

Measuring Constraints on Land Supply:

The Case of Hong Kong

by Alain Bertaud

July 24, 1997

Hong Kong New Status Has Implications For Land Use Policy

The objective of this brief note is, first, to determine whether, by international standards, Hong Kong current land supply has been abnormally constrained; and, second, to find whether there is a justification and scope to increase Hong Kong land supply through new regulatory measures and infrastructure investment—or in economic jargon whether land supply could become more price elastic in the future—so that an increase in land prices would result with an increase in land supply.

Topography and land use regulations are severely restricting Hong Kong land supply. Topography – steep hills, islands and sea inlets — while limiting the supply of developable land, is also an asset by providing Hong Kong with a stunning natural environment. Large programs of land reclamation and the ability to develop high rise buildings on steep hills have somewhat lessened the most severe constraints brought by topography. Regulations –the other restrictive factor– were aimed at rationing land, a justifiable objective in an isolated city state with a fixed amount of land and no hinterland. Because the city state had to be self sufficient, vast reserves of land had to be kept for recreation, agriculture and water catchment areas within the city's artificial boundaries. These land reserves prevented the city from expanding within the radius of the normal commuting distance of a regional metropolis. We will see below that because of the constraints imposed on land supply by topography and regulations Hong Kong has the smallest current land supply per capita as compared with 10 other metropolis of Asia, Europe and America.

Since July 1997 Hong Kong has become a Chinese city and has gained a hinterland in the process. As a consequence, some of the regulations aimed at rationing land have lost their *raison d'être*. These regulations should be carefully reviewed taking into account the new historical situation. Now is the time for urban planners to look at the land use of Hong Kong the way they would look at the land use of any large metropolis i.e. looking at the best use of land within a commuting distance from the central business district.

The gradient of land prices –expanding beyond the current Hong Kong Special Administrative Region (SAR) boundary– should be the best guide to establish what is the commuting distance radius. Certainly, regulators should retain a concern for environmental and recreational needs but the need for rationing land has disappeared. The Chinese hinterland is now open and accessible to all Hong Kong citizens. Some additional infrastructure might be required to provide easy access to the new land resources within and beyond the SAR boundary. Planners should be able to conduct a relatively simple cost-benefit analysis based on future land value to identify where and when such an infrastructure would be needed.

In the sections below, I will compare current Hong Kong land supply with other metropolises. The data will show how Hong Kong has overcome its developable land scarcity –

self imposed to a certain extent – by consuming much less land per person than any other metropolis in the world. Indeed data shows that in spite of its extremely limited land supply Hong Kong has managed to maintain a labor force accessibility to the central business district comparable to other metropolis better endowed when it comes to land. But the price has been very high: very high land prices and as a consequence a very low land and housing consumption per capita compared to other cities with comparable GDP.

The continuation of the present regulatory constraints on land supply raises a number of issues: will the very skilled Hong Kong labor force accept to consume less and less land and floor space as land prices keep rising? Could the perception that the supply of developable land is a finite quantity contribute to the creation of a speculative “bubble” as seen in Japan and in Korea? To address these issues we will show that Hong Kong future economic expansion is not prisoner of its topography, and should not be prisoner either of obsolete regulations and that there is significant scope for enlarging the supply of land for Hong Kong consumers within and outside the HKSAR.

Land Supply: An Asset In the Competition Between Cities

Cities compete with each other. The quality of their citizens, education and diligence, is their principal competitive advantage. Next come the sophistication of urban infrastructure that will allow the citizens to be fully productive and at the same time would enhance the quality of urban life. The availability of developable land as a key support for both the development of economic activities and the welfare of citizens comes in a third position among a city main assets. With the new improvements in transport and telecommunication infrastructure, the comparative advantage of a favorable geographical location plays a much lesser role in successful development than it used to play in the past. This means that cities cannot rely solely on a favorable location to maintain their competitive advantage.

The competitive advantage conferred by the qualities of citizen, infrastructure and land availability is not permanent. A city which wants to stay competitive has to monitor its performance in all the categories which are key to its economic welfare. International comparators have been developed to monitor the level of workforce education and productivity and the performance of urban infrastructure. For instance, the proportion of university graduates in the work force or the number of telephone per person are routinely monitored. If, compared to other cities, the value of these comparators are found lagging, Governments may change policy and adjust investments. However, a city land supply is much more difficult to measure and to compare with other cities. No accepted international normative comparators yet exist to measure land supply, and yet it is one of the most important city asset.

Office and residential rent and land prices are the most commonly used proxy for land supply comparators. But high rents level and high land prices by themselves do not necessarily have a negative implication. They may be indicating only a high productivity, and a sophisticated infrastructure, or a booming economy combined with a temporary inelastic building supply. What is required is to develop comparators of land supply across cities. To have an operational value, these comparators should clearly differentiate the constraints on supply due to topography, regulations and lack of infrastructure. In the following section, I have tried to compare the land supply of Hong Kong with a number of metropolitan areas in the region and across the world using a number of parameters which in my opinion are best to

reflects land supply. In the choice of cities comparators I have tried to bias it toward Asian Cities but the availability of reliable data has also been a factor.

How does Hong Kong land supply compares with other cities?

There are three important components in the measure of land supply: (1) the total built-up area, (2) the shape of the built up area, and (3) the spatial distribution of population and jobs within the built up area. We will compare the value of parameters measuring these components of the land supply for Hong Kong SAR and for different cities around the world. While there are no established normative value for these parameters, by comparing Hong Kong with other cities we will be able to determine, first, how Hong Kong performs compared to other cities and second, whether Hong Kong has some flexibility in the future to respond to an eventual shift in demand and supply.

The Total Built Up Area

The average built up area per person or the average population density in the built-up area¹ is a good -- if somewhat crude-- way of comparing the supply of developed land across metropolitan cities. Table 1 shows the population density in the built-up area of 15 cities across the world and the corresponding built-up area per person.

