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The formation of owners' corporations in Hong Kong's private housing estates
A probit evaluation of Mancur Olson's group theory

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Abstract *This paper uses a probit model to analyse 100 observations in terms of three hypotheses about the formation of owners' corporations in high-density private housing estates in Hong Kong within the context of Mancur Olson's group theory. The findings do not reject the theory, revealing that it is more likely for an older urban estate with fewer owners to form owners' corporations. The discussion includes a brief introduction to Olson's group theory and the development of the probit analysis. Some speculative thoughts about public participation in local level urban management and planning are offered in the conclusion.*

Owner's participation in property management

A typical feature of modern property management is the legislative requirement of or provision/allowance for owners' participation in a corporate body that manages a property development with multiple owners. Three examples of the enabling legislation in common law jurisdictions are the Commonhold and Leasehold Reform Bill of the UK introduced in June 2001; the Strata Titles Act 1973 (NSW) and Strata Schemes Management Act 1996 (NSW) of New South Wales, Australia and the Building Management (Amendment) Ordinance (Cap. 344) of Hong Kong, China. From the stance of the legislator, the purpose of the law is utilitarian. It is intended that by providing a legal framework which governs the property manager and the owners, there would be a balance between the accountability of property managers to owners and an efficient management of collective property, notably communal space and facilities. From the point of view of the public participation advocates, the law must

ensure maximum control by the owners. Presumably, from their points of view also, owners would always take advantage of the freedom to manage their own communal property. However, the efficacy of participation by owners varies with the size of the property, the number of owners, social background of owners (income, education, and whether they are in the jurisdictions or are absentee owners). In the property management literature, research on the performance of owners in property management is a developing area.

The case of Hong Kong is interesting in a number of ways. First, the numbers of owners involved are large, because most private housing is in the form of "estates" comprising high-rise high-density flatted blocks. Kornhill, an estate in Quarry Bay managed by the developer Mass Transit Railway Corporation, has for instance more than 6,648 flats dwelling units in 16 medium-rise and high-rise twin-blocks. By contrast, a typical "villa" type of "strata" development in a Sydney suburb may only have six units. The sheer scale of housing estates in Hong Kong, in the specific context that they are targets of political parties in election campaigns, poses a great challenge to the property manager. This challenge is in terms of effective communication between the manager and owners (and tenants), the management of conflicts of interest and the resolution of disputes among owners.

Second, while the first property manager is the developer as advised by an owners committee according to the deed of mutual covenant (DMC), the owners under the Building Management Ordinance introduced in 1993 have the option of removing this developer-manager and to form an owners' corporation (OC). OC is a legal entity which is formed by an agreement of the owners who collectively hold not less than 30 per cent of the undivided shares of the building/estate, and provided that there is no DMC or the DMC contains no provision for the appointment of management committee of OCs. The exercise of this option, as a kind of group formation behaviour of individual owners, is the focus of this paper.

The usefulness of examining the voluntary formation of OCs in Hong Kong is threefold. First, it can reveal the key factors in the formation of OCs. Intuitively, the size, age and location of the estates are critical but no rigorous study has ever been conducted. Second, as corporations may be regarded as "groups" formed by voluntary action, such analysis can be used for an evaluation or application of Mancur Olson's group theory. Third, the analysis of corporations already formed can also help verify whether the formation of owners' corporations would be more beneficial to owners than leaving the management of the estate to the developer-manager. In this paper, we shall deal only with the first and second aspects. Suffice it to say that the story of the OC is not always a happy one. It is indeed a fertile area of litigation between the corporation and individual owners aggrieved by the behaviour of the corporation, as exemplified in the cases involving the OCs of Wah Kai Industrial Centre, Fanling Centre, Tai On Building and Shui Lung Court. Olson's theory is discussed below.

