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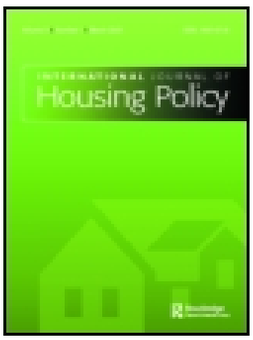

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Management of low-income condominiums in Bogotá and Quito: the balance between property law and self-organisation

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Governments in urbanising Latin America encourage low-income homeownership. In practice, this means that low-income urban families become owners of units in condominium properties. While the homeownership dream may thus be achieved, difficulties with maintenance can lead to deterioration. This paper considers condominiums as collective action arenas and applies the Institutional Analysis and Development framework of Ostrom (2005) to explore the links between the characteristics of (1) the communities, (2) governance and (3) the physical environment with the perceived level of maintenance (PML). Using data from a survey of 414 households carried out in 2014, we compare the circumstances of low-income condominiums in Bogota (Colombia) and Quito (Ecuador), two cities with similar housing policies but different horizontal property laws. Our central hypothesis is that the more modern law in Colombia enforces self-organisation and therefore better maintenance outcomes. In line with our hypothesis, the results demonstrate that the maintenance level in Bogota is higher than in Quito. Contrary to our hypothesis, participating in self-organisation in Bogota had a negative effect on PML, while in Quito the effect was positive. This indicates that the law matters but the relationship between the formal arrangements required by law, self-organisation and maintenance outcomes is more complicated than expected.

Keywords: low-income homeowners; condominium; common property maintenance; self-organisation; collective action; IAD framework

Introduction

Many studies on housing problems in Latin America deal with informal housing. This study, however, focuses on problems with formal low-income homeownership. Since the 1990s, governments in Latin America have encouraged low-income homeownership through several subsidy programmes. This homeownership policy is understood as a mechanism for poverty reduction and economic development of the urban poor (Ferguson, Rubinstein, & Vial, 1996; Klaufus, 2010; Molsalve, 2003).

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Since urban areas are densifying, homeownership increasingly means that families (including low-income families) become owners of units in condominiums and co-owners of common property elements such as the land and the infrastructure of the building. In Bogota, 65% of units in the housing stock fall under the condominium regime, while 45% of the dwellings registered in the cadastre in Quito are condominiums (Donoso, 2013).

Low-income homeownership is the major housing policy goal in Colombia and Ecuador, but problems with the maintenance of common property appear to complicate the dream of homeownership. Why are the new homeowners not taking care of their dwellings? Both the benefits and risks of low-income homeownership remain the subjects of a lively debate within the housing research and policy fields and from both a sociological and economic perspective (Elsinga, DeDecker, Teller, & Toussaint, 2007; Elsinga & Hoekstra, 2005; Galster, 1983; Scanlon, 1998). Low-income homeowners often neglect the maintenance of their properties for different social and economic reasons, possibly due to the initial poor quality of the dwellings, which makes maintenance of a dwelling even more costly. In Latin America, housing research has already identified the deterioration path on which affordable units lie (Esquivel, 2008; Rodriguez & Sugranyes, 2005; Rojas, 2010; Santo, Zanin, & Rufino, 2015), considering that units are mass-produced and often cheaply built on the peripheries of the cities (Paquette-Vasalli & Sanchez, 2009; Rolnik & de Oliveira, 2014).

Research that deals with housing quality or lack of maintenance of dwellings is generally focused on individual households owning single-family houses. However, when we consider units in a condominium regime, our understanding of the lack of maintenance by low-income homeowners changes. Common property areas are particularly subject to deterioration, and therefore, more complex arrangements are necessary for collective decision-making and cost sharing (Werczberger & Ginsberg, 1987; Yip, Chang, & Hung, 2007).

The focus of this study is the perceived maintenance level (PML), with the aim to better understand the interaction between horizontal property law and the self-organisation of co-owners. The Institutional Analysis and Development Framework (IAD), developed by Ostrom (2005), is applied to guide the multivariate analysis of the different formal and informal institutions involved in the condominium regime. This framework helps to diagnose which variables related to the (1) community, (2) governance and (3) physical characteristics of the housing complex interact and influence the maintenance outcome.

The literature on condominium maintenance problems is generally focused on one single institutional context, although there is research in different parts of the world. This paper, however, compares and uses data collected from two Latin American cities, Bogota, Colombia and Quito, Ecuador. These two capital cities have different property laws but similar cultures and subsidy policies promoting low-income homeownership in condominiums. Our central hypothesis is: ‘The

more modern property law in Colombia has a positive impact on self-organisation and in turn on maintenance.' The result will be better self-organisation and a higher score on perceived maintenance in Bogota than in Quito. Unlike previous studies on condominium maintenance problems, this paper demonstrates that comparative housing research can be applied by using Ostrom's IAD framework (Ostrom, 2005).

