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 THE HONG KONG INSTITUTE OF
SURVEYORS
香港測量師學會

Suite 801, 8/F, Jardine House,
1 Connaught Place, Central, Hong Kong
香港中環康樂廣場1號怡和大廈8樓801室

Telephone 電話：(852) 2526 3679
Website 網址：www.hkis.org.hk

Fax 傳真：(852) 2868 4612
Email 電郵：info@hkis.org.hk

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Editorial

RETHINKING THE FERRIES

It is an ironic situation for Hong Kong people to boast of and treasure Victoria Harbour as a recreation, heritage, and tourism asset, and yet to face an ever deteriorating standard and network of ferry services. The recent lack of interest amongst operators in running the remaining routes points towards a ferry-free, natural harbour while population continues to grow in Hong Kong's hinterland.

Time economics and a change in habits of transit are surely a factor behind the decisions by the ferry companies to reduce their already small scales of operation, but arguably, it is more likely the combined long term result of policy neglect and rigidity that has stripped our harbour of its graceful ferries and an alternative mode of transport.

The discontinuation of most harbour ferry routes and the near destruction of what was once the largest ferry fleet in the world silently occurred more than a decade ago, when the chance of cross-subsidizing public ferries by real estate development on piers was lost in a lose-lose legal battle.

Since then, the policy protection of rail transport, which involves no less cross-subsidizing by property development in each station (via an artificial technical assumption of no station or rail connection in premium assessment), has further marginalized ferry operations.

What possible policy options are open to revitalize the ferries?

In the short run, there seem to be few choices other than accepting what the ferry operators propose.

In the medium run, however, there can be a real possibility of bundling together profitable cross-harbour tunnel bus routes and specific harbour ferry routes to achieve cross-subsidization. This option, however, must be carefully analyzed as it would have a great impact on existing bus operators already facing problems posed by the preferential treatment of the Mass Transit Railway (MTR). Some form of incentive is essential as a public investment. An alternative is to tie in the harbour ferries with either the Cross Harbour Tunnel, which has been subsidizing private transport by charging too little, or the monolithic MTR.

The above option of cross-subsidy attracts two inter-related non-economic

questions. The first question is the wisdom of using real estate items to sponsor anything. The second is the danger with any horizontal integration involving big business, which risks being anti-competitive.

The reply to these so-called problems is that the harbour ferries are under imminent threat of extinction and hence any source of cross-subsidy should be seriously considered on a case-by-case basis, granted that the ferry remains an item on the government's transport planning agenda.

The long term method for recapturing the lost potential of ferry services must lie in a major re-thinking and re-organisation of internal public transport, which has been fragmented, not just in terms of efficiency but also scope and diversity. It may entail de-regulating the ferry as the current model would appear to be outmoded.

This rethinking should be informed by at least two considerations, namely the nature of public transport operations and the credibility of perpetuating government subsidies of private road transport in light of the practicalities and sensibility of electronic road pricing (ERP).

In many world cities (say, Sydney), where international tourism is a major source of income, public transport has been operated as a single concern that provides coordinated rail, bus, and ferry services to compete with such individual free market competitors as taxis. The libertarian argument against this approach has been backed by findings of constant return to scale, if not diseconomies of scale. In the case of Hong Kong, however, all major public transport operators, save the Star Ferry (likely due to constraints in pier handling capacity), enjoyed economies of scale from 1946 up to 1998. Interestingly, however, while the Ngong Ping 360 (cable car), Light Rail Transit (LRT), Ma On Shan Line, Kowloon Canton Railway (KCR), and Airport Express and MTR have since combined into one commercially operated rail concern, there has been no attempt to apply the logic thoroughly so that buses and ferries are also absorbed into one mass mover transport operation.

The modern Hong Kong complaint against "too many buses" on the road is the same as complaining that there are already too many private vehicles on the street. This is so because there has been no direct pricing of the use of expensively-built and maintained road space. The cost of using that space is paid indirectly by taxes on petroleum, on vehicles and by the costs of queuing (congestion). ERP is a viable solution and it

makes absolutely no economic sense not to implement it for both private and public road transport to ensure an efficient method of allocating scarce road resources. If the social consequences of efficient road space allocation by the market are deemed unacceptable, then solutions can be found by cross-subsidy in favour of public transit.

The argument against ERP for fear of invasion of privacy is no longer valid not only because personal data collected by ERP is now well-protected by the relevant privacy legislation, but also because of the actuality that in other cities with similar problems (for instance Singapore and London) the public good of less pollution and congestion has been deemed to have superior claims to a supposed private right to anonymous movement.

Professor Lawrence WC Lai
28 February 2011

A Framework for Understanding Property Right Creation: Quantity Vs. Quality Dimensions of Properties

*Frank T Lorne

ABSTRACT

Referencing the work of Alchian and Cheung, this paper suggests the use of reference points to be important in defining property rights. The framework so derived classifies property rights into Type A and Type B where the former's value is derived primarily from characteristics within the physical boundary of the property, while the value of the latter is primarily derived from reference points outside the physical boundary. The quantity dimension of properties is largely measurable as in Type A, while the quality dimension of properties is indirectly measured in terms of potential income to be generated based on various reference points. Exclusivity in Type A does not imply exclusivity for Type B.

KEYWORDS

Property Rights, Reference Points, Sustainable Development, Institutions

INTRODUCTION

Conceptual distinctions need to be made regarding two types of property right creation in the dimensions of quantity and quality. Governments of the world can formalize, recognize, or in some situations, create private property rights by constitution, by law, and by custom. They can also govern the various uses of properties by regulation, by zoning, via various taxes and subsidies that can alter private rights in dimension via tampering with exclusive use, income rights and transfer rights.¹ Understanding properties as entities beyond assets defined by measurable physical boundaries is the first step towards appreciating the multi-dimensional aspects of property rights, often with values derivable from reference points *out of the physical boundary of the property*. These factors constitute various characteristics of the quality of property rights, which need to be distinguished from the quantity dimension of property rights.

Traditional conceptual treatment of property rights assumes property as exogenously given, and that property rights are treated as institutional constraints.² Yet, constraints themselves can become decision choice variables as well. Aside from that they are the rules for the game of competition, they can be altered by the referees in specific instances as well as constitutionally,

and as such, will likely affect how the whole economic system operates. Thus practical examples of the alteration of constraints are ubiquitous, even without requiring there to be an overhaul of the system. Increasingly in various market regimes of the world, the inclusion of stakeholders in pursuing the additional criterion of the sustainable development of firms, replacing a pure profit-seeking motivation can create new properties for intangibles not easily capturable in measurable dimensions of the tangibles. These various choice complications require a simplified framework of categorization to provide further critical thinking on the subject which this paper hopes to provide. The static (traditional) notion of property rights, stressing only the quantity dimension and the set of rights specific to a market mechanism, is somewhat inadequate in dealing with these complex issues of choice. Properties and their rights are likely to evolve as a dynamic process over time due to innovation. Clearly, the cumulative build-up of properties in human civilization was not a homogenous expansion but an evolving, expanding set of heterogeneous entities in numerous dimensions involving quantity and quality.

¹ Demsetz (1967) talked about the “coalescing” of property rights into bundles. This notion has been further articulated in Steven N.S. Cheung (1974).

² Umbeck (1981) made the first attempt to make constraints endogenous in the context of the California gold rush, but the property right concept in his treatment is one-dimensional, emphasizing the quantity dimension, as gold is rather homogenous.

THE “OLD” UCLA APPROACH TO PROPERTY RIGHTS

Consider a pet rock which could have been found anywhere: As a generic piece of rock, it is valueless because similar pieces of rock are abundant. It is meaningless to define that pet rock as property because it does not contain identifiable characteristics that will trigger competition to own it as a scarce resource. Yet, considering what valuable mineral may be inside the rock, the location where that rock was found, the year it was found, the season and the time of the day it was found, who found it, the context in which the rock was found, all these can create values for the rock which is valued, perhaps by at least one person.³ If there is one additional person valuing one characteristic, or a mix of such characteristics that cannot be easily found in other pet rocks, the need to define that rock as property is established.

The point that scarcity results in competition, and that competition requires defining a rules of the game for allocating the use and the ownership of the property is not a novel point. They are well-known propositions in property

right literature.⁴ Taught as an oral tradition by UCLA economist, Armen Alchian and many of his students in other universities in North America in the 70s, it was originally described in an introductory chapter in his book with William Allen, entitled *Production and Exchange: Theory in Use*. For a period of 20 or 30 years, this thinking has defined the property right approach in economics. All economics students who graduated from the PhD program at UCLA from the 60s to the 80s knew this material well.⁵

REFERENCE POINTS AS QUALITY OF PROPERTIES

There are other dimensions of property that are worthy of further exploration. Let's use the same example of a pet rock. **The perspective from which the rock is viewed and the backdrop in which the rock is featured would also make a difference.** We can call this the reference point of the property. The elaboration in the previous paragraphs implicitly defines the reference point of the pet rock as the rock itself, as a display, as a piece of mineral ore, or as any use associated within the physical boundary of that physical property. Yet, the reference points of a property can be multiple; the rock itself may have

³ Unlike a rock that contains intrinsic mineral values, in an old town in Yibin China, next to the Yangtze River, pet rocks of “Yangtze River” can fetch values of over 1000RMB based on reference points outside the intrinsic values. The pattern of a rock is a matter of subjective interpretation, involving characters, symbols, objects, sceneries or sentimental values.

⁴ Lai and Yu (2003), chapter 3, explained this concept for planning professionals. Webster and Lai (2003) also recounted the literature on property rights which broadly include Chicago, UCLA, and Washington.

⁵ The influence of this approach and its relationship with the Chicago and the Washington approach is not the gist of this article. Certainly, many economists, e.g. Demsetz, Cheung, Barzel, North, overlapped in school of thought. The introduction of the property right approach to Asia, on which inspiration of this article is in large part based, can be uniquely credited to Steven Cheung, who obtained his PhD in economics from UCLA.

little value, but the vantage point of the surroundings from which the rock is viewed may be very valuable. Scenery may be abundant, but a particular view of some scenery may not be. It is not unusual that properties exist side by side in the same location with size and soil condition being exactly identical. They may nevertheless command drastically different prices because one parcel has a better view advantage over the other. Perhaps it is a particular angle of a view from the property that makes the property valuable, not the intrinsic, measurable quantity dimension of the property. If one thinks about this for a moment, it is strange that the value of a property can be derived from something physically out of its boundary; and yet, that seems to be a matter of significant concern in many situations, e.g. fung-shui, etc. Fung-shui is not particularly measurable, but referencing a property from that perspective can decide whether that property will be used or not. In Asia, a bad fung-shui property has below market value.

This discussion suggests that the property of the rock can go beyond the physical matter of the rock itself, with unique accessories tied (bundled) to it. Be it a view (and how far from the rock), an air current (how strong and how often), or a tendency to attract the attentions of other living entities (be it human, birds, or insects), properties cannot be analyzed in isolation. This conceptual or socio-legal nature of

land as property probably distinguishes itself to a large extent from other physical items of property such as a car. Although one can argue that people attach sentimental values to their own cars in such a way beyond the physical characteristics of the car itself also; by and large, the value of driving or owning a car is derived from the value of characteristics embedded in the car.

The reference points of properties are matters beyond bundling, coalescing, and the mere inclusion of characteristics in the manner of a hedonic index for properties.⁶ In many scenic spots in China, carving of poems on stones by artists, calligraphers, persons of historical significance or nobodies can be found. What triggered their actions in leaving traces at particular spots? Often these are triggered by moments of inspiration, but perhaps in some situations also by particular scenic views that triggered the inspiration. These historical carvings often add value to a tourist visit to particular spots, although modern environmentalists would probably label them as some sort of a permanent *graffito*. Of interest here is the query as to why a particular location or a particular rock is chosen on which the thoughts of the person are registered. Certainly, scenic spots exist everywhere in the world, in some sense, they are so abundant as to be almost unlimited. Yet, until a particular spot is registered in thought and in terms of its reference

⁶A hedonic index can be interpreted objectively as a bundle of characteristics, intrinsic to the property and constant over time. However, if any hedonic index is interpreted as a discovery process evolving from entrepreneurial efforts, reference points of a property undoubtedly shift and the hedonic index under an evolutionary approach is in principle similar to the proposition made here. For details on this evolutionary approach to consumption, see Andersson (2008).

point, the spot is not a property.⁷ When that reference point is accepted as valuable, the physical location attains value as property.

A discussion of reference points in relationship to the concept of property rights can be quite important as a complementary understanding of the traditional concept of property rights. Property rights in the literature emphasize the right to income, the right to use, the right to transfer and the right to exclude. The reference points implicitly used in these concepts are all within measurable boundaries of the physical property. The economic system within which property rights are meaningfully discussed is usually a market system. The criteria for survival are profits and utilities. Yet, reference points beyond the physical boundaries can imply certain aspects of rights originating from those reference points. It could be those rights (aside from the rights emphasized in the literature) that contribute to the main value of a property.

Lai and Yu (2002) noted that Hong Kong was a “barren rock” as considered by the British colonialists when they first arrived. Trees on the island “existed largely as planted *feng shui* woods in villages as a result of customary rules — indigenous property rights that play a part in conserving the environment.” p.47. Clearly, rocks

without trees would be valueless, and trees without rocks would not be location specific in a traditional Chinese aesthetic context. The property in that case (and its associated value) is created by *referencing* the barren rocks with trees, either alone will not be sufficient to define the property. The fact that the barren rock later did not persist requires a framework of analysis that will be further elaborated in the subsequent sections of this paper.

Addressing the reference points of properties requires investigations beyond their measurable boundaries. This can pose a significant problem in the profession of surveying, which is founded on the premise that properties are measurable. Even when an asset possesses measurable characteristics that can be surveyed, it may not be a property until it goes through a transformation process from something valueless to something valuable. The transformation process could be a discovery (an accidental encounter), an event attachment (a rock concert), or from the spillover effects of an infrastructure investment. The latter was a proposition suggested by Dr. Sun Yat-sen in *San Min Chu I* (Three People’s Principles), based on lectures he presented in 1924 — an idea that largely originated with an American sociologist, Henry George.⁸ These writers emphasized primarily the transformed value of properties rather

⁷ If human statements made on nature can be considered as *graffiti*, the biggest *graffito* of the West could be found at Mount Rushmore in North America, on which the face of George Washington, Abraham Lincoln, Thomas Jefferson, and Theodore Roosevelt are carved into massively monumental busts.

⁸ See Trescott (1994). The extended discussion in the paper is also in line with the idea of the reference points raised in this article.

than any intrinsic value of the properties. To the subject of transformation we now turn.

QUALITIES OF PROPERTIES GENERATED FROM TRANSFORMATION

Transformation is innovation. That it can play a role in affecting values is a trivial proposition. However, it will be useful to ask whether there is a physically measurable entity that can capture, or at least reflect, the value increase of the property in this process. If innovation is recognized and further protected by patent or some sort of a legal recognition, the creation of new properties is most obvious. Yet, those may not be the only instances where new properties are created.

Before we elaborate on these other instances, it is also relevant to ask whether the transformation of innovation is by luck, or whether it comes from some deliberate effort that follows the design of a “blue print”, or some type of sophisticated planning. Innovation by contract and planning by contract have been separately explored in different contexts in past writing;⁹ the former dealing with industrial market changes while the latter specifically refers to land use. What has not been

emphasized in the past is that both processes will result in more properties being created.

That properties can be created by a contractual process, rather than an exogenous addition to a system and be treated as unalterable *constraints* is an important point, because the creation of natural resources is exogenous, but a transformation process capable of being designed and managed by humans is endogenous. What principle(s) do humans want to use for this transformation process? Each society has its own answer for that question. For some primitive societies, this transformation process may be sometimes determined by the medicine man (a *shaman*) of some sort. For others, it could be a tribal tradition carried over from generation to generation. This is usually in the realm of study by social-anthropologists, but political economists, system analysts, and management gurus have also explored that in the context of information management.¹⁰

Can additional critical thinking provide further insights to this transformation? The answer is affirmative. In the next section, I argue that the criterion for this transformation is not much different from that embedded in the regular tools of demand and supply, though

⁹ Yu (1981) proposed that in the context of patent licensing contracts. Lai (1997, 1998, 2004, 2005), in a series of paper, formulated the idea in the area of planning and land development.

¹⁰ Jean-Jacques Rosa (2006, French version 2000) explored these dimensions in detail. See particularly the chapter “The Decisive Role of Information” (Chapter 6, p.201-264). The fundamentals of information can be intimately related to the question of organization — markets versus hierarchies. System analysis can also be found in Casper and Waarden (2005) in which a collection on essays addressed how some national systems can do better in innovation even though their institutions may be deeply rooted in history and culture.

additional elaboration of its implications will be useful. Furthermore, the same set of tools can be used to integrate additional criteria that have been imposed from outside the economics profession, namely, the concept of sustainable development. During the infancy of the concept of sustainable development, supporters of the concept believed the concept is fundamentally in conflict with neoclassical economic principles. This has been argued to be incorrect in several of writings by me, Professor Lai and others in the past. To adopt sustainable development principles for resource allocation and management of resources, one may need to modify some economic criteria for decision making, but we need not throw the baby out together with the bathwater. Sustainable development as a concept and as a strategy for property development is not patentable, but it can add value to properties in the same sense that a good view or a good fung-shui can add value to properties.

Lai and Lorne (2006) analyzed the case of the town of Britannia Beach in Canada to illustrate how sustainable development can be different from the traditional concept of resource allocation by economists. Property rights in the traditional sense of the word in the form of land deeds and Crown leases long existed at the location being studied, and indeed, were well supervised by Environment Canada. Thus, it cannot be said that it was a lack of private property that had led to various misallocation of resources. Yet, relying on private negotiation of property rights in the Coasian bargaining sense of word had reached nowhere for a period of close

to 20 years in resolving the copper mine pollution (brown field) problems in the area. It was not until there was a changing of reference points, i.e. the changing of mindset, as to what is perceived to be desirable, that redevelopment of the area took a giant step forward.

We have argued that sustainable development should aim at the shifting of the marginal curves, rather than a movement along a set of marginal curves. It should be designed as a mechanism to increase value, rather than the neoclassical emphasis of negotiating along the marginal curves to the point of static optimality. The crucial difference between the two methods of increasing value is that sustainable development creates new properties, whereas negotiating along existing marginal curves would not create new properties. It merely leads to properties being more efficiently utilized. Sustainable development embeds values into properties in the same way that cultural and historical happenings can embed values into properties. The reference points that sustainable development can bring in are extensive, with stakeholders from various sectors of the economy *outside* the physical boundaries of a property having a say on the property. The mechanism that would allow this to happen is conceptually not that different from a mechanism that will make a physical object move at great speed (i.e. an engine) or even a seemingly antigravity device such as an airplane. They are *new properties*, and as such, methods of legalizing their protection may be as important as the conventional concept of properties in the form of

deeds and contracts, i.e. along the measurable quantity dimension of the properties. This statement is made as a proposal rather than a statement of facts, however.¹¹

SUPPLY AND DEMAND FOR BASIC HUMAN NEEDS OF TRANSFORMED LAND (BHNTL)

Integrating the above considerations, let us outline a theoretical framework for analyzing the creation of properties. We can conceptually distinguish two types of property creation — type A and B, several real estate development implications can then be derived and clarified in the context of this theoretical framework. The conventional supply and demand tool of economists can be used for this illustration. Figure One depicts this set of curves in the context of property development of a country, let's say China.

The supply curve of property, *S*, is the marginal opportunity cost of raw land allocated for developers for property transformation. The opportunity cost of raw land includes the foregone agricultural produce from the raw land, the migration costs of the farmers, and the administrative costs of the land conversion.

Note that opportunity costs also include the values of natural resources, vegetation, and micro-organisms endowed with the land (rock). There are resources hidden that have yet to be discovered; if so, the opportunity costs would not reflect that, although some natural resource economists would attribute an option value to it.

The values of various natural and historical endowments of a location could be a matter of subjective interpretation. A micro-organism existing in that location certainly has no means to express its preference for survival, but microbiologists in the name of bio-diversity could create a value for such existence, and in that sense that would count as part of the opportunity costs also.

The ranking of opportunity costs of raw land from low to high opportunity results in an upward sloping supply curve of land. Theoretically, low opportunity cost land should be developed first. However, land of low opportunity costs is often also low value land, not highly demanded by human users. The matching of low opportunity costs with high value uses as the supply and demand tool would imply is unlikely.