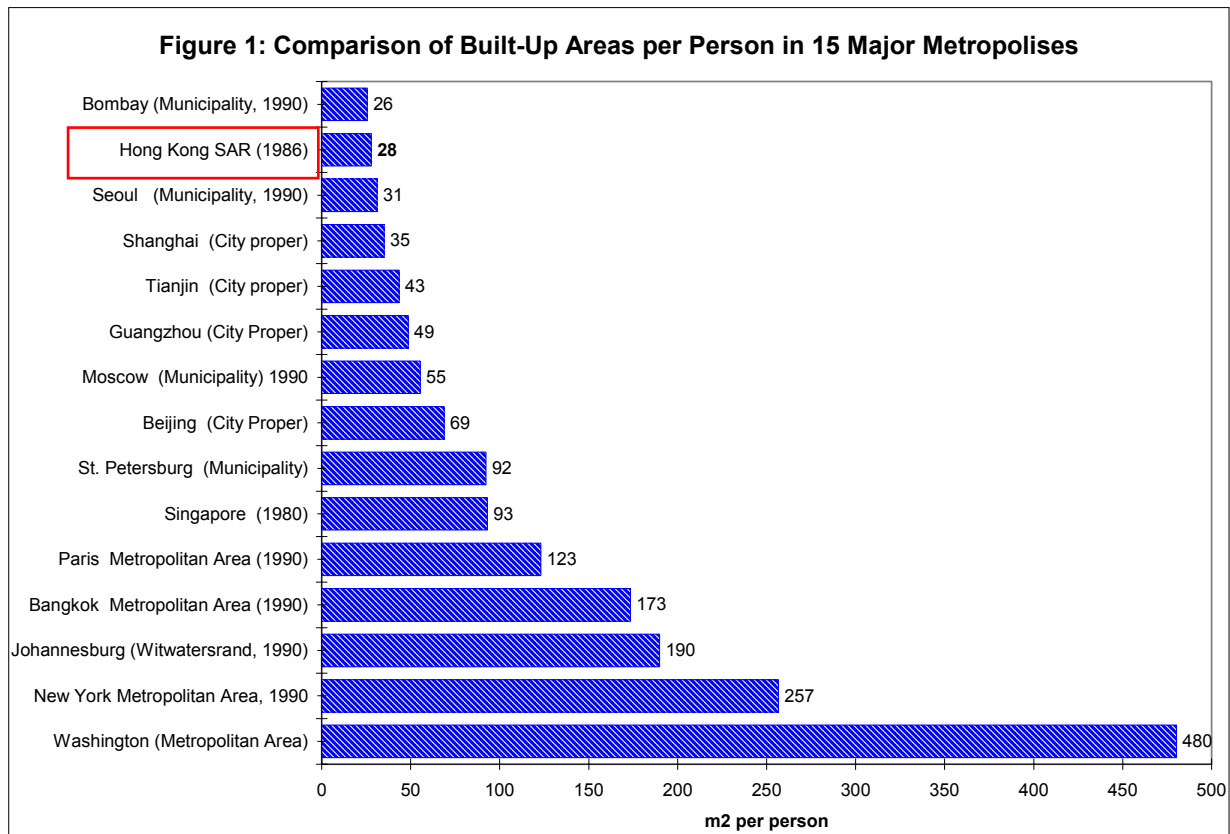
Table1. Comparison Between the Built Up Area and population of 15 cities

City	Population	Built-up area Km2	Population density People/ha	Area per person m2
Bombay (Municipality, 1990)	9,825,000	252	390	26
Hong Kong SAR (1986)	5,400,000	147	361	28
Seoul (Municipality, 1990)	10,287,000	319	322	31
Shanghai (City proper)	7,397,000	258	286	35
Tianjin (City proper)	3,500,000	152	230	43
Guangzhou (City Proper)	2,022,000	98	206	49
Moscow (Municipality) 1990	8,544,000	473	181	55
Beijing (City Proper)	5,333,000	367	145	69
St. Petersburg (Municipality)	4,366,000	403	108	92
Singapore (1980)	2,035,000	189	107	93
Paris Metropolitan Area (1990)	8,875,000	1,092	81	123
Bangkok Metropolitan Area (1990)	7,788,000	1,350	58	173
Johannesburg (Witwatersrand, 1990)	5,415,000	1,027	53	190
New York Metropolitan Area, 1990	10,424,000	2,674	39	257
Washington (Metropolitan Area)	2,836,000	1,362	21	480

sources: "Order Without Design", Alain Bertaud, 1997

¹ The built-up area is measured from satellite imagery or maps. This method allows to measure the built-up are of cities across administrative boundaries and to eliminate from the built up distorting elements such as large parks, airports, military areas, etc. Many publications on this subject are using gross density rather than built up density. Gross density is the number of people divided by the area within an administrative boundary. It is most often a useless comparators as the definition of municipal boundaries may include only the city core (as in the case of Paris) or a vast rural hinterland (as in the case of Shanghai).

Figure 1 shows the ranking of built-up area per person for 15 metropolises. The consumption of built-up land per capita in Hong Kong SAR (26 m² per capita) is close of the lowest among the 15 metropolises considered in Table 1 and Figure 1. While Asian cities tend to use less land per capita than cities in other part of the world, one should note that Singapore (98m²) and Bangkok (173 m²) have a per capita land consumption in the same order of magnitude than European and American cities. It should also be noted that Hong Kong has one of the highest GDP per capita of the cities selected as comparators.



sources: "Order Without Design", Alain Bertaud, 1997

Does the low built-up land area per person in Hong Kong SAR matters? Yes, as it shows that there is probably not much flexibility in consumption adjustment if demand for land increases and if there is no short term elasticity in the supply of land --as it is probably the case. There will be a very high resistance in lowering further the already very low land consumption. Because of the already exceptionally high densities in Hong Kong there is very little opportunity of using land more intensively, either by consuming less floor space or by adding more floors on the existing built-up land. Therefore, it is probable that in the case of a demand surge for new floor space, most of the adjustment to reach a new equilibrium would come from an increase in the price of land with very little supply response.

Shape Of The Built Up Area

The value and usefulness of the built-up area depends on its distance from the city center. The measurement and comparison of the total built-up area discussed above is therefore an imperfect tool to measure the land supply. It is also necessary to measure and compare the supply of land of different cities at different distances from the city center. Compactness – a lot of land next to the city center – would confer a significant advantage over dispersion – a lot of developed land scattered far from the city center.

