Government Policies and Private Housing Prices in Singapore

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Summary. Regression models are used to show that interest rates, income growth rates and the supply of housing have not played a statistically significant role in the determination of private housing prices in Singapore between 1975 and 1994. Instead, private housing prices in Singapore were highly correlated with the prices for public-sector-built housing. Moreover, the timing of government policies relating to the use of compulsory savings for private housing finance purposes, the liberalisation of rules on public housing ownership criterion as well as for housing finance had a significant impact on private housing prices.

1. Introduction

Singapore is a small densely populated island city state with a population of 3.6 million and a land area of 648 sq km. Singapore's per capita GNP in 1995 was S$34 500 or approximately US$24 500 (where S$1 = US$0.71). For the decade between 1986 and 1995, prices of private housing in Singapore rose unabatedly at an average rate of 18 per cent per year (in nominal terms). Over the same period, nominal per capita GNP increased at an average annual rate of 10 per cent, while inflation as measured by the consumer price index averaged only 2 per cent per annum. Escalating property prices became a major issue of public concern, and resulted in the convening of a high-level, government-appointed Cost Review Committee in 1993 and again in 1996 (Cost Review Committee, 1993, 1996).

Private housing prices in Singapore cannot be easily analysed by recourse either to analysis of private-sector supply and demand or simple trend-line extrapolations. Only where housing markets are essentially free of government controls and intervention can studies be made by the simple application of partial equilibrium or real estate cycle analyses. In Singapore, as well as many other nations of the world, housing markets are characterised by the co-existence of a freely priced part of the market with a part that is subject to varying degrees and forms of government intervention and regulation. The Singapore housing market has an especially complex institutional structure with its large regulated public housing sub-sectors.

Part 2 of this paper contains an overview of the Singapore housing market which is dominated by the public housing sector. The Housing and Development Board (HDB) and the Central Provident Fund (CPF), two important institutions in the housing market, are described. Prices in the private housing sector are affected by the standard determinants

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of supply and demand as well as by many government policies. In the public housing sector, the HDB decides prices and supply of new units and excess demand has spillover effects on the HDB resale sector and the private housing sector. Prices set by the HDB for its new flats also serve as a guide for properties in the other sectors. Policies on HDB resale flats, Central Provident Fund housing finance terms and conditions, and the release of state land for development are but a few of the several ways through which the government affects prices in the private sector. Part 3 reviews key government policies that are likely to have an effect on private residential property prices.

The objective of this paper is to develop an understanding of how various policies have affected private residential property prices during the past two decades. Part 4 of the paper contains a time-series analysis of private housing prices in Singapore for the period 1975–94. Besides the conventional factors of income growth, interest rates and private-sector supply, we consider two supply-side policy variables: public housing prices and public housing supply. In addition, the effects on housing prices of liberalisation in housing finance regulations in 1981 and 1993, and deregulation measures for resale public housing in 1989 and 1991 are estimated using dummy variables.

2. The Singapore Housing Market

Singapore's housing market is skewed towards the public sector. In 1995, 86 per cent of the 3.6 million population in Singapore resided in public housing (see *Yearbook of Statistics Singapore*, 1995). Of the 700 060 units of public housing, 90 per cent were owner-occupied units while the other 10 per cent of the public housing stock comprised rental units. Owner-occupied public housing, an anomaly in most other countries, is housing built by the Housing and Development Board (HDB)[1] and sold on 99-year leases to eligible households who are subject to resale and other regulations imposed by the housing authority. Designated town councils chaired by members of parliament take care of general estate maintenance for a monthly fee.