The theoretical formulation for this is to assume an implicit cost of “betterment”

¹¹ Ronald Coase, an ardent supporter of the property rights approach, in a 2009 conference on “Markets, Firms, and Property Rights” at the University of Chicago, suggested the study of property rights should be largely the work of lawyers. Tangential to this inspirational suggestion are also his propositions that Markets should be viewed as *creations*, while Firms may have to be examined from a *sociological* perspective. The framework articulated in this paper, however, suggests that the study of property rights can also be the work of surveyors, particularly in the context of property type B to be further explained in the text of this article.

for the transformation, represented by the dotted line of S in Figure One. After basic betterment, raw land is transformed for basic human needs. The type of basic transformation required are shelter, utilities, and access.

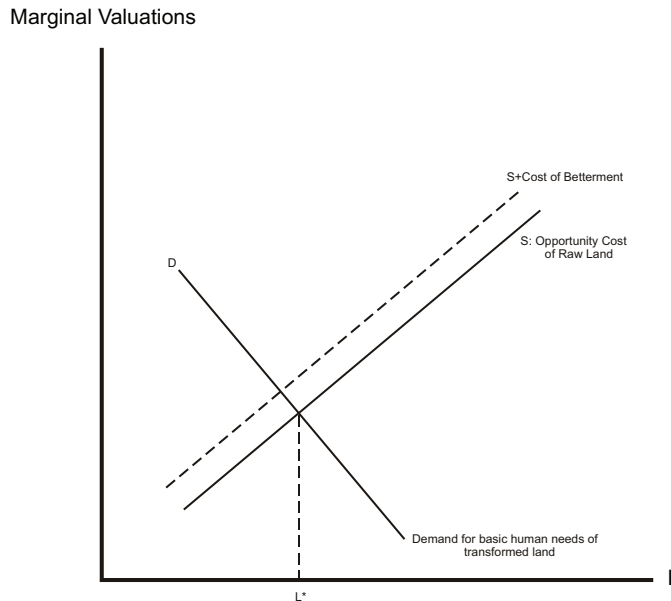


Figure One: Framework of Basic Human Needs of Transformed Land (BHNTL)

Thus, the dotted line S+ Cost of Betterment is now the supply curve of Basic Transformed Land (BTL). This, together with a demand for **basic human needs of transformed land (BHNTL)**, D, we can develop as a benchmark framework for analyzing property creation. This supply and demand framework assumes that the raw land units on the supply side are substitutable, and thus opportunity costs can be ranked, while a transformed land for basic needs is also substitutable. Thus the supply and demand tool can be used as an exposition tool for benchmark discussions.

INTERPRETATION OF BASIC HUMAN NEEDS AND THE CONCEPT OF OPTIMALITY

The basic human needs of transformed land should not be sensitive to the income levels of a country. Why? It is because it is basic, the facilitation of a minimum (or a range in the lower bound) for survival. It is not advisable that the definition of basic be subjectively determined (e.g. by a survey), as what is basic to one person might be different to another person. The theoretical concept here must thus be objective and hopefully scientific.

Basic is the level of facilitation for habitat continuation, like what might be needed for any species survival in the biosphere of the animal kingdom.

The value of basic needs therefore is the value for survival (not enjoyment). Units of BHNTL are thus entirely substitutable in that the survival characteristics are scientifically (or biologically) based. As long as a similar unit of land can be found to have the same characteristics, it is just as good for survival purposes.¹² If we assume the demand for basic needs is subject to diminishing returns (a quite plausible assumption), the demand for BHNTL is necessarily downward sloping.

The concept of opportunity cost of raw land has been discussed in the last section. The quantity dimension of raw land is again entirely substitutable, meaning that the 1st unit of BHNTL can be physically substituted by the 10th unit of BHNTL because they serve the same basic need purposes. However, the opportunity cost of the 1st unit is not the same as of the 10th unit. The theoretical formulation of the supply of BHNTL ranks opportunity costs in ascending order — thus an upward sloping supply.

A downward sloping demand together with an upward sloping supply

(marginal cost) implies there is an intersection denoting the point of optimality. Optimality implies that L^* amount of raw land should be transformed for human usages. How to estimate L^* is a different question, suffice to say here that an answer exists. The area between the curves represents the welfare of basic needs. But what about the “negative” area associated with the demand portion to the right of the intersection? Does it mean that some basic needs of humans will be denied? Not really, the diminishing return property in the formulation of demand assumes there is a quantity range of basic needs, e.g. people can survive on between x to y gallons of water per day. Thus, the intersection of the demand and supply of BHNTL denotes only a per-capita basic need consumption. A smaller quantity equilibrium only means a smaller quantity of basic needs per capita. It does not imply some people are being denied of basic needs.¹³

That basic needs are independent of income is an important assumption. If accepted, it means the demand for BHNTL should not be affected by growth in GDP, and certainly would not be affected by speculative purchases. The demand, however, should be affected by population growth. Thus, we might expect the demand to shift to the right as population in a country

¹² The original location of human habitat clustering therefore could very well be a random event. A random spot on a map with identical measurable characteristics would have been the starting point. It is when the location becomes *transformed* with clustering that additional property considerations for enjoyment (i.e. utility) will be added to complement the basic needs.

¹³ There can be more ramifications to the concept of basic needs, which have been addressed through other frameworks, e.g. Harberger (1984). To synthesize these various concepts is outside the scope of this paper.

increases. Whether the demand should shift in response to other indicators is an open question, but it is worthwhile for policy makers to devote some time to thinking about this.¹⁴

BHNTL IN DYNAMICS

We can now bring some dynamics into the analysis. The simplistic model of land development in the previous

section implies that raw land will be transformed for human use every year based on additional increases in population, with ΔL added every year for betterment, based on the magnitude of ΔD caused by a change in population.¹⁵ If population reaches a sustainable level of constancy at D^{**} , raw land transformation will stop at L^{**} . This dynamic process is represented in a static sequence in Figure Two.

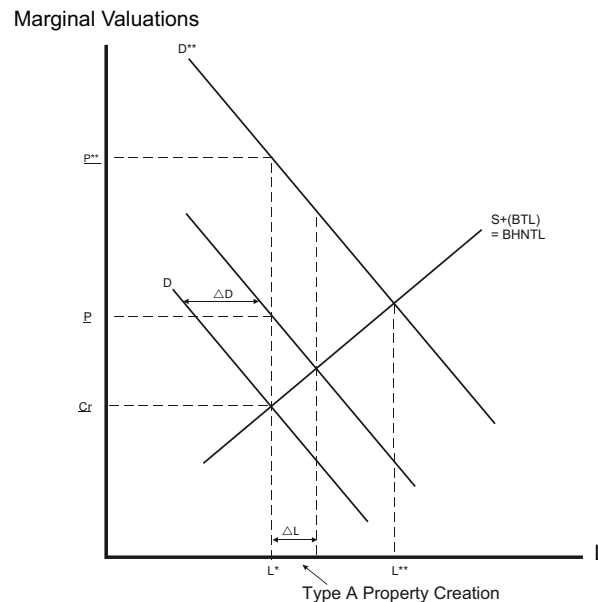


Figure Two: Property Creation of Quantity Through Time

¹⁴ Other questions worth pondering concern the slope of the supply curves and the divergence between supply curves beyond the initial transformation may want to advocate conservation. Yet, all conservation actions may be only suitable up to a limit. Certainly, the mere action of exploration will put in some carbon footprint, but no one would argue that all and any exploration of the wilderness should be banned. The reasoning behind this can be justified as recognizing that diminishing returns apply also on the supply side, thus affecting the slope of the supply curve. A few houses built in the wilderness impose small damage to nature, but human effects can rapidly accumulate and thus provide a reason for limiting development to a small scale in pristine areas.

¹⁵ Implicit in this formulation is a stock and flow dynamic process that we are collapsing into one diagram for exposition purpose. Time as an input to this process is being suppressed without losing the essential meaning in the text.

For the focus of discussion of this paper, ΔL increases the quantity dimension of properties, it represents the additional “basic properties” added every year to the economic system. It has the effects of lowering the price of the basic needs of land for human uses (as opposed to other species’ uses). Several implications of this formulation are immediate:

1. Transformed land costs more than raw land.
2. The quantity of transformed land in existence affects the difference between transformed value and raw value of land. The less quantity of land exists, the larger is the difference for any given plot of land.
3. The transformed land value may or may not be equal to developer’s cost of conversion. If that cost is added to the raw land supply curve, the new properties created may be less than ΔL every year.
4. What is more likely to be the case is that developers usually want more land than ΔL every year, because the developer would think ahead of the increase in population; and will perceive \underline{P}^{**} minus \underline{C}_r as the gain of conversion, while the present population will pay only \underline{P} for basic need of land for human uses, i.e. a social gain of only \underline{P} minus \underline{C}_r . If developer’s cost of conversion is greater than $\underline{P}-\underline{C}_r$ but smaller than $\underline{P}^{**}-\underline{C}_r$, developers are likely to ask for more raw land to be transformed than ΔL .

Notice the policy implication of this basic model: Any planning

commission may want to allocate land transformation based on macroeconomic data, not on specific location needs, which may be further evaluated by balancing the local benefits with the specific location opportunity costs. Needless to say, that approval process has to be decided on a case by case basis.

But the *modus operandi* is a simple one. Basically, a Planning Commission evaluates local specific information but subject to the planning constraint of not exceeding ΔL in a given year. Whether by request from developers or by direct granting from the Land Bureau, we will call this type of new property creation to be Type A.

PROPERTY RIGHTS OF TYPE A

Figure Three is used for the discussion of the meaning of property rights for the strip-down notion of properties that are measurable in the quantity dimension. Property rights include the right to exclude, to generate income, and to transfer (Cheung 1974). Laws and regulations will affect the *values* of these rights. Cheung (1974) argued that government rent control is an infringement of private property rights, thus creating nonexclusive income. From this perspective, a given statutory granting process for the *quantity* of properties cannot assure that the income rights of the properties are protected, because government bureaucratic procedural issues can entail loopholes, and uncertainties with respect to impending government directives can open up prospects for rent dissipation.

This part of the analysis, indeed, has been well explained in the literature.

Type A properties are granted along the quantity dimension by government allocation. These are raw land, or at best, in units of BHNTL after a basic betterment transformation. If rules of further development are unclear, the values that these properties can generate could be in doubt and can be considered to be nonexclusive (in the manner described by the conflict between developers and a Land Bureau as described in the previous section). This is so even for homogeneous development efforts of the type of building of readily recognized duplication from a blue print. The homogeneous development efforts entail only the quantity dimension limited to the duplication of the first building of the blue print.

Type A property creation follows standard regulatory procedures, considering both local and macro country needs. It aims to achieve an optimal land use for human uses as the broad objective, balancing the needs of the present generation with environmental (natural) opportunity costs. The creation of Type A emphasizes the process of transforming raw land into “semi-cooked” or “fully-cooked” land.¹⁶ Understandably, the “cooking” process of land in transitional economies may be weakly defined; and if so, the various aspects of the right to income to land may not exhibit full features of private property right, leading to some rent dissipation of the nonexclusive income equal to (or a little less than, see fn.17) the shaded area in Figure Three.

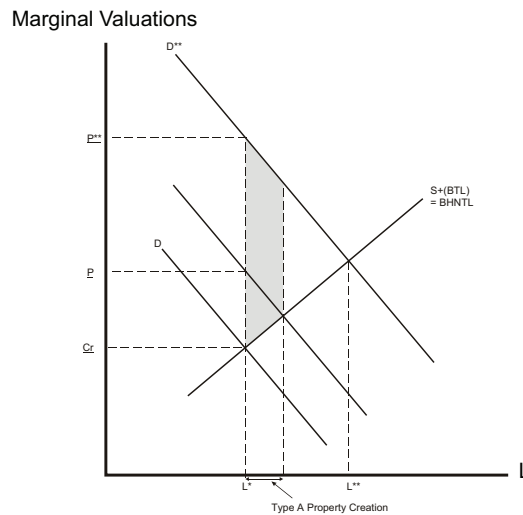


Figure Three: Nonexclusive Income of Type A Property Development

¹⁶ Nicknames given to the conversion process; in 2008, Chinese Premier Wen Jia-Pao, in his attempt to combat the heated real estate market development in China, proclaimed a freeze on farmland conversion in the name of land preservation.

It may be useful to further clarify the nature of the shaded area in light of past writing on rent dissipation. If Type A properties are allocated under a regime where a market mechanism is honored, part of the shaded area will be necessarily passed on to the consumer in the form of a consumer surplus. There is an implied distribution in the values of Type A between consumer and developers if a market mechanism is built in as an irremovable system component.¹⁷ Cheung (1974) argued that rent control creates nonexclusive income distorting the welfare distribution as determined by the free market intersection point of demand and supply. In other words, nonexclusive income can be the result of unclear development rules as well as an infringement of a free market mechanism for distributing income according to some prior understanding of the rules of the game.

SUSTAINABLE DEVELOPMENT CONSIDERATIONS

The problem can be further complicated if land transformation is also going to adhere to a principle of sustainable development which, according to the Bruntlund definition, is development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs.

Setting aside the debate of whether this definition of sustainable development can be implemented or not, this additional criterion can be represented by an upward shifting of the supply curve in Figure Two, meaning that there are implicit social costs of future generations that need to be taken into account. If so, new properties of Type A added every year should be less than ΔL . This interpretation is consistent with a halting of farmland conversion and the preservation of wilderness in the name of sustainable development. Indeed, if the implicit future value of farmland is high, new properties added could be zero. This can be represented by Figure Four.

¹⁷ Demsetz (1967) has the following statement that may appear puzzling to some: "Harming a competitor by producing superior products may be permitted, while shooting him may not...." While property rights may not necessarily imply the use of market mechanism, a regime committed to the use of market mechanism in conjunction with property rights can support the proposition so articulated.

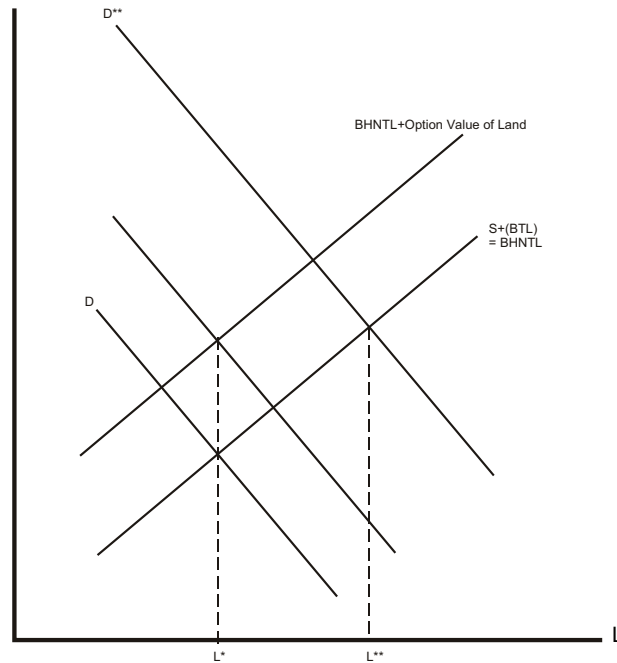


Figure Four: Bruntlund Implications for Property Development

There are reasons to adopt a more workably pragmatic meaning of sustainable development beyond the Bruntlund definition however. Many countries now adopt a version of sustainable development emphasizing the compatibility between economy, environment and society as described in Figure Five. The approach looks for methods of adopting a win-win strategy between the three sectors. Lai and Lorne (2003, 2006) interpreted the key to sustainable development to be a conversion of negative externalities

to positive externalities. Doing so requires a changing of the mind-set of stakeholders involved. In the case of Britannia Beach, Canada, the past act of negative externalities of soil and river pollution have been converted into a historical museum and a mining research facility that are using the past wrong to draw tourist visits and universities' participation in research for the future. The economy of the town can be gradually revived from such initiatives.

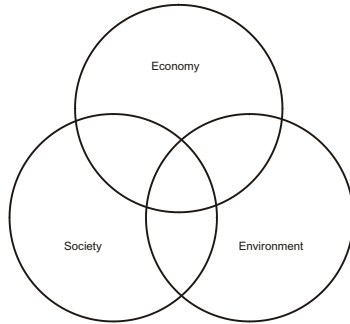


Figure Five: Conceptual Diagram for Sustainable Development

How should this meaning of sustainable development be incorporated into the new properties creation framework above? A representation of this, particularly if it involves a changing of mind-set for adopting a win-win agenda, is to shift the demand curve of Figures One and Two to the right. To be sure, the sustainable development criteria adopted are likely to be location specific rather than policy measures that can benefit human uses uniformly for all land transformed. Thus, the “new properties” being created in this case are not to be measured in the

quantity dimension by ΔL as in the Type A case. For the changing of mind-set and a new method of improving location specific advantages, the new properties so created would be of Type B. New properties of Type B are to be represented by value in terms of the shaded area in Figure Six. It may be pertinent to ask whether the shaded area of Type B is more (or less) likely to be subjected to rent dissipation when compared with that of Type A. Again, these are policy issues that need to be further addressed.

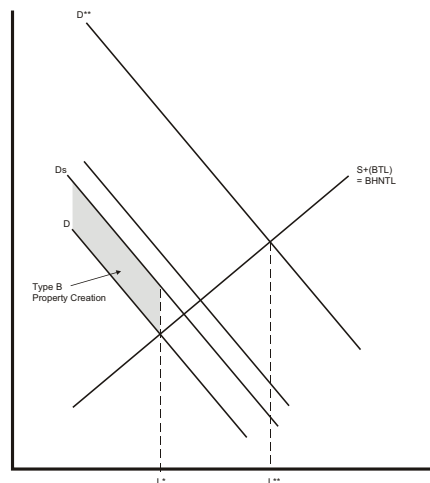


Figure Six: Sustainable Development Property Creation

PROPERTY RIGHTS OF TYPE B

Type B new properties can be tangible or intangible. Lai and Lorne (2006) examined the case of Britannia Beach in Canada finding that there were tangible investments such as the museum and the university research facilities in that area. The values of these tangible (new) properties are likely to build up when township population increases. The clustering will increase as the timeline progresses.

But the build-up of the value of properties of Type B can be more than that. It is the identity of a “new” direction for the town development that can also add value to the existing properties in the area. Type B properties include also a type of neighborhood, community effect that is specific to a location. This may be implemented often in a gated community where new values are created via a progressive management principle that developers can assist in building. Many of the private developers in China, as well as in other countries of the world are now aware of that, and have actively adopted measures to create new neighborhood properties of Type B.

Having said that Type B is possible, it does not mean that adopting sustainable development measures will necessarily result in a win-win of a positive nature. There can be investment and strategies that work in an opposite direction. I.e. the demand curve can shift to the right as well as to the left. Yu et.al. (2000) considered both cases by arguing that a win-win outcome can only be realized

in a probabilistic sense. The shift in the local production function may be aiming to elevate win-win interests for all, but it could also fail in that everyone turns out to be worse off. This is the intrinsic nature of innovation. It is risky and uncertain, and there is no guarantee of success.

The heart of the issue is not whether Type B values are positive or negative, but whether Type B values are likely to be exclusive and nonexclusive. Recognizing Type B values in a framework of property right creation can help identify factors that contribute to that *vis-à-vis* factors contributing to Type A values. Reasons for a lack of exclusivity for Type A have been explained in earlier section. Reasons for a lack of exclusivity for Type B have yet to be spelled out. If a stakeholder concept in sustainable development is implemented without some type of an organization or institutional protection, it seems theoretically similar to a common property situation; and if so, Type B values may ultimately become nonexclusive also.

CONCLUSION

A framework of property rights in quantity and quality dimensions is formulated in this paper to provide some new insights on the concept of property rights. The reference points of a property have been argued as the sources of the value of properties, and the rights of a property can be extended to tie with the property’s main contributing values. Property rights in this framework go beyond the conventional aspects of right to

use, right to income, right to transfer, and right to exclude, and may have to include the rights from these reference points. The classical notion of property rights is formulated as a Type A property, while additional features of property rights introducing the concept of reference points may be useful in identifying new properties of Type B. Basic human needs transformation of land in units of BHNTL is set up to facilitate a discussion of the two types of property creation. Potential conflicts between private developers and land policy administration can be described within this framework. Lastly, sustainable development as a criterion for development can be incorporated in the discussion of this framework, suggesting a need for its institutionalization.

