The first step on the housing ladder: A natural experiment in Hong Kong

Lok Sang Ho

Department of Economics and Center for Public Policy Studies, Lingnan University, 8 Castle Peak Road, Tuen Mun, Hong Kong Lsho@Ln.edu.hk

Gary Wai-chung Wong,

Centre for Public Policy Studies, Lingnan University, Tuen Mun, Hong Kong

wongwc@Ln.edu.hk

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Abstract

The article presents and illuminates evidence, based on recent Hong Kong experience, indicating the existence of a "housing ladder effect" when housing prices increase or decrease. An increase of housing equity at the bottom of the ladder tends to translate into a trading up activity that will both increase housing market turnover and buoy up the entire housing market. Based on a natural experiment through the introduction of a public housing privatization scheme, this article demonstrates the importance of the first step on the housing ladder using a logit model.

Keywords: Ladder effect; Housing ladder; Logit model; Natural experiment; Public housing privatization

1. Introduction

Although Hong Kong is well known as a bulwark of free market capitalism, the government plays a major role in the housing market of Hong Kong. As Table 1 shows, over 46% of Hong Kong's households live in "public housing," which is a rather misleading term considering that some 36% of this "public housing" are privately owned. "Public housing" in Hong Kong refers to all publicly subsidized accommodations.[1] The government also controls the new supply of land while its Planning Department directly controls land use types and land use intensity through zoning regulations. Thus the Hong Kong government has much control over the new housing supply. Moreover, because any purchase of housing is typically financed through the banking sector, the Hong Kong Monetary Authority's "guidelines" on loan ratios,[2] which all local banks are expected to follow, will have big impact on the demand side. The Hong Kong Monetary Authority is also instrumental to the setting up of the Hong Kong Mortgage Corporation in 1997, whose mission is "to enhance the stability of the banking sector by offering a reliable source of liquidity, to promote wide homeownership, and to facilitate the growth and development of debt security and mortgage-backed security in Hong Kong." Table 1.

Land domestic households by types of accommodation.

First quarter	**1996**	**2001**	**2006**
Total (thousands)	1820	2056	2292
Public permanent housing (%)	46.1	46.8	46.2
Rental flats (%)	35.5	30.1	29.7
Subsidised sale flats (%)	10.6	16.6	16.5
Private permanent housing (%)	51.2	51.8	53.0
Public temporary housing (%)	0.8	—	—
Private temporary housing (%)	1.9	1.4	0.8

Source: Hong Kong Housing Authority.

Just as Bardhan et al. (2003) pointed out about Singapore, private sector housing in Hong Kong cannot be understood without a good grasp of the role the public sector plays in the housing market. In this paper, we are particularly interested in the role public housing plays in the household savings and "trading up" activities. As we will show, low rents in public housing lend support to the private housing market, especially when tenants who have become well-off are given incentives to leave the public housing sector. When these incentives are suddenly reversed so those who can afford private housing prefer to stay within the public sector instead, on the other hand, significant damage can also be done to the private housing market.

The history of public housing in Hong Kong began with the famous 1953 Shek Kip Mei fire that destroyed the homes of some 50,000 people who lived in the squatter huts there. As the economy developed and fiscal conditions improved, what was intended to be a stop-gap measure program was expanded and improved, culminating in the completion of the Wah Foo Estate in 1971, which was the first public housing development planned using a "new town" concept. Subsidized for-sale housing did not begin until 1978. From then on "Home Ownership Scheme" (HOS) housing as it is called became very popular. Public housing tenants were given priority to buy these units. Home Ownership Scheme housing not only provided an avenue for these tenants to improve their living conditions but also to vacate their units to make way for people waiting in the queue for the rental units. As it happens, HOS housing also provided the Housing Authority with a steady stream of profits that more than offset the losses for running the rental housing program.

An important policy change was approved in 1986. In order to make sure that public resources are used effectively to help the needy, the Housing Authority began to implement a policy of charging double rents for tenants who had resided in public rental housing for over 10 years and whose incomes had breached the "subsidy income limit." The policy, dubbed "Housing Subsidy Policy," was to be implemented in 1987. As it happens, this policy has far-reaching consequences both on the government's finances and on the private housing market. The Hong Kong experience with this policy change, and that with yet another policy change

announced in December 1997, which effectively reversed the incentives established under the earlier policy, provide an interesting case study and illuminates the working of the housing market.

