INTERNATIONAL REAL ESTATE REVIEW
2002 Vol. 5 No. 1: pp. 115 - 132

Public Policies and Public Resale Housing Prices in Singapore

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In Singapore, the public resale housing market is an active second-hand housing market, whereby previously subsidised new public housing units were being transacted at market prices. In contrast to the private housing price determinants that have been identified in the international literature, the prices of public resale housing in Singapore are largely determined by public policies rather than by economic variables. This paper provides some empirical evidence on how and to what degree public housing policies affected the price dynamics of public resale housing in Singapore during the 1990s. The findings have additional implications of the wider consequences of public policies on the prices of private housing units.

Keywords

Public, resale, housing, policies, prices, Singapore

Introduction

In the city-state of Singapore, there are two active owner-occupier housing markets: the private owner-occupier housing market, where private housing units are transacted at market prices, and the public resale housing market, which is an active second-hand housing market, whereby previously

subsidised new public housing units were being transacted at market prices. Over the years, the private housing market has tended to be the main focus of most previous studies that were aimed at modelling the private housing price dynamics. For instance, Phang and Wong (1997) empirically analysed the impacts of government policies on private housing prices, while Chen and Sing (2000) discussed the inflation-hedging characteristics of private housing prices. In addition, Ong and Sing (2002) identified the causal relationship between prices of private housing and prices of public resale housing using a Granger causality-error correction model.

Despite the limited local and international research on the determinants of public resale housing prices, the works of Tu (2002) and Tu, et. al. (2002) implied that the public resale housing market is basically a self-determined housing market, and public resale housing prices are essentially driven by public housing policies. However, the extent to which public housing policies influence public resale housing prices has never been empirically examined. This paper therefore explores the development of the public resale housing market and the public housing policies in Singapore, as well as evaluates the impacts of such policies on public resale housing prices through the application of an empirical model.

Development of the Public Housing Resale Market in Singapore

The Public Housing Resale Market

Over the past four decades, the Singapore Government has managed to provide decent quality public housing for the majority of its people. As of 31 March 2002, 85% of the population in Singapore were living in public housing. With 83% of the population participating in public homeownership in 2002, the resale market for public housing has matured since its first establishment in March 1971 to allow public homeowners to sell their heavily subsidised public housing units in the secondary market at market prices after first fulfilling a minimum residence period as well as other regulations (Tables 1 and 2).

Currently, the volume of annual transactions in the public housing resale market has reached 5% of the existing public housing stock. According to the size of the housing stocks, the public housing resale market is approximately five times that of the private housing market. The sheer size of the public housing resale market has far-reaching impacts on the majority of the population in Singapore. As most of the population have been housed in public housing, and as the housing shortage problem has gradually

diminished, the public housing resale market has also become less regulated over the years so as to allow for easier residential mobility and movement, as well as better housing equilibrium. Although the policies affecting the public housing resale market have been numerous since its formation, their impacts on the issues of efficiency and equity vary.

Table 1: Characteristics of Owner-Occupied Public Housing Units in Singapore

Characteristics	Owner-occupied new public housing	Owner-occupied public resale housing
Housing subsidies	Subsidised selling prices	Market prices, but housing grants are available for first-time purchasers
Housing finance	Subsidized mortgage interest rates subject to income ceilings; may use CPF[1] or cash to pay mortgage loan instalments	Subsidized mortgage interest rates subject to higher income ceilings; may use CPF1 or cash to pay mortgage loan instalments
Down payment	May use CPF1 or cash	May use CPF1 or cash
Housing quality & Prices	High rise, low cost, 99-year leasehold new apartments; S$200,000 to S$250,000[2]	High rise, low cost, 99-year leasehold resold apartments; S$300,000 to S$500,000[3]
Constraints	Long queues in certain locations; strict access criteria; five years minimum occupancy period	Based on market transactions; two and a half-year minimum occupancy period

Notes: (1) See footnote 1 in the main text.
(2) Prices are the average selling prices of new public housing units with an average size of 110 square metres. (Source: HDB, 2000/01.)
(3) Prices are the average selling prices of resale public housing units with an average size of 110 to 120 square metres. (Source: www.mnd.gov.sg/ecitizen/homepage/housing_home.htm, 2002.)

