Does size matter? Is there an optimal size for tenant–owner associations?

Peter Karpestam and Peter Palm
Department of Urban Studies, Faculty of Culture and Society, Malmö University, Malmo, Sweden

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Abstract

Purpose – The authors investigate how prices of condominiums are affected by the size of the tenant-owner associations that they belong to.

Design/methodology/approach – The authors use data of sold apartments in the Swedish municipality Malmö 2013–2018 and estimate hedonic price regressions. The authors also perform semi-structured interviews with three senior professionals in real estate companies.

Findings – The authors find significantly negative relationships between the prices of condominiums and the size of tenant-owner associations. Also, regression results indicate that associations should be no smaller than 6–10 apartments. The interviews support that associations should not be too small or too big. The lower and upper limit was suggested by the respondents to 40–50 and 80–150 apartments, respectively. In these ranges, economies of scale can be achieved, and residents will not lose the sense of community and responsibility.

Research limitations/implications – The authors do not prove causality. Smaller associations may have relatively exclusive common amenities, about which we lack data. The same relationships may not exist in different market conditions.

Originality/value – The authors are not aware of previous studies with the same research question. The size of tenant-owner associations may affect the price through different channels. First, several of the banks in Sweden do not always grant mortgages for condominiums that belong to small associations. Second, larger associations may have better economies of scale and more efficient property management. Third, homeowners may prefer smaller tenant-owned associations, because they may feel less anonymous and provide more influence on common amenities.

Keywords Hedonic price model, Tenant ownership, Condominium, Malmö, Tenant–owner association

Paper type Research paper

1. Introduction

About 25% of all Swedish homes are owned by tenant–owner associations (Statistics Sweden, 2019). According to legislation, a tenant–owner association must have at least three members/dwellings (SFS, 1991). The size of Swedish tenant–owner associations ranges from as little as three to several thousands of dwellings.

The size of tenant–owner associations may affect the price of dwellings that belong to them. There are several reasons for this: First, several of the larger banks in Sweden do not grant loans to tenant-owner associations considered as too small or to households that consider buying a dwelling in these associations. In the news articles by Bergling (2018) and Rytterström (2020), representatives of tenant-owned associations claim that banks are reluctant towards issuing loans to associations with less than 6–10 apartments, or to households that consider buying a dwelling in such associations. This has raised attention in media in recent years, but we are not aware of related academic work. However, it is

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potentially a major issue because loan-financing is the norm when buying a home or starting a new association (SCB, 2020). Second, it is common to outsource management and maintenance services to specialized firms (Zalejska-Jonsson, 2020), and larger tenant–owner associations may benefit from economies of scale in property management, as they can purchase larger quantities of those services and thereby negotiate a better price. Both above-mentioned mechanisms may imply a lower price for condominiums that belong to small associations. For example, economies of scale in property management suggest that large associations can charge relatively low monthly fees from their residents, which would make them attractive to live in. Size could also signal quality. However, a negative relationship between size and price is also possible because larger associations might run into problems related to the overuse of collective resources and to free riding. Ho and Gao (2013) conclude that buildings with multiple owners risk depreciating faster. They explain this risk of faster depreciation with a lower degree of responsibility-taking for joint resources. Correspondingly, residents who want less anonymity/more familiarity and more influence on the development on the property in which they live may prefer smaller associations. We conclude that it is possible that tenant–owner associations can have an optimal size – not too large or too small.

The objective of this paper is to analyse how the size the tenant–owner associations affects the prices of dwellings that belong to them. We are not aware of such a study. We use transaction data for condominiums in the Swedish municipality Malmö and estimate hedonic price regressions. Also, we perform semi-structural interviews with three experts from the real estate sector.

Our study is not only interesting from a Swedish perspective. Although Swedish tenant–owner associations have some unique properties they also share collective decision making and ownership features of what is internationally referred to as "multi-owned housing" (see for example Johnston and Too, 2015). There exists some form of multi-owned housing in several countries, e.g. the United States, Australia, Singapore, and Hong Kong (Ho and Gao, 2013). Like "condominiums" in other countries, new residents must buy dwellings from the previous residents also in Sweden. However, what is unique for Sweden is that residents do not actually own the dwellings, they merely own the right to live there. All residents co-own the property and the tenant–owner associations must accept all new residents as members before they can move in (Zalejska-Jonsson, 2020). Membership has no upper time limit but is automatically transferred when dwellings are bought and sold. In addition to paying a one-time down-payment for the right to live, residents usually pay a monthly fee to the associations which have the overall responsibility for the management of common facilities. In the following, we refer to dwellings owned by tenant–owner associations as "condominiums", although we are aware that it is not their correct legal name. Previous studies (see, e.g. Song and Wilhelmsson, 2020) also commonly refer to them as "condominiums".

From previous literature, we have learned that legislation about responsibilities, rights and obligations differs between the countries. However, regulations generates problems of owning and managing this type of housing. These problems are similar for several countries (see, e.g. Sherry, 2016; Altman and Gabriel, 2018; Reid, 2015; Reid *et al.*, 2017; Levy *et al.*, 2019). Also, residents must cooperate on the maintenance and management of common facilities (e.g. corridors, facades, shared outside spaces, drainage systems). How should common facilities be maintained and what common investments should be made? These are questions that imply that the buyer of a condominium in a multi-owned property should be careful not only when choosing the condominium and the property, but also in choosing the association (or corresponding) that the condominium belongs to. These are important questions for households living in multi-owned properties not only in Sweden.

This paper is organized as follows. Section two reviews previous research. The results of the interviews are summarized in section three. Section four presents the hedonic price regressions and discusses methodological issues. Section five presents the data. Section six presents and discusses the results from the regressions. Section seven concludes.

2. Related literature

We stipulate that the size of tenant-owners associations affects the price of the condominiums that belong to them. We have identified three mechanisms. First, several of the larger banks in Sweden do not grant loans to tenant-owner associations which are considered too small or mortgages to household that consider buying a dwelling in small associations. Second, larger tenant–owner associations may benefit from economies of scale in property management. Third, residents who want less anonymity/more familiarity and more influence on the development on the property in which they live may prefer smaller associations. Related to this, a lost sense of community could result in tragedy-of-commons/free-riding issues. Therefore, the overall sense of responsibility and community may be greater in smaller associations.