The paper is organised as follows. Section 2 will outline the literature on condominium governance and maintenance, while Section 3 will describe the IAD framework. Section 4 will then present the OLS multivariate analysis, diagnosing which factors are associated with the PMLs. Section 5 will put the results in comparative perspective, while Section 6 will reflect on the results, discussing the comparative approach to condominium housing problems and offering some conclusions and a theoretical contribution.

Literature

Co-owners in low-income condominiums have similar collective action problems to those in other communities involved in either common pool or common property resource (CPR) management (Agrawal, 2001; Orban, 2006; Ostrom, 2007). Opportunistic owners that free-ride on others are one of the problems faced in the governance of common property resources (Orban, 2006; Yau, 2014). Free-riders are households that do not attend meetings of co-owners or do not contribute to the expenses and costs for the upkeep of the common property. This opportunistic and individual behaviour is, however, not the only problem in the governance and management of condominiums (Ostrom, Gardner, & Walker, 2006). Research on common interest communities or gated communities – sometimes the products of residential segregation – demonstrates the central role of homeowner associations (HOA) and the necessary collective action needed to govern these forms of ownership (Gordon, 2004; McKenzie, 2011; Nelson, 2005).

Olson's (1965) logic of collective action has been applied to test how the size of a group may affect its cooperative potential (Chen & Webster, 2005; Chu, Chang, & Sing, 2012; Orban, 2006; Yau, 2014). Research has demonstrated that the number of dwellings in a co-ownership regime influences maintenance and organisational outcomes, with smaller groups likely to be more effective (Olson, 1965; Orban, 2006; Yau, 2014). However, as Ostrom (2005) has demonstrated, group size is only one factor that should be taken into account. Different incentives and perceptions of the benefits and costs might influence the sustained organisation that is required to collectively maintain a CPR such as condominium housing (Chen & Webster, 2005).

Horizontal Property Law is the formal institution under which different actors, including developers and property managers, operate and govern common properties (Alterman, 2010; Blandy, Dixon, & Dupuis, 2006; Lujanen, 2010). The existence of a legal framework is important, but legal enforcement may not always

guarantee successful collective management (Alterman, 2010; Ostrom, et al., 2006). Informal institutions may also play a role, such as low or high levels of trust in a board of homeowners, or other community characteristics of the residents (Ostrom, 2005).

Studies of condominiums have used institutional approaches that usually explore single institutional contexts. Orban (2006) looked into the evident difficulties with condominium management within the privatised social housing sector in Budapest, Hungary, a phenomenon that has also been studied in many other eastern European cities (Grover, Munro-Faure, & Solviev, 2002; Rabenhorst & Ignatova, 2009; Soaita, 2012). Using Olson's theory of collective action (Olson, 1965), Orban found that condominium size (measured in number of dwellings) is negatively associated with the cooperative potential of a building's residents. Additionally, she investigated the role of the law and of some of the residents, revealing how more positive outcomes are achieved when a leader from within the community is present.

In Hong Kong, Yau (2014) found that perceived collective efficacy shapes participation in the management of a common resource. The regression analysis revealed that self and group beliefs about efficacy correlate significantly with the level of activity in an owners' association. In addition, Werczberger and Ginsberg (1987) studied low-income condominiums in Israel, finding that maintenance can be explained by looking at different social and physical aspects of both the residents and the buildings.

Empirical work thus far demonstrates that physical and social factors play a role, but the role of the law is rarely studied. Our expectation is that the law may play an important role. After all, the law prescribes the operational responsibilities of the different actors, in addition to the rights and obligations of owners. As the Colombian law of 2001 is more recent and contains more details on the responsibilities of the different actors in the condominium regime than the Ecuadorian law (Donoso, 2013), we expect that the level of maintenance and the level of self-organisation will be at a higher level in Colombia.

To analyse the effects of the law, in combination with the physical and social features of condominiums, we applied the IAD framework of Ostrom. This framework combines the three different institutional characteristics involved in common property management to determine which variables in the specific context studied affect outcomes such as maintenance levels.

Analytical framework

The theoretical framework: Institutional Analysis Development (IAD)

When we think about homeowners, the usual image is of an owner of a single-family dwelling. In this scenario, the owner has complete control over the physical structure. In condominiums, the institutional organisation of homeownership is different, having a collective aspect. The formal institutions related to housing in

condominiums concern the tenure form (Bengtsson & Ruonavaara, 2011; Oxley, 2001) and, therefore, to the bundle of rights involved. In condominiums, individual property rights are bounded by the rights and obligations of the collective (Lujanen, 2010). Therefore, the management problem in condominiums is a property right problem (Yiu, Wong, & Yau et al., 2006).

The bundle of rights concept is used to refer to 'all the various rights obtained by ownership of property' (Blandy et al., 2006, p. 2366). Based on empirical research on different cases of common property resources, scholars have identified five rights in the 'bundle', which also apply to condominium properties: access, withdrawal, management, exclusion, and alienation (Schlager & Ostrom, 1992). Management rights include 'the right to regulate the use patterns and transformations to make improvements' (Schlager & Ostrom, 1992, pp. 250–251). This right is particularly collective, from which the obligation to attend meetings of the homeowners originates, as well as their capacity to set their own operational rules for condominium management and maintenance. According to formal rules, an annual assembly meeting is the only moment when certain decisions, such as adopting new rules concerning a maintenance plan or budget, or hiring a property manager, can be made.

