their property face a challenge in legally transferring property (Jimenez, Cruz, & Ubaldo, 2012).

In Mexico, homeowners' estimates are that houses with a full deed were almost six percent more valuable than similar houses without, in rural and urban areas, after controlling for house, household, and neighborhood characteristics. Yet this estimate of a deed's value differs substantially across urban areas. The standard deviation of the estimated value is as large as the premium itself. This variation should not be surprising. There is a diversity of factors pushing individuals to value deeds more in particular places, from greater threats to tenure security, to more opportunities for using property as collateral, or the ability to obtain a higher price when selling it (Muñoz-Peña et al., 2003). Similarly, there is a diversity of legal origins for housing in Mexico, from squatting to unauthorized developments, on land that is private, state or collective, all of which have implications for the formalization process (Azueta de la Cueva, 1987).

In order to test various hypotheses that seek to explain the difference in the value of property rights across markets, such as the prevalence of informality, the level of economic activity, the quality of legal and bureaucratic institutions, and the local political environment, I use the National Household Income and Expenditures Survey (ENIGH by its initials in Spanish), household-level survey data from 2012 and 2014. The results expand upon and reinforce Kim's (2007) finding that in Vietnam, local political culture is closely associated with the self-assessed value of property rights claims. In Mexico, the share of a city's population with university education, the extent of electoral competition, and the degree of citizen participation in voting are all statistically significantly associated with a higher value for property rights claims at the city level, whereas variables measuring local economic activity, degree of informality, and level of inequality are not. Additionally, more educated households value property rights more, and having a deed is more valuable for larger, self-built houses in neighborhoods with better infrastructure and less housing vacancy.

The findings demonstrate the need for further investigation and debate on this topic. They draw into question the relevance and structure of government efforts to provide property titles as a development strategy. Should resources be dedicated to giving titles in places where they are not greatly valued? Should these programs be considered as poverty reduction programs, giving preference to households who place less value on property rights? Or should resources instead be direc-

ted to improving the institutions that provide households with property rights and providing low-income households with residential infrastructure?

## 2. RESEARCH ON THE VALUE OF PROPERTY RIGHTS CLAIMS

Research on demand for and the value of land titles has not overlapped extensively. Studies of 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. Alston et al. (1999) and Miceli et al. (2001), for example, 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 urban land. One exception is Monkkonen (2012), who adapts these models to the regularization<sup>1</sup> of urban land in Tijuana, Mexico. He finds, contrary to theoretical predictions, that there has been a higher rate of regularization in neighborhoods with lower land values.

There are many studies of the value of title for urban land. These are generally based on a hedonic regression model that decomposes the value of land and housing into attributes, 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 from eight studies. 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% more expensive. The present study incorporates this work in developing control variables at the house and neighborhood level.

Other findings from the existing literature help frame the analysis. 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, Hoffman, & Katsura, 1990). 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 greater price impact than the sum of different types of claims independently (Kim, 2004).

The work by Kim (2004) raises 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). Thus, title can serve as a proxy for unobserved quality factors. 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. Nonetheless, it is evident in the descriptive data for Mexico (Appendix Table 6), there is a clear correlation between titling and housing quality. Thus, this threat to endogeneity must be taken seriously.

Another aspect of the variation in the value of property rights scholars have directly studied is the way in which a title benefits different groups of people. Notably, Lanjouw and

Table 1. Summary of results from studies of 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. (1990)	All urban Indonesia	Certificate	35–48	Owner-occupied units
		Tax receipts	9–21	
Dowall and Leaf (1991)	Jakarta, Indonesia	Certificate	45–60	Model of land prices not housing
		Tax receipts	20–25	
Lanjouw and Levy (2002)	Guayaquil, Ecuador	Full title	23.5	Expected value
Kim (2004)	Ho Chi Minh City, Vietnam	Legal papers	3	For sale classified listings
		Title	8	
		Both	10	
Mendez (2006)	Costa Rica	Full title	69–85	
Dowall and Monkkonen (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

Levy (2002) examine the premium associated with property titles and informal claims in different types of communities. Their main theoretical motivation is the counterintuitive notion that titles will be less important in wealthy neighborhoods because rich households can assert their claims to property without full title. They address the threat of endogeneity by using survey data that ask those *with* title to estimate their property's value *without* title and vice versa, and find that titles are subjectively valued more by households in newly formed, low-income settlements.

Mendez (2006) also examines whether some groups value legal titles more than others. Using survey data from Costa Rica, 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 identifies 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. Then, he tests whether titles added more value to their properties than the rest of the population, finding that the premium on title for the high-value group was roughly *twice* that of the low-value group. This is contrary to the findings of Lanjouw and Levy (2002), indicating the need for more systematic comparison across contexts.