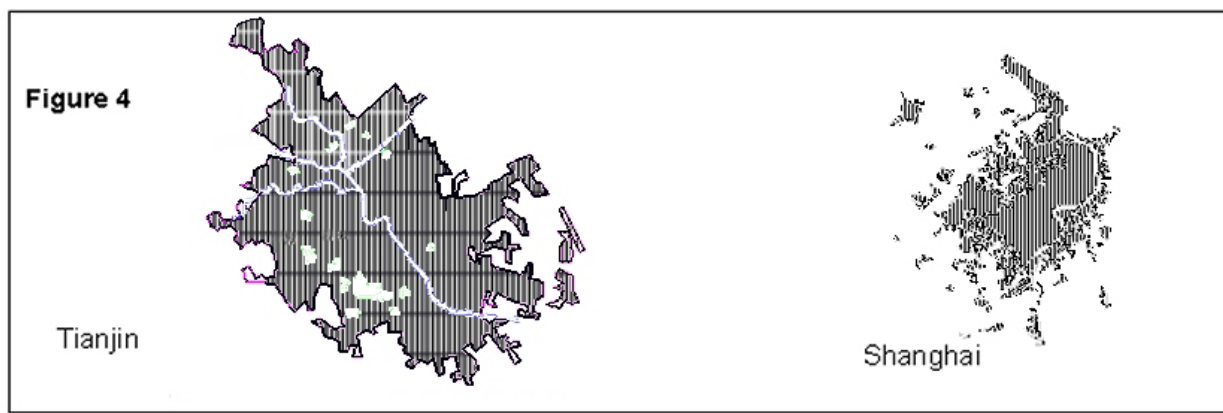
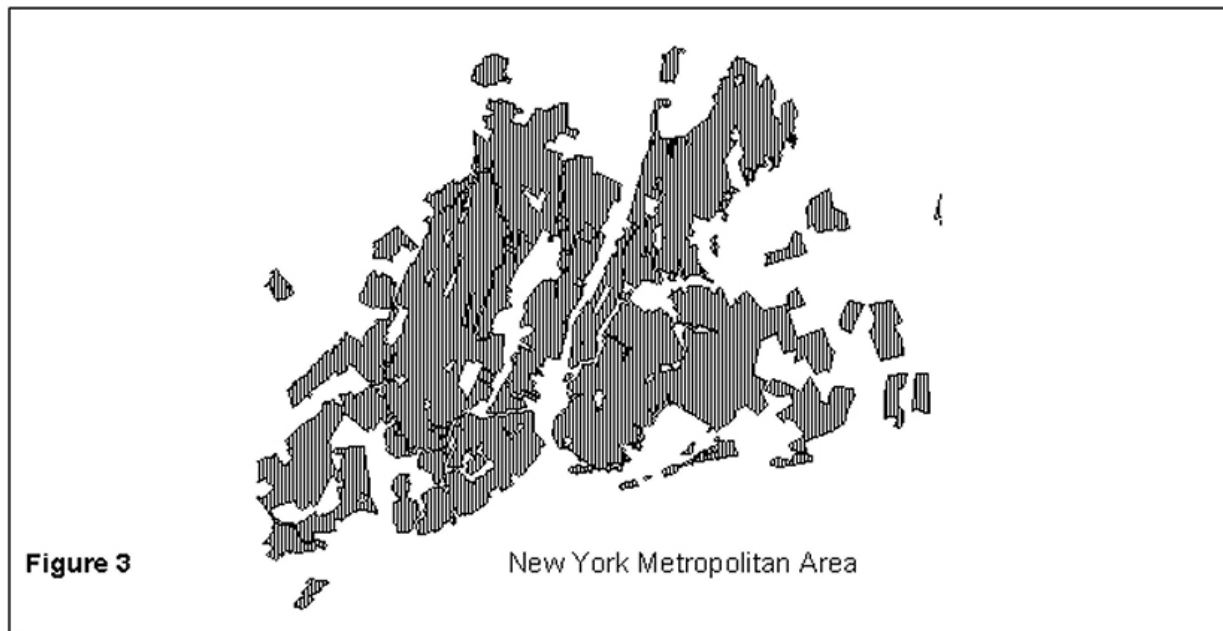
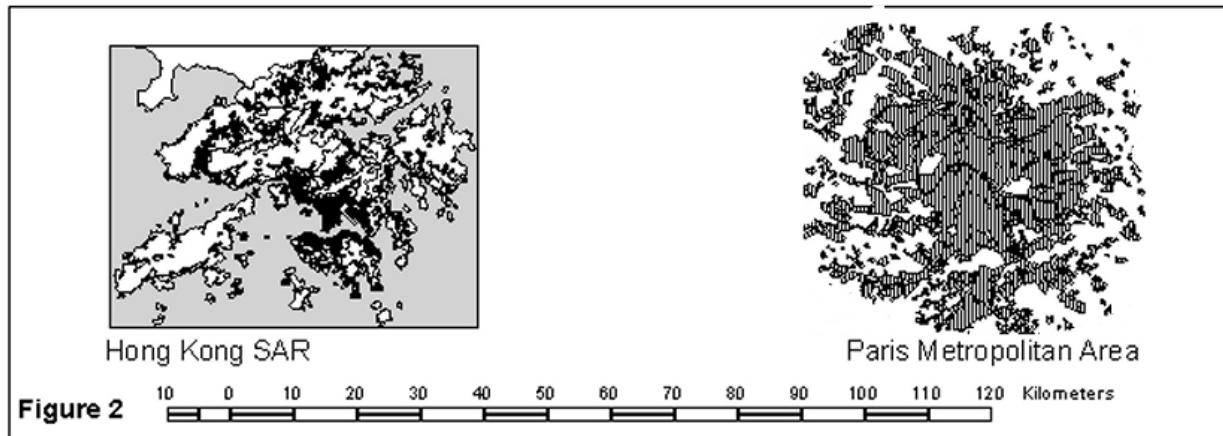
Why should the dispersion of the built-up area matter? Eventually, all the built up areas of a city have to be linked by a network of transport, utilities and communication. The more dispersed and fragmented the built-up area the more costly the city will be to operate. In addition, in fragmented built-up area, parcels of land located closer to the CBD might bear the brunt of the demand pressure, but isolated islands of built-up areas, while theoretically on the market, will not contribute much to reducing pressure on land demand because of their isolation and their reduced accessibility.

Observation and measurement of the shape of the built-up areas of different cities will allow us to determine their relative compactness or dispersion and therefore the comparative advantage that some cities have over others because of their shape.

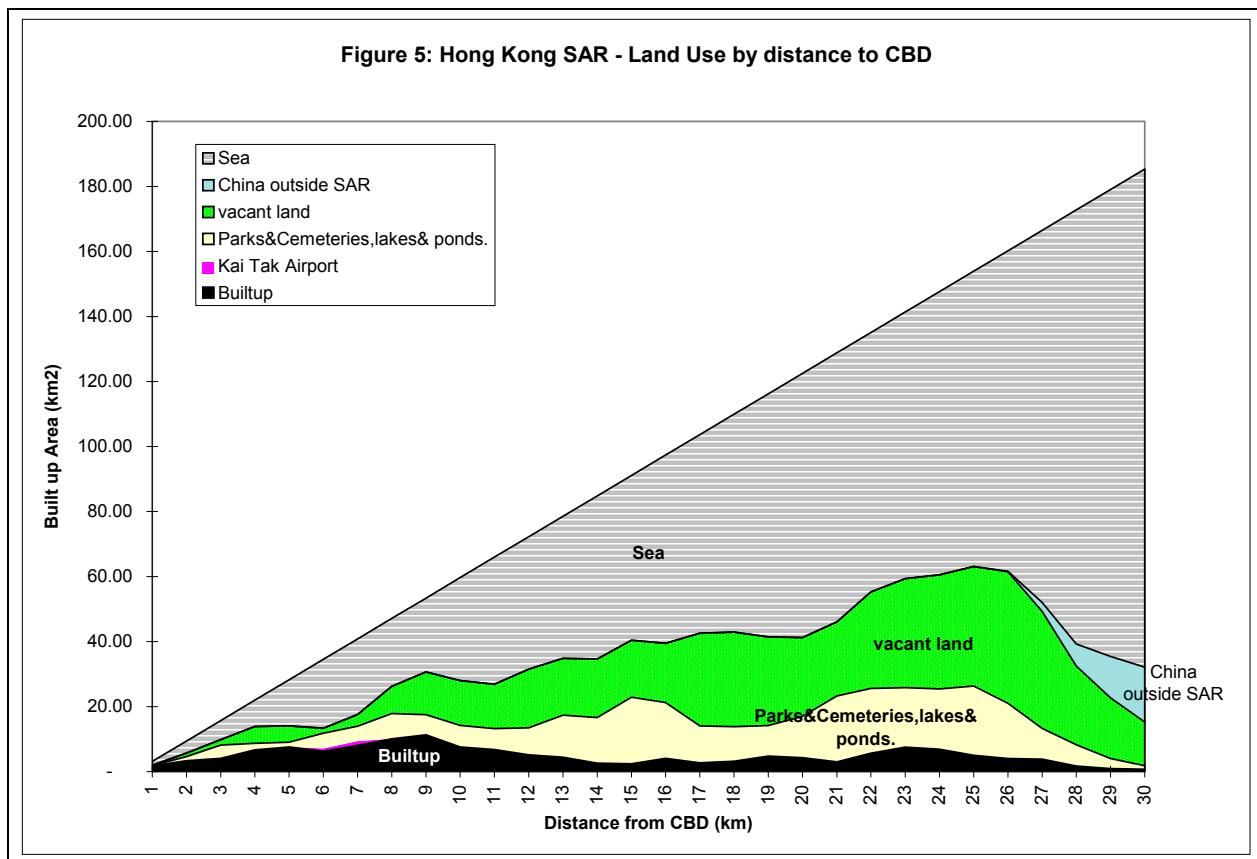
As a first step, a visual comparison of maps of different cities drawn at the same scale is the simplest way to observe the shape of the built-up area. In the next step we will compare the distribution of the area of built-up land at different radii from the center business district (CBD). This will allow us to measure compactness as an important element of land efficiency. The maps of [Figure 2](#), [3](#) and [4](#) show the built up area of Hong Kong (population: 6.3 million), Shanghai (population: 7.4 million), Tianjin (population 3.5 million), Paris (population 7.8 million) and New York Metropolitan Area (population: 10.4 million) at the same scale of 1:500,000.