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REFERENCES

- Alchian AA and Allen WR (1964), *Exchange and Production: Theory in Use*, Wadsworth Publication, Belmont.
- Andersson DE (2008), *Property Rights, Consumption and the Market Process*, Edward Elgar, Northampton, MA.
- Barzel Y (1989), *Economic Analysis of Property Rights*, Cambridge University Press, New York.
- Casper S and Waarden FV (2005), *Innovation and Institutions: A Multidisciplinary Review of the Study of Innovative Systems*, Edward Elgar, Northampton, MA, USA.
- Cheung, SNS (1974), A Theory of Price Control, *Journal of Law and Economics*, 17:1, 53-71.
- Demsetz H (1967), Toward a Theory of Property Rights, *The American Economic Review*, 57:2, Papers and Proceedings of the Seventy-ninth Annual Meeting of the American Economic Association, 347-359.
- Lai, LWC (1997), Evolution of the Contractual Nature of Land-use Control in Hong Kong, *Political Order and Power Transition in Hong Kong*, Li, P.K. (ed.), Chinese University Press, Hong Kong.
- _____ (1998), The Leasehold System As a Means of Planning By Contract—The Case of Hong Kong, *Town Planning Review*, 69:3, 213-25.
- _____ (2004), Spontaneous Catallaxis in Urban & Rural Development Under Planning By Contract in A Small Open Economy: The Ideas of Hayek and Mises at Work in Town & Country Planning in Hong Kong, *The Review of Austrian Economics*, 17:2/3, 155-86.
- _____ (2005), Planning by Contract in Hong Kong: the Foundation of A Comprehensively Planned Capitalist Land Market, *Economic Affairs*, 25:4, 16-18.

- Lai, LWC and Lorne FT (2003), *Implementing Sustainable Development: Institutional Features, Understanding and Implementing Sustainable Development*, Lai L.W.C. and Lorne FT (eds.), Nova Science Publishers, New York.
- _____ (2006), The Coase Theorem and Planning for Sustainable Development, *The Town Planning Review*, 77:1, 41-73.
- _____ (2006), Planning By Negotiation for Sustainable Development: A Tale of Two Habitats, *Economic Affairs*, 26:1, 54-58.
- Lai LWC and Yu BT (2003), *The Power of Supply and Demand*, Hong Kong University Press, Hong Kong.
- Harberger, AC (1984), Basic Needs versus Distributional Weights in Social Cost-Benefit Analysis, *Economic Development and Cultural Change*, 32:3, 455-474.
- Rosa, JJ (2006), *The Second Twentieth Century: How the Information Revolution Shapes Business, States, and Nations*, Hoover Institution Press, Stanford.
- Trescott PB (1994), Henry George, Sun Yat-sen and China: More Than Land Policy Was Involved, *American Journal of Economics and Sociology*, 53:3, 363-375.
- Umbeck, J (1981), Might Makes Rights: A Theory of The Formation and Initial Distribution of Property Rights, *Economic Inquiry*, 19:1, 38-59.
- Webster CJ. and Lai LWC (2003), *Property Rights, Planning and Markets: Managing Spontaneous Cities*, Edward Elgar, Cheltenham.
- Yu, BT (1981), Potential competition and Contracting in Innovations, *Journal of Law and Economics*, 24:2, 215-228.
- Yu, BT et al (2000), A Contractual and Property Right Approach to Sustainable Development, *Environmental Economics and Policy Studies*, 3:3, 291-309.

Transaction Cost Economics and Planning: A Note on the Contribution of Steven N.S. Cheung

*Lawrence W.C. Lai

ABSTRACT

This paper discusses the contribution of Steven N.S. Cheung to transaction costs analysis of planning as central economic planning as well as town planning, with specific reference to the similarities and differences between his concepts and those of Hayek, Coase, North and Williamson. Examples of the application of Cheung's theories to practical issues for economic reform in ex-communist economies and for town planning are discussed.

**Professor, Department of Real Estate and Construction, Faculty of Architecture, University of Hong Kong, Pokfulam Road, Hong Kong, China.
Email: wclai@hku.hk*

OBJECT

The incentive to write this paper is provided by the reception of transaction cost analysis in the literature on town planning, as exemplified by Burton (1978); Fischel (1978, 1979, 1980, 1987); Willis (1980); Alexander (1992, 1994); Diamond (1995); Webster (1998a, 1998b); Webster and Lai (2003), as summarized in Lai (2005) as well as the emergence of the paradigm of sustainable development (Gibbs 1994; Micklin 1996; Yu et al 2000; Lai and Lorne 2003, 2006; Lorne 2009) as an agenda item in international politics and local planning.

INTRODUCTION: CHEUNG AND PLANNING

As a distinguished economist, with more than 1351 citations by the end of 2010¹ in the social science literature for almost all his works since 1970, including those made by Becker (1992), Coase (1988, 1992), North (1990) and Williamson (1979), Steven N.S. Cheung has made a number of important theoretical innovations worth consideration by researchers in planning. In the planning arena, reference to the ideas of Cheung regarding property rights in general has been made by Pearce (1981) and Lai (1994); the problem of social cost by Pennington (1996); and positive externalities by Webster (1988b). Burton (1978) has also written a long epilogue for Cheung's monograph *The Myth of Social Cost* (Cheung 1978). However, there has been no

systematic exposition of Cheung's economic thoughts and their relevance to planning.

This short paper discusses the contribution of Steven N.S. Cheung to transaction costs analysis of planning in central economic planning as well as town planning. The discussion is conducted, where appropriate, in terms of the similarities and differences between his concepts and those held by Nobel Prize laureates in economic science, namely Coase (1937, 1959, 1960, 1974), Hayek (1944, 1960) and North (1990). Examples of the application of Cheung's theories to practical issues for economic reforms in planned economies and for town planning are also suggested. The discussion is an attempt not only to set a proper context for the emerging transaction cost paradigm for town planning research but also rekindle interest in much broader planning issues pertaining to the reforms of ex-communist regimes.

CHEUNG'S METHODOLOGY: THE SCIENTIFIC NATURE OF ECONOMICS

As indicated in his inaugural lecture for the Chair of Economics at the University of Hong Kong in 1983 (Cheung 1983a), Cheung is fundamentally a Popperian and an empiricist, though he has never made any reference to Popper or empiricists in his writings or other lectures.

¹ ISI, accessed on 21 December 2010.

Cheung stresses that theories must be positive, refutable and subject to rigorous empirical tests by measurable facts. With this tenet in mind, he criticises development economics, largely a post war product intended to improve the welfare of undeveloped nations for being prescriptive and, above all, being divorced from reality. Axiomatic mathematical equations and proofs of various types of equilibria, the state of art not just for development economics but for contemporary economics, as stated in his presidential address to the Western Economic Association, US, (Cheung 1998c), are considered much less meaningful or useful than theories contestable in terms of facts.

To economists, Cheung's heroic assertion about the futility of development economics, not to mention the sweeping claim that economics is the only social science which is as reliable as physical sciences may sound too extreme. However, Cheung is able to explain himself unambiguously about the hallmark for any discipline that professes itself as a science founded on demonstrable facts.

To planners whose jobs inevitably involve articulation of normative values as well as control of the market, Cheung's uncompromisingly empiricist stance reminds them that legislative and policy proposals derived from normative considerations must be predicated on the solid evaluation of existing facts and predictable consequences. The heyday of planning as a tool for regional, city and social improvement backed by massive public

spending had gone with the end of the 1970s. Since then, budget cuts, user charges, the privatisation of public facilities in western democracies and the near global collapse of planned communist economies have posed a universal challenge to the interventionist intellectual orientation of planners. In this context, the need for the planning theorist to marshal empirical facts to shape the law and policies, and argue a case has become much more important.

It is one thing to lay emphasis on empirical analysis; it is another thing to be able to do so. Many economists rely on arm-chair speculation in analysing or prescribing the law or government policies. Cheung fulfilled his own standards by carrying out a series of empirical studies, which are directly relevant to the planning researcher.

Cheung's studies fall into two interrelated transaction cost-based branches. One branch is intimately informed by Coase, consisting of three connected groups. The first relates to the Coasian analysis of social cost, the second to Coase's theory of the firm, and the third to the Coase Theorem itself. This branch is particularly amenable to the analysis of town planning. The other branch is partly based on the derivatives of the first branch but mostly on Cheung's own insights concerning the nature of private property rights and the importance of contractual arrangements for economic interactions. This branch envelops the first branch and is also relevant to the study of the planning problems of liberalising socialist systems. It begins with Cheung's doctoral thesis

on share-cropping, published in 1968 (Cheung 1968) and 1969 (Cheung 1969a) and encompasses not only rent control (Cheung 1975, 1979b), political indoctrination (Cheung 1969), phenomena in pricing of cinema seats (Cheung 1977, 1980), family relationships (Cheung 1972) and innovation (Cheung 1979a), but also various issues of economic reform (Cheung 1986, 1996, 1998a, 1998b). Many of Cheung's analysis can be transferred to interpret phenomena in the land market.

As unfolded in the following discussion, one of the key contributions of Cheung to economic analysis, that also lends its services to planning, is his stress on the need to identify the relevant constraints on making economic decisions. Cheung's emphasis on constraints with respect to competition has not only clarified controversies over "efficiency" but has also revealed the crucial role of property rights as institutional constraints. Competition flows naturally from human nature, as seen by the economist (Mundell 1968).

EMPIRICAL VERIFICATION OF MARKET INTERNALISATION OF EXTERNALITIES

Cheung empirically verifies the Coase Theorem, specified in Coase's "The Problem of Social Cost" (Coase 1960), in his paper "The Fable of the Bees" (Cheung 1974). Coase's theorem is presented by reference to the example of a cattle rancher and a wheat farmer, given the assumption of zero transaction

cost. Involving a land use conflict, this example should be easily appreciated by the planner. In "The Fable of the Bees", the scenic countryside parable of Coase is juxtaposed by Cheung's tale of the existence of a sophisticated market for pollination between the bee and apple farmers in Washington State.

Till then, Coase's idea that, where transaction cost does not exist, the market can internalise third party effects remained an academic speculation. A full elucidation of the concept of social cost is presented by Cheung in *The Myth of Social Cost* (Cheung 1978). Cheung's pioneering endeavour has been followed by Lai who (1993) found out that pollution as an externality has less effect than the absence of exclusive property rights on the yield of ocean fish. Cheung's paper on the bees appeared in the same year Coase provided an empirical study of the lighthouse in England as a supposed public good in the *Journal of Law and Economics* (Coase 1974), recently rigorously reviewed by Lai et al (2008a, 2008b).

Like Coase, however, Cheung has never preached the use of the market as a panacea for all human interactions. In "The Problem of Social Cost", Coase reminds the reader that zoning regulations are essential and regulation may enlarge a market in some situations. The reason is that in these situations the transaction costs of using the market are prohibitively high and the use of a hierarchy to organise the division of labour may be more appropriate. This is the original message of "The Nature of the Firm"

(Coase 1937), written by Coase when he was a second year student at the London School of Economics, to which we now turn.

THEORETICAL REFORMULATION OF COASE'S THEORY OF THE FIRM

The notion of transaction cost was introduced into the planning literature largely through the works of Williamson in managerial economics as referred to by Alexander (1992). The same is true of other professional disciplines such as construction management (Winch 1989). The reality is that the transaction elements of Williamson's works owe an intellectual debt to Coase (1937, 1959, 1960), with particular reference to Coase's "Nature of the Firm", where the advantages of using the organisation of the firm vis-à-vis an atomistic market are explained in terms of the transaction costs of using the mechanism.

To the planner, Coase's comparison between the firm and market is highly relevant, as it is the same as a comparison between the visible hand of the government, a special kind of firm, and the invisible hand of market. This line of thinking provides an alternative to welfare economics arguments of social cost and public goods to justify intervention in the market. As mentioned, Coase and Cheung have addressed the nature of both social cost and public goods.

If we jointly consider Coase's "*Nature of the Firm*" (1937) and his "Problem

of Social Cost" written 23 years later, we may get the impression that Coase is a "Humpty Dumpty" sitting on the wall. Before the Second World War, Coase provided an explanation for abandoning the market in favour of the firm in a scenario of positive transaction costs. This scenario logically ends up in a centrally planned economy, much criticised by Hayek (1944), if the transaction costs of contract formation are uniform for all relevant contracts (Lai 1999). After the Second World War, Coase gave an indication of the potency of the market to resolve the market failure problems of externalities in a scenario of zero transaction costs.

The better view is that Coase has been extremely consistent. The critics of the Coase Theorem, including Buchanan (1973), commonly ignore Coase's analysis of transaction cost in "The Nature of the Firm" (1937) or Coase's contingent approach to intervention clearly indicated in "The Problem of Social Cost". Cheung clarifies this subtle point by emphasising Coase's theoretical contribution as the specification of the twin pre-constraints for market conditions, namely the *rule of law* and *private property rights*. Cheung advances this idea by reformulating Coase's ideas in terms of three theorems, first presented in the prize presentation ceremony for Coase (Cheung 1990), and subsequently (Cheung 1992) commented on by Coase (1992) and Becker (1992) in *Contract Economics* (Werin and Wijkander 1992).

Before we move on to discuss Cheung's reformulation of the Coase

Theorem, we shall first examine how Cheung reinterprets Coase's theory of the firm, which underlies the thrust of Williamson's works. In "The Contractual Nature of the Firm" (Cheung 1983), Cheung advances the argument that the Coasian firm (and hence the Williamson hierarchy) is ambiguous as it is better to describe economic interactions in terms of different forms of contracts. While Cheung's contractarian view about the ambiguity of the firm may be contestable (Alchian and Woodward 1988, Lai 1998, 2000), his focus on the contractual arrangement renders his ideas amenable to a social contract view of society and the importance of private property, the relevance of which to the planner is discussed below.

THEORETICAL REFORMULATION OF COASE THEOREM

Most notable economists such as Buchanan (1973) and Stigler (1987) define the Coase Theorem as one derived from Coase's 1960 work on social cost: where transaction costs are zero and property rights are clearly delineated, resource allocation is the same (and hence "invariant") irrespective of the assignments of rights and liabilities. The standard Coasian explanation is that parties involved will exchange their rights or liabilities depending on which party gives the higher value to the use of the resource involved. Another "theorem" is that the allocation of resources in this context is always optimal and efficient. Cheung asserts that the most important theorem

is the third one which is to be found in Coase's "The Federal Communications Commission" (Coase 1959): clearly delimited property rights are the prerequisite for market transaction. More generally, taking into account Cheung's contractual view, a clear delineation of private property rights is a prerequisite for economic interaction. This apparently common sense generalisation, shared by Hayek (1960), cannot become operational without Cheung's specification of private property rights as well as his "theory of price control" (Cheung 1974).

CLEAR SPECIFICATIONS OF PRIVATE PROPERTY RIGHTS AND "THEORY OF PRICE CONTROL"

"The Theory of Price Control" (Cheung 1974) is probably the most important paper (referred to as the 1974 paper below) written by Cheung in the 1970s. It is logically connected with his earlier works on nonexclusive resources (Cheung 1970), which can be relied on to canvass the theoretical problems of "the tragedy of commons", now intimately related to the paradigm of "sustainable development".

Cheung's theory is of such general applicability that it goes beyond price control and is applicable to elucidate matters from system issues of economic reforms (Cheung 1982, 1998) to specific policy issues of rent control (Cheung 1975, 1979b), quota and zoning regulations. It is also directly useful to interpret the economic implications of various types of regulations, including

rent control and zoning.

In terms of academic citations, the 1974 paper does not appear to be as much discussed in the literature of institutional economics as his other works. From 1970 to 2010, Cheung's 25 works were cited in 1351 occasions, of which 75 made reference to the 1974 paper², compared to as many as 184 to his paper on the firm (Cheung 1983). Though Cheung's paper is called a theory of price control, it goes beyond a discussion of the economic consequences of price control. It gives a three-fold categorization of private property rights and offers a general theory of the attenuation of any of these rights by government and its aftermath. As such, Cheung's analysis of price control and rent control goes beyond the standard libertarian criticism of rent control as offered by Hayek (1960), which focuses on the disincentive effects on landlords and the moral issues involved.

In the 1974 paper, Cheung defines private property in terms of exclusive use, income and transfer. Cheung postulates that if any of these rights is affected involuntarily, there will be an adjustment in one or both of the remaining rights. The end result is that all potential for trade will again be exhausted and any "dis-equilibrium" associated with regulations will not persist. For instance, rent control on income rights may lead to a more intensive use and depreciation of the resource or earlier redevelopment to a higher intensity if that is not excluded

by the rent legislation. Cheung verified this prediction in his papers "Roofs or Stars" (Cheung 1975) and "Rent control and housing reconstruction: the postwar experience of prewar premises in Hong Kong" (Cheung 1979b), which explain why redevelopment of pre-war tenements was so hectic as a result of rent control. Cheung's thesis can be applied to quotas and other forms of regulation. In all cases, black markets will also emerge to recapture lost opportunities of trade, unless the enforcement of law is perfect. Thus in the end, the market is back to its original equilibrium, assuming zero transaction costs of black market deals. Cheung's theory can be integrated with the "rent-seeking" thesis, as interest groups and law enforcers may participate in capturing the lost opportunities of trade, converting "dissipated rent" into exclusive income for these groups and for enforcers.

There are three methods to regulate a land market to tackle "externalities". They are plot ratio zoning; development rights rationing through a restrictive planning application regime; and discriminatory zoning. The last method is now almost universally condemned on ethical and human rights grounds. Justification and criticism of zoning that excludes a certain ethnic or cultural group is often influenced by moralistic reasoning. The group that imposes such zoning often resorts to factors that characterize the target group as being the source of some undesirable problems, such as unhealthy social and living habits. The group being

² ISI, accessed 21 December 2010.

discriminated against and those who disagree with such zoning see it as a shameful manifestation of racism. The removal of discrimination laws is often said to be the triumph of enlightened public opinion. Our model can indicate that the establishment and downfall of discriminatory zoning can be explained in terms of pure economics.

Let us examine a simple supply and demand model (Figure 1) for a local land market to interpret three forms of intervention in the land market which can be illuminated by Cheung's theory of price control (Lai 1999b, 2000). Assume that in a certain city there are two identifiable ethnic groups. We call

the group which is being discriminated against the "target group" and the other group which is favoured the "protected group". It is "protected" as the measure, as the discussion reveals, is protectionist. If the land market is not regulated by any planning law, then the equilibrium will be E_M and the gain from trade represented by triangle $A E_M E$. Let us assume that the housing habits of the target group were really generating negative externalities (say noise and over-congestion) and for the sake of argument "the true cost of housing supply is S_S instead of S_M " then, following a Pigovian approach, the government can tackle these externalities by three methods.

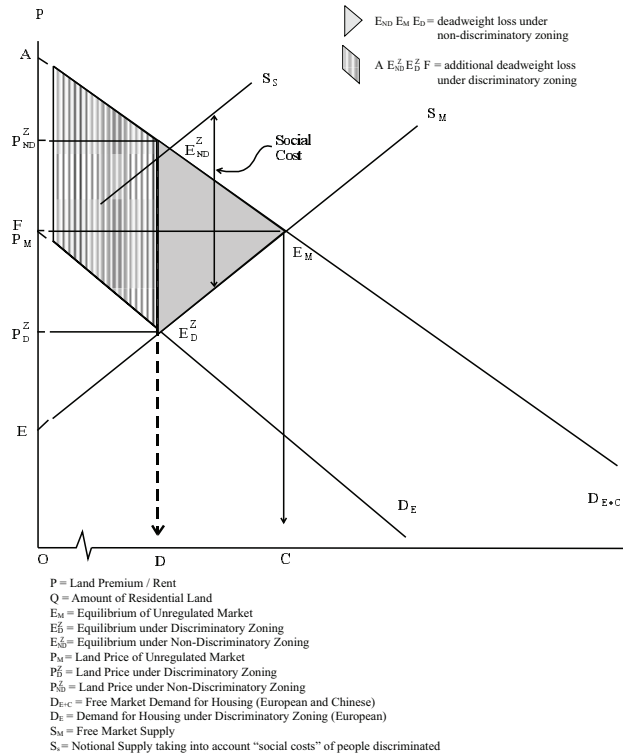


Figure 1. A Price Control Model of Racial Segregation (After Lai & Yu 2001)

A non-discriminatory method is to impose a universal maximum plot ratio zoning restriction (such as 50% of the pre-regulation amount) such that buildings in designated zones cannot exceed a certain floor space, as floor space is a proxy for the amount of externalities. This would mean that land supply becomes reduced to S_s . This is a kind of taxation in kind under which the financial impact on the proprietor is similar to a per unit tax based on the amount of total floor space in the absence of plot ratio control. The major difference between a per unit tax and taxation by plot ratio control is that in the latter situation, the lost income of the proprietor does not go to the tax authority but is “dissipated”.