The present study combines insights from the two areas of research described above, developing and testing hypotheses to explain why individuals place a higher value on full title in certain cities in Mexico. Only one similar effort was identified in the literature. Struyk et al., 1990 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 and only use comparison across categories rather than statistical analysis. 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.

Four aspects of a local context are expected to influence the value of property title: (1) property market characteristics, (2) the local economy, (3) the legal or bureaucratic context, and (4) the political environment.

The property market itself should be a primary factor in differences between cities. One basic implication of early theories on the evolution of property rights is that in places 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 et al. (1999) and Miceli et al. (2001) consider land value to be a primary determinant of demand for property rights in agricultural areas. Thus, it stands to reason that property rights to houses are likely to be more valuable in cities with more expensive housing. Additionally, the degree of informality in a city's property market is likely to influence the value of having a deed.

Second, the value of a title is expected to be related to levels of economic activity in a city and the distribution of resources available. 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).

The effect of a more cumbersome court system and slow and costly local bureaucratic processes on the value of title is unclear. 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). Onerous bureaucracy might make titles more valuable because it becomes more costly to obtain them, but where households must pay more to obtain a title it may also reduce the need to have one and thus their value as more houses do without.

Finally, the political environment is hypothesized to impact the value of property rights. Depending on the 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, though evictions are relatively uncommon in Mexico. In Mexico, titling programs have often been used as patronage by local politicians (Schuetz, 2008; Varley, 1998), though the 1992 amendment to the Mexican constitution is argued to have limited this practice by giving at least some irregular land developers more power (Salazar, 2012). Therefore, political competition may increase uncertainty around property rights and therefore be associated with more valuable titles. Similarly, titles are expected to be more valuable in places with higher levels of civic participation because this reflects a greater commitment to formal rules among the population (Cleary, 2007).

### 3. 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. It is a national survey conducted according to a stratified multi-phase design for maximum statistical validity. In 2012, roughly 9,000 households were surveyed and in 2014 this number was over 13,000 (INEGI, 2012, 2014). Roughly 16,000 of these 23,000 are owner-occupied houses, and about 10,000 of these are located in the 75 largest cities<sup>2</sup> in Mexico. The urban sample is the focus of the majority of hypothesis testing due to the availability of data for city-level indicators.

The present analysis focuses on owner-occupied houses because renters are not asked about property deeds in the ENIGH. A much smaller number of properties, less than one percent, are also eliminated because of the type of structure—dwellings on rooftops or spaces not intended for habitation. Another very small set of observations with missing data on key variables were excluded.

The majority of questions in the survey focus on the structure and distribution of household incomes and expenditures, including housing expenditures. As such, it is a useful data source for housing market analysis—as evidenced by Sobrino's (2014) study of housing sub-markets in Mexico City, Nuñez, Paredes, & Garduño-Rivera (2015), and the World Bank Urbanization Review for Mexico (forthcoming)—because it includes an estimate of house value. This estimate is self-reported. Self-reported house values are generally overestimates (Goodman & Ittner, 1992; Kain & Quigley, 1972), and this creates a threat of endogeneity stemming from a possible correlation between accuracy of estimates and propensity to have a title. If older household heads, for example, overestimate the value of their home and are more likely have full title, the use of self-reported values will bias estimates of the value of title.

Fortunately, a recent study (Gonzalez-Navarro & Quintana-Domeque, 2009) rigorously examined the discrepancy between self-reported and assessed values of houses in Mexico. Gonzalez-Navarro and Quintana-Domeque test the correlation between characteristics of homeowners and the difference between external and self-reported values for their house. Their analysis reveals two important facts. First, they find that individual's estimates of house value in Mexico are not very accurate, especially as compared to previous studies conducted in the United States. Self-reported values are 124% of appraisers' estimates on average. Therefore, I interpret coefficients not as a market premium but as an owner's estimates of the value of housing attributes.

Gonzalez-Navarro and Quintana-Domeque (2009) also find that education, household expenditures, and title status were not significantly associated with bias or inaccuracy in estimates of house value. The length of time a household had lived in their home, on the other hand, is. Households who have moved recently have a much more accurate understanding of their home's value. Thus, Gonzalez-Navarro and Quintana-Domeque recommend that studies using self-reported values limit their analysis to recent-movers. Therefore, I run a parallel set of models restricted to houses built or purchased within five years that more accurately reflect market values. Coefficients from the two sets of models can be interpreted alternately as estimates of value placed on housing attributes (full sample) and estimates closer to the market value (recently built houses).

