Why Doesn’t the Hong Kong Government Sell More Public Land?

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Abstract

Why doesn’t the Hong Kong government sell more of its enormous land holding to lower the city’s high housing price and increase the residents’ small living space? We answer the question in an overlapping generations framework. We show that while a rapid and complete privatization of government land is efficient in the absence of externalities; it is made politically difficult by a compensation gap, when the losses of current property owners are greater than the government revenue from land sales. We argue that the cross-country diversity of government land ownership owes to historical incidents in some countries (such as the U.S. in the 19th century) that allowed disposal of government land without filling the compensation gap and the absence of such incidents in others (such as Hong Kong).

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1 Introduction

Hong Kong government’s tight land supply policy appears difficult to justify in light of the city’s enormously high housing price and low per capita living space. Hong Kong has approximately 84 percent of undeveloped land, largely publicly owned and all under government control for development purpose. Historically, only small plots of land were released or were allowed to develop annually for residential and commercial uses. Government land sale is often followed by decrease in housing price, as Figure 1 indicates. Since 1990, the correlation between average land sale area from 3 to 5 years ago and the current housing price is -0.76. It appears that Hong Kong government has considerable power in increasing housing supply and reducing high housing prices.

Various conjectures have been made to explain why Hong Kong government did not sell more of its enormous land holding to lower housing prices. One hypothesis, widely shared by the general public, considers high housing prices as a tax and asserts that the government’s policy is aimed to maximize land sales revenues (see, for example, Tse 1998). Although roughly ten to twenty percent of tax revenues comes directly from land sales and a one percent increase in housing prices is associated with a 0.8 percent increase in all government revenues, scholars and policy participants bluntly point out that high land prices has never been Hong Kong government’s housing policy objective. Instead, they offered other plausible explanations, which include justifying a large part of high land premium as necessarily related infrastructure expenditures, blaming high land and housing prices to political and economic influences of strong housing developers and real estate

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1Hong Kong’s housing price is among the highest in the world. The Hong Kong government does not report an official statistic on per capita housing. But estimates by various sources show that it is about 13m², smaller than that of major metropolitan cities in the world (e.g., about half of that of Singapore and Beijing.)

2Even if one takes into account of terrains that are difficult to develop, developable public lands remain sizable. Privately owned farmlands are restrained from development without government rezoning permission and are subject to land use conversion premiums that link up to government land sale prices.

3These estimates are obtained from Ho, “HK’s high land price policy: Myth or reality?” China Daily Asia, April 1, 2014. Noted that, aside from land sale proceeds, sizable amount of government revenues are raised from land re-zoning charges, land use conversion premiums, rates, profit taxes and real estate transaction taxes.

4It is argued that, once expenditure in complementary infrastructure development is factored in, land premium is not huge. Furthermore, Hong Kong’s land premium is diminishing in recent years. See Liu (2014).
holders in Hong Kong,\textsuperscript{5} and more intricately pointing fingers at a series of unfortunate events that initially are responsible for pushing up housing prices and at institutional changes that makes pushing down housing prices increasingly difficult.\textsuperscript{6}

Instead of making another conjecture, this paper offers a theoretical framework to analyze government land sale policy. The framework is flexible enough to be used to examine Hong Kong’s unique situation and also to other countries’ experiences. We first show that in theory it is socially optimal for a government to sell its land holding. In light of this efficiency argument in theory

\textsuperscript{5}This hypothesis is based on the fact that big developers have substantial market powers in real estate market as well as property development market. With four-firm concentration ratio in individual market segment can be as high as ninety percent in Hong Kong, it is plausible that high housing prices can result from powerful developers exercising their market power. For details and issues relating to competitiveness of Hong Kong land markets, see, for example, Ching and Fu (2001).

\textsuperscript{6}Hong Kong is a unique place in many ways. It is next to China that went through revolutions, wars and transitions in economic system. It is a trading post for the region and the world, ruled by a western government using common laws. It is a city that grows fast in population, mainly through immigration, and in per capita GDP. It is connected with everyplace in the world commercially and culturally. As such, it is also a place that is subject to an unusual number of big economic and political shocks. Some observers have argued that, under these shocks, high housing prices were started with a series of unfortunate events and mistakes such as poor housing demand forecasting, bad timing in policy execution and confusing policy objectives in resettlement, income support and homeownership. Further institutional development that caters to growing social, political and environmental concerns also make housing development increasingly difficult, and so causing housing prices more difficult to adjust downward. See, for example, Wong (2015).
and Hong Kong’s obvious need for larger housing supply in practice, virtually everyone, including every politicians at the time of campaigning for the city’s top position, agree that the government should sell more land. The interesting question is why every new government administration in Hong Kong, once they were in power, ends up becoming incapable of selling more land, both in good and bad times?

We then provide a political economy explanation to this question. We argue that, in the case of Hong Kong, releasing land slowly is a rational response of the government to the potential conflict between the current property owners and other interest parties (such as tenants and new entrants) in the economy. We call a key measure of this conflict a compensation gap, which is defined as the gap between losses imposed on current property owners and the government revenue on potential land sale, the less likely that (any) government would undertake land sale. We remain agnostic on how the actual compensation would take place, given that it is both likely to be politically hard to do (and often disguise under other social, economic and environmental measures) and that it depends heavily on the institutional aspects of the economy (namely the ownership structure and the identity of owners).²

Our theoretical analysis establishes two points: First, it is efficient for the government to release land to the private sector as early as possible. Second, while selling more government land than the market anticipated may improve welfare for future generations, it reduces welfare of the current property owners. Whether the government can compensate the loss of the current property owners using the proceeds of the land sale depends on a number of factors, including the demand elasticity of housing and the land share in the production of housing. In empirical analysis we estimate that the compensation gap of selling one percent of land in Hong Kong is quite large relative to the GDP and we argue that this is an important obstacle for the Hong Kong government to sell its land holding.

