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Applying Evaluation in Mediation – A Possible Step forward in the Resolution of Disputes in Hong Kong?

Ever since the introduction of Practice Direction No. 31 (“PD31”) by the Judiciary in 2009¹, the number of mediation cases in Hong Kong has increased rapidly², since under PD31, most of the parties in litigation would need to attempt mediation at certain stage of their cases. With the accumulation of more experience by practising mediators in Hong Kong, such as those who deal mostly with construction cases, there arose a question: Should the traditional model of facilitative mediation, which has been almost the exclusive model being practised and being offered in the training of mediators in Hong Kong up to present, be the only model for the purpose of assisting the parties to resolve their disputes?

In Hong Kong, the dominant style of mediation in practice is facilitative mediation. A browse through the website of Hong Kong Mediation Accreditation Association Limited (“HKMAAL”) would enable one to get the general meaning of mediation, which is: “a voluntary, confidential

and private dispute resolution process in which a neutral person, the mediator, helps the parties to reach their own negotiated settlement agreement”³. The essential requirements for passing the assessment to become a HKMAAL General Accredited Mediator include “refrained from advising”⁴ and one of the possible fail criteria is “Mediator gives advice”⁵. These show that under the current practice of mediation in Hong Kong, a mediator would not give advice and indeed should not express views on the parties’ cases. These restrictions actually follow from the basic concept of facilitative mediation in which the mediator purely facilitates the negotiation among parties.

An early discussion of evaluative mediation could be found in Riskin (1996), who described mediations by reference to two continuum: one was the problem definition continuum, from broad to narrow; and the other described the strategies and techniques that the mediator employed. The two ends of the latter continuum span from where the mediator facilitates to where the mediator evaluates. Naturally there

¹ Revised in 2014.

² The number of cases under the judiciary’s record for the purpose of costs statistics shows that the number of mediation cases increased from 421 to 632 for the period of 2011 to 2014 for the Court of First Instance; see **Lam and Lam (2015)**.

³ Definition given by HKMAAL.

⁴ Section 7 of HKMAAL Assessment Form 1.

⁵ Under HKMAAL Possible Fail Criteria in “Guidance Notes for Candidates of HKMAAL Stage 2 Mediator Assessment (General)”.

exists mediation in between the ends where the mediator uses a mixture of both techniques.

There have been different views expressed by different writers and mediators on the use of evaluative mediation. **Kavoch & Love (1996)** viewed evaluative mediation with reservation. They opined that “‘Evaluative Mediation’ was an oxymoron”. It jeopardised neutrality as a mediator’s assessment would invariably favour one side over the other. **Pollack (2012)** suggested that there were risks of evaluative mediation for the parties’ representatives including whether the mediator was a “good enough lawyer”, whether there was sufficient time for preparation for and ventilation of the legal issues by the parties’ representatives, whether the parties’ representatives could prepare the clients sufficiently well for a negative evaluation on the merits of their case, and whether the timing and delivery of the evaluation would be appropriate. **Simon (2016)** pointed out that there were five fatal flaws of evaluative mediation: evaluative mediators might intentionally mislead the parties, the process prevented meaningful communication, evaluative mediation offered at best a settlement that both sides were unhappy with, evaluative mediation was inefficient and it did not settle more cases than other approaches.

On the other hand, there exists another group of witters and mediators who were more open-minded and receptive to the concept of evaluative mediation. For example, **Quek (2012)** questioned

whether facilitative and evaluative mediation should be treated as if it were a dichotomy. She suggested that the two styles of mediation should not be treated as mutually exclusive or polar opposites. She highlighted that a balanced approach had to be adopted and the right question should be how mediators could help parties evaluate their alternatives. She stressed that one should get away from the debate on the facilitative and evaluative extremes of mediation and return to consider the basic questions concerning the philosophy and elements of mediation. **Zumeta (2015)**, after reviewing articles on the different styles of mediation, concluded that there was room in mediation practice for many styles including facilitative, evaluative and transformative mediation. She suggested that it would be helpful for mediators to articulate to parties and attorneys the styles they generally use and the assumptions and values these styles are based on. **McMullan (2017)** pointed out that in the real world most mediators operate somewhere between a facilitative and evaluative approach. Moreover, there were different kinds of cases for which both approaches would be more suitable.

In Hong Kong, academic studies on the use of evaluative mediation⁶ have

⁶ See for example, “Mediation of Construction Disputes: A Step Closer to Evaluative Model” by **Sammy Yip (2016)**, winner of Outstanding Student Award by the Chartered Institute of Building; and “Feasibility Study of Evaluative Mediation for Resolving Disputes arising under Land (Compulsory Sale for Redevelopment) Ordinance” by **Yoyo Li (2017)**, both in candidacy for BSc in Surveying of University of Hong Kong.

started in recent years, which showed local demand for the use of evaluative mediation in specific sectors including construction disputes. Moreover, the Government has begun to show interest in evaluative mediation and in 2015⁷ and 2016⁸, the Department of Justice held seminars related to the use of evaluative mediation in intellectual property disputes. In 2017, a Special Committee on Evaluative Mediation was formed under the Steering Committee on Mediation chaired by the Secretary for Justice. Meanwhile, a Working Group on Evaluative Mediation was formed within Hong Kong Mediation Council.

Whilst the development of evaluative mediation in Hong Kong is still at a very early stage such that there are still debates on the fundamentals – such as whether evaluation in mediation is simply a technique, a style or an approach in mediation; or whether evaluative mediation could form a mediation model by itself, like facilitative mediation – it is clear that the use of evaluation by the mediator has caught the attention of both users and practitioners. One would foresee that in the near future the use of evaluation will form one of the major focuses in the development of mediation in Hong Kong.

Hing Fung Leung

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The Xueshan Tunnel and the Enlargement of the Taipei Metropolitan Area

Oliver F. Shyr¹, David Emanuel Andersson², Yeun-Touh Li³, Chien-Hung Tu⁴

ABSTRACT

Xueshan Tunnel has halved the travel time between central Yilan County and downtown Taipei from 90 to 45 minutes. The improved accessibility has transformed the economic opportunities of residents in the affected area. This paper analyses the pace of change by comparing estimated hedonic price functions for Yilan County during five different time periods - from the onset of construction to the initial period after its completion. The estimated accessibility effects show that the implicit price of relative access to central Taipei exhibits an upward trend, which indicates the spatial enlargement of Taipei's housing and labour markets.

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INTRODUCTION

After more than a decade of construction work, the *Xueshan Tunnel* and National Freeway No. 5 were opened in June of 2006. The completion of the project in effect halved the distance from Yilan County to central Taipei. The *Xueshan Tunnel* is the fifth-longest road tunnel in the world, cutting through the *Xueshan Range*, which at its highest point reaches an altitude of nearly 3,900 metres above sea level. Prior to the completion of the tunnel, the connections between the two regions consisted of a single railway line and two two-lane highways. The old highways have low speed limits of 40 or 50 kilometres per hour as they traverse mountain passes and trace out jagged coastlines, respectively. As a result, these roads tended to be severely congested on weekends; they not only linked Taipei and Yilan but were also the main gateways to destinations further south on Taiwan's east coast. As a gateway, Yilan County is a transit region for visitors to Taroko National Park in Hualian County, which is Taiwan's most popular tourist destination.

In 2007, Yilan County had a population of about 460,000 within a land area of 2,144 square kilometres. The main administrative centre in the county is Yilan City with about 100,000 residents while the main commercial centre is Luodong Township with more than 70,000 residents.

Figure 1 shows how the new National Freeway No. 5 connects downtown Taipei and northern Yilan County through the *Xueshan Tunnel*. The accessibility effect of the new link has reduced the average travel time between eastern districts of Taipei City and northern Yilan County from 90 to 45 minutes. **Table 1** shows time distances, passenger volumes by travel mode and modal splits before and after the completion of the tunnel. Travel time refers to average time distances between the Yilan Railway Station and Taipei 101, which is at the heart of Taipei's new downtown area. The new downtown area exhibits the highest office rents and house prices per square metre in Taiwan and is located to the east of the old – but now rather dilapidated – centre around the main railway and transit interchange.

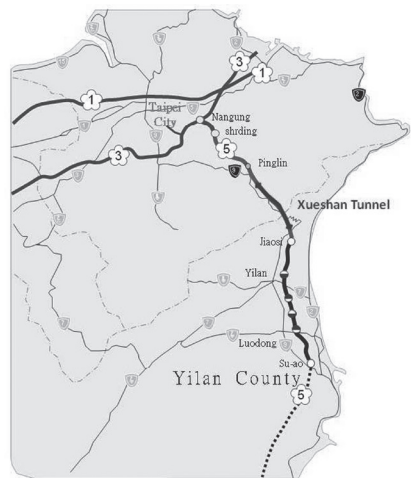


Figure 1: Location of Freeway No. 5 and the Xueshan Tunnel in Northeast Taiwan

Table 1 shows that the travel time by car has been cut in half while the travel time by bus has dropped by 70 percent. In parallel, the number of people travelling by car each day increased by more than 50 percent while the number of bus passengers increased thirty-fold in 2006. The total number of trips per day between Taipei and Yilan increased 62 percent, from 38,600 to 62,500.

Table 1: Time Cost, Money Cost and Daily Passenger Volume before and after the Opening of the Xueshan Tunnel

| | Before May 2006 | | | After May 2006 | | |
|------------------------|-----------------|-------|-----|----------------|-------|-------|
| | Car | Train | Bus | Car | Train | Bus |
| Time Cost (minutes) | 90 | 120 | 170 | 45 | 110 | 50 |
| Money Cost (NT\$) | 224 | 240 | 219 | 128 | 240 | 130 |
| Daily Passenger Volume | 30,648 | 7,549 | 355 | 45,763 | 5,744 | 5,494 |
| Market Share (%) | 79.5 | 19.6 | .9 | 73.2 | 9.2 | 17.6 |

It is becoming increasingly obvious to both buyers and sellers of real estate that Yilan has become a feasible spatial option for Taipei-bound commuters. Perhaps as a result, Yilan’s Land Value Index (LVI) rose by about 10 percent from 2002 to 2007, vis-à-vis the national LVI which increased less than 5 percent (see **Figure 2**). The construction and opening of the freeway has thus coincided with an over-performing regional land market in relative terms. In Taiwan, land values account for as much as 30 to 50 percent of the total property value: this reflects the combination of a high population density and relatively low construction costs.

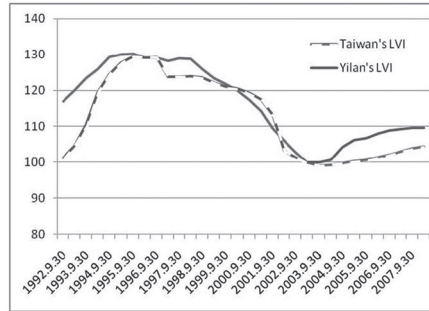


Figure 2: Land Value Indices (LVI); Yilan County and Taiwan; 1993-2007

Casual observation of aggregate data is, however, insufficient for establishing whether and to what extent access to the new freeway affects residential property prices in Yilan. The objective of this paper is to estimate the effect of the new link on residential market prices in Yilan County using detailed disaggregated observations on actual house transactions in four different time periods: 1992-1994, 2002-2003, 2004-2005 and 2006-2007. The analysis is roughly cross-sectional and uses a well-established technique for the estimation of hedonic price functions. The aim of hedonic price functions is to decompose prices into separate implicit prices that correspond to valued product (in this case, housing) attributes. The analysed time periods encompass the 15-year construction period as well as the completion of the tunnel. Following **Yiu and Wong (2005)**, we hypothesize that the distance-to-Taipei price effect should increase in magnitude with the approach of the completion of the tunnel.

THEORETICAL BACKGROUND

The underlying theoretical assumptions in this study resemble but modify the well-known monocentric model, as developed by **Alonso (1964)**, **Muth (1969)** and **Mills (1972)**. That model rests on several simplifying assumptions, such as a rent-distance gradient that is identical in all directions. The monocentric model has been used in a great number of empirical studies, although it is not without its critics (e.g. **Heikkila et al. 1989**). Alternative models include the network city (**Batten 1995**), the polycentric urban region (**Parr 2004**) and the two-workplace model (**Yiu and Tam 2007**). Our interpretation of the model as it is applied in this study relaxes some of these assumptions. We conceive of Taipei City as having two centres: 1) the area around Taipei Railway Station, which is located at the western end point of the central business district; this remains the main hub for ground transport in Taiwan; and 2) the area around Taipei 101, which is located in the easternmost part of the central business district; this area includes the headquarters of most large enterprises. But since the relative distances to these two nodes are virtually identical in Yilan County, we use the distance to Taipei 101 as a general centre accessibility measure. Suburban nodes may also have an impact on house prices but should be interpreted as localized centres. Such localized centres may impact house

prices within the relevant sub-region but should not impact house prices in other sub-regions within the same conurbation. The town centres of Yilan and Luodong are examples of such sub-regional nodes in Yilan County.

Few studies have explicitly addressed the effects of tunnel construction on residential property prices within an urban region. **Yiu and Wong (2005)** did the most comparable study in terms of subject matter and location, focusing on the land price effects from a proposed tunnel project in Hong Kong. Their results showed that expectations of improved accessibility had been capitalized in house prices well before the completion of the tunnel. Such expectation effects should therefore enable governments to fund infrastructure investments by selling land in areas with contingent accessibility benefits.

For the estimation of accessibility effects on house prices, we estimate eight hedonic price functions – two for each of the selected time periods. One function is a pre-specified logarithmic function which yields mean estimated attribute elasticities. The other function is the data-specific both-side Box-Cox function, which maximizes the log likelihood of the function within pre-specified constraints. Hedonic price theory is usually traced back to a paper by **Sherwin Rosen (1974)**. Rosen used a conventional utility-maximizing approach to derive implicit attribute prices for multi-attribute goods under

conditions of perfect competition. The basic idea is that goods such as housing, which are differentiated rather than homogeneous, can be decomposed into homogeneous attributes, where each attribute has a unique implicit price in equilibrium. Perfect competition, however, rests on assumptions of perfect information, which is not normally approximated in markets for experience goods such as housing. The concepts of multi-attribute goods and hedonic prices are however valid concepts even if we do not assume perfect competition (**Lancaster 1966, Barzel 1989**). Hedonic price models aim at disentangling the attributes of a good from one another to estimate implicit prices. Individual buyers or renters attempt to maximize their expected utility, subject to various constraints, such as their money and time budgets.

One of the most difficult questions regarding hedonic price functions concerns the geographical extent of the market. A statistical consideration for empirical studies is that we can expect biased parameter coefficients if the assumed market is larger than its real size. If the assumed size is smaller, it leads to parameter estimates with lower precision (**Palmquist 1991**).

The stated purpose of this paper is to estimate the effect (as well as the timing of the effect) of improved accessibility on residential property prices. The use of the log-linear form throughout makes it possible to make direct comparisons between attribute coefficients from different time periods, which become more complicated when using data-specific forms such as the Box-Cox function. In this paper, we report the results of both the log-linear and the both-side Box-Cox forms of the hedonic price functions, which are consistent with earlier hedonic price studies from Taiwan (**Andersson et al. 2010, Andersson et al. 2012**). Equation (1) shows the functional form of the log-linear model while Equation (2) specifies the functional form of the simple both-side Box-Cox-transformed model.

$$\ln \bar{Y} = \alpha + \ln X_s \bar{\beta}_s + \ln X_n \bar{\beta}_n + \ln X_a \bar{\beta}_a + \bar{\varepsilon} \quad (1)$$

$$\bar{Y}^\lambda = \alpha + X_s^\lambda \bar{\beta}_s + X_n^\lambda \bar{\beta}_n + X_a^\lambda \bar{\beta}_a + \bar{\varepsilon} \quad (2)$$

where

$Y^\lambda = (Y^\lambda - 1) / \lambda$ for $\lambda \neq 0$ and $Y^\lambda = \ln Y$ for $\lambda = 0$

$X_i^\lambda = (X_i^\lambda - 1) / \lambda$ for $\lambda \neq 0$ and $X_i^\lambda = \ln X_i$ for $\lambda = 0$

Y = transaction price in the housing market;

X_s = structural attribute s ;

X_n = neighbourhood attribute n ;

X_a = accessibility attribute a ;

α, β = model parameters;

ε = random error.

OVERVIEW

The observations of transaction prices¹ and structural characteristics were obtained from the Department of Land Administration of the central government, and encompass four distinct sets of observations. The data on socio-economic neighbourhood characteristics were obtained from the Ministry of Finance. The neighbourhoods correspond to the administrative subdivisions in Yilan County (Yilan City and numerous smaller townships, including Luodong). The tunnel-related distance measurements amount to approximate

house-specific time distances to the nearest freeway interchange, which is then added to the time distance from the relevant interchange to Taipei 101. Local accessibility attributes include the approximate distance to the nearest sub-centres², as well as distance to the nearest township centre. All distances refer to the shortest route for motor vehicles according to a popular GIS program that covers the entire road network of Taiwan: *PaPaGo R12*.

The hedonic analysis makes use of

¹ Transaction prices are preferred to asking prices, since they amount to exact market prices rather than estimates that are sometimes subject to competitive bidding among interested parties.

² We use the distance to the Yilan and Luodong Railway Stations as our “distance to sub-centre” measure. The accessibility variables measure the distance from the centre of the census tract in which a housing unit is located to the relevant railway station. Exact locations of property transactions are unavailable since the identity of the transacting parties is confidential.

sales prices rather than rents since owner-occupied housing accounts for more than 80 percent of Taiwan's housing market. In addition, sales prices reflect expectations of future developments, and should therefore - unlike rents - reflect potential long-term future benefits of new or planned infrastructure investments. All sales prices were adjusted by the monthly consumer price index (CPI) as calculated by the Directorate General of Budget, Accounting and Statistics (DGBAS).