ENIGH surveyors ask homeowners whether they have a deed (*escritura*) for their house and whether the owner's name is on the deed. In the sample of houses in large urban areas from the ENIGH in 2012 and 2014, over 21% of houses had no deed and eight percent had a deed under the name of someone else. The latter likely results from individuals waiting to change the name on the deed after purchasing a house. Recording a property transaction is costly (Monkkonen, 2016) and the penalties for not doing so are not immediate. Additionally, in the case of a death, it is also common for inheritors of a property to delay the transfer of ownership due to the cost or lack of will.

Properties with a full deed are expected to differ from those without in a number of ways (Field, 2005). Appendix Table 6 presents summary characteristics of house, household and neighborhood<sup>3</sup> characteristics for all houses and urban houses with and without full deed. Some variables, such as construction materials, were simplified by combining categories with few observations. The first variable reported is the self-reported rental value of the house. Without controls, we see that households valued houses with deeds between 30 and 40% more than houses without.

There are stark differences in the physical conditions of houses (the type of materials used for the walls, floor, and roof) with and without full title<sup>4</sup>, for all houses and for urban houses only. For example, 76% of houses with title have a cement slab roof whereas only 60% without title do. Houses with title have 4.2 rooms on average and houses without only have 3.6. Roughly 33% of houses with title were purchased already built whereas only 19% of houses without were. Houses without title are also about 3 years newer. The quality of residential infrastructure (water, electricity, and method of trash disposal) also differs. For example, 79% of houses with title have a water tap inside the house but only 57% of those without do.

Additionally, the attributes of households living in fully titled houses differ from those without title. More educated and older households are more likely to own houses with full title. The average age of household heads with full title is 54 years as compared to 48 years for those without. Those with a full deed have a 13% higher level of education. Finally, more houses have full title in neighborhoods that are larger and more centrally located, with similar levels of housing vacancy but much higher infrastructure quality. The average neighborhood of a house without full title has roughly 42% of houses lacking in residential infrastructure, whereas only 25% of houses in the neighborhoods of fully titled houses do.

The second unit of analysis is cities or urban areas. I follow the definition of urban areas developed by federal government agencies in Mexico (Comisión Nacional de la Población, 2012). Measures for the four groups of factors outlined previously—housing market, economy, legal/bureaucratic environment, and political/civic culture—are taken from several sources, including the National Agrarian Registry, the 2010 Census of Population and Housing (INEGI, 2010), and the Mexican Institute of Competitiveness (IMCO). IMCO develops and disseminates indices of competitiveness for cities and states in Mexico. Their data are from a variety of official government sources.

Table 2 presents variables with sources and summary statistics. Data are available for 75 cities, except for the three measures of legal and bureaucratic environment, which are only available for 31 (the biggest city in each state). Therefore, analysis is conducted separately for these variables. Most of the correlations between these city-level variables are small and not significant. Only two pairs of variables (income and

Table 2. *Descriptive statistics of city characteristics, 75 largest cities in Mexico*

Variable	Source	Definition	Mean	Std. Dev.
<i>Property market</i>				
Population	CONAPO	Log of city population	13.12	0.89
Deed	INEGI	Percent of houses with deed	0.84	0.05
Self-built	INEGI	Percent of houses self-built	0.14	0.04
House price	ENIGH	Quality controlled average price	0.30	0.26
<i>Ejido</i> land	RAN	Share of city area that is <i>ejido</i>	0.21	0.13
<i>Local economy</i>				
Avg. income	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>				
Contracts	DB	Index of steps, days, and cost to enforce contract	0.00	2.13
Registration	DB	Index of steps, days, and cost to register property	-0.02	2.08
Permits	DB	Index of steps, days, and cost to obtain construction permit	-0.02	1.87
<i>Local political environment</i>				
Participation	IFE	Percent population registered to vote	0.43	0.09
Competition	IFE	Difference between 1st and 2nd 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), Registro Agrario Nacional (RAN), Comisión Nacional Bancaria y de Valores (CNBV), Encuesta Nacional de Ocupación y Empleo (ENOE), Doing Business (DB), and Instituto Federal Electoral (IFE).

education, and share formal and share self-built) had a correlation coefficient of greater than 0.3, and they are less than 0.4.

#### 4. ANALYSIS AND RESULTS

This section presents three sets of models. All models use the standard hedonic framework (Rosen, 1974) to test the various hypotheses about the relationship between city characteristics and the value of full title. Hedonic models of housing prices are an ordinary least squares (OLS) regression in which the logged price is regressed on a set of house characteristics with 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, one dummy is used to indicate a deed in the name of the owner and the other indicating if there is a deed but in another person's name.

To ameliorate the threat of endogeneity stemming from self-reported prices, I run two sets of models. The first uses all houses and the second restricts the data to houses built within five years of the survey. The fact that data indicate recently built houses rather than households who have recently moved is not ideal as it limits the sample size, but it is close enough. We can interpret coefficients in the models recently built homes as more reflective of market values.