We recognize that compensation gap varies by the institutions and initial land ownership. The

²Compensation gap, in a sense, measures the inability of the government to orchestrate a Pareto-improving transfer scheme to the old (existing property owners) when new lump sum taxation of the young (non-property owners) is politically infeasible.
difference in compensation gaps across countries plays an important role in shaping the diversity in government land policies. Not every jurisdiction on the world has similar “extremely-low supply, high land prices” policies as Hong Kong does.\textsuperscript{8} A number of observations suggest that governments tend to implement liberal land sale policies when the compensation gap is low or can be circumvented.

The main argument we make in this paper is that compensation gap in an economy with wide housing ownership creates political resistance against efficiency-enhancing government land sale. Consequently government should sell public land at a time when the compensation gap and housing ownership are low (for instance, in a transitional economy.) The rest of the paper is organized as follows. Section 2 presents a theoretical model for a positive analysis of government land sale policies. Section 3 discusses the implications of compensation gap with reference to past episodes of land disposals in various countries and municipals. The last section concludes.

\section{The First Best Policy and the Compensation Gap in an OLG Model}

Our starting point is a very simple overlapping generations (OLG) model. At each time period there are two generations alive: the young and the old. The young individuals supply labor inelastically, consume housing and the single consumption good in the economy. The old individuals only consume the single consumption good, with no supply of labor and no consumption of housing. Consumers are rational and they maximize a well-defined lifetime utility function. Population expands at rate \( n \). The gross interest rate \( R > 1 + n \) so dynamic inefficiency is ruled out. When the agent is young, he works, saves, and purchases housing. When he is old, he consumes the saving and sells the house.

\textsuperscript{8}The process that leads to Hong Kong’s unique situation may be attributed to a series of unfortunate historical events. One example is that the British administration in Hong Kong, upon request from the Chinese government out of the fear that the British controlled Hong Kong government would sell all its land holding, has agreed to limit land sales to no more than 50 hectares a year.
Available land supply is fixed and all land is initially assumed to be controlled by the government. Land is also assumed to have no value in alternative uses, so the optimal policy problem with unlimited land supply would not have an interesting solution.

It is assumed that wages are exogenous and grow at a rate \( g \). Housing is assumed to be produced by combining two inputs - construction material \( m \) and land \( l \) - under a constant return to scale technology \( \Delta h = f(m, l) \). Housing is assumed to be perfectly durable and thus housing stock grows in steps with new constructions. As in a small open economy, the interest rate \( R \) and the construction material price \( r \) in the model are assumed to be given by the world markets.

2.1 The First Best Land Policy

Available land supply is fixed at \( \bar{L} < \infty \). The first best land and resource allocation policy is defined as the solution to the following problem:

\[
\max \sum_{i=0}^{\infty} \lambda_i u(c^y_i, h_i/(1+n)^i, c^o_i)
\]

subject to

\[
\sum_{i=0}^{\infty} \left( \frac{1+n}{R} \right)^i (c^y_i + c^o_{i-1}/(1+n) + rm_i/(1+n)^i - W(1+g)^i) = 0,
\]

\[
h_i - h_{i-1} = f(m_i, l_i),
\]

\[
L_i = L_{i-1} + l_{i-1},
\]

\[
L_i \leq \bar{L},
\]

\forall i > 0, where \( L_i \) is the developed land in period \( i \), \( \lambda_i \)'s are the welfare weight of each generation, and \( c^y, c^o, W \) are consumption of young, old, and the initial wage of the first generation. Initial values of housing, developed land and the consumption of the current old are fixed. In addition to these constraints, there are also constraints on non-negativity of investment, land use and

\[9\text{We are trying purposefully to keep our model simple and abstract hence from any agglomeration effects that would introduce a interdependence between housing market and labor productivity. For an empirical analysis of the importance of these effects for Chinese cities see Au and Henderson (2006).} \]
consumption.

The optimal policy for this maximization problem follows a very simple rule: as long as land availability constraint is slack, optimal land investment policy satisfies

\[ f_l(m_i, l_i) \times \sum_{j=1}^{\infty} \left( \frac{\partial u(c_j, h_j/(1+n)^j, e_j)}{\partial (h_j/(1+n)^j)} \right) / \left( R^j \frac{\partial u(c_j, h_j/(1+n)^j, e_j)}{\partial c_i} \right) = \text{constant}. \]  

(6)

This condition, derived in the Appendix, implies that the return to land in housing production increases as land becomes more scarce. It follows immediately that if \( f(m, l) \) is linear in land (or housing = land) then all land should be released in the initial period. On the other hand, if land and construction material are perfect complements in construction, land should be released at a slower schedule.

Since an economy without productive capital accumulation is dynamically efficient, the US-style rapid privatization is an optimal land sale policy in the model. Here, the government sells enough land in period 0 and competitive markets result in a Pareto optimal allocation. The schedule of selling the remaining land does not matter and would not affect the present value of government land sale proceeds.\(^{10}\)

A slower, apparently more active, land disposal policy may also correspond to an optimal policy, as long as it is in accord with condition (6). However, its successful implementation relies on the assumption that the government is able to perform intergenerational transfers, not only though taxation but also through international borrowing and lending that extend across many generations. Our view is that this is not possible in practice even given the current high level of development of the international financial markets. This consideration leads us to our next topic, a positive theory of land sales. In the next subsection, we will argue that a very inefficient (under-utilization) of land policy, once set, can persist over time.\(^{11}\)

\(^{10}\)More precisely: As long as private sector holds some non-developed land every period before the total land endowment is privatized the net present value of the land revenue is independent of the particular land sales schedule satisfying the constraint given in (6).