On these maps, one can see immediately two features which are unique to Hong Kong. First, the extremely small area occupied by the built-up area compared to other cities; and second, the dispersion and fragmentation of the built-up area across a vast territory. Shanghai's built-up area ([Figure 2](#)) with a population about 17% larger than Hong Kong's is distributed within a radius of about 22 km from the CBD as compared to 30 km for Hong Kong. The Hong Kong built-up area is dispersed across a territory roughly similar in radius to the built up area of Paris metropolitan area ([Figure 3](#)) although it occupies only about 13% of the area of Paris. Finally, to give a sense of commuting scale in large metropolises, we can observe from [Figure 4](#) that the length of Manhattan is roughly equal to the straight line distance from Kowloon to Shenzhen. This indicates that the area beyond the limits of the SAR are well within a reasonable commuting distance from Hong Kong.

The Built up area of Hong Kong SAR, Paris, New York, Shanghai and Tianjin represented at the same scale (1:1000,000)

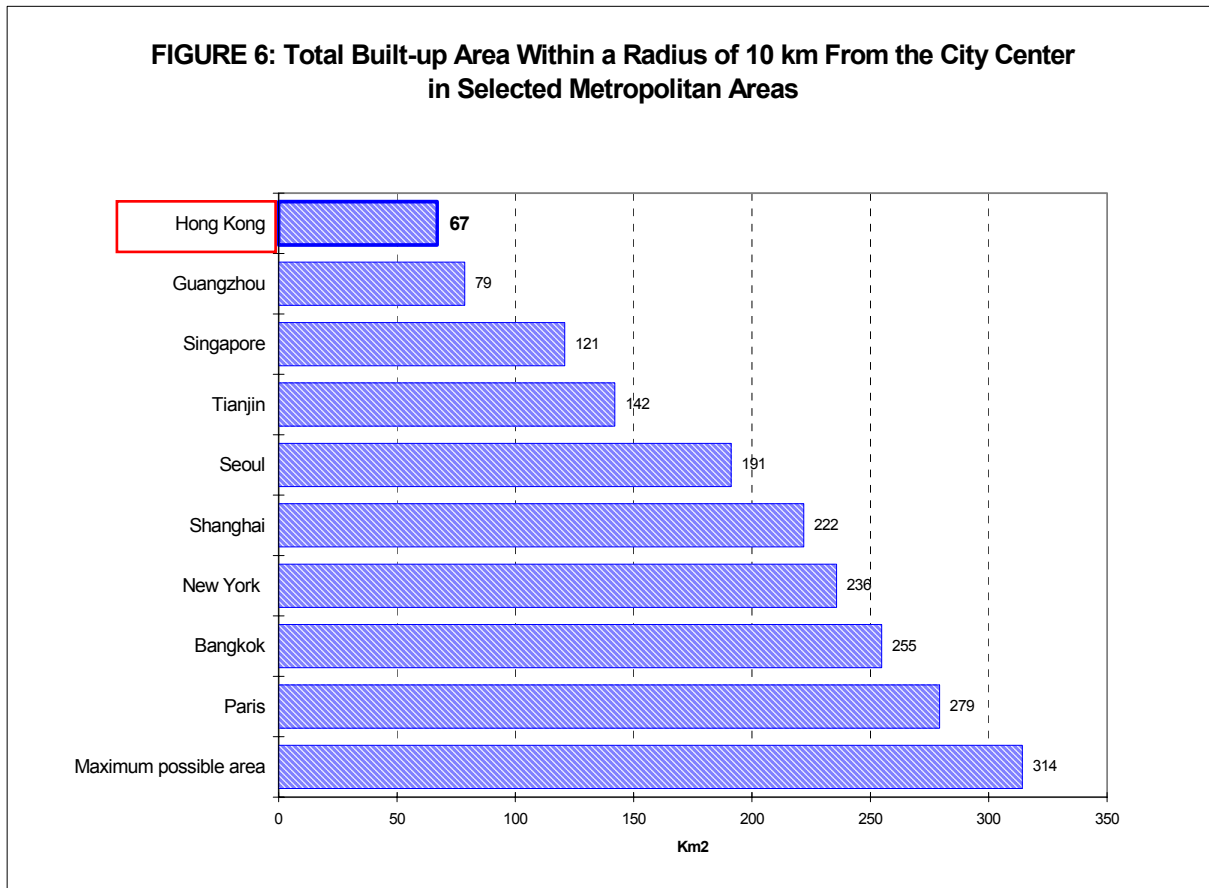


The previous visual comparison of the “foot print” of Hong Kong with other cities is rather crude. It is also possible to quantify dispersion by measuring the built-up area within a certain distance from the CBD. Figure 5 Shows the distribution of built-up land and other types of land use by incremental radius of 1 km from the CBD. One can observe on Figure 5 that the peculiar topography of Hong Kong is an important factor in limiting the amount of built up land –up to a radius of 26 km from the CBD, the sea occupies about 50% of the area within this radius. But the built-up area occupies only a small fraction of the land area, and there is very little developed land between 14 and 18 km from the CBD. Topography – while a severe constraints – is only partially responsible for the smallness of the developed area.