The bundle of rights and rules in condominiums creates a CPR. There are two elements that are relevant to identifying a CPR: the rights of *excludability*, and their status as a *rival* good. Because a condominium is common private property (Ostrom, 2005), owners have the collective right to exclude others from physically entering the boundaries of their common property. At the same time, inside the common property, owners who do not pay maintenance fees cannot be excluded from using common property elements such as elevators or parking areas. These common resources are *rivalrous*, because the use and/or overuse of the common property can reduce the availability of the resource to other co-owners. As suggested by Hastings, Wong, and Walters (2006), the case of maintenance in condominiums can be considered a case of a 'tragedy of the anti-commons': a situation in which many owners have rights over a common property asset or resource, but the right is that of exclusion rather than usage. This excludability is also emphasised in the club theory approach, which can also be applied to the maintenance of condominiums. As Warner demonstrates (2011), clubs are not simply spontaneous responses to urban problems; they are actively supported by government in terms of legal and administrative frameworks and finance provisions. This literature demonstrates that it is very important to study the details of the property rights and their effect, taking into account the right of exclusion in the case of condominiums.

There are two conditions that can help to identify whether a CPR faces a dilemma: (1) suboptimal outcomes and (2) institutionally feasible alternatives (Ostrom et al., 2006, p. 16). Affordable condominium housing in Bogota and Quito fulfils both conditions, although the situation is diverse in each housing complex: some complexes have deteriorated more than others, and institutional arrangements

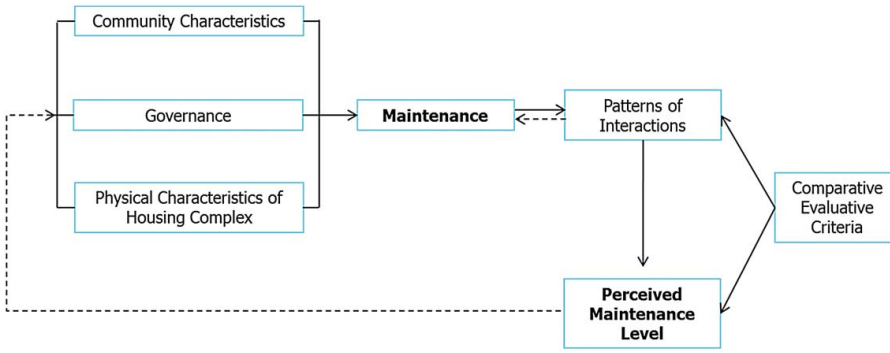

Figure 1. IAD framework adapted to condominium housing (based on Ostrom, 2005).

are continuously adapted to each community's situation. For example, in order to make costs more affordable, maintenance work may be done on a community work day or a *minga* (a Quechua term used in Ecuadorian and Peruvian Spanish), when everyone is expected to assist and collaborate on work rather than contributing to a monthly maintenance fee. While *mingas* are common in Quito, in Bogota households organise *bazares*, or small market days, to collect funds to cover common property insurance. Both kinds of institutional arrangements are informal, since they are not prescribed by law, but they are often implemented in housing complexes owned by low-income families.

The IAD framework of Ostrom enables us to study the effects of the law, and at the same time take into account the community and physical features of the condominium. Figure 1 includes a diagram of the IAD framework adapted to the condominium maintenance situation. Three main first-tier variables are associated with the context of the maintenance problem: (1) community characteristics, (2) governance and (3) physical characteristics. The outcome is evaluative criteria about maintenance levels and comparisons between cities.

Hypothesis and analysis

The analysis of the maintenance level and the characteristics of the condominiums is based on a survey carried out in housing complexes in Quito and Bogota in 2014. A total of 200 households in Bogota and 212 households in Quito were surveyed. The average response rate was 45%. To ensure a high response rate, the survey was undertaken door to door and information was sent beforehand inviting residents to participate in the survey. The non-respondents were usually renters, while in some cases, the head of the household was not present or could not be reached on the day the survey was carried out at the housing complex.

The analysis should allow us to draw conclusions on our main hypothesis:

> The more modern property law in Colombia has a positive impact on self-organisation and in turn on the perceived maintenance level.

The expected result is a positive relationship between self-organisation and PML and a higher score on perceived maintenance in Bogota than in Quito.

Our assumption was that the presence of maintenance plans and operational rules, as well as the effect of these, would be related to the horizontal property law. The relevant laws in both countries were systematically compared, and although the laws regulating condominiums used the same concept of common land property, with the assembly of owners as the main governing body, there were some significant differences, as shown in Table 1. Different informal rules have developed regarding the training level of property managers and the role of social managers in affordable housing provision, as well as community work days to fund maintenance activities.