\(^{11}\)One interesting alternative theory predicting under-utilization of land (in formal sector) of developing countries is squatting, where in the equilibrium both formal and informal housing sectors exist and the expansion of the formal sector is constrained by the land use of the informal sector (see, e.g. Brueckner and Selod, 2009). For the specific
2.2 A Positive Analysis of Government Policies

We now analyze a market economy where the government controls land supply. Housing is produced via competitive markets and at the beginning of each time period the current old sell their housing capital to the current young. Our main interest is the political implications of land policy. In an OLG economy with exogenous labor income and interest rate, the timing of government land sale has differential impacts on different generations. In particular, for any given land sale schedule, an unanticipated land sale in the beginning of period \( t \) benefits all generations born after \( t \) at the expense of the period \( t \) old. This statement holds because the added housing supply raises the utility of the period \( t \) young and all generations born thereafter, but reduces the housing price paid to the period \( t \) old.

The question we are asking is how much political pressure there would be for the government not to release any land. Our measure of political pressure is marginal compensation gap, which is defined as the difference between losses of market value by current owners of housing due to increased housing supply and governments revenue from a marginal land sale. Larger (or more positive) compensation gap means more political pressure against land sales. If we are to take our current overlapping generations setting literally, the compensation gap would measure whether (say) a pension transfer program that would be financed entirely by the land revenue would be Pareto-improving.\(^\text{12}\) Less literally, we think that marginal compensation gap measures the political feasibility of a land sale regardless of the exact labels (old, young, real estate investors, capitalists, landlords, renters etc.) applied to our model and we postulate that a government policy that fails the compensation test is unlikely to be politically feasible. Thus a ‘liberal’ government land policy (releasing land to markets quickly) that would be efficient might be politically infeasible due to distributional concerns (either inter-generational distribution, or distribution between renter versus

\(^{\text{12}}\) Here, we assume side-payments, either from taxing the young or borrowing from the international financial market, are deemed infeasible in the political game and are not included in the measure of compensation gap. Otherwise, the calculation of compensation gap will be reduced to the usual cost-benefit calculus, which bears a foregone efficiency conclusion.
The key endogenous price variables for our analysis of market economy are the spot prices for land \( p_{l,t} \) and housing \( p_{h,t} \) and the lifetime cost of owning housing \( q_{h,t} = p_{h,t} - \frac{p_{h,t+1}}{R} \). The last is the relevant variable for specifying the market clearing conditions for housing markets while the spot prices are relevant for revenue gap considerations. In the absence of bubbles, housing price is determined by the present value of future rents.

\[
p_{h,t} = \sum_{s=0}^{\infty} \frac{q_{h,t+s}}{R^s}.
\]  

(7)

The equilibrium we are analyzing is as follows. At time period 0 there is expectation that government will follow a future land sale policy \( \{\tilde{l}_t\}_{t=0}^\infty \) and all economic agents rationally see the corresponding equilibrium values of housing and prices.

The government announces a deviation from this expected land policy by announcing that it is selling rights to additional land \( \Delta l_s \) for \( s \geq 0 \) periods into the future.\(^\text{13}\)

The equilibrium for housing markets, for any time period \( t \) and for any land policy, is given by:

\[
h_t = D(q_{h,t}),
\]

(8)

\[
h_{t+1} = h_t + f(m_{t+1}, l_{t+1}),
\]

(9)

\[
p_{h,t} f_m = r,
\]

(10)

\[
p_{h,t} f_l = p_{l,t}.
\]

(11)

Our compensation gap (for additional land sale in time period \( s \)) is defined as

\[
\chi(\Delta l_s; s; \tilde{l}) = (\tilde{p}_{h,0} - p_{h,0})\tilde{h}_0 + \sum_{t=0}^{\infty} \frac{(\tilde{p}_{h,t} - p_{h,t})\tilde{l}_t}{R^t} - \frac{p_{l,s}\Delta l_s}{R^s},
\]

(12)

where quantities marked by a bar on top (e.g. \( \tilde{h} \)) refer to the original equilibrium. The first term in

\(^\text{13}\)We also make an assumption that the announced land sale is sufficiently small that every unit of land sold in each period is being immediately converted to housing by the competitive housing sector. This allows us not to consider the complicated situation where the private sector holds some undeveloped land. We also assume, for simplicity of notation, that population growth is zero while still allowing for technological growth.
this expression is the initial losses for the property owner at period $t$ (when policy is announced), the second term is the effect of the announcement on the net present value of all planned land sales by the government and the third term is the revenue from additional land sales.