A similar effect is true of a development rationing system which delays the release of development rights through a regressive planning permission system, which has the consequences that the supply of land becomes vertical at E_D^Z . In either case, assuming that there can be no bribery contracts to overcome the restriction, land price will be pushed to P_{ND}^Z with a dead weight loss which equals triangle $E_{ND}^Z E_M E_D^Z$, in terms of the free market equilibrium.

The situation of discriminatory zoning to deal with “social costs” for the target ethnic group is to rule out from designated zones the demand for land by that target group so that the relevant market demand curve is shifted from D_{E+C} to D_E . The resulting land price for the applicable zones will fall from the free market price P_M^F to P_D^Z . In other words, the target protected group gets a price discount for acquiring

their property. The dead weight loss associated with this kind of zoning greater than the above mentioned methods by $A E_{ND}^Z E_D^Z F$ in terms of the free market equilibrium.

Cheung’s insight is that, given the maximisation postulate for human behaviour, dead weight loss or “dissipated rent”, as common property with no definite owner, will be recaptured by rational individuals and groups. We can predict that the larger is the extent of “dissipation of rent”, the stronger will be the economic incentive for various groups to define the “dissipated rent” as exclusive property for themselves, whether they are the original owner, the regulator or professional groups (notably the lawyers and accountants), and hence the stronger are economic forces to abolish the measure in due course.

The moral of Cheung’s analysis of private property may be summarised as: private property as a consensual product has a stubborn character, any attempt to regulate its normal allocation by overt market price controls or contract constraints will be neutralized by covert transactions (i.e. bribery, smuggling, under table deals, and other evasive means) or, where such covert transactions are stamped out, such controls and constraints benefit no one save the regulators and enforcers of regulations. Note that Cheung’s analysis is compatible with the “rent-seeking” thesis developed independently by Tullock (Tullock 1993, 1994).

Cheung extends his analysis of the

attenuation and reconstruction of private property for one sector of the economy to the entire economy, leading us to even more exciting and important issues in domestic and international politics: the trends towards privatising public services; the universal demand for human rights protection; clean, responsible and democratic government as well as a viable economy which caters for the welfare of all. At this level of analysis, Cheung's ideas are remarkably similar to and probably foretelling those used by North (1990).

A THEORY OF THE ATTENUATION AND RECONSTRUCTION OF PRIVATE PROPERTY RIGHTS

In *The Road to Serfdom* (Hayek 1944), Hayek criticised central economic planning. Hayek depicts the Soviet economy as one super firm controlled from the office of Stalin. Hayek also explains that in a planned economy, the rule of law, which has superseded the rule of status, is displaced by totalitarian rule. Recall that Coase's "Nature of the Firm" (1937) explains that the firm saves the costs of using the market. Without dwelling on issues of civil liberty and rule of law, Cheung breaks theoretical ground in his monograph, *Will China Go Capitalist?*, published during the latter part of the Cold War and 4 years after the adoption of liberal economic reforms in China (Cheung 1982b). In the monograph, Cheung eloquently argues that the transaction costs of a command economy are far too great and predicts that China

will re-introduce a system of private property. In Cheung's thought, different economic systems are alternative means to resolve the problems of unrestrained competition that will prevail in anarchy or under common property. The socialist or communist system use party orders to replace the dollar vote of the market in deciding who gets what and how much. "Public ownership" of all resources in communist system is an inaccurate representation of party command of resources.

Hayek says that economic planning for an entire economy, an aspect of socialism, is bad. Schumpeter predicts that socialism will replace democracy nevertheless. Cheung argues that socialism has no future in any country. As far as communist regimes are concerned, Cheung has not been proven to be incorrect.

Cheung's ideas in the monograph are developed on the basis of his interpretation of Coase's works, his insights about private property and sub-contracting that date back to his doctoral thesis published in the midst of nuclear deterrence and a bi-polar world. Cheung's caveat for the triumph for the market economy is that the transaction costs to change an inefficient economy, due to the presence of vested interests, must be surmountable and that the planned economy does not degenerate, upon liberalisation, into an elaborated regulatory system with de facto rights to corruption clearly defined among bureaucrats (Cheung 1989, 1996).

After the "June 4 Incident" of 1989, Cheung further develops his ideas

about economic reforms in ex-communist regimes. He points out that liberalisation of state control of agriculture is easier than privatisation of state owned enterprises. The explanation is that land resources are largely non-depreciable but industrial capital is depreciable. Cheung also believes that the government of China is only communist in form. Its performance in economic and political dimensions is shaped more by the legacy of a command economy rather than sincere commitment to any ideology (Cheung 1998a).

More importantly, Cheung offers an economic explanation of the problems of human rights and legal reforms in communist regimes. In a market economy, there are equal human rights and equality before the law but there is inequality in the ownership of resources, which determines resource allocation. In a communist society, the priority of resource allocation is dictated by commands, the weight of which depends on the rank of the party comrade in charge. The rank ordering system of a communist society cannot co-exist with a system of equal human or legal rights. As to whether, in such a context, democratisation per se can tackle the problems of the establishment of a viable market economy based on equal rights and the rule of law, Cheung has great reservations (Cheung 1998b).

Though we may not agree with his political views, Cheung's analysis of the implications of a centrally planned economy for human rights and law is certainly helpful for understanding the problems in reforms of ex-communist

countries. In a more concrete way, Cheung's ideas provide a warning to those who feel despair about the looming problem of sustainability and seek refuge in the hope of a benevolent almighty government which may "do the right things to save mankind." A green Leviathan is no better than a red one.

CONCLUSION

Davidoff (1965) has argued that the planner in a pluralist society should be an advocate. Stigler (1981) has suggested that the economist is a preacher. It is this author's belief that the planner's advocacy can be much better today if he or she appreciates the preaching of the economist, whether as an ally, an opponent or a consultant. The preaching of Cheung in this context is particularly important because his ideas traverse law and policies at both the micro and macro level. His preaching is also easy to understand for the planner as his theoretical vocabulary is friendly. For planners who are interested in the transaction cost paradigm and its broader political context, Cheung's works are essential reading.

EPILOGUE

After his retirement from the Chair of Economics of the University of Hong Kong, Cheung eventually moved to Shenzhen and continued to publish books and articles in the Chinese language on the economy of China, which have been taken very seriously and with respect by the public and the

government of China. He recapitulated his views on Chinese economic reform in his most recent English work (Cheung 2008), which was a rarity since his Western Economics Society Presidential Address delivered in 1998 (Cheung 1998c), presented to the Conference on China's Economic Transformation, The University of Chicago Law School, 14 to 18 July 2008. The paper and the acclaim by his peers in America for it testify that though economic analysis itself is a matter of empirical science, its use is ultimately one of policy persuasion.

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REFERENCES

Alchian AA (1973), 'The Property Rights Paradigm', *Journal of Economic History*, 33:1, 16-27.

Alchian AA and Wood S (1988), The Firm is Dead, Long Live the Firm: A Review of Oliver E Williamson's the Economic Institutions of Capitalism, *Journal of Economic Literature*, 26:1, 65-79.

Alexander ER (1992), A Transaction Cost Theory of Planning, *Journal of the American Planning Association*, 58:2, 190-200.

Alexander ER (1994), To Plan or Not to Plan, That is The Question: Transaction Cost Theory and Its Implications For Planning, *Environment and Planning B: Planning and Design*, 21:3, 341-352.

Becker GS (1992), Comments on Steven N S Cheung's "On The New Institutional Economics", *Contract Economics*, in Werin, L, and Wijkander, H. (eds.), Blackwell, Oxford, 66-71.

Buchanan JM and Stubblebine W C (1962), Externality, *Economica*, 29:116, 371-384.

Buchanan JM (1965), An Economic Theory of Clubs, *Economica*, 32:125, 1-14.

Buchanan JM (1968), *The Demand and Supply of Public Goods*, Rand McNally, Chicago.

Buchanan JM (1973), The Coase Theorem and the Theory of the State, *Natural Resources Journal*, 13:4, 579-594.

Buchanan JM (1986), 'The constitution of economic policy', Nobel lecture, December 8, 1986, in Maler KG eds. *Nobel Lectures: Economic Sciences 1981-1990*. World Scientific, London, 180-189.

Buchanan JM, Tollison RD and Tullock G (1980), *Towards a Theory of a Rent-seeking Society*. Texas A&M Press, College Station, Tex.

Burton J (1978), Externalities, Property Rights and Public Policy: Private Property Rights or the Spoliation of

Nature, in Cheung, SNS (ed.), *The Myth of Social Cost*, Hobart paper 82, The Institute of Economic Affairs, London.

*Cheung, SNS (1968), Private Property Rights and Sharecropping, *Journal of Political Economy*, 76:6, 1107-1122.

Cheung SNS (1969a), *The Theory of Share Tenancy: With Special Application to Asian Agriculture and the First Phase of Taiwan Land Reform*, University of Chicago Press, Chicago and London.

Cheung SNS (1969b), Transaction Costs, Risk aversion, and The Choice of Contractual Arrangements, *Journal of Law and Economics*, 12:1, 23-42.

*Cheung SNS (1969c), Irving Fisher and the Red Guards, *Journal of Political Economy*, 77:3, 430-433.

Cheung SNS (1970), The Structure of A Contract and The Theory of A Non-exclusive Resource, *Journal of Law and Economics*, 13:1, 49-70.

Cheung SNS (1972), The Enforcement of Property Rights in Children, and The Marriage Contract, *Economic Journal*, 82:326, 641-657.

Cheung SNS (1973), The Fable of The Bees: An Economic Investigation, *Journal of Law and Economics*, 16:1, 11-33.

Cheung SNS (1974), A Theory of Price Control, *Journal of Law and Economics*, 17:1, 53-71.

*Cheung SNS (1975), Roofs or Stars:

The Stated Intent of A Rents Ordinance, *Economic Inquiry*, 13:1, 1-22.

*Cheung SNS (1977), Why Are Better Seats Underpriced, *Economic Inquiry*, 15:4, 513-522.

Cheung SNS (1978), *The Myth of Social Cost*, Hobart paper 82, The Institute of Economic Affairs, London.

Cheung SNS (1979a), *Property Rights and Inventions*, University of Washington, Institute for Economic Research, Discussion Paper No. 79-11.

*Cheung SNS (1979b), Rent Control and Housing Reconstruction: The Postwar Experience of Prewar Premises in Hong Kong, *Journal of Law and Economics*, 22:1, 27-53.

*Cheung SNS (1980), Rose Bowl vs. Hong Kong: The Economics of Seat Pricing. *Research in Law and Economics*, Supplement 1, JAI Press Inc.

*Cheung SNS (1982a), Property Rights in Trade Secrets, *Economic Inquiry*, 20:1, 40-53.

Cheung SNS (1982b), *Will China Go 'Capitalist'?* Hobart Paper 94, Institute of Economic Affairs, London.

Cheung SNS (1983a), 'Economic Explanation: Let Us Ride With the Surging Tide', Inaugural lecture delivered on October 26, 1982. *University of Hong Kong Supplement to Gazette February 28, 1983*, University of Hong Kong, Hong Kong.

*Cheung SNS (1983b), The Contractual Nature of The Firm, *Journal of Law and Economics*, 26:1, 1-21.

Cheung SNS (1984), Why is There A Lack of Freedom Under Communism?, Discussion Paper Series No. 39, Department of Economics, University of Hong Kong, Hong Kong, October.

Cheung SNS (1986a), China in Transition: Where is She Heading Now, *Contemporary Policy Issue*, 4:4, 1-11.

Cheung SNS (1986b), *Will China Go 'Capitalist'*, 2nd edition, Hobart Paper 94, Institute of Economic Affairs, London.

Cheung SNS (1987a), Alchian, Armen Albert, in Eatwell, J. and Milgate, M. and Newman, P. (eds.), *New Palgrave: A Dictionary of Economics*, Vol.1, Macmillan, London, 76.

Cheung SNS (1987b), 'Coase, Ronald Harry', in Eatwell, J. and Milgate, M. and Newman, P. (eds.), *New Palgrave: A Dictionary of Economics*, Vol.1, Macmillan, London, 455-457.

Cheung SNS (1987c), Common Property Rights, in Eatwell, J. and Milgate, M. and Newman, P. (eds.), *New Palgrave: A Dictionary of Economics*, Vol. 1, Macmillan, London, 504-505.

Cheung SNS (1987d), Transaction Costs and Economic Organisation, in Eatwell, J. and Milgate, M. and Newman, P. (eds.), *New Palgrave: A Dictionary of Economics*, Vol.1, Macmillan, London, 55-58.

Cheung SNS (1989), Privatization Vs. Special Interest: The Experience of China's Economic Reforms, *Cato Journal*, 8:3, 585-596.

Cheung SNS (1990), *On the New Institutional Economics*, Discussion Paper Series No. 118, Department of Economics, University of Hong Kong, Hong Kong.

Cheung SNS (1991), *On the New Institutional Economics*, in Werin, L and Wijkander, H eds. *Contract Economics*, Blackwell, Oxford, 48-65.

Cheung SNS (1994), *Economic interactions: China vis-avis Hong Kong*, A Hong Kong Lecture delivered at the Rayson Huang Theatre, 5th March 1994, University of Hong Kong, Hong Kong.

Cheung SNS (1996), A Simplistic General Equilibrium Theory of Corruption, *Contemporary Economic Policy*, 14:3, 1-5.

Cheung SNS (1998a), Deng Xiaoping's Great Transformation, *Contemporary Economic Policy*, 16:2, 125-135.

Cheung SNS (1998b), The Curse of Democracy as An Instrument of Reform in Collapsed Communist Economies, *Contemporary Economic Policy*, 16:2, 247-250.

Cheung SNS (1998c), The Transaction Costs Paradigm, Presidential Address Western Economic Association, *Economic Inquiry*, 36:4, 514-521.

Cheung SNS (2008), The Economic

- System of China, paper presented to the Conference on China's Economic Transformation, The University of Chicago Law School, 14 to 18 July 2008, collected in S N S Cheung (2008), *The Economic System of China*, Arcadia Press, Hong Kong.
- Coase RH (1937), The Nature of the Firm, *Economica*, 4:16, 386-405.
- Coase RH (1959), The Federal Communications Commission, *Journal of Law and Economics*, 2, 1-20.
- Coase RH (1960), 'The Problem of Social Cost', *Journal of Law and Economics*, 3, 1-44.
- Coase RH (1974), The Lighthouses in Economics, *Journal of Law and Economics*, 17, 357-376.
- Coase RH (1992), Comments on Steven N S Cheung's "On The New Institutional Economics", *Contract Economics*, Werin, L. and Wijkander, H. (eds.), Blackwell, Oxford, 72-75.
- Davidoff P (1965), Advocacy and Puralism in Planning, *Journal of American Institute of Planners*, 31:4, 331-338.
- Diamond DR (1995), Geography and Planning in The Information Age, *Transactions of the Institute of British Geographers*, 20:2, 131-138.
- Fischel WA (1978a), A Property Rights Approach to Municipal Zoning, *Land Economics*, 54:1, 64-81.
- Fischel WA (1978b), Equity and Efficiency Aspects of Zoning Reform, *Public Policy*, 27, 301-331.
- Fischel WA (1978c), *The Economics of Zoning Law: A Property Rights Approach to American Land Use Controls*, John Hopkins University Press, Baltimore.
- Gibbs D (1994), Towards the Sustainable City: Greening the Local Economy, *Town Planning Review*, 65:1, 99-109.
- Hayek FA (1944), *The Road to Serfdom*, University of Chicago Press, Chicago, IL.
- Hayek FA (1960), *The Constitution of Liberty*. University of Chicago Press, Chicago, IL.
- Lai LWC (1993), Marine Fish Culture and Pollution - An Initial Hong Kong Empirical Study, *Asian Economic Journal*, 7:3, 333-352.
- Lai LWC (1994), The Economics of Land Use Zoning: A Literature Review and Analysis of the Work of Coase, *Town Planning Review*, 65:1, 77-98.
- Lai LWC (1997), Property Rights Justifications for Planning and a Theory of Zoning, *Progress in Planning*, 48:3, 161-246.
- Lai LWC (1998), *The Coasian Market-firm Dichotomy and Sub-contracting in The Construction Industry*, Discussion paper, Department of Real Estate and Construction, University of Hong Kong, Hong Kong.

- Lai LWC (1999a), Hayek and Town Planning: A Note on Hayek's Views Towards Town Planning in the Constitution of Liberty, *Environment and Planning A*, 32:9, 1567-1682.
- Lai LWC (1999b), *The Rise and Fall of Discriminatory Zoning in Hong Kong*, Discussion paper, Department of Real Estate and Construction, University of Hong Kong, Hong Kong.
- Lai LWC (2000), The Coasian Market-firm Dichotomy and Subcontracting in the Construction Industry, *Construction Management and Economics*, 18:3, 355-362.
- Lai LWC (2005), Neo-institutional Economics and Planning Theory, *Planning Theory*, 4:1, 7-19.
- Lai LWC (2006a), The Coase Theorem and Planning for Sustainable Development, *Town Planning Review*, 77:1, 41-73.
- Lai LWC (2006b), Planning by Negotiation for Sustainable Development: A Tale of Two Habitats, *Economic Affairs*, 26:1, 54-58.
- Lai LWC (2011), Discriminatory Zoning in Colonial Hong Kong: A Review of the Post-war Literature and Some Further Evidence for an Economic Theory of Discrimination, *Property Management*, 29.
- Lai LWC and Lorne FT (2003), Implementing Sustainable Development: Institutional Features, in LWC Lai and FT Lorne eds. *Understanding and Implementing Sustainable Development*, Nova Science Publishers, New York.
- Lai LWC and Lam K (1998), Pond Culture of Snakehead in Hong Kong: A Case Study of An Economic Solution to Common Resources, *Aquaculture International*, 6:1, 67-75.
- Lai LWC and Yu MKW (2001), The Rise and Fall of Discriminatory Zoning in Hong Kong, *Environment and Planning B: Planning and Design*, 28, 295-314.
- Lai LWC, Davies SN and Lorne FT (2008a), The Political Economy of Coase's Lighthouse in History (Part I): A Review of The Theories and Models of The Provision of A Public Good, *Town Planning Review*, 79:4, 395-425.
- Lai LWC, Davies SN and Lorne FT (2008b), The Political Economy of Coase's Lighthouse in History (Part II): Lighthouse Development Along The Coast of China, *Town Planning Review*, 79:5, 555-579.
- Micklin M (1996), *Natural Resources, Environment and Development in Ecological Perspective: a Source Book for Teaching and Research*, Centre of Urban Planning and Environmental Management, Hong Kong.
- Mundell R (1968), *Man and Economics*, University of Chicago Press, Chicago US.
- North DC (1990), *Institutions, Institutional Change and Economic Performance*, Cambridge University Press, New York.

- Nozick R (1974), *Anarchy, State and Utopia*, Blackwell, Oxford.
- Pearce BJ (1981), Property Rights Vs. Development Control, *Town Planning Review*, 52, 47-60.
- Pennington M (1996), *Conservation and the Countryside: By Quango or Market?* Institute of Economic Affairs, London.
- Pigou AC (1932), *The Economics of Welfare*, 4th edition, Macmillan, London.
- Popper KR (1945), *The Open Society and Its Enemies*, Routledge, London.
- Posner RA (1992), *Economic Analysis of Law*, 4th edition, Little Brown, Boston.
- Poulton MC (1997), Externalities, Transaction Costs, Public Choice and The Appeal of Zoning – A Response to Lai Wai Chung and Sorensen, *Town Planning Review*, 68:1, 81-92.
- Sorensen T (1994), Further Thoughts on Coasian Approaches to Zoning: A Response to Lai Wai Chung, *Town Planning Review*, 65:2, 197-204.
- Stigler GJ (1981), Economics or Ethics, *The Essence of Stigler*, Leube K.R. and Moore T.G. (eds.), Hoover Institute Press, Stanford, 303-336.
- Stigler GJ (1987), *The Theory of Price*, 4th edition, MacMillan, New York.
- Tullock G (1993), *Rent Seeking*, Edward Elgar, Aldershot.
- Tullock G (1994), Rent Seeking and Zoning, Unpublished research paper.
- Webster CJ (1998a), Public Choice, Pigovian and Coasian Planning Theories, *Urban Studies*, 35:1, 53-75.
- Webster CJ (1998b), Analytical Public-Choice Planning Theory, *Town Planning Review*, 69:2, 191-209.
- Webster CJ and Lai LWC (2003), *Property Rights, Planning and Markets: Managing Spontaneous Cities*, Edward Elgar, Cheltenham.
- Werin L and Wijkander H eds (1992), *Contract Economics*, Blackwell, Oxford.
- Williamson OE (1979), Transaction-cost Economics: The Governance of Contractual Relations, *Journal of Law and Economics*, 22:2, 233-261.
- Williamson OE and Winter SG (1991), *The Nature of the Firm: Origins, Evolution, and Development*, Oxford University Press, Oxford.
- Willis KG (1980), *The Economics of Town and Country Planning*, Granada Publishing, Oxford.
- Winch G (1989), The Construction Firm and The Construction Project: A Transaction Cost Approach, *Construction Management and Economics*, 7:4, 331-145.