The role of the law was included in the survey, based on what it regulates in terms of governance, such as the obligatory assistance to the assembly meeting of owners. Questions that allowed us to determine whether the households know about operational rules, monitoring rules and sanction rules were also asked. Questions about informal ways to raise funds for maintenance, such as community work days, and participation in such days, were also asked. The expectation was that knowing about rules or not would positively or negatively influence PML. Table 1 includes the property law regulations of Bogota and Quito that were operationalised in the survey.

The analysis explored how the PML was influenced by three groups of variables: household characteristics, governance and physical features. Data on all these variables were collected by our survey based on the IAD framework and governed by the commons theory. The first step was a bivariate analysis describing the statistical relationship between the independent variables and the dependent variable of PML. Only the independent variables that had a significant relationship with PML in each country were included in the next step, the multivariate analysis described in Section 4.

Dependent variable

To measure the performance of the condominiums we used the PML as the dependent variable. Households were asked to grade the level of maintenance (not maintained = 1, maintained = 2, and well maintained = 3) of a total of 10 physical elements of the housing complexes that were common property and in common use. The common property elements chosen concerned the land (gardens, parking area and walkways), the structure (facades, stairs, roofs and common rooms for meetings), and the infrastructure (water pipes, lighting of common areas). The sum

Table 1. Condominium law variables in Bogota and Quito.

	Bogota	Quito
Assembly meeting	Obligatory presence	Obligatory presence
Majority rule required in assembly meeting	Always 70% of property shares	Rule varies depending on decision: 51%, 66%, 75%
Operational rules		
Property manager	Obligatory to hire a paid property manager	Flexible based assembly's decision: there should be one, paid or unpaid
Provisional property management and delivery of common property parts to HOA	Provisional property management by initial owner, transfer of rights and obligations after 51% is sold (Art. 51)	No rule for provisional management and transfer of rights and obligations
Sanction rules	Agreed maintenance fee can be enforced by law	Agreed maintenance fee can be enforced by law
Monitoring rules	Formal and informal practice	Formal and informal practice
Other informal rules	Social manager hired by developer Community work day to collect funds	Social manager hired by developer Community work day to do maintenance works or to collect funds

of the scores (total of 30 points) for the 10 elements became the PML index, indicating very low perceived levels of maintenance at a minimum of 10 points and perceptions of good levels of common property maintenance at a maximum of 30 points. The reliability of the different factors related to the common property elements was tested using principal component analysis, obtaining Cronbach's alpha coefficients of .943 for Bogota and .873 for Quito. These high coefficients indicate that each element's grading was consistent. Table 2 includes the mean of the PML scores for each housing complex surveyed in Bogota and Quito. The differences within housing complexes were statistically significant ($p < .01$) in both countries.

The survey included a control question to measure the convergent validity of the PML index. PMLs were expected to be negatively correlated with the costs of the work required to be done on those specific elements of the common property. The question asked about the current condition of the common property element and whether it needed maintenance or not, or repair or renovation. If the elements needed repair, this would mean that there were more costs associated with the maintenance score. The negative correlation coefficient in both Bogota ($n = 200$, $r = -.696$, $p < 0.01$) and Quito ($n = 214$, $r = -.5562$, $p < .01$) confirmed the

Table 2. Descriptive statistics of the perceived maintenance level (PML) by case study.

City and housing complex code		N	Minimum	Maximum	PML mean	Std. dev.
Bogota		200	10	30	23.6	5.6
	B01	54	10	30	24.6	5.4
	B02	50	16.3	30	23.5	4.3
	B03	46	10	30	18.8	5.4
	B04	50	17.8	30	27	3.8
Quito		214	10	30	20.7	4.8
	Q01	56	10	30	19.3	4.9
	Q02	52	10	30	21.5	4.8
	Q03	50	11.3	27.5	19.5	3.8
	Q04	56	12.9	30	22.4	4.9

hypothesis that lower PML reflects the level of deterioration. This provides validation for its use as the dependent variable to measure the perceived maintenance outcome.

Independent variables

Table 3 includes a list of topics that were included in the household survey, based on Poteete, Ostrom, and Janssen (2010). C*ommunity characteristics* concern individual household socioeconomic conditions, the duration of stay in the housing complex, trust in the board of the condominium and the social capital. Table 4 shows that age and education are significantly related to PML in Bogota but not in

Table 3. Blocks of variables associated with the perceived maintenance outcome.

Dependent variable: perceived Maintenance level (PML)		
Block 1	Block 2	Block 3
Community	**Governance**	**Physical Characteristics**
Socioeconomic Attributes	Government Organisation	Size of the Resource
History of Use	Network Structure	Quality of Human-constructed Facility
Trust	Property Rights System	Economic Value
Social Capital		

Note: Based on Ostrom (2007) and Poteete et al. (2010) for condominium maintenance arrangements.

Table 4. Variables tested on significant bivariate relationship with PML, for Bogota and Quito separately.