Now we can use the constant returns to scale assumption in housing production and write

$$p_{t,s} \Delta l_s = \alpha_s p_{h,s} (h_s - \bar{h}_s)$$

i.e. the payment to land in housing production is a share $0 < \alpha < 1$ of the total revenue of the construction industry in the period where the actual land sale takes place. Note that $\alpha$ like everything else, is defined as an implicit function of the government’s land policy. A notable special case is constant $\alpha$ that corresponds to Cobb-Douglas production.\(^{14}\)

Taking this into account and using the key pricing relation for housing we can calculate the marginal compensation gap as:

$$\frac{\partial \chi(\Delta l_s; s; \bar{l})}{\partial \Delta l_s} = -\bar{h}_0 \frac{\partial p_{h,0}}{\partial \Delta l_s}$$

$$- \sum_{t=0}^{\infty} \frac{\bar{l}_t}{R^t} \frac{\partial p_{l,t}}{\partial \Delta l_s}$$

$$- \frac{\partial \alpha_s}{\partial \Delta l_s} \times \frac{p_{h,s} (h_s - \bar{h}_s)}{R^s}$$

$$- \alpha_s \left( \frac{\partial p_{h,s}}{\partial \Delta l_s} \times (h_s - \bar{h}_s) + p_{h,s} \frac{\partial h_s}{\partial \Delta l_s} \right).$$

(13)

The second line of the previous expression is the hardest to evaluate explicitly. It incorporates all the effects of land sales in period $s$ to land sales revenue (through land prices) in all future periods. This effect will be a fully dynamic effect that depends on both production technology of housing (substitution between capital and land) and the demand for housing. Without any substitution between land and materials (Leontieff production technology for housing) this term is unambiguously positive by simple economic intuition.

We will instead use our equation to analyze a much simpler situation: we will (informally) introduce a game where government land policy is governed by compensation gap. Assume that government can deviate from pre-announced policy $\bar{l}$ only if the compensation gap is negative. We

\(^{14}\)Thornes (1997) finds using data from Portland, Oregon metropolitan area that Cobb-Douglas (in land and materials) is a reasonable approximation for production function for single family housing.
will analyze below the condition on when a deviation from a “Hong Kong type”-policy is possible, i.e. when it is possible to deviate from “$\bar{l}_t = 0 \ \forall t$” type policy. This means, we want to ask when is the compensation gap positive (Hong Kong policy is self-reinforcing) or negative (Hong Kong policy is not self-reinforcing) when starting with (near) zero land sales.

Evaluating the compensation gap at $\bar{l} = 0$, using the fact that the change in housing in every period after $t + s$ is the same, and applying the pricing formula for land, we get the marginal compensation gap for small land sale (with derivation in the appendix) as:

$$
\left. \frac{\partial \chi(l_s)}{\partial \Delta l_s} \right|_{l=0, \Delta l_s \to 0} = - \sum_{t=s}^{\infty} R^{-t} \left( \alpha_s q_{h,t} + \frac{t_t}{D_s} \right) \frac{\partial h_t}{\partial \Delta l_s} \\
= - \frac{\partial h_s}{\partial \Delta l_s} \sum_{t=s}^{\infty} R^{-t} q_{h,t} \left( \alpha_s + \frac{1}{\epsilon_{h,t}} \right)
$$

(14)

where $\epsilon_{h,t}$ is the housing demand elasticity and $D_s$ is the housing demand derivative for time period $s$. To simplify the discussion, let us assume that the elasticity of demand is constant across time periods. Then this results means that, if (the absolute value of) the inverse of elasticity of housing demand is smaller than the land share in production in the period where the land is to be used, then marginal compensation gap is negative and land sale are politically feasible. Notice also that the (sign) of political feasibility is independent of the timing of the land sale.$^{15}$

To put this in perspective we first note that for Cobb-Douglas demand (unit elasticity), land sale are politically feasible only if land share in production is one (corresponding to the middle cell of the last row in Table 1). This in our view highlights the political infeasibility of land sale policy: the estimates of housing price elasticities are typically significantly less than one (making $1/\epsilon_h$ large) and while the land share in housing production varies across markets it is certainly less than one.$^{16}$

We now take a closer look at the special and empirically implausible case where the elasticity

$^{15}$Note that in the discussion from now on we will be referring to the magnitudes of demand of elasticity and the inverse of the demand elasticity without the explicit mention of the sign of the quantity of question.

$^{16}$A vast empirical literature has been developed on housing demand elasticities in U.S. and other countries, e.g., Polinsky and Ellwood (1978), Rosen (1979), Hanushek and Quigley (1980), Horioka (1988), Peng and Wheaton (1994) and studies referenced therein.
Table 1: Compensation Gap

<table>
<thead>
<tr>
<th>Share of land</th>
<th>Demand Elasticity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-0.4</td>
</tr>
<tr>
<td>0</td>
<td>2.5</td>
</tr>
<tr>
<td>0.1</td>
<td>2.4</td>
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<tr>
<td>0.2</td>
<td>2.3</td>
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<tr>
<td>0.3</td>
<td>2.2</td>
</tr>
<tr>
<td>0.4</td>
<td>2.1</td>
</tr>
<tr>
<td>0.5</td>
<td>2</td>
</tr>
<tr>
<td>0.6</td>
<td>1.9</td>
</tr>
<tr>
<td>0.7</td>
<td>1.8</td>
</tr>
<tr>
<td>0.8</td>
<td>1.7</td>
</tr>
<tr>
<td>0.9</td>
<td>1.6</td>
</tr>
<tr>
<td>1</td>
<td>1.5</td>
</tr>
</tbody>
</table>

Note to Table 1: Marginal compensation gap values assuming constant demand elasticity across time periods. Interpretation of the values: if the land sales result in a 1% increase in total housing stock, then the compensation gap will be 1% times (value from the table) times (value of the current housing stock). The row corresponding to zero share of land gives the absolute elasticity of value of existing housing with respect to new housing.

of housing demand is unity and the land share of housing production is one. In this special case we derive equilibrium prices analytically and show intuitively why the compensation gap is zero.