Tables 2 and 3 give descriptive statistics for all variables. The tested independent variables encompass ten structural, five neighbourhood and four accessibility attributes, of which only one accessibility attribute is assumed to have a metropolitan-wide impact, i.e. distance to Taipei 101. Pair-wise correlation analysis reveals generally low correlations among variables. However, preliminary correlation analysis showed very high correlations between neighbourhood income and education. Since income data from commercial and agricultural activities are often unreliable in Taiwan, we use education³ as a proxy variable for the general socio-economic character of the neighbourhood. The neighbourhood attributes, "commercial zone" and "residential zone," refer to Taiwanese zoning regulations, which are more flexible than in many other

jurisdictions. Taiwan's cities and townships have retained a mixed-use character; "residential zones" allow for commercial use on the first and second floors of apartment houses and townhouses. "Commercial zones" allow for some residential use on higher floors. For example, downtown residential zones are often used for high-rise apartment blocks with high-valued commercial uses such as banks or luxury retailing on the first two floors. Moreover, land use regulations tend to be somewhat haphazardly enforced compared with European or North American cities (**Bernstein 2007**).

³ Education is the percentage of the resident population between the ages of 25 and 64 with at least an undergraduate degree.

Table 2: Descriptive Statistics for Time Periods 1 and 2, Yilan County

| Time Period: | | 1992(Q3)-1994(Q2) | | | | 2002(Q1)-2003(Q4) | | | | | |
|-----------------------------|--------------------|---------------------------|--------|--------|--------------------|---------------------------|--------|--------|--------------------|---------------|---|
| State of Xueshan Tunnel | | Beginning of Construction | | | | 4 Years before Completion | | | | | |
| Variable | Unit | Min. | Max. | Mean | Standard Deviation | Min. | Max. | Mean | Standard Deviation | Expected Sign | |
| Transaction Price | NT\$10,000,000 | 0.060 | 5.350 | 0.730 | 0.600 | 0.100 | 2.600 | 0.460 | 0.290 | | |
| Structural attributes | | | | | | | | | | | |
| Lot Size | 100 m ² | 0.080 | 8.610 | 0.930 | 0.640 | 0.110 | 3.810 | 0.958 | 0.390 | + | |
| Floor Area | 100 m ² | 0.350 | 18.610 | 1.610 | 1.370 | 0.150 | 6.440 | 1.520 | 0.650 | + | |
| Age of Dwelling | 10 Years | 0.050 | 4.500 | 1.220 | 0.780 | 0.050 | 4.600 | 1.810 | 0.970 | - | |
| Housing Type | Shophouse | Dummy | 0.000 | 1.000 | 0.190 | 0.390 | 0.000 | 1.000 | 0.030 | 0.160 | + |
| | Townhouse | Dummy | 0.000 | 1.000 | 0.710 | 0.460 | 0.000 | 1.000 | 0.960 | 0.180 | + |
| | Apartment | Dummy | 0.000 | 1.000 | 0.100 | 0.310 | 0.000 | 1.000 | 0.000 | 0.060 | - |
| | Farm | Dummy | - | - | - | - | - | - | - | - | - |
| Parcel Type | Corner Lot | Dummy | 0.000 | 1.000 | 0.020 | 0.130 | 0.000 | 1.000 | 0.000 | 0.060 | + |
| | Street Lot | Dummy | 0.000 | 1.000 | 0.600 | 0.490 | 0.000 | 1.000 | 0.400 | 0.490 | + |
| Hot Spring | (Private) | Dummy | 0.000 | 1.000 | 0.100 | 0.300 | 0.000 | 1.000 | 0.020 | 0.150 | + |
| Neighbourhood Attributes | | | | | | | | | | | |
| Road Width ⁸ | Metres | 4 | 40.000 | 12.580 | 5.940 | 4.000 | 40.000 | 13.140 | 6.570 | + | |
| Zoning | Commercial | Dummy | 0.000 | 1.000 | 0.220 | 0.420 | 0.000 | 1.000 | 0.080 | 0.260 | + |
| | Residential | Dummy | 0.000 | 1.000 | 0.780 | 0.420 | 0.000 | 1.000 | 0.920 | 0.260 | + |
| Distance to Park | Kilometres | 0.48 | 8.600 | 2.520 | 1.430 | 0.300 | 12.900 | 3.060 | 2.230 | - | |
| Education | (College) | Percentage | 7 | 17.000 | 13.000 | 4.000 | 13.000 | 32.000 | 23.000 | 6.000 | + |
| Accessibility Attributes | | | | | | | | | | | |
| Distance to Township Centre | Kilometres | 0.24 | 7.400 | 1.680 | 1.580 | 0.020 | 12.100 | 2.100 | 1.810 | - | |
| Distance to Yilan | Kilometres | 0.13 | 25.300 | 7.930 | 7.150 | 0.570 | 26.800 | 9.520 | 7.270 | - | |
| Distance to Luodong | Kilometres | 0.4 | 18.400 | 8.950 | 5.170 | 0.544 | 34.700 | 8.700 | 6.190 | - | |
| Distance to Taipei 101 | Kilometres | 64.8 | 96.700 | 78.700 | 8.500 | 41.300 | 72.500 | 57.080 | 7.430 | - | |
| Number of Observations (n) | | 298 | | | | 245 | | | | | |

⁸ "Road width" is the width of the road or street in front of the main entry gate or door to the relevant dwelling.

Table 3: Descriptive Statistics for Time Periods 3 and 4, Yilan County

| Time | | 2004(Q1)-2005(Q4) | | | | 2006(Q1)-2007(Q4) | | | | | |
|-----------------------------|--------------------|---------------------------|--------|--------|--------------------|-------------------|--------|--------|--------------------|---------------|---|
| State of Xueshan Tunnel | | 2 Years before Completion | | | | After Completion | | | | | |
| Variable | Unit | Min. | Max. | Mean | Standard Deviation | Min. | Max. | Mean | Standard Deviation | Expected Sign | |
| Transaction Price | NTS10,000,000 | 0.110 | 5.840 | 0.490 | 0.450 | 0.070 | 7.620 | 0.550 | 0.480 | | |
| Structural Attributes | | | | | | | | | | | |
| Lot Size | 100 m ² | 0.050 | 58.080 | 1.540 | 3.340 | 0.060 | 45.190 | 1.850 | 3.460 | + | |
| Floor Area | 100 m ² | 0.010 | 14.780 | 1.630 | 0.960 | 0.140 | 9.870 | 1.660 | 0.760 | + | |
| Age of Dwelling | 10 Years | 0.050 | 4.800 | 1.730 | 1.070 | 0.070 | 5.840 | 1.750 | 1.230 | - | |
| Housing Type | Shophouse | Dummy | 0.000 | 1.000 | 0.030 | 0.170 | 0.000 | 1.000 | 0.080 | 0.270 | + |
| | Townhouse | Dummy | 0.000 | 1.000 | 0.910 | 0.280 | 0.000 | 1.000 | 0.840 | 0.370 | + |
| | Apartment | Dummy | 0.000 | 1.000 | 0.030 | 0.160 | 0.000 | 1.000 | 0.020 | 0.150 | - |
| | Farm | Dummy | 0.000 | 1.000 | 0.030 | 0.170 | 0.000 | 1.000 | 0.040 | 0.200 | - |
| Parcel Type | Corner Lot | Dummy | 0.000 | 1.000 | 0.000 | 0.086 | 0.000 | 1.000 | 0.010 | 0.090 | + |
| | Street Lot | Dummy | 0.000 | 1.000 | 0.360 | 0.480 | 0.000 | 1.000 | 0.330 | 0.470 | + |
| Hot Spring | (Private) | Dummy | 0.000 | 1.000 | 0.020 | 0.150 | 0.000 | 1.000 | 0.020 | 0.150 | + |
| Neighbourhood Attributes | | | | | | | | | | | |
| Road Width | Metres | 2.000 | 40.000 | 12.900 | 7.060 | 2.000 | 50.000 | 12.910 | 6.990 | + | |
| Zoning | Commercial | Dummy | 0.000 | 1.000 | 0.080 | 0.300 | 0.000 | 1.000 | 0.050 | 0.500 | + |
| | Residential | Dummy | 0.000 | 1.000 | 0.590 | 0.490 | 0.000 | 1.000 | 0.540 | 0.220 | + |
| Park Distance | | 0.070 | 17.100 | 3.590 | 2.490 | 0.100 | 18.100 | 2.460 | 2.070 | - | |
| Education | (College) | Percentage | 16.000 | 35.000 | 25.000 | 6.000 | 16.000 | 33.000 | 25.000 | 6.000 | + |
| Accessibility Attributes | | | | | | | | | | | |
| Distance to Township Centre | Kilometres | 0.020 | 16.900 | 2.630 | 2.200 | 0.010 | 18.100 | 2.830 | 2.320 | - | |
| Distance to Yilan | Kilometres | 0.230 | 30.700 | 9.950 | 6.360 | 0.460 | 39.500 | 8.970 | 6.250 | - | |
| Distance to Luodong | Kilometres | 0.340 | 39.500 | 8.500 | 5.750 | 0.290 | 41.200 | 9.050 | 5.890 | - | |
| Distance to Taipei 101 | Kilometres | 39.600 | 74.000 | 57.900 | 7.400 | 39.860 | 84.300 | 54.800 | 7.070 | - | |
| Number of Observations (n) | | 674 | | | | 946 | | | | | |

Figure 3 shows a map of central Yilan County on which three lines have been superimposed. The lines denote temporal equidistance to Taipei 101. Yilan and its proximate townships have relatively good metropolitan accessibility. They are all within 30 to 50 minutes of downtown Taipei, which corresponds to a commuting distance which is not at all unusual in large metropolitan areas. Luodong and associated townships, meanwhile, correspond to the outer reaches of feasible commuting, with many parts necessitating commutes of over one hour.

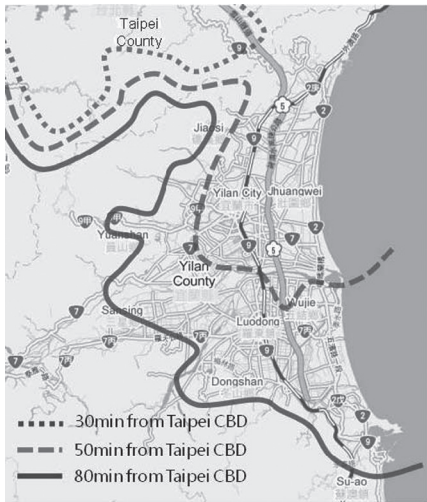


Figure 3: Map of Central Yilan County with Time Distances to Taipei 101

RESULTS

The estimated hedonic price functions comprise four different cross-sectional models.⁴ **Table 4** shows the estimated attribute effects using the common pre-specified log-linear functional form during each of the four time-periods.⁵ **Table 5** shows the estimated both-side Box-Cox functions for the same periods. We found that the distance to Taipei CBD and the distance to Yilan township centre exhibited high variance inflation factor values in the first model, but we decided to keep both variables in the model so as to make the first model specification consistent with those of later time periods. A problem with the ordinary least squares versions

⁴ In the mature economies of Western Europe and North America, investments in new transport infrastructure amount to no more than a minuscule addition to the existing stock. Thus, it is reasonable to assume a stable accessibility structure, which supports the use of panel data econometrics. In contrast, Taiwan experienced a major restructuring of its transport infrastructure in the 1990-2010 period. The Xueshan Tunnel was a *minor* component of a wide-ranging investment program, which among other things included a new metropolitan rapid transit system for the Taipei region, a new high-speed rail link connecting all cities in western Taiwan and a new north-south freeway (National Freeway No. 3). It is thus preferable to use several cross-sectional analyses, which makes it possible to avoid the imposition of stable structural relationships among the independent variables.

⁵ The four periods correspond to the following events: the commencement of construction of the tunnel; the sub-period with the lowest housing prices in Taiwan in the 1990-2010 period; the period two years prior to the completion of the project; and the period immediately subsequent to its completion.

of the second and third models was the clear presence of heteroscedasticity. We therefore re-estimated the equations for the second and third time periods using the weighted least squares method. The reported functions therefore fulfil conventional statistical criteria such as residuals that are approximately homoscedastic and normally distributed.

The results show that all structural and neighbourhood variables have the expected signs in all four periods, and most of them are highly significant. A comparison of **Tables 4 and 5** shows that the Box-Cox attribute estimates resemble the estimates of the logarithmic functions, particularly in the first two periods. This is consistent with the results of earlier hedonic price studies from Taiwan (**Andersson and Shyr 2010**).

By comparing the 2nd and 3rd models, we find that the accessibility to Taipei 101 attribute transitions from having a moderate and insignificant implicit price to having a substantial and significant one. We can also see that the accessibility effects are less robust over time than most of the structural or neighbourhood variables.

The estimates of the log-linear function imply a price-distance elasticity from downtown Taipei of -.458 in 2007.⁶ A similar price-distance elasticity was however already present during the third period. On the other hand, the price-distance elasticities associated with distance to the town centres of Yilan and Luodong declined between 1992 and 2007 from -.119 to -.071 and from -.199 to -.133, respectively. The implication is that houses which are more suitable for commuting to Taipei commands a significant price premium over less accessible dwellings. A further implication is that Yilan County represents a sub-region of Taipei's functional urban region, rather than the separate region that it no doubt was before the construction of the *Xueshan* Tunnel and its new freeway.

⁶ Detailed data analysis revealed that there is greater variability in accessibility within the Luodong sub-sub-region, leading to greater variability in land values there than in the northern part of Yilan County. Moreover, there seems to be a threshold effect that is associated with a fifty-minute time distance to downtown Taipei.

Table 4: Log-linear Hedonic Price Functions, Yilan County

| Time Sections | 1992(Q3)-1994(Q2) | | 2002(Q1)-2003(Q4) | | 2004(Q1)-2005(Q4) | | 2006(Q1)-2007(Q4) | | |
|--|-------------------|-----------|-------------------|-----------|-------------------|------------|-------------------|------------|----------|
| | Coefficient | t-value | Coefficient | t-value | Coefficient | t-value | Coefficient | t-value | |
| Constant | 1.300 | 0.530 | 2.583 | 3.175*** | 4.497 | 8.896*** | 4.883 | 12.155*** | |
| Time Constants | | | | | | | | | |
| 1 st Year: 2 nd Half | -0.065 | -1.301 * | -0.002 | -0.041 | 0.004 | 0.097 | -0.059 | -2.418** | |
| 2 nd Year: 1 st Half | 0.035 | 0.727 | -0.134 | -3.007*** | -0.036 | -0.950 | -0.035 | -1.513* | |
| 2 nd Year: 2 nd Half | 0.028 | 0.545 | -0.083 | -1.930 ** | 0.025 | 0.674 | -0.087 | -3.762*** | |
| Structural Attributes | | | | | | | | | |
| Lot Size | 0.561 | 14.911*** | 0.399 | 7.710*** | 0.484 | 20.654*** | 0.366 | 18.155*** | |
| Floor Area | 0.348 | 8.423*** | 0.625 | 12.589*** | 0.349 | 15.172*** | 0.366 | 18.352*** | |
| Age of Dwelling | -0.033 | -1.872** | -0.094 | -5.094*** | -0.080 | -9.061*** | -0.126 | -14.586*** | |
| Housing Type | Shophouse | 0.304 | 5.443*** | 0.239 | 2.161** | 0.331 | 3.768*** | 0.738 | 9.939*** |
| | Townhouse | — | — | — | — | 0.120 | 1.859** | 0.312 | 4.483*** |
| | Farm | — | — | — | — | -0.439 | -3.855*** | 0.055 | 0.531 |
| Parcel Types | Corner Lot | 0.474 | 3.545*** | — | — | 0.312 | 2.571** | 0.239 | 2.544** |
| | Street Lot | 0.244 | 6.403*** | 0.173 | 5.033*** | 0.158 | 6.769*** | 0.127 | 6.340*** |
| Private Hot Spring | 0.457 | 2.657*** | 0.512 | 4.425*** | 0.193 | 2.384** | 0.328 | 5.296*** | |
| Neighbourhood Attributes | | | | | | | | | |
| Road Width | 0.203 | 4.849*** | 0.127 | 3.776*** | 0.096 | 4.450*** | 0.057 | 3.256*** | |
| Zoning | Commercial | 0.102 | 2.329** | 0.077 | 1.269* | 0.445 | 8.989*** | 0.325 | 6.976*** |
| | Residential | — | — | — | — | 0.183 | 6.261*** | 0.176 | 8.401*** |
| Distance to Park | -0.001 | -0.015 | -0.059 | -2.219** | -0.068 | -4.058*** | -0.063 | -4.867*** | |
| Education | 0.008 | 0.056 | 0.509 | 4.777*** | 0.399 | 5.374*** | 0.235 | 4.019*** | |
| Accessibility Attributes | | | | | | | | | |
| Distance to Township Centre | -0.107 | -2.454** | -0.020 | -1.111 | -0.049 | -3.654*** | -0.035 | -3.249*** | |
| Distance to Yilan | -0.119 | -1.937** | 0.026 | 0.902 | -0.033 | -1.619* | -0.071 | -4.448*** | |
| Distance to Luodong | -0.222 | -5.506*** | -0.145 | -7.591*** | -0.183 | -11.615*** | -0.133 | -9.300*** | |
| Distance to Taipei 101 | 0.190 | 0.338 | -0.139 | -0.760 | -0.436 | -3.540*** | -0.458 | -4.989*** | |
| Number of Observations (n) | 298 | | 245 | | 674 | | 967 | | |
| F | 70.972 | | 60.148 | | 139.103 | | 203.065 | | |
| R-Squared | 0.821 | | 0.818 | | 0.818 | | 0.819 | | |
| Adjusted R-Squared | 0.809 | | 0.805 | | 0.812 | | 0.815 | | |
| Log Likelihood | -1936.108 | | -1444.130 | | -4134.268 | | -5953.694 | | |