Table 2: Price Differences between New and Public Resale Housing Units in Singapore

Type of public housing	Average size (square metres)	Average price of new public housing (S$)	Average price of resale public housing (S$)
Executive condominium	110 - 130	480,000-600,000	Not available
Executive apartment	125	350,000-400,000	440,000-600,000
5-room apartment	110	240,000-250,000	320,000-520,000
4-room apartment	90	140,000-150,000	240,000-300,000
Studio apartment	35 or 45	56,200 & 71,300	Not available

Sources: HDB, 2000/01 and www.mnd.gov.sg/ecitizen/homepage/housing_home.htm, 2002.

Development of Public Housing Policies

Singapore's public housing allocation and finance systems have been shaped and re-shaped through successive waves of programmes and policies, as well as economic development, but the main objective of promoting public homeownership has never wavered. The evolution of public housing policies in Singapore could be divided into four stages.

The Initial Stage (1960 - 1967)

In the pre-independence years, Singapore faced an acute shortage of decent housing partly due to the post-war baby boom, and partly as a result of a rapidly growing immigrant population. Poverty and poor housing conditions were rampant, with about 30% of the population living in slums and squatter housing in 1965 (Wong and Yeh, 1985; Department of Statistics, 2002). Given the weak economic conditions at that time, the direct provision of public housing was the primary means adopted by the Singapore Government to improve the country's appalling housing situation. To implement the various public housing policies and programmes, the Housing and Development Board (HDB) was established in February 1960. As the main housing authority in Singapore, the HDB plans, designs, and develops affordable public housing, as well as provides mortgage loan financing at interest rates that are lower than commercial banks.

As the main objective of the public housing programme is not to provide homes for free, but to encourage low cost public homeownership, the public homeownership scheme (HOS) was launched in 1964. The scheme experienced slow growth and remained relatively inefficient in allocating available dwellings to target households simply because most of these households could not create an effective demand by paying the initial 20% cash deposit.

The Second Stage (1968 – 1979)

From 1965 to 1979, Singapore experienced strong economic growth, which in turn raised incomes and increased the contributions to the Central Provident Fund (CPF). [1] In view of such a favourable economic climate, the HOS was further deregulated in 1968 to allow public housing purchasers to use a part or the whole of their CPF assets as their initial deposits, and also for the payment of monthly mortgage instalments. This policy boosted public homeownership so much so that the quantity of public housing units sold in 1968 was more than the total sold since the HOS was implemented in 1964 (HDB, 1964/65 to 1968/69). Besides this CPF policy, the other initiatives that encouraged public homeownership included raising the household income ceiling, reducing the initial deposit, reducing the property tax rate for owner-occupiers, and extending the mortgage loan repayment period. Although all of these deregulations combined to create a better housing equilibrium, a more efficient market, and greater distributional equity, the CPF policy provided the greatest impetus in promoting the public housing market because it directly increased the buying power of households, especially those with lower incomes, to purchase public housing.

Another significant initiative to promote public homeownership was implemented in 1970, when public homeowners were given the option of resale at a profit under certain conditions. Thus, purchasing a public housing unit is no longer merely for shelter, but also for investment purposes. Besides providing potential homebuyers with an additional incentive to purchase public housing, this resale policy also improves the market's efficiency by allowing greater residential mobility and movement.

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1 The Central Provident Fund (CPF) is the social security system in Singapore. The fund comprises pension, medical care, and education schemes, among others. It is mandatory for both the employer and employee to contribute monthly a certain fraction of the employee's monthly salary to the fund. The CPF interest rate is determined by the government based on the major local banks' saving rates. Since the CPF has no active fund manager, its members have been encouraged to invest their CPF savings in property, approved shares, unit trusts, or gold. CPF members have been allowed to use their CPF assets to purchase public and private housing since 1968 and 1981, respectively.

Chua (2000) stated that through the CPF system, a close housing financial circuit is set up in the public housing sector whereby individual workers compulsorily deposit a portion of their monthly salaries in their respective CPF accounts with a matching portion from their employers. The CPF uses the pooled funds to buy government bonds, a part of which is used as grants and loans to the HDB to construct public housing and to provide subsidized mortgage loans. Public housing units are sold to individual workers who can also obtain home loans at a subsidized mortgage rate from the HDB, subject to an income ceiling constraint. The monthly mortgage repayments are deducted from these individual workers' CPF savings accounts directly. A household can therefore own a public housing apartment without affecting its disposable income. The CPF policy, as well as the establishment of the public housing resale market, has laid a foundation for the jump in property values during the 1990s.