Olson's group theory
Mancur Olson theory is well known in the economics of public choice (Stevens, 1993). It is a convenient model to interpret the voluntary formation of Hong Kong's corporation owners as voluntary associations because it challenges the social scientist's assumption that voluntary organisations exist to further the common interest of their members. In one of his classic works Olson (1965) argues that voluntary organisations exist in spite of the common interest of their members. Individuals may certainly have common interests, but they also have private interests that could well inhibit participation in or support for the organisation. Olson (1965) developed an analytical model, based on several assumptions of human rationality, which defines the critical number of potential "joiners" of a group for the formation of a voluntary group. Above a certain threshold, the costs of participation will prohibit the formation of a group.

Olson's (1982) concept on groups has been further developed to form the line of thought of his second major work, *The Rise and Fall of Nations*, in which he explains the growth and decline of Western countries by reference to interest groups (Olson, 1982). At a micro level, Olson's (1982) group concept has been echoed by Hirschman's (1970) concept of "voice" and "exit" (Hirschman, 1970). Hirschman 's (1970) model is intended to characterise the choice options available to the minority shareholders who seek to control the behaviour of the board of directors. By analogy, it can be extended to constitutional politics and property management. In our context, "voice" would refer to the forming, participating in or contesting an OC; and "exit" to selling the property rather than expending time and resources in establishing, forming or fighting the OC. As participation is only one option and "exit" may be a more efficient alternative to "voice", it is not expected that all private housing estates in Hong Kong would witness owners' revolts which overthrow their developer-managers.

Olson's model, however, is an analytical construct and has neither been refuted by empirical evidence nor applied to evaluate empirical data in the real world. By using laboratory methods like those commonly used in experimental psychology, some economists have "rejected" Olson's arguments (Hamburger *et al.*, 1975; Bonacich *et al.*, 1976; Marwell and Ames, 1979, 1980, 1981). As these tests are conducted in artificial environments in which the subjects were not confronted by real costs borne by them, a typical methodological limitation of experiments in social sciences, we do not regard their findings as being conclusive or even relevant. As a prelude to in-depth case studies, which are commonly used in property management research, we shall use a standard statistical model, the probit model, to evaluate three refutable hypotheses using statistics on OCs in Hong Kong. This model is introduced in the next section.

The probit model and its applications
The underlying principles of the probit analysis were established in the nineteenth century but only witnessed in widespread use in the form of

statistical modelling in biology in or about 1935 (Finney, 1952). Probit analysis is a statistical method for regression in which the dependent variable has the value of either zero or one (Vogt, 1999, p. 224). This kind of dependent variable is described as being "categorical" or "limited", as it is not a matter of degree. In biology, the probit method has been used in connection with the analysis of toxicity data (Trevan, 1927; Burn, 1930; Bliss, 1935). In such studies, the biologist is interested to know what percentage of insects would be killed (say the value is 1) or not (the value is 0) at the same time given a certain dosage of an insecticide under investigation. In this case the percentage is the dependent variable and the amount of dosage the independent or explanatory variable. As the insects are either killed or alive on the application of a given dosage, the usual regression analysis cannot be used. After the biologist, the psychologist introduced the method to social science analysis. In stimulus-response studies, the psychologist had to find a method to estimate the magnitudes of a stimulus from statements by test subjects. The statistical properties of these magnitudes are similar to those in the biologist's insecticide analysis, as the magnitudes are greater than or less than the various members of a standard series (Fechner, 1860; Müller, 1879; Urban, 1909, 1910; Thomson, 1914, 1919a, b; Brown and Thomson, 1940; Shackell, 1923).

While the probit method was being adapted to psychological research, the biologist adopted and refined the methods (Greenwood and Yule, 1914; Trevan, 1927; Bliss, 1935; Finney, 1944a, 1947). Ferguson (1942) used the constant process for analysing data on the selection of items for mental tests. In considering the theory of this problem, Lawley (1943, 1944) came near to an independent derivation of the maximum likelihood solution. Finney (1944b) successfully combines the biological and psychophysical methods by illustrating the use of the probit method on Ferguson's (1942) data. Thomson (1947) shows how the two streams have eventually come together.