* Significant at one-tailed 10% level

** Significant at one-tailed 5% level

*** Significant at one-tailed 1% level

Table 5: Both-side Box-Cox Hedonic Price Functions, Yilan County

| Time | 1992(Q3)-1994(Q2) | | 2002(Q1)-2003(Q4) | | 2004(Q1)-2005(Q4) | | 2006(Q1)-2007(Q4) | |
|--|-------------------|-----------|-------------------|-----------|-------------------|------------|-------------------|------------|
| | Coefficient | t-value | Coefficient | t-value | Coefficient | t-value | Coefficient | t-value |
| Constant | 2.138 | | 2.010 | | 7.093 | 2.982*** | 5.969 | |
| Time-period Constants | | | | | | | | |
| 1 st Year: 2 nd Half | -0.070 | -1.337* | -0.005 | -0.209 | -0.015 | -0.104 | -0.103 | -2.448*** |
| 2 nd Year: 1 st Half | 0.028 | 0.743 | -0.096 | -3.162*** | -0.239 | -2.623*** | 0.023 | 0.583 |
| 2 nd Year: 2 nd Half | 0.019 | 0.560 | -0.058 | -2.009** | -0.120 | -1.356* | -0.116 | -2.923*** |
| Structural Attributes | | | | | | | | |
| Lot Size | 0.550 | 13.217*** | 0.378 | 6.976*** | 0.432 | 14.622*** | 0.405 | 17.452*** |
| Floor Area | 0.344 | 7.959*** | 0.586 | 11.316*** | 0.633 | 16.005*** | 0.463 | 12.742*** |
| Age of Dwelling | -0.030 | -1.931** | -0.072 | -5.085*** | -0.118 | -6.663*** | -0.174 | -17.744*** |
| Housing Type | | | | | | | | |
| Shophouse | 0.294 | 5.447*** | 0.165 | 2.176** | 1.718 | 6.524*** | 1.432 | 10.652*** |
| Townhouse | — | — | — | — | 1.218 | 5.848*** | 0.643 | 5.350*** |
| Farm | — | — | — | — | 0.279 | 0.847 | 0.061 | 0.347 |
| Parcel Type | | | | | | | | |
| Corner Lot | 0.446 | 3.623*** | 0.122 | 5.096*** | 0.800 | 2.664*** | 0.415 | 2.554*** |
| Street Lot | 0.220 | 6.381*** | 0.143 | 0.784 | 0.364 | 6.316*** | 0.223 | 6.372*** |
| Private Hot Spring | 0.403 | 2.734*** | 0.365 | 4.535*** | 0.486 | 2.493*** | 0.605 | 5.600*** |
| Neighbourhood Attributes | | | | | | | | |
| Road Width | 0.012 | 4.910*** | 0.102 | 3.835*** | 0.012 | 3.928*** | 0.078 | 3.248*** |
| Zoning | | | | | | | | |
| Commercial | 0.097 | 2.382*** | 0.052 | 1.255 | 0.688 | 6.495*** | 0.605 | 7.315*** |
| Residential | — | — | — | — | 0.332 | 2.502*** | 0.302 | 8.125*** |
| Distance to Park | -0.008 | -0.031 | -0.045 | -2.379** | -0.131 | -3.537*** | -0.105 | -4.790*** |
| Education | -0.018 | -0.089 | 0.325 | 4.653*** | 1.506 | 6.993*** | 0.461 | 3.901*** |
| Accessibility Attributes | | | | | | | | |
| Distance to Township Centre | -0.104 | -2.510*** | -0.013 | -1.036 | -0.198 | -6.475*** | -0.061 | -3.344*** |
| Distance to Yilan | -0.116 | -2.000** | 0.016 | 0.747 | -0.060 | -1.471* | -0.151 | -4.432*** |
| Distance to Luodong | -0.212 | -5.542*** | -0.109 | -6.972*** | -0.336 | -10.946*** | -0.096 | -3.657*** |
| Distance to Taipei 101 | 0.056 | 0.339 | -0.100 | -0.643 | -0.509 | -2.911*** | -0.532 | -4.741*** |
| Lambda(λ) | -0.008 | -0.212 | -0.057 | -0.941 | 0.152 | 7.792*** | 0.093 | 4.791*** |
| Number of Observations (n) | 298 | | 245 | | 674 | | 967 | |
| LR χ^2 | 502.550 | | 412.310 | | 1073.820 | | 1628.460 | |
| R-Squared | 0.823 | | 0.818 | | 0.819 | | 0.819 | |
| Adjusted R-Squared | 0.809 | | 0.805 | | 0.798 | | 0.814 | |
| Log Likelihood | -1936.086 | | -1443.689 | | -4106.302 | | -5942.780 | |

* Significant at one-tailed 10% level

** Significant at one-tailed 5% level

*** Significant at one-tailed 1% level

TWO COMPARATIVE EXAMPLES: KEELUNG CITY AND TAOYUAN COUNTY

In order to compare the hedonic estimates of Yilan with nearby peripheral locations in the same region, we selected Keelung City and Taoyuan County, both of which are areas across the border from New Taipei City (which was formerly called Taipei County, surrounding Taipei City).⁷ Keelung City hosts the second largest international port in Taiwan as well as a population of about 350,000. Taoyuan County is the location of the largest international airport in Taiwan and hosts a population of about two million. Taoyuan and Chungli are the main town centres in Taoyuan County. **Table 6 and Table 7** give descriptive statistics for Keelung that correspond to the descriptive statistics for Yilan County. The hedonic estimates shown in **Table 8** suggest that the distance to Taipei CBD had a much stronger effect on house prices than the distance to Keelung CBD throughout the 15-year period under study. The tunnel that connects Keelung to Taipei was

constructed long before 1992, and it has thus experienced functional integration with Taipei for a much longer time. Likewise, **Table 9 and Table 10** give descriptive statistics for Taoyuan that again correspond to the descriptive statistics for Yilan County. The hedonic estimates shown in **Table 11** suggest that the distance to Taipei CBD had a stronger effect on house prices than the distance to the nearest local town centre in three of the four analysed periods. The studied time periods were all prior to the construction of the Taoyuan International Airport MRT extension, which has been in operation since the first quarter of 2017. The results suggest that home buyers and investors who cannot afford the high housing prices in Taipei City and New Taipei City have been locating in Taoyuan County since at least the early 1990s. Such long-distance commuting has been facilitated by the existence of two parallel north-south freeways and regular commuter rail services.

⁷ Keelung City is a part of the Taipei Metropolitan Area to the north of Taipei City. Taoyuan County is not officially part of that area, and is located to the southwest of Taipei City; Yilan is located to the northeast of Taipei City, also beyond the official boundaries of its metro area. Our results indicate that most of Taoyuan and Yilan counties are economically integrated with the official metro area, which consists of Taipei City, New Taipei City and Keelung City.

Table 6: Descriptive Statistics for Time Periods 1 and 2, Keelung City

| Time | | 1992(Q3)-1994(Q2) | | | | 2002(Q1)-2003(Q4) | | | | | |
|-----------------------------|--------------------|---------------------------|--------|--------|--------------------|---------------------------|--------|--------|--------------------|---------------|---|
| Status of Xueshan Tunnel | | Beginning of Construction | | | | 4 Years before Completion | | | | | |
| Variable | Unit | Min. | Max. | Mean | Standard Deviation | Min. | Max. | Mean | Standard Deviation | Expected Sign | |
| Transaction Price | NT\$10,000,000 | 0.070 | 3.860 | 0.284 | 0.421 | 0.058 | 63.500 | 0.365 | 2.287 | | |
| Structural Attributes | | | | | | | | | | | |
| Lot Size | 100 m ² | 0.020 | 19.940 | 0.558 | 2.214 | 0.012 | 3.329 | 0.381 | 0.353 | + | |
| Floor Area | 100 m ² | 0.330 | 15.404 | 1.266 | 1.666 | 0.114 | 5.546 | 1.005 | 0.507 | + | |
| Housing Type | Shophouse | Dummy | - | - | - | - | 0.000 | 1.000 | 0.036 | 0.187 | + |
| | Townhouse | Dummy | 0.000 | 1.000 | 0.038 | 0.192 | 0.000 | 1.000 | 0.112 | 0.316 | + |
| | Apartment | Dummy | 0.000 | 1.000 | 0.532 | 0.502 | 0.000 | 1.000 | 0.591 | 0.492 | - |
| Parcel Type | Corner Lot | Dummy | 0.000 | 1.000 | 0.051 | 0.221 | 0.000 | 1.000 | 0.021 | 0.142 | + |
| | Street Lot | Dummy | 0.000 | 1.000 | 0.772 | 0.422 | 0.000 | 1.000 | 0.449 | 0.498 | + |
| Neighbourhood Attributes | | | | | | | | | | | |
| Road Width | Metres | 2 | 25.000 | 10.190 | 4.475 | 4.000 | 26.000 | 12.930 | 4.192 | + | |
| Zoning | Commercial | Dummy | 0.000 | 1.000 | 0.152 | 0.361 | 0.000 | 1.000 | 0.160 | 0.366 | + |
| | Residential | Dummy | 0.000 | 1.000 | 0.620 | 0.488 | 0.000 | 1.000 | 0.840 | 0.366 | + |
| Accessibility Attributes | | | | | | | | | | | |
| Distance to Central Keelung | Kilometres | 4.300 | 36.100 | 15.220 | 7.391 | 0.200 | 32.400 | 6.995 | 7.336 | - | |
| Distance to Taipei 101 | Kilometres | 7.800 | 52.800 | 33.380 | 9.829 | 12.300 | 32.900 | 25.230 | 2.966 | - | |
| Number of Observations (n) | | 79 | | | | 777 | | | | | |

Table 7: Descriptive Statistics for Time Periods 3 and 4, Keelung City

| Time | | 2004(Q1)-2005(Q4) | | | | 2006(Q1)-2007(Q4) | | | | | |
|-----------------------------|--------------------|---------------------------|--------|--------|--------------------|-------------------|--------|--------|--------------------|---------------|-----|
| State of Xueshan Tunnel | | 2 years before Completion | | | | After Completion | | | | | |
| Variable | Unit | Min. | Max. | Mean | Standard Deviation | Min. | Max. | Mean | Standard Deviation | Expected Sign | |
| Transaction Price | NT\$10,000,000 | 0.055 | 1.800 | 0.256 | 0.188 | 0.022 | 6.000 | 0.283 | 0.322 | | |
| Structural Attributes | | | | | | | | | | | |
| Lot Size | 100 m ² | 0.024 | 3.610 | 0.375 | 0.332 | 0.034 | 3.470 | 0.378 | 0.332 | + | |
| Floor Area | 100 m ² | 0.111 | 5.133 | 0.990 | 0.499 | 0.294 | 5.966 | 1.056 | 0.540 | + | |
| Housing Type | Shophouse | Dummy | 0.000 | 1.000 | 0.053 | 0.224 | 0.000 | 1.000 | 0.025 | 0.155 | + |
| | Townhouse | Dummy | 0.000 | 1.000 | 0.119 | 0.324 | 0.000 | 1.000 | 0.140 | 0.347 | + |
| | Apartment | Dummy | 0.000 | 1.000 | 0.577 | 0.494 | 0.000 | 1.000 | 0.588 | 0.493 | +/- |
| Parcel Type | Corner Lot | Dummy | 0.000 | 1.000 | 0.036 | 0.187 | 0.000 | 1.000 | 0.036 | 0.186 | + |
| | Street Lot | Dummy | 0.000 | 1.000 | 0.454 | 0.498 | 0.000 | 1.000 | 0.445 | 0.497 | + |
| Neighbourhood attributes | | | | | | | | | | | |
| Road Width | Metres | 4.000 | 26.000 | 12.880 | 4.347 | 3.000 | 26.000 | 12.940 | 4.343 | + | |
| Zoning | Commercial | Dummy | 0.000 | 1.000 | 0.146 | 0.854 | 0.000 | 1.000 | 0.178 | 0.383 | + |
| | Residential | Dummy | 0.000 | 1.000 | 0.353 | 0.353 | 0.000 | 1.000 | 0.822 | 0.383 | + |
| Accessibility attributes | | | | | | | | | | | |
| Distance to Central Keelung | Kilometres | 0.400 | 12.100 | 4.554 | 2.780 | 0.245 | 11.900 | 4.172 | 2.747 | - | |
| Distance to Taipei 101 | Kilometres | 16.800 | 31.900 | 25.570 | 3.126 | 16.600 | 31.900 | 24.630 | 3.273 | - | |
| Number of Observations (n) | | 796 | | | | 813 | | | | | |

Table 8: Log-linear Hedonic Price Functions, Keelung City

| Time | 1992(Q3)-1994(Q2) | | 2002(Q1)-2003(Q4) | | 2004(Q1)-2005(Q4) | | 2006(Q1)-2007(Q4) | | |
|--|-------------------|-----------|-------------------|-----------|-------------------|-----------|-------------------|------------|-----------|
| | Coefficient | t-value | Coefficient | t-value | Coefficient | t-value | Coefficient | t-value | |
| Constant | -0.100 | -0.302 | -0.812 | -2.837*** | 0.156 | 0.576 | 0.699 | 2.836*** | |
| Time Constants | | | | | | | | | |
| 1 st Year: 2 nd Half | -0.258 | -1.086 * | 0.044 | 1.543* | -0.093 | -3.471*** | 0.017 | 0.612 | |
| 2 nd Year: 1 st Half | -0.178 | -1.579* | 0.061 | 1.913** | -0.055 | -2.059*** | 0.027 | 0.967 | |
| 2 nd Year: 2 nd Half | -0.140 | -1.243* | -0.032 | -1.118* | -0.085 | -3.206*** | -0.002 | -0.083 | |
| Structural Attributes | | | | | | | | | |
| Lot Size | 0.087 | 1.542* | 0.053 | 1.873** | 0.113 | 4.026*** | 0.037 | 1.252* | |
| Floor Area | 0.824 | 10.283*** | 0.981 | 29.450*** | 0.819 | 26.260*** | 1.040 | 31.850*** | |
| Housing Type | Shophouse | — | — | 0.489 | 8.328*** | 0.297 | 6.387*** | 0.386 | 5.772*** |
| | Townhouse | -0.463 | -3.436*** | 0.059 | 1.120* | 0.028 | 0.578 | 0.155 | 3.086*** |
| | Apartment | -0.316 | -5.122*** | -0.115 | -4.215*** | -0.153 | -5.741*** | -0.067 | -2.339*** |
| Parcel Type | Corner Lot | -0.029 | -0.226 | -0.006 | -0.080 | 0.155 | 2.902*** | 0.142 | 2.571*** |
| | Street Lot | 0.028 | 0.403 | 0.041 | 1.814** | 0.084 | 3.924*** | 0.086 | 3.958*** |
| Neighbourhood Attributes | | | | | | | | | |
| Road Width | 0.106 | 1.712** | 0.038 | 1.224* | 0.044 | 1.553* | 0.039 | 1.275* | |
| Zoning | Commercial | 0.367 | 3.709*** | 0.312 | 9.704*** | 0.282 | 8.960*** | — | — |
| | Residential | 0.279 | 3.545*** | — | — | — | — | -0.248 | -7.920*** |
| Accessibility Attributes | | | | | | | | | |
| Distance to Central Keelung | -0.137 | -1.983*** | -0.055 | -4.056*** | -0.132 | -7.726*** | -0.164 | -10.110*** | |
| Distance to Taipei 101 | -0.325 | -4.364*** | -0.162 | -1.885** | -0.420 | -5.200*** | -0.575 | -7.534*** | |
| Number of Observations (n) | 79 | | 777 | | 796 | | 813 | | |
| F | 38.326 | | 162.449 | | 173.994 | | 205.502 | | |
| R-Squared | 0.893 | | 0.749 | | 0.757 | | 0.783 | | |
| Adjusted R-Squared | 0.870 | | 0.743 | | 0.752 | | 0.778 | | |
| Standard Error of the Estimate | 0.206 | | 0.279 | | 0.263 | | 0.272 | | |