The Third Stage (1980 – 1989)

During the 1980s, the major public housing policies were aimed at limiting the growth of the public rental sector, while at the same time offering public housing buyers more choices in terms of dwelling sizes and locations and encouraging public homeowners to sell and upgrade to newer or larger units. As a result of these policies, the public housing resale market expanded very rapidly. Through the public housing policies, the filtering-down effect of the housing market mechanism has enabled lower-income households to purchase smaller and older units, hence making public homeownership even more popular and accessible. With these policy reforms, the public housing system has become more efficient and equitable, allowing greater residential mobility as well as enlarging the market of target households. By the end of the 1980s, the public homeownership rate had increased to 79% of the total population (HDB, 1989/90). This success in public homeownership could be attributed to the huge increases in saving rates and CPF contribution rates. The CPF contribution rates from both employers and employees increased rapidly from a total of 38.5% of an employee's salary in 1980 to a peak of 50% in 1984 and 1985 (Department of Statistics, 1980-1990). The sharp rise in CPF contribution rates significantly enhanced homebuyers' purchasing power. Therefore, when the public housing resale market was deregulated in the 1990s, the prices of resale of public housing units escalated.

Policy Developments in the 1990s

Throughout the 1990s, demand for resale public housing increased, partly due to stringent eligibility and access criteria, limited choice of new public housing, long waiting times for certain locations, and the deregulation policies issued during the decade. Nine major resale public housing policies are believed to have made a significant impact on the prices of resale public

housing (Table 3). One such policy is the "HDB Single Citizens Scheme," implemented in 1991, which allows single-person households to purchase only smaller sized (3-room apartments) resale public housing units in suburban areas. This scheme not only satisfied the housing needs of single-person households, but also helped maintain the demand and prices for such resale public housing units, which had been falling due to the population's desire for larger and newer dwellings. This policy likely had a positive impact on the resale public housing market.

Table 3: Major Public Housing Policies between 1990 and 2003

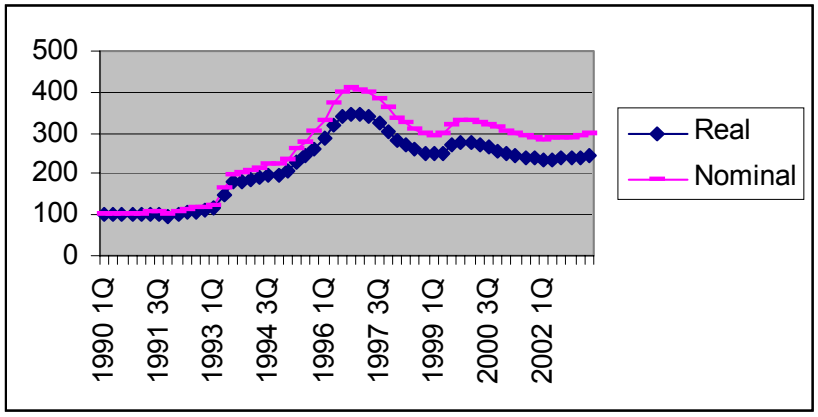
Housing policy	Implementation date	Effect of impact
"HDB Single Citizens" scheme	October 1991	Positive
"HDB Liberalisation of Finance Terms" scheme	April 1993	Positive
"CPF Liberalization" scheme	October 1993	Negative
"CPF Housing Grant" scheme	October 1994	Positive
"De-regulation of CPF Housing Grant" policy	September 1995	Positive
"Stamp Duty" policy	May 1996	Negative
"Regulation of HDB Mortgage Finance" policy	April 1997	Negative
"Further De-regulation of CPF Housing Grant" policy	June 1998	Positive
"Reduction of CPF Housing Grant" policy	January 1999	Negative
"Reduce the usage of CPF savings on serving housing loan"	September, 2002	Negative

Source: Authors' selection.