Table 3 reports the results of four models; two using the full sample and two using houses built within five years. The first of each set tests for the importance of household and neighborhood characteristics for all houses in the country, the second for urban houses only. All are OLS with standard errors clustered at the place level, which is a municipality for rural houses and urban area (sometimes including more than one municipality) for urban houses.

The majority of the results are as expected and consistent with most studies of housing price. Houses built of more substantial material, with better access to infrastructure and pub-

lic services, in larger, higher quality neighborhoods, are estimated by their owners to have a higher price. Coefficients on individual dummies for the number of rooms in a house are not reported because they are included as dummies, but are strongly statistically significant and increasing in size.

Controlling for house and neighborhood characteristics, properties with a deed in the owner's name have a higher price—roughly six percent—than those with incomplete title. When household characteristics (gender, age, and education of household head) are included, the perceived value added of a title drops somewhat but not dramatically. Results are consistent for recently built houses, which are closer to market premium. Female-headed households tend to report higher value houses with and without quality controls.

The second set of models mirror the first, but include interaction terms that assess how much the house, household, and neighborhood characteristics affects the assessment of a deed's value by owners. Table 4 presents results for the coefficients that are statistically significant and/or most relevant from two models; one using all houses and one using recently built houses only.

Of all the house attributes, two significantly interact with the dummy for full deed in the sample of recently built houses; size and the materials used to build the house's walls. Larger, more solidly built houses are worth more, and having title adds more value to larger houses. But if one has a title, the added value from having concrete walls actually disappears. This is an unusual result that might result from the tenure security implied by concrete walls.

In the larger sample, houses that are self-built and do not have a full deed are nine percent less expensive than those purchased already built. However, having a deed greatly reduces this discount, and houses that are self-built but have full title are only about two percent less expensive than otherwise similar houses.

Both measures of neighborhood 'quality' have a statistically significant interaction with full title. A title adds less value to a house in neighborhoods with higher vacancy rates or with worse infrastructure quality. This is consistent with the idea that a title brings more value to places and households that

Table 3. *Models results from OLS models of log housing price*

Variables	All houses		Recently built houses	
Housing type				
Apartment	0.202** [0.103]	0.177* [0.093]	0.427*** [0.160]	0.367*** [0.141]
Wall material (wood is ref.)				
Adobe	-0.078* [0.042]	-0.064 [0.041]	-0.121 [0.104]	-0.0742 [0.098]
Cement	0.136*** [0.035]	0.133*** [0.033]	0.142** [0.056]	0.169*** [0.056]
Roof material (metal is ref.)				
Wood	0.024 [0.042]	0.016 [0.042]	-0.226** [0.106]	-0.249*** [0.095]
Cement slab	0.094*** [0.029]	0.0727*** [0.028]	0.0994** [0.046]	0.068 [0.043]
Floor material (earth is ref.)				
Cement	0.114*** [0.033]	0.0973*** [0.032]	0.0794 [0.058]	0.061 [0.056]
Wood	0.393*** [0.041]	0.307*** [0.040]	0.407*** [0.072]	0.289*** [0.068]
Age	0.000 [0.001]	0.000 [0.001]	-0.005 [0.010]	-0.004 [0.010]
Water availability (in house is ref.)				
On property	-0.147*** [0.021]	-0.112*** [0.020]	-0.165*** [0.048]	-0.096** [0.045]
Another house	-0.268*** [0.060]	-0.250*** [0.055]	-0.174** [0.082]	-0.143* [0.081]
Bathroom in house	0.109*** [0.034]	0.0862** [0.035]	0.184*** [0.061]	0.173*** [0.062]
No electricity	-0.213*** [0.070]	-0.214*** [0.069]	0.032 [0.110]	-0.004 [0.105]
Self-built	-0.127*** [0.031]	-0.0417 [0.027]	0.00259 [0.057]	0.0258 [0.053]
Trash disposal (city collects is ref.)				
Burn it	-0.137** [0.067]	-0.120** [0.055]	0.0219 [0.090]	0.00935 [0.081]
Other	-0.282*** [0.056]	-0.275*** [0.058]	-0.279*** [0.082]	-0.253** [0.099]
Locality size (> 100,000 is ref.)				
15,000–100,000	-0.184*** [0.046]	-0.158*** [0.043]	-0.136** [0.067]	-0.109* [0.062]
2,500–15,000	-0.318*** [0.047]	-0.279*** [0.044]	-0.206*** [0.078]	-0.189*** [0.067]
<2,500	-0.431*** [0.044]	-0.374*** [0.041]	-0.279*** [0.075]	-0.231*** [0.069]
NBD hsg. vacant (%)	-0.0734* [0.043]	-0.0572 [0.040]	-0.025 [0.063]	0.00121 [0.059]
NBD infras. quality	-0.788*** [0.159]	-0.731*** [0.150]	-0.351 [0.245]	-0.361* [0.213]
Male household head		-0.038*** [0.012]		-0.117*** [0.030]
Education of head		0.005*** [0.001]		0.004*** [0.001]
Age of head		0.077*** [0.004]		0.088*** [0.008]
Title in owner's name	0.058*** [0.012]	0.044*** [0.011]	0.057* [0.031]	0.053* [0.029]
Constant	6.540*** [0.084]	5.967*** [0.087]	6.462*** [0.159]	5.912*** [0.173]
Observations	15,978	15,978	2,052	2,052
R-squared	0.477	0.514	0.468	0.515