The home-ownership rate in Singapore is therefore in the region of 90 per cent—one of the highest rates in the world. Besides HDB policy, this high rate is also attributed to Singapore's unique housing finance arrangement known as the Central Provident Fund (CPF) (see Asher, 1991, 1996). The fund is essentially a fully funded, pay-as-you-go social security scheme which requires mandatory contributions by both employers and employees of a certain percentage of the employees' monthly contractual wage to his/her account in the fund. The contribution rates peaked at 25 per cent of wages for both employers and employees from 1984–86. Contribution rates are currently 20 per cent of wages for both employees and employers. The scheme covers about two-thirds of the work-force and CPF balances at the end of 1995 were S$66 bn or 56 per cent of GDP. CPF contributions are exempt from income tax and balances earn interest which are also tax-deductible. The interest rate is based on the average of 1-year fixed deposit and month-end savings rates of the 'Big Four' Singapore banks, subject to a minimum rate of 2.5 per cent.

These fairly substantial forced savings may be withdrawn at age 55 or earlier for various approved purposes. Between 1968 and 1981, they could only be withdrawn for purposes of downpayment, stamp duties, mortgage and interest payments incurred for the purchase of public-sector-built housing. In 1981, the scheme was extended to allow for withdrawals for mortgage payments for the purchase of private housing. During the past decade, rules governing the use of CPF savings have been gradually liberalised to allow for withdrawals for medical and education expenses, insurance and investments in various financial assets (Phang, 1992, pp. 74–83).

Public housing rents and prices of new units are subsidised by the government. While a brand new 5-room HDB flat cost between S$160 000 and S$260 000 (depending on location) in 1995, a comparable resale

HDB flat would cost double the amount. Subsidies to the HDB are in the form of loans (at below market rates of interest) and grants financed from the government's budget, and more importantly, land made available to the HDB at prices below market value. About four-fifths of the land in Singapore belongs to the state.[2]

The HDB also provides mortgage financing to its flat-buyers. The loan quantum is either 80 or 90 per cent (depending on loan scheme) of the price for the new flat and the maximum repayment period is 25 years. The HDB mortgage interest rate is pegged at 0.1 per cent above the CPF interest rate, which is below the housing mortgage interest rates of commercial banks. This represents another subsidy for the purchaser of an HDB flat.

Public housing supply is allocated based on 'first-come-first-served' waiting lists as well as various eligibility conditions. About 140 000 households are presently on the waiting list for new HDB flats and the waiting time is about 5 years. An applicant who satisfies the eligibility conditions is entitled to apply to the HDB to purchase a flat twice. Half the households on the present waiting list are second-time applicants. Eligibility conditions (which have been relaxed over time as the housing programme expanded) include citizenship status, non-ownership of other residential properties, minimum household size of two, and having household incomes below the ceiling set by the HDB. The present monthly income ceilings are S$800 for rental flats (mainly 1- to 3-room units), S$1200 for 3-room flats, S$8000 for 4- and 5-room flats, S$10 000 for executive condominiums, and S$12 000 for multi-tier families.

An authorised resale market for HDB flats has existed since 1971 and is subject to the regulations laid down by the HDB. The seller must satisfy a minimum occupancy period of 5 years if the flat was purchased at a subsidised price from the HDB. The minimum occupancy period is 30 months if the flat had been purchased in the resale market. A resale unit differs from a new unit in that the buyer does not have to be on a waiting list for new units to be completed. In contrast to the chronic disequilibrium evident in the market for new flats, prices in the resale market are determined largely by market forces but are also influenced by prices for new HDB flats and HDB credit and valuation policies for resale flats (see section 4).

Table 1 shows the structure of the housing market as at the end of 1995. Of a total of 830 000 units of housing, 84 per cent had been built by the public sector. Clearly government interventions in the regulated public housing sector have spillover effects on the private housing sector. Thus, any meaningful discussion of the private housing market cannot ignore the public housing sector. This is a key premise underlying this paper.