* Significant at one-tailed 10% level

** Significant at one-tailed 5% level

*** Significant at one-tailed 1% level

Table 9: Descriptive Statistics for Time Periods 1 and 2, Taoyuan County

| Time | | 1992(Q3)-1994(Q2) | | | | 2002(Q1)-2003(Q4) | | | | | |
|----------------------------|--------------------|---------------------------|--------|--------|-----------|---------------------------|--------|--------|-----------|----------|------|
| State of Xueshan Tunnel | | Beginning of Construction | | | | 4 Years before Completion | | | | | |
| Variable | Unit | Min. | Max. | Mean | Standard | Min. | Max. | Mean | Standard | Expected | |
| | | | | | Deviation | | | | Deviation | | Sign |
| Transaction Price | NT\$10,000,000 | 0.120 | 3.910 | 0.618 | 0.429 | 0.070 | 3.800 | 0.497 | 0.348 | | |
| Structural Attributes | | | | | | | | | | | |
| Lot Size | 100 m ² | 0.114 | 2.477 | 0.781 | 0.345 | 0.036 | 19.590 | 0.785 | 0.888 | + | |
| Floor Area | 100 m ² | 0.128 | 7.579 | 1.344 | 0.794 | 0.147 | 17.140 | 1.423 | 0.978 | + | |
| Town Core | Dummy | 0.000 | 1.000 | 0.950 | 0.212 | 0.000 | 1.000 | 0.850 | 0.358 | + | |
| Age of Dwelling | Year | 0.200 | 51.000 | 18.086 | 9.143 | 0.000 | 44.000 | 18.120 | 9.860 | - | |
| Housing Types | Shophouse | Dummy | 0.000 | 1.000 | 0.060 | 0.237 | 0.000 | 1.000 | 0.040 | 0.202 | + |
| | Townhouse | Dummy | 0.000 | 1.000 | 0.910 | 0.284 | 0.000 | 1.000 | 0.790 | 0.411 | + |
| | Farm | Dummy | - | - | - | - | - | - | - | - | - |
| Parcel Types | Corner Lot | Dummy | 0.000 | 1.000 | 0.010 | 0.098 | 0.000 | 1.000 | 0.010 | 0.095 | + |
| | Street Lot | Dummy | 0.000 | 1.000 | 0.610 | 0.488 | 0.000 | 1.000 | 0.400 | 0.491 | + |
| Neighbourhood Attributes | | | | | | | | | | | |
| Road Width | Metres | 3.000 | 30.000 | 12.070 | 6.130 | 4.000 | 40.000 | 11.850 | 6.331 | + | |
| Zoning | Commercial | Dummy | 0.000 | 1.000 | 0.050 | 0.212 | 0.000 | 1.000 | 0.060 | 0.239 | + |
| | Residential | Dummy | 0.000 | 1.000 | 0.950 | 0.212 | 0.000 | 1.000 | 0.940 | 0.239 | + |
| Accessibility Attributes | | | | | | | | | | | |
| Distance to Town Centre | Kilometres | 0.810 | 17.160 | 6.037 | 3.603 | 0.500 | 30.600 | 6.161 | 4.561 | - | |
| Distance to Taipei 101 | Kilometres | 36.700 | 59.400 | 48.389 | 3.928 | 36.700 | 70.200 | 48.075 | 5.216 | - | |
| Number of Observations (n) | | 710 | | | | 873 | | | | | |

Table 10: Descriptive Statistics for Time Periods 3 and 4, Taoyuan County

| Time | | 2004(Q1)-2005(Q4) | | | | 2006(Q1)-2007(Q4) | | | | | |
|----------------------------|--------------------|---------------------------|---------|--------|--------------------|-------------------|----------|--------|--------------------|---------------|---|
| State of Xueshan Tunnel | | 2 Years before Completion | | | | After Completion | | | | | |
| Variables | Unit | Min. | Max. | Mean | Standard Deviation | Min. | Max. | Mean | Standard Deviation | Expected Sign | |
| Transaction Price | NT\$10,000,000 | 0.060 | 39.000 | 0.542 | 0.060 | 2.520 | 1082.910 | 10.615 | 18.838 | | |
| Structural Attributes | | | | | | | | | | | |
| Lot Size | 100 m ² | 0.025 | 193.551 | 1.555 | 7.542 | 0.011 | 133.376 | 1.428 | 5.594 | + | |
| Floor Area | 100 m ² | 0.239 | 62.670 | 1.765 | 3.500 | 0.105 | 120.779 | 1.715 | 3.355 | + | |
| Town Core | Dummy | 0.000 | 1.000 | 0.740 | 0.436 | 0.000 | 1.000 | 0.710 | 0.455 | + | |
| Age of Dwelling | Year | 0.000 | 56.000 | 19.030 | 10.286 | 0.2 | 71.000 | 17.510 | 11.827 | - | |
| Housing Type | Shophouse | Dummy | 0.000 | 1.000 | 0.030 | 0.162 | 0 | 1 | 0.020 | 0.147 | + |
| | Townhouse | Dummy | 0.000 | 1.000 | 0.800 | 0.399 | 0 | 1 | 0.740 | 0.437 | + |
| | Farm | Dummy | 0.000 | 1.000 | 0.010 | 0.093 | 0 | 1 | 0.020 | 0.132 | - |
| Parcel Type | Corner Lot | Dummy | 0.000 | 1.000 | 0.010 | 0.073 | 0 | 1 | 0.000 | 0.044 | + |
| | Street Lot | Dummy | 0.000 | 1.000 | 0.310 | 0.463 | 0 | 1 | 0.350 | 0.478 | + |
| Neighbourhood Attributes | | | | | | | | | | | |
| Road Width | Metres | 3.000 | 40.000 | 13.850 | 7.132 | 4 | 80 | 13.790 | 7.024 | + | |
| Zoning | Commercial | Dummy | 0.000 | 1.000 | 0.040 | 0.200 | 0 | 1 | 0.050 | 0.223 | + |
| | Residential | Dummy | 0.000 | 1.000 | 0.580 | 0.494 | 0 | 1 | 0.560 | 0.496 | + |
| Accessibility Attributes | | | | | | | | | | | |
| Distance to Town Centre | Kilometres | 0.300 | 27.293 | 8.666 | 6.024 | 1.7 | 33.215 | 8.455 | 6.131 | - | |
| Distance to Taipei 101 | Kilometres | 36.700 | 72.393 | 49.969 | 6.748 | 36.7 | 72.361 | 49.669 | 7.662 | - | |
| Number of Observations (n) | | 2053 | | | | 3684 | | | | | |

Table 11: Log-linear Hedonic Price Functions, Taoyuan County

| Time | 1992(Q3)-1994(Q2) | | 2002(Q1)-2003(Q4) | | 2004(Q1)-2005(Q4) | | 2006(Q1)-2007(Q4) | | |
|--|-------------------|-----------|-------------------|-----------|-------------------|-----------|-------------------|------------|------------|
| | Coefficient | t-value | Coefficient | t-value | Coefficient | t-value | Coefficient | t-value | |
| Constant | 3.721 | 5.146*** | 2.317 | 5.909*** | -1.074 | -5.896*** | -0.379 | -2.719*** | |
| Time Constants | | | | | | | | | |
| 1 st Year: 2 nd Half | -0.205 | -1.079 | 0.093 | 1.628** | -0.002 | -3.447*** | 0.101 | 0.629 | |
| 2 nd Year: 1 st Half | -0.093 | -1.559* | 0.131 | 1.945** | 0.012 | -1.986*** | 0.121 | 1.005 | |
| 2 nd Year: 2 nd Half | -0.116 | -1.150 | -0.026 | -1.096 | -0.081 | -3.185*** | 0.047 | 0.002 | |
| Structural Attributes | | | | | | | | | |
| Lot Size | 0.162 | 4.009*** | 0.510 | 19.957*** | 0.361 | 32.526*** | 0.366 | 40.951*** | |
| Floor Area | 0.639 | 15.799*** | 0.491 | 19.531*** | 0.645 | 43.053*** | 0.632 | 52.674*** | |
| Town Core | 0.305 | 3.933*** | 0.102 | 3.427*** | 0.122 | 8.064*** | 0.159 | 14.340*** | |
| Age of Dwelling | 0.002 | 0.823 | -0.006 | -5.326*** | -0.005 | -7.416*** | -0.008 | -17.052*** | |
| Housing Type | Shophouse | -0.236 | -2.121** | 0.012 | 0.190 | 0.114 | 3.027*** | 0.119 | 3.707*** |
| | Townhouse | -0.443 | -4.935*** | -0.168 | -4.285*** | -0.014 | -0.800 | -0.056 | -4.249*** |
| | Farm | — | — | — | — | -0.189 | -3.015*** | -0.429 | -10.310*** |
| Parcel Type | Corner Lot | 0.289 | 1.944** | 0.225 | 2.193** | 0.153 | 2.072** | 0.235 | 2.366*** |
| | Street Lot | 0.027 | 0.891 | 0.134 | 6.465*** | 0.169 | 13.541*** | 0.183 | 18.076*** |
| Neighbourhood Attributes | | | | | | | | | |
| Road Width | 0.004 | 1.516* | -0.226 | -5.416*** | 0.007 | 9.341*** | 0.005 | 7.557*** | |
| Zoning | Commercial | — | — | — | — | 0.630 | 20.495*** | 0.682 | 30.717*** |
| | Residential | -0.120 | -1.648** | -0.208 | -4.873*** | 0.354 | 28.184*** | 0.353 | 35.172*** |
| Accessibility Attributes | | | | | | | | | |
| Distance to Town Centre | -0.076 | -3.058*** | -0.062 | -4.653*** | -0.076 | -8.398*** | -0.056 | -6.430*** | |
| Distance to Taipei 101 | -1.070 | -5.845*** | -0.717 | -7.003*** | -0.058 | -1.230 | -0.213 | -5.586*** | |
| Number of Observations (n) | 710 | | 873 | | 2053 | | 3684 | | |
| F | 71.522 | | 233.869 | | 1044.636 | | 1580.584 | | |
| R-Squared | 0.547 | | 0.766 | | 0.883 | | 0.858 | | |
| Adjusted R-Squared | 0.540 | | 0.762 | | 0.882 | | 0.857 | | |
| Standard Error of the Estimate | 0.387 | | 0.281 | | 0.242 | | 0.260 | | |

* Significant at one-tailed 10% level

** Significant at one-tailed 5% level

*** Significant at one-tailed 1% level

CONCLUSIONS

The new tunnel-and-freeway link that connects downtown Taipei with rural Yilan County has had a substantial and statistically significant impact on residential house prices in the region since early 2004. The estimation results thus indicate that a major portion of the benefits from improved accessibility were capitalized in residential property values as early as 2.5 years prior to the existence of those benefits. Moreover, the estimated price-distance elasticities imply that the valuation of access to downtown Taipei is much greater than the valuation of access to various local sub-centres. Properties that are more suitable for Taipei-bound commuting enjoy a significant price premium over less accessible ones in the local real estate market, despite being located between 40 and 70 kilometres from the metropolitan centre.

Our findings suggest that the positive effect of accessibility to downtown Taipei on house prices in the region reflects how the new tunnel-freeway connection has made it feasible to commute from Yilan County to Taipei City and New Taipei City. The results of this study imply that the delimitation of the Taipei metropolitan area should be expanded to include most of Yilan County, since the size of metro areas should correspond to the extent of the regional land and labour markets. This would increase the registered population of the metropolitan region by more than 400,000 to about 7.1 million. The real population is likely

to be greater still, since many *de facto* residents are registered in other parts of Taiwan (**Bernstein 2007**). Moreover, freeways and commuter trains as well as later additions of a high-speed rail line and an MRT extension into Taoyuan County are likely to have caused the metropolitan region to absorb parts of Taoyuan and Hsinchu counties to the southwest of the capital city, as indicated by the hedonic price functions reported in **Andersson et al. (2010, 2012)**. A measure of the size of the Taipei metropolitan area that is based on the spatial extent of CBD price effects would show that it is considerably larger than what is reported in official statistical publications, with a population that is approaching ten million.

It is likely that Yilan County will experience increasing residential development and population growth in the coming years. Housing prices are still substantially below those in Taipei City and New Taipei City, while air and noise pollution levels have (so far) remained low. Only when the combined effects of emergent congestion, pollution and house price increases reach the (accessibility-adjusted) levels of the regional core and its western outskirts can we expect a stable spatial distribution of the region's population.

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Armen Alchian Economics for Everyday's "Theory in Use"

Ben T. Yu

I've known Professor Armen Alchian since 1979 (**Figure 1**). Prior to that, I've only read his writings; I read his encyclopedia piece on *Costs* very seriously in 1974, before I got admitted to a PhD program in Economics at the University of Washington. However, before that, my first encounter with Alchian's writings was in my first undergraduate microeconomic course, taken from Clyde Reed (Emeritus Professor of Economics, Simon Fraser University) in 1970, who was a sessional instructor at that time, teaching introductory economics in a small college in Seattle, Washington.

Alchian's impact to me personally – that class being my first course in economics – wasn't so much due to its content, but rather the abstract artwork on the cover of the book which had a black background. And also, it was in paperback; a rather unconventional style to use for a textbook. Actually, it was particularly mysterious to us (the students) at that time, and we constantly referred to it as "the little black book."

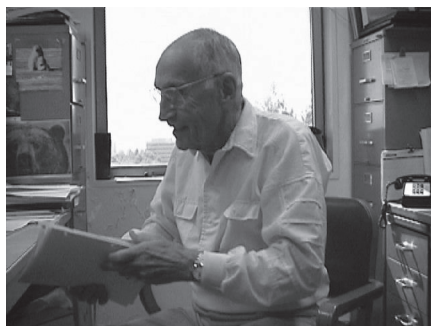


Figure 1: Armen Alchian working in his office in 1999, at the age of 85. My last visit with him was at his home in 2007. He died in 2013.

Indeed, I recall that the students of that class were scrambling to find a copy of the book; at least, for a peep of the title of the book, as Dr. Reed did not disclose it officially, although he did bring the book every time to class, and referred to it frequently. But he never required us to buy the book, and he never pitched himself as a disciple of its author. That book, of course, is Armen Alchian's famous textbook, with an unconventional title: *Exchange and Production: Theory in Use*, 3rd

*Printing, 1969. Wadworth, Belmont, California.*¹

I've read *Theory in Use* many times after I became a PhD student in Economics. This book which I've been using all these years needs to be glued and re-glued several times now, because pages fall off very easily. Over the years, I have formulated and thought much about market economics and the theory of firms. Sometimes, I directly got material from various original sources, in print and on the internet; sometimes, by listening to speakers in seminars and conversations; but often, by observing economics in action (a technique taught by Steven N.S. Cheung, a disciple of Alchian). I was able to formulate ideas not based on textbooks and literatures. I find the quote on page 8 of this book to be always encouraging, particularly when I encounter something seemingly irrational, indeed, close to insanity:

"Nothing in economic theory suggests that any particular form of competition is "absurd"."

The statement is provocative in light of the standard treatment of the concept of perfect competition prevailing in most economics textbooks at that time.

¹ This title was preceded by *University Economics* (1964), and later replaced with the title *Exchange and Production: Competition, Coordination, and Control* (1977), and *Universal Economics* (2005). It is the 1969 version that is of particular affection to me, given what I'm doing now, and the audience of this journal.

Years later, when I saw a theoretical version of competition in the Oscar winning film *A Beautiful Mind*, which dramatized mathematician-turned-economist John Nash's interpretation of a (wrongly inferred Adam Smith's version of) competition in a bar room scene, I was convinced that the absurdity of a theory (or what one perceives as a theory) is only a matter of persuasion. If one has doubts about this proposition, he/she only has to look into the economics of Mr. Donald Trump.

Alchian taught neoclassical economics at UCLA with William Allen for at least 30 years using various versions of their textbooks. It wasn't only Alchian's book that was well known among UCLA students, who regarded it as UCLA economics, but also his teaching style – a complete intellectual dominance and yet entirely Socratic. I detected that in my teacher, Steven N.S. Cheung, as well. *The Library of Economics and Liberty* (an online encyclopedia) described *Exchange and Production* in the following way:

"... unique in economics. It is much more literary and humorous than any other modern economics textbook that deals with complex issues for an undergraduate audience..... Because of its literary quality and complexity, the textbook generally did not work with undergraduate or even M.B.A. classes. But its impact was out of all proportion to its sales. ..."

Accessed on 7 October 2017 at <http://econlib.org/library/Enc/bios/Alchian.html>

What caught his students the most was his style of inquiry in and outside classrooms. I've seen many imitations, but never quite a real Armen Alchian. I say this as a lifetime professional student, having studied many courses, and audited classes and seminars at famous institutions such as Chicago, Harvard, MIT and not to mention, many video and internet seminars, etc.

I can relate to this with a personal experience I had while I was a young Assistant Professor of Economics at UCLA in 1979. Armen walked into my room one day, holding a copy of the paper that I was soliciting for comments. He went to the blackboard in my room right away, writing down some bullet points or drawings that I can't really recall now; but I do remember that the whole episode looked like him giving a lecture to a class using my paper. I was most delighted to hear my proposition being articulated in the language of a true master. He went on and on for a while, thinking as he spoke, but paused at one point, staring at the board, and said, "Now, help me on how I should think through the logic on this point..." It was an amazing deep learning experience that I had valued throughout my professional life. Indeed, he gave me such confidence in my reasoning about the notion of competition – which was considered to be absurd by many

at that time – that I've continuously worked on that problem for another 30 years. When I got a version of my paper published in 1981, he wished me luck by autographing a copy of his book, *Economic Forces at Work*, using a term that was used in the title of my paper.

Armen Alchian particularly likes interpretations of phenomena, or what the profession calls positive economics.² However, I believe he analyzed them all for the purpose of seeking support for a general concept, an idea that he wanted to find generality for in the reality he sees and experiences. The formulation of a general idea is necessarily conceptual; and in that sense, Alchian is also a theorist, although not in the same sense that many economists would mean, which rely mostly on mathematical modelling. An example of that is his treatment of the demand curve, an abstract concept with strong "theoretical" foundation, even though not necessarily embraced by many businessmen and policy makers as a practical guide for decision making.

² Positive economics refers to a methodology that aims to explain phenomena as they are, without asking whether they are good or bad, the latter being in the realm of normative economics. Positive economics typically requires the testing of a hypothesis, usually relying on quantitative data and statistical analysis. This would be doable if good data sets are available. Otherwise, a pragmatic way to practice positive economics may indeed require a researcher to look at reality and test his judgement against decisions made on the basis of surrounding circumstances and theories. Steven Cheung practiced this methodology in his study of many everyday market phenomenon.