Notes: Coefficients not reported for year dummy (not significant) and non-significant categories of the following variables: trash disposal, water availability, roof materials, and method of acquisition. Coefficients on individual dummies for number of rooms also not reported though most are strongly statistically significant and increasing in size. Standard errors in brackets. \*, \*\*, and \*\*\* indicates significance at the 0.1, 0.05 and 0.01 levels.

Table 4. OLS results: Log housing price with interaction between house, household, neighborhood characteristics and full deed, urban houses only.

Variable	All houses		Recently built houses	
	Coefficient	Interaction w/deed	Coefficient	Interaction w/deed
Walls of cement (wood is Ref.)	0.053 [0.055]	0.0615 [0.044]	0.241** [0.096]	-0.279* [0.163]
Age	-0.000 [0.001]	0.001 [0.001]	-0.011 [0.015]	0.029 [0.022]
Number of rooms	0.115*** [0.006]	0.011 [0.008]	0.113*** [0.019]	0.043** [0.020]
Self-built (purchased is Ref.)	-0.087*** [0.032]	0.068* [0.035]	0.0301 [0.082]	0.013 [0.099]
NBD hsg. vacant (%)	-0.851*** [0.225]	-0.091 [0.197]	-0.170 [0.353]	-0.861** [0.392]
NBD infras. quality	-0.042 [0.110]	0.090 [0.116]	0.180 [0.151]	-0.542** [0.226]
Householder is male	-0.061** [0.025]	0.041 [0.032]	-0.139*** [0.048]	0.051 [0.071]
Householder education	0.073*** [0.005]	0.014* [0.007]	0.079*** [0.013]	0.030* [0.017]
Householder age	0.006*** [0.001]	0.001 [0.001]	0.004* [0.002]	0.003 [0.003]
Constant	6.002*** [0.122]		5.820*** [0.238]	
F-statistic	107.49 <sup>a</sup>		18.26 <sup>a</sup>	
Observations	9,987		1,136	
R-squared	0.464		0.566	

Notes: Coefficients not reported for control variables (models include all those reported in Table 3). Standard errors (clustered by urban area) in brackets. \*, \*\*, and \*\*\* indicates significance at the 0.1, 0.05 and 0.01 levels.

<sup>a</sup>F-statistic without interaction terms is 153.63 for the model using all houses and 24.74 for the model limited to recently built houses

are more likely to buy and sell houses in formal manners that require deeds.

The education level of the household head is the only household characteristic that statistically significantly interacts with full title, in the full and restricted sample. More educated household heads have more expensive houses (or at least think they do) and value having a deed much more - especially those living in recently built homes. This result is consistent with arguments that more educated people benefit from having full title more because they are more likely to use property as collateral in lending, and participate more actively in the property market (Mendez, 2006).

Households with a female head value their home more, but not having a full deed. This finding is interesting given the literature on Mexico that discusses how property rights in Mexico can be empowering to women (Varley, 2007), but that their relationship to formal institutions of titles is complex (Varley, 2010). Older household heads do not appear to value deeds more.

Standard errors are clustered by urban area in the models reported in Table 4. On account of the structure of the data—some of the 75 cities have very few observations, especially for the samples restricted to recently built houses—I run an additional set of models as a robustness check. I exclude data from cities with less than three observations of houses without title (almost 30 cities). Results from these models are available as Appendix Table 7. The coefficients change slightly but there is no major difference in the implications of the models.

The final set of models test the effects of city-level factors on the value of having a deed. They are multi-level models (Rabe-Hesketh & Skrondal, 2008) in which I interact city characteristics and the dummy variable for full title. I do this to test hypotheses about the variation in title premium across different kinds of cities. The models can be written as:

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

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

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

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

Before testing hypotheses, I run a multi-level model without city characteristics to examine the variation in the coefficient on full deed across cities. Results (available upon request) show that the coefficient on full title varies widely across urban areas. The standard deviation is slightly larger than the coefficient on full title (0.0517 vs. 0.0513) and highly statistically significant.