To further promote the resale public housing market, the "Mortgage Loan Financing Scheme" was revised in April 1993. This scheme allows resale public housing purchasers to obtain mortgage loans of up to 80% of the purchase price or the market value of a housing unit, whichever is lower. Before this policy revision, the amounts of mortgages available for resale public housing were pegged at the HDB's "posted prices," which were fixed at historical values and priced very much below transacted prices. This change in mortgage loan financing has therefore provided a great boost to the public housing resale market, as purchasers are now able to obtain much larger mortgage amounts. In order not to exclude lower-income households, a supplementary scheme known as the "Low Income Family Incentive Scheme" has also been implemented to allow lower-income households to borrow up to 95% of the purchase price or the market value, whichever is lower. These two policies, which are also termed the "HDB Liberalisation

of Finance Terms," have had significant positive impacts on the resale public housing market. Since 1993, the number of households purchasing resale public housing has increased so much that as a result of the higher demand, prices of resale public housing have also been on an upward trend (HDB, 1993/94 to 1999/2000). Figure 1 shows the resale public housing price dynamics process.

Figure 1: Real and Nominal HDB Resale Housing Prices between 1990 and 2003



During the 1990s, the use of the CPF for the purchase of public housing units was further liberalised through an initiative known as the "CPF Liberalization" policy. With effect from October 1993, households purchasing public housing units are no longer required to withdraw the entire sum of their CPF balances as of the time of purchase. This means that a household is allowed to pay only the deposit, which amounts to 20% of the purchase price, and still retain the remaining balance of its CPF for servicing the monthly mortgage payments or for investing in the financial market. Meanwhile, the Singapore financial market has been developing very rapidly, attracting investments from CPF members through a wide variety of financial products. With more and more CPF members diverting their CPF savings from the housing market to the financial market as a result of the "CPF Liberalization" policy, it is likely that there would be negative implications for the resale public housing market.

Due to the large subsidies prevailing in the pricing of new public housing sold by the HDB, the average waiting time for these units was about seven years in the mid-1990s, much longer than the usual two to three years' wait. As such, the "CPF Housing Grant" policy was implemented in October 1994 to encourage young households to purchase resale public housing units,

especially those near their parents. The "CPF Housing Grant" is a form of government grant that is given to first time purchasers of resale public housing. This policy was deregulated in 1995 to include all first time households and to raise the amount of the grant. In 1998, it was further deregulated to include single-person households. As a result of this demand-side "subsidy," greater demand and higher prices have continued to prevail in the resale public housing market until the recession that was triggered by the 1997-1998 Asian Financial Crisis.

Meanwhile, Singapore's economy had experienced very fast growth during the first half of the 1990s. From the first quarter of 1990 to the fourth quarter of 1996, real GDP per capita increased 46%, while the unemployment rate was kept below 2%. Real income per employee almost tripled. Although population growth remained steady, the strong economic growth, together with a series of deregulation policies, resulted in a boost to resale public housing prices. As shown in Figure 1, real resale public housing prices increased by more than 250% during the first half of the 1990s.

As a result of the public housing policies aimed at promoting the resale public housing market in the 1990s, public housing has become a highly speculative commodity basically because of its heavily subsidized prices for new public housing units, highly subsidized mortgage loan interest rates, strong demand, and good potential for huge profits upon resale. Thus, in 1996, the Singapore Government decided to implement some anti-speculation measures into both the public and private housing markets. A "Stamp Duty" was made payable on transactions of both public and private housing units. Since the objective of the "Stamp Duty" was to curb the overheated housing market at the time, it created a negative impact on the demand and prices of both public and private housing units.

In 1997, the eligibility criteria for subsidized mortgage loan interest rates became more stringent. These tightened measures (referred to as the 'Regulation of HDB Mortgage Finance Policy', as stated in Table 3), aimed to curb the overheated resale public housing market, have actually worsened the impact of the 1997-1998 Asian Financial Crisis. The policy is therefore expected to have a negative impact on the resale public housing market.

During the Asian Financial Crisis, Singapore's economic growth rate slowed sharply from 8.5% in 1997 to 0.1% in 1998 (Department of Statistics, 2001). One of the Singapore Government's cost-cutting measures to manage the crisis has been to decrease employers' CPF contribution rate from 20% to 10%. As CPF contributions constitute the major financial resource for households to pay their housing mortgage instalments, the reduction in

employers' CPF contributions has provided yet another setback for the housing market. In light of a global recession and increasing unemployment, the subsequent measures implemented by the government to help public homeowners with their mortgage payments have had little effect in encouraging homeownership or residential movement. In June 1998, a further deregulation of the CPF housing grant policy (see Table 3) was issued to stimulate the depressed resale public housing market. However, this policy change was soon tightened through a significant reduction of CPF housing grants issued in January 1999.