Let the utility function of time $t$ born be $u(c_t^y, h_t, c_t^y) = \ln c_t^y + \phi \ln h_t + \beta \ln c_t^y$, where $c_t^y$ and $c_0^y$ are goods consumption of the period $t$-born agent in the first and second period of his life. $h_t$ and $p_t$ are the amount and price of housing. The agent’s disposable labor income is exogenous, so is the optimal consumption. Suppose the private land available for generation born in period 0 is $h_0$. Without losing generality, assume the population of the initial generation is 1. Consider a policy (known in period 1) of a sale of public land in period of size $zT_0$ in period $T_0$. Because land is assumed to be transformed to housing, there is an equal amount of increase in total housing supply. The equilibrium in the absence of the land sale is denoted by a bar. The resultant private land with the land sale becomes $h_t = \bar{h}_t = h_0/(1 + n)^t$ for $t < T_0$, $h_t = \bar{h}_t + zT_0/(1 + n)^t$ for $t \geq T_0$. The first period consumption is a constant share of the exogenous wage, hence $c_t^y = \bar{c}_t^y$. Without the land sale, the fundamental value of housing is $\bar{p}_t = \sum_{j=0}^{\infty} \phi c_{t+j}^y/(R^j \bar{h}_{t+j})$. It is straightforward to
verify that the land sale reduces land price in every period $p_t = \sum_{j=0}^{\infty} \phi c^y_{t+j}/R^j h_{t+j}$. The welfare of generations born at or after period $T_0$ is straightly higher because $c^y_t = \bar{c}^y_t$, and $h_t > \bar{h}_t$ for $t \geq T_0$. The initial old agents are worse off because their land holding $h_0$ is fixed and the price of the land is reduced by the expected future sale of land. The generations born before period $T_0$ are indifferent to the reduction in land price: with the government land sale, these generations will pay lower prices for the land and sell it at lower prices.

Can the initial (period 1) old be compensated so that the land sale is Pareto improving? The loss of housing value for period 1 old is (in period 0 value) is $(\bar{p}_1 - p_1)h_0$. Suppose the proceeds are transferred to the period 1 old, then the initial generation’s consumption is given by $c^o_0 = p_1 h_0 + p_{T_0} z_{T_0}/(R^{T_0-1}(1 + n)^{T_0})$. With some algebra one can show that $c^o_0$ equals to with the value of housing without government land sale, $\bar{p}_1 h_0$.

Therefore the initial generation is exactly compensated for its loss in land value if it receives the proceeds of the government land sale in its entirety (regardless of the timing of sale, $T_0$). With this arrangement, government land sale straightly improves the welfare of all generations born at or after period 1 and keeps the initial old indifferent. *The Pareto dominating policy is to sell all lands in period 1. In this way all generations born at or after period 1 benefit from the increase in the service flow from land while their consumption of goods remains unaffected.*

Another way of characterizing the Pareto dominating policy under the restriction that the proceeds be given to the original old is that simply give the land to the original old for free. The generation that receives the free land is not made better off or worse off because the reduction in the value of its land holding exactly offset the value of the free land. All subsequent generations are straightly better off.
3 Policy Implications of the Compensation Gap

3.1 The case of Hongkong

The following observation suggests that without binding constraints in land supply, the political economy of the government land sale is biased against efficient land allocations. In the case of Hong Kong, the land share of the cost of residential construction is about 0.5, and the estimate of the demand elasticity of housing service by Peng and Wheaton (1994) is roughly $-1$. This means that each percentage increase in Hong Kong’s housing stock creates a compensation gap of more than 0.5% of the value of housing market. Most estimates of demand for housing service cited in footnote 16 are below unity, so the 0.5% of the value of housing market is a conservative estimate of the compensation gap. The value of private residential housing, according to the May 2001 issue of Quarterly Bulletin published by the Hong Kong Monetary Authority, is 2.8 times the GDP in 1997 (a peak year for the Hong Kong housing market) and 1.4 times for 2000 (a near trough for the market). The government spending is 14.2% of GDP in 1997 and is 17.7% for 2000. So, if by our conservative estimates that 0.5% of housing stock is the compensation gap to increase housing supply by 1% in Hong Kong, then to fully compensate the existing owners it would take 4.0% to 9.8% of the government budget in addition to the proceeds of the land sale.

The system of land and housing policy in Hong Kong originated from the date of the colonial period. Following the land and housing policy in Britain, the colonial government adopted and maintained a freehold system. All lands in Hong Kong were owned by the government on behalf of the Royal, and after 1997 turnover the freehold land interest was passed onto the Special Administrative Region Government. As such, land buyers obtain only the rights for development and occupation under specific terms. Hong Kong is not large in land mass, about 1,100 km$^2$ as a total. Surprisingly, only 16% of the total area was developed. This low percentage number is partially attributed to Hong Kong’s hilly topography. Land usages are strictly regulated and land conveyances are through public auction, tender and Letter A/B (which entitles the holder to be granted land with building status at an unspecified future date with the stipulated ratio exchange.)
As such, the property market is closely linked to governmental attitude and land policies. Table 2 summarizes new land supply in Hong Kong for recent years.\textsuperscript{17}

<table>
<thead>
<tr>
<th>Year</th>
<th>New Land (square kilometers)</th>
<th>Year</th>
<th>New Land (square kilometers)</th>
<th>Year</th>
<th>New Land (square kilometers)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1979</td>
<td>0.1705</td>
<td>1991</td>
<td>0.3309</td>
<td>2003</td>
<td>0.0007</td>
</tr>
<tr>
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<td>0.4323</td>
<td>1992</td>
<td>0.2303</td>
<td>2004</td>
<td>0.3046</td>
</tr>
<tr>
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Note that the total area of Hong Kong is 1,104 square kilometers.