In the next Section, we will offer a sketch of the quality continuum of the Hong Kong housing market, and explain how the policy of charging higher rents for richer tenants may affect the trading up activities of homeowners. We will argue that the "housing ladder effects," which will be defined in that section, play a role in the booms and busts of the housing market.[3] A working hypothesis will be developed, which will then be tested in Section 3 using a logit model. It takes advantage of a natural experiment that allows us to examine how the propensities of different households to take the first step in the homeownership ladder after a policy change. Finally, Section 4 concludes the paper.

2. The Hong Kong housing market and the nature of the housing ladder

Private housing in Hong Kong is extremely diverse, from much run-down premises dating back to pre-war times to very well decorated luxury villas with gardens and club facilities, and they are located in various locations with a huge degree of variations in accessibility and desirability. Prices could vary from less than HK$2000 (US$356) a square foot to over HK$30,000 (US$3846) a square foot.

In Hong Kong although private housing is generally more costly than public housing, many private housing units are in poor shape, and people often live in overcrowded conditions with several households sharing one small flat, and one could wait for up to 3 years to be assigned a public rental flat. While many private housing units continue to deteriorate over the years with little or no maintenance, there has been an ongoing effort to improve the quality of public housing. The standard in terms of space per tenant has been rising, and older buildings are demolished with tenants to be moved into newer, better equipped buildings from time to time. This makes public housing a very desirable option for many households. But public housing tenants may miss out on capital gains on owner-occupied housing, and their tenancy has been rendered less secure after the Housing Subsidy Policy was implemented in 1987.

When the Tenant Purchase Scheme (TPS) was announced on 8 December 1997, the Housing Authority claimed that by providing an opportunity for sitting tenants to buy their own units cheaply, the TPS provided tenants with the first step in the home ownership ladder so that they could begin to move up to higher quality housing. However, in fact the real first step in the homeownership ladder for many is actually a place in the heavily subsidized public rental housing. This has become increasingly evident in the early 1990s. As shown in Table 2a and Table 2b, public housing tenants generally saved more than households in Home Ownership Scheme housing, private rental housing, and private owner-occupied housing. The discrepancy has enlarged tremendously from 1989/90 to 1994/95. The Tables listed the monthly savings, in dollars, by income brackets. It should be pointed out that these income brackets refer to the general Hong Kong population.

Table 2a.

Mean monthly household savings by type of living quarters by income group (1989/90).

Income group	**Mean household savings (HK $, monthly)**				
	Public housing tenants	**Home Ownership Scheme**	**Private rental housing tenants**	**Private housing owners**	**Overall**
Bottom 25%	−503	n.a.	−174	−631	−451
25–49%	714	−277	−6	202	425
50–74%	2924	1880	2187	2410	2499
75–89%	6459	3552	5788	4989	5212
Top 10%	16,635	15,746	17,915	14,770	15,845

Table 2b.

Mean monthly household savings by type of living quarters by income group (1994/95).

Income group	Mean household savings (HK $, monthly)				
	Public housing tenants	Home Ownership Scheme	Private rental housing tenants	Private housing owners	Overall
Bottom 25%	−713	−2091	−724	−2773	−1041
25–49%	2059	396	469	439	1221
50–74%	6749	4103	1445	4225	4621
75–89%	15,716	11,700	10,981	12,365	12,565
Top 10%	40,933	26,217	26,117	28,229	27,929

Sources of both Table 2a and Table 2b: Household Expenditure Survey 89/90, 94/95, Census and Statistics Department, reported in Watanabe (1998, Table 6.6).

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From the Tables, it is clear that some of the rather well-off households in Hong Kong continued to live in public housing even though their financial conditions had vastly improved, and that they saved huge amounts of money. The income brackets refer to the entire Hong Kong population included in the Household Expenditure Surveys, and relatively fewer households in the richest 10% of households lived in public rental housing than in private owner-occupied housing. Nevertheless the figures highlight the validity of the observation that many of the tenants who had been living in public housing and had been enjoying the subsidized rents no longer needed such subsidies—this observation evidently was behind the policy of imposing higher rents on the so-called “well-off tenants.”