As a result, the combination of anti-speculation measures, cost-cutting initiatives, and the reduction of CPF housing grant issued in January 1999, together with the effect of the Asian Financial Crisis, have made a negative impact on the resale public housing market in that the demand has remained low and the HDB resale price index as of December 2001 was 28.9% lower than its peak in the fourth quarter of 1996 (HDB website, 2003).

Policies in the 2000s

By 2000, the resale public housing market in Singapore had become less regulated, with a volume of annual transactions reaching 5% of the existing public housing stock. Major public housing policies focus on the development of better quality public housing such as the development of the executive condominium market, which was first launched by the HDB in 1996 to reduce the mismatch between the homogeneous public housing stock and the housing desires of middle class households. The criticism was whether it is justifiable and equitable to use taxation income to benefit a small segment of the population who cannot be considered poor, but who have aspirations of luxury housing (Chua, 2000).

Meanwhile, the HDB, the largest public housing provider, has housed 85% of the total population and has successfully resolved the housing shortage problem. It now faces new problems and challenges. One of the major issues is that the extensive use of CPF savings on housing purchases has resulted in many homeowners being asset-rich but cash-poor by their age of retirement. To resolve this problem, in September 2002, the Singapore Government reduced the usage of the CPF for servicing housing mortgages. One of the key policy changes is that the CPF amount for servicing housing mortgages will be limited to 150% of a property's price, which will eventually be lowered to 120% over five years. Second, the use of CPF savings to pay for the initial deposit is now limited to 10% of a property's price. Third, the salary ceiling for CPF contributions will be reduced from a monthly salary of $6,000 to $5,000. The first two measures took effect on 1 September 2002, while the third measure will take effect when the CPF contribution rate reverts to 40%" (Lee, et. al., 2002). By fixing the

maximum amount that can be drawn from the CPF to 150% and later to 120%, the government has implied that homebuyers will have to pay out more cash for the remaining months when their CPF drawings reach their limit. The new policy's impact on the resale public housing market is expected to be negative. It is argued that these CPF changes would make the already depressed housing market worse, particularly after the tragic 9/11 event in 2001. In the next section, we will use an empirical model to test the significance of these public policies on the resale public housing market.

Public Resale Housing Price Determinants

Variable Selection and Data Collection

The demand, and hence, prices of resale public housing units are generally affected by a bundle of determinants, both policy and non-policy factors. See Equation (1).

$$P_{hdb} = f(Non - Policy\ Factors,\ Policy\ Factors) \quad (1)$$

where P_{hdb} is the real resale public housing price index issued by the HDB. It is argued that the HDB resale price index is generated using average transaction prices and the fixed base weighted Laspeyres formula, which is not of constant quality. However, this is the only official resale public housing price index available in Singapore.

Non-policy factors could be associated with those macroeconomic factors that affect potential homebuyers' ability to afford resale public housing. These macroeconomic variables could be drawn from various international literature of housing price models, and adjusted to fit the Singapore context. Meen and Andrew (1998) undertook a thorough literature review to summarise the methodologies employed in modelling housing prices in both the British and North American housing markets, and addressed the salient findings from these housing price models, as well as the main determinants of macro housing price dynamics. According to Meen and Andrew, household real income is the most important explanatory variable in determining housing price dynamics. However, as data on household income in Singapore was not available, real income per employee has been adopted for our model. Real GDP per capita and unemployment rates have also been selected to reflect macroeconomic performance (see also the discussion in Munro and Tu, [1996]; Tu, [2000]). A dummy variable indicating the 9/11 event in 2001 is also included in the model. This variable indicates the negative global political economic shock resulting from 9/11. The sign is expected to be negative and the effect may have a time lag.

