

Dynamic Impact of Land Supply on Population Mobility with Evidence from Hong Kong

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Abstract: The government uses its land-use planning system to impose constraints on land supply and development to address the problems arising from “market failure”. This system includes not only Town Planning and Buildings legislation and also government land lease conditions too, especially on flat size and development density. Previous literature refers mostly to planning constraints and market failure; and has presented aggregate data on land and housing. (For example, see Holmans, 1990; Fleming and Nellis, 1983; Buckley and Ermisch, 1984; Neuburger and Nichol, 1976.) Internationally, most recent studies include Hannah (1993 for Korea), Bramley (1993 for Britain), Barlow (1993 for Europe), Evan (1996 for Britain). No one has yet explicitly concentrated on the linkages between the land and housing markets and population mobility, including the effects of land use planning (although Bramley’s recent research may be the first exception to date). In Hong Kong, there exist no studies specifically in this area. The aim of this paper is to analyse the dynamic impact of land supply on population mobility in Hong Kong. The first part provides background information on the current situations in Hong Kong. The second part uses statistical analysis to examine the key relationships between land supply, land prices, housing supply and population mobility. Findings are then tabulated and analysed. This is followed by recommendations on more detailed and comprehensive research on this important issue.

Introduction

Hong Kong has always been well known for its high population density. Comparing to international standards, it is by far one of the highest, well over other Asian cities such as Seoul, Taipei, Singapore and Tokyo. With the limited resources available, Hong Kong has long faced the problem of finding suitable sites for housing. However, researches have also shown that Hong Kong has not been using its land in the most effective and efficient way. Currently, only less than 20% of the land in Hong Kong has been urbanised.

In Hong Kong, the previous colonial government and the present SAR government have been the sole supplier of new developable land. As a result, the decisions on the quantity of land to be allocated for housing development and the number of housing units to be built each year are determined by Government policy involving various departments. The Government has also established a maximum level for the amount of government land disposal each year.

Another important factor that is widely believed to affect people’s decision to move is housing price. However, other socio-economic factors can also be influential during individual’s decision making process, according to studies carried out in the United States and the United Kingdom.

In general, land supply directly determines the quantity of housing supply by imposing restrictions on locations for housing development. Since every individual has the right to pursue their ideal living environment, new housing development provides options for people to choose and therefore, influences their intentions to move. However, some key questions remain to be asked. How closely are these variables affecting each other, and in particular, what are the current situations regarding land supply and population mobility in Hong Kong?

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1. Literature Review

This general review of the literature explains the relationships between land-use planning systems, land supply, land price and population mobility. The review begins with the effects of land-use planning system on land supply, followed by the effects of land supply on land prices. Then it examines the relationships between land price and new housing provision, population density and mobility, and concludes with a description of the effects of new house provision on house prices.

Effects of Land-use Planning System on Land Supply

Popetan (1996) provides a general summary of the effects of land-use planning system on land supply. He points out that the function of a land-use planning system is to allocate a restricted amount of housing land for development, to control the location of development, and to justify the types of developments in different areas. In order to control the location of developments, the land-use planning system establishes a set of zoning regulations to identify a list of possible developments in a particular area (Downs, 1993). More importantly, the decisions on the levels of development, locations and types are made after considering issues such as public accessibility, the condition of the neighborhood and the environmental impacts that the development is likely to produce.

Effects of Land Supply on Land Prices

From an economic perspective, increasing the quantity of land supply for development reduces the price of land, as a result of a decrease in demand. If the landowners and developers accurately foresee future demands, and the land-market is perfectly competitive, then the prices of land should be determined by market forces (Copazza and Helsley, 1987). Popetan (1996) also believes that if the land-use planning system fails to supply sufficient quantity of land for development, and forces an increase in the price of land, developers will then reduce their investment in housing capital and thus the supply of housing services. In contrast, if the supply of land exceeds the developers' demands, and the price of land falls below the equilibrium, developers will be more willing to increase their investment in housing capital and housing services. Downs (1993) further suggests that government zoning regulations and building codes are the two most important causes of high land prices and housing costs.

Effects of Land Prices on New Housing Provision and Population Mobility

Copazza and Helsley (1987) state that an increase in land price reduces the provision of new housing as developers become more hesitant to invest. Developers generally increase the density of the land in new housing projects to maximize profit, in order to compensate for the cost paid for the land. As a consequence, housing price and density only decrease in areas distant from employment centres and other facilities, where the prices of houses have declined to offset the rising costs of commuting (Copazza and Helsley, 1987).