Table 1. Structure of Singapore's housing market (end-1995)

Type of housing	Number of units
HDB housing	
1-room	25 930
2-room	35 165
3-room	241 085
4-room	236 798
5-room	111 664
Executive	44 100
HUDC[a]	5 318
Total	700 060
Private residential units	
Non-landed	
Apartment	34 402
Condominum	34 908
Landed	
Terrace house	31 316
Semi-detached bungalow	18 286
Detached bungalow	10 194
Total	129 106

[a]This refers to middle-income public housing built initially by the Housing and Urban Development Company between 1973 and 1982. The functions of the HUDC were taken over by the HDB in 1982.
Sources: Yearbook of Statistics Singapore, 1995; and Urban Redevelopment Authority, *Real Estate Series: Stock and Occupancy*, 4th Quarter, 1995.

3. Government Policies and Regulations

Government policies that affect housing prices in Singapore are wide-ranging and varied. Policies that have an impact on private housing prices include policies concerning public housing, the supply of state land for private housing developments, as well as rules governing the use of Central Provident Fund savings. How these numerous policies affect private housing prices are discussed in this section.

Public Housing Policies

Pricing and supply of new HDB flats. Prices of new HDB flats are regulated and are at substantially below market rates. Prices vary with flat size, design, location, storey height, orientation and housing market conditions. The stock of HDB flats is another policy variable which is determined by new construction and the demolition of older units. The number of dwellings under HDB management was 552 000 in 1985, 624 000 in 1990 and 700 000 in 1995.

Weibull (1983) has built a simple model of a housing market with two sectors with characteristics similar to the Singapore housing market. In one of these sectors, prices are free and housing is traded competitively; in the other sector, prices are fixed by regulation and excess demands are dissipated by means of trade frictions which cause spillovers to the unregulated sector. Using Weibull's model, we obtain the following comparative statics: when the regulated price (regulated stock) of dwellings is increased, prices in the private sector increase (decrease), and queue times in the regulated sector are reduced.

Changes in eligibility criteria for public housing. Eligibility criteria for public housing purchase were extremely restrictive in the 1960s and 1970s due to the severe housing shortage. As the public housing programme expanded and the basic shelter needs of the majority were met, the eligibility criteria were made less stringent. For example, the household monthly income ceiling to purchase a 5-room flat was S$1500 in 1975, but it has been increased over the years to the present S$8000 (Phang, 1992, p. 85). Only citizens, non-owners of any other residential property, and households with a minimum size of two persons could purchase new or resale HDB flats before 1989. In 1989, the income ceiling restriction was removed for HDB resale flats; the public housing resale market was opened to permanent residents and private property owners who had to owner-occupy their HDB properties; HDB flat-owners who could not own any other residential properties before, could also invest in private-sector-built dwellings. In 1991, single citizens above the age of 35 were allowed to purchase HDB 3-room or smaller resale flats in estates outside the central area for owner-occupancy.

Credit policies relating to resale HDB flats. The HDB also provides loans to buyers of resale HDB flats. Loan financing prior to 1993 was based on 80 per cent of 1984 HDB new flat prices. The failure to adjust the loan quantum for HDB resale flats for a decade affected the demand for these flats. In 1993, the HDB moved its mortgage financing terms closer to market practice by granting loan financing of up to 80 per cent of current valuation or the declared resale price of the flat, whichever is lower (see section 4).

State Land Sales for Private Housing Developments

The government, through its sale of sites programme, makes available state land (via auction or tender) to the private sector for the development of 99-year leasehold dwellings (Phang, 1996). The few major private-sector developers in Singapore also possess their own (limited compared with the state's) land banks of freehold or 999-year leasehold properties.

Central Provident Fund Policies

Between 1968 and 1981, CPF savings and future contributions could only be used for

downpayment and mortgage payments related to the purchase of public-sector-built dwellings. In 1981, the Approved Residential Properties Scheme was implemented which extended the use of CPF savings to the purchase of private residential property. The objective of this scheme extended beyond home-ownership as the dwelling purchased could be used for rental as well as owner-occupation. CPF members were allowed to use 90 per cent of their CPF balances and monthly contributions to redeem one housing loan or to buy one residential property at any one time. Withdrawals, however, were not allowed to exceed 80 per cent of the valuation price of the property, which either had to be on freehold land or have a remaining lease of at least 75 years. Upon the sale of the property, the amount of CPF savings withdrawn under the scheme had to be returned, together with interest, to the member's account, and a 3-year lapse was necessary before the savings could be withdrawn again.