Since its inception in social sciences by the psychologist, the probit estimation technique has been adopted in urban economics. It is applied to model home ownership (Lee and Trost, 1978; Goodman, 1988; Horioka, 1988; Bourassa, 1995; Hsueh and Chen, 1999; Painter, 2000), ownership of automobiles (Farrell, 1954) and residential construction (Chan, 1999). Recently, the technique has been applied to town planning (Lai and Ho, 2001a, b, c, d; 2002a, b, c, 2003). We are seeking to apply the technique to property management.

A probit analysis of Mancur Olson's group theory

We shall use a probit model to examine the pattern of owners' participation in private residential housing management, in order to carry out empirical tests to verify the Olson's (1965) group theory. The propensity of owners to form OCs, a categorical dependent variable, for their buildings/estates is used as a proxy to evaluate Olson's group theory. The central idea to form our hypotheses is that

the larger the number of owners of a building/estate contains (the explanatory variable), the less likely that the building/estate would have an OC (the categorical dependent variable). The rationale is that the transaction costs associated (such as the cost of setting up the organisation, legal fees and the like) in forming a voluntary group (the OC) would increase with the expansion in the size of the group.

If the hypotheses developed on the basis of this conjecture could not be refuted in the probit analysis, then we may conclude that Olson's group theory is not rejected. A sample of 100 observations are used in this analysis and a probit regression model is built to verify the association between the three explanatory variables, namely size (i.e. the number of flat units), location and age of buildings/estates, on the one hand and the categorical dependent variable whether these buildings/estates would have an OC or not on the other hand. We shall discuss further the study data and methodology in the next section and derive the hypotheses for testing.

Methodology of data collection

The population data, covering 7,718 buildings (with the same name[1]), are collected from the government publication *Names of Building 1999* (Rating and Valuation Department, 1999). In the population data set, the locations of buildings are categorised as either urban area or the new territories[2] (NT). The former covers buildings in Hong Kong Island and Kowloon (including New Kowloon), whereas the latter includes those buildings that are found outside the urban area – in the new territories. The research, with the same set of data used for the logit analysis by the second author (Chan, 2002), examines the owners' participation pattern for residential buildings in Hong Kong Island and excludes commercial or industrial buildings in all areas. The reason for such exclusion is that the behaviour of the occupants of these non-domestic buildings is considered to be significantly different from that of the occupants of residential properties. Most likely, the occupants in the former are tenants rather than owners. Tenants are likely to pay no or less interest in the formation of OC as a means to deal with building management problems, as they are just "temporary" occupants. This is especially true with the commercial property sector. It is evident that owners really do take better care of their properties than tenants, a phenomenon called "rental externality". (Henderson and Ioannides, 1983)[3] The inclusion of non-domestic buildings into the study may "distort" the "normal" or "true" behaviour of residential owners.

Any non-privately owned residential building/estate is also excluded from this study. That means housing estates built by the Hong Kong Housing Authority (HKHA), Hong Kong Housing Society and Hong Kong Settlers Housing Corporation Limited (i.e. public housing), building or estate built under the Home Ownership (HOS) Scheme, Private Sector Participation and

Sandwich Class Housing (PSPH) schemes are excluded. The reason is that the nature of the ownership of these buildings/estates types is different from that in private residential housing. As the former is fully or partially owned and fully managed by the government, an owners' organisation is seldom formed for resolving management issues.

Population data description

The 7,718 buildings/estates are categorised according to whether they have OC[4] or not. The building/estate with an OC refers to a residential property that has been registered at the Hong Kong Land Registry by an owners' organisation[5] management committee. The age of the population buildings/estates varies from 1 to 99 years. For better evaluation, the age is categorised into five types, namely A (from 1 to 4 years), B (from 5 to 10 years), C (from 11 to 20 years), D (from 21 to 40 years) and E (more than 40 years). Tables I and II show, respectively, the locational and tenural distributions of buildings/estates with/and without OCs.

From Table I, we can see that the proportion of each building/estate with OC in urban area is 0.529, whereas in NT it is 0.024. By observation, owners' corporations are more likely to be found in the urban area than the NT. The reason is probably that there are more "small houses" in NT. These houses contain a small number of flats units (with the norm of three units per house). Hence it is rare for small house owners to form OC, as building management problems tend not to be complicated.