The intricacies and applications of demand theory suggested by Armen Alchian were profound. Legend had it that he lectured on demand curve for 4 weeks, 3 hours each, with each time only a downward sloping curve being drawn at the beginning of the lecture, and the rest of the hours spent on the elaboration of examples supporting the law of demand.

The development of a general concept can lead to divergent applications in different fields. For real estate and construction, as an example, valuation being based on demand analysis has been long accepted to be a basic fundamental principle. Indeed, its valuation being a composite of “characteristics”, each of which has also its implicit demand curves, has led to many interesting work done on hedonic prices. On the supply side, Alchian’s 1973 piece with Demsetz, allegedly the most cited work in *American Economic Review*, has provided guidance on understanding the theory of firms, and constituted much of the construction industry analysis that has been uniquely addressed at the Department of Real Estate and Construction at the University of Hong Kong. The development pathways, on both the demand side as well as the supply side, for the real estate and construction industry, have aptly demonstrated the intended purpose of the “little black book”—*Theory in Use*. Professor Lawrence Lai and I, in a 2002 paperback textbook *Thinking Tool*

for Students and Professionals”, also strived to achieve that aspiration.

Armen Alchian’s contribution to economics, of course, is not limited to demand and supply. He assisted others, including his students, to explore original ideas. Steven Cheung’s PhD thesis on share cropping, as an example, was a path-breaking piece of work in that it diverged from the conventional understanding of a price-taking economy; and indeed, suggesting that *Price Theory* alone is NOT the whole story in microeconomics, and that there are much more to microeconomics than the operation of the demand and supply. The structure of contracts opens up another new area of microeconomic inquiry that finally won the Economic Nobel Prize Committee’s recognition in 2016, although not awarded to Cheung. Alchian’s joint article with Klein and Crawford (1978) on vertical integration and specific investment reinforced and opened up new areas of inquiry beyond his 1973 joint work with Demsetz. It had a great impact on the inquiry direction that many young assistant professors (including myself) had worked on diligently in the early 80s. But perhaps, the development of these ideas was so widespread that when the Nobel Prize Committee had to find a person to symbolize these developments, they awarded it to O.E. Williamson in 2009. Armen’s *close encounters* with Nobel Prize winners are numerous. I’m just providing the two that I am most familiar with.

This article is not intended to be a review of Alchian's lifetime work. That kind of writing has been done numerous times already on the internet and in the literature. What this article intends to highlight, are some footsteps of Alchian, perhaps reflecting more on his lifestyle than his accomplishment, when he was alive. He was generous in giving his time and ideas on commenting others' works. He didn't seem to care too much about authorship. To many professional academicians, this may be deadly and self-destructive. This turned out to be not entirely true. Virtually everyone who had some interaction with Armen Alchian went away with new insights and some degree of intellectual satisfaction. The only rumor I heard was that once, he almost drove a female student on the verge of committing suicide, for refusing to see her. Irrespective of the truth of that, it illustrates a point about his strong personality which is also reflected in his treatment of ideas. He was not afraid of calling someone stupid, because he saw his time has better use than listening to garbage. Yet, he was extremely generous with his time when he deemed a discussion worthwhile to pursue. Alchian is a private person. He respects, writes and preaches private property. Indeed, he was a symbol of liberty – and still is – my personal Statue of Liberty. We love him dearly. Susan Woodward characterized him as a man of "enthusiasm for lives, a rare enthusiasm, an extraordinary enthusiasm." She followed this by

saying, "We all give him credit for it and we should, because it was an act of choice, it was an act of will, a gift to us all." I couldn't have agreed more.

Alchian's disciples may be diminishing, and I sincerely hope that this is not the case. In the summer of 2016, when I visited Bunch Hall of UCLA campus on a quiet Sunday afternoon, for a reflection of my 7-11 stimulating yet hard-working years that I still mesmerize about, I could not find any physical trace of Armen Alchian. While I could perceive an atmosphere for a continuous strive for development of general theories, and arguably, more suitably geared towards the economic problems of the 21st century, I did not see the same physical recognition that famous institutes such as University of Chicago has given to their intellectual giants, e.g. Milton Friedman, Gary Becker etc. Perhaps some would find the physical symbols of past recognition to be irrelevant, and indeed that might be the case, especially if the term *Theory in Use* is acquiring a meaning contrary to the spirit of positive economics that Alchian had strongly advocated while he was alive.

The term "*Theory in Use*" has a different connotation for businessmen wanting a theory to help them to make decisions. The term is not intended to be used as an empirical verification of a theory or a testing of a hypothesis. That does not mean that there have not been very successful attempts by economists doing empirical work in providing

“guestimate” that successfully effected policy changes. The discussion here certainly is not intended to degrade their important contributions. Pragmatically speaking, however, to a businessman, he/she couldn’t care less about the testing of hypothesis as well as various guestimates. In this sense, the term “theory in use”, in order to have the impact it deserves, should strive to achieve the explanation of phenomena happening every day. It should be an everyday economics.

In closing, and now living a retired life in pursuit of liberty and happiness, I travel and offer consulting services to various organizations, community groups, startups and NGOs. I still ask an important question that Armen Alchian has led me asking continuously: which “theor(ies)” would best be put “in use” by the businessmen and policy makers of the 21st century? Economists, living under the shadow of great scientists of the world, for a long time have tried as hard as possible to translate their theories into various types of mathematical models.³ Realizing that they were

getting nowhere, a large number of them have now tried equally hard in theories of various statistical models. Alas, the needs of the businessmen and decision makers are very simple—elevator economics that they can digest and indeed elevate thinking within the duration of an elevator ride, or best, a dinner. Decisions are often made not by meticulous benefits/costs analyses, but by something that “obviously works” at the time a decision maker is making a decision.

Am I advocating that general theories in economics are useless? Definitely not. “Theory in Use” takes a long time to prepare for a foundation that it would take “an expert” 50 words or less to summarize.⁴ This skill cannot be easily attained except with repeated thinking and rethinking via modeling or statistical exercises. Even with that, the 50 words or less so articulated, or what may be commonly called

would talk about a real-world phenomenon, but with a general theory formulating at the back of his mind. He demonstrated that in his Nobel Prize acceptance speech, although on a fictitious phenomenon from the movie *The Beautiful Mind* which, in my opinion, has been wrongly directed.

³ Indeed, for the UCLA economics department, competing in the idea arena along this direction appears to have paid off, not least with the 2012 Economic Nobel Prize being awarded to Lloyd Shapley. Alchian and the founding fathers of UCLA economics would probably applaud that award, as there is nothing absurd about how the prize was finally garnered for UCLA. Lloyd Shapley was hired as a full professor at UCLA the last year I was there. We had several friendly chats on general observations of things. I do recall that Shapley did have some of that UCLA flare, in that he

⁴ This “50 words or less” rule was invented by my ex-colleague, Bill Brown, at the California State University, Northridge. As another faithful, though less well-known, disciple of Armen Alchian, he often used that to screen young PhDs in job talks at department seminars. Both he and myself, easily could easily see ourselves attending Armen’s Memorial (described by David Henderson) in 2013, and saying something too about how Armen had affected our personal lives. For myself, hopefully, this essay makes up for that missed opportunity.

an executive summary, is at best a probability statement to be used as the best course of action, as no one knows the future with perfect certainty. Alchian's co-author, Professor William Allen, has made his fame independently as a Midnight Economist, a half-hour radio show that was widely syndicated among 200 plus radio stations across the United States in the 80s. A half-hour elaboration of some applications of economic principles in everyday event is not a trivial task.

In retrospect, one can ask: has Armen Alchian's approach to economics been helpful in building the general knowledge necessary in making a short and simple decision? You bet. That is why many economics students of the world are still spending hours and hours of their time in learning some fundamental concepts of economics, which is what Armen Alchian economics had done best in explaining. In a friendly paperback style, using raw unpretentious logic, and in its humble unselfish manner of educating rather than promoting or proclaiming, Alchian had impacted generations of teachers. I have attempted to demonstrate many of these first hand experiences in the early part of this essay.

Finally, to the readers of this journal, the relevance of Armen Alchian's economics to the real estate development profession may well be lured from an angle suggested in an excerpt of a recent book published by Professor Auerbach in your profession:

"A Business Learned by Doing— Unlike architecture, engineering and other recognized professions, real estate development at first had no schools to provide training or grant degrees. It has been, and remains, a business learned by doing. Several universities now offer courses in real estate development as a profession. However, many of these courses focus only on asset management and fail to teach the creative elements of real estate development, leaving unanswered questions such as "Where does the vision come from?" or "How do you add value to land?" And "adding value" is what real estate developers try to do by determining highest and best use scenarios and then, more often than not, having to secure the entitlements necessary to realize these possibilities." p.15.

Ladies and gentlemen, may I suggest a contemplation of exchange and production—the source of values on which you will be surveying for the building of future environments.

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Mediation of Construction Disputes: A Step Closer to Evaluative Model

LEUNG Hing Fung¹ and Sammy Yip²

INTRODUCTION

In Hong Kong, since the coming into effect of the Court's Practice Direction No. 31 on Mediation in 2010, there has been a rapid increase in the use of mediation in the resolution of disputes³. Naturally the increase in the use of mediation will extend to disputes in every sector, including disputes in the construction industry.

At present the most popular approach of mediation practiced in Hong Kong is based on facilitative model, also described as a model with an "interest-based" approach. For many years disputes related to construction contracts are largely concerning quantum, arising from different issues such as delay in completion, quantities of work and amount of payment. The approach of negotiation adopted by quantity surveyors is often purely positional bargaining. The adoption of a facilitative approach, in which the mediator will not and indeed cannot express any view on the merits of the parties' cases, or give any advice to the parties, may sometimes be inconsistent with the parties' expectation of the ways in which the mediator may assist them in reaching a settlement. In reality there exist cases where the mediator was asked to give views regarding the parties' dispute⁴, such as those

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³ The number of Mediation Minutes increased from 444 to 666 from 2011 to 2016 in the Court of First Instance, and from 223 to 429 in the District Court for the same period, see http://mediation.judiciary.hk/en/figures_and_statistics.html.

⁴ The author LEUNG Hing Fung did come across such situations in his experience as a mediator.

regarding the valuation of certain unit rate, or even the entire amount of the claim.

There arises a question, that is, would there exist a market demand for the use of mediation based on an evaluative approach, rather than facilitative approach, in the resolution of construction dispute?

To address this question, a survey has been carried out in 2014 to 2015 in the area⁵. Before we move further towards discussion on the survey, we would like to first look into the definitions of mediation and some studies on mediation models.

DEFINITIONS OF MEDIATION

Folberg and Taylor (1984) put forward a classical conceptual definition, namely,

“Mediation can be defined as the process by which the participants, together with the assistance of a neutral third person or persons, systematically isolate disputed issues in order to develop options, consider alternatives, and reach a consensual settlement that will accommodate their needs.”

The above definition was quoted by the Department of Justice (DoJ) in 2010⁶, by Chau in 1992 and by Lau⁷ in the Mediation Conference in March 2014⁸.

Moreover, **Cheung⁹ (2010)** defined that *“Mediation in Hong Kong is typically identified as a confidential, voluntary and non-binding dispute-resolution process in which a neutral person, ‘the mediator’, helps the parties to reach a negotiated settlement.”*

Despite the above conceptual definitions, **To (2010)** proposed a relatively descriptive approach. *“Mediation is a process in which a neutral third party, the mediator, facilitates the negotiation between the disputants to arrive at a mutually acceptable solution.”* Also, **Chau (1992)** suggested that mediation could be considered in a constructive way, as a goal-orientated and problem-solving intervention by a third party. It is meant to settle disputes and abate conflict as well as offer a forum for decision-making. In addition, **Riskin (1996)** proposed that *“mediation is a process in which an impartial third party, who lacks authority to impose a solution helps others resolve a dispute or plan a transaction.”*

⁵ The survey is part of the dissertation work by Miss Yip for her BSc in Surveying in University of Hong Kong. Miss Yip’s dissertation has thereafter been awarded the prize of Outstanding Student Award by the Chartered Institute of Building.

⁶ See Report of the Working Group on Mediation (2010) by the DoJ.

⁷ Ir Prof. LAU Ching Kwong, Chairperson of the Alternative Dispute Resolution Committee of the Hong Kong Institution of Engineers.

⁸ Mediation Conference co-organized by the DoJ and HKTDC, held in March 2014, themed as “Mediate First for a Win-Win Solution”.

⁹ Director, Construction Dispute Resolution Research Unite, Department of Building and Construction, City University of Hong Kong.

It seems that the academic sector generally tends to focus on the some features of mediation, which could be found commonly in Hong Kong, namely non-binding, voluntary and confidential, and the mediator should be neutral to assist parties to settle the disputes. On the other hand, some descriptive definitions put emphasis on the settlement of disputes, which is the ultimate aim of the whole mediation process. It seems that different models of mediation only differ in terms of the emphasis on the individual features.

STUDIES ON MEDIATION MODELS

Empirical studies on mediation models have been carried out by various experts.

Alexander (2010) stated that reality cannot be replicated by system and model, as they systematize the real world in brief. Nonetheless, system and model are valuable in ordering one's thinking about a certain topic and in highlighting how theories affect one's mind. They also provide a framework for understanding if the application of them could fit in the world of mediation practice, and how they may brush mediators' mediating skills. The classification of mediation into models also helps assist the court and any referring bodies to be clear about the type of mediation they want to promote.

In 1996, Riskin developed a typology of mediation approaches, and ten years later, he reworked his categories. His typology is oriented around *problem solving*, in which the primary goal of mediation process is assumed to be settlement. He originally proposed a system with two continuums, which the first one concerns the goal of the mediation, i.e. the scope of the problem. For the purpose of this research, this continuum will not be discussed. The other continuum he proposed concerns the mediator's activities, which is to measure the strategies and techniques that the mediator employs to resolve dispute. Facilitating parties' negotiation goes to one end; while evaluating matters goes to another.

Later, **Boulle (2001)** identified four models of mediation, namely therapeutic, facilitative, settlement and evaluative mediation. Boulle's idea is that in a therapeutic model, the underlying causes of behaviour may be considered; in a facilitative model, negotiation in terms of underlying needs and concerns is promoted; in a settlement model, the objective is to reach a compromise and in an evaluative model, the focus is on achieving settlement by reference to legal rights. He further explained that they are not completely four different models, which means that they sometimes may overlap with each other. In addition, they may not reveal the mediation practice in the real world.

Boulle (2001) has proposed this division of model since 1996, and he admitted that although facilitative mediation model, also regarded as the 'pure mediation' or the 'class mediation process', was paid much attention, the other three mediation models still influenced and competed with it. It is so because cases are different from one and the other, there is no one best model to resolve all the disputes. As we can see, this is true nowadays.

Irrespective of what Riskin and Boulle proposed, **Wall et al. (2011)** opined that mediators have approximately 100 techniques and scholars and practitioners usually divide them into 25 strategies, such as analytic, broad focused, bottoms up, differentiated, evaluative, evaluative-directive, facilitative, interest-based, insight, mediation-arbitration, and so on. This indicates that various kinds of strategies through the use of these techniques would need to be applied by reference to the nature of the cases. **Wall et al. (2011)** further divided the strategies into three main categories, namely, facilitative, evaluative and pressing strategy, of which the former two will be investigated in this research.

Furthermore, **Brown (2004)** divided the models into rights-based and interest-based respectively. He explained that a *rights-based* approach focuses on the legal rights of the parties and attempts to achieve a resolution which meets the relevant legal criteria of the dispute in a manner that is consistent with

resolutions achieved in a traditional court setting; while an *interest-based* approach focuses on the underlying needs or interests of the parties and encourages a broader range of solutions or resolutions to the dispute which address the underlying interests, business or otherwise, of the parties instead of, or in addition to, legal interests. This approach may yield an outcome that satisfies the parties, yet may not be congruent with legal norms.

Despite the many different ways of classification of mediation models or techniques suggested by the experts as discussed above, the most common two types of mediation models would be facilitative and evaluative mediation models, and they share one common goal, which is to facilitate negotiation or communication between parties by the mediator (**To 2010**). The two models are always being studied and compared, as per **Brown (2004)**, **Wall et al. (2011)**, **Broker (2007)** and **Riskin (2003)** and **Waldman (1998)**.

OBJECTIVES

With the above background, the authors are going to address the questions set out in Section 1 above. The objectives of this paper are as follows:

- (1) To outline and review the development of mediation practice in respect of the Hong Kong construction industry.

- (2) To investigate any possible shortcomings of using facilitative mediation model in resolving construction disputes in Hong Kong.
- (3) To suggest the possibility of using evaluative mediation model in resolving construction disputes in Hong Kong.

HYPOTHESES AND RESEARCH DESIGN

Development of Hypothesis

From the above observations regarding users' expectation of mediation in construction disputes, if these users find that the success rate when using facilitative model in mediation is not satisfactory, and if a satisfactory result is expected in adopting evaluative model in mediation of construction disputes, then one may conclude that evaluative mediation model should be used in resolving construction disputes in Hong Kong. The hypothesis to be tested in this paper is "evaluative model should be used in resolving construction disputes".

This hypothesis is premised on the expectation of users, not the actual effect of evaluative approach in mediation of construction disputes, which approach has not yet been developed into a mature stage appropriate for a meaningful research.