The above numerous restrictions accompanying the scheme were gradually lifted over the next one and a half decades: in 1984 (the 3-year lapse condition was removed); in 1985 (100 per cent instead of 90 per cent of savings); in 1988 (100 per cent instead of 80 per cent of valuation price of property); in 1989, 1992 (remaining lease of at least 60 years instead of 75 years) and in 1993. The more significant changes in CPF polices occurring in 1989 and 1993 will be elaborated upon in the next section.

4. Empirical Findings on the Effects of Government Policies on Housing Prices

There exists a large international literature on house-price determination and modelling. DiPasquale and Wheaton (1996) analyse US housing markets which are essentially free of government controls and intervention (see chs 8–10 for a review of the US literature). Anas and Cho (1988) is an example of a study that explicitly incorporates regulated sub-markets with rationed dwellings and queues. While these are also features of the Singapore housing market, the Singapore market has the further complexity that it is frequently subjected to policy interventions that result in structural changes with their consequent effects on housing prices.

In this part of the paper, a time-series econometric model is used to study the effects of these interventions on private housing prices. The model uses the private residential property price index (RPPI) series from the first quarter of 1975 to the fourth quarter of 1994 (a total of 80 periods). The RPPI excludes HDB properties and is the weighted average of current prices of five types of property (see Table 1) in five planning districts. The weight assigned to each group is the percentage share of the value of property transactions in the base year 1990.[3]

The variables included in the study are:[4]

(1) economic growth—measured by the quarterly growth rate of real Gross Domestic Product (GDP);
(2) nominal interest rate—measured by the quarterly average of prime lending rates (PLR);
(3) quarterly private-sector supply of completed residential units (PRSUPPLY)—this is partly market-driven and partly dependent on the volume of government land sales in previous periods;
(4) HDB supply of new units—this is captured in the variable TSUPPLY which is the total supply of completed residential units in any quarter; and
(5) HDBPRICE—the average price for new HDB 5-room flats in thousands of Singapore dollars; HDBPRICE is determined by the HDB.

Part 4.1 describes the correlation between RPPI and each of the above variables on RPPI. Part 4.2 is a regression model which estimates the overall effect of these variables on RPPI. Part 4.3 looks at the interaction between price and supply over time by analysing the correlation between lag values of price and supply.

Many discrete changes in housing policies occurred over the 20-year period. In particular, we would like to estimate the effects on RPPI of the following policies implemented in 1981, 1989, 1991 and 1993:

(1) *June 1981—The Approved Residential Properties Scheme (ARPS).* In March 1981, it was announced that with effect from June 1981, under the ARPS, CPF compulsory savings that previously could only be used for the purchase and financing of public housing could now be used for private housing purchases.

(2) *August/September 1989—HDB ownership criterion liberalisation.* The income ceiling restriction was removed for HDB resale flats. Owners of HDB flats purchased from the resale market were allowed to use their CPF savings to purchase private residential properties for investment purposes (i.e. to earn rental income). Permanent residents of Singapore and owners of private residential properties were allowed to use their CPF savings to purchase HDB resale flats for owner-occupancy. Before this change in policy, the eligibility criteria for resale HDB flats were similar to those for new subsidised HDB flats, and HDB-dwellers were not allowed to own any other residential property.

(3) *October 1991—The Single Singapore Citizen Scheme.* Single citizens (bachelors/spinsters) above the age of 35 were allowed to purchase HDB 3-room or smaller resale flats in estates outside the central area for owner-occupancy.