Community		Bogota	Quito
Socio-economic attributes	Gender head of household	–	–
	Age of head of household	Yes	–
	Education level head of household	Yes	–
	Household income level	–	–
History of use	Duration of stay in the housing complex	–	–
	Housing tenure, or *type* of occupation	–	–
Leadership (trust)	Level of interest in participating in the board	Yes	–
	Interest in assuming property management role	–	Yes
	Trust in management effectiveness	–	–
	Trust in manager	–	–
	Trust in the board of homeowners	Yes	Yes
Social capital	How well people know the neighbours	–	–
	Collective efficacy	–	–
	Identify problems with maintenance	–	Yes
Governance			
Government organisation	Received or not down-payment subsidy	–	–
Network Structure	Perceived responsibility with maintenance	Yes	–
	Received information about rights and obligations	–	–
	Social management	–	–
Property rights system	Acknowledge existence of the assembly of co-owners	–	–
	Attendance of assembly meeting	Yes	Yes
Operational rules	Proposed rule/change in assembly meeting	–	–
	Planning for maintenance	Yes	–
	Knowledge about reserve funds	Yes	–
	Rule about pets in the building	–	–
	Maintenance done by community work day	–	–
Monitoring and sanctions	Sanction if delays with payment of maintenance fee	–	–
	Non-sanction, if late with payment people wait	–	–
	Knowledge about neighbours being behind with maintenance fee	–	–
Physical features			
Size	Number of dwellings per case	–	Yes
Quality	Perceived construction quality of common property	Yes	Yes
	Perceived construction quality of units	–	Yes
	Construction year	–	–
Economic value	Maintenance fee	–	–
	Up to date with maintenance fee	–	–
	Satisfaction	–	–

* Tests for significance: Pearson's correlation (numerical variables) and ANOVA (categorical variables), yes = significant.

Quito. Also, interest in being active in the board and trust in the board were significantly related to PML, both in Bogota and Quito. Finally, the extent to which inhabitants identify themselves with maintenance problems plays a significant role in Quito.

Condominium property rights and obligations are included within the *governance* block of variables, including the rights and operational rules, as well as monitoring and sanctions that are regulated by the property law. Table 4 shows that a number of variables are significantly related to PML: attendance of the general meeting was significant in both cities, while perceived responsibility for maintenance, planning for maintenance and knowledge about funds were significant in Bogota. Variables regarding sanctions when behind with the maintenance fee, including informal monitoring, did not have any effect on PML in either Bogota or Quito.

The *physical features* of the housing complex, such as size and quality, were operationalised as the total number of housing units and construction quality of the human-built resource was measured with a categorical question that graded the perceived quality of the common property built environment. The bivariate analyses found that only the perceived quality of the common property was significantly related to PML in both Bogota and Quito. However, in Quito, PML was also related to the size and quality of the housing units.

Multivariate models for Bogota and Quito

The IAD framework was systematically applied in both cities, developing a multiple regression model using a nested approach with cluster correction to achieve more robust variances (Williams, 2000), knowing that household perceptions might be correlated due to the sample form. The nested approach in STATA is a multivariate regression model, and variables were entered by block, following each conceptual element of the IAD model. For comparative purposes, rather than treating countries as dummy variables, we separated the data and developed models for each context, testing significant variables and observing R-square coefficients by blocks.

Model for Bogota

Table 5 shows the model's results for Bogota. In the first block of community characteristics for Bogota, the age of the head of the household had a significant influence on the PML. Younger households were more critical of maintenance levels than older households.

Education level was significant when the variables of Blocks 1 and 2 were entered; however, when Block 3 variables were entered into the model, education factors lost their significance. This is an indication that other institutional factors were more relevant than education level. For example, variables measuring trust in

Table 5. OLS nested model for Bogota.

Bogota – linear regression – nested Dependent variable: PML	Block 1:		Block 2:		Block 3:	
	Coef.	t	Coef.	t	Coef.	t
Variables						
Community						
Age	.07273	2.83*	.0946	4.76*	.07529	3.76*
Education	−2.4320	−2.83*	−2.3057	−3.15*	−1.4256	-1.47
	−.3090	-0.48	−.9596	−1.26	−.1941	−0.19
Trust in board	4.7611	7.21**	3.0494	17.05**	2.1821	3.99*
	4.7955	4.05*	2.9316	4.90*	1.7944	6.79**
	2.8464	1.67	.5918	0.80	.8635	0.83
	−3.9075	−5.21*	−3.3313	−4.03*	−2.3511	−3.48*
	−1.2556	−0.82	−1.2227	−0.76	−1.4663	−0.68
Governance						
Attendance to assembly meetings			−2.1918	−3.53*	−2.3511	−3.48*
			−1.8927	−4.10*	−1.5946	−3.16*
Feeling responsible for maintenance			−3.4718	−3.68*	−2.9078	−3.16*
Maintenance plan			−2.3738	−6.33**	−2.3769	−11.20**
Rules for pets			−1.46	−4.84*	−1.8338	−3.11*
Physical characteristics						
Quality common property					−3.7826	−5.39*
					−3.4268	−5.08*
	Observations	193	Observations	193	Observations	193
	R-square	0.2037	*R*-square	0.34	*R*-square	0.39
			Change in *R*-square	0.1422	Change in *R*-square	0.0540