Methodology

With the above objectives, it could be seen that all of them are within the knowledge and experience only of those within or close to the field of construction mediation in Hong Kong. The development of methodology for achieving the objectives should be accordingly tailored. It is considered that neither a quantitative nor a qualitative approach alone could be sufficient for the purposes. Given both data from the general practitioners within the field of mediation for quantitative analysis and data from experts in mediation for qualitative uses are required, it is suggested that a combination of quantitative and qualitative approaches should be adopted. The methodology is outlined as follows:

(1) Survey (quantitative)

The survey is carried out amongst experienced mediators of construction disputes in Hong Kong by means of questionnaire.

(2) Interview (qualitative)

Both practicing mediators and disputants who have participated in mediation will be interviewed. The aim is to obtain data regarding their valuable experience in construction mediation. Clearly it is the value of their opinions which is most important but not the size of the sample. Therefore only prominent mediators and disputants with

experience in cases of sufficient significance will be interviewed. They are all very experienced mediators in construction disputes or professionals or directors of companies that often participated in construction mediation cases as parties or consultants.

Survey Conducted on Mediators – Quantitative and Qualitative Approaches

There are two stages of data collection from mediators; the first one is quantitative in nature and the second one qualitative.

In the first stage, raw data were collected through questionnaire sent to mediators with construction background. At the time of the survey, there were altogether 431 mediators on the panel of HKMAAL general accredited mediators with a background related to construction and engineering field.

The second stage, which is qualitative in nature, helps in collecting evidence to validate and assist in the interpretation of the survey results from the first stage. The second stage is based on interviews.

As far as the interviews of mediators are concerned, in March 2015, 18 interviews were carried out; 1 by telephone and 17 by face-to-face interview. The relatively small number compared to the first stage is due to the stringent requirements in the

background and experience of the interviewees and also the limitation in the time and resources. The interviews were semi-structured in nature and each lasted around 30 minutes.

Interviews with Disputants

This forms the third stage to collect data from a different perspective. Again because of the nature of data expected, the approach is qualitative in nature. Interviewees were chosen by considering the company lists available from relevant professional bodies including Hong Kong Institution of Engineers, Hong Kong Institute of Surveyors, Hong Kong Institute of Architects and Hong Kong Construction Association. There was no response at all after sending invitations to these institutions.

Interviewees were then contacted via referral and this improved the response rate by a lot. Ultimately 6 face-to-face interviews were conducted, each lasted around 30 minutes. The data collected from interviews of the mediators and disputants both help in the interpretation of the survey result from the questionnaire.

The chart below summaries the three stages of study:



Figure 1: Three Stages of the Study

RESULTS AND ANALYSIS

Stage 1 - Survey Conducted on Mediators

Out of the 431 mediators to whom questionnaire was sent out, 62 responded. The response rate is 14% approximately.

In the follow parts, the result of the survey will be analysed in the sequence as shown in the table below:

Table 1: Content of Result of Survey

| | |
|--------|--|
| Part 1 | Background information |
| Part 2 | Mediation experience in resolving all kinds of disputes |
| Part 3 | Mediation experience in resolving construction disputes |
| Part 4 | Mediation experience in using facilitative model to resolve construction disputes |
| Part 5 | Mediation experience in using evaluative model to resolve construction disputes |
| Part 6 | Prospect of the application of mediation in construction industry |
| Part 7 | Interest for follow-up interviews |

Background Information

Question 1 of the questionnaire is related to the major profession of the mediator. It can be seen that lawyers

form the largest group. The result is presented as follows:

Table 2: Major Profession of the Respondent

| Major profession | Response | Percentage of response |
|------------------|----------|------------------------|
| Architect | 3 | 5% |
| Engineer | 12 | 19% |
| Lawyer | 18 | 29% |
| Surveyor | 14 | 23% |
| Other | 15 | 24% |

Question 2 is on the number of years of accreditation. The largest group of mediators comprises those who have been accredited for 1 to 5 years. The finding is as follows:

Table 3: Years of Accreditation of the Respondent

| Years of accreditation | Response | % of response |
|------------------------|----------|---------------|
| Within 1 year | 3 | 5% |
| 1 to 5 years | 30 | 48% |
| 6 to 10 years | 15 | 24% |
| 11 years or above | 14 | 23% |

Question 3 is concerning the types of training that the mediator has received. Most of them received training in the form of advanced mediation course. The result is as shown in the chart below:

Table 4: Types of Training received by the Respondent

| Types of training | Response | % of response |
|---------------------------|----------|---------------|
| Mediation Workshop | 27 | 44% |
| Advanced Mediation Course | 46 | 74% |
| Other | 9 | 15% |

Question 4 is on the respective organisations which have accredited the mediator. Not surprisingly, most of the mediators were accredited by

HKMAAL¹⁰ whilst many of them have also been accredited by other bodies. The distribution is shown below:

Table 5: Organizations of Accreditation of the Respondent

| Organizations of accreditation | Response | % of response |
|---|----------|---------------|
| Hong Kong Mediation Accreditation Association Limited | 36 | 58% |
| Hong Kong International Arbitration Centre | 27 | 44% |
| Hong Kong Mediation Centre | 21 | 34% |
| Other | 9 | 15% |

Question 5 is on the types of disputes that have been handled by the mediator. Construction disputes constitute the large number among the group of mediators under this survey. The distribution of the various types of disputes is shown in the chart below:

Table 6: Types of Disputes handled by the Respondent

| Type(s) of disputes handled | Response | % of response |
|------------------------------|----------|---------------|
| Building Management Disputes | 31 | 50% |
| Commercial Disputes | 33 | 53% |
| Construction Disputes | 55 | 89% |
| Family Disputes | 4 | 6% |
| Financial Disputes | 15 | 24% |
| Other | 14 | 23% |

The last question on the mediator’s background information is on the number of mediation cases that he/she has handled in the past years since year 2000. As expected, the number of cases has been increasing rapidly during the period. The result is shown below:

Table 7: Number of Mediation Cases handled by the Respondent

| Period | Number of cases |
|------------------------|-----------------|
| Before Year 2000 | 50 |
| Year 2001 to Year 2005 | 235 |
| Year 2006 to Year 2010 | 367 |
| Year 2011 to Year 2015 | 589 |

The above data collected would help to give a picture of the general background of the mediators who participated in the questionnaire exercise.

The Mediator’s Experience in Mediation in Resolving the Various Kinds of Disputes

This part deals with the experience of the mediator in handling different kinds of disputes, including the model(s) or approach(es) that they have used.

Before going into details, it would be important to find out the different mediation model or approach that the mediators under the study have learned. The facilitative model is expectedly the most popular model. Followed by the settlement model and then the evaluative. This is collected by means of Question 7 and the result is shown below:

Table 8: Mediation Model learned by the Respondent

| Mediation model taught | Response | % of response |
|------------------------|----------|---------------|
| Facilitative Model | 59 | 95% |
| Evaluative Model | 13 | 21% |
| Settlement Model | 13 | 21% |
| Therapeutic Model | 3 | 5% |
| Other | 2 | 3% |

¹⁰ Hong Kong Mediation Accreditation Association Limited

Question 8 under this part is on the frequency of applying different models of mediation in the mediator’s cases. As it is a matter of degree instead of solid figures, the mediators were asked to give an estimate of the frequency instead of a detailed retrospective calculation on the actual number of cases, which is impracticable. Other than the different frequencies, many different models were found used in actual practice. The result is as below:

Table 9: Frequency of Applying Different Mediation Models

| Mediation model used | Always | Sometimes | Rarely | Never |
|----------------------|--------|-----------|--------|-------|
| Facilitative Model | 48 | 9 | 1 | 4 |
| Evaluative Model | 1 | 21 | 16 | 24 |
| Settlement Model | 6 | 18 | 12 | 26 |
| Therapeutic Model | 0 | 8 | 15 | 39 |
| Other | 1 | 2 | 4 | 55 |

An interesting question is: in what ways the mediator has employed different mediation models in a single case. Would it be one model? A combination of different models, or the mediator only uses a new model when a model fails? And how frequent did that happen? Question 9 in the survey deals with this question and the following is a diagrammatic summary of the result:

Table 10: Ways of Respondents Employing Mediation Models

| Ways of using above model | Always | Sometimes | Rarely | Never |
|--|--------|-----------|--------|-------|
| Use one model only when dealing with one case | 32 | 17 | 6 | 7 |
| Use a combination of two models when dealing with one case | 5 | 31 | 7 | 19 |
| Use the models one by one when failed | 0 | 20 | 18 | 24 |
| Other | 0 | 2 | 2 | 26 |

Mediation Experience in Resolving Construction Disputes

This part is specific to construction disputes and deals with the experience of the mediator in handling construction disputes, including the frequency of conducting mediation for construction disputes in past years, the difficulties encountered and the reasons for not mediating construction disputes.

The following table shows the distribution of the respondents’ experience in dealing with construction disputes.

Table 11: Experience of Respondents dealing with Construction Disputes

| Experience in resolving construction disputes | Response | % of response |
|---|----------|---------------|
| Yes | 53 | 85% |
| No | 9 | 15% |

Question 11 of the questionnaire aims at finding out as regards construction disputes, what is the pattern in the distribution of the number of cases over the past years. The result shows a steady increase amongst this group of mediators as show below:

Table 12: Frequency of Respondents in handling Construction Disputes

| Period | Number of cases |
|------------------------|-----------------|
| Before Year 2000 | 30 |
| Year 2001 to Year 2005 | 36 |
| Year 2006 to Year 2010 | 49 |
| Year 2011 to Year 2015 | 121 |

Under this part, the focus is to find out what are the general difficulties faced by construction mediators. Question 12 deals with the problem and the data collected are presented below:

Table 13: Difficulties Encountered by Construction Mediators

| Difficulties | Response | % of response |
|---|----------|---------------|
| Do not have construction knowledge to handle the case | 4 | 9% |
| Clients holding evidence prepared by experts, thus there is no room for negotiation | 15 | 34% |
| Other | 15 | 34% |
| There is no difficulty | 19 | 43% |

Question 13 is intended to find out the possible reasons as to why some mediators do not mediate construction disputes at all. From the returns, the most common reasons given are that they do not have construction knowledge or they found construction cases were more complicated than other types of cases. The result is presented below:

Table 14: Reasons for not Mediating Construction Disputes

| Reasons | Response | % of response |
|---|----------|---------------|
| Not interested | 1 | 11% |
| Do not possess construction knowledge | 2 | 22% |
| The cases are more complicated to handle when compared to other kinds of disputes | 2 | 22% |
| Other | 5 | 56% |

Mediation Experience in Using Facilitative Model to Resolve Construction Disputes

This part is intended to find out the details of experience of the mediator in using facilitative model to resolve construction disputes. The areas studied include the experience in using facilitative model, the mediator’s view on the effectiveness in using facilitative

model and the reason(s) of the possible ineffectiveness of facilitative model in this kind of cases. The results are as shown below.

Question 14 is concerned with whether the mediator has experience in resolving construction disputes using facilitative model. It is somewhat surprising to find that some mediators do not have experience in using facilitative model at all in resolving construction disputes. The distribution is shown in the pie chart below:

Table 15: Experience in Resolving Construction Disputes using Facilitative Model

| Experience in resolving construction disputes using Facilitative Model | Response | % of response |
|--|----------|---------------|
| Yes | 52 | 84% |
| No | 10 | 16% |

Question 15 relates to another interesting relevant question, that is the mediator’s view on the effectiveness of facilitative model. Some of them gave positive response and others did not. The result is shown below:

Table 16: View towards Effectiveness of Facilitative Model

| | Response | % of response |
|-----|----------|---------------|
| Yes | 55 | 89% |
| No | 7 | 11% |

It would then be important to find out why in the view of some mediators, the facilitative model is not effective in the resolution of construction disputes. Most of them accepted the reason that as both parties may provide detailed

evidence by the experts, they may therefore be unwilling to compromise. The results from Question 16, which focus on this area, is shown below:

Table 17: Reasons for Possible Ineffectiveness of the Facilitative Model

| Reason(s) | Response | % of response |
|---|----------|---------------|
| Mediators may not possess construction knowledge/experience to understand the case | 25 | 40% |
| Both parties may provide detailed evidence by the experts and therefore unwilling to compromise | 35 | 56% |
| Other | 17 | 27% |

Mediation Experience in Using the Evaluative Model to Resolve Construction Disputes

This part is intended to find out mediators’ experience in using another model, namely the evaluative model, in the resolution of construction disputes. The areas studied include, according to the respondents’ views, the spread of using the evaluative model and other models, the effectiveness of using the evaluative model, the reasons of possible ineffectiveness of the evaluative model, the ways to promote the use of the evaluative model and the future use of mediation.

The first question in this part is Question 17, which asks about the mediator’s experience in resolving construction disputes using the evaluative model. A fair portion of the respondents do have experience in resolving construction disputes using the evaluative model. The result is as presented below:

Table 18: Experience in Resolving Construction Disputes using the Evaluative Model

| | Response | % of response |
|-----|----------|---------------|
| Yes | 23 | 37% |
| No | 39 | 63% |

Following the above question, Question 18 is concerned with the mediator’s view concerning the effectiveness of the evaluative model towards the resolution of construction disputes. It can be seen that most of them are of the view that it is effective.

Table 19: View towards Effectiveness of the Evaluative Model

| | Response | % of response |
|-----|----------|---------------|
| Yes | 40 | 65% |
| No | 22 | 35% |

As there are mediators who considered that the evaluative model is not effective in the resolution of construction disputes, Question 19 follows up by asking for the reasons for the possible ineffectiveness of evaluative models. The most frequent reason given is that professional construction knowledge is required. The result can be seen in the table below:

Table 20: Reasons for Possible Ineffectiveness of the Evaluative Model

| Difficulty | Response | % of response |
|--|----------|---------------|
| Professional construction knowledge is required | 36 | 58% |
| It may be difficult to give opinions as the case is usually complicated | 19 | 31% |
| There is not enough training for the evaluation mediation model in general | 12 | 19% |
| Clients may not agree with the non-binding results | 18 | 29% |
| Other | 13 | 21% |

On the other hand, given there is certainly a group of mediators who considers that mediation is effective in the resolution of construction disputes, it would be relevant to inquire the mediators as to the ways to promote the evaluative model. The result is as shown below:

Table 21: Ways to Promote the Evaluative Model

| Ways to promote | Response | % of response |
|---|----------|---------------|
| More training should be provided for the use of that model | 37 | 60% |
| It should become a compulsory step when the facilitative model fails to settle the construction dispute | 8 | 13% |
| Other | 7 | 11% |
| There is no need to promote the evaluative model | 10 | 16% |

Prospect of the Application of Mediation in Construction Disputes

This is a broad question. The respondents provided views in relation to the various ways which may improve the use of mediation including more training from recognised organizations, subsidy from the Government to encourage the use of mediation to resolve construction disputes, making mediation a compulsory step in litigation and more procedural rules and guidelines from recognised organisations. The results are shown in the following chart and table:

Table 22: Views of Respondents towards Future Use of Mediation in resolving construction disputes

| | Response | % of response |
|-----|----------|---------------|
| Yes | 56 | 90% |
| No | 6 | 10% |

Methods Suggested to Encourage the Application of Mediation on Construction Disputes

This question is intended to wrap up the survey after the respondents have attempted the many questions above.

Table 23: Methods to Promote Mediation

| Methods to promote mediation | Response | % of response |
|---|----------|---------------|
| More training from recognized organizations | 30 | 48% |
| Subsidy from the government to encourage the use of mediation to resolve disputes | 29 | 47% |
| Mediation should be a compulsory step before litigation | 39 | 63% |
| More procedural rules and guidelines from recognized organizations | 19 | 31% |
| Other (Please Specify) | 10 | 16% |

Summary of Findings from the Survey through Questionnaire

From the above survey, it could be seen that 21% of the mediators in the study have learned evaluative model but 35% have actually used it. Leaving aside the question why some mediators who have not learned about the model went on to use it and why users would not disagree to the use of the model, the result clearly shows that there is real demand in practice in using the model.

As regards the reasons for not using the evaluative model, some mediators expressed the view that using the evaluative model may be a move that is inconsistent with the mediation codes of conduct commonly used in Hong Kong whilst others said that they did not have the relevant training. Besides, 65% of the respondents support the use of the evaluative model. In other words, given a suitable adjustment in the content of most mediation codes

and relevant training, it could be expected that the use of the evaluative model could become more popular. As the figure suggested, the resistance in the use of the evaluative model is due to a discouraging environment in the training and the mediation codes, instead of the preference of the mediators and users generally.

It could be concluded that the concerns raised by the mediators in the lack of training and appropriate provisions in mediation codes should be appropriately addressed.

Stage 2 - Interview with Mediators

Other than the survey from which the distribution of views of mediators in practice could be obtained, valuable views from prominent mediators should also be considered, particularly on specific issues which not too many mediators would have experience or the relevant perspective to give an appropriate view. The survey by questionnaire provides the data concerning consensus in certain views whilst from the interviews we could obtain views that would carry weight and the interviews would also allow freedom for the mediators to elaborate on the details. The results from the two approaches should be expected to give solid findings for the purposes of this study.

The interview is aimed at collecting views on the following questions:

- (1) How do the interviewees perceive construction disputes
- (2) How do they view mediation in terms of its merits
- (3) Effectiveness of the facilitative model
- (4) Difficulties when using the facilitative model
- (5) How do they perceive the evaluative model and their concerns when using it
- (6) What are the requirements of the evaluative mediators
- (7) How to incorporate the evaluative model
- (8) Future use of the evaluative model

How Do Mediators Perceive Construction Disputes

A general view obtained from the interview is that construction disputes are more complicated than other disputes and often involve numerous parties and discreet division of liabilities. Moreover, the disputes are often the result of pursuing for time, cost and quality.