The Theoretical Foundation of China's *Xian* System¹

K C Wong*

ABSTRACT

In 2009, Professor Steven N.S. Cheung published a book on the economic system of China. Cheung clearly explained China's share contract system at the *xian* level, and argued that this system had enabled China's rapid and continuous economic development over the past twenty years. This paper confirms that Cheung's propositions are proven correct mathematically. It further investigates the empirical implications of share contracts, with or without private land ownership.

KEYWORDS

xian competitions, share contracts, value added tax, dissipation of rent, co-operative joint ventures

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In 2008 Professor Ronald Coase organized a Conference in Chicago on China's Economic Transformation. Professor Steven Cheung presented the lead paper entitled "The Economic System of China" (Cheung 2009), which revealed the secrets behind China's continuously high economic growth over the past 20 years.

ALFRED MARSHALL'S CONJECTURE

Cheung's main argument is as follows. After 1989, Beijing rapidly decentralized economic powers to the 2,860 local *xian* (縣) governments, which fiercely compete with one another. Each *xian*, with an average size ranging from 1,000 to 3,000 square kilometers, is effectively an enterprise in itself: it fights for investors, who would buy from *xians* the land use rights for manufacturing and other investments (Cheung 2009: 74-92). 75% of these land premiums goes to the *xians*; and the remaining 25%, to higher government level bodies.

The final product produced is subject to a 17% value added tax: i.e. 17% on the added value of the final products on top of the costs for raw materials. Unlike the 75% share of land premiums in favour of the *xians*; the *xians* share only 25% of the valued added taxes. And the remaining 75% goes to higher government level bodies.

Using the 75% of the land premiums, plus the 25% of value added taxes, the *xians* may develop more land and public infrastructure in order to invite even more investors.

These systems of sharing clearly explain

why both China's economy, as well as the wealth of the nation, has been growing continuously at phenomenal rates. Cheung's proposition centres around a paradox: there are clearly disparities in locations, availabilities of resources, and hence in productivities at various *xians*. Yet the 17% valued added tax is fixed all over the country. This violates the fundamental principle of the theory of share tenancy: that the rental share percentage is not a constant. It depends on location, fertility and is subject to negotiation by the contracting parties.

In 2004 Cheung was inspired by a footnote in Professor Alfred Marshall's classic book – *Principles of Economics* – and found the answer to the paradox: land premiums paid by investors to *xians* could even be negative! I.e. the degree of freedom on charging land premiums could be so high that it can accommodate a constant 17% value added tax; and yet an optimal allocation of resources could still be attained.

Like most classical analysis, Marshall assumes the rental share to be a constant ratio. But the difference is: there is no other land rent on top of the share rent under share tenancy. But under the *xian* system, a land premium is charged on top of the 17% value added tax. What Marshall said in this footnote is basically this: on assuming the rental share percentage to be constant, the landlord could adjust his capital investments in the share tenancy. Allowing free negotiations with the tenants on labour input, it can be proved geometrically that the share tenancy is as efficient as the fixed rent contract. Unfortunately, Marshall did not provide a mathematical, or a geometrical, proof to this conjecture.

In 1969 Professor Cheung provided a mathematical proof for his theory of share tenancy. But that was based on the assumption that the rental share ratio is not constant. As for the *xian* system, since the land premium could be varied to such a great extent that it would compensate for the rigidity of the 17% tax ratio, Professor Cheung conjectured that the *xian* system could in principle achieve optimal resource allocation. Intuitively, what can be labeled the 'Steven Cheung Conjecture' is correct. Professor Cheung, however, did not provide a mathematical proof either.

The formal mathematical proof is now provided as follows.

THE MATHEMATICAL PROOF

Suppose a *xian* has L hectares of land, which can be subdivided into n equal slices, each l hectares. And suppose also that this *xian's* interest is consistent with that of all higher level governments: that is, they are to maximize the total rental income R derived from these L hectares of land. Thus the *xian's* objective function can be written as:

$$\text{Max}_{\{l,b,a,m,P\}} R = n \{ \bar{S} [f(l,b,a,m) - rm] + iPl \} \quad (1)$$

There are two sources for the rental income R in Equation (1):

The first is the value added tax, which equals the constant tax rate, $\bar{S} = 17\%$, times the net value added - i.e. the value of the product $f(l,b,a,m)$, net of raw material cost tm , where t is the price of the raw material. The output $f(l,b,a,m)$, in turn, depends on 4 factors

of production: land area l , factory premises b , labour input a , and raw material m .

The second source is the interest on the land premium, iPl , where i is the interest rate; and P the land price determined by negotiation.

Under competition, the investor's share, $(1-\bar{S}) [f(l,b,a,m) - tm]$, plus the raw material cost tm reserved before sharing should barely pay for:

- (a) iPl , the interest on land premium;
- (b) rb , the rent for the factory premises;
- (c) wa , the wages; and
- (d) tm , the raw material cost;

where r is the rental rate per square meter of factory premises; w , the wage rate; and t , the raw material price.

Hence, under competition, the factor market constraint could be written as:

$$(1-\bar{S}) [f(l,b,a,m) - tm] + tm = iPl + rb + wa + tm \quad (2)$$

This is a typical constrained maximization problem. Cheung (1969) solved this by introducing a Lagrange Multiplier. Silberberg (1990: 607-611) published a text book on mathematical economics, in which he used Cheung's theory of share tenancy as an example to illustrate the Coase Theorem. Silberberg simplified Cheung's constrained maximization problem, by eliminating the share ratio S from the constraint and the objective function, hence reducing the mathematical problem to an unconstrained maximization.

Following Silberberg's method of simplification, eliminating iPl from Equations (1) and (2), and replacing

n by $\frac{L}{l}$, Equation (1) reduces to an unconstrained maximization:

$$\text{Max}_{\{l,b,a,m\}} R = \frac{L}{l} \{f(l,b,a,m) - rb - wa - tm\} \quad (3)$$

The conditions for maximization are:

$$\frac{\partial R}{\partial b} = \frac{L}{l} \frac{\partial f}{\partial b} - r = 0 \quad \text{or} \quad \frac{\partial f}{\partial b} = r \quad (4)$$

$$\frac{\partial R}{\partial a} = \frac{L}{l} \frac{\partial f}{\partial a} - w = 0 \quad \text{or} \quad \frac{\partial f}{\partial a} = w \quad (5)$$

$$\frac{\partial R}{\partial m} = \frac{L}{l} \frac{\partial f}{\partial m} - t = 0 \quad \text{or} \quad \frac{\partial f}{\partial m} = t \quad (6)$$

$$\frac{\partial R}{\partial l} = \frac{L}{l} \frac{\partial f}{\partial l} - \frac{L}{l^2} \{f(l,b,a,m) - rb - wa - tm\} = 0$$

$$\text{or} \quad \frac{\partial f}{\partial l} = \frac{\{f(l,b,a,m) - rb - wa - tm\}}{l} \quad (7)$$

Conditions (4), (5), (6) mean that the marginal productivities equal the respective factor prices. Condition (7) means that the marginal productivity of land equals land rent per hectare. All these four are necessary conditions for resource optimization.

Cheung's conjecture is mathematically correct!

Now suppose that the land price is fixed. P therefore becomes a constant, now denoted as \bar{P} . Again, putting Equations (2) into (1), $f(l,b,a,m)$ is unavoidably eliminated. Equation (3) becomes:

$$\text{Max}_{\{l,b,a,m\}} R = \frac{L}{l} \left\{ \frac{i\bar{P}l + \bar{S}(rb + wa)}{1 - \bar{S}} \right\} \quad (8)$$

Since the product $f(l,b,a,m)$ is eliminated, Equation (8) does not have a solution for resource optimization.

MARSHALL'S CONJECTURE

As for Alfred Marshall's conjecture, since Marshall did not allow the sharing ratio to be varied, and unlike the *xian* sharing system, there is in general no other rent besides the share rent in a tenancy contract. Hence, in Equation (8), P equals 0. Omitting rb , for agricultural production, Equation (8) becomes:

$$\text{Max}_{\{l,b,a\}} R = \frac{L}{l} \left\{ \frac{\bar{S}wa}{1 - \bar{S}} \right\} \quad (9)$$

Output $f(l,b,a,m)$ is also eliminated. Hence, Equation (9) does not have a solution for resource optimization. Intensity of production could not possibly be the same as those under fixed rent contracts. As a result, Marshall's conjecture could not be proven correct.

PUBLIC-PRIVATE JOINT VENTURES

What about public-private joint ventures? Suppose it costs p dollars per square meter to construct a total floor area of b square meters. Party A's could share a ratio S on the property sales $f(l,b)$ after deducting the construction cost pb . Party A's objective function can be written as:

$$\text{Max}_{\{l,b,S\}} R = nS[f(l,b) - pb] \quad (10)$$

Subject to the capital market constraint:

$$(1 - S)[f(l,b) - pb] = pb \quad (11)$$

Eliminating S from (10) and (11), objective function (10) can be simplified as:

$$\text{Max}_{\{l,b\}} R = \frac{L}{l} [f(l,b) - 2pb] \quad (12)$$

The conditions for maximization are therefore:

$$\frac{\partial R}{\partial b} = \frac{L}{l} \left[\frac{\partial f}{\partial b} - 2p \right] = 0 \quad \text{or} \quad \frac{\partial f}{\partial b} = 2p \quad (13)$$

$$\frac{\partial R}{\partial l} = \frac{L}{l} \frac{\partial f}{\partial l} - \frac{L}{l^2} [f(l,b) - 2pb] = 0$$

$$\text{or} \quad \frac{\partial f}{\partial l} = \frac{f(l,b) - 2pb}{l} \quad (14)$$

From equation (13), marginal productivity with respect to construction input $\frac{\partial f}{\partial b}$ does not equal the factor price p . From equation (14), marginal productivity with respect to the input land $\frac{\partial f}{\partial l}$ does not equal the factor price $\frac{f(l,b) - 2pb}{l}$ either. Hence, the structure of this public-private joint venture does not allow a mathematical solution for resource optimization.

Summarising the 3 different examples of mathematical proofs above we may conclude the following. For any share contract, only if the contract structure allows the combination of Equations (1) and (2) back to the basic Equation (3): i.e.

If the total rental income R equals the rent per hectare, $\frac{\{f(l,b,a,m) - pb - wa - tm\}}{l}$ times the total land area, L , then there is a mathematical solution for resource optimization.

EMPIRICAL EXPERIENCES: PUBLIC PRIVATE JOINT VENTURES IN THE 80s

These are mathematical viewpoints. From an empirical point of view, share contracts under free market competition are in general more effective in resource allocation. The *xian* sharing system is clearly a counter example, which is enormous in scale and yet surprisingly effective.

When China first opened up its economy in the early eighties, no land use rights were sold. Real estate developments were enabled by co-operative joint ventures: where state enterprises negotiate with foreign investors on a project by project basis, their respective resources being the input and the outputs being shared by each party. First-hand information of these co-operative joint ventures (Wong 1992) revealed that compared to a shareholding arrangement, a public land owner under a co-operative joint venture usually shares much less than the potential maximum shareholdings of the project. The reason for this is: should party A's interests in a project be clearly defined as definitive number of shares of a company, the process of rent dissipation would cost even more.

Apparently, the fact that Party A shares less could arguably be merely a wealth transfer, which may not be harmful to the economy. But in the process of this transfer the rights of neither party are well defined. This leads to vicious competition over any wealth transfer, which is costly to resolve (Cheung 1974). Examples in the eighties revealed problems such as: Party A offer guarantees to Party B's

construction loan; Party B absconding with the loan; Parties A and B compete for control over the procurement of construction works; one, other or both Parties refuse to cooperate in order to force the other party to offer sufficient benefits...etc. All these activities, due to unclear definitions of rights, are most costly.

THE SUCCESS OF THE XIAN SYSTEM

The success of *xian* system is particularly surprising to the economist because this system actually evolved from communism! Yet under this *xian* system, property rights are defined clearly, layer by layer, in general and in particular, all over the administrative hierarchy of the entire country. The important question is: why was the *xian* system possible in China, but not in other communist countries.

From the viewpoint of history, there were two main reasons. Firstly, the communist land reform in China before and after 1949 was so thorough and extensive that there has been little resistance to the introduction of the new *xian* system. Secondly, central powers over land development were decentralised quickly and thoroughly to local *xian* governments after 1989.

From the viewpoint of applied economics, there were two important breakthroughs. Firstly, in 1985, Professor Steven Cheung suggested separating land ownership rights from land use rights: Land is still owned by the state; and yet land use rights can be bought and sold in the market. This separation, in subsequent years, formed the basis of Deng's "Socialism

with Chinese characteristics". The second breakthrough was the extensive application of the Coase Theorem: that "the clear delineation of rights is the necessary prelude to market exchanges". Every step of China's economic reform can be understood as if the Coase Theorem has been a guiding principle of policy.

These two breakthroughs worked magic in combination. A separation between land ownership rights and land use rights simply took China off the ideological hook: land still belongs to the state, but land use rights can be taken care of by the free market. Given this foundation, land use rights can be clearly defined in detail: step by step, layer by layer, from central down to local, from agricultural to industrial, until the market operates as smoothly as a system of private property rights.

To fully understand why a similar system was not made possible in other formerly communist countries, it is important to note that the *xian* system has been feasible only where a system of western democracy has not been fully developed.

Let's go back to the *xian* sharing system to illustrate this point. A *xian* is analogous to a shopping mall. In Hong Kong, many shopping centers at high rent locations also charge turnover rents: 5% to 8% for small shops; around 10% for anchor tenants such as restaurants and department stores; and 10% to 17% for fashion and other brand-named stores.

When competing for investors, a *xian* always emphasizes whether investors are complementary to one another; whether there is sufficient

transportation, entertainment and other public services; and whether the investors would bring business into the *xian* (Cheung 2009: 82). In Hong Kong, shopping centers also emphasize tenant diversity, brand names, ability to bring in customers, and pedestrian flow. Shopping centers in Hong Kong may not go so far as to offer a 'negative' rental to anchor tenants. Yet developers are often more than willing to offer low rents, best locations, and long terms leases to reputable anchor tenants.

And similar to the *xian*, there is a sharing system above the ownership of the shopping centre: shopping centres are owned by publicly listed or private companies. The shares of these companies are clearly defined according to companies ordinance and share register. Different chains of shopping malls, not belonging to one another, always compete; as a *xian* would compete with other *xians*.

But the clear difference is that in Hong Kong and in the west, public transportation and utilities outside the perimeters of a mall are 'public areas'. Conflicts of interest in managing these areas are resolved by means of western democratic procedures: including elections, negotiations inside and outside council meetings, politicking, and/or media management. Whereas in a *xian* public areas belong to the state, and are still under the direct management of the *xian* government. This may allow savings on the costs of politicking.

Consider this. Assume a developer subdivides a large shopping mall into small individual shops which are all sold to individual tenants, then it follows that all the corridors, stairs,

lifts, escalators, lobbies, and even the façade of the mall become "public" areas. And if these small owners were to vote, elect representatives, negotiate, and come up with plans to design the mall and then gather sufficient funds from individual owners to finance the management of these public areas, then it is very likely that these public areas would be left unattended, and would gradually deteriorate, although some malls might still be able to organize themselves to manage the public areas. Nevertheless, the most successful shopping centres in Hong Kong are owned by single-owners.

CONCLUDING REMARKS

It is clear that a private shopping mall owner would benefit from rent maximization. Yet in a *xian* sharing system, it is unclear both how much any individual involved can benefit from the collection of land premiums and value added taxes; and what incentives schemes can be used. Coase stated that "the clear delineation of rights is an essential prelude to market transactions" (Coase 1959). The *xian* experience poses further a revealing question: can the clear delineation of rights itself be a *sufficient* condition for the effective allocation of resources, *even in the absence of private ownership titles*? This should be an area for further research.

Cheung (2009) noted that China's *xian* system is not an invention of one single man, but a result of the economic forces acting behind China's economic reform. It is therefore essential for us to understand the logic behind these economic forces. Deng once said that China's economic reform is like

crossing the river by feeling for stones. Yet one finds it hard to feel for stones with his eyes completely blindfolded. The economist's views and analysis are also essential for pointing out why anyone has felt for the right stone at one given time; but the wrong stone at some other time. Hence, the success of *xian* system of land development has to be studied carefully.

REFERENCES

Cheung, SNS (1974), A Theory of Price Control, *Journal of Law and Economics*, 17, 53-71.

Cheung, SNS (2009), *The Economic System of China*, First Edition October, 2009, Third imprint January 2010, China CITIC Press, Beijing.

Coase, RH (1959), The Federal Communications Commission, *Journal of Law and Economics*, 2, 1 – 40.

Silberberg, E (1990), *The Structure of Economics: A Mathematical Analysis*, International Edition, McGraw-Hill, Singapore.

Wong, KC (1992), *A Theory of Joint Venture Partnership*, Unpublished PhD thesis, Department of Real Estate and Construction, University of Hong Kong.

An Outline of a System Dynamics Model for Studying the Pre-movement Behavior of People in Fire

*M. Liu, S.M. Lo, C.M. Zhao

ABSTRACT

Traditionally, buildings should be designed in accordance with the prescriptive requirements stipulated in building codes. However, designers may sometimes find it difficult to meet all the prescriptive requirements especially for some buildings with complex settings. A fire engineering approach, which may be regarded as a performance approach, may be adopted to evaluate the fire safety performance of such buildings. To evaluate the performance, specialists may sometimes need to predict the evacuation pattern of occupants in the building by using evacuation models. Most of the models can effectively predict the flow time of the evacuees and adopt a stochastic delay time to reflect the pre-movement reactions of the occupants. However, the behavioral reaction process cannot accurately be modeled by most evacuation models. To provide a more reasonable prediction for the evacuation process, we therefore attempt to establish a model that can simulate the pre-movement behavioral reaction. This article briefly outlines a system dynamics approach to simulate the pre-movement pattern of people in fire.

KEYWORDS

Evacuation, Pre-movement Behavior, System Dynamics Model

INTRODUCTION

Fire safety design is one of the concerns for building and facilities designers. Traditionally, buildings should be designed in accordance with the prescriptive requirements stipulated in building codes. However, designers may sometimes find it difficult to meet all prescriptive requirements especially for some buildings with complex settings. A fire engineering approach, which may be regarded as a performance approach, may be adopted to evaluate the fire safety performance of such buildings (APP-87/ PNAP204, 1998; BSI, PD7974). To analyze the fire safety level of the facility, the designers should demonstrate that the Available Safety Egress Time (ASET) should be longer than the Required Safety Egress Time (RSET) in case of fires. Figure 1 shows a brief outline of ASET and RSET. To evaluate the fire safety performance in a building, fire engineering specialists will determine the ASET and RSET for 'worst fire' scenarios. They may also use some fire models, zone or field models, to predict the fire and smoke flow in the building so as to determine the time, usually referred to as the ASET, for a zone to become untenable. For RSET, specialists may adopt an evacuation model, such as EVACNET (Kisko et al., 1998), EXIT89 (Fahy, 1993), SIMULEX (Thompson and Marchant, 1995a; Thompson and Marchant, 1995b), and SGEM (Lo, 2000; Zhi, 2003; Lo, 2004), which have been developed in recent decades, to assist the prediction of the movement pattern of the occupants. In general, RSET comprises two time periods, namely the pre-movement response time and movement time. The flow time can be accurately predicted by the evacuation

models, in particular if the setting of the building is not complicated. For the prediction of pre-movement time, little work has been done. Usually, pre-movement time from alarm actuation to movement initiation was just simplified as a specific delay time or a common-used distribution. Lo (2009) has mentioned in his study that pre-movement behavioral reaction of people may have substantial influence on the evacuation pattern (Crawford, 1999). A model that can simulate the pre-movement behavioral reaction may help to establish a more reasonable prediction for the evacuation process. This article briefly outlines an attempt to use a system dynamics approach to simulate the pre-movement pattern of people in fire.