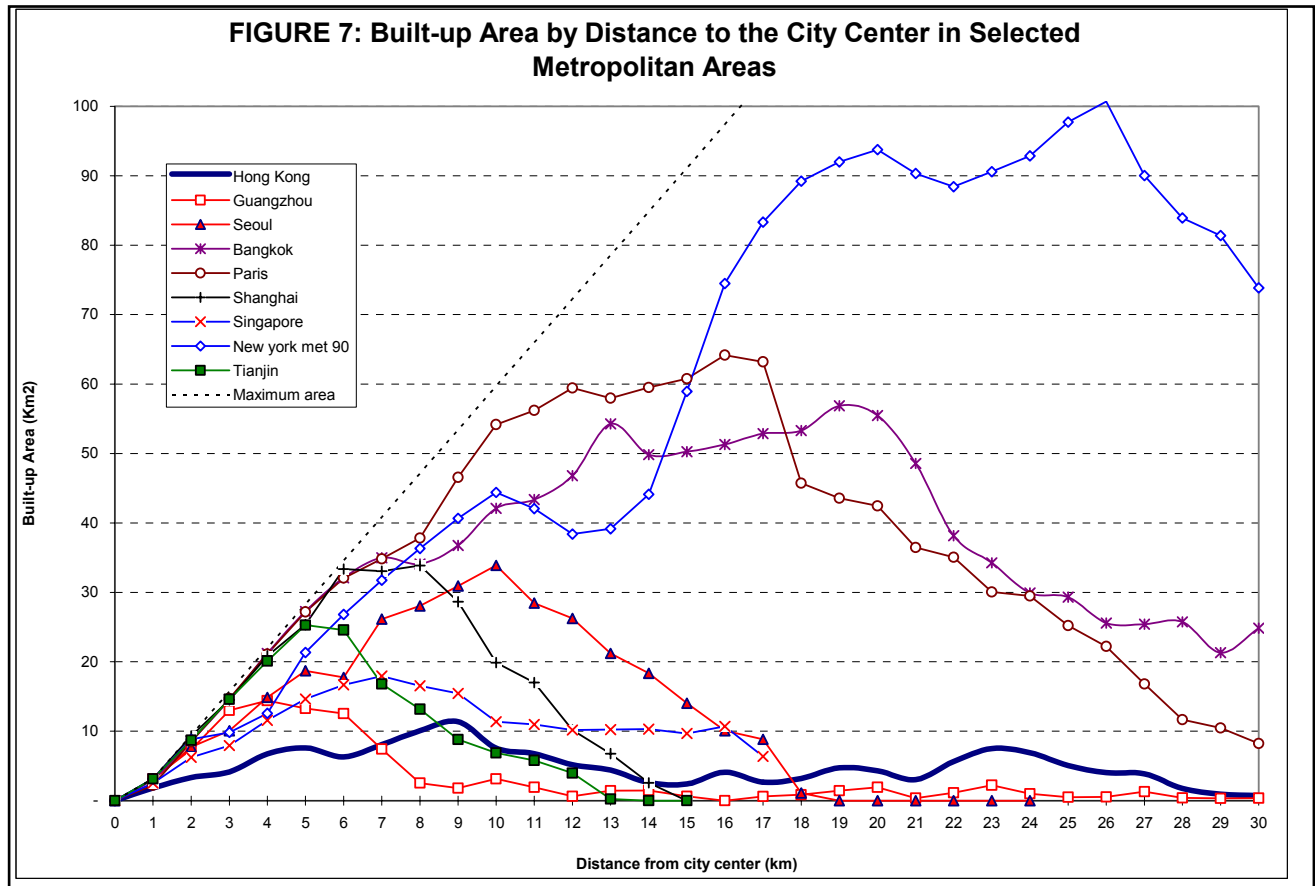
sources: “Order Without Design”, Alain Bertaud, 1997, Digitization of “Land Utilization in Hong Kong “ Map Town planning Office, Building and Land Department, Hong Kong 1988.

How does Hong Kong's land dispersion compare with other cities'? Figure 6 shows the amount of built-up land within a 10 km radius from the CBD for 9 cities. Within this 10 km radius, Singapore has about 80% more land than Hong Kong. Tianjin's built-up area is double Hong Kong's; Seoul has nearly 3 times more developed land than Hong Kong within the same radius. Hong Kong has the most dispersed built up areas among the cities selected. This would suggest that not only is Hong Kong total land supply very small when compared to other cities, but that a part of this supply is more expensive to use because of its remoteness from the center.



sources: "Order Without Design", Alain Bertaud, 1997

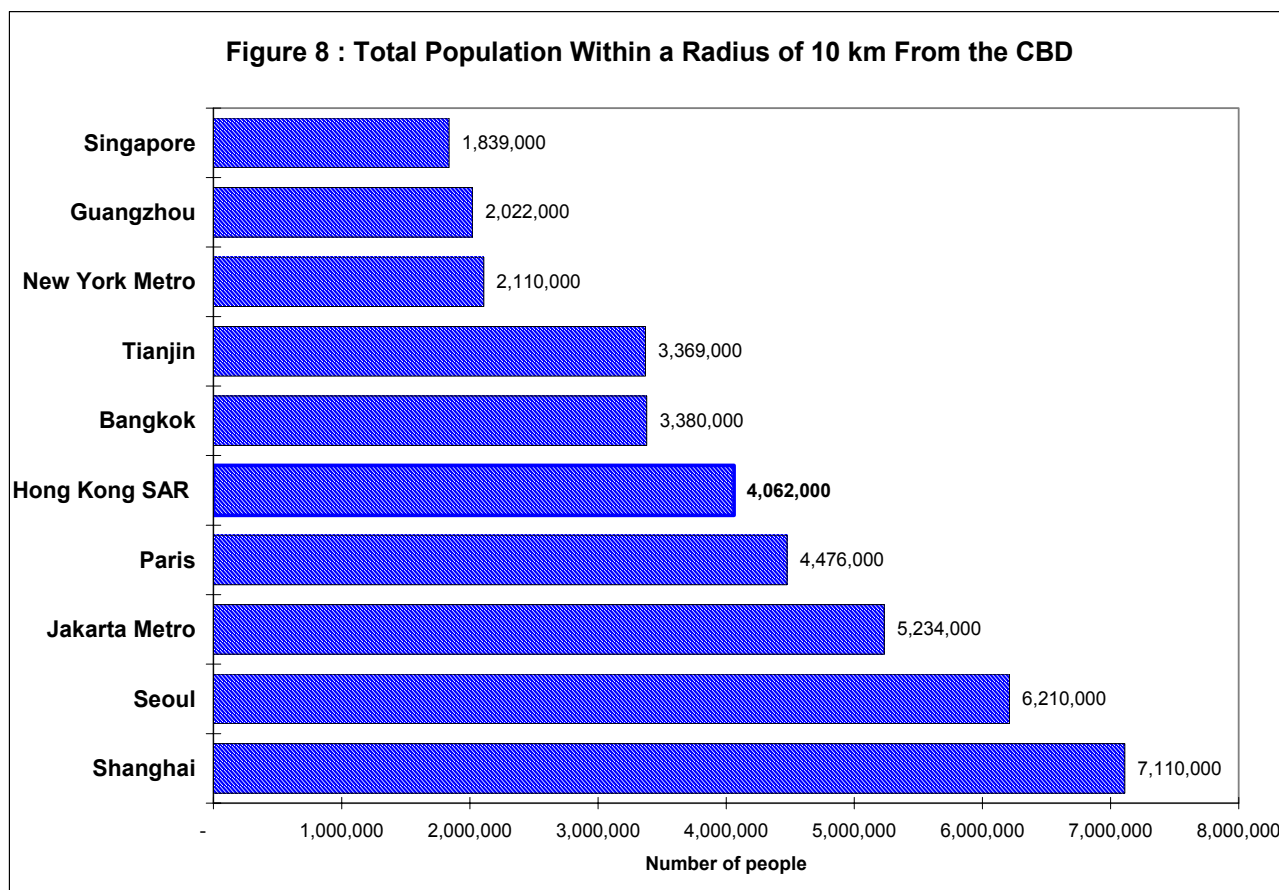
Figure 7 shows the distribution of built-up land of 9 cities by distance from the city center. One can see the flat profile of Hong Kong as opposed to the pyramid shape profile of all the other cities used as comparators. The flat profile shows an extreme dispersion of built-up land over a large distance and the extreme scarcity – compared to other cities— of “well located” land close to the city center where most of the market pressure will be exerted.