Relocation is, therefore, generally seen as “an investment decision”, and most people only consider moving to another location if there is an expectation of better private returns (Quigley and Weinberg, 1976). Rossi (1955) and Speare (1974) also believe that people move when they are no longer satisfied with their present living conditions. The function of mobility is a process by which households adjust their

housing needs based on life cycles and family compositions (Hawley, 1971). According to Murie (1997), Brown (1975) and Fredland (1974), the amount of private returns can be affected by trade-offs between various costs and also other factors such as demographic changes.

Stockdale and Lloyd (1998) in the United Kingdom examined how the mobility of residence could be influenced by the level of perceived satisfaction with living environment. Their results show that the primary reason for moving was house-related, including quality of the settlement, house availability and accessibility, and location. In addition, the study also suggests that the demographic and socio-economic composition of the residence influences the demand for land and the types of local services and facilities required.

Strassmann (2001) also conducted a similar study in America, comparing findings with European countries. These suggest that Americans tend to move twice as often as the Dutch, French and other Europeans because there is less control in the US as to how dwellings should be designed, financed, built, sold or rented. A study by Long (1991) also supports these findings. Further to Strassmann's explanations, Brown and Sanders (1981) suggest that mobility in advanced societies tends to be higher because people are always searching for better amenities in their living environment and improved quality of life. However, Lansing and Mueller (1967) observe that most movements involved only relocation within the same metropolitan or rural area.

As government intervention has a significant effect on population mobility, Strassmann (2000) introduced an Index of the Strength of Intervention I, to examine the impact of government intervention on rent or housing price control, on population mobility. By working out the indexes for data collected from 16 countries, Strassmann confirms a negative Spearman rank correlation of 0.962 between government intervention and population mobility. He concludes that this correlation coefficient was significant enough to suggest that greater government intervention would reduce population mobility. Ault (1994) also provides evidence on how government intervention can reduce population mobility. However, the study carried out by Li (1995) in China provides a contrasting result. His findings suggest that the government can also intervene to move people from their origin to other areas.

In addition, Pindyck and Rubinfeld (1997) suggest that the Stochastic time-series could be used to explore the mobility behavior of the population. They maintain that the advantages of this method are that it represents the real situation by a simplified model, and the mobility of subgroups within the whole population can be identified and compared, based on their unique goals, evaluation criteria and opportunities. Furthermore, trends can be integrated into the time-series, and importantly, can enable policy makers to work out a confidence interval for their forecast to estimate the margin of error.

Effects of New House Provision on House Prices

Popetan (1996) suggests that house prices decrease as the provision of new housing increases. However, Graves (1983) points out that if new provision does not satisfy demand, the price of house still increases. Berger and Bloomquist (1992) further indicate that house prices are determined by other factors besides the quantity of new

house provision, including population growth, demand for new housing, and the desire for a better living environment, etc.

Relationship between Land Supply and Population Mobility

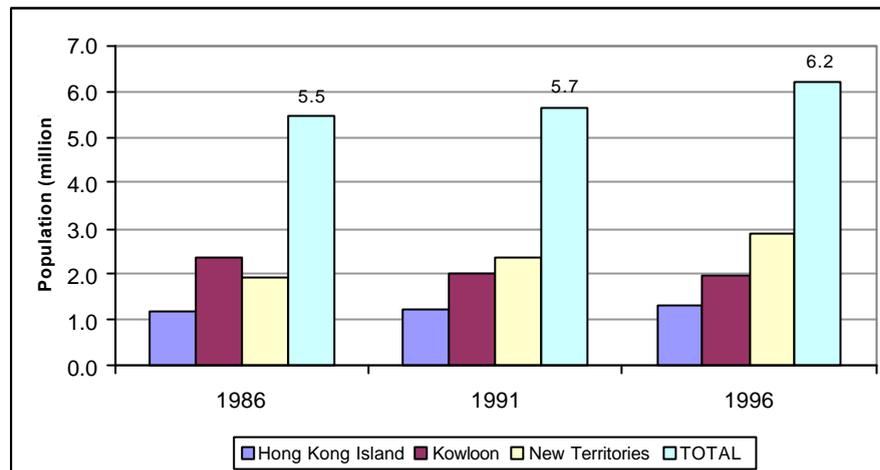
Studies by Stockdale and Lloyd (1998) and Strassmann (2001) suggest that the overall relationship between land supply and population mobility can be described as indirect, with many socio-economic factors affecting them. In fact, considering the studies by Popetan (1996), Copazza and Helsley (1987), Speare (1974) and Graves (1983) would indicate that there is a chain relationship between land supply, land price, housing provision and population mobility. These variables are closely interrelated, therefore affecting each other constantly.