Note: Robust standard error adjusted for four clusters in HOUSING_COMPLEX.
* Significant at $p < .05$.
** Significant at $p < .01$.

the board of homeowners and interest in being part of the board were both relevant measures regarding the role of leaders in the community, with a highly significant effect on PML. As the negative coefficient demonstrates (-2.514, $p = 0.041$), people who have some interest in assuming a role on the board of homeowners perceive more problems with maintenance levels than those who are not interested. Therefore, these are the people who are willing to participate and assume the leadership role necessary to improve maintenance outcomes.

Governance variables, such as those related to the network structure (maintenance responsibility), were significant and negative. The PML index for people who placed responsibility on external actors (professionals) was -2.90 points less than the PML index for those who perceived maintenance to be the responsibility of the internal actors such as the residents. Compliance with a property rights regime was measured by looking at how often people attended assembly meetings. PML in Bogota was negatively associated with attending assembly meetings. Households that attend meetings 'sometimes' or 'always' perceive lower levels of maintenance than those households that never go to assembly meetings. Going to assembly meetings probably helps to have a better or more transparent idea of maintenance issues in a housing complex. Variables related to the operational rules of condominiums were significant, with negative coefficients. Furthermore, knowledge about a plan increases the chances of having higher PML.

Finally, the variable that represents the quality of construction of the CPR influenced the PML index. The relationship was negative, meaning that a good quality of construction was associated with less satisfaction with the current level of maintenance. One explanation for this could be that a good quality of construction makes any lack of maintenance more evident. The other physical characteristics, such as size, did not have any statistical influence on PML.

To summarise, community characteristic variables explain 20% of the variance in PML, and when variables regarding formal institutions are introduced, the explanatory power of PML rises by 14%. Finally, the quality of construction of common property areas increases the explanatory power of PML, leading to a total *R*-square of 0.40 in Bogota.

Model for Quito

The first variable regarding an individual's relationship with the condominium community is the level of interest in assuming a role as property manager. According to Ecuadorian law, this role can be assumed by any co-owner of the community by being elected the president of the board of homeowners in an assembly meeting. Alternatively, if households are willing to pay, the board can hire an external person or a company as property manager. The low-income condominiums surveyed in Quito did not have external property managers. The results revealed that PML scores change negatively when people are not interested in assuming this role. A

Table 6. OLS nested model for Quito.

Quito – linear regression – nested Dependent variable: PML	Block 1: Coef.	 *T*	Block 2: Coef.	 *T*	Block 3: Coef.	 T
Variables						
Community						
Willing to be manager	−1.2983	−4.56*	−1.5965	−4.60**	−1.5500	−3.06*
Trust in board	3.5112	.8759*	2.9679	4.31*	2.8086	7.50**
	3.9592	2.56	3.4026	2.19	2.7725	2.75*
	1.6050	3.09*	1.7672	4.65*	1.4310	3.40*
Responsible for problems	3.4133	5.38**	3.5547	4.44 *	3.2286	3.37*
Governance						
Attendance to assembly meetings			2.8537	3.80*	2.5762	4.45*
			1.1073	1.28	1.0099	1.83
Physical Characteristics						
Quality unit					.6151	0.59
					2.1956	9.74**
Quality common property					1.1550	2.81*
					2.5514	1.82
Size					−.7995	−1.08
					−1.9766	−6.74**
	Observations	212	Observations	212	Observations	212
	R-square	0.2167	*R*-square	0.2543	*R*-square	0.3638
			Change in *R*-square	0.0377	Change in *R*-square	0.1094

Note: Robust standard error adjusted for four clusters in HOUSING_COMPLEX.

* Significant at $p < .05$.

** Significant at $p < .01$.

high percentage of households not willing to assume a role in management is a sign of lack of interest in assuming leadership in relation to collective action issues.

The second community variable associated with PML was trust in the board of homeowners. Households in Quito have trust in their current board members, and when trust is high, the association with PML is positive.

Regarding governance variables, attendance at assembly meetings makes households more optimistic about the maintenance level. People who 'sometimes' go to assembly meetings had a PML that was 2.5 points higher than those who 'never' attend meetings. Physical characteristics such as construction quality were significantly associated with PML. As expected, the better the construction quality, the higher the levels of perceived maintenance. The variable of size was negatively associated with PML: as the size of the complex increases, the PML score decreases.

In summary, individual perceptions and community characteristics explain 22% of the variance in PML, a percentage that increases by 4 points when the governance variables are introduced and 10 points when the variables regarding the physical characteristics are included. In total, this model explains 36% of the variance in PML in the context of the housing complexes selected in Quito (Table 6).