We are not aware of previous research about financing-conditions for small and large tenant-owner associations. Previous studies have separated between economies of scale in capital costs and operating efficiency. Larger firms generally have greater efficiency and higher profitability. Operating a larger number of units increases knowledge and experience. However, economies of scale within real estate are little researched if we exclude studies of Real Estate Investment Trusts (REIT) in the U.S. Several studies on REIT in the US have indicated that larger firms have lower general and administrative expenses. Larger real estate firms also have higher profitability (Ambrose *et al.*, 2019).

It is generally acknowledged that larger economic agents (e.g. firms) can have lower capital costs than smaller agents (Hansen and Torregrosa, 1992; Archer and Faerber, 1966). Also, property managers that outsource property management services (e.g. cleaning of common areas, broadband services) may obtain better deals for larger contracts than for small ones. Palm (2013) finds that the number of properties that the commercial real estate companies own influences how these companies are organized. This also implies that there is a benefit of scale. Also, Palm (2015) finds that company size can signal quality when commercial companies advertise rental offices on the web. Zheng *et al.* (2011) conclude that an increased size of real estate companies generates increasing returns to scale. In their study, 69% of the companies proved to have an increased operational efficiency through the company's scale. This is also confirmed by Ambrose *et al.*'s (2019) study of European real estate companies. Ambrose *et al.* (2019) finds that small firms that grow can reap substantial economies of scale when they grow, while larger companies do not appear to benefit from further growth. Benjamin *et al.* (2006) conclude that scale/size gives the property owners of rental dwellings the ability to manage their properties more efficiently (e.g. through reduced overhead costs), to provide better service to customers, and that they can obtain a rent premium. Jain and Robinson (2018) also conclude that larger property owners can obtain a rent premium.

However, none of the studies mentioned above are about tenant-owner associations. Nor do they conclude what size is required to benefit from economies of scale. Transferred to this study, the above-mentioned results could imply that tenants are willing to pay more to live in condominiums that are owned and managed by an association with a certain size. Large associations may signal more efficient and better property management.

There are also potential benefits with smaller associations. There is little research about collective actions problems in real estate management processes (Ho and Gao, 2013; Blandy *et al.*, 2010). However, Ho and Gao (2013) study collective actions for apartment buildings in

Hong Kong. They conclude that buildings with multiple owners risk depreciating faster, which they explain with less responsibility-taking for joint resources. Although owners have a common interest to maintain a good standard, they are often not interested in the maintenance and caretaking of the building. This illustrates a tragedy of the common/free-riding problem as well as a lost sense of community in building management, a risk also pointed out by Ostrom (2000). Yau (2012) study determinants of homeowner participation management of multi-owned housing in Hong Kong. Their results are sensitive to the type of management activity. However, they identify group cohesion as one factor that may improve the willingness to participate. We speculate that group cohesion may be stronger in smaller associations where households are less anonymous. Shilling *et al.* (1991) conclude that tenant-occupied dwellings depreciate faster than owner-occupied units, implying that homeowners take better care of their homes than renters. Further, Bengtsson (2001) discusses that tenant ownership offers stronger incentives for management cooperation than rental tenure. Similarly, Ho *et al.* (2006) run OLS regressions and find that private apartments buildings with incorporated owners in Hong Kong generally have better conditions than no-ownership associations. This suggests that there is a risk of faster depreciation of condominiums if residents lose their sense of ownership and the sense of responsibility for shared facilities. Large tenant-owner associations may be at larger risk for this than smaller associations.

3. Interviews

Our quantitative analysis is the focus of this paper. However, because of the lack of previous empirical evidence about our topic, we decided to include some qualitative work. The objective is to get a better understanding of how the real estate sector reason about the role of the size of tenant-owner associations. We selected three respondents through a stratified purposeful sampling (see Patton, 2002; Eisenhardt, 1989). A stratified purposeful selection should obtain the expert's perspective. All the anonymous respondents have more than five years of experience from the real estate sector and have previously worked with tenant-owner associations. They have senior positions in their companies, and work with strategical questions linked to new construction and management of tenant-owner associations. Table 1 summarizes information about the respondents.

The interviews have a semi-structural form (Kvale and Brinkmann, 2009) and include questions about three main themes: management, financing-conditions, and attractiveness. The guide that was used for the interviews is in Appendix 1. Due to Covid-19 restrictions, we conducted all interviews by telephone. The interviews were recorded and transcribed, and a manual content analysis was performed. The results of the interviews can complement our quantitative analysis. Also, because previous empirical evidence on our topic is scarce, the interviews help build a stronger case and better motivation for our research question. We briefly summarize the results of the interviews below.

3.1 Management

Generally, the respondents did not raise concerns regarding the impact of size on management issues. However, all respondents raised concerns about "very small"

Table 1. Information about the interview respondents

Respondent	Company type	Company size	Position
1	Development and management consulting company	Medium	CEO
2	Construction and development company	Large	Head of department
3	Development and management company	Large	CLO

associations. The respondents suggested that very small associations have difficulties to negotiate the price for basic services. Also, they will encounter problems to get enough offers from contractors when procuring for renovations or other investments.

One of the respondents stated:

> We have negotiated agreements with broadband providers that the tenant -owned-associations we manage can take benefit from. The large associations that we manage could have managed to get the same agreements, sometimes perhaps better, that we have now arranged. But the small associations, say fewer than twenty condominiums or like the one in Staffanstorp with twelve condominiums, would never be able to negotiate such an agreement. (. . .) If we have an association with only 40–50 condominiums then it will be dependent on that the residents help each other out instead of buying in the service, because buying them will not be cost efficient. At the same time, when residents help each other, it will build another kind of fellowship compared to larger associations where all services are bought. (Respondent 3)

The response from respondent three underlines the fact that many associations take help from professional property management firms that are specialised in the management of tenant-owner associations. These firms represent several associations and allow smaller associations to benefit from the property management firms bargaining power. However, there is a charge for using these firms, which not all tenant-owner associations do.