The findings of this review of literature relating to the effects of a land-use planning systems on land supply, land prices and population mobility are mixed. Summary tables of the major findings and techniques used in the literature have been attached as an appendix for clearer reference (Appendix 1). However, none of the literature reviewed focuses specifically on the topic of this paper, which is the relationship between land supply and population mobility. Most of the studies do not involve research and analysis on the direct relationship between land supply and population mobility. The details of the types and origins of the data used had not been specified. In addition, the methodologies used in these literatures do not appear applicable to smaller areas, such as a district or suburb. As these studies are generally focused at the macro level, looking at the circumstances among countries and cities, the findings they produce may not be closely relevant to the situation in Hong Kong. Therefore, a new framework is needed in this paper to study the relationship between land supply and population mobility at the micro level. The new framework of analysis is particular important because areas of small scale, such as Hong Kong, may have very different circumstances compare to larger cities and countries.

2. Current Situations in Hong Kong

Hong Kong is one of the smallest cities in the world. Therefore, tackling the problems created by the global issue of population growth, has always been an issue for Hong Kong (Figure 1). In 1996, the population of Hong Kong was 6 217 556. By 1999, the population had reached nearly 7 million people, and estimated to increase to over 8 million by the year 2011.

Figure 1: Population by District in 1986, 1991 & 1996



(Source: Hong Kong Population Census)

Notes: The population of the Marine is excluded as it comprises a very small proportion of the total population.

Due to the limited amount of land allocated for urban development, the population density of Hong Kong is also well above international standards. In 1998, the population density in Hong Kong was 6,095.9 persons per square kilometer, and the number of people per square kilometers of urbanised land is 37,358.66, which was exceptionally high compared to Seoul, Singapore, Taipei and Tokyo (Table 1).

Table 1: Comparison of Population Density in Major Country/ Metropolitan Areas in Asia Pacific Rim

Country/ Metropolitan Areas	Population Density (No. of Persons/ Total Land Area in sq.km)	Population Density (No. of Persons/ Urbanised Land Area in sq.km)
Hong Kong	6,095.9	37,358.66
Seoul	17,046.24	31,866.30
Singapore	6,063.69	12,389.74
Taipei	9,717.85	24,611.55
Tokyo	5,627.97	8,962.12

(Source: from various gov't websites)

Table 2 provides the reason for the uneven distribution of population in Hong Kong. In 1999, the total amount of land devoted to residential development contributes to only 4.1% of the total land area in Hong Kong, which was approximately 45 square kilometres in area.

Table 2: Hong Kong's Existing Land Use Allocation in Year 1999

Category of Land Uses	Area (sq. km)	%
Commercial	2	0.18%
Residential	45	4.10%
Public Rental Housing	14	1.28%
Temporary Housing	1	0.09%
Industrial	11	1.00%
Vacant Development Land	27	2.46%
Government, Institutional & Community	21	1.91%
Roads/ Railways	33	3.01%
Open Space	17	1.55%
Other Uses	13	1.18%
TOTAL DEVELOPED LAND	184	16.76%
NON-BUILT-UP LAND	914	83.24%
HONG KONG'S LAND MASS	1,098	100.0

(Source: Planning Department, 2001)

3. Findings

Government Land Disposal and Housing Supply

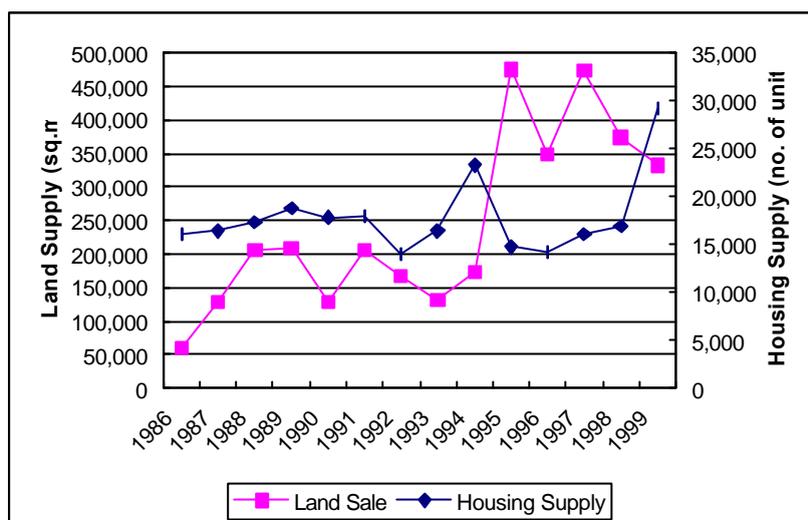
In Hong Kong, the government controls all land and their availability for property development. However, approval of re-development and rezoning of land also contribute to the availability of land for development. Between 1996 and 1999, the annual sales of Government land for private residential development through public auction and private treaty grant has an upward trend, rising from 147,385 square kilometres to 764,855 square kilometres. Between 1994 and 1995, the New Territories had a sharp increase followed by a slight decrease subsequently. This fall could be due to the financial turmoil in Asia, which began at 1997.