The spatial distribution of population and jobs within the built up area

The area of land developed and where this land is developed are important factors in the formation of land price; it may also be a significant factor in the city's operating cost. However, the overall efficiency and competitiveness of a city lay in its access to a large and diverse labor market. One way to measure this accessibility is to count the number of people and jobs which are located within a given radius from the CBD².

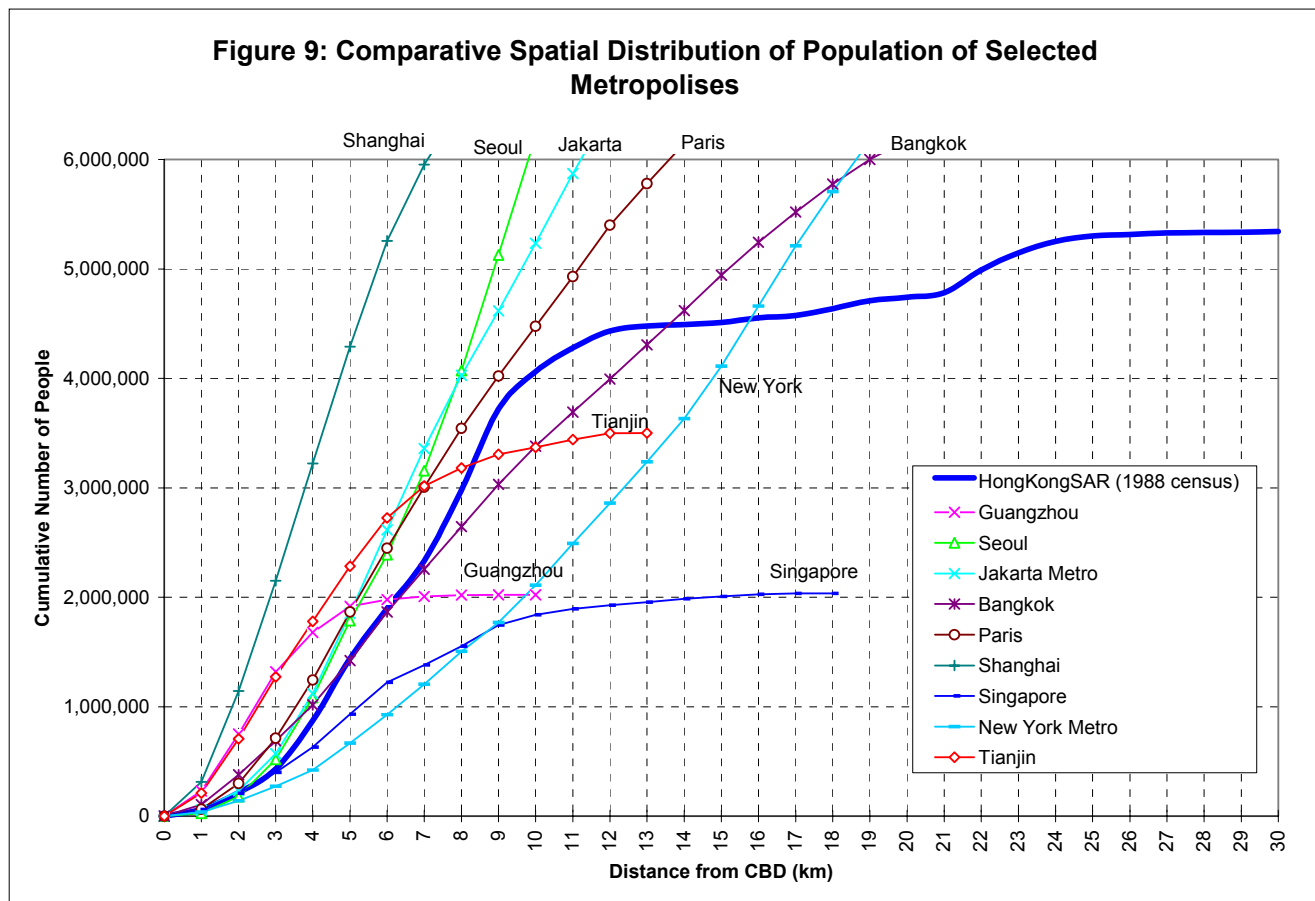
When we perform the comparative analysis of population distribution among the same cities used previously as comparators we obtain astonishing results: Hong Kong – in spite of having much less land within 10 km from the CBD than all the other cities – has a similar number of people who are located within 10 km from the CBD than Paris and scores much better than Bangkok, New York and Singapore (see [Figure 8](#)). Hong Kong, for instance, has more than 4 million people within 10 kilometers from the CBD, compared to Bangkok's 3.5 million and New York's barely more than 2 millions.



sources: "Order Without Design", Alain Bertaud, 1997

² Unfortunately, at the time of writing, the number of jobs by census tract was not available. The study concentrates therefore on population distribution and skips the job distribution aspect.

When we look at the distribution of population around the CBD at a distance of 30 kilometers (Figure 9), Hong Kong starts losing its advantage at around 12 kilometers from the CBD, however more than 2/3 of its population is within 10 km from the center. Up to 10 km from the CBD, Hong Kong cumulative population curve is similar to Seoul, Jakarta and Paris.