3.2 Finance

As discussed, banks may be reluctant to issue loans to very small associations or to households that want to buy a condominium there. Bergling (2018) and Rytterström (2020) suggest that associations with less than 7–10 condominiums could be considered as too small. However, during the interviews it became clear that the banks are even more restrictive regarding new construction and new associations. All respondents suggested that banks are reluctant to finance new construction of tenant associations with less than twenty condominiums:

> To get funding for an association, I would say you must have more than twenty condominiums. This is true whether it is new construction or maintenance financing. To get good financing, I would say you need to have about forty condominiums. But of course, it also depends on the location. In more attractive areas, the banks would be more inclined to grant a mortgage also for associations with fewer condominiums. (Respondent 1)

3.3 Attractiveness

"Attractiveness" concerns how the respondents think that residents reason about the size of the associations that their condominiums belong to. The respondents emphasized how smaller associations may struggle with finding board representatives. Furthermore, they also speculated about how the sense of collective responsibility can be lost if the associations are too big. The respondents differed somewhat on what they considered as "too big". Respondents one and two preferred no larger than 80–100 condominiums, while respondent three suggested 100–150 condominiums. However, all three reasoned similarly:

> If the associations have less than twenty condominiums, they will have trouble finding people to engage in the board of the association. There is also a risk for being too vulnerable if something happens. (. . .) We find that when the association have one hundred condominiums or more the sense of community is lost. You do not know your neighbours nor who sits on the board. Our experience is that it can be even more difficult to engage people to participate. This is from our perspective not positive as you at the same time do not take that collective responsibility that the concept of tenant-owner association is built upon. (Respondent 3)

To summarize, our interviews support that the size of tenant-owner associations matters. Associations can be "too big" or "too small". Associations which are "too small" will have more severe financing restrictions than larger associations. Larger associations may benefit from economies of scale, e.g. when outsourcing property management services. However, when the associations are larger than 80–150 condominiums, it can result in losing a sense of community among the residents.

4. Methodology

We employ hedonic price regressions to investigate the relationship between the price of condominiums and the size of the tenant associations that they belong to. Multiple studies have uses hedonic price regressions to explore the determinants of property prices. Housing is assumed to provide several services, which consumers value separately (Rosen, 1974). Housing characteristics are typically divided into structural characteristics, location characteristics and macro characteristics (Chau and Chin, 2003; and Heyman *et al.*, 2019). *Structural characteristics* are characteristics of the properties and condominiums (e.g. floor area). *Locational characteristics* typically refer to location attributes within a city/municipality. *Macro characteristics* are general factors that affect the aggregate housing market, e.g. fluctuations in mortgage interest rates and business cycles. Hedonic price models employ regression analysis and micro data to analyse how these characteristics affect property prices. The estimated relationships are interpreted as the implicit price of a specific attribute.

The hedonic price model can be expressed accordingly:

Price = f(Structural Characteristics, Locational characteristics, Macro Characteristics, Size of tenant-owner association).

Our variable of interest is the size of tenant-owners association to which the condominiums belong. We regress the prices of sold condominiums (P) on several independent variables (X) according to $P = \alpha + X^* \beta + \varepsilon$. β represents the estimated regression coefficients, α is the vector of district fixed effect and ε is the residual term. The hedonic model can be estimated in different ways, e.g. as a completely linear model or as log-log model. Comparing information criteria between different specifications favours the log-log model. Therefore, we transform all continuous and strictly positive variables using natural logarithms. Discrete variables are not transformed.

X represents structural, locational as well as macro characteristics and including them should reduce the risk of omitted variable bias. However, data does not allow controlling for all relevant attributes that potentially affect prices. For example, we are not able to control for some structural characteristics, e.g. the number of bathrooms or the physical quality of the condominiums. Regarding locational characteristics, we include distance to the closest train station, distance to coast, distance to the closest primary school and average area incomes. Including other distance variables is possible (e.g. proximity to shopping malls, green areas, and the central business district), but it results in multicollinearity as the major shopping malls, green areas, boutiques and the three train stations (Triangeln, the Central Station and Hyllie) [1] are closely located. Instead, we include geographical coordinates and district fixed effects [2]. We cluster the standard errors over districts. We assess that this approach solves the issues of excluding some potentially relevant locational characteristics as well as the potential issue of spatial autocorrelation. Including the coordinates have been used in several studies (Cassetti, 1972; Jackson, 1979; Clapp, 2004; Clapp *et al.*, 2001; Walsh *et al.*, 2011; Zheng *et al.*, 2011). When their regressions coefficients are significant, they confirm the presence of spatial autocorrelation, but do not have meaningful economic interpretation. Table 2 defines all variables.

P	Price of condominium (ln)
Floor area	Living area (square metres) (ln)
Floor	Apartment floor. 0 = ground level
Distance coast, Distance train and Distance school	Euclidean distance to coast, closest train station and nearest primary school (metres) (ln)
SAMS_income	Average disposable income (#SEK) per consumption unit of the SAMS area (ln)
#Condominiums	Number of condominiums in the tenant–owner association (ln)
Ground level	The condominiums is located at ground level. (1 = yes, 0 = no)
Monthly Fee per square meter	The monthly fee per-square meter paid to the tenant-owner-association (ln)
Q1–Q3	Seasonal dummies indicating quarter when apartment were sold
Construction year	Year when apartment was built or last renovated/extended. Apartments built before 1930 are all set to 1930
Time trend	Quarter time trend variable
Built before 1930	1 = Construction year <1930 = 1, 0 otherwise

Note(s): We also include longitude, latitude district dummies among the explanatory variables. ln denotes natural logarithm

Table 2.
Variable definitions

5. The data

Transaction data originate from Värderingsdata [3] (Data for valuation of properties). We complement with geographical socioeconomic data from Statistics Sweden. Some locational attributes have been acquired using GIS software. Street addresses of local primary schools were obtained from the national Agency for Education [4].

Our data is a cross-section of sold condominiums in Malmö Municipality 2013–2018. Although data is available from 2005, we assess that data quality deteriorates with age. Moreover, by starting in 2013, we exclude the period during which the property market stagnated due to the international recession, initiated by the subprime crisis in the U.S. Thus, our regression results should primarily contribute to an increased understanding of the housing market during normal market conditions.

Malmö is the third largest municipality in Sweden, with a tenure distribution that resembles other metropolitan/larger municipalities. Hence, Malmö is a relatively strong housing market and holds a relatively high share of condominiums and rented dwellings, while the share of owned dwellings is low (see Table 3). Malmö should thus be representative for other large municipalities where the shares of condominiums are relatively high.

We employ standard control variables (see, e.g. Ceccato and Wilhelmsson, 2020; Miller *et al.*, 2018; Taltavull *et al.*, 2017). Table 4 provides summary statistics of the employed variables (not logarithmized).