The homeownership ladder refers to the tendency for homeowners to trade their existing homes for more expensive, better homes when they have accumulated sufficient equity in their homes and other savings, and when their ability to service larger loans has gone up. Both Ortalo-Magne and Rady (2006) as well as Ho et al. (2008) provided theoretical frameworks explaining the working of the homeownership ladder. For a tenant to become a homeowner, he will need to have accumulated enough savings for the down-payment, which is always

required in Hong Kong[4] and which will help reduce the mortgage payments down the road. This process will be faster if their rents are lower or if nominal incomes rise faster. An official survey by the Hong Kong Housing Authority showed that in 1992–1993 as much as 24% of housing transactions were due to public housing tenants and as much as 13% of public housing tenants owned one or more homes.[5] This provides some evidence that a public rental housing program, by allowing households to pay low rents, also boosts their savings and hence the ability to buy a home. Although hard to verify, the increased interest in buying a home among public housing tenants in the 1990s may be related to the "Public Housing Subsidy Policy" that began to be implemented in 1987. By imposing higher rents on the well-off tenants, the attractiveness of staying in public housing for these tenants will be reduced. Since the talk of the day had been raising the rents for the well-off tenants even higher to eliminate any subsidy, it made sense to get prepared. Although relatively few tenants moved out of public housing each year, a sizable number were becoming owners of private flats, which they typically rented out.

Prior to 1998, Home Ownership Scheme homeowners would always make a handsome profit when they eventually sell their units, notwithstanding the repayment of the implicit land cost subsidy. They could sell their units in the open market after having lived in their units for over 10 years upon repaying such subsidies. Starting in June 1997, there was a new arrangement called the HOS Secondary Market, which is a market with buyers restricted to "Green Form Applicants,"[6] who are predominantly public rental housing tenants. Home Ownership Scheme owners were allowed to sell from the fourth year after purchase provided that they sold to such Green Form Applicants, and as long as they sell to such applicants, they would not need to repay the implicit land cost subsidy.[7] The fact that such transactions in the "secondary market" in 1997 were at very high prices (see Table 3) suggest that many public housing tenants were really cash-rich and that they had indeed played an important part in the very strong housing market in 1996 and 1997.

Table 3.

Actual transactions in the Home Ownership Scheme Secondary Market, Fu Keung Court ∗.

Usable floor area	High, middle, or low floor	Date of agreement to purchase	Price US$,000	Land premium discount rate (%)
644	Middle	09/1997	506.4	29
644	High	11/1997	461.2	29
645	Middle	04/1998	328.2	29
645	Middle	10/1998	253.8	35

Source: Downloaded from Housing Authority website at the time of writing from: http://www.housingauthority.gov.hk/chi/hd/hos/s_market/index.htm.

* Fu Keung Court in Wang Tau Hom. An exchange rate of HK$7.8 to US$1 dollar is assumed. Sellers do not have to pay the land premium discount when they sell in the secondary market that is restricted to public housing tenants. The buyer will however have to repay the land premium discount upon resale in the future. The land premium discount is calculated from the formula (Market Price–Sale Price)/Market Price at the time of original purchase.

The policy to deny well-off tenants the benefits of housing subsidies was further stepped up in June 1996. Tenants paying double rent were required to declare their assets and would be required to pay market rent if the values of these assets exceeded specified limits. This policy provided a big incentive for the well-off tenants to buy in the private market and gave much impetus to housing prices through 1997. It is not surprising that 1996 and 1997 were the years with the greatest number of public housing units returned to the Housing Authority on record.

Inadvertently, however, the Housing Authority suddenly reversed the incentives for the well-off tenants to give up their units. On 8 December 1997, it announced the Tenants Purchase Scheme (TPS). Under this scheme, sitting tenants, regardless of whether they were "well-off" or not, had the option to buy their units at as much as 88% discount from the estimated market price if they decide to buy in the first year the TPS was offered them. While the "discount upon discount" privilege was later no longer offered to well-off tenants, allowing them to buy their own units at any discount is tantamount to a one-off gift capitalizing part of the future

rent savings that these tenants should not enjoy. This constitutes a reversal of the Housing Subsidy Policy that was designed to deny them of the subsidies. It reduces the incentives of the well-off tenants to buy in the private market and to vacate their units. Ho and Wong (2008b) found that TPS produced a structural shift which affected the relationship between housing price and its determinants (pp. 232–233).

From this discussion, it is logical to expect differential effects of the TPS on the probabilities of different households to buy a private sector home. The introduction of the TPS provides a natural experiment. The offer of deep discounts available for sitting tenants to buy their own flats—whose quality has been steadily improved over the years relative to Home Ownership Scheme housing—effectively lured public housing tenants to stay in public housing even though they can afford to buy Home Ownership Scheme or private housing. We expect therefore that there will be a marked change in the probabilities of the well-off public housing tenants to buy a home following the announcement of the TPS. The same cannot be said of the low income tenants, whose probabilities to buy a private unit had always been low. Results of an empirical test based on these hypotheses are presented in Section 3.