How Do Mediators View Mediation in terms of its Merits

Views expressed include that mediation is flexible, time and cost saving and could maintain business relationships. Moreover, it is a common view that the revelation of the parties' cases by themselves at a relatively early stage would help in the resolution of the disputes. A number of mediators also opined that the parties would feel respected when they are given a right to terminate the process as they may decide and this feeling of being respected would reinforce the parties in abiding by the settlement agreement if that could be reached. They are of the view that this makes mediation a process that could truly result in a win-win situation.

Effectiveness of the Facilitative Model

The majority of the interviewees are generally satisfied with the facilitative model. However, some of them expressed the view that the facilitative model may only be effective in the resolution of disputes of relatively small scale. There is contrary view that the facilitative model is not effective as the mediator does not give advice at all and the parties may not feel being assisted sufficiently.

Difficulties when Using the Facilitative Model

The general view of the mediators is that actually there is no major difficulty for them to apply the various techniques

under the different models. However, they see a difficulty that it is not unusual for the parties present at the mediation not to have any incentive for settlement and indeed they are very often unfamiliar with the mediation process. Moreover, sometimes representatives from large companies apparently do not have sufficient authority (though they claim to have full authority) and it is hard for the mediator to report back to the parties and to assist in any way for such situations.

How Do Mediators Perceive the Evaluative Model and Their Concerns When Using It

The views in this respect are quite divided: 1/3 of the interviewees strongly object to the use; 1/3 try not to use it, but sometimes incorporate evaluative elements into the mediation process; 1/3 support the use of the evaluative model. Obviously this is an area that would need to be explored further.

Moreover, many of the interviewees expressed concerns over the liability of the mediator and the possible perception of bias by the parties if the evaluative approach is adopted. There are suggested solutions including proper consultation with the legal profession, that disputants should be given a right to decide which model should be used and that clauses to indemnify mediator from liability of professional negligence when adopting the model in their mediation should be incorporated into the agreement to mediate.

What Are the Requirements for One to be an Evaluative Mediator

Views from the interviewees include that the mediator using an evaluative model should be an expert in construction field; that the mediator must be someone both disputants respect and trust; that the mediator should be objective and impartial and, interestingly, the view that the mediator should be willing to go to the site for investigation.

How to Incorporate the Evaluative Model

A notable view is that if the parties need a change in the model of the mediation from facilitative to evaluative (or presumably a mixed model with an evaluative element), they may need to appoint another appropriate mediator. Moreover, some interviewees expressed the view that when using the evaluative model, the original contract should be studied more carefully by the mediator as he/she is supposed to express views based on that. Further, both parties should agree on the use of the evaluative model.

Future Use of the Evaluative Model

Under this title there are a group of supporters and a group of opponents to the use of evaluative mediation among the interviewees. The supporters are of the views that there is already extensive use of the facilitative model particularly due to the Mediation Ordinance and a number of them expressed that the

success rate does not appear satisfactory at present¹¹. Therefore attempt should be made to allow alternative models to be used. Those who objected said that the present low success rate is likely the result of unsatisfactory process. Any incorrect move may make disputants reluctant to attempt mediation further, whatever model it is.

Summary and Analysis

From the interviews with mediators a definite view is that the facilitative model is not sufficiently effective due to the complicated features of construction disputes. About half of the interviewees were of the view that the evaluative model could help in these situations. The other half disagreed for the reasons mentioned above. The authors however are of the view that the concerns are not problems that are insurmountable and should be addressed in an appropriate way.

It could be concluded from the interviews with mediators that the evaluative model should be used in resolving construction disputes as an additional choice to the facilitative model.

¹¹ This view seems to be contrary to the high success rate of Government mediation cases of 70-80% as published in the Report of the Working Group on Mediation in 2010, p.12. There is otherwise no more updated published data for the success rate of construction mediation cases. For reference the records kept by the Judiciary show that the general success rate and success rate for building management cases for the year 2016 are 63% and 55% respectively, see http://mediation.judiciary.hk/en/figures_and_statistics.html

Stage 3 - Interviews with Disputants

Clearly the disputants could provide views of another perspective when compared with those by mediators. Therefore, disputants who have participated in construction mediation are interviewed with a view to address the following questions:

- (1) How do they perceive construction disputes
- (2) How do they view mediation
- (3) Effectiveness of the facilitative model
- (4) Difficulties when using mediation in general
- (5) How do they perceive the evaluative model and their concerns when using it
- (6) What are the requirements of evaluative mediators
- (7) Future use of mediation in resolving construction disputes

How Do Disputants Perceive Construction Disputes

Amongst the group of disputants interviewed, there are general views that construction disputes generally relate to time delay, quantum, and quality of work, and these disputes usually require a judgment in the circumstances. Moreover, the representatives of the parties in these cases are usually familiar with the disputes and know

what they need. They will usually choose to keep the underlying interest to themselves and the facilitative model may not be able to assist.

How Do Disputants View Mediation

The general view is that mediation allows parties to face the dispute at the early stage. This enables them to know the underlying concerns of the opposite party even if they failed to reach settlement. The process under the facilitative model is effective for “person v person” cases. However, there exists view that such a model may not be as good for “company v company” cases, particularly where one or both of the representatives bear a burden to report back to the respective parties (a company or the Government), which will give a heavy burden on the representatives in the accountability of the offer or acceptance of the options and therefore may deter them from reaching a settlement.

Effectiveness of Facilitative Model

There are views that mediation (as at present) is a waste of time and money as it is not effective in the sense that no advice is offered and the parties in construction disputes usually do not have emotional or relationship problems as in other types of cases, such as family cases. The parties in construction disputes usually know clearly what they need and would not usually need a facilitative mediator to uncover their underlying needs and concerns. There are opinions that mediation at present

is not effective particularly when the negotiation started with an unreasonably wide gap in quantum as a result of the preparation works by the parties' professionals and facilitative model in these situations would not usually help. The disputants however opined that the present model is quite successful in the way that it reduces the possibility of misunderstanding between the parties.

Difficulties When Using Mediation in General

There are views from the disputants that in some cases the parties may not be prepared for the mediation process. There are also cases where the parties have no intention to settle or the parties are not willing to approach mediation rationally for fear that they may reveal the weaknesses of their cases.

How Do Disputants Perceive Evaluative Model and Their Concerns When Using It

Most interviewees are strongly in support of evaluative model and expressed that evaluative model should be more effective in resolving construction disputes. They considered that advice offered by the mediator could form the basis of developing good reasoning leading to settlement in "company to company" case.

There are however concerns expressed about evaluative model that there may be difficulty to ensure the impartiality of the mediator, whose advice and views are the key to a successful

evaluative mediation. Moreover, the parties may not be willing to reveal all the details of their cases or the mediator for various reasons may not have been able to consider all the evidence, and this may affect the use of the views and advice expressed by the mediator in assisting a settlement.

What Are the Requirements for One to be an Evaluative Mediator

A major concern expressed is that someone who is dominating would not be a suitable candidate to be an evaluative mediator. On the requirements, most of the disputants considered that the mediator should be impartial when giving advice; that the mediator should have sufficient legal knowledge and should have extensive knowledge and experience in the construction industry.

Future Use of Mediation in Resolving Construction Disputes

In this respect many of the interviewees noted the possible impact of adjudication brought about by the regime of the New Engineering Contract. They anticipated that only if an evaluative element is added to the mediation process then the use of mediation could be further developed.

Summary and Analysis

From the interviews with the disputants the general view is that the evaluative model is more effective than the existing model and parties see the need

for views and advice from the mediator in settling construction disputes. Moreover, the disputants trust that mediators would have the impartiality and ability to apply evaluative model. The mediator (as some of the respondents opined), as an independent third party, would be in a better position to express views than the parties' own experts during the negotiation.

It could therefore be concluded for this section that in the general views of the disputants interviewed, mediation with an evaluative approach should be used in resolving construction disputes.

LIMITATIONS OF THE INTERVIEW WITH MEDIATORS AND DISPUTANTS; FURTHER SUGGESTIONS

Because of the limitation of time and resources, the scale of the survey may not be large enough to obtain opinions that are sufficiently representative of the mediators and users at large. In this respect the Government or other reputable mediation organisations may be in a better position to do a better job. Moreover, the number of mediators and disputants interviewed is limited. If more time and resources could be given, mediators and disputants of a wider range of backgrounds of experiences could be interviewed, thereby improves the quality of this research.

CONCLUSION AND SUGGESTIONS

With the research in the three dimensions as carried out, it can be concluded that a genuine need to use the evaluative model in the resolution of construction disputes in Hong Kong is found. The concerns raised by the different parties in the current model should be addressed.

It is particularly noted that a clear view from the disputants who have used mediation is that they need advice from the mediator, and this is contrary to what the mediator can do under a facilitative model. It is suggested that appropriate amendments should be made to the relevant mediation codes¹² and the Mediation Ordinance¹³, which at present may not contain provisions sufficiency encouraging in use of an evaluative approach.

As to the hypothesis, from the results of the study it is shown that the statement "evaluative model should be used in resolving construction disputes" is not rejected.

Finally, an observation of the authors is that at present virtually all mediation training courses and accreditation in

¹² For example, under the Hong Kong Mediation Code, the Mediator will not give legal or other professional advice to any Party (see clause 4 thereof)

¹³ For example, the definition of Mediation in the Mediation Ordinance includes the expression "without adjudicating a dispute" (see section 4 thereof)

Hong Kong are based on a facilitative model and there is as yet no such thing as an evaluative model. Therefore different mediators may have different understanding of the term “evaluative model”. To the impression of the authors many mediators take the view that if the mediator gives advice or expresses view on the merits of any party’s case in a mediation under the current model in Hong Kong, then it would fall within the meaning of evaluative mediation or, in the broadest sense, an evaluative model or approach.

In the circumstances it is likely that what is in the minds of these mediators is a “tainted” model of facilitative model by introducing an element of advice based on evaluation into an existing facilitative model. It is therefore the case that there is no such thing as a pure “evaluative model” and, as suggested by some experts, “evaluative” is an approach but not a model¹⁴ (or in the authors’ view not a model yet until such time when a model is created and well accepted by the public). Leaving the question of whether evaluative is a model or an approach aside, it is important that the meaning of evaluative model or approach must be well defined in training and accreditation and also in the amendment of mediation codes and the Mediation Ordinance. This is clearly in the interest of the general public in

using mediation for the resolution of disputes as it relates to how the standard of evaluative mediation could be benchmarked. The importance of this is not limited to construction disputes but to all disputes at large.

There is no doubt that the development potential of evaluative mediation in Hong Kong has been noticed by the Government and the mediation community. In 2017 a Special Committee on Evaluative Mediation was set up within the Steering Committee on Mediation¹⁵ of the Government and a Working Group on Evaluative Mediation was set up within Hong Kong Mediation Council. The authors would suggest that it would be important to set up some sort of action plan providing for milestones taking into account the definition of evaluative mediation, the training and accreditation standard, the revision in the code of conduct and legislation and the provision of professional indemnity insurance. In line with this point, **Brooker (2007)** suggests that the adversarial approach of lawyers has been part of the problem in mediation process and there should be reviews on the governing codes of practice and training of mediators.

In the course of this research some interviewees mentioned about the advantages of adjudication under the proposed Security of Payment

¹⁴ For example, by Prof. Nadja, A, expressed in the IP Mediation Workshop - Evaluative Approach in Practice organized by the DoJ and held on 23 May 2015

¹⁵ Chaired by the Secretary for Justice and set up in 2013, see <http://www.doj.gov.hk/eng/public/mediation.html>

legislation. It seems to the authors that an evaluative approach in mediation is a step closer to adjudication and therefore researches concerning the comparison of the two in particular in respect of the situations where either of these will be more effective in the resolution of disputes will certainly be of importance to all the stakeholders in the relevant fields. On a more theoretic side, there are further related research areas such as those related to the neutrality of mediator in evaluative mediation¹⁶.

In any case it is important to note that evaluative mediation is often market driven, **Brooker (2007)**, it would be very important to make sure that disputants should be aware what they are getting out of the various approaches of mediation.

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¹⁶ As pointed out by **Quek (2012)** that the major issues in evaluative mediation are parties’ autonomy and the mediator’s neutrality.

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A Proposal to Use Plover Cove Reservoir as a Land Reserve for Hong Kong

Sr Frederick Lai

BACKGROUND

Is Hong Kong really short of land supply?

During the 1970 to 1980s, the Government launched a huge new town programme to deal with the rapid population growth. In just 20 years, nine new towns were established (see **Table 1**). At present, the total population of these nine new towns is about 3.47 million, and is expected to reach 3.63 million by 2021¹. Among these new towns, only Tung Chung will expand further to accommodate another 144,000 people². Therefore these new towns, in view of their imminent saturation, will certainly be unable to quench the severe housing shortage problem currently confronting Hong Kong society. Moreover, the current development plan only envisages smaller new areas, which would not relieve the housing shortage problem. Also, the slow planning and development approval process exacerbates the problem. The situation now is a long term under-supply of developable sites and expected continual rise in private property prices beyond the reach of the ordinary people.

¹ **Civil Engineering and Development Department (2016)**, *Hong Kong: The Facts - New Towns, New Development Areas and Urban Developments*.

² Accessed on 10 February 2017 at <http://www.cedd.gov.hk/eng/whats/p20160616.html>

Table 1: Populations of New Towns and New Development Areas

| New Town & New Development Area | | Area (Hectare) | Population ('000) | | Residual Capacity | Density (/Hectare) | Year of Commencement |
|---------------------------------|---|----------------|-------------------|---------|-------------------|--------------------|----------------------|
| | | | Planned | Present | | | |
| 1st Generation | 1 Tsuen Wan | 3286 | 866 | 805 | 7.04% | 264 | 70's |
| | 2 Sha Tin | 3591 | 771 | 691 | 10.38% | 215 | 70's |
| | 3 Tuen Mun | 3266 | 589 | 502 | 14.77% | 180 | 70's |
| 2nd Generation | 4 Tai Po | 3006 | 307 | 278 | 9.45% | 102 | Late 70's |
| | 5 Fanling/Sheung Shui | 667 | 290 | 261 | 10.00% | 435 | Late 70's |
| | 6 Yuen Long | 561 | 185 | 164 | 11.35% | 330 | Late 70's |
| 3rd Generation | 7 Tin Shui Wai | 430 | 306 | 290 | 5.23% | 712 | 70 - 80's |
| | 8 Tseung Kwan O | 1718 | 445 | 396 | 11.01% | 259 | 70 - 80's |
| | 9 Tung Chung including TC East/TC West extension (under planning) | 245 | 268 | 124 | 53.73% | 1094 | 70 - 80's |
| New Development Area | 10 Kai Tak Development | 318 | 87 | | | 274 | 2007 |
| | 11 Anderson Road (under intake) | 20 | 48 | | | 2400 | 2008 |
| | 12 Anderson Road Quarry Site (under planning) | 40 | 25 | | | 625 | 2016 |
| | 13 Kwu Tung North, Fanling North (under planning) | 330 | 172 | | | 521 | 2017? |
| | 14 Hung Shui Kiu (under planning) | 435 | 173 | | | 398 | 2019? |

Source of data: website of Civil Engineering and Development Department

An adequate land reserve needs to be identified for long term land supply to keep property prices at reasonable levels. An analogy can be drawn by considering the Linked Exchange Rate: If Hong Kong does not have a foreign reserve of several hundreds of billion (USD)³, it will be difficult to keep a stable linked exchange rate. Therefore the key to the Hong Kong property price is not just an announced target supply for the next year, but also the existence of a known and feasible

long term land reserve. A ‘high land price policy’ has caused many social problems in Hong Kong, including difficulties for family formation due to costly home purchase; social disparity, lack of upward mobility channel for the younger generation, people becoming “flat slaves”, shrinking of industries and businesses, etc. The solution to most of these problems lies in an effective policy of stabilizing property prices through assuring abundant long term land supply.

³ “The Hong Kong Monetary Authority (HKMA) announced today (Thursday) that the official foreign currency reserve assets of Hong Kong amounted to US\$413.7 billion as at the end of August 2017.” (HKMA 2017)

A PROPOSED PROJECT

With an area of only 1,100 sq. km and a hilly terrain, Hong Kong is short of usable land (the total is about 210 sq. km or 21,000 hectares only). According to published government sources, from 1950 to 2017, a total of 6,318 hectares of land in Hong Kong were produced by reclamation of the sea, accounting for about 30% of the usable land⁴. As the role of reservoirs in water supply is diminishing, the author has come up with a bold proposal to reclaim some land from a major reservoir, itself reclaimed from the sea, to build affordable, dignified and comfortable homes for citizens, and construct a smart, green and eco-friendly new town.

The Plover Cove Reservoir has an area of about 1,200 hectares⁵. Based on a plot ratio of 2, it is estimated that the reclaimed land could provide 300,000 flats of 650 sq. ft., plus 65 million sq. ft. for non-domestic purpose such as commercial buildings, public facilities, research centers, university campus, hospitals, shopping malls, etc. The total land value could be up to \$775 billion, assuming average land price at \$3,000 per sq. ft. This amount would be sufficient to build all the necessary rails, highways, cross-sea tunnels, as well as site formation works and infrastructure construction.

This may appear contentious if one does not understand the situation of water supply in Hong Kong. In the analysis of converting the Plover Cove Reservoir into a new town, the first key issue is its impact on the water supply. If the proposal would lead to water shortage in Hong Kong, it should be abandoned. Would reclaiming the Plover Cove Reservoir jeopardize the water supply for the population? Let us examine this question from different angles.