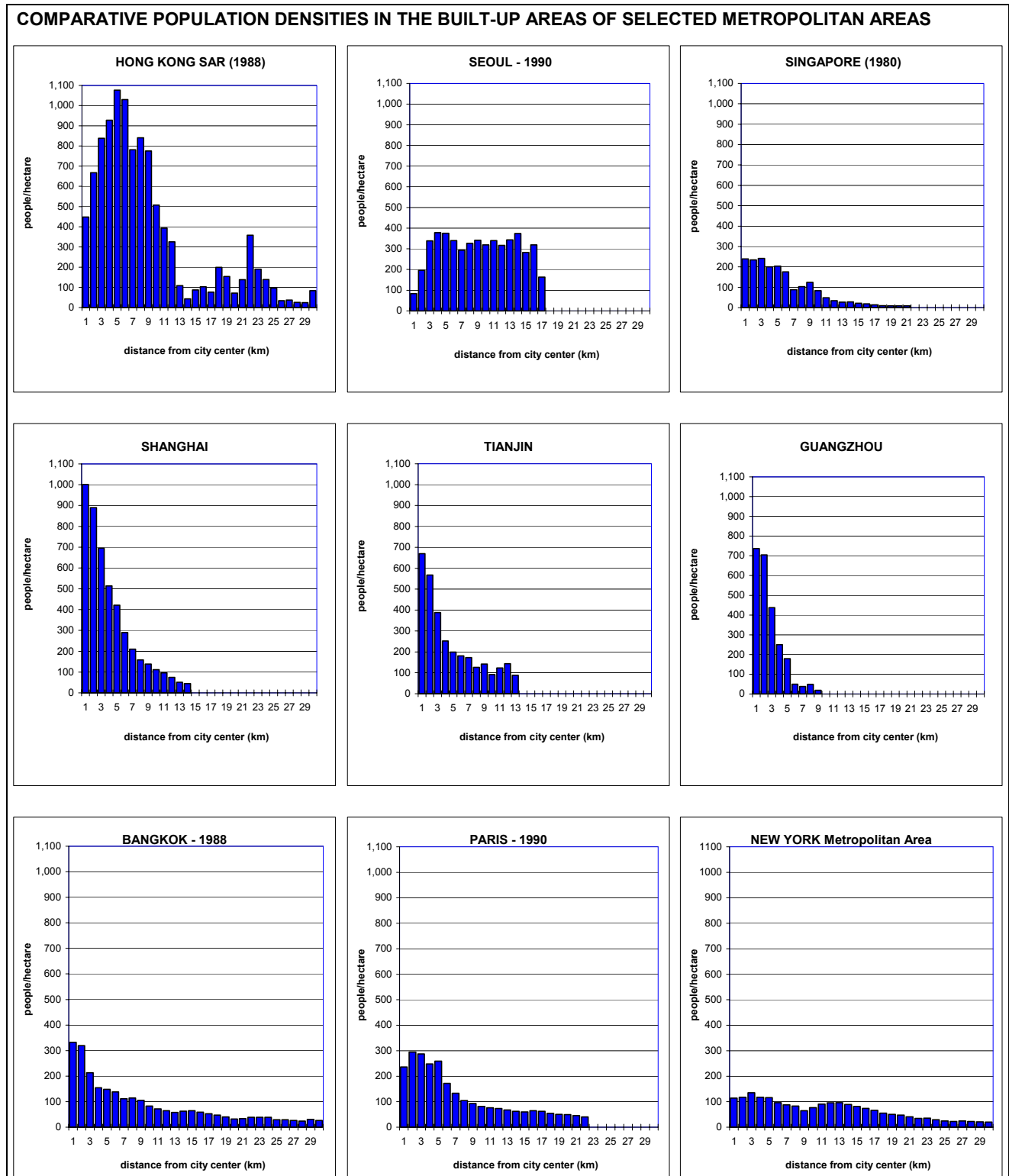


sources: "Order Without Design", Alain Bertaud, 1997

Hong Kong, therefore, managed to overcome its handicap in land supply by allowing very high population densities. In doing so, it has managed to maintain its competitive edge among other cities by providing the CBD with a good access to a large labor pool. We have seen above (Table 1) that the average population density of Hong Kong in the built-up area is among the highest in the world. When we look at the way densities are distributed around the city center of Hong Kong and when we compare it to other cities, we see that Hong Kong is again an outlier (Figure 10). No other cities in the world come even close to Hong Kong in maintaining densities around 800 people per hectare on a radius of about 10 km. Even a city like Seoul, which is considered a very dense city by world standards, does not even come close to Hong Kong. The graph of Figure 10 illustrates the land development modes of the 9 cities represented. In the top row are 3 cities (Hong Kong, Seoul and Singapore) where the supply of land has been tightly controlled by the government, in the second row, 3 Chinese cities which have expanded only recently and with very little investment in infrastructure, hence very large concentration of people in the city center and brutal drop of density when the distance becomes too long for cycle commuting. In the third row (Bangkok, Paris, and New

York) are the more liberal cities economies (when it comes to land development only) where citizens and enterprises have made more freely the trade-off between distance and land consumption .

Figure 10



Recommendations : Expansion of the Hong Kong Land Market

In addition to the constraints imposed by topography, Hong Kong planners have severely rationed the land supply of the city. In exchange for this severe restriction on the use of land, they have allowed very high floor area ratio and as a consequence very high densities. The deliberate use of these very high residential densities has been a pioneering experiment for the world. Hong Kong has demonstrated that high densities in well designed estates with adequate infrastructure and social services bring important economic benefits without significant social drawbacks. In particular, it provides the chance to the citizens to have easy access to a large pool of jobs, and it allows enterprises an easy access to a large labor pool. Without these densities Hong Kong would probably not be the economic success story it has become.

However, in the future, the combination of very high densities and very tight land supply – demonstrated in the above paragraphs – may expose Hong Kong to a rapid surge in land prices and eventually to a “speculative land bubble” similar to the one suffered by Japan and Korea. To avoid this danger it will be imperative to expand the supply of land. This can be done in two manners: first, by expanding the area deemed buildable within HKSAR, and second, by expanding Hong Kong land market well into Guangdong province.

Expansion of the supply of land within HKSAR boundaries

The various land reclamation programs and the redevelopment of Kai Tak airport will add to the supply of land where it is the most needed – within a radius of 10 km from the CBD. The review of the restrictions of floor area ratio in the flight path of Kai Tak airport will allow also more development at higher densities, therefore indirectly allowing an increase in the supply of land. However these projected additions will not be large enough to alter the land scarcity relative to other cities discussed above. To maintain some supply response to a surge in demand it is therefore essential that some more land be released within HKSAR boundaries to decrease the fragmentation of the built-up area.