Figure 2: Annual Land Sales and Housing Supply for Private Residential Purpose in Urban Areas



(Source: Hong Kong Annual Digest of Statistics & Hong Kong Property Review)

Figure 3: Annual Land Sales and Housing Supply for Private Residential Purpose in New Territories



(Source: Hong Kong Annual Digest of Statistics & Hong Kong Property Review)

Figures 2 and 3 have not provided significant evidence for the existence of a relationship between land supply and private housing supply. Affected by reasons such as time lag between the acquisition of land and the completion of construction and development, the supply of private housing in the urban areas has been declining since 1986, despite increases in the amount of Government land disposal. However, consistent relationship between the upward trend in the sale of Government land for private residential development and private housing supply appears to exist in the New Territories.

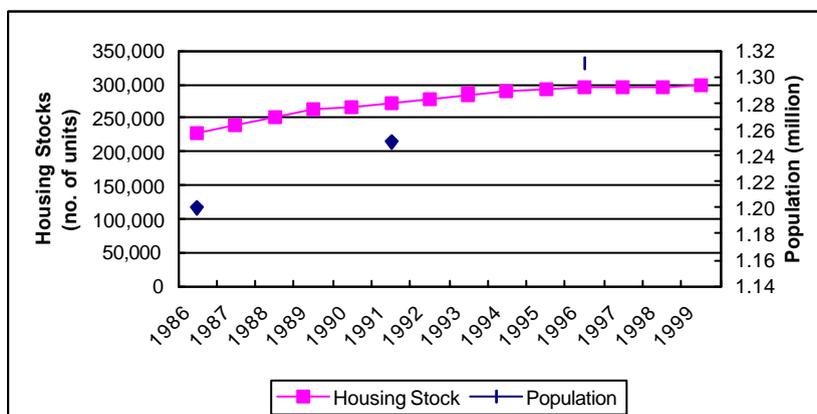
The overall housing stock in Hong Kong had grown by 59.6%, from 625,075 units to 997,636 units, between 1986 and 1999. The growth in the New Territories had been the sharpest, compared to the increase of housing stock in the Hong Kong Island and Kowloon, which were both less obvious. Figures of the New Territories increased by 178.3% from 1986 to 1999. As more people choose to settle in the New Territories, developers are also motivated to increase in the provision of housing to satisfy the population's demand (Figure 4). Although population growth for the Hong Kong Island had also been significant, the hilly landscape somehow restricted the amount of suitable land for residential development. Hence, the housing stock remained at a slow growth rate over the period (Figure 5). Moreover, the housing stock and population growth in Kowloon seemed to move in opposite directions. A strong growth in housing stock in Kowloon could be restricted by declining population living in the area (Figure 6).

Figure 4: Private Housing Stocks and Population in New Territories



(Source: Hong Kong Population Census & Hong Kong Property Review)

Figure 5: Private Housing Stocks and Population on Hong Kong Island



(Source: Hong Kong Population Census & Hong Kong Property Review)

Figure 6: Private Housing Stocks and Population in Kowloon



(Source: Hong Kong Population Census & Hong Kong Property Review)

Despite the continuous completion of new housing units, the overall growth rate of housing supply for the three areas declined from the first period between 1987 and 1991 into the second period between 1992 and 1996 (Table 3).

Table 3: Comparison of Growth Rate and Housing Supply between 1997 to 1996

	Hong Kong Island		Kowloon		New Territories	
	1987-1991	1992-1996	1987-1991	1992-1996	1987-1991	1992-1996
Growth Rate%	4.1%	4.9%	-13.6%	-2.1%	24.5%	22.4%
Housing Supply%	18.80%	10.70%	10.49%	5.69%	37.46%	24.13%

(Source: Hong Kong Population Census & Hong Kong Property Review)

The reason for this decline in the overall growth rate of housing supply could be caused by the Government and developers' decisions to reduce housing supply during the periods. Incidentally, the growth rate of housing supply somehow move downwards to match the rate of population growth. The closeness of the two rates in the New Territories between 1992 and 1996 provides evidence for this claim.