At the speed of land sale implied by these numbers, it would easily take another century or even longer for Hong Kong to develop all land held by government. Hong Kong is a prominent example that the compensation gap is a key factor in the decision of government land disposal. There is direct evidence that past attempts to deviate from the high housing price policy failed because of the compensation gap. For instance, right after Hong Kong’s turnover in 1997 from Britain to China, the new administration established a new land sale policy that aimed to boost up land and housing supply. Although the policy was presented with a clear deliberation that it would benefit the general public, given the large compensation gap, the uncompensated losses in property value to existing owners had created a tremendous political turmoil and the policy, failed miserably, was abandoned later.

\textsuperscript{17}One consideration we ignore throughout our analysis and discussion is the potential of conversion of land in commercial use into residential use. This process is highly regulated and controlled by the authorities of Hong Kong and requires both getting a special permit and paying the difference of land value between residential and commercial use.
3.2 Path-dependency of the compensation gap and government land policies

Hong Kong is not the only jurisdiction that has to deal with the issue of significant land and real estate holdings by the government. Below, we will discuss some important episodes of land sales and land giveaways by governments in the U.S., and transitional economies. We find in historical cases that disposal of large quantity of public land seemed to have occurred only when the government was not pressured to fill the compensation gap or the existing housing ownership was low.

The most prominent example of liberal land policy can be observed in the U.S. before the mass-populating of the country by Europeans. The 18th and 19th century U.S. government land disposal was made easy because it did not need to compensate property owners west of Mississippi, and the land was a poor substitute for the east coast properties. In a period of one century, from 1783 to 1883, the U.S. population increased from below 3 millions to over 50 millions and the land that U.S. government acquired increased from 820 thousands square miles to 3.5 million square miles. During the same period, over 680 million acres (or more 1 million square miles) were disposed (see appendix of Hart (1887), Tables 1 and 2). While about a fourth (192 million acres) of the public land disposition were through sales, most of the public land disposition were made through grant to institutions (e.g. universities) and individuals. In a short period of time (1847-1855), 61 million acres of public land were granted to soldiers of all Indian wars and the Mexican war (Gates 1941, page 61). The U.S. government adopted a policy of making it almost free for settlers instead of keeping most of the land publicly owned. The land policy served the purpose of keeping the newly acquired land occupied and under the control of the U.S. Since the land given away was in undeveloped areas of the country, this policy can be easily understood by our formula because the new housing was likely to be an imperfect substitute for old housing and hence the elasticity of demand should be really small.\footnote{This calls for a slightly extended version of our model allowing for two types of housing, but the extension needed is very straightforward.}

This policy, which was taken more than a hundred years ago, shaped the land and housing market of the U.S. to the present day.
The political economy considerations of the government land sale is most relevant for economies that makes transition from state ownership of land and housing to private ownership. East Bloc privatization of public housing through a whole-sale change of ownership during a transition period was aided by the fact that there was no need to compensate the original owners. Following the collapse of the communist bloc in Europe the transitional economies followed the policy path of selling it to the current occupants often at heavily subsidized rates (Struyk, 1996; Turner and Vitorin, 1996).¹⁹ Note that these housing market reforms were often parallel to the reforms in financial sector and developing legal and regulatory framework for private ownership of housing.²⁰

Like Hong Kong, Singapore was a former British Colony with a small land mass and large population and its land was regulated and controlled by a colonial system. But, unlike Hong Kong, Singapore has successfully reshaped its land and housing policy at the time of its independence in 1965. Singapore’s low housing price policy was announced in the 1960s upon independence when there was little pressure to compensate the existing homeowners and the policy has been sustained since then. Under the reformed policy that remains effective today (see Yuen 2005), a new national housing authority was created with a mandate to build enough public housing to meet the government-established housing needs and a new land acquisition legislation was enacted to empower the government to acquire any private land at un-inflated prices. At the time, Singapore’s survival as an independent country was uncertain. The compensation gap of existing real estate owners was overcome by more overriding economic and political concerns for the newly independent country.

The issue of compensation gap is still relevant in places where government does not sell public land but can influence land supply through zoning and other regulations. In many communities of developed economies with established property rights, the debate between advocates of expansion

¹⁹ A major exception to this is the Baltic States (Estonia, Latvia and Lithuania) who also pursued restitution of pre-Soviet occupation ownership rights, probably motivated by the fact that many current occupants were ethnic Russians who were not immediately granted full citizenship rights.

²⁰ For an analysis of interdependence of housing markets and financial markets in transformations, see Renaud (1996).
and ‘way of life’ is common place. It is well understood in the urban economics literature that this debate is often motivated by the political economy of housing price.\textsuperscript{21}

At first glance it would seem that our model would have a very strong policy prediction for local land policy: no land should ever get released by the local government. So in our attempt to explain Hong Kong’s restrictive housing policy we have a model explaining too much: it would seem to no jurisdiction ever should sell any land because of the political pressure from the land owners.

Our answer to this puzzle comes from a reinterpretation of the demand elasticity in our model. If we believe the argument presented (among others) in Aura and Davidoff (2008), the relevant demand elasticity for finding housing market equilibrium should include also the effect of in-migration into housing demand. This can explain why say small U.S. municipalities can follow liberal land market policies: the smaller the jurisdiction is in comparison to the economy of as whole, the larger the effect of the in-migration elasticity to the housing market. In Aura & Davidoff the reasonable values for $1/\epsilon_h$ for a very small jurisdiction were calculated to be potentially as small as .05, making potential land sale policies very feasible.\textsuperscript{22} This analysis here is almost certainly an oversimplification of the complicated decision-making relating to land use policies in a small jurisdiction: our analysis ignores at least all considerations raising from Tiebout-sorting and property tax-funded public goods.

