The Anatomy of a Housing Bubble: Overconfidence, Media and Politics

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Abstract:

This paper investigates a potential housing bubble in Hong Kong in the 1990s. A within-city analysis is performed using a new panel, representative data set on 324 large-scale housing complexes (estates). By focusing on cross-sectional variations during a dramatic, market-wide price upswing, price bubbles are distinguished from changes in macroeconomic fundamentals, sidestepping the major flaw of time-series analyses. I formally test, and find robust evidence for, an overconfidence-driven speculation bubble. The results cannot be explained by alternative pricing models nor are similar patterns found outside the price upswing. Suggestive evidence is found for two potential causes of the bubble – media coverage and political uncertainties.

Bubbles are commonly defined as a price component that is supported by expectations of future price appreciation not justified by the fundamentals (Joseph Stiglitz 1990, Karl E. Case and Robert J. Shiller 2003, Markus Brunnermeier 2008). Despite dramatic swings in prices both in the stock markets and the housing market, currently there is little consensus on the empirical literature of asset bubbles. While some conclude that no evidence exists yet to establish the existence of bubbles (Robert P. Flood and Robert J. Hodrick 1990, Refet S. Gurkaynak 2005), others cite data limitation as a cause of unreliable evidence *against* the existence of bubbles (Shiller 2006b).

The empirical literature so far focuses on the time-series variations in price movements and therefore cannot credibly distinguish a bubble component from measurement errors or model specification problems (e.g., Richard Meese and Nancy Wallace 1994; Jesse Abraham and Patric Hendershott 1996; Charles Himmelberg, Christopher Mayer and Todd Sinai 2005). This paper

adopts a new approach and provides evidence of a housing bubble with a time-space dimension. The potential bubble in question concerns an increase of more than fifty percent in real terms between 1995 and 1997 in Hong Kong housing price index (Figure 1).[1] I first document the spatial variation in this housing price upswing and then formally test for an overconfidence-driven bubble as modelled in José A. Scheinkman and Wei Xiong (2003). This approach is made possible by the compilation of a unique, monthly panel data set of the Hong Kong housing market from 1992 to 1998. The unit of observation is a housing complex, locally called a housing estate, consisting of an average of 370 almost identical units. Most of the Hong Kong population lives in an estate and over 80percent of all residential real estate transactions are covered by my sample. This data set also circumvents the comparability problem of cross-sectional data and the selection problem of repeat-sales samples. Using a hand-collected data set that measures media exposure of each estate leading up to the price upswing and also the characteristics of the local government, I dissect the price upswing along yet another dimension to reveal the potential causes of the price bubble.

In absence of good quality data at a disaggregate level that is at a high frequency, the biggest question when a potential bubble phenomenon arises is whether or not the price swing is caused by shifts in fundamentals, which can be either imperfectly measured or mis-specified in the pricing model. One notable empirical finding emerges from my analysis: the trough-to-peak increase in real terms varies from 30 percent to 250 percent points among the 324 housing estates during the price upswing. This observation, made possible by the within-city comparison, discounts the theory that shifts in fundamentals were the main driver of the price upswing. The variation in the size of the price upswing cannot be explained by estate characteristics such as the

[1] The increase is measured using the CentaCity Index, CCI, deflated by the food price index to avoid a housing-component in the deflator.

pre-upswing (baseline) price level. District fixed effects play a much greater role, suggesting local variations in the force behind the price upswing. Interestingly, pre-upswing media exposure, but not indicators of political uncertainties, increases with the eventual trough-to-peak price increase during the upswing.

One theoretical framework that is capable of explaining a dramatic price upswing and local variations in the size of the upswing is the overconfidence-driven speculative bubble model in Scheinkman and Xiong (2003) [speculation model henceforth]. Evidence is presented for a price bubble under this framework, in the form of a positive, contemporaneous return-turnover relationship. This relationship remains stable and robust after controlling for the baseline price and turnover levels, an array of estate characteristics and district fixed effects. As a second robustness check, a placebo sample period of the same length preceding the price upswing is examined and no similar results are found. Alternative frameworks are unable to reconcile the various empirical facts, as discussed in Section IV. Trends of an array of macro-economic fundamentals during the price upswing are described in Section V; no significant changes either in levels or in trends are observed. This paper does not explicitly rule out other models of bubble formation.

To exploit the rich data set for a more thorough investigation of a potential bubble, falsifiable implications of the speculation model concerning potential causes of the bubble are tested. Under the speculation model, three factors – increases in the degree of overconfidence, information volatility or the underlying uncertainties about property values – contribute to the size of the bubble. Hence housing bubbles can be much localized or isolated, depending on the locality and intensity of the issues that market agents disagreed upon. No substitution necessarily occurs unless there is a contagion of disagreement or uncertainties among the local area or

property. Keeping in mind that the trigger of the bubble is likely to be multi-faceted, I examine the media coverage on specific housing estates and the local political environment before and during the price upswing.

Media hype has been cited as a potential source of speculation (Shiller 2000, Case and Shiller 2003). I calculate an estate-specific measure of media exposure 8 months prior to the price upswing by counting the number of property market-related articles in a major local business newspaper by month and by estate. This number for each estate is further broken down by tone: positive, neutral and negative, and then divided by the total number of units in that estate. An additional indicator measures the per-unit number of estate-specific articles that relate to large-scale transactions by month. These four indicators track the intensity and nature of media exposure each estate received before the price upswing, controlling for the size of the estate.

To capture local political uncertainties, I focus on the local District Boards, which form the lowest level of the government structure and are responsible for procurement and utilization of public funds for the provision and monitoring of public services and facilities. They are consulted by the Town Planning Board in zoning regulatory planning.[2] The first fully direct elections of the District Boards took place in September 1994. It was widely known at the time of the election that elected members would be replaced by appointed Board members after the Handover in 1997. Exactly who would be replaced, and by whom, was unknown. I used two indicators to measure the extent of disagreement and uncertainties surrounding the District Board administration. First, the winning vote margin is inversely related to the divergence of opinions or disagreement. Second, the more "pro-China" the party the elected Board member belonged to,

[2] District elections took place at the constituency level within the 18 districts in Hong Kong. Each of the 300-plus constituencies consisted of around 17,000 residents.

the more likely the elected member would be re-appointed or be replaced by a candidate of similar ideology. Because it is unclear whether this mechanism operates at a sub-district (constituency) level or at the district level, results are shown with and without the district fixed effects.

A notable pattern emerges when the return-turnover relationship is allowed to differentiate by the media exposure or political uncertainty indicators. A higher number of news articles in a positive tone, especially those reporting large-scale transactions, relates to a more significant return-turnover relationship. The same is true for a wider winning margin in the District Elections and for the less "Pro-China" candidates. This exercise is by nature a joint test of the existence of a speculative bubble and its origins: while positive evidence is affirmative of both; the lack of it does not necessarily falsify the hypothesis of a speculative bubble. I interpret these results as suggestive evidence of link between the housing price upswing, media coverage and the political environment.[3]

This paper is organized as follows: the next Section describes the data set and market trends in the Hong Kong housing market. Section III lays out the speculation model and contrasts it with the existing literature; Section IV presents empirical evidence of a speculative housing price component during 1995-1997, followed by a discussion of alternative explanations in Section V. Section VI investigates the role of media coverage and political uncertainties. Section VII offers concluding remarks and thoughts on future research.

I. Data and the Price Upswing

A. *Data*

[3] It is worth pointing out that my results do not directly speak to the importance of the role of newspaper coverage or political uncertainties in the housing bubble.

The CentaCity Index, which is used to describe market-wide trends, is publicly available. Raw transaction data were obtained for all real estate transactions in Hong Kong during the period 1992-1998.[4] After discarding transactions for the non-residential sectors and non-liveable space (example, car parks), there are 349,149 property-level observations with the settlement price, square footage, building name and street address.