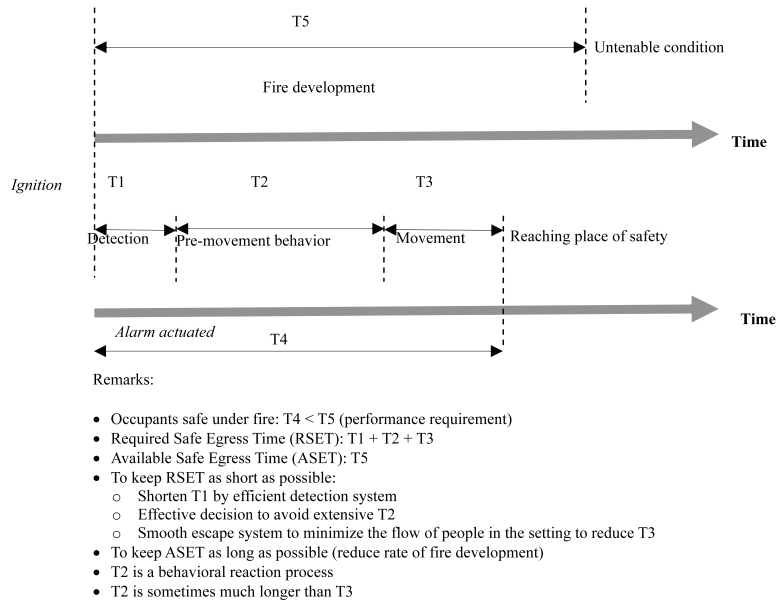


Figure 1 Outline of ASET and RSET

SYSTEM DYNAMICS APPROACH

System dynamics is an approach to understanding the behavior of complex systems over time. It deals with internal feedback loops and time delays that affect the behavior of the entire system. The differences between the system dynamics approach and counterparts studying complex systems are the use of feedback loops and stocks and flows. These elements help to describe how even seemingly simple systems can display baffling non-linearity. System dynamics has been applied in a wide range of areas, including population, ecological and economic systems (Coyle, 1996; Forrester, 1961; Forrester, 1990; Sushil, 1993). The elements of system dynamics diagrams are feedback, accumulation of flows into stocks and time delays.

(1) Causal loop diagrams

A causal loop diagram is a visual representation of the feedback loops in a system. The dynamic behavior of the system can be identified as a consequence of the system structure, which contains circular chains of cause and effect relationship. The process, through which the initial cause goes through a chain of causal relations to an indirect effect on itself, is called 'feedback'. Feedback loops can be divided into positive and negative loops. A feedback is positive if an increase in a variable, after a certain delay, leads to a further increase in the same variable. Positive feedback could produce reinforcing behavior in systems. For a negative feedback loop, an increase in a variable leads to a decrease of the same variable. Negative feedback drives balancing or stabilizing systems

that produce asymptotic or oscillatory behavior. The causal loop diagram of the new product introduction has the form as follows (Figure 2):

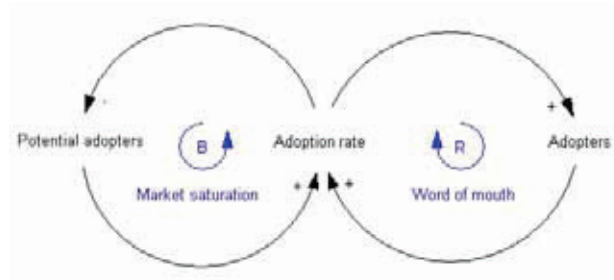


Figure 2 A Causal Loop Diagram of the New Product Introduction

(2) Stock and flow diagrams

In order to understand the dynamic behavior of the building control system over time, a stock-flow diagram is established based on a causal loop

diagram. A stock is the term for any entity that accumulates or depletes over time. A flow is the rate of change in a stock. The stock and flow diagram for the new product adoption model is illustrated in the following (Figure 3):

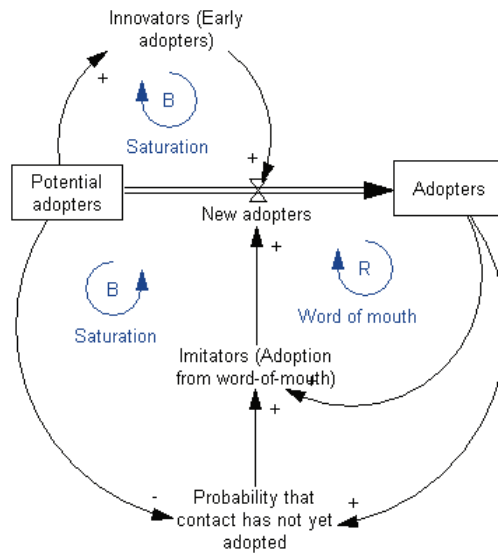


Figure 3 Stock and Flow Diagrams for The New Product Adoption

Model

In recent years, there have been many modeling software packages developed for system dynamics thinking, such as Dynamo (Richardson and Pugh, 1981), ithink/Stellar, and Vensim. All the packages are based on integral calculus and equations to do the simulations. In this study, Vensim-PLE (PLE stands for Personal Learning Edition) was selected for establishing the system dynamics model due to its user-friendly interface and use for free. Vensim is a visual modeling tool that allows the users to conceptualize, document, simulate, analyze and optimize models using a system dynamics approach. Vensim-PLE is a freeware version with limited functions for education and research use. It is free for downloading

from the official website. It provides the basic functions of creating models, building diagrams, checking illogical errors and simulating behavior. Due to use of a graphical interface, the system structure is easy to use to illustrate inter-relationships among the essential variables.

The Model

First, the major factors related to the rational pre-movement behavior were identified (Lo, 2009). The factors were divided into four categories, referred to as initial conditions, cognitive variables, psychological variables and social factor variables, respectively. A summary of the major factors related to the pre-movement behavior was given in Table 1.

Table 1 Summary of The Major Factors Related to The Pre-movement Behavior

Category	Sub-Category	Factors
Initial Conditions	Human Characteristics	<ul style="list-style-type: none"> • Age • Gender • Fire experience and evacuation training • Pre-fire activity • Location before fire
	Fire Information	<ul style="list-style-type: none"> • Smoke • Flame
	Building Environment	<ul style="list-style-type: none"> • Type of occupancy • Type of warning system
Cognitive Variables	Safety Management	<ul style="list-style-type: none"> • Management level of staff • Sufficient staff at the site
		<ul style="list-style-type: none"> • Received fire information • Received evacuation orders • Awareness of fire • Acceptance of evacuation orders
Psychological Variables		<ul style="list-style-type: none"> • Concern rate • Mental stress
Social Factors		<ul style="list-style-type: none"> • Altruistic action

Then, a human pre-movement behavior model using a system dynamics approach was established. The study was based on previous works of Zhao (2007) and Lo (2008), in which a system dynamics model was adopted to predict the pre-movement reactions of occupants in fire, and the use of performance-based fire safety engineering in building design respectively. In the case of emergent situations in a mass transit station, focus was placed on the major factors affecting human responses at recognition stage and response stage, which led to varying results of occupants under threat, occupants with fire awareness, and occupants who made an immediate evacuation decision. The causal loop diagram of human behavior in the pre-movement process is presented in Figure 5. The stock flow diagram for human pre-movement behavior is given in Figure 6. A field survey was conducted for occupants

from a fire accident at an International Trade Center (Zhao, 2007). A total of 650 questionnaires were collected and 92% of them were eligible answers. The comparison between questionnaire data and the established behavioral model revealed that the established pre-movement model was reasonable in reflecting human responses in an emergency.

Example

A notional fire incident in a mass transit station was assumed to investigate the performance of various emergency policies in the concerned station. A fire was assumed to occur in a toilet. The warning system was activated immediately after the fire was noticed. All the passengers and staff were required to leave the station as soon as possible.

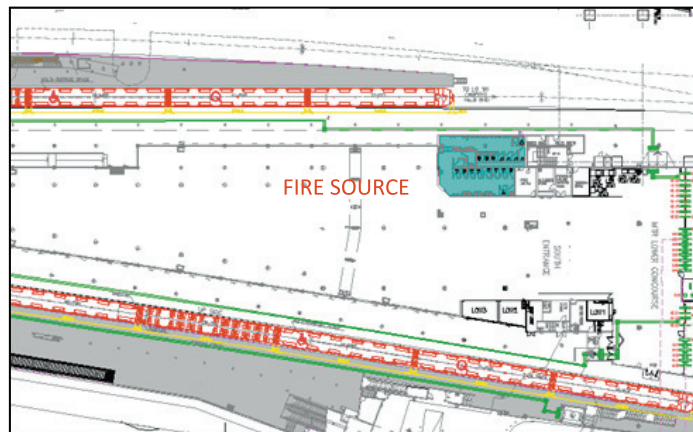


Figure 4 Layout Plan for The Notional Fire Incident

The necessary information for the model input was assumed and the interrelationships of the model components are shown in Figure 6. Five fire scenarios based on five emergency policies were proposed. Simulations were performed to examine the influence of each policy on the pre-movement process. The details of the five emergency policies were given in.

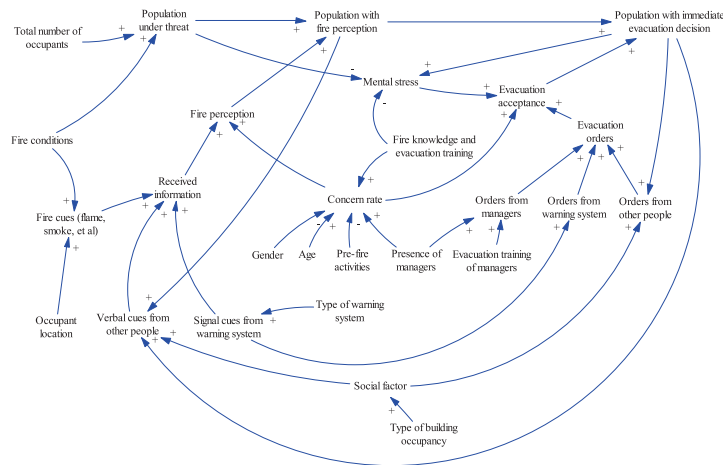


Figure 5 Causal Loop Diagram for Pre-evacuation Human Behavior

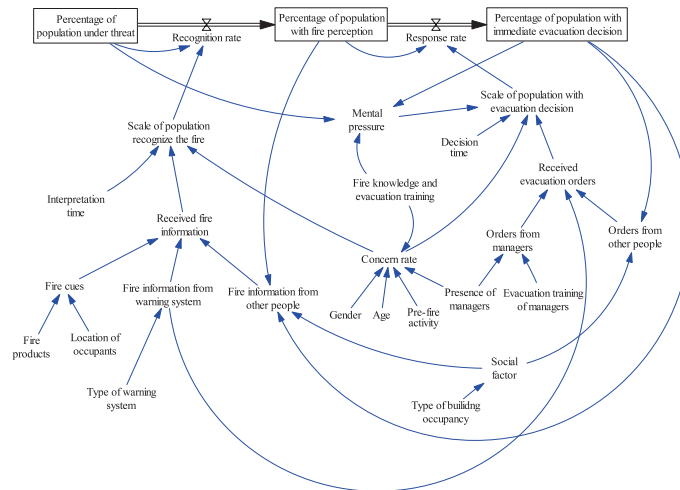


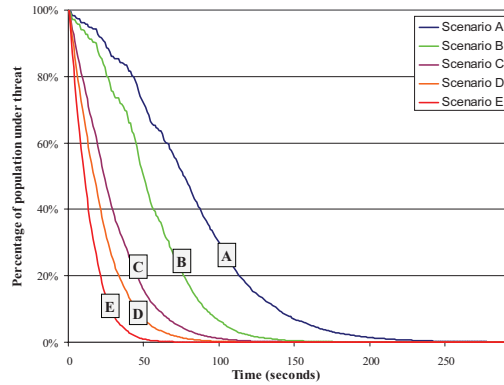
Figure 6 Stock Flow Diagram for Pre-evacuation Human Behavior

Table 2 Summary of The Five Emergency Policies

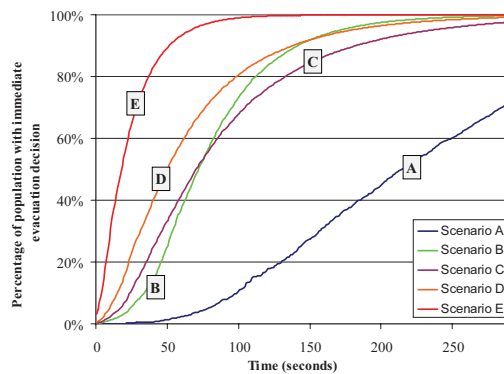
Scenario	Details
A	Only alarm bell rang. No staff present. No public announcements.
B	Alarm bell rang with staff on-site. The staff only investigated the fire site.
C	Pre-recorded voice announcement with evacuation alert.
D	Live public announcement with detailed evacuation instruction, informing the passengers to start to evacuate as soon as possible.
E	Live public announcement with detailed evacuation instruction. The staff were on-site and also informed people to evacuate as soon as possible.

The simulation results are presented in Figure 7. Figure 7(a) illustrates the comparison of the percentages of 'population under threat' for the five scenarios. The performance of the five scenarios was Scenario E > Scenario D > Scenario C > Scenario B > Scenario A in descending order. It appeared that the predicted results were logical in respect of usual evacuation drill exercises. The alarm bell in Scenario A was the least effective measure to make people aware of the fire or emergency incident. On the other hand, the live public address system with well-trained managers seems to serve as the most effective measure to alert the passengers in the station. Figure 7(b) showed the comparison of predicted results of the percentage of 'population with immediate evacuation decision' for the five scenarios. Similar to case (a), evacuation measures for Scenario A and Scenario E turned out to be the least effective and the most effective respectively. An interesting finding was that the measures for Scenario B initiated the evacuation in a shorter

time than Scenario C and Scenario D. It revealed that the presence of staff members would seem to have a considerable influence on the evacuation process. The results also coincided with the fact that passengers were often reluctant to respond to the warning system, but more likely to respond to the staff. For Scenario B, even though the staff did not really persuade the passengers to leave, their presence itself drew enough attention from passengers, and a signal for evacuation was given just by their presence, without any words. This prediction indicates that further investigation by drill exercise and perception survey might be useful to justify this finding and for planning evacuation strategies.



(a)



(b)

Figure 7 Main results for the investigations of the influence of each policy on the pre-movement process. (a) illustrated the predicted results of the percentages of ‘population under threat’ for the five scenarios. (b) showed the predicted results of percentage of ‘population with immediate movement decision’ for the five scenarios.

Concluding Remarks

A people pre-movement behavior model using a system dynamic approach was established. On the basis of previous studies, major factors related to rational pre-movement behavior were identified. To illustrate the application,

the proposed model was applied, as an example, to investigate the performance of various emergency policies in the concerned station. Traditionally, pre-movement time was simplified as a delay time or a common-used distribution. Due to the uncertainties and complexities of human behavior,

in the past few models have been able to provide a reasonable explanation for the pre-evacuation behavior. The proposed model, on the other hand, was capable of integrating a number of major factors related to human perception and cognition processes, and analyzing the pre-movement behavior process from a systems point of view.

The majority of existing evacuation programs were developed for specific aspects of the evacuation process. For example, most of them can effectively model the egress paths of each individual in a building. They can be used to examine the flow capacity of each individual component of the escape routes. However, they are normally unable to model the evacuees' behavioral responses to the facility's system over time and its underlying structure and decision rules. The proposed model is structured on the basis of people's behavioral reaction process and seeks to examine the interrelationship between occupants' characteristics, cues recognized, the warning system, safety management and other determinants relating to evacuation. In other words, the proposed pre-movement model was employed to analyze the performance of emergent management policies for facility or safety managers before a real emergency occurs.

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REFERENCES

- British Standard Institute (2003), PD 7974 - *Application of Fire Safety Engineering Principles to the Design of Buildings*, Probabilistic risk assessment.
- Coyle RG (1996), *System Dynamics Modeling: A Practice Approach*. Chapman & Hall, London.
- Crawford K (1999), *Effect of Safety Factors on Timed Human Egress Simulations*, School of Engineering, University of Canterbury, New Zealand.
- Fahy, RF (1993), *An Evacuation Model for High-Rise Buildings*, In: Proceedings of InterFlam'93 – 6th International Fire Conference, London, 519-528.
- Forrester JW (1961), *Industrial Dynamics*, MIT Press, Cambridge, MA.
- Forrester JW (1990), *Principles of Systems*, Productivity Press, Portland.
- Kisko TM, Francis RL and Nobel, CR (1998), *EVACNET 4 User's Guide*, University of Florida, Florida.
- Lo SM and Fang, Z (2000), A Spatial-Grid Evacuation Model for Buildings, *Journal of Fire Science*, 18:5, 376-394.
- Lo SM, Fang Z, Lin P and Zhi GS (2004), An Evacuation Model: the SGEM Package, *Fire Safety Journal*, 39:3, 169-190.
- Lo SM, Zhao CM, Liu M and Copping, A (2008), A Simulation Model for Studying the Implementation of Performance-Based Fire Safety Design in Buildings, *Automation in Construction*, 17:7, 852-863.

Lo SM, Liu M, Zhang PH and Yuen KK (2009), An Artificial Neural-network based Predictive Model for Pre-evacuation Human Response in Domestic Building Fire, *Fire Technology*, 45:4, 431-449.

APP-87/ PNAP 204 (1998), *Practical Note for Authorized Persons and Registered Structural Engineers*, Building Department, Hong Kong Special Administrative Region Government, Government Press.

Richardson GP and Pugh AL (1981), *Introduction to System Dynamics Modeling with Dynamo*, MIT Press, Cambridge, MA.

Sushil KS (1993), *System Dynamics: A Practical Approach for Managerial Problems*, Wiley Eastern Limited, India.

Thompson PA and Marchant EW (1995a), Computer and Fluid Modeling of Evacuation, *Safety Science*, 18:4, 277-289.

Thompson PA and Marchant EW (1995b), Testing and Application of the Computer Model 'SIMULEX', *Fire Safety Journal*, 24:2, 149-166.

Zhao CM (2007), *A Study on Human Pre-Movement Behavior under Emergencies Using System Dynamics Approach*, unpublished PhD Thesis, City University of Hong Kong, Hong Kong, China.

Zhi GS, Lo SM and Fang, Z (2003). A Graph-Based Algorithm for Extracting units and Loops from Architecture Floor Plans for a Building Evacuation Model, *Computer-Aided Design*, 35:1, 1-14.

Urban Renewal in Hong Kong: A Community Aspiration Study

Daniel CW Ho¹, Y Yau², SW Poon³, CK Law⁴, Ernest WT Chui⁴, YC Wong⁴, KM Lee⁴, Lisanne SF Ko⁵, HK Yip⁶, Albert KH Kwan⁷, and Katherine HY Wong³

ABSTRACT

Coupled with the growing number of aged private residential buildings, the lack of proper building care culture has led to serious problems of building dilapidation and urban decay in Hong Kong, particularly in the old urban areas. Not only is the cityscape ruined, but also the health and safety of the residents and general public as a whole are jeopardized. To arrest urban decay, redevelopment has long been adopted to renew rundown areas. However, the approach usually has a negative impact on the existing social fabric and causes a reduction in social capital. Given that older buildings usually have a larger proportion of older residents, and that the elderly population tends to be financially less well-off, this group of residents is more adversely affected by the negative impact of social destruction due to redevelopment. Recently, building rehabilitation has been gaining popularity. Yet, with a view to a sustainable strategy for urban renewal, it is necessary to balance the interests of different stakeholders. The alternative ways the community perceives different approaches to urban renewal in Hong Kong is a worthwhile topic to study. In this paper, the community's attitudes towards redevelopment and rehabilitation as urban renewal options are examined through a structured questionnaire survey. The survey findings are discussed with emphases on their policy implications. Recommendations will be drawn with respect to the community engagement process that enhances the likelihood of arriving at a more balanced urban renewal strategy.