Table II shows that the proportion of buildings/estates with OCs increases with time, as measured by the length of occupation. Logically, older

Count total %	New territories	Urban area	Total
Buildings/estates without OC (0)	1,596 (20.68%)	2,866 (37.13%)	4,462 (57.81%)
Buildings/estates with OC (1)	40 (0.52%)	3,216 (41.67%)	3,256 (42.19%)
All buildings/estates	1,636 (21.2%)	6,082 (78.8%)	7,718
Proportion of OC/each building/estate	40/1,636 = 0.024	3,216/6,082 = 0.529	

Table I.
Locational distribution of buildings/estates with/without OCs

Count	Buildings/estates without OC (0)		Buildings/estates with OC (1)		Total	
	No.	%	No.	%	No.	%
A (1-4 yrs)	277	3.59	22	0.29	299	3.87
B (5-10 yrs)	813	10.53	252	3.27	1,065	13.8
C (11-20 yrs)	1,352	17.52	789	10.22	2,141	27.74
D (21-40 yrs)	1,905	24.68	2,058	26.66	3,963	51.35
E (>40yrs)	115	1.49	135	1.75	250	3.24
Total (%)	4,462	57.81	3,256	42.19	7,718	

Table II.
Age distribution of buildings/estates with/without OCs

multi-storey buildings need more maintenance works than "younger" buildings. Therefore, their owners tend to form an OC (as a legal entity) to tackle matters concerning major renovation and maintenance works (notably funding, tendering and supervision). The precise statistical association between age of property and location on the one hand and whether there is an OC on the other hand is to be further tested by a probit model.

Sample data description

A sample of 100 buildings/estates is drawn from the population data aforementioned for rigorous statistical tests of Olson's group theory. The sample is drawn randomly according to the "proportional allocation method"[6]. The population data are first stratified into two strata, i.e. NT and urban area. URBAN represents a residential building or estate located in urban area. It is a dependent variable with a dummy value that equals 1 if the building or estate locates there; 0 otherwise. The selected data are further stratified into two different sub-strata, i.e. long/old (age) and short/young (age)[7]. Since the median age of the population data is 22 years, an age below 22 years is categorised as "short" age, otherwise as "long" age. AGE represents the time length of occupation or age of a residential building or estate. It is measured in the number of years. In the population data set, there are 1,097 (14 out of 100) and 3,197 (41 out of 100) buildings/estates, in the NT and urban area respectively, with "short" age. There are 538 (eight out of 100) and 2,885 (37 out of 100) buildings/estates, in the NT and urban area respectively, with "long" age. Then, the 100 sample units are drawn according to the various proportions.

We have already explained the meaning of the explanatory variables "location" and "age" above. Now, we come to the most important explanatory variable in the evaluation of Olson's group theory. This is "the number of owners each building/estate contains". The "number of flat units"[8] each building/estates contains is used as a proxy to estimate the "number of owners". The former is believed to be a good proxy of the latter, as the amount of voting rights an owner possesses (in proportion to the total number of voting rights of all owners) in an owners' meeting is based on the number of undivided shares[9] that a single owner holds. In the case of multiple ownership of one flat (as in the case of joint tenancy), the voting right would still be the same (as the total number of undivided shares for that flat unit remains constant). UNIT represents the number of units in a residential building or estate. Finally, OC represents the setting up of an owner corporation in a residential building or estate. It is a dummy variable that equals 1 if there is an owner corporation in a building or estate; 0 otherwise.

The hypotheses and empirical estimates

A probit model is established to test three hypotheses about the likelihood of setting up an owner corporation in private housing estates in Hong Kong. The hypotheses are as follows:

H1. A residential building/estate with a larger number of owners is associated with a lesser likelihood of setting up an OC than one with a smaller number of owners.

H2. A residential building/estate located in urban area is associated with a greater likelihood of setting up an OC than one located in the new territories.