A comparison between Bogota and Quito

The models presented included variables regarding the three main conceptual elements of the IAD framework: (1) community, (2) governance and (3) physical characteristics. Below we examine the extent to which the interaction between these variables and PML are similar or different in Bogota and Quito (Table 7).

Variables such as the age of the head of the household and education level were associated with small differences in PML in Bogota but were not relevant in Quito. What is common to both contexts is the relevance of informal institutions, such as the level of trust in the board of homeowners and attitudes towards assuming roles in the management of common property, either as part of the board of co-owners in Bogota or as both owner and property manager in Quito. Specific concern about maintenance levels was a significant variable in Quito but not in Bogota. The effects of this variable can be explained with reference to the governance variables, since in Quito concern about maintenance levels was associated with attendance of assembly meetings.

The establishment of a board is obligatory and generally prescribed in condominium laws. However, whether or not people have trust in the board is something that cannot be regulated, and it is therefore the result of informal processes or is facilitated through the involvement of social managers, who can help members of a community get to know each other and recognise trustworthy leaders.

An understanding of the condominium structure may explain the difference in levels of trust. In Bogota, some members of the boards have training in

Table 7. Comparison of variables associated with PML in Bogota and Quito.

Variables	BOGOTA	Coef.	QUITO	Coef.
Community				
Socioeconomic attributes	Age of head of household	+		
	Education level	−		
Leadership (trust)	Trust in board of homeowners	+	Trust in board of homeowners	+
Norms and social capital	Interest in participating in the board	−		
			Will to assume a property management role	−
			Concern about maintenance problems	+
Governance				
Network Structure	Maintenance responsibility	−		
Property rights system	Attendance of assembly meeting	−	Attendance of assembly meeting	+
Operational rules	Maintenance plan	+		
	Rule for pets	−		
Physical Characteristics				
Size of the resource			Size by number of dwellings	−
Human-constructed facility	Construction quality of common areas	−	Construction quality common property	+
			Construction quality of unit	+

Note: Dependent variable: perceived maintenance Level (PML)

condominium management and community organisation. In Quito, however, these kinds of training opportunities are not available to low-income owners, unless a social management entity is hired by a developer. Trust needs to be sustained over time and, therefore, who participates in the board or in management roles is important. The problem is that participation in the board of homeowners or as a manager is not a popular activity among co-owners in the sample. Consequently, rotation, as one democratic principle involved in condominium obligations, is difficult to achieve (Yip & Forrest, 2002). To summarise, community characteristic variables in both Bogota and Quito explained about 20%–22% of the variance in PML.

As expected, and corresponding to one of the most important assumptions in this research project, there are significant differences between Bogota and Quito at the level of institutions and governance that are related to differences in the property law. Specifically, differences are seen in terms of operational rules, such as the use of the maintenance plan and, more importantly, the role of the external property manager, which is regulated in Bogota and not in Quito. Having a maintenance plan is an indication of some forethought regarding deterioration processes, and the significance of this variable with regard to PML proves its interdependence on property law prescriptions.

A similarity between the two countries with respect to governance is the central role of assembly meetings of owners. As seen in the condominium bundle of rights, all five rights and obligations, including voting powers, are exercised during the meetings of homeowners. In Bogota, attendance at meetings makes households more critical about their collective maintenance outcomes, while in Quito attendance at meetings gives people a better idea of what can be achieved and therefore has a positive association with PML. Households in Bogota seem to rely on a well-functioning board and are inclined to attend meetings when not satisfied, while in Quito the opposite occurs. Since there is less trust in Quito, people concerned about maintenance levels are more inclined to attend the meeting of owners and help to improve conditions.

The incorporation of the physical characteristics of the resources in this particular analysis of condominium tenure makes Ostrom's approach a valid framework to use in the development of a comprehensive institutional analysis of this common property resource. Construction quality was measured in terms of the perceptions of the owners and residents of the housing complexes. In both cities, the quality of construction of the common property was strongly associated with PML outcomes. However, the effects were different in Bogota and Quito. In Bogota, the relationship was negative, while in Quito it was positive. One explanation for this difference may be that there are higher construction standards in Bogota, which lead to a more critical perspective on maintenance levels among households.

Resource size is a measure that is highly debated in the literature on collective action, and there is no agreement about the effect of the size of the group on collective outcomes. As Ostrom would have expected, there is no definite

relationship between size and PML: the size of the housing complex had some effect in Quito but not in Bogota. More important than size is the multilevel structure of governance that a larger housing complex may develop. For example, in Bogota, the largest complex surveyed had an efficient decentralised system of governance that appears to work well based on an observation of the PML scores. Each housing block has an administrative committee that sends a representative to the main board of owners of the whole complex. The larger housing complexes in Bogota have higher PML scores than the smaller ones. The opposite was found in Quito, where the largest complex lacked an efficient governance system, as there were no clear physical boundaries to management, which is in the hands of the general board. However, smaller complexes with more clearly defined boundaries for management and maintenance show higher levels of perceived maintenance.