A large proportion of the Hong Kong population live in large-scale housing complexes, called estates. These estates consist of many blocks of almost identical units, and are spread across different geographical areas in the territory. Each estate has its own building management body and residents enjoy access to communal amenities such as retail facilities and health clubs. To focus on the large-scale housing estates with frequent transactions, 400 estates with a total transaction higher than 400 are included in my sample. As Figure 2a shows, not only do these 400 housing estates account for 85 to 95 percent of all residential market transactions during 1992 to 1998, movements in turnover for the 400 estates track the overall market trend.

This allows the construction of a panel data set which circumvents the comparability problem of cross-sectional data and the selection problem of repeat-sales samples. Although there is no information on the unit characteristics (example, view and floor level) for each transaction, the top and bottom 1 percent of (per square foot) price observations of each housing estate are discarded. The mean of the trimmed price distribution within each estate should be a reasonable proxy for housing values of any unit in that estate, provided that transactions are frequent.[5] To eliminate effects of primary market sales, only estates built before 1993 are

[4] Tsur Sommerville kindly provides this data, which also covers part of years 1991-1993.
[5] Units of different types or quality within an estate being sold seasonally also create a bias in measuring movements in the true housing value. Wong (2008) documents the high correlation between averaged raw transaction prices and hedonic-adjusted transaction prices for 44 prominent housing estates in Hong Kong.

included. Labelling errors in the original data further reduce my sample size to 324 housing estates and a total of 19,044 estate-month observations in the panel data set.

Table 1 demonstrates the monthly within- and across-estate variation in transaction prices and sizes of units sold during 1994-1998. The standard deviation in prices is 4 to 5 times higher across estates than within estates; the standard deviation in unit sizes is about 4 times higher across estates than within estates. For example, the average unit sold for 540 dollars in 1994 and the standard deviation is 230 dollars across the estates and 50 dollars within the typical estate (column 1). A comparison across the columns shows that this holds true for years 1994-1998 despite the differences in transaction frequency by year.

Time-invariant, estate-specific characteristics are hand-collected for close to 300 estates; Table 2 (top panel) shows the across-estate variation in age, size and distance to the city centers. Note that the unit size data in Table 2 are hand-collected for each block of the estate whereas the statistics reported in Table 2 are based on sold units only.

The bottom panels of Table 2 show the media coverage and political variables. Newspaper articles in the South China Morning Post were searched through LexisNexis using the estate names. Every article has been read to determine if it is related to the property market. The tone of the relevant articles, either positive or negative, is recorded. Among the positive articles, those that discuss large-scale transactions are singled out. The article indicators are re-scaled using the number of units in each estate, to adjust for the variation in news coverage due to the estate size.

The political affiliation of the District Board members and contestants is publicly available on the elections webpage. The political parties are rated by their statements on their webpage – after speaking to local newspapers and independent politicians, there seems to be

little disagreement about how pro-Chinese government each party is. Each elected District Board member is assigned a Pro-China index on a five-point scale according to their political party affiliation, five being the most Pro-China.

B. *Description of the Price Upswing*

A couple of noteworthy facts emerge from a descriptive analysis of the price upswing; they inform the empirical focus of this paper. Two characteristics of the price upswing limit the extent to which it can be explained by macroeconomic factors: the co-movements of housing price and transaction volume, and the cross-sectional variation in the size of the price upswing. Figure 2b plots the percentage change in transaction volume against that in prices. The dramatic price upswing was accompanied by even more dramatic increases in transaction volume in the market.[6]

In terms of timing, the majority of the estates hit the price trough in 1995 and the peak in 1997. In contrast, Figures 3a-3c illustrate the cross-sectional variation in the size of the price upswing. Figure 3a compares the distribution of price changes relative to the 1992 baseline price level across years 1993, 1995 and 1997. The distribution of price changes flattened substantially as they shifted to the right. To ensure that this is not driven by estates with high turnover rates, the bottom panel shows the price change distributions by baseline turnover rates in 1992 and reveals the same general pattern. Figure 3b plots the distributions by year and month, showing that the flattening of the distribution is not due to aggregation. Figure 3c shows considerable cross-sectional differences in the trough-to-peak price increases, defined as the percentage difference between the monthly average transaction price and the price trough. The inter-quartile range of the increase is 26 percentage points. The change in average housing prices in a given

[6] Similar return-turnover co-movements in stock market booms have been documented (Hong, Scheinkman and Xiong 2004).

year relative to the 1992 baseline and the standard deviation of the price distribution for that year are highly correlated (ρ=0.92; years 1993-1998).

Table 3 describes the cross-sectional variation in the trough-peak price increases in percentage points by time-invariant housing estate characteristics. A lower baseline price relates to a larger trough-peak price difference, consistent with findings in Case and Mayer (1996), but this link becomes insignificant when district fixed effects are controlled for (columns 1 and 2). [7] Pre-upswing media exposure, as measured by the per-unit number of news reports on the estate, increases with the trough-peak price increase. It is not due to a proxying effect for turnover activities (columns 3 and 4). I experimented with numerous estate characteristics and Table 3 presents the more interesting results. The estate characteristics are controlled for in the test for speculative activities as a robustness check, and their inclusion or exclusion does not affect the conclusions.

II. The Speculation Model and Relevant Literature

The speculation model in Scheinkman and Xiong (2003) is a continuous-time solution of the speculation model with heterogeneous beliefs first proposed by J. Michael Harrison and David M. Kreps (1978), using overconfidence as a mechanism to generate divergence in beliefs. While the model is sophisticated in formulation, the intuition is straightforward. Overconfident agents, who believe their information sources or price signals of choice to be more precise than they actually are, disagree about the fundamental value of an asset even in the absence of asymmetric or private information.

Agents adjust their valuation of the asset as new information arrives. With short-selling constraints, this introduces a speculative motive to own the asset for the option to sell the asset to

[7] All results reported in this paper remain quantitatively and qualitatively identical regardless of the choice of baseline year (1992 vs. 1993). Regressions using year 1993 as baseline are available upon request.

another agent who might in the future value the asset at a price higher than the original purchase price. This option is particularly valuable because of its recursive nature: each buyer has the option to re-sell it to someone else, who can then sell it again, and so on. Given that the asset is sold at any point to an agent with the highest valuation, the purchase price, which is the sum of the valuation and the option value, is higher than the highest market valuation. This implies a non-zero, non-fundamental price component: a bubble.

The size of the bubble increases with the level of overconfidence, the volatility of information, and the underlying uncertainties about the asset. Also, depending on the locality of the issues that agents disagree about, this model is capable of explaining cross-sectional differences in the bubble size. Once the trade barrier for speculative trading is reached, there will be a frenzy of trading, implying a co-movement of prices and turnover. A testable implication of the model is therefore a contemporaneous and positive correlation between the size of the bubble and turnover rate.

This model is different from other models of price bubbles in important ways. Aside from its ability to reconcile a price bubble with localized price increases and higher trading volume, it enables one to abstract from a fundamental analysis. Because of the difficulty of correctly measuring the fundamental values of property, this approach yields results with more credibility. Lastly, this model allows, upon the evidence of a bubble, an empirical examination of its potential causes through an investigation of market disagreement and uncertainties. Most models discuss the sustainability of a bubble but treat triggers of the bubble as exogenous, leaving the timing and reason of the bubble unexplained (Brunnermeier 2008). Sunspot models, which can explain localized price movements, do not specify the origin of the extrinsic uncertainty (David Cass and Karl Shell 1983). While the next Section presents supporting evidence for the

speculation model and argues that there existed a price bubble in the Hong Kong housing market between 1995 and 1997, this paper does not explicitly test or rule out other models of bubble formation.

III. Evidence of a Bubble

A. *Return-Turnover Correlation*

The contemporaneous and positive relationship between the size of the speculative price component and the turnover rate is the empirical focus of this paper. As a first cut, a pooled regression of the following form is estimated:

$$(1) \qquad \Delta P_{it} = \alpha + \beta V_{it} + X_i + Y_t + Q_t + \varepsilon_{it},$$

where ΔP_{it} is the percentage change in prices at estate *i* during month *t*, relative to the trough price level of estate *i*. α is a constant term and V_{it} is the log turnover rate at estate *i* during month *t*. X_i, Y_t and Q_t are estate, year and quarter fixed effects respectively. ε_{it} is an error term. The analysis is performed separately for the speculative period (Oct 1995-September 1997) and for the non-speculative period (July 1993 – June 1995), both 24 months long.[8] Table 4 shows a stronger and more robust correlation between price movements and turnover rates during the speculative period. If the positive correlation is caused by non-speculative factors, it can be expected to remain stable both in and out of the upswing. This suggests that the time-invariant component of the estate-specific liquidity premium cannot fully explain the observed correlation.