A number of studies lend support to the ladder effect hypothesis. Stein (1995) suggests that transactions at the lower tiers of the housing ladder, which may be triggered by price increases, will lead to more transactions up the ladder. (Ho and Wong, 2006) and (Ho and Wong, 2008a) provide evidence using alternative estimation methods suggesting that housing prices will "Granger-cause" transactions in existing homes. Ho et al. (2008) further shows that housing prices of lower-tier housing lead ("Granger-cause") housing prices in higher tiers, and that lower-tier housing transactions lead higher-tier housing transactions. The logit test reported in this paper provides insight into the first step in the housing ladder taking advantage of a natural experiment. The results strongly suggest that the Tenants Purchase Scheme severed the housing ladder. There is evidence that it played a key role in the dramatic and sudden collapse of the housing market in 1998 and beyond.

3. Tests using a logit model

3.1. Data and descriptive statistics

The work reported in this section is based on a survey conducted by the authors in September 2002 using the facilities of the Survey Research Program of Lingnan University. It was a telephone survey using the random-digit-dialing sampling method. The target respondents were heads of households aged 25 or above. Table 4 presents the distribution of the 2031 sample households by key characteristics. These are domestic households by type of quarters, tenure of accommodation, and monthly household income. The survey sample more or less duplicated the distribution by key characteristics in the official data supplied by the Census and Statistics Department, lending credence to our results. We should, however, add the caveat that the household income categories are as reported at the time of the survey, and that there probably have been some upward or downward mobility during the 10 years covered in our study. If any upward or downward mobility of households in different income categories did not significantly change the income distribution of our sample, so that a relatively well-off household at the time of the survey (September 2002) was generally also a relatively well-off household in 1997, our results should stand.

Table 4.

Comparison of sample and official statistics.

	Sample statistics ∗ ∗ **(%)**	**Official statistics** ∗ **(%)**
Domestic households by type of quarters		
Public rental flats	36.3	31.1
Government subsidized sale flats	18.9	17.3
Private residential flats	44.8 (*n* = 2024)	51.7
Domestic households by tenure of accommodation		
Owner–occupier	58.3	52.9
Sole tenant	40.3	39.4
Co-tenant	1.2	2.6
Provided by employer	0.2 (*n* = 2021)	2.5

	Sample statistics ∗ ∗ (%)	Official statistics ∗ (%)
Domestic households by monthly household income		
Below $10,000	31.8	28.6
$10,000–$25,000	40.9	39.4
$25,000 or above	27.3 (*n* = 1659)	32.0

∗ *Source:* Distribution based on Quarterly Report on General Household Survey, July to September 2002, Census and Statistics Department of HKSAR government and ignores temporary housing.

∗ ∗ Note: Percentages are based on valid responses. Responses "Don't Know" and "Refuse to Answer" to the question about tenure were excluded from the calculation.

3.2. Variables and the model

Table 5 presents the list of dummy variables and their definitions. The dependent variable—Ownership of a Private or an Home Ownership Scheme unit—is a qualitative variable which was coded as 1 if the respondent answered positive to the question about ownership of a home (other than a TPS unit) acquired either within the 5 year window before or within the 5 year window after December 31, 1997. The number of observations for the dependent variable is based on valid responses only (i.e., all missing values were excluded from the analysis). As a result the sample size for this variable was reduced by 24.

Table 5.

Definitions of qualitative variables.

Variable	Value
Dependent variable	
Ownership of either Private or Home Ownership Scheme unit	1 = acquisition of a private or Home Ownership Scheme flat within the specified 5 year window, 0 = renter or TPS owner

Variable	Value
Independent variable	
Household income	
Less than $10,000	1 = yes, 0 = no
$10,000–$25,000 (reference group)	1 = yes, 0 = no
$25,000 or above	1 = yes, 0 = no
Not available *	1 = not available, 0 = other income groups
Public housing tenant	
Have you ever been a public housing tenant?	1 = yes, 0 = no
Age	
25–39	1 = yes, 0 = no
40–49	1 = yes, 0 = no
50 or above (reference group)	1 = yes, 0 = no
Not available *	1 = not available, 0 = other age groups

* Not available, including “don’t know” responses and “refusals”, is a dummy variable (=1).

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The explanatory variables Age and Income were coded as categorical variable with three groups. Here we treat “Don’t Know” responses and “Refuse to Respond” as “Not Available” and use a dummy variable (=1) to capture such responses. “Public housing tenant” is a dummy variable which assumes the value of unity for both current and past public housing tenants. We then created three interactive dummy variables by multiplying the public housing tenant to the three income dummies (see Table 5). The coefficients on these interactive terms would capture the effect of public housing tenancy for any given income category.