We exclude 28 observations where square meter prices exceed SEK 100 000, are below SEK 5000 and for which monthly fees per square meter are below SEK 200. We assess these values as unrealistic. Even though some observations could be considered as outliers, one must be cautious with removing them if they only represent natural variations of the data. In

	Value	Municipality rank (descending order)
Share condominiums	39.28%	8/290
Share rented dwellings	46.17%	13/290
Share owned dwellings	14.54%	287/290
Population	339, 313	3/290

Source(s): Statistics Sweden (2020–05–20)

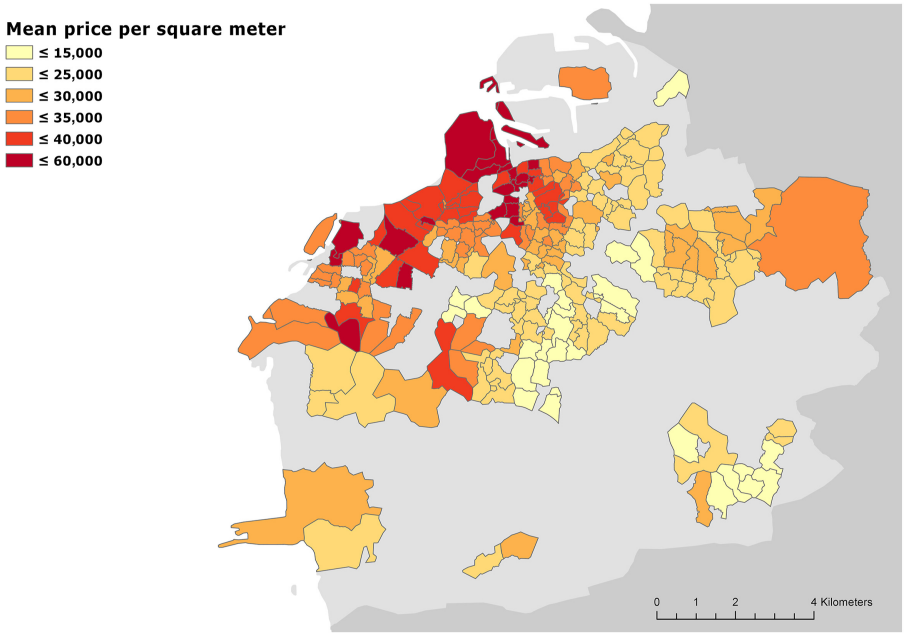
Table 3.
Malmö distribution of tenure types in 2018

	Mean	Standard deviation	Min	Max
Price (SEK)	1,622,923	995.8067	140,000	13,650,130
Floor area	67.6028	23.95943	10	274
Distance train	1797.217	1,020.776	51.1738	7175.222
Distance coast	2183.537	2634.47	0.00545	10173.74
Distance school	342.0054	184.3464	19.76519	2050.177
#Condominiums	173.713	193.9549	3	994
Construction year	1964.365	22.85964	1,929	2,017
SAMS_Income	222916.300	609.7157	59216.67	681025.8
Price per m^2	24052.56	10209.41	5,000	73,684
Monthly Fee per m^2	53.62386	10.68172	14.58064	166.9853
# Floor (discrete variable)	3.15028	2.097524	1	19
Ground level	0.1970784	0.3977994	0	1
Built before 1930	0.0454853	0.2081515	0	1
Q1	0.25558079	0.4363225	0	1
Q2	0.2766978	0.4473741	0	1
Q3	0.2532803	0.4389982	0	1
Q4	0.214214	0.4102836	0	1

Table 4.
Descriptive statistics

any case, removing the outliers and additional observations did not considerably change the regression results.

Malmö is a coastal municipality with three train stations serving commuter as well as regional trains. Malmö is segregated with varying household incomes. We use the division of SAMS areas to illustrate differences in mean prices [5] (Figure 1).



Note(s): Grey indicate that no transaction took place

Source(s): Värderingsdata

Figure 1.
Mean price per square metre by SAMS areas of condominiums during 2017 and 2018

It is apparent that prices are higher downtown and closer to the coast. However, we do not see obvious patterns for tenant–owner association size (Figure 2). If any pattern, condominiums belonging to smaller associations are more common on the town outskirts.

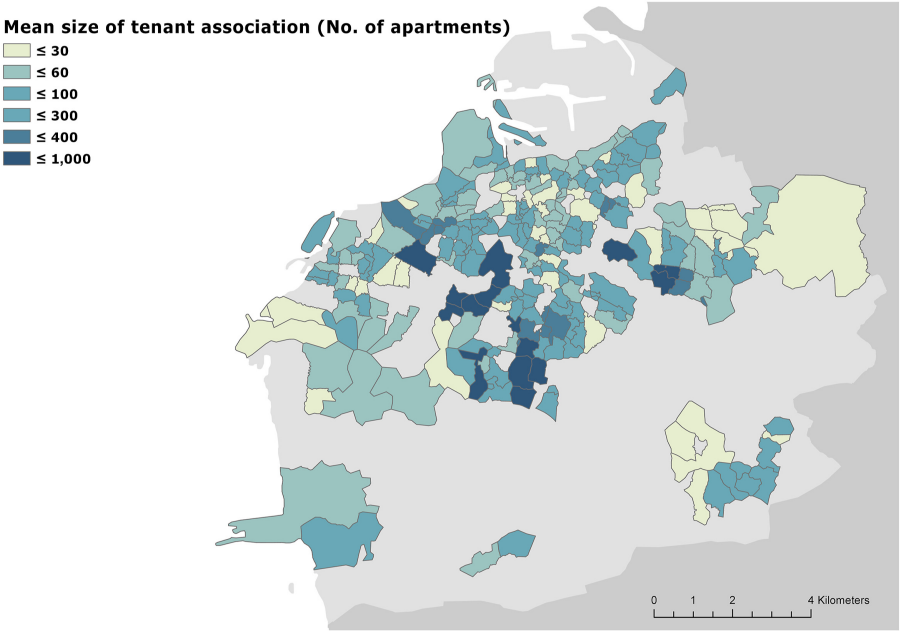
6. Empirical results

6.1 OLS regressions

Table 5 shows all regression results. Model 1–4 add different control variables stepwise. Models 5–6 add the second and third polynomials of tenant-owner association size to detect potential non-linear (log-log) relationships. Model 7 uses dummy variables for association size instead of including it as a continuous variable.