User cost of housing capital, originally developed by Dougherty and Van-Order (1982), has been found to be a significant variable in explaining housing price dynamics (Meen, 1990; Poterba, 1984; Ebrill and Possen, 1982; DiPasquale and Wheaton, 1994 and 1996; Hendershott and Hu, 1981 and 1983). User cost is measured by the difference between the mortgage rate and the housing price appreciation rate over time. As mentioned before (see Table 1), in the resale public housing market, mortgage rates are subsidised and do not vary as market conditions change. In other words, in this particular market, the change of the user costs is mainly determined by the change of resale public housing price appreciation rates. Therefore, the first difference of resale public housing prices is used in the empirical model instead of user costs.

Policy factors refer to the specific policies and schemes that are specially targeted at the public housing market. For instance, Ng (1999) suggested that in the public housing mortgage loan financing scheme, interest rates as well as the "CPF Housing Grant" scheme are important resale market-based public housing policies. Among the other significant market-based initiatives, Tan (1997) indicated that resale public housing purchasers tend to be motivated by the relaxation of eligibility rules such as the "HDB Single Citizens" scheme. For the purposes of this paper (see the discussion in Section 2.2 and Table 3), ten public policies have been selected and evaluated using dummy variables to test the significance of their impact on the resale public housing market. Since it is reasonable to assume that the announcement and implementation of the policies may have time-lag effects on the property market, empirically, the policy dummy variables are incorporated into the model with the time lags considered up to four quarters.

A wide range of statistics published by the Singapore Government authorities such as the Urban Redevelopment Authority (URA), the HDB, the CPF Board, and the Department of Statistics have been employed to construct the time series model for the above selected macroeconomic variables. Due to data availability, the time period under study is between the first quarter of 1990 and the second quarter of 2003. Using 1990 as the base year, the variables are in real terms and are deflated by the consumer price index.

Empirical Evidence

The empirical modelling process takes the following three steps. First, integration tests are applied to the time series variables and have found that they are integrated of order one. Second, co-integration tests are applied to the selected variables to see if there are any co-integration vectors between

the real resale public housing prices and the rest of the major economic variables, with policy dummy variables and the 9/11 event dummy variables as exogenous variables. The findings revealed that there is no co-integration vector. This result implies that the resale public housing price dynamics are likely to be determined by the public policies, and the resale public housing market is self-determined (as found in Tu, 2002; Tu, et al., 2002). Third, since our data failed the co-integration tests, a parsimonious robust regression model at first difference for real resale public housing price time series is then constructed, the results of which are illustrated in Table 4.

Table 4: The Empirical Model

Dependent variable ($\Delta RP_{hdb,\,t}$, Real public resale housing prices)		
Variables	Coefficient	Std. error
Constant	0.7643	0.8858
$\Delta RP_{hdb,\,t-1}$ (Real Resale public housing prices)	0.8719**	0.0799
"HDB Liberalisation of Finance Terms" policy, 1993", no time lag	29.5568**	5.8340
"CPF Liberalization" policy, 1993", no time lag	-22.3411**	6.2469
"CPF Housing Grant Scheme, 1994", two-quarter time lags	14.2305**	5.8557
"Stamp Duty" policy, 1996," one-quarter time lag	-13.2487*	6.4408
"Regulation HDB Mortgage Finance" policy, 1997," one-quarter time-lag	-13.2409*	5.8435
"Reduction of CPF Housing Grant" policy, 1999," three-quarter time lags	-12.0219*	5.0144
Statistical Diagnoses	R^2 = 0.8094 Adjusted R2 =0.7784 σ = 5.7604 Log likelihood=-157.3167 Durbin-watson=1.8243 AIC = 6.4830 SIC = 6.7860 F-statistics = 26.088** Normality = 7.8319* Serial Correlation LM =0.2449 ARCH = 0.3702 White Heteroskedasticity =0.7708 Number of observations=51	

Notes: ** 1% level of significance. *5% level of significance.

The empirical results show that out of all the selected macroeconomic variables, only real income is weakly significant at the 10% significance level. After omitting the real income variable, there is no significant change in R2. Therefore, the final model excludes all the macroeconomic variables. The first lag of the real resale public housing prices appears to be robust and significant at 1%. In addition, six out of ten selected policy variables are significant with their expected effect of impact. Altogether, these variables explain nearly 80% of the price variations for resale public housing. This further supports the previous findings that the resale public housing market is a self-determined market. Prices of resale public housing are observed to be mainly driven by the resale public housing market-based policies (Tu, 2002). It was also found that while some policies have an immediate effect on the market, other policies take effect only after a time lag of three quarters.