4 Conclusions

In summary, this short paper notes that the policy decision on whether and when to sell government held land is in many countries as important as fiscal and monetary policy. Unlike fiscal and mone-

\textsuperscript{21}Some examples of analysis growth controls and zoning are Brueckner (1990)), Turnbull (2004) and Quigley and Swoboda (2005). Examples of analysis that highlight the issue of local decision making and political economy are Hamilton (1978), Brueckner (1998) and Glaeser and Ward (2006).

\textsuperscript{22}Note that the argument here does not hinge on the government getting the sales revenue, a simple lobbying model could easily be built where the political lobbying efforts of the land owners for zoning changes would depend on the potential land revenue while the lobbying effort of the existing homeowners would depend on the effect of new development on housing prices. The point of Aura & Davidoff estimates in this context is that gains for land developers in small jurisdiction are likely to be significantly higher than the losses to the existing property owners.
tary policies which can be altered over time, it is difficult for the government to reverse its decision once ownership or right of usage of land is transferred from government to the private sector. We argue that a major reason for the remarkable diversity in land policy across countries today is due to the path dependency of land sale policy. When a large portion of the land is in government hand and the majority of the households are homeowners, it is politically difficult for the government to release large amount of land because of the compensation gap. The ‘tight land supply’ policy leads to high housing price and high compensation gap. This self-sustaining high compensation gap handicaps the government’s ability to ever sell land for productive use if the government needs to answer to the existing property owners. Less regard to the initial owners may give rise to substantial benefit for the future generations. Our main policy advice is that commitment to selling public land should be made as early and as predictable as possible.

Our result on compensation gap casts doubt on a number of arguments for government land holding. Although the argument that government land holding may deter housing bubble is intuitively appealing, the data on Hong Kong’s housing prices do not lend support to it. The practical value of using government held land as a deterrence of housing bubble is questionable because regardless of cause of rising housing price, whenever government releases land it must deal with the compensation gap, especially when housing price is high. Government land holding designed for maximizing land sale revenue is also politically constrained by the fact that the higher land price the stronger is the resistance from the existing owners to government land sales.

Another policy implication of our analysis is that sub-federal control of land-policy could be efficient. Since smaller jurisdictions are facing the more elastic demand curves (due to migration pressures) they are more likely to follow “liberal” land policies while a single federal government faces the market demand curve as a monopoly and is much more likely to follow a restrictive land policy.

Our highly stylized model can be extended for quantitative analysis of government land policy. For instance, simulation of an extended model with realistic parameter values can help find a land sale policy that minimizes the compensation gap, which will guide the government to privatize
public land with the least political resistance.

References


Appendix

Derivation of Equation (6)

The planner problem is

$$
\max_{c^y_i, c^o_i, m_i, l_i, h_i, L_i} \sum_{i=0}^{\infty} \lambda_i u(c^y_i, \frac{h_i}{(1+n)^i}, c^o_i)
$$

(A1)

subject to

$$\sum_{i=0}^{\infty} \left( \frac{1+n}{R} \right)^i \left( c^y_i + \frac{c^o_{i-1}}{1+n} + \frac{rm_i}{(1+n)^i} - W(1+g)^i \right) = 0$$

(A2)

$$h_i - h_{i-1} = f(m_i, l_i)$$

(A3)

$$L_i = L_{i-1} + l_{i-1}$$

(A4)

$$L_i \leq \bar{L}.$$  

(A5)

The Lagrangean is

$$\mathcal{L} = \sum_{i=0}^{\infty} \lambda_i u(c^y_i, \frac{h_i}{(1+n)^i}, c^o_i)$$

$$+ A \left[ \sum_{i=0}^{\infty} \left( \frac{1+n}{R} \right)^i \left( -c^y_i - \frac{c^o_{i-1}}{1+n} - \frac{rm_i}{(1+n)^i} + W(1+g)^i \right) \right]$$

$$+ \sum_{i=0}^{\infty} B_i \left[ f(m_i, l_i) - h_i + h_{i-1} \right]$$

$$+ \sum_{i=0}^{\infty} C_i \left[ L_i - L_{i-1} - l_{i-1} \right]$$

$$+ \sum_{i=0}^{\infty} D_i \left[ \bar{L} - L_i \right].$$

and the first order conditions are

$$\frac{\partial \mathcal{L}}{\partial c^y_i} = \lambda_i \frac{\partial u}{\partial c^y_i} + A \left( \frac{1+n}{R} \right)^i = 0$$

(A6)
\[
\frac{\partial \mathcal{L}}{\partial c_i} = \lambda_i \frac{\partial u}{\partial c_i} + \frac{A}{R} \left( \frac{1 + n}{R} \right)^i = 0 \tag{A7}
\]
\[
\frac{\partial \mathcal{L}}{\partial m_i} = -\frac{A r}{R^i} + B_i \frac{\partial f}{\partial m_i} = 0 \tag{A8}
\]
\[
\frac{\partial \mathcal{L}}{\partial l_i} = B_i \frac{\partial f}{\partial l_i} - C_{i+1} = 0 \tag{A9}
\]
\[
\frac{\partial \mathcal{L}}{\partial h_i} = \lambda_i \frac{\partial u}{\partial (h_i/\left(1 + n\right)^i)} \cdot \frac{1}{\left(1 + n\right)^i} - B_i + B_{i+1} = 0 \tag{A10}
\]
\[
\frac{\partial \mathcal{L}}{\partial l_i} = C_i - C_{i+1} - D_i = 0. \tag{A11}
\]