H3. A residential building/estate with a longer age is associated with a greater likelihood of setting up an OC than one a shorter age.

H1 is a direct test of Olson's theory and *H2* is an indirect test of Olson's theory, as the magnitude of common interest should increase of the property. *H2* may be regarded as a subsidiary hypothesis to both *H1* and *H3* as a building in the new territories tends to be younger and smaller, due to its recent development and the existence of low-density housing.

Table III presents the estimated results. The variable UNIT is found to be negative and highly significant. Empirical evidence shows that the larger the number of owners in a residential building/estate, the lower is the likelihood of setting up an OC in that building/estate. Hence, *H1* (the Olson's Group Theory) is not refuted. The variable URBAN is found to be positive and significant, indicating that a residential building/estate located in urban area is associated with a greater likelihood of setting up an OC in that building/estate; and hence, *H2* is not refuted.

Finally, the variable AGE is also found to be positive and significant, indicating that the older a residential building/estate is, the greater is the likelihood an OC is set up for that building/estate. Hence, *H3* is not refuted either.

Conclusion and discussion

The findings of our probit analysis suggest that whether an owners' organisation would be formed voluntarily for any particular building/estate is contingent on three factors, namely the total number of owners in a property;

Dependent variable	Constant	LUNIT	URBAN	LAGE	Log-likelihood	McFadden R^2
OC	− 0.36380	− 0.29068*	0.90933*	0.53665*	− 48.25907	0.26144
	(− 0.39169)	(− 2.65331)	(2.54987)	(2.43855)		

Notes: * indicates statistically significant at 1 per cent confidence level. UNIT and AGE are in natural logarithm; Figures in parentheses are z-statistics; the McFadden R squared measures the extent a categorical or limited dependent variable (in our hypotheses the formation of an OC or otherwise, bearing the dummy values 1 or 0) are explained by three independent or explanatory variables. The type of dependent variable selected could not be measured by the usual R squared method

Table III.
Probit estimates of the decision function

the age of the property and the location of the property. Although the findings could not be used as a "proof" of any causal relationship between the number of owners and the formation of an owners' organisation, the fact that there is such a negative correlation means that Olson's theory is not refuted.

To recapitulate, Olson's group theory (Olson, 1965) is that there is a relationship between the number of "potential" group members and the likelihood of these potential group members would form an interest group to further their common interest.

In terms of property management theory, our analysis introduces a popular regression method for handling categorical dependent variables that has been well received in the field of urban study and planning (Lai and Ho, 2002c). The probit model used can treat such pairs of categorical observations as "yes" or "no" or "successful" or "unsuccessful" which could not be dealt with by the usual linear regression techniques.

Our analysis has one important policy implication. The government has attempted to promote owners' participation in property management in the hope that the OCs would be an effective means for property owners to take control of their property in lieu of the developer-manager. However, one fundamental inherent constraint in the voluntary formation of an OC is neglected, i.e. the absolute number of owners a building/estate contains. If an OC cannot be formed or is hard to form in the first place, how can individual owners manage their own property? The government cannot expect that the owners of all private properties would or could voluntarily form and participate in owners' organisation. This is especially true for buildings/estates with a large number of owners.

Our rather negative finding shows that there is no inherent propensity of owners to participate in property management affairs through their own corporations. Owners of many housing blocks have simply passively left property management matters to the developer-manager, though this is not to say that they must necessarily be very satisfied with the performance of such managers. The owners' choice of "keeping the peace" by not revolting against the developer-appointed manager, an option akin to "exit", may simply mean that the alternative of "voice' is too costly.

The personal liability of committee members of OCs and the news about court cases involving OCs may have deterred the formation of corporations, unless the perceived advantages or "profits" of forming groups (i.e. OC in this case) are positive or the costs of not forming are unbearable.

It is to be hoped that the legislator and policy maker would be mindful of empirical evidence about the behaviour of the property owners and advocates for "public participation" (see Arnstein, 1971) and be sensitive to the implications of numbers in voluntary actions, as informed by Olson's theory.