KEYWORDS

Urban renewal, sustainable development, community aspiration, community engagement, Hong Kong

¹ Associate Professor, Department of Real Estate and Construction, The University of Hong Kong, Hong Kong. Email: danielho@hku.hk

² Department of Public and Social Administration, City University of Hong Kong, Hong Kong

³ Department of Real Estate and Construction, The University of Hong Kong, Hong Kong

⁴ Department of Social Work and Social Administration, The University of Hong Kong, Hong Kong

⁵ The Nethersole School of Nursing, Chinese University of Hong Kong, Hong Kong

⁶ Policy 21 Limited, Hong Kong

⁷ Department of Civil Engineering, The University of Hong Kong, Hong Kong

INTRODUCTION

Urban decay has been a long-lasting problem in many developed cities. Hong Kong is not an exception to this trend. While enjoying the fruitful products of the economic growth, a large proportion of the community in Hong Kong suffers from the problem of urban decay. As estimated by the Urban Renewal Authority (2009), some 3,600 buildings out of a total of 18,000 private buildings aged 30 years or above in the city are dilapidated. On account of the high-density, high-rise development pattern in Hong Kong, building dereliction not only devastates the cityscape, but also jeopardizes the health and safety of the community as a whole. The outbreak of Severe Acute Respiratory Syndrome (SARS) in 2003 and the collapse of a 55-year-old tenement block in Tokwawan in 2010 vividly illustrate the gravity of the issue. In this light, urban renewal gains its importance and urgency. Regarding the age-old urban decay problem in Hong Kong, most of the literature focuses on the difficulties encountered in the urban renewal process. For example, Jim (1994), Yeh (1990) and Ng (2002a) censured the slow progress of urban renewal in Hong Kong. Adams and Hastings (2001) ascribed the sluggishness to the poor institutional arrangements for urban renewal in the city. In addition, Kam et al (2004) claimed that the compensation for compulsory acquisition are not fairly assessed. Moreover, Ng et al (2001) and Ng (2002b) criticized Hong Kong's urban renewal policy for being non-people-centred. At the more fundamental level of private property

rights protection under the Basic Law, Lai (1993, 2002a, 2002b, 2010) and Siu (2010) criticised the philosophy and manner of land resumption. One of the issues is that whether the use developed is sufficiently "public" within the meaning of "public purpose" for resumption.

Nevertheless, granted that land resumption for "public purpose" is a non-issue, there is a need to deal with the very question on the choice of renewal approach for a particular project. In fact, in Hong Kong this question created challenges to the public authority responsible for urban renewal in various projects such as the Sai Yee Street Project and the Lee Tung Street Project. In these cases, some interested parties favoured the approach of building rehabilitation to conventional redevelopment. Yet, great difficulties have been faced by the public authority in balancing the diverse interests of the stakeholders in deciding on the way forward for any urban regeneration project. Key issues should be addressed in the choice of redevelopment and rehabilitation. These include the physical and regulatory conditions of the buildings, the future uses and sustainability of buildings (Watson, 2009). Other than physical and economic concerns, what matters most in the choice between these two approaches are the aspirations of the affected parties. Given that urban renewal plays a pivotal role in the sustainable development of a city (Lehmann, 2006; Yau and Chan, 2008), more informed decisions should be made by public administrators, town planners and urban managers.

Therefore, it is necessary to understand how the community perceives the different approaches to urban renewal in Hong Kong. In this study, the community's attitudes towards different strategies of urban renewal (i.e. redevelopment and rehabilitation) is examined through a structured questionnaire survey. The survey findings are then discussed and policy implications follow. Recommendations can be drawn with respect to the community engagement process that can facilitate the development of a balanced urban renewal strategy.

URBAN RENEWAL IN HONG KONG

Trajectory and challenges

Hong Kong's urban renewal has a long history (Yau and Chan, 2008). In the late 19th century, living conditions in the city were insanitary (Chadwick, 1882) and, thus, in 1884 the colonial government attempted slum clearance as a means of urban renewal to get rid of the urban sore. In the early 1960s, urban regeneration once again became a great concern of the colonial government in the face of a rapidly decaying living environment in the old districts (Fong, 1985). Nevertheless, the inadequate financial resources for property acquisition and a lack of coordination among government departments held up the process, even though the government was determined to redevelop the whole area of Sheung Wan, which was designated an "Urban Renewal District" in 1965 (Ng, 2003).

Starting from 1973, the approach of government-led urban renewal shifted from comprehensive redevelopment to area improvement. In 1974, the Urban Improvement Scheme was launched by the Hong Kong Housing Society, aiming to redevelop dilapidated properties with fragmented or absentee ownership and to re-house the affected residents in the same locality. However, the colonial government's efforts in urban renewal in the 1970s and 1980s were rather *ad-hoc* and patchy (Ng, 1998). In this light, the Hong Kong government established the Land Development Corporation (LDC) in 1988 as an independent statutory body responsible for site assembly for redevelopment projects.

However, the LDC was not equipped with direct resumption power conferred by law. In other words, it had to rely solely on private negotiation for property acquisition (Kam et al., 2004). This explains why only ten redevelopment projects were completed by the LDC by mid-1996 (Adams and Hastings, 2000). The inefficiency of the LDC led to the transformation into the current Urban Renewal Authority (URA), which possesses statutory power to resume land for redevelopment with a view to ensuring the public interest (Planning, Environment and Lands Branch, 1996).

To facilitate government-led urban renewal, the *Urban Renewal Authority Ordinance* (Chapter 563 of the Laws of Hong Kong) was enacted in 2000 and the URA was finally established in May 2001. It was proposed that the URA would work through a holistic "4Rs"

strategy, comprising Redevelopment, Rehabilitation, Preservation and Revitalisation. Clearly, the URA's working scope was much broader than that of the LDC (Kam et al, 2004).

Redevelopment versus building rehabilitation

The government started realizing that the pace of redevelopment, which involves demolition and rebuilding, could not keep pace with the speed of urban decay. Therefore, to relieve the pressure on redevelopment, building maintenance and repair that could extend the serviceable lives of buildings were promoted through incentives offered to the building owners for carrying out building improvement works to their buildings (Planning, Environment and Lands Branch, 1996). The government's advocacy of building maintenance and repair, in effect, highlighted its recognition of the importance of building rehabilitation (i.e. building improvement and upgrading without complete demolition) in the process of urban renewal. Despite the fact that more options became available for urban renewal, new challenges have arisen from the choice among the various options. For example, facing building dilapidation or obsolescence, building owners typically need to decide between two alternatives: i) rehabilitating their buildings; or ii) tearing down the buildings and redevelop the sites.

The Sai Yee Street project (also known as K28 project) in Mongkok is a good example of this issue. Immediately after the URA announced its general intention

to redevelop fourteen residential cum commercial buildings in the project in March 2006, a heated debate was sparked between the affected residents on upper floors and retail operators on ground floor on how the project should proceed. A wave of debate over the choice between redevelopment or rehabilitation then followed (But, 2007; Lai, 2007a; 2007b). After several years of consultation and pondering, the URA finally opted for the redevelopment option in 2009. More recently, a similar predicament was encountered in the Wing Lee Street Project in Central District. In view of the prominence of objections to the project by conservationists, the URA withdrew its redevelopment plan, which would have cleared most structures on the project site, notwithstanding that some residents there had been longing for redevelopment for years (Lu, 2010).

RESEARCH PLAN AND DATA COLLECTION

In order to find out preferences between rehabilitation and redevelopment vis-a-vis demographic and other factors, a structured questionnaire survey was conducted during the period 28 May 2008 to mid-October 2008. The survey covered 393 privately owned residential buildings in Sham Shui Po (SSP), Yau Tsim Mong (YTM), Wanchai (WC) and Central and Western (CW) districts, and a total of 1,500 residents were interviewed. These four districts, all located in the metropolitan area of Hong Kong, are dominated by old buildings and have been regarded as the most problematic areas which warrant

urgent renewal (Planning and Lands Bureau, 2001).

According to the Census and Statistics Department (2010), the total number of households in Hong Kong was 2,311,600 as of mid-2009; where CW district consisted of 92,500 households, 58,100 in WC, 107,200 in YTM and 128,300 in SSP. In our study, 1,500 households living in the private residential buildings were randomly selected for assessment. A total of 412 (27.5%) respondents came from SSP, 642 (42.8%) from YTM, 79 (5.3%) from WC and 367 (24.5%) from CW district. Our survey was dominated by the respondents aged between 30 to 59 years, covering 56% of the whole sample. The majority of the respondents (80%) have educational attainment up to secondary level. About 43% of the respondents were employees, while 45% have average monthly household income in the range of HKD10,000 to 24,999. The demographic and socio-economic characteristics of the respondents are summarized in Appendix 1. Across the four districts,

69.9% of the respondents were owner-occupiers and 56.2% of the respondents lived in buildings which were over 30 years old.

FINDINGS AND DISCUSSION

About 50% and 30% of the respondents have been living in the same district and the same flat for at least 20 years, respectively (Appendix 2). Among all the respondents, 20.1% complained about concrete problems (e.g. concrete spalling and exposure of reinforcement bars) in their buildings. Problems of water seepage at home were suffered by 7.1% of the respondents. In addition, 16.1% of the respondents stated that unauthorized building works existed in their buildings. Table 1 summarizes the satisfaction levels of the respondents in various aspects. Overall, the respondents were quite satisfied with their living environments, and this explained why the majority (76.1%) of the respondents liked to live in their current residences (Appendix 3).

Table 1: Satisfaction levels of the respondents on living environment

Aspect	Number of respondents (% in parenthesis)					
	Very Dissatisfied	Dissatisfied	Neutral	Satisfied	Very Satisfied	No Comment
Hygiene condition	20 (1.3)	116 (7.7)	371 (24.7)	878 (58.5)	76 (5.1)	39 (2.6)
Fire safety	29 (1.9)	93 (6.2)	332 (22.1)	883 (58.9)	51 (3.4)	112 (7.5)
Structural safety	10 (0.7)	75 (5.0)	351 (23.4)	939 (62.6)	50 (3.3)	75 (5.0)
Amenity facilities	13 (0.9)	104 (6.9)	36 (24.5)	912 (60.8)	57 (3.8)	47 (3.1)
Overall	12 (0.8)	75 (5.0)	398 (26.5)	857 (57.1)	43 (2.9)	115 (7.7)

As for the intention to move, 915 (61.0%) of the respondents expressed no wish to move out from the buildings they were living in. The major reasons behind this included “being accustomed to the district” (11.9%), “convenient district to live in” (5.7%), “satisfied with the current living conditions” (4.5%) and “unable to afford the cost of living in other places” (4.4%). Among those who intended to move, 56.4% opted to continue to live in the same district as before. This indicated that there was a strong adherence of the residents to their local areas or neighbourhoods.

Those respondents who lived in buildings over 30 years old were asked about their inclinations towards redevelopment or rehabilitation. It is interesting to see that out of the 843 respondents, 394 (46.7%) made no comment on this issue (Table 2). This indicates that an overwhelmingly

large portion of respondents was indifferent as to the two approaches of urban renewal. It might also suggest that the respondents do not have enough information to choose between the approaches. For the rest of the respondents, 34.3% supported redevelopment, and only 19% opted for rehabilitation. When they were questioned further on the reasons for their choices, 30.6% of the pro-rehabilitation respondents thought that their buildings were not so dilapidated or were repairable. A small proportion (10.6%) wanted to live in the same flat, and around the same proportion (9.4%) wanted to live in the same building. Regarding the supporting grounds for redevelopment, building dereliction was the most frequently cited reason (43.6%). The chance to move to a new home and the thorough improvement of the quality of the living environment accounted for 10.0% and 8.3%, respectively.

Table 2: Preference of residents living in buildings with different ages

Preference	Living in buildings aged 30-39 years		Living in buildings aged 40 years or above	
	Number	%	Number	%
No comment	155	45.1%	239	47.9%
Strongly support rehabilitation but oppose redevelopment	10	2.9%	8	1.6%
Strongly support rehabilitation	6	1.7%	8	1.6%
Support rehabilitation	60	17.4%	68	13.6%
Support redevelopment	91	26.5%	136	27.3%
Strongly support redevelopment	9	2.6%	15	3.0%
Strongly support redevelopment but oppose rehabilitation	13	4.5%	25	5.0%

Table 3: Preference of all residents towards different approaches of urban renewal categorized by districts

Preference	CW	WC*	YTM*	SSP*	Overall
No comment	43%	24.5%	38.0%	73.4%	46.7%
Strongly support rehabilitation but oppose redevelopment	2.0%	5.7%	2.9%	0%	2.1%
Strongly support rehabilitation	2.8%	0%	1.7%	0.5%	1.7%
Support rehabilitation	19.9%	18.9%	18.4%	2.1%	15.2%
Support redevelopment	26.3%	30.2%	29.1%	22.9%	26.9%
Strongly support redevelopment	4.0%	0%	3.7%	0.5%	2.8%
Strongly support redevelopment but oppose rehabilitation	2.0%	20.8%	6.1%	0.5%	4.5%

* columns do not sum to 100% due to rounding-off.

Tables 2 and 3 show the preferences of the responding residents. The findings indicate that the respondents residing in buildings aged 30 to 39 years were more likely to support rehabilitation than those residing in buildings of 40 years old or above. Though the difference was not significant, one might suggest that people living in older buildings preferred redevelopment to rehabilitation. This is confirmed by the regression analysis result that respondents residing in building of 40 years old or above were more likely to support redevelopment than those in building aged 30 to 39 years old (Table 4). All these results suggest that when making a choice between redevelopment and rehabilitation, residents in old buildings were concerned about building quality more than other social and environmental issues. The large number of “no comment” responses might suggest the respondents’ resistance to redevelopment and rehabilitation, and also reflect their uncertainties about both renewal methods.

By district, Table 3 demonstrates that the respondents in those four districts preferred redevelopment (32.3% in CW, 51% in WC, 38.8% in YTM and 23.9% in SSP) to rehabilitation (24.7% in CW, 24.6% in WC, 23% in YTM and 2.6% in SSP). Among the respondents providing their views, the statistical analysis implies that respondents in SSP had the strongest inclination towards redevelopment, followed by WC, YTM and then CW respectively (Table 4). Concerning the response of “no comment”, Table 3 reveals an interesting result that the majority of the respondents in SSP express no opinion about redevelopment or rehabilitation. The probit analysis shows that respondents in SSP with a higher income were less likely to answer “no comment” when being asked their views about both renewal methods (Table 5). However, the estimated coefficients are statistically insignificant at the 10% level. Respondents with education attainment of primary level or below were most

likely to give a preference, followed by those of post secondary or above and those of secondary level, respectively. Yet again, these coefficients are statistically insignificant. Respondents aged below 30 years old were more likely to give “no comment” response

than those aged 60 years old or above. On the other hand, respondents aged between 30 and 59 years old were most likely to give their views, implying their concern about renewal methods for the buildings where they were currently residing.

Table 4: Results of probit analysis: respondents’ preference for redevelopment over rehabilitation

Variable	Coefficient	Standard Error	z -Statistics	
Building aged 40 or above	0.41555	0.14048	2.95803	*
WC	0.54406	0.24806	2.19323	**
YTM	0.32796	0.14925	2.19746	**
SSP	1.32159	0.27887	4.73907	*
Dependent Variable	<i>REDEVELOPMENT</i>	No. of observations	449	
McFadden <i>R</i> -squared	0.05303	Akaike info criterion	1.25577	
Schwarz criterion	1.30151	Log likelihood	-276.921	
Hannan-Quinn criterion	1.27380	LR Statistic	31.0137	*

Notes: (*) and (**) denote statistical significance at 1% and 5% levels respectively.

Table 5: Results of probit analysis: respondents in SSP without preference for renewal method

Variable	Coefficient	Standard Error	z -Statistics	
Income \$ 10,000 – 29,999	-0.06858	0.24113	-0.28443	
Income \$ 30,000 – 59,999	-0.70500	0.42955	-1.64123	
Income \$ 60,000 or above	-1.01484	0.71158	-1.42619	
Education – Primary or below	-0.29943	0.53210	-0.56273	
Education – Secondary	0.29380	0.50103	0.58640	
Age 30 – 59	-0.95918	0.47867	-2.00385	**
Age 60 or above	-0.37696	0.54256	-0.69479	
Dependent Variable	<i>NO_COMMENT</i>	No. of observations	174	
McFadden <i>R</i> -squared	0.06278	Akaike info criterion	1.19601	
Schwarz criterion	1.34125	Log likelihood	-96.0527	
Hannan-Quinn criterion	1.25493	LR Statistic	12.8675	***

Notes: (*), (**) and (***) denote statistical significance at 1%, 5% and 10% levels respectively.

DISTRICT ASPIRATION STUDIES (DAS)

The findings of our study deviate from those of the District Aspiration Studies (DAS) conducted by the District Councils of the four districts.¹ As interpreted by the Urban Renewal Authority (2010), the DAS revealed a strong inclination to preservation and revitalization as ways of renewal by the residents in CW district. In contrast, respondents from WC and SSP districts placed rehabilitation as the priority, followed by preservation, revitalization and redevelopment. Respondents from SSP district also highlighted the need for redevelopment in certain areas of the district in which the quality of the buildings was relatively poor. Respondents from YTM district preferred redevelopment to rehabilitation. The differences in the findings between this study and the DAS may probably originate from the methods used in collecting the views of the community. In our study, we initially randomly selected 393 private residential buildings in the four districts. We then randomly selected 1,500 households residing in the targeted buildings and letters were sent by post to schedule the interviews. Face-to-face interviews based on the structured questionnaire were conducted by trained interviewers. The households living in buildings aged 30 or above were asked about their inclinations towards redevelopment or rehabilitation, involving a total of

843 respondents. In contrast, the DAS employed various approaches such as questionnaire surveys, workshops and focus groups in their study. The findings from workshops and focus groups may be subjected to selection bias. Also, respondents in the DAS included a mixture of backgrounds such as private housing residents, public housing tenants and retail business operators whereas only private housing residents in old private buildings (i.e. over 30 years) were surveyed in this study. All these methodological and respondent differences contributed to the divergent findings between the studies.

In our study, when the respondents were asked whether they would participate in the rehabilitation scheme of the Urban Renewal Authority (URA), nearly half of the respondents (46.7%) answered negatively, with only 17.3% indicated that they would participate. The rest of 36% indicated either that the question was not applicable to their current situation or had no idea at all. This inclination actually runs against the government's and URA's aspirations to revitalize Hong Kong's built environment through rehabilitation. It also poses a question as to whether the URA's strategy of using rehabilitation as a tool to improve the built environment and reduce the pace of redevelopment actually reflects the residents' wants. The apathy of the residents with respect to rehabilitation schemes might suggest the insufficient promotion of the benefits and incentives of rehabilitation, or it may be that the

¹ In July 2009, the URA invited each of the seven District Councils in URA's target areas to conduct a DAS as a part of the Urban Renewal Strategy Review.

support offered by various government and quasi-government organizations for rehabilitation are not attractive enough.

Table 6: Preference of compensation method of the respondents

Preference	Number	%
Answers not obtained	700	46.7%
Government or developer's acquisition	324	21.6%
Move to similar sized flat in the neighbourhood by flat-for-flat method	258	17.2%
Move back to current address with the flat size similar to the current one by flat-for-flat method	189	12.6%
Participate in future redevelopment and being the building shareholder in proportion to the plot	29	1.9%

When the respondents were asked about which of the compensation methods they would prefer (Table 6), acquisition compensation was the most popular option (21.6%). The choice of move to a similar sized flat in the neighbourhood in the 'flat-for-flat' option was next (17.2%), followed by the option to move back to the current address (12.6%). Nearly half (46.7%) of the respondents chose not to indicate any preference. This also suggests that the respondents might not have enough information to make a decision. It is not surprising to see that while the respondents prefer redevelopment to building rehabilitation in renewing the local area, the majority of respondents wanted to stay in the same locality. This offers insights to public administrators and the URA to formulate more attractive compensation for the affected residents in redevelopment projects. In addition to conventional cash compensation, other options such as in-situ flat-for-flat compensation or re-housing in the same district should be considered by the redevelopment agents. Alternatively, the technique of transfer of development rights may also help to solve this redevelopment dilemma.

CONCLUDING REMARKS

The point of departure of this paper is the rising number of dilapidated buildings in Hong Kong and the difficulties encountered in the urban renewal decision-making process. One should bear in mind that the quality of the housing stock and public health are closely correlated (Hasselaar, 2009). Moreover, long-term vigilant management of the building stock is a key to sustainable development of a city (Kohler and Yang, 2007). Equally, social stakes are important to consider in building stock management or housing stock policy (Gilbert, 2009). As suggested in Agenda 21 of the United Nations (1992), apart from the economic and environmental quality, the social quality of human settlement should be duly and carefully considered in the development of a city. Otherwise, achieving sustainable urban renewal would be unrealisable. That is why policy and decision makers need to acknowledge the interests of different stakeholders in the urban renewal process. The survey in this study revealed that residents living in aged buildings preferred redevelopment to rehabilitation. Residents in SSP

have the strongest inclination towards redevelopment. This result appears to be contrary to the on-going emphasis promoting rehabilitation by the government. Undoubtedly, knowing the stakeholders' aspirations is the start, rather than the end. How to balance the divergent interests and views of stakeholders in each renewal project is highly challenging. Therefore, further research and discussions should be undertaken to explore the strategies (e.g. public engagement) to arrive at solutions which are acceptable and beneficial to affected residents as well as ensuring consensus in the community.