(4) *1993—HDB resale flat credit policy and CPF liberalisation.* In April 1993, subsidised mortgage loans provided by the HDB for purchase of resale flats were increased to 80 per cent of the market value or resale price, whichever is lower. Previously, the mortgage loan provided by HDB to a buyer of a resale flat was based on up to 80 per cent of HDB's 1984 sale price for a comparable new flat (the posted price). In March 1993, the CPF Board announced that with effect

from October 1993, it would allow withdrawals of CPF savings to be used to meet interest payments on mortgage loans for resale HDB and private housing purchases. Before this, members were allowed to withdraw only up to 100 per cent of the value of the property at the time of purchase.

In Part 4.4, we estimate the effects of the above policies on private residential property price RPPI using a regression model with dummy variables.

4.1 Correlation Coefficients

Table 2 shows the correlation coefficients of RPPI with variables t (t is the time-trend variable where the first quarter of 1975 is represented by 1, the second quarter of 1975 by 2, and so on), PLR, GDP, PRSUPPLY, TSUPPLY and HDBPRICE. The results show that private housing prices are significantly positively correlated with time t, and prices of new 5-room HDB flats HDBPRICE, but are significantly negatively correlated with interest rates PLR and total supply of housing units TSUPPLY. RPPI is positively but not significantly correlated with GDP growth rates.

4.2 Regression Model 1

To study the overall effect of these variables on RPPI, we use a multiple regression model with random error terms that follow a first-order autoregressive process:

$$\mathrm{RPPI}_t = b_0 + b_1 t + b_2\, \mathrm{PLR}_t + b_3\, \mathrm{GDP}_t + b_4$$
$$\mathrm{PRSUPPLY}_t + b_5\, \mathrm{TSUPPLY}_t + b_6$$
$$\mathrm{HDBPRICE}_t + e_t$$
$$e_t = \rho\, e_{t-1} + u_t$$

where, ρ is a parameter such that $|\rho| < 1$; u_t are independent $\mathrm{N}(0,\sigma^2)$.

The results of the multiple regression analysis are shown in Table 3. We note that there is no serious multicollinearity problem among the independent variables. Table 3 shows that t, interest rates PLR, and

Table 2. Correlation analysis: Pearson correlation coefficients (sample size = 80)
Prob $> |R|$ under H_0: $Rh_0 = 0$

	t	PLR	GDP	PRSUPPLY	TSUPPLY	HDBPRICE
RPPI	0.85846	− 0.26969	0.15825	0.46906	− 0.24787	0.96681
	0.0001	0.0156	0.1609	0.0001	0.0266	0.0001

Table 3. Regression model 1

Variable	b value	Standard error	t ratio
Intercept	− 26.9020372	7.7438	− 3.474
t	0.3830944	0.1536	2.495
PLR	1.9981912	0.6390	3.127
GDP	0.5265946	0.3451	1.526
PRSUPPLY	0.0008158	0.0010	0.782
TSUPPLY	− 0.0001560	0.0002	− 0.932
HDBPRICE	0.0008810	0.0001	14.923
$\hat{\rho}$	0.7968865	0.0712	11.193
R^2	0.9196		

HDBPRICE have significant positive effects on RPPI; GDP, PRSUPPLY, TSUPPLY are insignificant in explaining RPPI; t and HDBPRICE are significantly positively correlated to RPPI individually as well as marginally in the regression model. However, the individual effect of PLR on RPPI is negative (refer to Table 2) but the marginal effect is positive in the regression model (see Table 3).

4.3 Interactions between Prices and Supply

To analyse further the relationship between supply and prices, the cross-correlation coefficients between lag values of RPPI and PRSUPPLY and between RPPI and TSUPPLY are estimated. The results are shown in Table 4 and suggest that TSUPPLY is significantly negatively correlated to RPPI up to 12 quarters (3 years) into the future. However, PRSUPPLY is significantly positively correlated to RPPI up to a lag of 10 quarters (2.5 years). From these findings, one may conclude that, *ceteris paribus*, an increase in the RPPI in period t will result in an increase in private-sector supply of completed units (PRSUPPLY) for up to $t + 10$ quarters (2.5 years), while an increase in total supply of

residential units (TSUPPLY) in period t will result in a fall in RPPI for up to $t + 12$ quarters (3 years).