One interesting question is posed by this Hong Kong study. If individuals with proprietary interests may not always take an active role in local planning

and management matters, how could government expect that people with no proprietary interest would play an active role in participating in wider district or regional planning issues? Such participation must be mediated by political and interest groups rather than a direct democratic participation of all, as is expected of the owners of private property for property management.

List of legislation
- Commonhold and Leasehold Reform Bill (UK).
- Strata Titles Act 1973 (NSW).
- Strata Schemes Management Act 1996 (NSW).

List of Hong Kong Ordinances
- Multi-Storey Building (Owner's Incorporation) Ordinance, Chapter 344, Laws of Hong Kong.
- Building Management (Amendment) Ordinance, Chapter 344, Laws of Hong Kong.

List of Hong Kong cases
- *Incorporated Owner of Wah Kai Industrial Centre* v. *HKSAR Government and Kowloon Canton Railway Corporation (the Wah Kai Industrial Centre Case)*.
- *Millap Ltd., Egeria Investment Ltd., & Golden Dragon Developments Company Ltd.* v. *The Incorporated Owners of Fanling Centre, Success Property Company Ltd., Poon Chung Yuen, Au Shing Hei, Lam Shui Tak, Ko Kam Ming, Chi Choi Chung, Wong Sin Ho, Lee Pak Kwung, Tse Wai Pun and Tang Po Gab LDBM 150/1999* and *Wong Ching Yee (suing on behalf of and representing not less than 5 per cent of the owners of Fanling Centre)* v. *Poon Chung Yuen and the Incorporated Owners of Fanling Centre, LDMR 32/1999. (The Fanling Centre Case)*.
- *Yip Yik Kwan, Wu Kit Yee, Mak Shuk Ching, Koo Kwan Ying, Lo Lam Lit* v. *The Incorporated Owners of Tai On Building, Lo Kwok Chau, Sui Yuen Hing, Shau Kwan Wing, Yuen Chong, Pong Man Chi, Chun Ho Wa and Mak Kan, HKCU 34/1997 (The Tai On Building Case)*.
- *Incorporated Owners of Shiu Lung Court* v. *Chow Mei Tak LDBM 150/1999* and *Chow Mei Tak (Chairman of Incorporated Owners of Shui Lung Court)* v. *Mui Kam Lam, Law Pak Ling, Chiu Kwan Ying, Tsang Yuen Ling, Yuen Hoi Tong, Kwan Shui Ping, Kwan Kam Yung, Mak Kwong Fu, Ng Kai Sun, Cheung Yue Ching, Chung How Kim, Kwok Shui Wah, Wan Tse Sun and Leung Moi Jing LDBM 232/1999.(The Shui Lung Court Case)*.

Notes

1. There are estates with buildings of different names; in this case these buildings would one counted as one estate only.

2. The Rating and Valuation Department has already segregated the location of all buildings into either urban area or new territories.

3. Even though Harding *et al.* (2000) have argued that there is not only "rental externality" but also "mortgage externality", we only accept "rental externality". If the mortgaged property value is depreciated (e.g. due to quality deterioration), the mortgagor still has to pay back the full amount of the mortgage. It makes no sense for the mortgagor not to maintain the value of the property.

4. For the definition and meaning of an OC, see section 8 of the Building Management Ordinance (Cap 344).

5. One should not confuse this with the "owners' committee", which is not a legal entity and is only a committee formed voluntarily by owners.

6. For the definition of "proportion allocation method", see Scheaffer *et al.* (1996).

7. Age refers the length of the actual occupation up to the year 2000.

8. The information is obtained from the Centaline Property Agency Limited (2000).

9. Undivided shares may be calculated according to the gross floor area (GFA), but there is no restriction on the calculation method by law. It is subject to developers' discretion. "Each owner has an equal undivided share as tenant-in-common with all other co-owners of the Government lease. He has an exclusive right of possession of 'his' unit but he shares the common parts of the land with all other 'owners'" (Sihombing and Wilkinson, 1997, p. 168).

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