I then run the above model using city characteristics for four different samples. Two models use the full sample of 75 cities and two use the limited sample of 31 cities with data on measures of regulatory bureaucracy. For each of these sets, one model uses all observations and the other is limited to houses built within five years.

Table 5 reports the results from the models that use the full sample of 75 cities. The results (also available upon request) from models testing the relationship between full title and regulatory bureaucracy are not reported because none of the independent variables were statistically significant. We can reject the hypothesis that title is worth more in cities with more stringent bureaucratic processes, though with the large caveat that data strongly limit the analysis of these hypotheses. We should not rule out this relationship in Mexico; rather, attempt to gather data on regulatory bureaucracy from the other 44 large cities.

Table 5 omits all the control variables, reporting 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.



Table 5. Multi-level model results: DV = Log house price

Variable	Full sample		Recently built houses	
	Coefficient	Interaction	Coefficient	Interaction
Full title	-0.061 [0.275]		-0.777 [0.734]	
<i>Property market</i>				
Share with deeds	-0.087 [0.573]	0.146 [0.270]	-0.127 [0.717]	0.400 [0.709]
Share <i>ejido</i>	-0.140 [0.197]	-0.041 [0.091]	-0.332 [0.257]	-0.020 [0.255]
<i>Local economy</i>				
GDP per capita	-0.005 [0.032]	-0.016 [0.016]	-0.007 [0.049]	0.007 [0.048]
University	1.615 [1.045]	0.718 [0.540]	0.526 [1.550]	2.693* [1.468]
Inequality	0.774 [0.584]	-0.365 [0.289]	1.093 [0.806]	-0.723 [0.802]
<i>Local political environment</i>				
Citizen participation	0.241 [0.306]	0.206 [0.140]	-0.170 [0.427]	0.796* [0.416]
Electoral competition	-0.122 [0.262]	0.263* [0.135]	-0.704* [0.376]	1.039*** [0.398]
Constant	5.472*** [0.551]		5.839*** [0.748]	
Observations	9,920		1,127	
Number of groups	74		71	
SD of intercept	0.196*** [0.018]		0.167*** [0.026]	
Model chi-square	8812.14		1400.77	
F-statistic	127.71		20.91	

Notes: Coefficients not reported for control variables describing characteristics of house, household, and neighborhood as in models reported in Table 3. Standard errors in brackets. \*, \*\*, and \*\*\* indicates significance at the 0.1, 0.05 and 0.01 levels. <sup>a</sup>F-statistic without interaction terms is 143.49 for the model using all houses and 23.05 for the model limited to recently built houses.

Of the seven city characteristics tested, there is a significant association between their interaction with the full title dummy for only three—the share of the city with a college degree, electoral competition, and citizen participation in the political process. In all cases the coefficients on the interaction terms are positive. That is to say, deeds make houses more expensive in cities with a greater share of university graduates, more participation in elections, and more electoral competition. The social context of the property market significantly affects individuals' valuation of property rights.

A robustness check reinforces the findings. As with the models presented in Table 4, I run an additional set of models that exclude data from cities with less than three observations of recently built houses without title (almost 30 cities). Results from these models are available as Appendix Table 8. The main difference is that inequality and citizen participation become strongly significantly associated with housing prices, though not their interaction with title. Other than that, the interactions between title and average education levels, political competition, and civic participation are slightly more significant and have larger effects.

## 5. CONCLUSIONS

This paper is the first effort to study the variation in the value of property title across a large number of cities, and to test hypotheses about the relationship between city-level characteristics and the value premium of having full legal title. The results of multi-level models show that having a full title increases a houses value by more in cities with a population

who is more educated, more actively involved in the political process, and where there is more political competition. Houses with full title are not relatively more expensive in higher income cities with more formal property or less *ejido* land. This is a result that may be unique to Mexico, and merits further study there and in other countries. Further, self-reported house values complicate the study somewhat and an analysis using market values (and with data from more cities) would make the results more robust.

Nonetheless, the paper's findings shed empirical light on mostly unexamined aspects of the value of property rights claims, and open a new direction of research on property rights in developing countries. The demand for full title does not appear to increase with the average income of a city, levels of inequality, or the prevalence of titling. Instead, the most important determinant of higher values for deeds is the social context of the property market, factors like education and political participation and competition. Thus, it appears that the development of a formal property market is shaped primarily by a culture of formality. The broad empirical analysis presented here does not delve sufficiently into the mechanisms through which a city's culture and political environment makes titles more valuable, but future research should.