4.4 Demand-side Intervention Policies

Dummy variables are used to estimate the effects on RPPI of policies implemented in 1981, 1989, 1991 and 1993. They are defined in the following manner:

D81 = 1 for periods after the fourth quarter of 1980.
D81 = 0 OTHERWISE.
D89 = 1 for periods after the second quarter of 1989.
D89 = 0 OTHERWISE.
D91 = 1 for periods after the third quarter of 1991.
D91 = 0 OTHERWISE.
D93 = 1 for periods after the first quarter of 1993.
D93 = 0 OTHERWISE.

and

S81 = D81 * $(t − 25)$
S89 = D89 * $(t − 59)$
S91 = D91 * $(t − 68)$
S93 = D93 * $(t − 73)$

Table 4. Cross-correlation between supply and price

Cross-correlation between RPPI$_t$ *and* TSUPPLY$_{(t-L)}$

	1	2	3	4	5	6	7	8	9	10	11	12
1–12	−0.28	−0.30	−0.34	−0.32	−0.32	−0.32	−0.32	−0.31	−0.32	−0.30	−0.27	−0.26
Standard error	0.11	0.11	0.11	0.11	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
13–24	−0.21	−0.17	−0.14	−0.14	−0.11	−0.08	−0.03	−0.00	0.01	0.06	0.13	0.16
Standard error	0.12	0.12	0.12	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13

Cross-correlation between PRSUPPLY$_t$ *and* RPPI$_{(t-L)}$

	1	2	3	4	5	6	7	8	9	10	11	12
1–12	0.43	0.39	0.36	0.33	0.31	0.32	0.31	0.30	0.28	0.25	0.22	0.20
Standard error	0.11	0.11	0.11	0.11	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
13–24	0.18	0.16	0.11	0.09	0.08	0.06	0.01	−0.02	−0.04	−0.07	−0.11	−0.13
Standard error	0.12	0.12	0.12	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13

where, 25 is the smallest value of t such that $D81 = 1$, 59 is the smallest value of t such that $D89 = 1$, and so on.

We obtain the following piecewise regression model with random error terms that follow a first-order autoregressive process:

$$RPPI_t = b_0 + b_1\ t + b_2\ D81_t + b_3\ D89_t + b_4$$
$$D91_t + b_5\ D93_t + b_6\ S81_t + b_7$$
$$S89_t + b\rho_8\ S91_t + b_9\ S93_t +$$
$$b_{10}\ PLR_t + b_{11}\ GDP_t + b_{12}$$
$$PRSUPPLY_t + b_{13}\ TSUPPLY_t + e_t$$
$$e_t = \rho\ e_{t-1} + u_t$$

where, ρ is a parameter such that $|\rho| < 1$; u_t are independent $N(0, \sigma^2)$.

The estimates of the above model are presented in Table 5. In this model, we have dropped the variable HDBPRICE as it dominates the total variation of RPPI. From the results in Table 5, we infer the following:

(1) The large coefficient for D81 implies that the 1981 ARPS policy resulted in a large initial increase in private housing prices when the policy was first announced. However, the negative coefficient for S81 suggests that, while the initial effect was large, it dampened

off over time. The coefficient of S81 is -1.07 which is smaller in magnitude than the coefficient of t which is 1.21. This implies that the rate of housing price increase remained positive after the announcement (and subsequent implementation) of the ARPS, although its effect on RPPI dampened off over time.

(2) The coefficient of D89 is positive but not significant, while that of S89 is significantly positive. This implies that the 1989 HDB ownership criterion liberalisation policy did not result in a significant initial rise in private housing prices but did increase their growth rate significantly thereafter.

(3) The coefficients of both D91 and S91 are not significant. This leads us to conclude that the 1991 Single Citizen Scheme did not have a significant effect on private housing prices.