A potential problem is if some of the explanatory variables are highly correlated, which mainly concerns our main variable of interest (#Condominiums). Correlations between other variables are not necessarily a problem. Correlations between #Condominiums and all the other explanatory variables never exceed 0.39. The strongest correlation is found between distance to coast and SAMS_area incomes (−0.64). This indicates that high income households generally live relatively close to the coastline.

Control variables are mostly significant and with expected signs. Floor area is positively associated with price. The monthly fee per square meter paid to the tenant–owner association, distance to ocean, and distance to train station are all significantly negative. Moreover, proximity to train stations seems to have a stronger impact on the price than proximity to the ocean. Also, condominiums are more expensive in areas with relatively high average incomes presumably because these areas are perceived as relatively attractive. Prices increase about by one percent for each additional floor. We included a specific control



Note(s): Grey area indicates that no transaction took place
Source(s): Värderingsdata

Figure 2.
Mean size of tenant–owner associations by SAMS Area for sold condominiums 2017–2018

Table 5.
Regression results

Regression model	1	2	3	4	5	6	7
#Condominiums	−0.0863*** (0.000)	−0.0733*** (0.000)	−0.0605*** (0.000)	−0.0563*** (0.000)	0.0630 (0.254)	0.0153 (0.935)	
#Condominiums^2					−0.0136* (0.045)	−0.00240 (0.955)	
#Condominiums^3						−0.000835 (0.797)	
Floor area		0.716*** (0.000)	0.718*** (0.000)	0.723*** (0.000)	0.728*** (0.000)	0.728*** (0.000)	0.727*** (0.000)
Ground level		−0.0156 (0.262)	−0.0124 (0.371)	−0.0173 (0.156)	−0.0165 (0.171)	−0.0165 (0.173)	−0.0180 (0.133)
Floor		0.0121* (0.030)	0.00945 (0.052)	0.0102* (0.016)	0.0105* (0.013)	0.0105* (0.013)	0.00987* (0.024)
Monthly Fee		−0.424*** (0.000)	−0.430*** (0.000)	−0.377*** (0.000)	−0.381*** (0.000)	−0.381*** (0.000)	−0.371*** (0.000)
Construction year		0.00287*** (0.000)	0.00228** (0.005)	0.00133* (0.032)	0.00132* (0.028)	0.00132* (0.029)	0.00122* (0.033)
Time trend	0.0236*** (0.000)	0.0244*** (0.000)	0.0263*** (0.000)	0.0217*** (0.000)	0.0218*** (0.000)	0.0218*** (0.000)	0.0218*** (0.000)
Built before 1930		0.173*** (0.000)	0.135*** (0.000)	0.0931** (0.002)	0.0975*** (0.001)	0.0975*** (0.001)	0.0959** (0.001)
Distance train			−0.196*** (0.000)	−0.178*** (0.000)	−0.177*** (0.000)	−0.177*** (0.000)	−0.174*** (0.000)
Distance coast			−0.0553* (0.013)	−0.0322* (0.050)	−0.0286* (0.043)	−0.0286* (0.043)	−0.0275 (0.056)
Distance school			−0.00772 (0.726)	0.00354 (0.839)	0.00267 (0.878)	0.00261 (0.881)	0.00552 (0.757)
SAMS_Income				0.441*** (0.001)	0.432*** (0.001)	0.432*** (0.001)	0.443*** (0.001)
AP 3–5							0.290*** (0.000)
AP 6–10							0.191*** (0.000)
AP 11–20							0.161*** (0.000)
AP 21–30							0.150*** (0.000)
AP 31–40							0.142*** (0.000)
AP 41–50							0.170*** (0.000)
AP 51–100							0.117*** (0.000)
AP 101–200							0.0840** (0.004)
Observations	26,903	26,903	26,903	26,903	26,903	26,903	26,903
Akaike	21882.0	−7917.2	−11673.8	−14559.7	−14739.0	−14740.6	−14507.6
BIC	21939.4	−7810.6	−11542.6	−14420.3	−14591.4	−14593.0	−14360.0

Note(s): Results for quarterly fixed effects, coordinates and district dummies are not reported. Standard error are clustered over districts. *p*-values within brackets parenthesis. *, **,*** denotes significance at the 0.05, 1 and 0.1 percent, respectively

for being located at ground level because those condominiums have specific characteristics. For example, they are more exposed to eye gazing from pedestrians and some of them have small gardens. However, the results does not suggest that ground level condominiums are priced differently compared to other condominiums besides the "penalty" for having a low floor number (which is already captured by the variable "Floor").

When first including the construction year, we generally found no significant correlation with prices (besides model 2), although newer apartments should be more expensive. We suspect this is because some older condominiums have attractive attributes (e.g. high ceiling height). We therefore include a dummy variable for condominiums in properties built before 1930. This confirms that older condominiums are significantly more expensive than other condominiums. Also, the inclusion of a dummy for older condominiums lowers the p-value for construction year below five percent.

Turning to the variable of interest, models 1–4 display negative and significant relationship between price and the number of condominiums in the tenant–owner association (#Condominiums). The negative relationship weakens somewhat when adding additional control variables but remains statistically significant. These results indicate a negative price premium on larger tenant–owner associations, contradicting that larger associations benefit from economies of scale and better financing conditions. At least, it is not reflected in prices. The results may rather support our presupposition that residents perceive smaller associations as more "personal" and less anonymous. However, we cannot rule out other explanations. Smaller associations may have relatively attractive common amenities, about which we lack data, We do not, however, assess that the results reflect that smaller associations are situated in more attractive locations as we have included several locational attributes among the control variables. Also, recall Figure 2 which does not reveal any significant correlation between location and size.

Including #Condominiums^2 (model 5) and #Condominiums^3, (model 6) improves the information criteria although their regression coefficients are not significant. While models 1–4 suggest a negative and linear and log-log relationship, both models 4 and 5 support inverted U-relationships. Initially, there is a positive relationship between size and price. However, this relationship quickly turns negative. The "threshold" occurs at 10 and 6 condominiums in model 2 and 3, respectively. Interestingly, this is the same range as discussed in the article by Bergling (2018) which suggested that banks can be reluctant to lend money to associations with less than about 7–10 condominiums. However, it is substantially smaller than 40–50 condominiums which was mentioned during our interview with respondent one (section 3) as a necessary size to achieve economies of scale. It is also smaller than 20 condominiums, which was mentioned as a lower limit for the banks to be willing to grant loans newly started associations. Perhaps the Malmö housing market is too strong to fit such general claims. Recall that respondent 1 claimed that "*In more attractive areas, the banks would be more inclined to grant a mortgage also for associations with fewer condominiums*". We comment more on the "optimal size" in the next section.