The logistic regression model that we use to estimate the probability of owning a private or Home Ownership Scheme unit takes the following form:

(1)

$$Y_i=\beta' \alpha_i+\varepsilon_i$$

where Y_i = 1 denotes homeownership (other than TPS units), α_i is a vector of observable characteristics (i.e., age, income and residence of public housing) for the Head of Household i and β' is the associated coefficients (including a constant). ε_i denotes the error term. The estimated logistic regression coefficients can be used to calculate the probability of i's being a buyer of a housing unit in the respective time "windows" before and after the TPS. The standard equation (Greene, 1993, p. 638) is as follows:

(2)

$$\text{Prob}(\text{homeowner}_i = 1) = \frac{e^{\beta' \alpha_i}}{[1 + e^{\beta' \alpha_i}]}$$

The logit model allows us to determine if the probability of purchasing private residential flats or Home Ownership Scheme housing would be affected by a household's having lived in public rental flats or not. In principle there are two effects. The first is that, since tenancy in public housing is fairly secure and is very economical, tenants may perceive less need for purchase of a private or Home Ownership Scheme flat ("the substitution effect"). The second is that, since public housing tenants pay less rent, they receive an extra income in kind and therefore would accumulate more savings and thus will be in a better position to buy ("the income effect"). We expect that the latter effect is stronger for the richer tenants who may perceive their tenure as less secure, and weaker for the less well-off tenants. We hypothesize, in particular, that richer public housing tenants had the highest probability to buy a home before TPS and that with TPS this group's propensity to buy a home other than TPS would decline.

To determine these effects we introduce three interactive dummies—dummies for the low, middle and high income groups multiplied to the public housing tenant dummy—into our model.[8] The coefficients on these interactive terms depict, for the respective income brackets, the additional effects of tenancy in public rental housing. We expect that the coefficient on the interactive term for the group with highest household income (i.e., $25,000 or more, who are threatened with double or higher rent) to be positive, while that for the middle and lower in-

come groups to be smaller or even negative. Since the TPS was announced in December 1997 and launched in January 1998, we consider two "windows" for the home purchase decision: the 5 years up to the end of 1997 and the 5 years from January 1998. In particular, the regressions were run against the dependent variable of having bought a private or an Home Ownership Scheme flat in these two respective periods. These tests will allow us to determine if the TPS had produced differential effects on the incentive to buy in the private/Home Ownership Scheme flats among the different income groups. To highlight the possible different effects of the TPS on repeat buyers and first-time homebuyers, we add age dummies, in Model 2 and 2′, to see if the coefficients on the age dummies had changed after the launch of the TPS and if so how. It should however be noted that all the information was collected in September 2002. As a result the latter window is slightly smaller than the earlier window. In addition all income and age information reported pertain to the time of the survey, i.e., September 2002.

3.3. Empirical results

Table 6 indicates that all of the variables had the expected signs and were significant. In particular, for *Model 1*, which did not control for age effects, generally higher income households are more likely to buy a flat (32.8% more likely for those with household income at HK$25,000 and above than the reference group, as compared with only 25.7% more likely for those in the middle income range). Moreover, the relative sizes and signs of the interactive income/tenancy status dummies are also as expected. Before TPS, high income households who also live in public housing were about 19.2% *more* likely to buy than similar income households who do not live in public housing, indicating that the income effect dominates the substitution effect. Middle range income households, who perceive their tenures as secure, on the other hand, are less likely to buy if they lived in public housing (roughly 24.7% and 38.6% *less* for those with monthly incomes between HK$10,000 and HK$25,000, and those with incomes below HK$10,000 respectively[9]).

Table 6.

Logistic regression estimates of ownership of private residential flats.

Variables	Pre-December 31, 1997 5 year window						Post-December 31, 1997 5 year window					
	Model 1			Model 2			Model 1′			Model 2′		
	Coefficient	Standard error	Marginal effect (d*P*/dα)	Coefficient	Standard error	Marginal effect (d*P*/dα)	Coefficient	Standard error	Marginal effect (d*P*/dα)	Coefficient	Standard error	Marginal effect (d*P*/dα)
Constant	−1.168***	0.306	—	−1.546***	0.326	—	−2.197***	0.471	—	−2.343***	0.480	—
Household income												
<$10,000 (reference group)	—	—	—	—	—	—	—	—	—	—	—	—
$10,000–$25,000	1.281***	0.363	0.257	0.757**	0.381	0.149	1.949***	0.518	0.289	1.690***	0.526	0.249
$25,000 or above	1.631***	0.368	0.328	1.087***	0.386	0.214	2.628***	0.514	0.390	2.310***	0.526	0.340
Not available*	0.654**	0.340	0.131	0.343	0.352	0.067	1.443***	0.496	0.214	1.346***	0.499	0.198
Interactive dummy												
<$10,000 × public housing tenant	−1.920***	0.417	−0.386	−2.085***	0.426	−0.410	−1.259***	0.570	−0.187	−1.286**	0.573	−0.189
$10,000–25,000 × public housing	−1.232***	0.240	−0.247	−1.195***	0.245	−0.235	−1.110***	0.256	−0.165	−1.040***	0.259	−0.153