Following Mei, Scheinkman and Xiong (2005), to allow for heterogeneity in the speculative price component-turnover correlation, and to sidestep the persistence in turnover rates, a cross-sectional regression is run separately for each month *t*:

[8] The speculative period is defined by when at least 100 estates were between their trough and peak prices. Section III describes the timing of the price upswing across estates. A cutoff too low risks including estates that were not experiencing a bubble and thus rejecting the bubble test incorrectly. A cutoff too high decreases the power of the test by reducing the longitudinal size of the sample. Therefore an inaccurate definition of the bubble period biases against the evidence for a bubble.

(2) $\Delta P_{it} = \alpha + \beta V_{it} + L_i + \theta X_i + D_i + \varepsilon_{it}$,

where ΔP_{it} and V_{it} are defined as before, L_i is the number of no-trade months in 1992 as a measure of illiquidity, X_i contains time-invariant estate characteristics and D_i a set of district dummies.[9] ε_{it} is an error term. Results, with Fama-MacBeth standard errors, are reported in Table 5. The price movement-turnover rate correlation remains positive and robust in all specifications during the speculative period (columns 1 to 3). No such correlation is found outside the speculative period (columns 4 to 6). This supports the speculation model described in Section III.

A comparison of columns 2 and 3 shows a similarity between the across- and within-district return-turnover correlations. As a side note, baseline price levels cease to be significantly correlated with price increases once turnover volume is controlled for. The illiquidity indicator (number of no-trade months) has a negative correlation with price movements in both periods as expected.[10]

B. *Alternative Explanations of the Return-Turnover Correlation*

Alternative explanations consistent with the correlations shown in Table 5 are examined in this section. The most intuitive is an inadequate control for the potentially time-varying, estate-specific liquidity premium. However, a baseline liquidity measure is controlled for, which means one will have to imagine a time-varying component of liquidity premium that is orthogonal to the baseline measure. Also, the within-district comparisons imply that the liquidity premiums need to have changed in significantly different ways within each district in order to rationalize the results.

[9] Please refer to Section II and Table 3 for details related to the inclusion of estate characteristics. Results both with and without these controls are presented, and none of the conclusion will change because of the choice of control variables.

[10] I experiment with the reference year for the illiquidity measure and the baseline price measure. Using year 1993 produces quantitatively and qualitatively similar results which are available upon request.

The housing ladder effect can also cause a differential increase in prices and an increase in transaction volume (Don Haurin, Lok-Sang Ho and Gary Wong 2003; François Ortalo-Magné and Sven Rady 2006). Given an exogenous and negative shock to the affordability of public housing, for example, public housing renters might enter the purchase market, sending original owners of the lowest rung of the housing ladder climbing up, displacing the second lowest rung and so on. However, it is clear that the displacement and the size of price increase are both along the dimension of quality. In results presented, a baseline price measure and several other housing characteristics including average flat size and travel time to the city centers have been controlled for. To the extent that these proxy for the quality ranking of the housing estates, there is little evidence for the housing ladder effect being responsible for the cross-sectional return-turnover correlation. Also, the coefficients of the baseline price measure are not significant in columns 2 and 3 of Table 5, which is unlikely if the housing ladder effect were the main driver of the price upswing.

Lastly, one might think of the down-payment effect being responsible for the positive return-turnover correlation (David Genesove and Christopher J. Mayer 2001).[11] Down-payment requirements prevent households from trading down in a falling market because the equity recouped from the sale might not be enough for the down-payment of the second house. The opposite happens in a rising market. There are two reasons why this effect is less relevant to the empirical evidence presented. First, the down-payment model implies a sequence of events, first a price movement and then a change in turnover, which differs from the contemporaneous correlation being tested. Second, the unit of observation in the analysis is a housing estate. Unless households wishing to trade up in a rising market typically buy in the same estate again,

[11] While predicting decreases in turnover in a down market, loss aversion has less clear implications about price-volume correlation in an up market.

the effect on turnover will be market-wide, not estate-specific. It is not clear if the down-payment model predicts a positive correlation between price changes and turnover volume in the context of a within-city analysis.

IV. An Analysis of the Fundamentals

To allow more room for a non-bubble argument, this section overviews all fundamental factors during the past decade for which data are available. However, it is important to keep in mind that the cross-sectional variation in the price increases and the return-turnover correlation will be hard to be reconciled with a fundamental explanation.

The housing stock in Hong Kong has been growing at a remarkably smooth rate, and the share of housing units provided by the government has remained slightly less 50 percent since 1987 (Figures 4 and 5). Nor have construction costs shown any significant movement (Figure 6).

On consumption demand, Figures 7 and 8 illustrate stable trends in population and home ownership rate. Figure 9 illustrates the percentage change in the real wage index and real GDP per capita relative to the 1992-3 average as compared to the corresponding change in the CentaCity Index (left scale). A modest increase in both real wages and per capita GDP around 1998 hints at the possibility that optimistic expectations about future income could have driven up housing prices before 1998. This explanation of the price upswing is incomplete in the following ways. First, the real wage index used here is deflated using the Consumer Price Index including a housing price component. Therefore there is a mechanical, negative relationship between the two series. Also, the unemployment rate paints a less optimistic picture (right scale). Finally, if income expectations were the cause of the price upswing, it is not at all clear why the market experienced a sharp downtown in 1998.

Returns to the non-real estate components in the Hang Seng Index were at least as high as that to holding the residential housing stock (Figure 10); this rules out a "flight to quality" explanation. Figure 11 compares movements in Hong Kong housing prices with those in the stock markets in Singapore and Japan. All three experienced a downturn between 1996 and 1998, but the foreign stock market indices fell much earlier than Hong Kong housing prices, and they did not show a sharp upward movement prior to the fall. While the housing market collapse might have been catalyzed or aggravated by the regional economic downturn, this suggests that the upswing before 1997 was due to factors more specific to Hong Kong.

The correlation between the monthly averages of housing prices and that of the inflation-adjusted prime (best-lending) rate shown in Figure 12 is 0.51 during 1992-1997, and 0.58 during 1992-2004.[12] This is contradictory to the suggestion that lower interest rates fuelled the housing boom.

The market equilibrium condition of the standard asset pricing model (James M. Poterba 1984) implies that the real rental price is equal to the difference between per-period opportunity cost of housing services and expected capital gains. Therefore the price-rent ratio increases with the expected real house price inflation rate and serves as an indicator of market sentiments and discounting. During the price upswing, rents remained at a stable level and the price-rent ratio tracked the housing price index closely (Figure 13). This suggests that market beliefs about future prices mirrored price movements, contrary to the efficient market hypothesis. In conclusion, there is little evidence that changes in fundamentals caused the dramatic price upswing in the housing market between 1995 and 1997.

V. Media Reporting as a Source of Disagreement

[12] Because of the Hong Kong dollar peg to the US dollar since 1983, the Best Lending Rate (prime rate) often relates more to the economic conditions in the United States than to those in Hong Kong.

The net effect of media coverage on specific housing estates on the likelihood of bubble formation is ambiguous. On one hand, media hype might encourage the spread of speculative activities or perpetuate "conventional wisdom" (Shiller 2006a). On the other, media reporting might promote informational efficiency, which in turn reduces the degree of overconfidence or disagreement in the housing market.