Model 7 uses dummy variables to indicate the sizes of the tenant-owner associations. We use associations with more than 200 condominiums as the reference category and use dummies to separate between associations with 3–5, 6–10, 11–20, 21–30, 31–40, 41–50, 51–100 and 101–200 condominiums respectively. The results are mainly line with models 1–3, i.e. condominiums that belong to larger associations are cheaper than condominiums in smaller associations and prices are highest in associations with 3–5 condominiums.

6.2 Simulations

We perform simulations to illustrate the relationship between the size of tenant-owner associations and price [6]. We have converted the natural logarithms used in the regressions

to actual prices in SEK. Figures 3–5 display the simulations based on the regression coefficients obtained in model 4–6 in Table 1, respectively.

Figure 3 (based on model 4) show that the price drops at an accelerating pace as the association size increases. And, Figures 4 and 5 show that although models 5 and 6 suggest inverted U-relationships, the negative effect dominates over most of the range. Overall results suggest that smaller associations have more expensive condominiums. Models 5 and 6 estimate the size that maximize the price (i.e. the "optimal" size) to 10 and 6 condominiums, respectively (Figures 4 and 5). Interestingly, this is in the same range as suggested by the newspaper article by Bergling (2018), which suggested that banks could be reluctant to lend money to associations with less than 7–10 condominiums. However, there is a rapid negative relationship after these thresholds has been passed. Figures 4 and 5 clearly show that even

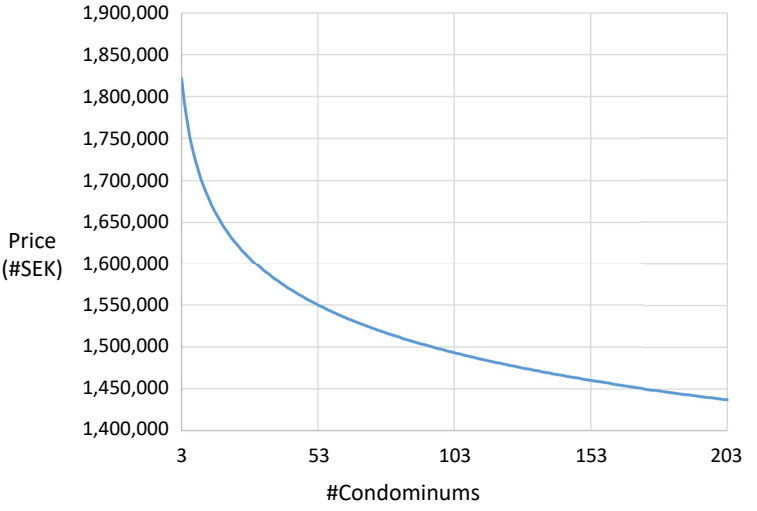


Figure 3.
Relationship between Price and #Condominiums according to model 4

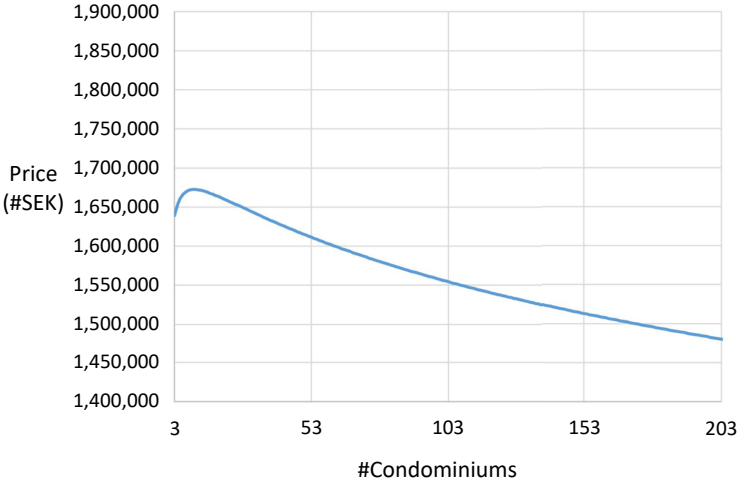


Figure 4.
Relationship between Price and #Condominiums according to model 5

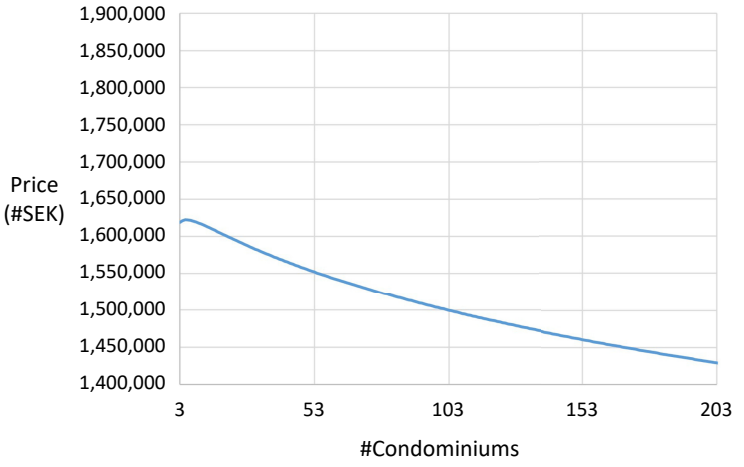


Figure 5. Relationship between Price and #Condominiums according to model 6

condominiums in associations which are smaller than the optimal size are relatively expensive compared to condominiums in larger associations.

6.3 Sensitivity analysis

We perform sensitivity analysis and elaborate by splitting the data into sub samples. First, we assess that construction year can be correlated with location and with other structural characteristics. If these are correlated with the size of tenant associations, our results may be driven by some segments of the data. We therefore divide the sample into three parts depending on when the condominiums were built: before 1965, 1965–1975 and after 1975. The period 1965–1975 was a unique period during which the Swedish government granted large subsidies to build one million new homes nationwide. The homes built 1965–1975 account for roughly 25% of all Swedish homes. Although they are spread across Malmö, most of the condominiums built between 1965 and 1975 are concentrated just about south of the city centre and include some less attractive areas, e.g. Rosengård. As Table 6 shows, condominiums that were built 1965–1975 also belong to larger associations compared to condominiums built before or after this period.