Among all the significant policy variables, the impact of the "HDB Liberalization of Finance Terms" policy that was implemented in 1993 on public resale housing prices appears to be the strongest, with an immediate effect on the market. Therefore, this policy could be deemed to have played the most important role in the development of the resale public housing market, as well as in enhanced its prices during the 1990s.

The findings highlight that the "CPF Liberalization" policy issued in 1993 has the second largest impact on the prices of resale public housing units with the expected negative, but immediate, effect. Thus, to a certain extent, it is likely that this initiative could have offset the positive impact created by the "HDB Liberalization of Finance Terms" policy.

When the "CPF Housing Grant" policy was first introduced in 1994, it significantly increased the prices of resale public housing units. However, the empirical model shows that the policy took effect on the market only after two quarters. In the following two policy deregulation exercises that happened in 1995 and 1998, none of them had a significant effect on the market. In contrast, the reduction of the CPF housing grant in 1999 had a significant impact on the market, although it did so only after a three-quarter time lag.

From the analysis, it is observed that the "Regulation of HDB Housing Finance" policy, which was issued in 1997, has significantly decreased the prices of public resale housing units. Together with the negative influence of the "Stamp Duty" policy, their combined effect has also worsened the impact of the 1997-1998 Asian Financial Crisis. Since the commencement of the crisis in July 1997, which was very close to when these policies were

implemented, our empirical model has been unable to isolate the outcomes of these policies on an individual basis, and also from that of the crisis.

Conclusions and Policy Implications

The public housing policies implemented during the 1990s could be categorised into three main types: taxation policies, for instance, the "Stamp Duty," public housing financing policies such as the regulation and deregulation of HDB mortgage loans, and finally, public housing subsidies like the "CPF Housing Grant". Despite this wide spectrum of public housing policies, only certain initiatives have been found to be significant in influencing the prices of resale public housing. The degree of impact also appears to vary from policy to policy, and is sensitive to the particular segment of the population targeted by the policy. For example, the policies aimed at encouraging single-person households to purchase resale public housing units have shown to be insignificant in affecting the prices of resale public housing.

There are also policies, which have generated some unexpected consequences, that are opposed to their initial objectives. One such example is the "CPF Liberalization" policy, which allows CPF members to retain the remainder of their CPF savings to service future mortgage instalments after first paying off the 20% down payment for the purchase of a resale public housing unit. It is thought that with some CPF savings remaining in their CPF accounts, public homebuyers would probably encounter a lower risk of mortgage arrears, although they have accumulated a higher mortgage debt than before. This policy was therefore expected to have a positive impact on the resale public housing market, but eventually, a negative effect occurred due to the following reasons.

First, the public housing mortgage loan is heavily subsidized such that the majority of public homeowners could usually afford to pay their loan instalments just by using their monthly CPF contributions alone. This method of mortgage repayment was especially prevalent during the first half of the 1990s, when Singapore's economy developed very rapidly with almost nil unemployment, thereby reducing the risk of mortgage arrears. This encouraging situation motivated many public homeowners who are CPF members to invest their remaining CPF savings in the financial market, since the CPF Board is not an active fund manager and its interest rates on CPF savings accounts are very low. Meanwhile, there was a wide range of financial products in which CPF members could invest. However, in the second half of the 1990s, particularly during the 1997-1998 Asian Financial Crisis, many public homeowners suffered losses in the financial market as

well as income reductions in the job market. As a result, more public homeowners were in mortgage arrears, and the demand for resale public housing has been adversely affected, resulting in a negative impact on its prices.

The findings in this paper have significant policy implications for government authorities and decision makers. By the end of the 1990s, the resale public housing market had become more established. According to the empirical model, if there are no major public housing policy changes in the future, the resale public housing market is likely to remain stable. As this paper has also highlighted that the performance of the public resale housing market is strongly linked to the performance of the private housing market, it could be expected that the stable and gradual development of the former would help to reduce any major price volatility in the latter.

Acknowledgements

We are grateful to the journal editors and the anonymous referees who have offered constructive comments and suggestions that have substantially improved this paper. Any errors are the responsibility of the authors.

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