I make use of the media coverage indicators as described in Section II. Column 1 in Table 6 shows a positive and significant differential in the return-turnover correlation by the number of all news reports. Column 2 reveals that it is likely to be driven by the number of positive articles. The positive reports are furthered broken down into those on large-scale transactions (column 3) and others (column 4); the former seems to be the main driver of the results in column 1. Although media coverage might proxy for turnover which might show positive short-term autocorrelation, I test for, and do not find, a similar differential by the baseline turnover rate (column 5).[13] In results not presented, neither negative or neutral news coverage nor the length of the articles shows a similar differential. No comparable phenomenon is found outside the speculative period (columns 6 to 10), which alleviate concerns about causality. These results offer tentative support for the hypothesis that positive media attention and media hype about large transactions fuelled speculation and echo the observation that "the history of speculative bubbles begins roughly with the advent of newspapers" (Shiller 2000).

VI. Political Uncertainties and Speculation

To investigate whether the political environment bred the disagreement underlying the property bubble, the local government is naturally the focus because of the within-city variations. The timing of the price upswing coincided with the first directly elected District Boards in

[13] A high turnover does not necessarily imply media coverage, or the presence of large-scale transactions. The correlation between the baseline turnover rate and the large deals-only news indicator is 0.042.

September 1994. The District Boards form the most local level of the government and are designed to assist the relevant government departments in formulating policies with local concerns. In particular, local zoning regulations are devised with consultation with the District Boards.

A. *Political Affiliation of District Board Members*

One controversy around the time of the 1994 election was the Chinese Government's plan to invalidate the directly elected District Boards after the Handover, and replace them with appointed boards. (The 1994-elected District Boards were eventually dissolved after the July 1997 Handover. Fully-appointed "Provisional District Boards" were put in place.)

At the time of the 1994 election, two things were uncertain: how many, and which, of the elected members would be replaced and by whom they would be replaced. Presumably the dissolution of the directly elected District Boards was to substitute candidates that were more acceptable to the new Hong Kong government after the 1997 Handover, or those closer to its political ideology, for members who had dissenting views. According to this logic, the more Pro-China the 1994 elected members were the less uncertainty should be involved with the political future of their constituencies.

To explore this dimension of uncertainty, data on all contestants of the 1994 election are collected and estates matched to their respective district and constituency. Each elected District Board member is assigned a Pro-China index on a five-point scale according to their political party affiliation, five being the most Pro-China. An indicator of district-level political leaning, LEAN, is the weighted average of the Pro-China indices of all elected members by the number of registered voters in the respective constituency. The empirical investigation focuses on the across-district differences, because the District Boards function at the district level. Although the

level effect of the LEAN variable cannot be estimated with the inclusion of district fixed effects (equation 3 below), the interaction of LEAN and turnover rate is still identified (equation 4):

(3) $\Delta P_{it} = \alpha + \beta V_{it} + \Omega\ LEAN_d + \gamma(LEAN_d * V_{it}) + L_i + \theta X_i + \varepsilon_{it}$

(4) $\Delta P_{it} = \alpha + \beta V_{it} + \gamma(LEAN_d * V_{it}) + L_i + \theta X_i + D_i + \varepsilon_{it}$,

where $LEAN_d$ is a time-invariant measure of political leaning at the district-level as described above and all other variables are defined as in equation (2). γ captures the differential in the return-turnover correlation by how Pro-China each district was on average. Equation (4) estimates Ω, the correlation between the district-level leaning indicator and price movements, which is absorbed by the district fixed effects, D_i, in (5). The coefficient of interest, γ, is identified in both. Twenty-four non-speculative months before the 1994 election form a control group.

Panel A of Table 7 shows a significantly stronger return-turnover correlation for estates situated in districts with a smaller proportion of Pro-China District Board members, but only during the speculative period.[14] This is consistent with the theory that political uncertainties around the future of the District Boards fuelled heterogeneous beliefs that caused the housing bubble.

C. *Vote Margin*

Another measure of disagreement on the political front is the number of votes by which the elected member won the election, as a percentage of the total number of votes cast. The district-level vote margin (VMARGIN), a weighted average by the number of registered voters, is interacted with the turnover rate variable:

(5) $\Delta P_{it} = \alpha + \beta V_{it} + \Omega\ VMARGIN_d + \theta(VMARGIN_d * V_{it}) + L_i + \theta X_i + \varepsilon_{it}$

[14] Column 1 suggests that the Pro-China index has a weak level effect on price movements.

(6) $\Delta P_{it} = \alpha + \beta V_{it} + \theta(VMARGIN_d * V_{it}) + L_i + \theta X_i + D_i + \varepsilon_{it}$,

where all other variables are defined as before. Panel B of Table 7 shows a significantly weaker return-turnover correlation for district where District Board members won elections by relatively larger margins. No such relationship is supported by data outside the speculation period. Again, this suggests that political disagreement was associated with more rampant speculative trading.

VII. Concluding Remarks

From the Tulip Craze in the Netherlands in the 17th Century to the Technology Stock Bubble in the United States in the late 1990s, the classical view of asset pricing has been challenged. The literature on non-fundamental price components has been limited, however, by the difficulty of measuring fundamental values of assets, which is exacerbated in housing studies because of the structural heterogeneity of the housing stock, low transaction frequency, and the importance of geographical location and local institutions (example, zoning laws) in determining housing values. This paper sidesteps these problems by performing a within-city analysis using a unique panel data set of over 300 large-scale housing complexes in Hong Kong.

The residential housing market in Hong Kong displayed unusual price behavior during the 1990s. Not only did we see dramatic price increases followed by sharp downfalls, an analysis of disaggregated data also reveals considerable cross-sectional variation in price movements and co-movements of prices and turnover rates. A metropolitan city with homeownership at 50 percent, well-developed capital markets and low information cost within the territory, Hong Kong is not unlike many major cities in other parts of the world.

While this paper does not assert the unimportance of the fundamentals during the upswing, it does strongly suggest that they are unlikely to be the complete story. This paper provides support for the overconfidence-generated speculation model as proposed by

Scheinkman and Xiong (2003). Both pre-upswing media attention and measures of uncertainties about the future political arrangements of the local government correlate with the extent of the speculative component of the price upswing. This paper offers a new look at and a more complete analysis of bubbles through a micro-analysis and an exploration of the potential causes.

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Table 1: Variation in Price and Size of Units Sold, Across and Within Estates by Year

	1994	1995	1996	1997	1998
Within-estate avg. price per sq. ft.	0.54	0.48	0.51	0.71	0.50
('000 USD)	(0.23)	(0.18)	(0.21)	(0.30)	(0.21)
Within-estate std dev (price per sq.	0.05	0.04	0.04	0.06	0.05
	(0.04)	(0.03)	(0.04)	(0.05)	(0.05)
Within-estate avg. unit size	737.86	728.45	738.85	722.09	730.40
(sq. ft.)	(398.43)	(386.44)	(402.98)	(375.11)	(375.44)
Within-estate std dev (unit size)	102.87	101.50	104.61	89.00	94.76
	(130.23)	(133.87)	(123.64)	(100.05)	(113.25)
No. of transactions	12.90	12.87	19.95	30.61	24.44
(per month in each estate)	(22.19)	(23.00)	(33.28)	(54.09)	(69.91)
Turnover rate	0.08	0.08	0.12	0.19	0.13
	(0.13)	(0.15)	(0.20)	(0.35)	(0.23)

† Averages and standard deviations of unit price and size are taken within each estate and month. Numbers reported are averages (standard deviations in parantheses) of the variables across the 324 estates. For example, in 1994 a typical unit in a typical estate in my sample sold for 540 dollars per square foot. The variation in price within that estate is 50 dollars, whereas the variation in average prices across estates is 230 dollars.