Second, we investigate whether the correlation between size and price mainly occurs over a specific size range. Roughly half of the condominiums in the data belong to associations with less than 100 condominiums. We therefore split the data into two subsamples: 3–100 condominiums and >100 condominiums.

The results from the sensitivity analysis are presented in Tables A1 and A2 in Appendix 1. The negative relationship between the size of tenant-owner associations (*#Condominiums*) and price is consistent and statistically significant over all the different subsamples and the

Construction period	Average no of apartments in tenant-owned associations	#Observations
Before 1965	137.2164	15,879
1965–1975	386.4483	5,554
After 1975	85.12946	8,018

Source(s): Värderingsdata and author's calculations. Estimates refer to the period 2013–2018

Table 6. Average size of tenant owned-associations by construction year

estimated elasticities for #*Condominiums* range between −0.35 and −0.098. When adding the second and third polynomials of #*Condominiums* we do not find evidence of inverted U-relationships for all subsamples. Thus, like the full sample our strongest and most consistent result support negative relationships between size and price. Recall that the regressions results from the entire sample indicated that the negative effects of increased size of tenant associations dominated over the positive effects at an early stage (i.e. at 6–10 condominiums). Thus, although there may be an inverted U-relationship, the results support a negative relationship over most of the range.

However, although the negative relationships are consistently significant across all subsamples, they are strongest in the subsamples with large tenant associations (101–1,000 condominiums) and for condominiums built after 1964. These two results are explained by the fact that condominiums built after 1964 on average belong to larger associations than condominiums built before this period. Thus, condominiums built after 1964 may, for different reasons, be perceived as relatively unattractive and/or happen to belong to relatively large tenant associations. Thus, although the negative relationships between size and price are significant for all subsamples, some portion of the results may be driven by particular segments of the data.

7. Discussion and conclusion

The strongest result in this paper is the significantly negative relationship between the size of tenant–owner associations and the prices of condominiums. The negative relationship between size and price results is robust and consistent when estimating the regressions for different sub samples and for different price intervals although they are strongest for condominiums built after 1964 and for associations with at least 100 condominiums.

Also, results indicate that associations should not be smaller than 6–10 condominiums. Interestingly, this is the same size range discussed by Bergling (2018) which suggested that banks can be reluctant to lend money to associations with less than about 7–10 condominiums. However, it is substantially smaller than 40–50 condominiums which was mentioned during our interview with respondent one as a necessary size to achieve economies of scale. It is also smaller than 20 condominiums, which was mentioned as a lower limit for the banks to be willing to grant loans to new associations. Perhaps the housing market of Malmö is too strong to fit such general claims and maybe relatively small associations in Malmö have good financing conditions. Therefore, similar studies should be performed on other regions. But overall, the results from both our quantitative and qualitative analysis indicate the following: tenant-owner associations can be both too small and too large, but it is not clear exactly how large they should be.

The aim of this paper was to draw attention to an issue rarely investigated in previous studies, but more research is needed. Results should be cautiously interpreted, and we have not proved causality. We cannot rule out other factors that explain the results. For example, smaller associations may have more exclusive common amenities and more luxurious condominiums about which we have no data. However, we are not aware of specific luxurious and small tenant-owner associations in Malmö.

If causality does exist, the results support that there is a preference for smaller associations over larger associations if they are not too small. As discussed previously, homeowners may associate smaller associations with a higher degree of influence and less anonymity. However, our interviews also suggest that larger associations benefit more from economies of scale and better financing conditions than smaller associations. But again, maybe the results from our interviews are too general and not applicable to the relatively strong housing market in Malmö. Because we cannot explicitly confirm that our hedonic price regressions reflect a causal relationship, we recommend additional studies. Besides

replicating our study for other regions/cities/countries, collecting smaller samples with more control variables could improve our study. Also, additional qualitative surveys should be performed. In this paper, we performed a small interview survey, but interviews should also incorporate the perspectives of residents and finance institutions (e.g. banks). However, we hope to have inspired others to continue exploring our topic as it is clearly neglected in previous work.

Notes

1. For example, the largest shopping mall (Emporia) is next to Hyllie Train station. Another shopping mall (Triangeln) is next to Triangeln train station as well as close to a major green area (Pildamsparken). The central station is close to some green areas (e.g. Slottsparken) and to several boutiques and some minor shopping malls (e.g. Caroli and Hansa).
2. Malmö municipality has 19 districts.
3. Värderingsdata is a private company that specializes in the valuation of properties. They regularly obtain data about all bought and sold dwellings in Sweden. https://www.varderingsdata.se
4. Skoladresser från skolenhetsregistret - Skolverket
5. SAMS areas = Small areas for market statistics, defined by Statistics Sweden.
6. We used average of the continuous variables and the most common values (i.e. the modes) for the discrete variables as inputs when performing the simulations.