The findings also have implications for policies and programs that subsidize land regularization and titling, inviting a reconsideration of the status quo. Specifically, the fact that property titles are worth more in some cities suggests that the Mexican Secretariat of Social Development might do well to channel the subsidies from its existing property regularization subsidy program, PASPRAH, to cities where titles are worth more, rather than to all eligible households in the

country. This would increase the cost effectiveness of the program. Further, direct study of that program's costs and the value added a title brings to low-income households should also be undertaken.<sup>5</sup>

The framing of subsidy programs like PASPRAH as poverty alleviation programs might also be reconsidered. They might be more appropriately framed as an urban development program, because of their efforts to formalize urban property markets. Full property rights facilitate certain kinds of property transactions and credit. In terms of poverty alleviation, low-income households not interested in selling or using their house as collateral would likely benefit more from subsidies for infrastructure and urban upgrading. The analysis in this paper shows that many house attributes are valued much more than complete property rights, reinforcing that poverty reduction funds for housing ought to focus on building materials and infrastructure.

In Mexico, as in many countries, the cost of obtaining a deed or transferring a deed is based in part on the price of the property (Monkkonen, 2016). The fact that almost one in ten owner-occupied houses has a deed in another person's name suggests that the cost of transferring a deed exceeds the benefit for many people. Reducing the price of property registration and transfer should be a policy priority. Scholars argue that the system of notaries, who are responsible for writing deeds, is rife with problems such as nepotism and corruption (Arellano Ríos, 2011; Medina, 2006). Changing the entire legal system is neither feasible nor desirable, but seeking ways to reduce the cost of deed execution should be at least as important as subsidizing regularization proceedings. This will reduce the estimated price difference between titled and untitled houses and more importantly, will save people money.

## NOTES

1. Registration of agricultural land is a relatively simple procedure, whereas regularization implies much more work, often requiring a detailed survey, the subdivision of a larger parcel, and the change of legal status.
2. I use the terms city and urban area interchangeably. I follow the standard definition of urban areas, which is the result of a joint effort of three federal agencies (CONAPO, SEDESOL and INEGI). Cities are defined through population centers not administrative boundaries. The smallest of the 75 largest cities has over 100,000 residents. Details can be found in [Comisión Nacional de la Población \(2012\)](#).
3. In this case neighborhoods are defined in the census as localities. Localities are defined by the census and correspond roughly to districts of cities. Distance to the city center is not available in the ENIGH data. However, a variable indicating the size of the locality in which houses are located is a useful proxy. More centrally located localities are larger. I also use locality variables measuring the quality of infrastructure and the share of housing that is vacant.
4. I refer to deeds alternately as titles.
5. Including whether awareness of the existence of this type of program affects individuals' valuation of their untitled home or the value of a title.

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## APPENDIX A

Table 6. *Housing, household, and neighborhood characteristics by deed status for all owner-occupied houses and urban owner-occupied houses*

Variable	All houses		Urban houses	
	Full deed	No/partial deed	Full deed	No/partial deed
Observations	10,672	5,367	7,180	2,845
Average estimated monthly rent (thousands of pesos)	2.2	1.4	2.6	1.7
Apartment (%)	3.4	2.3	4.7	3.6
Type of walls				
Wood (%)	3.7	9.1	2.1	6.3
Clay/Adobe (%)	5.5	8.3	2.2	3.1
Brick, cement, stone (%)	89.9	80.3	95.0	88.3
Improvised (%)	0.9	2.3	0.7	2.3
Type of roof				
Metal (%)	11.9	22.4	5.1	11.7
Asbestos (%)	5.7	7.0	4.3	5.5
Wood (%)	2.6	3.7	3.1	5.7
Tile (%)	2.0	3.4	0.8	1.4
Cement slab (%)	75.9	59.9	85.5	72.7
Improvised (%)	1.9	3.6	1.2	3.1
Type of floor				
Earth (%)	2.3	5.4	1.2	3.7
Cement or concrete (%)	47.5	64.2	38.8	55.5
Wood, tile, or other (%)	50.2	30.4	60.0	40.1
Kitchen				
Yes (%)	95.7	91.4	97.4	93.1
No (%)	4.2	8.6	2.6	6.9
Water supply				
Tap inside (%)	79.1	57.4	88.7	70.2
Tap outside on property (%)	14.9	28.8	8.1	20.5
Public tap (%)	0.4	0.7	0.2	0.4
From another house (%)	0.5	1.6	0.3	1.6
Truck (%)	0.8	2.2	0.7	2.7
Well, river, lake (%)	4.3	9.3	1.9	3.6