Table 2: Summary Statistics

Estate Characteristics	Mean	Std. Dev.	Obs
Age (in 2003)	18	5	299
Total no. of units	370	644	299
No. of blocks	21	142	299
No. of floors	25	8	299
No. of units per floor	3	5	299
Avg. unit size (sq. ft.)	583	304	289
Travel time to city centres (hour)	0.5	0.3	247
Turnover rate (%) -- pre-upswing	9	19	992
Turnover rate (%) -- post-upswing	14	27	992
Avg. price (constant USD per sq. ft.) -- pre-upswing	767	277	992
Avg. price (constant USD per sq. ft.) -- post-upswing	992	441	992

Media Coverage	Mean	Std. Dev.
1992-1995		
No. of articles per year	0.57	2.86
No. of articles per unit per year	0.005	0.02
No. of words per year	235.45	1230.28
No. of words per unit per year	1.99	10.08
No. of words per article	397.04	198.08
1996-1998		
No. of articles per year	0.46	2.02
No. of articles per unit per year	0.004	0.017
No. of words per year	164.04	729.2
No. of words per unit per year	1.22	5.65
No. of words per article	357.52	148.85

1994 DB elections	Mean	Std. Dev.
District-level		
Average Pro-China index	2.28	0.41
Voting rate	28.94	7.06
Vote margin	0.25	0.07
Constituency-level		
Average Pro-China index	2.73	0.71
Voting rate	30.80	7.04
Vote margin	0.30	0.17

Table 3: Explaining the Price Upswing

	Dependent Variable: Trough-Peak Increase in Per Square Foot Sales Prices (%), 1994-1998			
	(1)	(2)	(3)	(4)
Log baseline price (1992)	-11.917**	2.060	-0.189	0.165
	(5.953)	(6.745)	(6.685)	(6.845)
Log no. of floors	4.112	4.514	4.520	5.306*
	(3.152)	(2.968)	(2.917)	(3.007)
Log travel time	-1.750	-5.158	-4.687	-5.046
	(5.028)	(3.513)	(3.458)	(3.502)
Log age	-7.919	-3.008	-1.641	-3.868
	(2.173)	(4.869)	(4.814)	(4.888)
No. of articles per-unit pre-upswing	--	--	1.649***	--
			(0.629)	
Average turnover	--	--	--	2.167
				(1.480)
District dummies	No	Yes	Yes	Yes
Adj. R2	0.015	0.370	0.391	0.374
No. of obs	188	188	188	188

* The media indicator is measured over an eight-month period immediately preceding the speculative/ non-speculative periods. Media coverage is defined as the number of relevant reports in the South China Morning Post mentioning a specific housing estate divided by the total number of units in that housing estate.

Table 4: Pooled Panel Regression of Price Movements on Turnover Rates

	Dep Var: % Monthly Price change relative to trough			
	Speculative period		**Non-speculative**	
	(1)	(2)	(3)	(4)
Log turnover	22.875***	1.952***	2.823***	-0.072
	(0.933)	(0.709)	(0.750)	(0.447)
Estate fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	No	Yes	No	Yes
Quarter fixed effects	No	Yes	No	Yes
Adj. R2	0.265	0.853	0.049	0.700
No. of obs	6,736	6,736	12,485	14,056

Table 5: Correlation between Price Movements and Turnover Rate

	Dep Var: % Price change relative to trough					
	Speculative Period			Non-speculative Period		
	(1)	(2)	(3)	(4)	(5)	(6)
Log turnover	0.787***	1.214***	1.283***	-0.468***	-0.391***	-0.308***
	(0.353)	(0.388)	(0.345)	(0.177)	(0.147)	(0.124)
No-trade months 1992	--	-0.258***	-0.157***	--	-0.189***	-0.154***
		(0.050)	(0.048)		(0.052)	(0.041)
Log baseline p 1992	--	4.214***	3.939***	--	15.406***	11.007***
		(1.393)	(1.210)		(2.991)	(2.506)
Log no. of floors	--	2.137***	0.922***	--	-0.943***	-0.686
		(0.650)	(0.528)		(0.475)	(0.388)
Log travel time	--	-1.004***	-0.905***	--	-0.125	-0.734**
		(0.269)	(0.710)		(0.234)	(0.539)
Log age	--	-0.747	-0.710	--	-4.515***	-7.021***
		(0.476)	(0.391)		(0.764)	(0.806)
District Dummies	No	No	Yes	No	No	Yes
Adj. R2	0.021	0.130	0.270	0.003	0.221	0.309
Avg. no. of obs	250	181	181	210	160	160

Note: Speculative period refers to Oct 1995 - Sept 1997 (24 months); Non-sepculative: July 1993 - June 1995 (24 months). Fama-Macbeth standard errors reported in parantheses.

Table 6: Media Reporting and Speculation

	Dep Var: % Price change relative to trough									
	Speculative Period					Non-speculative Period				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Log turnover	1.211***	1.177***	1.260***	1.204***	2.668***	-0.370***	-0.420***	-0.393***	-0.430***	-0.757*
	(0.347)	(0.335)	(0.343)	(0.338)	(0.848)	(0.118)	(0.117)	(0.117)	(0.117)	(0.386)
No. of no-trade months, 1992	-0.159***	-0.160***	-0.159***	-0.160***	-0.164***	-0.042	-0.038	-0.043	-0.037	-0.019
	(0.048)	(0.048)	(0.048)	(0.048)	(0.048)	(0.046)	(0.046)	(0.046)	(0.046)	(0.050)
Baseline media coverage/ turnover interaction terms †										
All news reports * log turnover	0.033**	--	--	--	--	-0.226**	--	--	--	--
	(0.016)					(0.089)				
All positive reports * log turnover	--	0.138***	--	--	--	--	-0.109	--	--	--
		(0.038)					(0.291)			
Reports: large deals only * log turnover	--	--	0.365**	--	--	--	--	-1.932***	--	--
			(0.090)					(0.413)		
Other positive reports * log turnover	--	--	--	0.109***	--	--	--	--	0.059	--
				(0.036)					(0.240)	
Average turnover * log turnover	--	--	--	--	-0.335**	--	--	--	--	0.087
					(0.132)					(0.096)
District fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Avg. no. of obs	181	170	181	181	181	157	157	157	157	157
Avg. Adj R2	0.268	0.269	0.267	0.269	0.273	0.346	0.349	0.346	0.348	0.350

Note: Speculative period refers to Oct 1995 - Sept 1997 (24 months); Non-sepculative: Sept 1992 - Aug 1994 (24 months). Other controls in the regressions include the log 1992 baseline price and estate charateristics (no. of floors, travel time and building age). Fama-Macbeth standard errors reported in parantheses.

† All baseline media coverage/ turnover indicators are measured over an eight-month period immediately preceding the speculative/ non-speculative periods. Media coverage is defined as the number of relevant reports in the South China Morning Post mentioning a specific housing estate divided by the total number of units in that housing estate. Positive reports include all articles that portrait the estates in a positive light. Among the positive reports, those of which focus on large transactions are included under the "large deals only" indicator, while the rest are included under "other positive reports". Average turnover is average log monthly turnover rate over the same eight-month period.

Table 7. Politics and Speculation

Panel A: Pro-China Index

	Dep Var: % Price change relative to trough			
	Speculative Period		Non-speculative Period	
	(1)	(2)	(3)	(4)
Log turnover	1.969***	2.869***	-2.473***	-0.805**
	(0.492)	(0.512)	(0.695)	(0.498)
No. of no-trade	-0.255***	-0.175***	0.044***	0.008
months, 1992	(0.049)	(0.049)	(0.074)	0.063
Pro-China indicator	0.883*	--	-1.414*	--
(1=Least, 5=Most)	(0.720)		(0.925)	
Pro-China indicator	-0.321**	-0.693***	0.982***	0.226
*turnover	(0.242)	(0.135)	(0.274)	(0.207)
District fixed effects	No	Yes	No	Yes
Avg. no of obs	181	181	165	165
Avg. Adj R2	0.128	0.270	0.296	0.350

Note: Speculative period refers to Oct 1995 - Sept 1997 (24 months); Non-sepculative: Sept 1992 - Aug 1994 (24 months). Other controls in the regressions include the log 1992 baseline price and estate charateristics (no. of floors, travel time and building age). Fama-Macbeth standard errors reported in parantheses.

† Pro-China indicator is the district-level average of a pro-China index defined on an 1 to 5 scale. Each District Council member is assigned a pro-China index according to their political party affiliation, 5 being the most Pro-China and 1 being the least.