Variables	Pre-December 31, 1997 5 year window						Post-December 31, 1997 5 year window					
	Model 1			Model 2			Model 1′			Model 2′		
	Coefficient	Standard error	Marginal effect (d*P*/d*α*)	Coefficient	Standard error	Marginal effect (d*P*/d*α*)	Coefficient	Standard error	Marginal effect (d*P*/d*α*)	Coefficient	Standard error	Marginal effect (d*P*/d*α*)
tenant												
>$25,000 × public housing tenant	0.957***	0.291	0.192	1.010***	0.297	0.199	0.039	0.298	0.006	0.053	0.301	0.008
Age												
25–29	—	—	—	0.358	0.316	0.070	—	—	—	0.607**	0.282	0.089
30–39	—	—	—	1.149***	0.213	0.226	—	—	—	0.642***	0.213	0.095
40–49	—	—	—	1.098***	0.208	0.216	—	—	—	0.251	0.215	0.037
50 or above (reference group)	—	—	—	—	—	—	—	—	—	—	—	—
Not available*	—	—	—	0.756	0.555	0.149	—	—	—	−0.856	0.807	−0.126
Chi-square	261.23 (df = 6)***			397.45 (df = 10)***			357.28 (df = 6)***			274.85 (df = 10)***		
Observation (*n*)	1181			1181			1161			1161		

Full-size table

Note: (1) ** and *** denote significance at 5% and 1% respectively. (2) The sample size is smaller than is shown in Table 4 because (a) there are missing values, (b) only flat owners who bought their flats within the 5 year window before 1998 (1993–1997) or within the 5 year window after December 1997 were included in the analysis, (c) owners were divided into two groups—before and after 1998, and (d) those owners who forgot which year(s) that they bought their flat(s) were treated as missing values.

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Table 6 shows that in 1998 and beyond, the *marginal probability* of buying a home apparently increased for all income categories. This might have been due to the large decline in housing prices after 1997, which rendered homes much more affordable. Note, however, these marginal probabilities should be interpreted carefully, as they do not by themselves indicate the projected probabilities of particular groups of people, which must be estimated based on the actual characteristics of such groups (Table 7).

Table 7.

Estimated probability of ownership of private residential flats for household head aged at 30–39.

	Prob. of purchase in pre-December 31, 1997 5 year window			**Prob. of purchase in post-December 31, 1997 5 year window**		
	Public housing tenant = 1	**Public housing tenant = 0**	**Ratio**	**Public housing tenant = 1**	**Public housing tenant = 0**	**Ratio**
<$10,000	0.0771	0.4020	0.19	0.0480	0.1543	0.31
$10,000–$25,000	0.3026	0.5890	0.51	0.2590	0.4973	0.52
$25,000 or above	0.8455	0.6660	1.27	0.6597	0.6477	1.02

Notes: Public housing tenant = 1 implies household is public housing tenant; public housing tenant = 0 implies household is private tenant.

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Most noteworthy is the fact that from 1998, after TPS had been implemented, richer tenants living in public rental housing became no longer more likely to buy homes than their counterparts in the private rental housing market. Prior to 1998, Table 6 shows that the marginal probability for "well-off public housing tenants" to buy a home, holding all other characteristics at their mean values, stood at 19.9%. After 1997, i.e., after the announcement of the TPS in December 1997, this marginal probability almost vanished to zero.

Again, Model 2 and 2′ in Table 6 show that, after 1997, the marginal probability to buy for households headed by someone aged 25–29 rose noticeably from 7% to 9% and turned significant. This is clearly related to the fact that home prices had dropped so much so that buying a home became within reach of such young households. There is anecdotal evidence, frequently reported in newspapers, that developers were selling an increasing percentage of their new flats to first-time buyers.