Population Mobility

The Government defines population mobility as two types of residential internal migration. A person is considered to have internally migrated if he changes his residence from one District Board to another. The second case involves a person moving from one new town to another within a District Board in the New Territories, or to other districts and vice versa. These districts and new towns are geographical sub-divisions, with boundaries established according the Census.

The percentages of population mobility for Hong Kong Island, Kowloon and the New Territories between 1987 and 1996 were summarised in Table 4. By comparing the population mobility percentages, the frequency of relocation by people in different areas in a particular period can be observed.

Table 4: Percentage of Mobility and Housing Supply, and Mobility Index

	1987-1991			1992-1996		
	Hong Kong Island	Kowloon	New Territories	Hong Kong Island	Kowloon	New Territories
Mobility	203,615	260,061	645,204	197,113	267,285	673,970
Total Population	1,250,993	2,030,683	2,374,818	1,312,637	1,987,996	2,906,733
Mobility/ Population	16.28%	12.81%	27.17%	15.02%	13.44%	23.19%
Supply	51,045	28,745	88,320	31,677	16,188	82,699
Stock	271,501	274,052	235,773	296,089	284,380	342,718
Supply/ Stock	18.80%	10.49%	37.46%	10.70%	5.69%	24.13%
Mobility Index	0.87	1.22	0.73	1.40	2.36	0.96

(Source: Hong Kong Population Census and Hong Kong Property Review)

Table 4 shows that the percentage of population mobility had the highest in the New Territories between 1987 and 1996. Population mobility rates for the New Territories reached 27.17% between 1987 and 1991, and dropped slightly to 23.19% between 1992 and 1996. In contrast, the population mobility rates for the Hong Kong Island and Kowloon had been relatively low, around the 15% mark. More people chose to

move into the New Territories as consequences of better infrastructures, in pursuit of improved living environments.

The table also suggests that the New Territories had the highest percentages of new housing supply/ housing stock. The promotion of urban expansion and new town developments in the New Territories were clearly seen as the intention of the government over the last two decades. Coupled with deregulation and rezoning were that more agricultural land for development and redevelopment had provided more opportunities for residential development. However, the percentages had decreased in general, for the three areas. Evidence of a relationship between population mobility and housing supply certainly exists in the Hong Kong Island and the New Territories, as the percentages of population mobility in these areas also decreased during the two periods. In contrast, similar evidence did not appear to be true for Kowloon.

Furthermore, the table introduces a mobility index, which analyses the relationship between population mobility and percentage of new housing unit supply from a statistical point of view. For this index, the norm is assumed to be 1 with the same rates of changes in mobility and supply/ stock. An index smaller than 1 reflects relatively faster rate of increase in supply of new housing units, whereas a value greater than 1 indicates the opposite.

Based on our calculations, the New Territories had been in situations of a high rate of supply relative to mobility between 1987 and 1996, with indexes of 0.73 for the first period and 0.96 for the second. In contrast, supply of new housing units seemed to be higher under higher pressure in both Hong Kong Island and Kowloon. The index for Kowloon between 1992 and 1996 even reached 2.36, during a period in which the percentage of internally migrated population increased. The major causes for the reduction of new housing unit supplied between 1987 and 1996 could be the restrictive approach taken by the colonial Government in terms of land and housing supply. Furthermore, the state of the economy and the political environment during that period could also be influential.

4. Conclusion

In Hong Kong, land supply directly determines the quantity of housing supply by imposing restrictions on locations for housing development. Since every individual has the right to pursue their ideal living environment, land supply also restricts the options for people to choose and, therefore, influences their intentions to move. This paper has confirmed and clarified such a chain relationship in Hong Kong. The graphical tools adopted also provided a visualisation of the interesting interrelationship between land supply, housing supply and population mobility in Hong Kong. The major findings of the paper are as follows:

- There is a positive relationship between the quantity of Government land disposal and the quantity of land available for private residential development.
- There is an unclear and indirect relationship between the quantity of Government land disposal and the growth of housing stock, which is caused by time lags between the acquisition of land and the completion of construction, and various other reasons.

- There is a relationship between the rate of new housing supply and population growth as the government and developers try to maintain a balance between the rate of new housing supply over time and the overall population growth rate. However, such relationship is weak.

This paper also has implications for a larger and detailed study on the dynamic impact of land supply on population mobility in Hong Kong. Due to time and resources constraints, the scope of this paper has been limited, with findings mostly descriptive. When carrying out future studies, government departments such as the Planning, Housing, and Statistics should be coordinated to exchange and integrate relevant information. In order to explore accurate findings, these studies could also analyse the patterns of population mobility at the district level. Finally, future studies could also take into account the mobility patterns of the population, living in social housing, or private housing under Government's subsidy schemes.

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