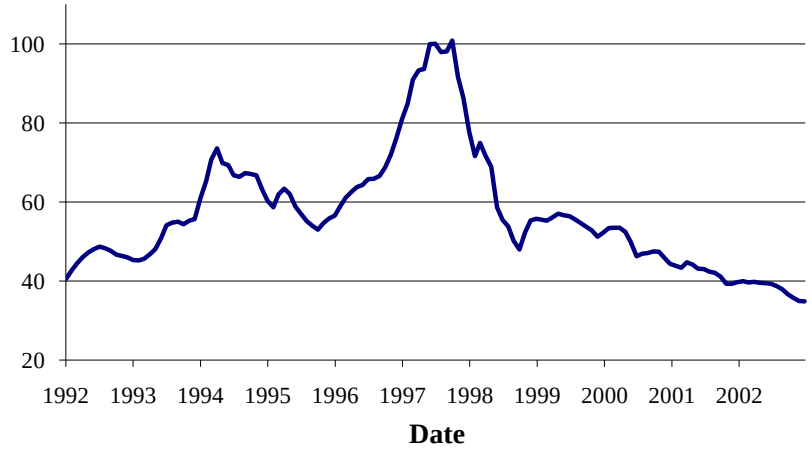
Panel B: Vote Margin

	Dep Var: % Price change relative to trough			
	Speculative Period		Non-speculative Period	
	(1)	(2)	(3)	(4)
Log turnover	2.629***	1.972***	-0.603*	-1.079***
	(0.520)	(0.450)	(0.597)	(0.548)
No. of no-trade	-0.239***	-0.151***	0.002	-0.023
months, 1992	(0.050)	(0.048)	0.073	(0.055)
Vote margin	19.500***	--	-8.016***	--
	(2.991)		(2.852)	
Vote margin	-5.920***	-2.963***	1.187	3.156**
*turnover	(1.114)	(0.988)	(2.343)	(1.940)
District fixed effects	No	Yes	No	Yes
Avg. no. of obs	181	181	165	165
Avg. Adj R2	0.133	0.267	0.287	0.350

Note: Speculative period refers to Oct 1995 - Sept 1997 (24 months); Non-sepculative: Sept 1992 - Aug 1994 (24 months). Other controls in the regressions include the log 1992 baseline price and estate charateristics (no. of floors, travel time and building age). Fama-Macbeth standard errors reported in parantheses.

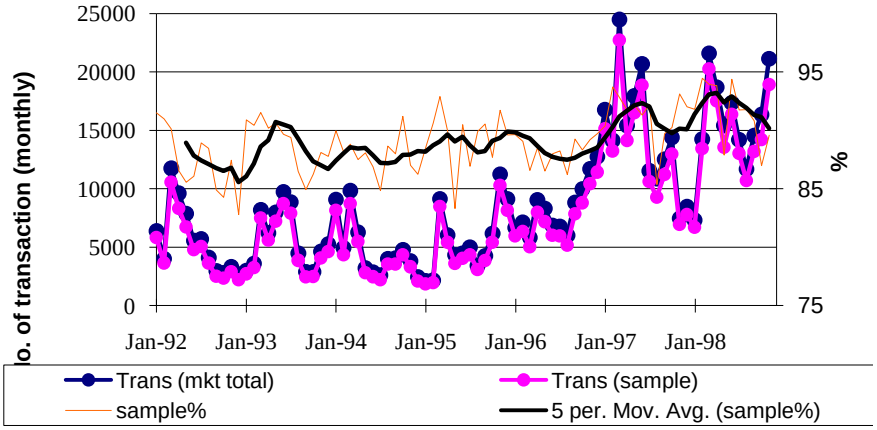
† Vote margin is the weighted average of vote difference between elected District Board members and the 2nd runner-up in percentage points.

Figure 1: Real housing price movements, 1992-2004



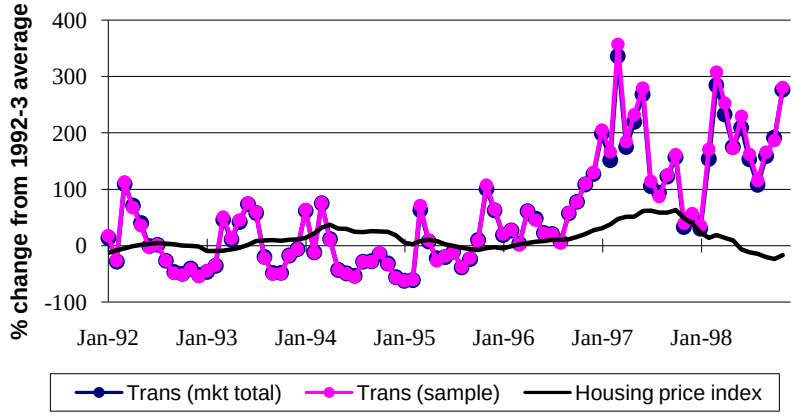
* Housing price index (CentaCity Index) deflated using the food price priced plotted against time.

Figure 2a: Sample vs. Market Wide Transaction Volume



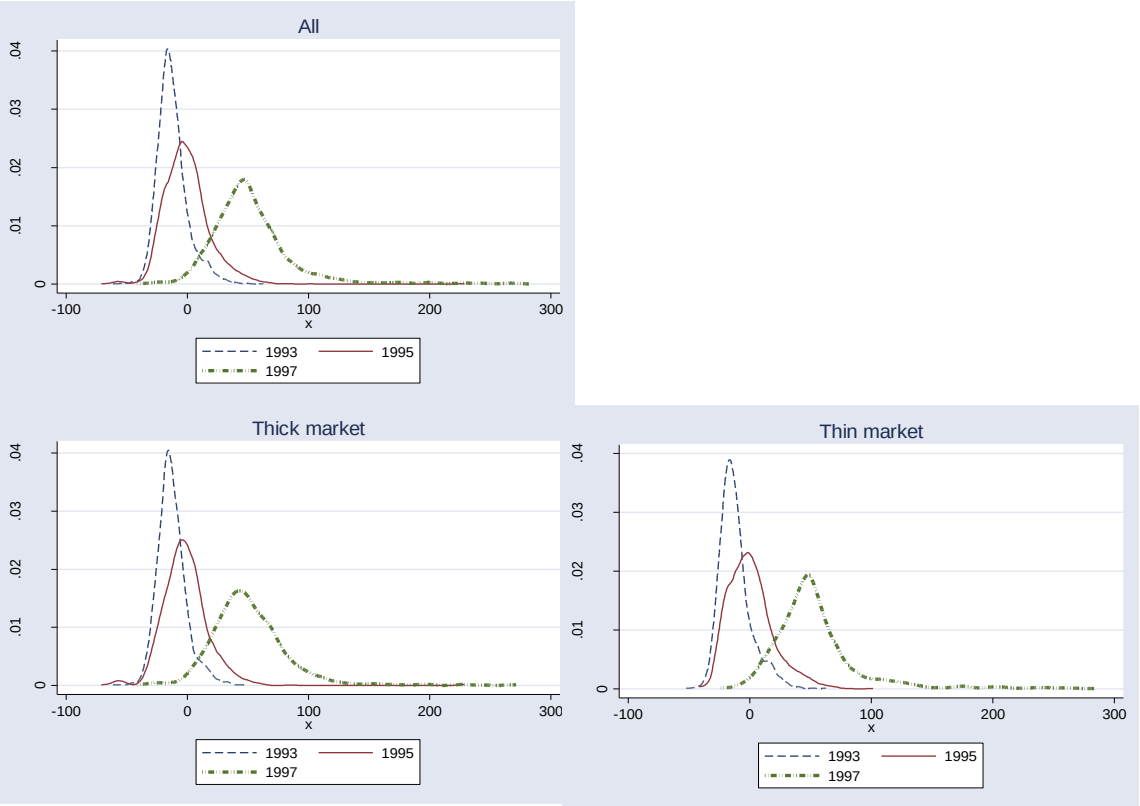
* The no. of residential property transactions in the entire market is compared to the no. of transactions within estates in the sample used in this paper (left scale). The "sample%" serier (right scale) express this comparison in percentages.