Using (A6) to express \( \lambda_i = -\frac{A}{\frac{\partial u}{\partial c_i}} \left( \frac{1 + n}{R} \right)^i \), substituting it into (A10), and simplifying give

\[
\frac{\partial u}{\partial (h_i/\left(1 + n\right)^i)} R^i \frac{\partial u}{\partial c_i} = \frac{1}{A} \left( B_i - B_{i+1} \right). \tag{A12}
\]

Summing this last equation forward gives

\[
\sum_{j=i}^{\infty} \left( \frac{\partial u}{\partial (h_j/\left(1 + n\right)^j)} R^i \frac{\partial u}{\partial c_j} \right) = \frac{1}{A} \left( \sum_{j=i}^{\infty} B_j - \sum_{j=i+1}^{\infty} B_j \right) = B_i \frac{\partial u}{\partial c_i} \tag{A12}
\]

If land availability constraint is slack, then \( D_i = 0 \) and, by (A11), \( C_i = C_{i+1} = C \), implying \( B_i = \frac{C}{\frac{\partial u}{\partial c_i}} \) from (A9). Replacing \( B_i \) in (A12) and rearranging gives Equation (6) in the text:

\[
\frac{\partial f}{\partial l_i} \times \sum_{j=i}^{\infty} \left( \frac{\partial u(c_j^y, h_j/\left(1 + n\right)^j, c_j^o)}{\partial (h_j/\left(1 + n\right)^j)} \right) \left/ \left( R^i \frac{\partial u(c_j^y, h_j/\left(1 + n\right)^j, c_j^o)}{\partial c_j^o} \right) \right) = \frac{C}{A} = \text{constant.}
\]

**Derivation of Equation (14)**

Let \( \overline{L} \equiv \{ l_t = 0 \text{ for all } t > 0 \} \) be the original land sale policy and \( L \equiv \{ l_t = 0 \text{ for all } t \neq s \)
and \( l_s = \Delta l_s \) be the new policy. Under \( L \), the equilibrium quantity of housing is

\[
h_t = \begin{cases} 
  h_0 & \text{if } t < s \\
  h_s & \text{if } t \geq s 
\end{cases}
\]

(A13)

making

\[
\frac{\partial h_t}{\partial \Delta l_s} = \begin{cases} 
  0 & \text{if } t < s \\
  \frac{\partial h_s}{\partial \Delta l_s} & \text{if } t \geq s 
\end{cases}
\]

(A14)

Since rental market rate is given by (8)

\[
h_t = D(q_{h,t}),
\]

it follows that

\[
\frac{\partial q_{h,t}}{\partial \Delta l_s} = \frac{\partial q_{h,t}}{\partial h_t} \frac{\partial h_t}{\partial \Delta l_s} = \frac{1}{D'} \frac{\partial h_t}{\partial \Delta l_s} = \begin{cases} 
  0 & \text{if } t < s \\
  \frac{1}{D'} \frac{\partial h_s}{\partial \Delta l_s} & \text{if } t \geq s 
\end{cases}
\]

(A15)

Given that housing price is the present value of rents

\[
p_{h,0} = \sum_{t=0}^{\infty} R^{-t} q_{h,t},
\]

(A16)

(A15) implies

\[
\frac{\partial p_{h,0}}{\partial \Delta l_s} = \sum_{t=0}^{\infty} R^{-t} \frac{\partial q_{h,t}}{\partial \Delta l_s} = \sum_{t=s}^{\infty} R^{-t} \frac{\partial q_{h,t}}{\partial \Delta l_s}
\]

\[
= \sum_{t=s}^{\infty} R^{-t} \frac{\partial h_s}{\partial \Delta l_s} \frac{1}{D'} \frac{\partial h_s}{\partial \Delta l_s}
\]

(A17)

The marginal compensation gap is easy to derive when we first take both limits (\( \Delta l_s \to 0 \) and \( \bar{l} \to 0 \)).
\[
\frac{\partial \chi(\Delta l_s; s; \bar{l})}{\partial \Delta l_s} \bigg|_{\bar{l}=0, \Delta l_s \to 0} = \left( -\bar{h}_0 \frac{\partial p_{h,0}}{\partial \Delta l_s} - \sum_{t=0}^{\infty} \bar{l}_t \frac{\partial p_{l,t}}{R^s \partial \Delta l_s} - \frac{\partial \alpha_s}{\partial \Delta l_s} \times \frac{p_{h,s}(h_s - \bar{h}_s)}{R^s} - \alpha_s \left( \frac{\partial p_{h,s}}{\partial \Delta l_s} \times (h_s - \bar{h}_s) + p_{h,s} \frac{\partial h_s}{\partial \Delta l_s} \right) \right) \bigg|_{\bar{l}=0, \Delta l_s \to 0} = \bar{h}_0 \frac{\partial p_{h,0}}{\partial \Delta l_s} - \alpha_s \frac{p_{h,s} \frac{\partial h_s}{\partial \Delta l_s}}{R^s} = -\sum_{t=s}^{\infty} R^{-t} \left( \alpha_s q_{h,t} + \frac{\bar{l}_t}{D_t} \right) \frac{\partial h_t}{\partial \Delta l_s}
\]

The second equality follows from taking the limits. The third equality follows from rearranging terms and substituting equations (A16) and (A17) and using the fact that \( \bar{h}_t = \bar{h}_0 \) for all values of \( t \geq 0 \).