Conclusions

Most studies acknowledging the property right dilemma in condominiums analyse the performance of the condominium using explanatory variables such as household and building characteristics (Alterman, 2010; Hastings et al., 2006; Orban, 2006). We also included governance variables and applied the IAD framework to explain the interaction between the formal institution, such as the property law, and the self-organisation and participation of co-owners. This framework allowed us to compare countries and to analyse interactions between the community, the governance structure (enforced by the property law) and the physical features of the condominium.

This study has its limitations. Despite the design of the research being fully focused on the role of the law, we cannot isolate the effect of the law from other factors; we can only suggest relationships based on our findings and present our reasoning on the relationship between the law and the variables in our survey. Moreover, the dependent variable was the PML, which may be influenced by factors other than the state of maintenance.

Despite these limitations, we think the outcomes can be used beyond Bogota and Quito to rationalise condominium mechanisms. The combination of residents' perceptions with other more formal condominium processes demonstrates that governance mechanisms are implied in condominium tenure, creating a bridge between theory and the empirical setting (Bengtsson & Hertting, 2014).

Theoretically, no single variable was more important than any other; rather it was their interaction that had an impact on the perceptions of those involved in maintaining the common property in condominium (Ostrom, 2005). Based on the results obtained in this study, if there is (1) trust in leaders of the community, (2) agreement about who is responsible for maintenance, (3) participation in assembly meeting and (4) adequate physical conditions of the building that can be

maintained, owners are likely to have higher estimates of the benefits (higher PML) than those who do not trust others and do not go meetings. One variable that made a significant difference in the equation was the knowledge of a maintenance plan. A planning process can be transformed into information and sustain self-organisation. Owners collectively need information, as well as knowledge about rules, to be able to manage condominium complexity.

The outcomes of the survey now allow us to draw conclusions on our central hypothesis: 'The more modern property law in Colombia has a positive impact on self-organisation and in turn on the perceived maintenance level'.

The expected result was a positive relationship between self-organisation and PML and a higher score on perceived maintenance in Bogota than in Quito. In line with our hypothesis, the results demonstrate that the PML of the cases in Bogota was, on average, higher than in the cases in Quito. However, contrary to our hypothesis, participating in self-organisation in Bogota had a negative effect on PML, while in Quito it had a positive effect. This is mirrored in the negative coefficients between PML and the role of the external or professional property manager, in comparison to the positive coefficient when the property manager comes from within the community. This demonstrates that although the law determines the presence of paid property management, norms and trust play a more important role when self-organising for maintenance.

While these findings indicate that the law matters, the relationship between formal arrangements required by law, self-organisation and maintenance outcomes is more complicated than expected. What they also indicate is that the more advanced and formal organisation in Bogota invites, in particular, those less satisfied with maintenance to participate. On the other hand, it may be that people are less positive about the maintenance because they know more. It is important to further analyse this issue in order to find a good balance between formal arrangements in the law and the mechanism of self-organisation.

The challenge in Bogota is to maintain the formal structure while promoting greater involvement of the inhabitants. The situation in Quito is different due to the flexible legal context, revealing more active inhabitants, who actually go to meetings hoping to contribute solutions. The functioning of the network structure of affordable housing provision can benefit from a well-managed and effective meeting of the owners that is capable of governing their common property resource. Physical characteristics such as size, which had opposite effects in Bogota and Quito, makes the importance of this variable debatable, in line with earlier work on governance and management of the commons (Orban, 2006).

The famous phrase 'My home is my castle' is not relevant to condominiums, as it is rather 'our' castle. As cities grow and denser communities are built, the meaning of homeownership is changing, requiring different tools and strategies to deal with maintenance problems. With respect to housing policy evaluation, when homeownership is not individual but collective, outcomes such as maintenance

need to be incorporated. Our findings contribute to a better understanding of the condominium mechanism and its role with respect to maintenance and the risk of deterioration of common property in the context of low-income homeownership.

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APPENDIX

Table A1. Controlled variables for the selection of condominium housing complexes.

Code	Year built	Housing programme	Subsidy to household	Social management	Size (N. units)	Typology
	BOGOTA					
B01	1958	Institute of Territorial Credit (ICT)	No	Yes	752	High- and middle-rise block towers
B02	2003	Market approach	Yes	Yes*	184	Terrace dwellings
B03	2010	Ciudad USME	Yes	No	83	Middle-rise building
B04	2012	Ciudad Verde	Mixed	Yes	240	Middle-rise building
	QUITO					
Q01	1974	BEV-JNV	No	No	480	Middle-rise building
Q02	2003	Vivienda Solidaria	Mixed	No	50	Rehabilitated historic house
Q03	2010	Market approach	Yes	Yes*	120	Terrace dwellings
Q04	2012	Ciudad Bicentenario	Yes	Yes	104	Mixed, middle-rise building and terraced dwellings

* Social managers were hired after problems within the community affected the development and external actors