Figure 2b: Movements in Transaction Volume



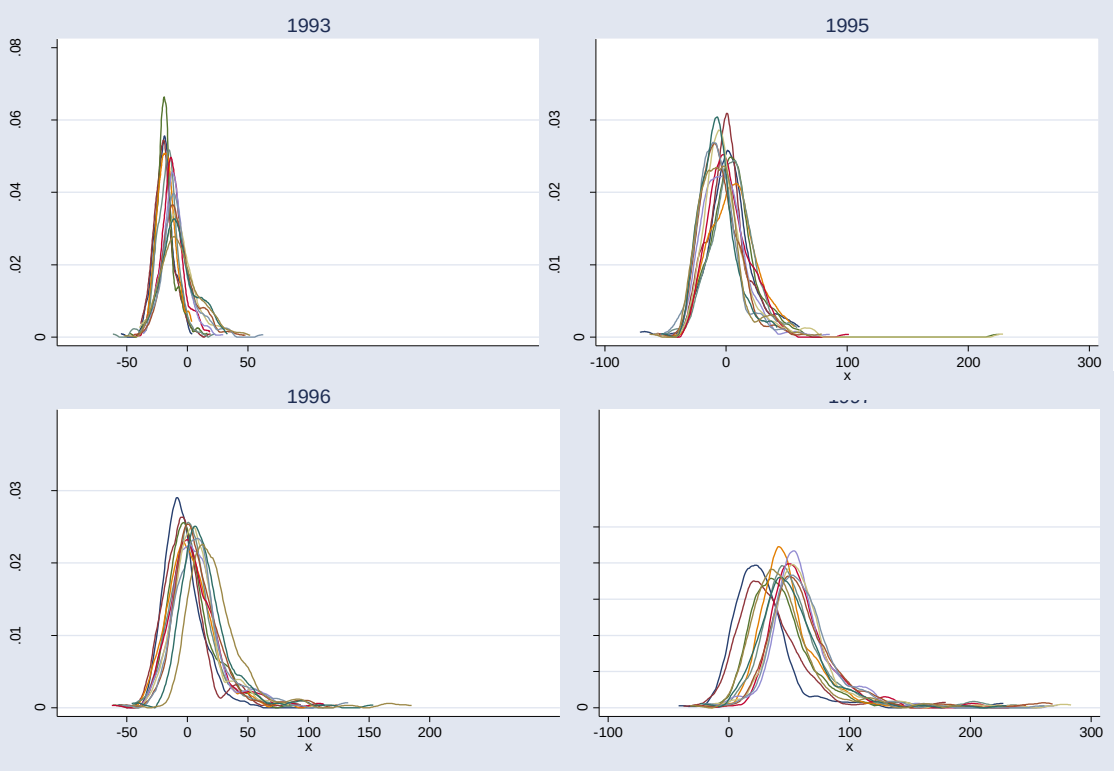
*The movements in the no. of residential transactions are compared to those in the housing price index. The former are much more significant.

Figure 3a: Cross-sectional variation in price changes by year



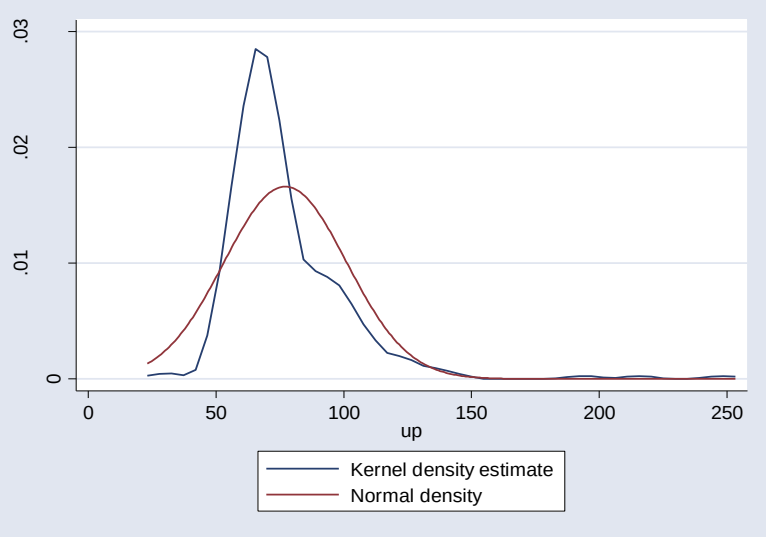
* Kernel density plot of monthly price movements of 266 housing estates by year and month relative to the average price in 1992. Thick market refers to estates with an above-median turnover rate in 1992.

Figure 3b: Cross-sectional variation in price changes by year and month



* Kernel density plot of monthly price movements of 266 housing estatesby year and month relative to the average price in 1992.

Figure 3c: Cross-sectional variation in trough-to-peak price changes



* Trough-to-peak price changes are are calculated using quarterly price averages for 266 housing estates over the period 1994-1998. Normal density distribution is included for comparison purposes.