In contrast, those aged 40–49 who used to be 21.6% (marginal probability, Model 2, (Table 6) more likely than those in their 50s to buy lost their differential incentive (3.7%, Model 2′, and no longer significant). The Chi-square statistics, which test whether a model as a whole predicts occurrence better than chance (testing of the joint significance of all *i*), are all highly significant. This suggests that older buyers, who were more likely to be repeat buyers, suddenly became inactive. This is consistent with the suggestion that the loss of buyers willing to pay a good price for existing homes had effectively "incapacitated" their trading up. The introduction of the Tenants Purchase Scheme not only meant a decline in the number of buyers in the Home Ownership Scheme and private homes market, but also had caused a dramatic decline in transactions volumes. For the first time in all the history of the Home Ownership Scheme since its launch in 1978, 1998 saw thousands of would-be buyers of new HOS units (who were chosen by a lottery mechanism) forfeit their down-payments. The oversubscription rate dwindled. Even though most of the supply was in the end taken up, prices

had to be cut dramatically. In the earlier years those potential buyers from among the public housing who failed to get a place in the Home Ownership Scheme lottery would spill over to the second hand HOS market and the private market. Now this stream of buyers either completely lost interest or were willing to pay only much lower prices. With some 218,000 HOS owners suddenly finding that their units lost a major source of buyers, homeowners who had depended on them to buy their units found difficulty trading up to better homes in the private housing market. Transactions in the existing home market plunged, in turn paralyzing transactions in the new homes market, which in the earlier years almost exclusively depended on buyers trading up (see Table 6).

Table 7 presents the simulated probabilities of a home purchase for public housing tenants and private housing tenants whose heads of households were aged 30–39. It shows that the probability of a private or Home Ownership Scheme flat purchase for public housing tenants within 5 years before 1998 was over 84% for those with a monthly household income at $25,000 or more. This compares with the 66.6% probability for tenants of private flats. Within the 5 year window from 1998, the probability of buying a private or HOS flat for public housing tenants in this income bracket fell to 66%.

In contrast, tenants in private flats with similar incomes and in the same age group saw only a marginal decline in the probability of home purchase. This revelation, combined with the evidence of strong purchasing power of Green Form Applicants prior to 1998, who were paying top prices for Home Ownership Scheme units sold in the secondary market (Table 3), supports the theory that the Tenants Purchase Scheme has played an important role in reducing the interest of the richer public housing tenants to buy private homes and hence in the reversal of the housing market in 1998. As Table 8 indicates, coinciding with the announcement of the TPS on December 8, 1997, housing transactions plummeted in December 1997.

Table 8.

Monthly transactions of private homes.

Year/month	First hand homes	Monthly changes (%)	Second hand homes	Monthly changes (%)

Year/month	First hand homes	Monthly changes (%)	Second hand homes	Monthly changes (%)
97/07	2147	—	17,227	—
97/08	2044	−4.8	8595	−50.11
97/09	1396	−31.7	7800	−9.25
97/10	2174	55.73	8315	6.60
97/11	1343	−38.22	8653	4.06
97/12	364	−72.9	3804	−56.04
98/01	2334	541.21	3598	−5.42
98/02	868	−62.81	2883	−19.87
98/03	2636	203.69	5501	90.81
98/04	649	−75.38	4683	−14.87
98/05	2429	274.27	4364	−6.81
98/06	3871	59.37	3413	−21.79
98/07	1880	−51.43	3337	−2.23
98/08	2603	38.46	3427	270
98/09	824	−68.34	3303	−3.62
98/10	3724	351.94	2681	−18.83
98/11	6203	66.57	4974	85.53
98/12	3578	−42.32	5946	19.54
99/01	1999	−44.13	5012	−15.71
99/02	1951	−2.4	3268	−34.80
99/03	2589	32.7	3640	11.38
99/04	3507	35.46	4313	18.49
99/05	4173	18.99	5063	17.39
99/06	1516	−63.67	4517	−10.78
99/07	1394	−8.05	4317	−4.43

Year/month	First hand homes	Monthly changes (%)	Second hand homes	Monthly changes (%)
99/08	777	−44.26	3871	−10.33
99/09	568	−26.90	3072	−20.64
99/10	1400	146.48	2797	−8.95
99/11	661	−52.79	3422	22.35
99/12	1022	54.61	3273	−4.35

Source: Centaline Property Agency Ltd.