(4) The estimate of b_9, the coefficient of S93, is the largest of the slope dummy coefficients ($b_9 = 12.7$). This result implies that the 1993 policies (or other events occurring in 1993) caused a steep increase in private housing prices. The fact that the estimate of the coefficient of D93 is small (and not significant) implies

Table 5. Regression model 2

Variable	b value	Standard error	t ratio
Intercept	8.8528573	6.7377	1.314
t	1.2058629	0.3404	3.542
D81	30.2054974	4.4425	6.799
D89	8.2197063	4.9274	1.668
D91	0.6234105	5.6940	0.109
D93	1.0948393	6.0831	0.180
S81	-1.0679206	0.5257	-2.032
S89	2.8478511	1.1996	2.374
S91	1.2685777	2.2367	0.567
S93	12.7007308	2.2938	5.537
PLR	0.3288408	0.8602	0.382
GDP	0.4419669	0.3193	1.384
PRSUPPLY	0.0006525	0.0013	0.506
TSUPPLY	-0.0000885	0.0002	-0.473
$\hat{\rho}$	0.5636353	0.1025	5.501
R^2	0.9710		

that events occurring in the second quarter of 1993 did not cause a significant initial jump in private housing prices, but did result in a significant increase in the subsequent rate of growth of RPPI.

The above results also suggest that nominal interest rate PLR, private housing supply PRSUPPLY and GDP growth rate are positively related to private housing prices, while the total supply of completed residential units TSUPPLY is negatively related to RPPI. However, all four conventional variables are insignificant in explaining RPPI. 'Insignificance' refers to the insignificant marginal contribution of PLR, GDP, PRSUPPLY and TSUPPLY in explaining RPPI.

5. Conclusion

The above results show that the conventional factors which affect private housing prices in other countries (see for example DiPasquale and Wheaton, 1996), such as interest rates, income growth rates and supply of housing, appear to have played a statistically less significant role in the determination of private housing prices in Singapore.

Private housing prices in Singapore are highly correlated with the prices for public housing that are set by the Housing and Development Board. Moreover, the timing of policies relating to:

(1) the use of compulsory CPF savings for private housing finance purposes in 1981;
(2) the liberalisation of rules on public housing ownership criterion in 1989; and
(3) the change in maximum HDB loan amount allowable for the financing of HDB resale flats and the use of compulsory CPF savings for housing mortgage interest payments in 1993; or
(4) other events occurring simultaneously during the respective periods;

appears to have had a significant impact on private housing prices.

The above findings suggest that the co-ordination and timing of housing-related poli-cies (such as changes in the prices for public housing, supply of private and public housing, liberalisation of public housing regulations and housing finance regulations) are crucial to prevent excessive instability in private housing prices. Well-timed housing-related policies may even be used to dampen the residential property cycle. These findings have important implications for residential property price management and therefore macroeconomic management in Singapore.

Notes

1. See Wong and Yeh (1985) for an informative review of public housing policies between 1960 and 1985. Since 1982, public housing previously built by other public-sector agencies such as the Jurong Town Corporation and the Housing and Urban Development Company have come under the management of the HDB. See Phang (1992) for the effects of housing policies on housing, location and commute decisions.
2. This has come about because of the application of the Land Acquisition Act of 1966 which has allowed the government to acquire land from private landowners at prices pegged below market values for broadly defined public purposes which include any public, residential, industrial or commercial purposes. See Phang (1996) for the effect of this land policy on the economic development of Singapore.
3. This price series is compiled by the Urban Redevelopment Authority and is not quality-controlled (Urban Redevelopment Authority, 1995). It is, however, the only series available for analysis.
4. There is a case for using personal income rather than GDP as an explanatory variable, and also a case for including measures of income distribution and wealth, given that the private housing market caters for the upper echelons of Singapore society. Ideally, demographic variables such as the number of households, should also be included in the explanatory variables. However, quarterly data for the above-mentioned variables do not exist.

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