Figure 4: Growth in Housing Stock

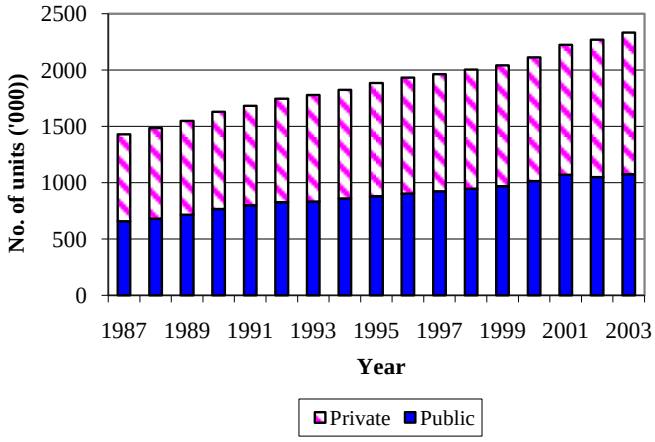


Figure 5: Government Participation in Housing Services Provision

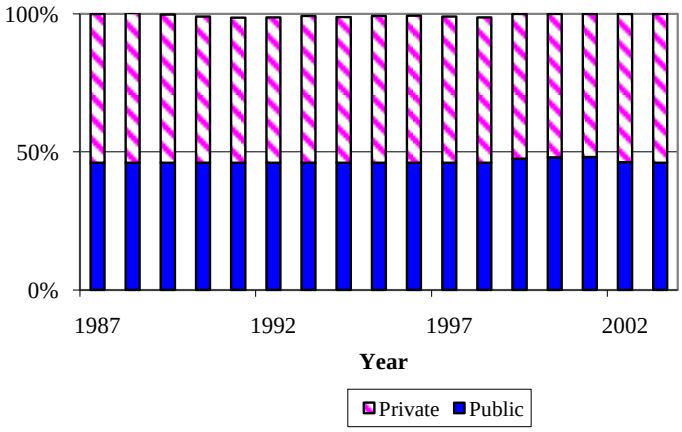


Figure 6: Construction Cost vs. Housing Prices

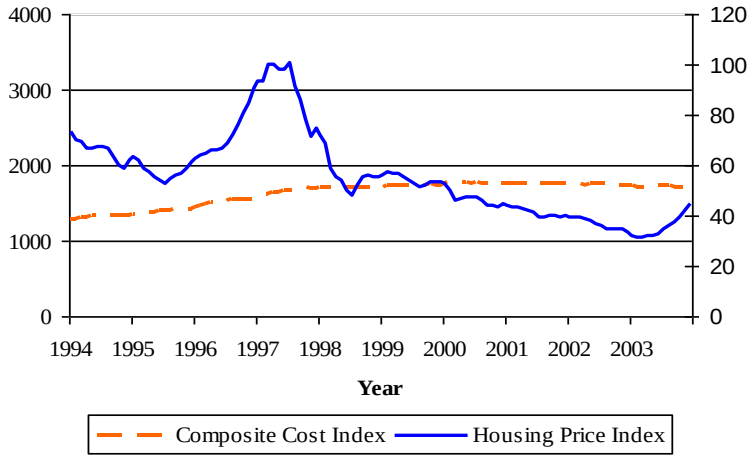


Figure 7: Number of Housing Unit Per Capita

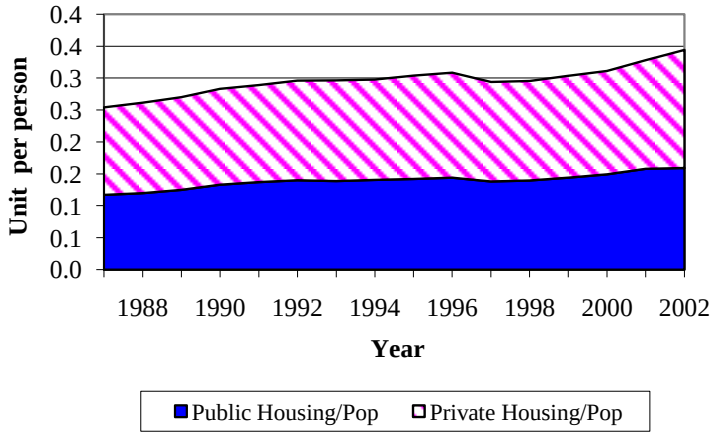


Figure 8: Ownership and Household Formation

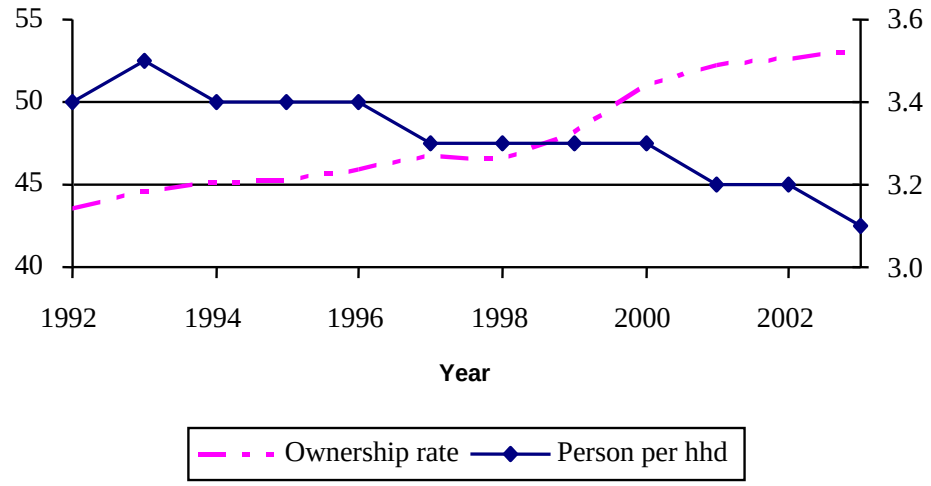


Figure 9: Income vs. Housing Price Index

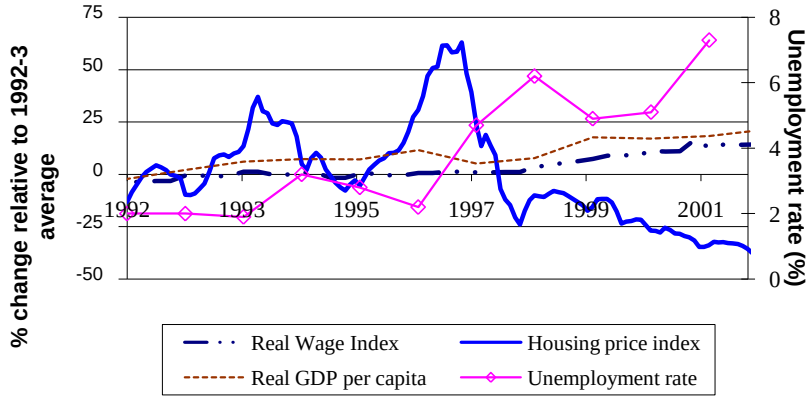


Figure 10: Returns to Housing and Non-Housing Assets

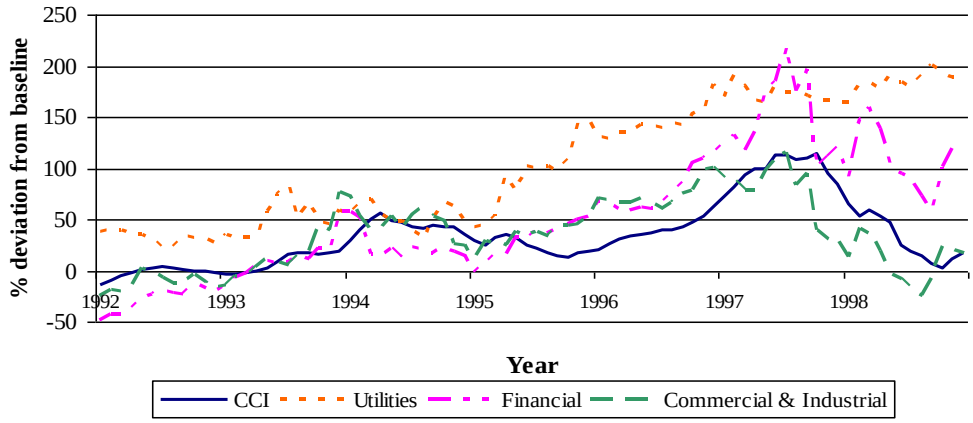


Figure 11: Returns to Asian Stockmarket Indices

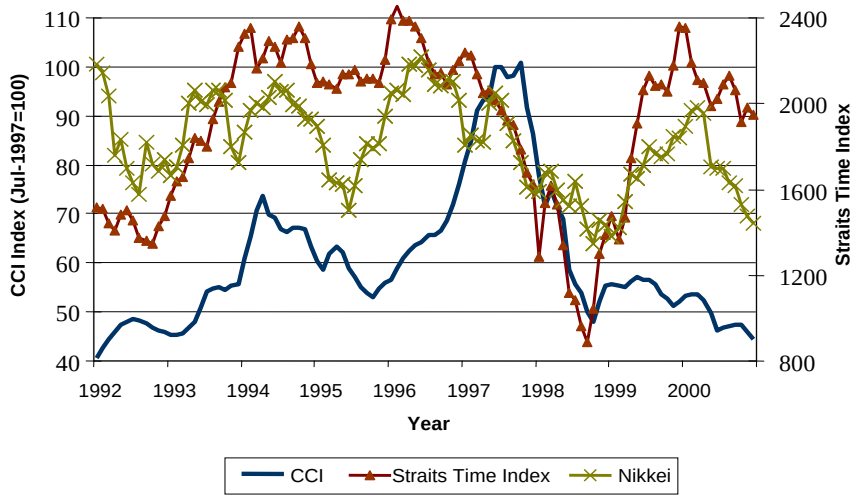


Figure 12: Cost of Capital

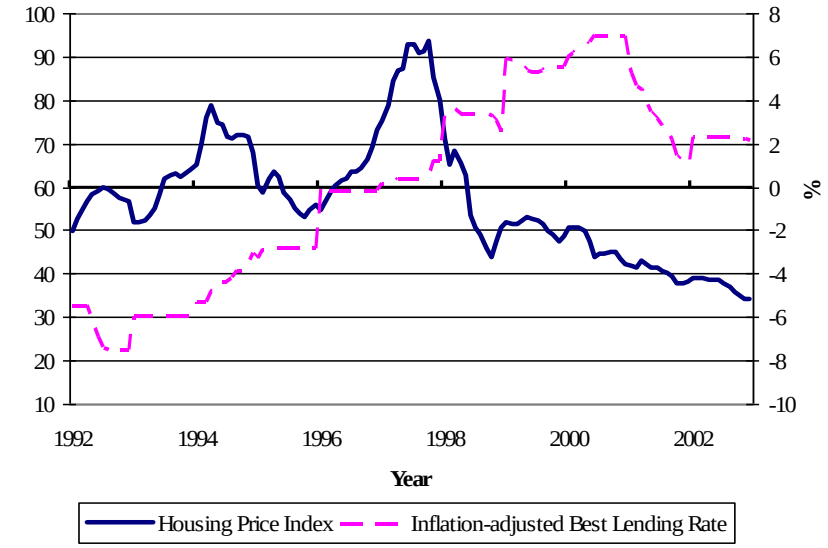


Figure 13: Price-Rent Ratio