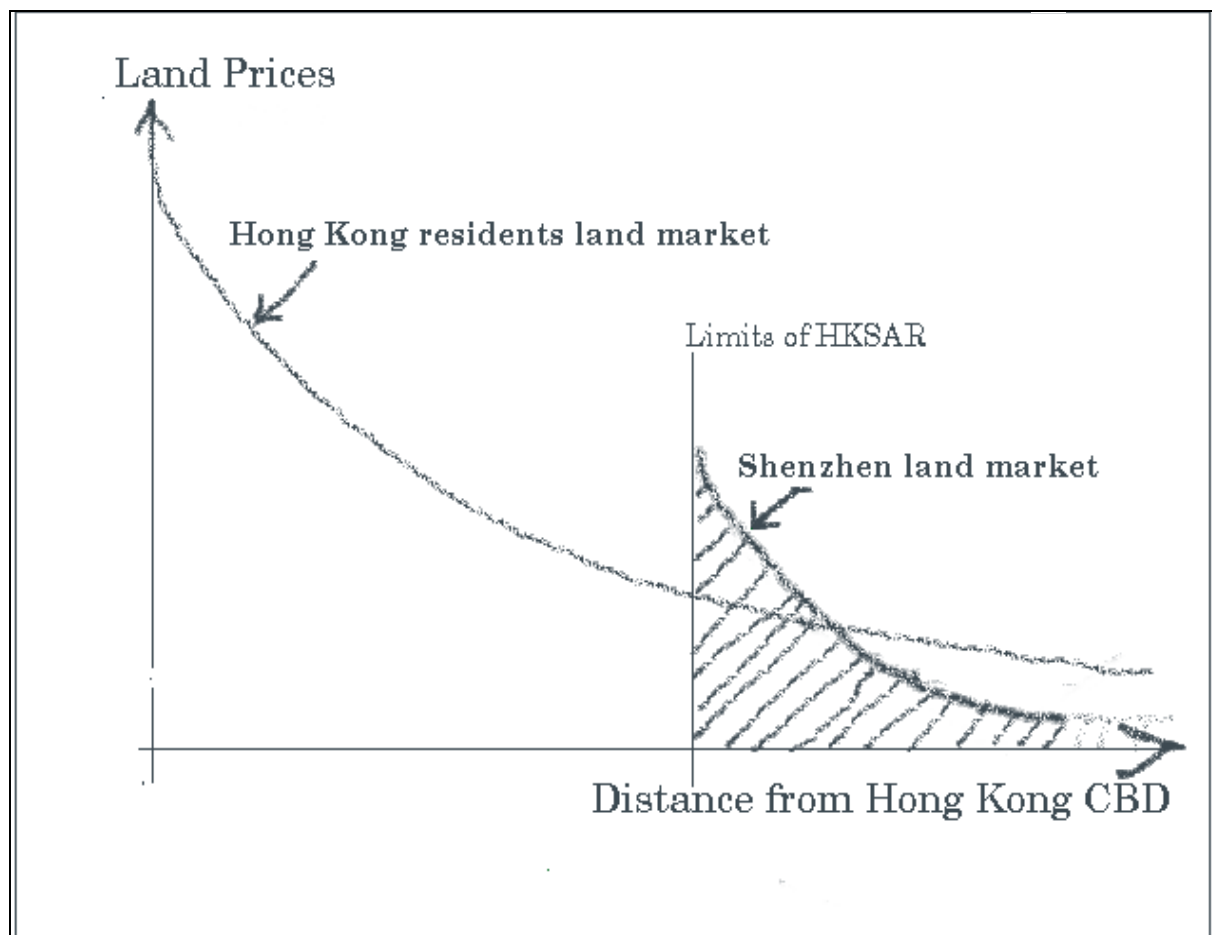
Land areas which have no special environmental or historical values should be released for development, including land with steep gradients (Hong Kong has also been a pioneer in the intensive development of land with steep gradients) with adequate development guidelines to prevent erosion and other externalities. Some areas have a high environmental vulnerability coupled with a high recreational potential, this is the case of many islands, these areas should of course be protected and at the same time given better controlled accessibility for recreation purpose.

Expansion of the supply of land inside Guangdong Province

Taking into account the new status of Hong Kong as a Special Administrative Region of the People’s Republic of China, the tightness of the land supply could be released by expanding Hong Kong land market outside HKSAR boundaries. If one looks at the density gradient of [Figure 10](#) it is clear that demand for land from Hong Kong residents would expand further away than the boundary of the SAR located at 30 km from the Hong Kong CBD.

The way the land market would operate within and outside the SAR is schematically and theoretically represented on Figure 11. We are looking here at 2 partially overlapping land market: the first market consists of demand from Hong Kong enterprises and residents where the highest bid prices for land are in Hong Kong CBD and the lowest expand well across the HKSAR boundaries into Guangdong province beyond Shenzhen; the second market consists of Shenzhen enterprises and residents with the highest bid prices at the boundary with the HKSAR and the lowest expand also into Guangdong Province.

Figure 11: The 2 overlapping markets of Hong Kong and Shenzhen



Within Guangdong Province the two markets compete with each other. The Shenzhen enterprises market will probably outbid the Hong Kong suburban residential market in the area which are within Shenzhen boundaries, but the Hong Kong residential market will outbid the Shenzhen market in areas more remote from Shenzhen CBD but with good environmental quality such as access to the sea, beautiful view, etc.

The HK residents land market will expand into Guangdong Province if some infrastructure exists there which allows residents to (i) be at a comfortable commuting distance from Hong Kong and (ii) enjoy the same level and quality of urban services as available in Hong Kong. Condition (i) can be met by expanding rail or highway services to areas which are meeting the characteristic of Hong Kong suburban markets. Conditions (ii) could be met by creating large horizontal condominiums where secondary and tertiary infrastructure is installed

and maintained by the condominium with only the bulk supply for electricity and water purchased from outside. If these conditions could be met, Hong Kong land supply would be able to expand and there will always be a supply response to demand.

Conclusions

Hong Kong has already been a world pioneer in a new form of high density urban development. Hong Kong urban planners have successfully innovated in the creation of an orderly, attractive and economically viable high density urban development. But Hong Kong could become a victim of its own success if the land supply is perceived as “closed”.

The restrictions imposed on land use by the concept of the isolated city state is not anymore valid. Hong Kong should now release the tightness of the land market by expanding the buildable area within the SAR and outside it. This will require new investments in infrastructure. Costs/benefits analysis should provide an answer to where these investment should be and what should be their limits.

Without this expansion of the land market, the perception of a fixed supply of land in a dynamic economy could provoke a speculative land bubble which could significantly damage Hong Kong economy in the future and adversely affect the welfare of many citizens by a deteriorating housing consumption.

Next Steps

The following tasks will need to be carried out to follow up on the preceding ideas:

- a) updating and completing the data of the current study; in particular by updating demography, land use and adding job distribution data;
- b) conducting a spatial survey of the current land market in Hong Kong SAR and in adjacent areas of Guangdong Province;
- c) identifying areas within the SAR which could be released for development and at what densities/FAR.
- d) identifying areas of Guangdong Province which have the necessary characteristics to participate in HK residents suburban land market;
- e) identify the infrastructure which would be needed to develop the new areas inside and outside the HKSAR and conduct preliminary cost benefit analysis;
- f) present the findings and recommendations on land market expansion to the HKSAR local government with a calendar for legislative and regulatory action and an outline of infrastructure costs and financing.