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4. Conclusions

We have suggested that the Housing Subsidy Policy, whereby richer tenants are required to pay higher rent, had acted as a catalyst contributing to the rally of housing prices from 1987 through 1997, as the better-off public housing tenants, who were able to accumulate savings thanks to the low rents enjoyed, increased their participation in the private housing market. Through the "housing ladder effect," an increase in equity at the bottom of the ladder readily transmitted through different qualities of housing and ultimately benefited prices of premium homes. Evidence of this effect is that prior to the launch of the Tenants Purchase Scheme public housing tenants who were reasonably well-off had a much higher probability of home purchase compared to private housing tenants with similar incomes, and that they had been paying high prices for homes in the secondary Home Ownership Scheme market. Thus the large public housing sector and the Housing Subsidy Policy jointly contributed to the high home prices in Hong Kong prior to 1997.

We presented evidence that the launch of the Tenants Purchase Scheme had effectively eliminated the relative higher propensity to purchase for the well-off public housing tenants. Their reduced demand for HOS and private flats again appear to have played a part in the housing market wind-down after 1997.

The logit test is based on data collected by the authors in a survey at the end of 2002. The results show a clear and interesting pattern. The propensity to purchase always increases with household incomes, and for high income households only, had been significantly higher among public housing tenants than private housing tenants prior to 1998. After 1997, the propensity to purchase fell for all households, but it fell particularly hard for the well-off public housing tenants. Both the timing of this change and economic theory suggest that the Tenants Purchase Scheme announced on 8 December 1997 played a role. The logit analysis in this paper provides clear support for the effects of the TPS on the propensity of the well-off public housing tenants to buy private housing. Although there is strong circumstantial evidence that the TPS contributed to the collapse of the housing market and the deep recession of Hong Kong in 1998 (Ho and Wong, 2006), because many things happened in 1997, and in particular the Asian Financial Crisis broke out in July of that year, it is not possible to definitively disentangle the effects of the Asian Financial Crisis from those of the TPS. This paper provides, for the first time, direct evidence of the effect of the TPS on the housing market. The Hong Kong story lends support to Ortalo-Magne and Rady's hypothesis about the "critical role of marginal first-time buyers in housing market fluctuations," and underscores the symmetric effects that changes in the purchasing activities of first-time buyers may have on the entire housing market.

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Corresponding author. Fax: +852 28917940.

[1] Publicly subsidized housing with implicit land cost subsidy paid off and permitted to sell in the open market is now officially classified as private housing after 2002.
[2] The tightening of the loan ratio by the HKMA, as well as the increasingly conservative appraisals of Hong Kong's banks as housing prices soared in 1996 through 1997, is instrumental to the relatively low delinquency rates in Hong Kong despite huge declines in prices after

1997.

[3] As (Ho and Wong, 2006) and (Ho and Wong, 2008b) show, the booms and busts of the housing market also have significant implications for the wider economy.

[4] Banks are not permitted to lend more than 60% or 70% of their appraised values, depending on the value of the homes. In recent years, this was relaxed but only if the borrower pays an extra premium and gets coverage for default insurance for the second mortgage covering the additional loan amounts.

[5] "[A]bout 13% of PRH (public rental housing tenants) or 74,000 out of 580,000 households covered by a survey in July 1993 owned private domestic properties. Another survey on tenants in North Point Estate showed that 18% of them owned private domestic properties in the urban areas alone. Some one-third of these households owned more than one property and a small number even owned up to five properties. An independent exercise revealed that PRH tenants accounted for as much as 24% of all purchases of private flats by local individuals in the period October 1992–March 1993. The survey results point to the prevalence among PRH tenants in private property ownership" (HK Housing Authority, 1994).

[6] Other "Green Form Applicants" include: Authorized occupants of Interim Housing (IH) of the HA, Allowance recipients of the HA's Rent Allowance for Elderly Scheme (RAES); Applicants on the Waiting List, Junior civil servants applying for the HALS under the Civil Service Public Housing Quota, Clearees and victims affected by clearance and natural disaster respectively, or Domestic tenants affected by Urban Renewal Authority's redevelopment programme or Divorcees/splitting households of the HA estates who are issued with Green Form Certificates.

[7] From June 1999, Home Ownership Scheme owners can sell after 2 years from the date of purchase in the secondary market without repayment of the land premium subsidy. The open market resale date was also reduced from 10 years to 5 years.

[8] See the caveat noted at the end of Section 1.

[9] These marginal effects reported in Table 4 were evaluated for a household with household income between $10,000–$25,000, age of head of household at 50–59, and with other interactive variables held at their respective means. Mathematically, they were the derivatives of the probabilities with respect to a particular explanatory variable *i*: specifically, $\frac{e^{\beta' \alpha_i}}{[1+e^{\beta' \alpha_i}]^2 \beta_i}$.