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APPENDICES

Appendix 1: Demographic and socio-economic characteristics of the respondents

Characteristic		Number	%
Gender	Male	719	47.9
	Female	781	52.1
Age	≤ 19 years old	51	3.4
	20 - 29 years old	162	10.8
	30 - 39 years old	229	15.3
	40 - 49 years old	316	21.1
	50 - 59 years old	293	19.5
	60 - 69 years old	174	11.6
	70 - 79 years old	194	12.9
	≥ 80 years old	80	5.3
Highest Educational Attainment	Refused to answer	1	0.1
	Non-formal education / Kindergarten	133	8.9
	Primary	278	18.5
	Lower secondary	332	22.1
	Upper secondary or sixth form	469	31.3
	Post-secondary - sub-degree	84	5.6
	Post-secondary - degree or above	193	12.9
Employment Status	Refused to answer	11	0.7
	Employee	638	42.5
	Employer	47	3.1
	Self-employed	69	4.6
	Student	92	6.1

Characteristic	Number	%	
	Housewife	278	18.5
	Retired	325	21.7
	Nothing to do / Unemployed	48	3.2
	Refused to answer	3	0.2
Length of Residence in Hong Kong	< 1 year	12	0.8
	≥ 1 and < 10 years	112	7.5
	≥ 10 and < 20 years	147	9.8
	≥ 20 and < 30 years	229	15.3
	≥ 30 and < 40 years	244	16.3
	≥ 40 and < 50 years	324	21.6
	> 50 years	274	18.3
	> 60 years	147	9.8
	Refused to answer	11	0.7
Average Monthly Household Income	< HK\$2,000	167	11.1
	HK\$2,000 - HK\$3,999	33	2.2
	HK\$4,000 - HK\$5,999	45	3.0
	HK\$6,000 - HK\$7,999	74	4.9
	HK\$8,000 - HK\$9,999	105	7.0
	HK\$10,000 - HK\$14,999	265	17.7
	HK\$15,000 - HK\$19,999	228	15.2
	HK\$20,000 - HK\$24,999	187	12.5
	HK\$25,000 - HK\$29,999	72	4.8
	HK\$30,000 - HK\$39,999	103	6.9
	HK\$40,000 - HK\$59,999	88	5.9
	≥ HK\$60,000	34	2.3
	Refused to answer	99	6.6

Appendix 2: Lengths of residence of the respondents

Length of residence	Number	%	
District	< 1 year	52	3.5
	≥ 1 and < 10 years	365	24.3
	≥ 10 and < 20 years	272	18.1
	≥ 20 and < 30 years	277	18.5
	≥ 30 and < 40 years	207	13.8
	≥ 40 and < 50 years	173	11.5
	> 50 years	76	5.1
	> 60 years	40	2.7
	Refused to answer	38	2.5
Current Residence	< 1 year	91	6.1
	≥ 1 and < 10 years	577	38.5
	≥ 10 and < 20 years	363	24.2
	≥ 20 and < 30 years	280	18.7
	≥ 30 and < 40 years	124	8.3
	≥ 40 and < 50 years	53	3.5
	> 50 years	5	0.3
	> 60 years	1	0.1
	Refused to answer	6	0.4

Appendix 3: Eagerness to reside in current residences

Response	Number	%
Yes	1,142	76.1%
No	168	11.2%
No Comment / Not Applicable	190	12.7%

REFERENCES

- Adams D and Hastings EM (2001), Assessing Institutional Relations in Development Partnerships: The Land Development Corporation and the Hong Kong Government Prior to 1997, *Urban Studies*, 38:9, 1473-1492.
- But C (2007), Legislator Suggests a Compromise on the Redevelopment of Sneaker Street, *South China Morning Post*, 19 March 2007, City, 3.
- Census and Statistics Department (2010), *Population and Household Statistics Analysed by District Council District 2009*, Census and Statistics Department, Hong Kong.
- Chadwick O (1882), *Report on the Sanitation of Hong Kong*, Government Printer, Hong Kong.
- Fong PKW (1985), Issues in Urban Development: the Land Development Corporation, *Built Environment*, 11, 285-293.
- Gilbert P (2009), Social Stakes of Urban Renewal: Recent French Housing Policy, *Building Research and Information*, 37:5/6, 638-648.
- Hasselaar E (2009), Health Issues and the Building Stock, *Building Research and Information*, 37(5), 669-678.
- Jim CY (1994), Urban Renewal and Environmental Planning, *The Environmentalists*, 14:3, 163-181.
- Kam PK, Ng SH and Ho CCK (2004), Urban Renewal in Hong Kong – Historical Development and Current Issues, *Building Dilapidation and Rejuvenation in Hong Kong*, Leung, A.Y.T. and Yiu, C.Y. (eds.), City University of Hong Kong and the Hong Kong Institute of Surveyors, Hong Kong, 97-112.
- Kohler N and Yang W (2007), Long-term Management of Building Stocks, *Building Research and Information*, 35:4, 351-362.
- Lai C (2007a), Lawmakers Condemn Urban Renewal Authority Over Woes of Development, *South China Morning Post*, 27 June 2007, City, 3.
- Lai C (2007b), Small Traders Vow to Fight Urban Renewal Plan, *South China Morning Post*, 17 January 2007, City, 3.
- Lai L W C (1993), Urban Renewal and the Land Development Corporation, in Po-king Choi and Lok-sang Ho (eds.), *The Other Hong Kong Report*, Hong Kong: Chinese University Press, pp.175-191.

- Lai L W C (2002a), Planning and Property Rights in Hong Kong under Constitutional Capitalism, *International Planning Studies*, 7:2, 213-225.
- Lai L W C (2002b), 'Fifty Years No Change?' Land Use Planning and Development in Hong Kong under Constitutional Capitalism, Chapter 10, Chan, M. and So, A. (eds.), *Crisis and Transformation in China's Hong Kong*, Armonk, M.E.Sharpe and Hong Kong, Hong Kong University Press, pp. 257-282.
- Lai L W C (2010), A Model of Planning by Contract: Integrating Comprehensive State Planning, Freedom of Contract, Public Participation, and Fidelity, *Town Planning Review*, 81:6, 647-673.
- Lehmann S (2006), Towards a Sustainable City Centre: Integrating Ecologically Sustainable Development (ESD) Principles into Urban Renewal, *Journal of Green Building*, 1:3, 83-104.
- Lu J (2010), Wing Lee Street Escapes Bulldozer, *China Daily (Hong Kong Edition)*, 17 March 2010, 1.
- Ng I (1998), Urban Redevelopment in Hong Kong: The Partnership Experience, *International Journal of Public Sector Management*, 11:5, 414-420.
- Ng I (2002a), Urban Redevelopment in Hong Kong: An Examination of the Land Development Corporation, *International Journal of Housing Science*, 26:2, 113-122.
- Ng I (2003), Community Approach: Is Solution to Age-old Problem of Urban Renewal in Hong Kong, *International Journal for Housing Science*, 27:1, 75-88.
- Ng MK (2002b), Property-led Urban Renewal in Hong Kong: Any Place for The Community, *Sustainable Development*, 10:3, 140-146.
- Ng MK, Cook A and Chui EWT (2001), The Road Not Travelled: A Sustainable Urban Regeneration Strategy for Hong Kong, *Planning Practice & Research*, 16:2, 171-183.
- Planning, Environment and Lands Branch (1996), *Urban Renewal in Hong Kong*, Planning, Environment and Lands Branch, Hong Kong.
- Planning and Lands Bureau (2001), *Urban Renewal Strategy*, Planning and Lands Bureau, Hong Kong.
- Siu J C W (2009), Planning by Regulations and Private Property Rights: Recent Court Cases on Two Town Planning Board Decisions, *Surveying and Built Environment*, 20:1, 79-101.
- United Nations (1992), *Agenda21: Programme of Action for Sustainable Development*, Department of Public Information, United Nations, New York.
- Urban Renewal Authority (2009), *Study on Building Maintenance, Steering Committee on Review of Urban Renewal Strategy Paper No. 19/2009*, Urban Renewal Authority, Hong Kong.

Urban Renewal Authority (2010), *Steering Committee on Review of the Urban Renewal Strategy Summary of Findings of District Aspiration Studies SC Paper No. 14/2010*, Urban Renewal Authority, Hong Kong.

Watson P (2009), The Key Issues When Choosing Adaptation of an Existing Building over New Build, *Journal of Building Appraisal*, 4:3, 215-223.

Yau Y and Chan HL (2008), To Rehabilitate or Redevelopment? A Study of the Decision Criteria for Urban Regeneration Projects, *Journal of Place Management and Development*, 1:3, 272-291.

Yeh AGO (1990), Public and Private Partnership in Urban Redevelopment in Hong Kong, *Third World Planning Review*, 12, 361-383.

Comments on The Theoretical Foundation of China's *Xian* System

Marco K. W. Yu¹

This is a review of the paper by Wong in this issue.

If a production process involves more than one provider of the factors of production, at least one party is the “residual claimant” of the production process. For example, a farmer (as a provider of labour) can, after paying a fixed rent to the landlord (as a provider of land), keep all of the crops; or a landlord can, after paying a fixed wage to a farmer, keep all of the crops. The third option is sharecropping. A landlord and a farmer agree to share the crops at a fixed ratio as returns to their respective factors of production.

Revenue or profit² sharing contracts, epitomised by sharecropping, are a very popular type of contractual arrangement. It is common to supplement a fixed rental contract with revenue or profit sharing. I have seen them in the form of turnover rent agreement, hotel franchise fee agreement, land-sale overage, as well as film rental contracts between distributors and exhibitors.

Wong, in this issue of Surveying and Built Environment, has chosen three very interesting cases of share contracts and attempted to provide some mathematical rigour to them. The three cases include i) uniform value-added tax rate in China, ii) Alfred Marshall's conjecture about landlord capital investment and iii) public-private joint venture.

¹ PhD candidate at the Bartlett School of Construction and Project Management, University College London. The author can be contacted via email at k.yu@ucl.ac.uk. The opinions and views expressed in this paper are not necessarily those of the organisations the author belongs to and the author is solely responsible for any errors that this article may contain.

² 'Profit' refers to the meaning in an accounting sense rather than the definition in the study of economics.

Uniform 17% value-added tax rate in China

Cheung (2008) observes that *xian*, the local government, and the higher government collectively charge a uniform 17% value-added tax³ on business investors throughout the country. Given the huge variety in the productivity of land because of the difference in location and in infrastructure investment, the value-added tax rate, which Cheung likens to a sharecropping ratio, should differ by locality to achieve an efficient outcome. However, the value-added tax rate is uniform across the entire country, which is at odds with the observation that China’s economy has been growing at recording-breaking speed for decades.

Cheung (2008) proposes that the flexible land price that local governments offer to the investors, which can even be negative, plays a crucial role in attaining efficient outcomes. The mathematical proof provided by Wong shows that several necessary features of efficient outcomes are attained; for example that the marginal product of labour is equal to wages. The following proof highlights a limitation that was not shown in Wong’s paper.

Using the same symbols as in Wong’s paper, I simplify the *xian* objective function by removing the factory premises⁴.

$$\text{Max}_{\{l,a,m,P\}} R = n \{ \bar{S} [f(l,a,m) - tm] + iPl \} \quad (1)$$

subject to the constraint faced by the investors:

$$f(l,a,m) = \bar{S} [f(l,a,m) - tm] + iPl + wa + tm \quad (2)$$

It is worth noting that a *xian* can specify the labour input provided by investors, *a*, in the objective function (1). Cheung (1969) argues that the labour input is stipulated in sharecropping, which is the key element leading to the efficient outcome.

The Lagrange function is written as follows:

$$\Lambda(l,a,m,P,\lambda) = \frac{L}{l} \{ \bar{S} [f(l,a,m) - tm] + iPl \} + \lambda \{ (1 - \bar{S}) [f(l,a,m) - tm] - iPl - wa \} \quad (3)$$

where λ is the Lagrange multiplier.

The first order necessary conditions are as follows:

$$\frac{\partial \Lambda}{\partial P} = 0 \text{ or } \lambda = \frac{L}{l} \quad (4)$$

$$\frac{\partial \Lambda}{\partial a} = 0 \text{ or } w = \frac{\partial f}{\partial a} \quad (5)$$

$$\frac{\partial \Lambda}{\partial m} = 0 \text{ or } t = \frac{\partial f}{\partial m} \quad (6)$$

$$\frac{\partial \Lambda}{\partial l} = 0 \text{ or } \bar{S} = \frac{l \frac{\partial f}{\partial l} - iPl}{f(l,a,m) - tm} \quad (7)$$

Using equations (2) and (7) to eliminate the term *iPl*, we get

$$f(l,a,m) = l \frac{\partial f}{\partial l} + a \frac{\partial f}{\partial a} + m \frac{\partial f}{\partial m} \quad (8)$$

Equations (5), (6) and (8) show that the maximization result is consistent with the efficient outcome. The marginal

³ The value-added tax is charged on the difference between the price of the output and the cost of raw materials and consumables.

⁴ Removing the factory premises would simplify the equations but would not compromise the generality of the result.

product of labour is equal to the wage value in equation (5). The marginal product of raw materials is equal to the price of raw materials in equation (6). Equation (8) is the product-exhaustion result. Each factor is paid its respective marginal product and the sum of the factor income is equivalent to the total output.

From equation (7), we can see S and P are inversely related. Holding other factors constant, if a *xian* wants to charge a higher value-added tax rates, it needs to reduce the land premium. Under the arrangement of uniform value added tax rate at 17%, P acts as a buffer to ensure equation (7) is satisfied despite the huge disparity in the productivity of land throughout China. At a good raw location, a *xian* can charge a high land premium and also benefit from the value-added tax. However, any *xian* is also willing to provide the land to an investor for free if the expected return from the value-added tax can compensate the opportunity cost. Re-arranging equation (7), we obtain:

$$-Pl = \frac{\bar{S}[f(l,a,m) - tm] - l \frac{\partial f}{\partial l}}{i} \quad (9)$$

From equation (9), if the land has no alternative use and the marginal product of land is zero, then the theoretical limit of the negative land price that a *xian* should pay to an investor is the discounted value-added tax.

However, according to Cheung (2008)

a *xian* will bear 100% of the negative land price in the form of infrastructure investment or rebate in future value-added tax whereas the same *xian* will only benefit from 25% of the value-added tax raised in the future. That is because 75% of the value-added tax will be passed to higher levels of government. This leads to the conclusion that the maximum negative land price any *xian* will pay is 25% of the efficient level. It follows that *xians* under-invest in poor land.

Marshall's Sharecropping Footnote

$$\text{From (9), if } P = 0 \quad \bar{S} = \frac{l \frac{\partial f}{\partial l}}{f(l,a,m) - tm}$$

Given the disparity in the fertility of land, the sharecropping ratio would not be at the efficient level except by coincidence and therefore it is tempting to conclude that the sharecropping ratio set by custom is inefficient.

However, Marshall's footnote inspired Cheung (2008) to solve the consequent paradox of a booming Chinese economy under a uniform value-added tax rate. Marshall noted that "there remains a wide margin of uncertainty as to the amount of capital which the landlord will from time to time invest in maintaining and extending the farm buildings and other improvements."⁵

It is this flexibility in the landlord's contribution in capital that can help to achieve an efficient outcome under sharecropping, which is comparable

⁵ Marshall (1920), book VI, chapter X, page 639. The footnote that Cheung (2008) refers to reads "Then, if the landlord controls the amount [of circulating capital] freely and in his own interest, and can bargain with his tenant as to the amount of labour he applies, it can be proved geometrically that he will so adjust it as to force the tenant to cultivate the land just as intensively as he would under the English tenure [fixed rent]; and his share will then be the same as under it." (Marshall 1920: pp. 645)

to the land premium in the first case. Using the same symbols, let m stand for general non-land input and c the proportion of m provided by landlord. The landlord's objective function is thus written as follows:

$$\text{Max}_{\{l,a,m,c\}} R = \frac{L}{l} \{ \bar{S} [f(l,a,m) - tm] - ctm \} \quad (10)$$

subject to the constraint:

$$f(l,a,m) = \bar{S} [f(l,a,m) - tm] + wa + (1-c)tm \quad (11)$$

The Lagrange function is written as follows:

$$\Lambda(l,a,m,c,\lambda) = \frac{L}{l} \{ \bar{S} [f(l,a,m) - tm] - ctm \} + \lambda \{ (1-\bar{S}) [f(l,a,m) - tm] - wa + ctm \} \quad (12)$$

where λ is the Lagrange multiplier.

The first order necessary conditions are as follows:

$$\frac{\partial \Lambda}{\partial c} = 0 \text{ or } \lambda = \frac{L}{l} \quad (13)$$

$$\frac{\partial \Lambda}{\partial a} = 0 \text{ or } w = \frac{\partial f}{\partial a} \quad (14)$$

$$\frac{\partial \Lambda}{\partial m} = 0 \text{ or } t = \frac{\partial f}{\partial m} \quad (15)$$

$$\frac{\partial \Lambda}{\partial l} = 0 \text{ or } \bar{S} = \frac{l \frac{\partial f}{\partial l} - ctm}{(f(l,a,m) - tm)} \quad (16)$$

since $0 \leq c \leq 1$ an efficient outcome can be achieved if the sharecropping ratio, S , falls into the following range:

$$\frac{l \frac{\partial f}{\partial l} - tm}{(f(l,a,m) - tm)} \leq \bar{S} \leq \frac{l \frac{\partial f}{\partial l}}{(f(l,a,m) - tm)}$$

This is consistent with Cheung's claim (1969: pp. 45) that given a certain (though not any) rental percentage, Marshall is correct.

Public – Private Joint Ventures

My understanding is that a public sector landlord teams up with a private sector developer. The public sector landlord's objective function is written as follows:

$$\text{Max}_{\{l,b,S\}} R = n S [f(l,b) - pb] \quad (17)$$

However, I struggle to understand the reason for equation (11) in Wong's paper being the capital market constraint. My reading of Wong (1992) and Wong and Walker (2000) is that pb includes all the return that a developer should obtain under competition. Therefore, the constraint should be as follows:

$$f(l,b) = S[f(l,b) - pb] + pb \text{ or } (1-S)[f(l,b) - pb] = 0 \quad (18)$$

In fact, as long as the development is financially feasible, i.e. $f(l,b) > pb$, R is an increasing function with respect to S , because

$$\frac{\partial R}{\partial S} = n[f(l,b) - pb] > 0$$

Therefore, the public landlord will choose the maximum S , which is 1, which also satisfies the constraint of equation (18). The objective function thus becomes the following:

$$\text{Max}_{\{l,b\}} R = \frac{L}{l} [f(l,b) - pb] \quad (19)$$

$$\frac{\partial R}{\partial b} = 0 \text{ or } p = \frac{\partial f}{\partial b} \quad (20)$$

$$\frac{\partial R}{\partial l} = 0 \text{ or } f(l,b) = l \frac{\partial f}{\partial l} + b \frac{\partial f}{\partial b} \quad (21)$$

Equations (20) and (21) are consistent with the efficient outcome. Wong (1992) and Wong and Walker (2000) observe that the share percentage is anything but 100%, which implies a wealth transfer but not necessarily an inefficient outcome.

REFERENCE

Cheung, Steven N S (1969), *The Theory of Share Tenancy: with Special Application to Asian Agriculture and the First Phase of Taiwan Land Reform*, Chicago: University of Chicago Press.

Cheung, Steven N S (2008), *The Economic System of China*, Hong Kong: Arcadia Press.

Marshall, Alfred (1920), *Principles of Economics*, London: Macmillan, 8th edition, first published in 1890. Available on-line at www.econlib.org/library/Marshall

Silberberg, Eugene and Suen, Wing (2001), *The Structure of Economics: a Mathematical Analysis*, New York: McGraw-Hill, 3rd edition, pp. 611-615

Wong, K C (1992), *A Theory of Joint Venture Partnership in Property Investment: with Special Application to the Profit Sharing Arrangements for Property Development*, unpublished PhD Thesis, Hong Kong: Faculty of Architecture, University of Hong Kong.

Wong, K C and Walker, Anthony (2000), "Property Rights Implications of Public-Private Joint Ventures", *Construction Management and Economics*, Vol. 18, pp. 131-138.

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Surveying and Built Environment is an international peer reviewed journal that aims to develop, elucidate, and explore the knowledge of surveying and the built environment; to keep practitioners and researchers informed on current issues and best practices, as well as serving as a platform for the exchange of ideas, knowledge, and opinions among surveyors and related disciplines.

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