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Appendix 1

Table A1.
Sensitivity analysis

Sample	Apartments Built Before 1965			Apartments Built 1965–1975			Apartments Built 1976–2018		
#Condominiums	−0.0270* (0.030)	0.0296 (0.621)	−0.00610 (0.975)	−0.0433* (0.014)	−0.0207 (0.789)	0.155 (0.708)	−0.0575*** (0.000)	−0.103* (0.017)	0.0286 (0.883)
#Condominiums^2		−0.00655 (0.361)	0.00202 (0.966)		−0.00232 (0.792)	−0.0408 (0.666)		0.00587 (0.288)	−0.0279 (0.546)
#Condominiums^3			−0.000661 (0.867)			0.00266 (0.698)			0.00276 (0.423)
Floor area	0.738*** (0.000)	0.740*** (0.000)	0.740*** (0.000)	0.717*** (0.000)	0.717*** (0.000)	0.718*** (0.000)	0.748*** (0.000)	0.748*** (0.000)	
Ground level	−0.0330** (0.001)	−0.0325** (0.002)	−0.0325** (0.002)	0.0140 (0.543)	0.0140 (0.542)	0.0140 (0.542)	0.00110 (0.962)	0.000852 (0.971)	0.00144 (0.951)
Floor	0.0114** (0.004)	0.0115** (0.004)	0.0115** (0.004)	0.00164 (0.618)	0.00160 (0.616)	0.00179 (0.567)	0.0269*** (0.000)	0.0268*** (0.000)	0.0268***(0.000)
Monthly Fee	−0.307*** (0.000)	−0.307*** (0.000)	−0.307*** (0.000)	−0.437*** (0.000)	−0.439*** (0.000)	−0.440*** (0.000)	−0.425*** (0.000)	−0.423*** (0.000)	−0.424*** (0.000)
Construction year	−0.000958 (0.486)	−0.000835 (0.542)	−0.000830 (0.547)	−0.00927 (0.196)	−0.00927 (0.199)	−0.00947 (0.189)	0.00462*** (0.000)	0.00477*** (0.000)	0.00480*** (0.000)
Time trend	0.0241*** (0.000)	0.0241*** (0.000)	0.0241*** (0.000)	00.204*** (0.000)	00.204*** (0.000)	00.204*** (0.000)	0.0207*** (0.000)	00.207*** (0.000)	00.207*** (0.000)
Built before 1930	0.0738* (0.013)	0.0777** (0.005)	0.0775** (0.005)						
Distance train	−0.186*** (0.000)	−0.187*** (0.000)	−0.187*** (0.000)	−0.217*** (0.001)	−0.217*** (0.001)	−0.217*** (0.001)	−0.0830 (0.064)	−0.0825 (0.070)	−0.0833 (0.069)
Distance coast	0.0635 (0.286)	0.0693 (0.246)	0.0698 (0.254)	0.133 (0.292)	0.138 (0.272)	0.136 (0.279)	−0.0140* (0.032)	−0.0143* (0.027)	−0.0148* (0.018)
Distance school	−0.0420 (0.052)	−0.0409 (0.058)	−0.0409 (0.057)	0.0383 (0.142)	0.0365 (0.142)	0.0359 (0.141)	0.00415 (0.840)	0.00392 (0.848)	0.00365 (0.858)
SAMS_Income	0.240* (0.035)	0.244* (0.027)	0.244* (0.026)	0.617*** (0.001)	0.616*** (0.001)	0.615*** (0.001)	0.264** (0.001)	0.263** (0.002)	0.263** (0.001)
Observations	14,746	14,746	14,746	5,184	5,184	5,184	6,712	6,712	6,712
Akaike	−11332.0	−11353.4	−11355.7	−3899.2	−3898.1	−3903.2	−3333.3	−3335.7	−3336.6
BIC	−11218.0	−11247.0	−11256.9	−3800.9	−3793.3	−3804.9	−3224.3	−3219.9	−3214.0

Note(s): Results for quarterly fixed effects, coordinates and district dummies are not reported. Standard error are clustered over districts. P-values within brackets parenthesis. *, **, *** denotes significance at the 0.05, 1 and 0.1 percent, respectively

Sample	3–100 apartments in tenant-owner association			>100 apartments in tenant-owner association		
#Condominiums	−0.0331* (0.024)	−0.000934 (0.992)	−0.846** (0.008)	−0.0880** (0.004)	−0.0851 (0.731)	6.071* (0.037)
#Condominiums^2		−0.00458 (0.722)	0.258* (0.017)		−0.000254 (0.991)	−1.086* (0.034)
#Condominiums^3			−0.264* (0.025)			0.0633* (0.034)
Floor area	0.740*** (0.000)	0.740*** (0.000)	0.740*** (0.000)	0.709*** (0.000)	0.709*** (0.000)	0.709*** (0.000)
Ground level	−0.0178 (0.079)	−0.0175 (0.080)	−0.0174 (0.081)	−0.00744 (0.720)	−0.00743 (0.720)	−0.00643 (0.760)
Floor	0.0211*** (0.000)	0.0212*** (0.000)	0.0212*** (0.000)	0.00410 (0.270)	0.00410 (0.268)	0.00460 (0.183)
Monthly Fee	−0.376*** (0.000)	−0.376*** (0.000)	−0.376*** (0.000)	−0.401*** (0.000)	−0.401*** (0.000)	−0.399*** (0.000)
Construction year	0.00110 (0.127)	0.00111 (0.118)	0.00111 (0.116)	0.00106 (0.292)	0.00106 (0.292)	0.000986 (0.341)
Time trend	0.0216*** (0.000)	0.0216*** (0.000)	0.0215*** (0.000)	0.0227*** (0.000)	0.0228*** (0.000)	0.0228*** (0.000)
Built before 1930	0.0880* (0.020)	0.0886* (0.016)	0.0886* (0.014)	0.176*** (0.000)	0.176*** (0.000)	0.186*** (0.000)
0. Distance train	−0.163*** (0.000)	−0.164*** (0.000)	−0.165*** (0.000)	−0.193*** (0.000)	−0.193*** (0.000)	−0.197*** (0.000)
Distance coast	−0.0275* (0.032)	−0.0280* (0.036)	−0.0290* (0.033)	0.0204 (0.666)	0.0204 (0.660)	0.0172 (0.702)
Distance school	−0.00576 (0.809)	−0.00580 (0.808)	−0.00534 (0.820)	0.0194 (0.438)	0.0194 (0.446)	0.0191 (0.444)
SAMS_Income	0.436** (0.001)	0.436** (0.001)	0.438** (0.001)	0.346* (0.029)	0.346* (0.029)	0.347* (0.027)
Observations	14,083	14,083	14,083	12,820	12,820	12,820
Akaike	−7429.4	−7428.9	−7471.2	−8371.7	−8369.7	−8434.1
BIC	−7301.0	−7292.9	−7335.3	−8259.8	−8250.4	−8322.2

Table A2.
Sensitivity analysis
continued

Appendix 2. Interview guide

(1) In what way, if any, do you consider that the size of tenant-owner associations matters for:

- Property management
- Financing
- The residents

(2) Do you believe that the size of tenant-owner associations matters for how efficient properties can be managed? If yes, please elaborate.

(3) Do you believe that the size of tenant-owner associations matters for the well-being of the residents If yes, please elaborate.

(4) Which do you think that the residents prefer? Large or small tenant-owner associations?

(5) Which are the pros and cons with small tenant-owner associations? Please elaborate!

(6) Which are the pros and cons with large tenant-owner associations? Please elaborate!

(7) Can tenant-owner associations have an optimal size? If yes, about how large do you think that they should be?

(8) May smaller tenant-owner associations be subject to stronger financing conditions than larger ones? If yes, please elaborate/explain.

Corresponding author
Peter Karpestam can be contacted at: peter.karpestam@gmail.com