Trash Disposal				
Picked up (%)	81.3	68.3	88.4	82.8
Public landfill (%)	1.3	2.1	0.9	1.4
Dumpster (%)	5.6	4.0	6.5	5.3
Burn it (%)	11.1	22.9	3.9	9.2
Other (%)	0.7	2.5	0.5	1.3
No separate bathroom	1.8	4.9	0.7	2.3
No electricity	0.8	2.7	0.4	1.7
Average age of house	21.3	17.6	21.4	17.6
Method of acquisition				
Purchased already built (%)	33.1	19.0	42.3	27.6
Built by current owner (%)	35.2	38.8	30.8	35.3
Owner hired a builder (%)	26.8	34.1	23.1	30.0
Other (%)	4.8	7.9	3.7	7.0
Average number of rooms	4.2	3.6	4.4	3.7
Male household head (%)	75.4	73.8	73.9	72.3
Average education level	5.6	4.9	6.1	5.5
Age of household head	53.7	47.7	53.0	47.3
Below avg. NBD infrastructure	25.4	41.5	15.1	23.2
Share NDB vacant	13.9	13.1	14.5	14.1
Large locality (>100,000)	50.1	30.1	72.3	55.2
Medium locality (15,000–100,000)	13.2	11.3	8.1	10.4
Small locality (2,500–15,000)	15.5	16.0	9.3	12.9
Very small locality (<2,500)	21.3	41.8	10.3	21.5

Source: Encuesta Nacional de Ingresos y Gastos de Hogares (ENIGH), 2012 & 2014.

Table 7. OLS results: Log housing price with interaction between house, household, neighborhood characteristics and full deed, urban houses only (robustness check)

Variable	All houses		Recently built houses	
	Coefficient	Interaction w/deed	Coefficient	Interaction w/deed
Walls of cement (wood is Ref.)	0.071 [0.055]	0.017 [0.040]	0.242*** [0.089]	-0.267* [0.133]
Age	-0.001 [0.001]	0.002 [0.001]	-0.015 [0.014]	0.018 [0.023]
Number of rooms	0.112*** [0.007]	0.0180** [0.008]	0.107*** [0.019]	0.055** [0.025]
Self-built (purchased is ref.)	-0.0782* [0.039]	0.103*** [0.029]	-0.018 [0.084]	0.111 [0.107]
NBD hsg. vacant (%)	-0.759*** [0.233]	-0.075 [0.173]	-0.018 [0.370]	-0.658** [0.307]
NBD infras. quality	0.078 [0.113]	-0.024 [0.081]	0.220 [0.132]	-0.429*** [0.153]
Householder is male	-0.058** [0.028]	0.021 [0.035]	-0.136** [0.051]	0.041 [0.083]
Householder education	0.0701*** [0.006]	0.0167** [0.008]	0.081*** [0.015]	0.031* [0.018]
Householder age	0.006*** [0.001]	0.001 [0.001]	0.005** [0.002]	0.004 [0.003]
Constant	6.134*** [0.126]		5.676*** [0.268]	
F-statistic	118.41		20.13	
Observations	8,095		979	
R-squared	0.461		0.555	

Notes: Coefficients not reported for control variables (models include all those reported in Table 3). Standard errors (clustered by urban area) in brackets. \*, \*\*, and \*\*\* indicates significance at the 0.1, 0.05 and 0.01 levels.

Table 8. *Multi-level model results: DV = Log house price (robustness check)*

Variable	Full sample		Recently built houses	
	Coefficient	Interaction	Coefficient	Interaction
Full title	-0.147 [0.322]		-1.034 [0.840]	
<i>Property market</i>				
Share with deeds	0.085 [0.651]	0.204 [0.293]	-0.180 [0.721]	0.437 [0.752]
Share <i>ejido</i>	-0.153 [0.209]	-0.022 [0.097]	-0.331 [0.253]	0.022 [0.267]
<i>Local economy</i>				
GDP per capita	-0.073 [0.045]	-0.007 [0.020]	-0.075 [0.055]	0.031 [0.057]
University	1.867 [1.496]	0.628 [0.651]	1.625 [1.797]	2.885* [1.716]
Inequality	1.882** [0.734]	-0.390 [0.326]	1.789** [0.865]	-0.699 [0.884]
<i>Local political environment</i>				
Citizen participation	1.265*** [0.416]	0.227 [0.163]	0.787* [0.475]	0.949** [0.457]
Electoral competition	0.182 [0.308]	0.317** [0.153]	-0.443 [0.389]	1.166*** [0.436]
Constant	4.807*** [0.670]		5.319*** [0.802]	
Observations	8,027		970	
Number of groups	47		44	
SD of intercept	0.189*** [0.022]		0.145*** [0.026]	
Model chi-square	7386.89		1242.78	
F-statistic	107.06		18.54	

Notes: Coefficients not reported for control variables describing characteristics of house, household, and neighborhood as in models reported in Table 3. Standard errors in brackets. \*, \*\*, and \*\*\* indicates significance at the 0.1, 0.05 and 0.01 levels.

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