1. Will the construction of the New Town impact on the collection and storage of rainwater?

It is clear that the construction of the New Town will not in any way affect the size or ecology of the water catchment. Therefore, there will be no impact on the capability of rainwater collection.

The total storage capacity of all reservoirs in HK is 586 million m³,⁶ while the average rainwater collected for the past 10 years was 246 million m³ per year⁷. Therefore, even if we take away the 230 million m³⁸ capacity of the Plover Cove Reservoir, there would be still enough storage capacity elsewhere to contain the entire rainwater collection.

⁴ Accessed on 28 July 2017 at <https://www.hku.hk/press/press-releases/detail/16599.html>.

⁵ Practice Notes and Publications - Major Reservoirs of the Survey and Mapping Office.

⁶ **Water Supplies Department (2016) Hong Kong: The Facts – Water Supplies.**

⁷ Accessed on 28 July 2017 at <http://www.wsd.gov.hk/en/core-businesses/total-water-management-strategy/local-yield/index.html>

⁸ See note 6, supra.

For the year 2015/16, the total rainwater collected was 270 million m³,⁹ with the Plover Cove and High Island Reservoirs accounting for 138 million m³. Assuming these two reservoirs have a similar catchment capacity, the Plover Cove Reservoir should have collected about 70 million m³ rainwater. With 280 million m³ capacity and average water storage at 72%, the High Island Reservoir has a residual capacity of 78 million m³, thus it alone can accommodate all the rainwater collected by the Plover Cove Reservoir.

Due to the huge surface area of the Plover Cove Reservoir, every year it loses about 15 million m³ water¹⁰, or about one-fifth of the rainwater collection, due to evaporation. If all rainwater is transferred to the High Island Reservoir, 15 million m³ rainwater will be saved due to its much smaller surface area.

2. Will the construction of the New Town impact on the reserve of the reservoirs?

Currently, Hong Kong has only two sources of water supply:

Dongjiang (Eastern River) Water and rainwater. If the daily water supply were interrupted, the reserve would be utilized. According to the Water Supplies Department, “*The total storage capacity of Hong Kong’s impounding reservoirs, comprising two reservoirs constructed by damming the sea and 15 conventional reservoirs, is 586 million m³. When they are 100% full, the storage can meet about 6 months’ demand of Hong Kong.*”¹¹

For the sake of risk management, we need to consider the worst scenario: assuming the three reservoirs (Plover Cove, High Island and Tai Lam Chung) receiving Dongjiang Water are also contaminated, the total water storage of the remaining 14 reservoirs has a mere 54.7 million m³¹² and can only last for 20 days. Under this stress test, despite claiming a total of 586 million m³ reserve, the HK water system is incredibly fragile. Developing a new source of water supply for Hong Kong is much needed to build up a long-term resilience.

In April 2015, water storage of most reservoirs dropped to the lowest point in 10 years’ time. Apart from the three reservoirs receiving Dongjiang Water, the other reservoirs had about 20-

⁹ See note 6, supra.

¹⁰ Annual average evaporation for 2007-2016 in Hong Kong is 1244mm. The total evaporation of Plover Cove Reservoir with a surface area of 12km² would be 14.93 million m³. Average evaporation is derived from evaporation data of Climate Change in Hong Kong of Hong Kong Observatory. Accessed on 28 July 2017 at http://www.hko.gov.hk/cis/monthlyElement_e.htm?ele=EVAP0

¹¹ Accessed on 28 July 2017 at <http://www.wsd.gov.hk/en/core-businesses/operation-and-maintenance-of-waterworks/waterworks/index.html>

¹² See note 6. Supra.

30% of capacity. Thus, in the worst scenario, if the reservoirs containing Dongjiang Water were contaminated, and the storage of all other reservoirs is about 30% of 54.7 million m³ or a mere 16.4 million m³, the water reserve would last for 6 days only. In other words, Hong Kong cannot afford any delay in the development of new sources of water!

The author suggests that the development of a Plover Cove New Town is tied in with the construction of two desalination plants. Taking into account the ultimate water production capacity of the Tseung Kwan O Desalination Plant¹³, the annual production of the 3 plants could reach 300 million m³ each year, providing 30% of water usage for HK on a sustainable basis. In the case of total suspension of Dongjiang Water due to contamination or water shortage in Mainland, the total 356 million m³ of all Hong Kong reservoirs (excluding Plover Cove) could last for 188 days to meet the 70% water usage; this is similar to the 6-month period mentioned above.

Under the worst scenario with two additional desalination plants, if reservoirs (High Island and Tai Lam Chung) containing Dongjiang

Water were also contaminated, the total storage of 54.7 million m³ of the remaining 14 reservoirs would be able to support a longer period of 29 days to meet the 70% water usage. More importantly, the three desalination plants could continue to supply 30% of water usage during this emergency period. So this is a more secure alternative thanks to risk diversification.

3. Will the construction of the New Town impact on the capacity of the reservoirs to receive the Dongjiang Water?

Recent discussions with engineers affirmed that the Dongjiang Water would not enter HK's water supply system directly. Before being transferred to the treatment plants, the Water is stored in three reservoirs for an observation period for risk control. Essentially, Hong Kong can only rely on collected rainwater to mix with the Dongjiang Water. These 3 reservoirs have a total rainwater collection of about 160 million m³,¹⁴ therefore the High Island and Tai Lam Chung alone can already provide the capacity to receive and/or stabilize the Dongjiang Water.

4. Will the construction of the New Town impact on the water supply system of Hong Kong?

The water supply system of Hong

¹³ Accessed on 28 July 2017 at <http://www.wsd.gov.hk/en/core-businesses/major-infrastructure-projects/tko-desalination-plant/index.html>

¹⁴ See note 6. Supra.

Kong is very well developed in terms of the delivery and distribution. Due to its location, the Plover Cove Reservoir has a central role in the overall supply system, with 2 huge pumping stations and a network of tunnels for distributing the Dongjiang Water to other reservoirs, including the High Island Reservoir. As the New Town plans to retain 600 hectares of the water area of Plover Cove Reservoir, the above mentioned infrastructure will not be affected.

5. Water Desalination by Reverse Osmosis (**Figure 1**)

The development of the New Town will not lead to importing more Dongjiang Water. The New Town, aiming to house 10% of the population, will implement various environmental friendly measures, such as large-scale tree planting, grey water recycling, rainwater harvesting, etc. This will result in reducing the overall water consumption of Hong Kong as well as lowering the import of the Dongjiang Water. In addition to the desalination plant in Tseung Kwan O, the development of the Plover Cove New Town are as mentioned accompanied by the construction of 2 more desalination plants, bringing the total annual production of fresh water to 300 million m³ by these plants. The supply of water can then be diversified across three sources: Dongjiang Water (45%),

desalination (30%) and rainwater (25%), which is a better strategy for long-term risk control. According to the Water Resources Group of World Economic Forum, by 2030, the Pearl River Basin will face a shortfall of 23% in water supply, or a shortage of 28 billion m³.¹⁵ As a coastal city, Hong Kong has obvious geographical advantages to develop desalination. As a part of the global village, Hong Kong should bear the carbon emission burden, instead of pushing this to the inland cities of the Guangdong Province.

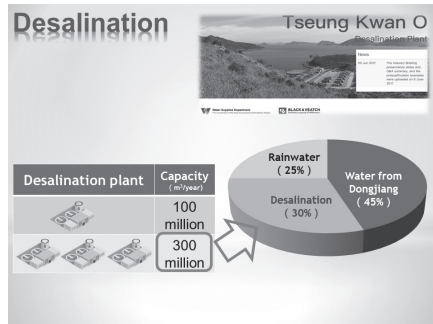


Figure 1: Water Desalination by Reverse Osmosis

6. Is the project compatible with the Government’s Total Water Management Strategy? (**Figure 2**)

The Total Water Management Strategy of the Water Supplies Department has the following description, “increasing risk

¹⁵ Accessed on 1 May 2017 at www3.weforum.org/docs/WEF/WRG_Background_Impact_and_Way_Forward.pdf.

of drought events and larger variability in year-to-year rainfall due to climate change which would affect the yield both locally and in the basin of Dongjiang (DJ), and competition for DJ water resources among other major cities in Guangdong, including Huizhou, Dongguan and Shenzhen, serving altogether 40 million people. One of the key supply management initiatives is to diversify the water supply resources to develop new water resources.

Under the Total Water Management strategy, therefore, Hong Kong should broaden its strategic investment in advanced water treatment such as the reverse osmosis (RO) technology for desalination plant, not affected by climate change. The project will provide the first stage of the proposed seawater desalination plant using reverse osmosis at Tseung Kwan O (TKO) Area 137. The plant will have a water production capacity up to 270,000 m³ per day or 98,550,000 m³ per year. The Water Supplies Department (WSD) awarded on 16 November 2015 a consultancy agreement worth \$180 million to Black & Veatch Hong Kong Limited for the investigation review, design and construction of the first stage of the proposed desalination plant at Tseung Kwan O with capacity of

*135,000 cubic metres per day.*¹⁶

The Project aims to enhance water supply resources via desalination and implement large scale grey water recycling/rainwater harvesting; therefore it is fully compatible with the Total Water Management Strategy.

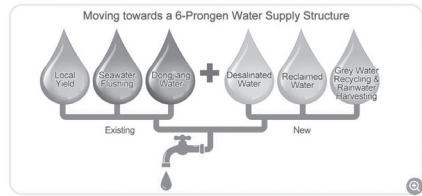


Figure 2: Moving towards a 6-Pronged Water Supply Structure¹⁷

7. Will the construction of the New Town impact on the overflow of reservoirs?

Overflows mainly occur in small to medium impounding reservoirs, which were built between the end of the 19th century and the middle of the 20th century. As these reservoirs were designed to meet the water needs then, they featured relatively small storage capacities and are prone to overflow in times of persistently heavy rainstorms in the rainy season. As there is no Inter-Reservoirs Transfer Scheme

¹⁶ Accessed on 28 July 2017 at <http://www.wsd.gov.hk/en/core-businesses/total-water-management-strategy/index.html>

¹⁷ Accessed on 28 July 2017 at <http://www.wsd.gov.hk/en/home/climate-change/adapting/index.html>

in between Plover Cove Reservoir and these small to medium impounding reservoirs, the Plover Cove Reservoir scheme proposed has no impact on the overflow of reservoirs.

8. Will the construction of the New Town impact on the beautiful Plover Cove environment? (**Figures 3, 4 & 5**)

The plan intends to retain HALF the surface area or 600 hectares for open space and water area. The circumference of the new town will be lined with a 30-meter wide green buffer zone, providing a 20-kilometer cycling and jogging trail that completely encircles the town.

The main dam and all the recreational facilities along the Bride's Pool Road will remain unchanged. The development on the 600 hectares group of artificial islands will assume a plot ratio 4 and 3:1 ratio for residential/non-residential area.

To take advantage of the 20m depth of the Plover Cove Reservoir, basement to a depth of 3 storeys can be built to house non-residential facilities such as public amenities, research centres, university campus, hospitals, shopping malls, mass transport, freight lanes, car parks, sewage treatment plants, refuse collection points, building services

machine rooms, district cooling system, etc.

Assuming residential and commercial buildings have 20 storeys on average, site coverage would be less than 20% of the reclaimed area. As all car lanes and transport can be accommodated underground, the aboveground area will be pedestrian zone, surrounded by parks, lake and green belt. This green and eco city will greatly enhance the recreational facilities in the area.

While the Reservoir is located within the Plover Cove Country Park, only about 1/3 of its area along the lake side can be accessed via the road on top of the main dam and the Bride's Pool Road.

There is no human activity on the remaining water surface.

In fact, the New Town, with 800,000 population, can come with eco-friendly design. For example, a buffer zone can be retained along the lake side and water canals can run through the whole area. The central park can be as big as 25 hectares, comparable to the scale of the Victoria Park. The buffer zone can provide a jogging and cycling track of more than 20km. This Project can actually provide much more leisure space than the present, in terms of quantity and quality.

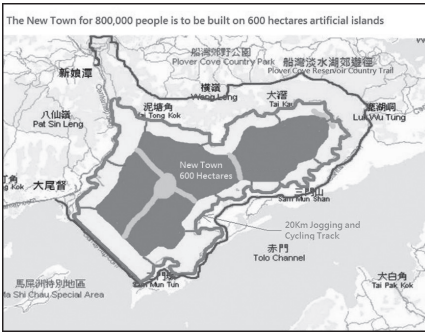


Figure 3: Conceptual Master Plan of Plover Cove New Town

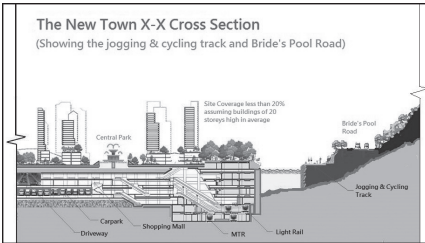


Figure 4: Cross Section of the Plover Cove New Town



Figure 5: Perspective of the Plover Cove New Town

The Plover Cove Reservoir was built 50 years ago for the benefit of the population. After 50 years, it can contribute to the society again by releasing valuable land resource to provide homes for 300,000 families or 800,000 people in Hong Kong.

TRANSPORTATION

Transportation is essential to support this smart new town, which is expected to provide housing for 800,000 people. During the initial phase, a rail and a highway can be built connecting Plover Cove New Town with Wu Kai Sha, Ma On Shan, via a tunnel across the Tolo Channel.

Enhanced Rail System (Figure 6)

Following the population growth, the railway can extend northwards to Sha Tau Kok, adding an additional land crossing to China by train. Or, it can simply extend to the west connecting Lok Ma Chau Spur Line, to provide rail service for the new development at Queen's Hill and Fanling North New Development Areas and for cross-border passengers via Lok Ma Chau and Lo Wu.

To ease the burden of the East Rail Line, this new north-south rail route has the potential to link up Ma On Shan with Tseung Kwan O, via Sai Kung and Hong Kong University of Science and Technology. As a result, passengers on the island side will be able to take the MTR to Mainland China via North

Point, Tseung Kwan O, HKUST, Sai Kung, Ma On Shan, Plover Cove New Town, Queen’s Hill, Fanling North and Sheng Shui as shown on **Figure 6**.

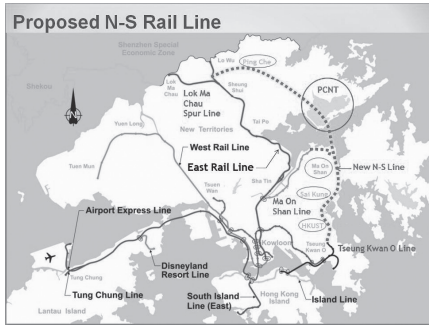


Figure 6: Hong Kong Railway Network

Highways

From the Plover Cove New Town, the highway can extend to the northwest via Kwai Tau Leng to Tan Chuk Hang, then link up the new highway of Liantang/Heung Yuen Wai Boundary Control Point. This will complete a new north-south route as shown on **Figure 7**.

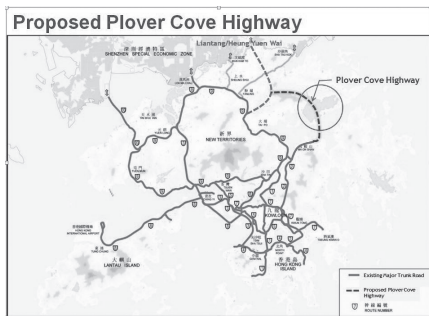


Figure 7: Hong Kong Road Network

IMPACT ON THE ECOLOGICAL ENVIRONMENT

“Reservoirs in Hong Kong are man-made water bodies, usually enclosed by dams in valleys or sea inlets – and fed by water from the surrounding hill streams and catchwaters, and also by water piped in from mainland China. They provide various types of aquatic habitat, ranging from shallow and bushy marginal zones, to deep and open water, which cater to the needs of various freshwater fish, including some rare species. For example, Kowloon Reception Reservoir harbours 19 species, including rare ones like *Rhodeus ocellatus*, *Rasborinus formosae* and *Rasborinus lineatus*, while Hok Tau Reservoir supports the locally rare *Mastacembelus armatus* and *Oryzias curvinotus*.”¹⁸ AFCD did not mention a unique rare species found in the Plover Cove Reservoir.

The Reservoir itself is not a natural ecology or a unique eco-system. Most species can be found in other ponds and reservoirs. Moreover, the water inflow from Dongjiang has imported the golden mussel, an invasive species,¹⁹ causing harm to the pipes. Therefore the foreseeable impact on the ecological environment should be minor compared to reclaiming land from the sea, which has a far richer marine ecology.

¹⁸ Accessed on 28 July 2017 at <http://www.afcd.gov.hk/english/conservation/hkbiodiversity/speciesgroup/speciesgroup.html>

¹⁹ Xu (2015) *Limnoperna Fortunei*. Invading Nature - Springer Series in Invasion Ecology.

CONCLUSION

The Plover Cove New Town can provide an option as a readily available abundant land reserve for Hong Kong. Compared to other proposals, it has large development scale (equivalent to the total area of all brownfield sites) and highly accommodative. It can provide sufficient capital for developing a resident area with eco-design, smart technology and leisure space. Moreover, it will not involve any issue of land resumption, clearance and compensation. Upon adjusting the water supply system, the Government can immediately start the project, with full control of the development pace.

The author urges the Government to be committed to this Project, which can bring about abundant land reserve to Hong Kong, hence stabilizing the land price and property price in the long term. The Plover Cove New Town, the comfort home for 800,000 people, should be implemented without delay.

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A Note on Coase and the Lighthouse as a Samuelson Public Good

Lawrence W C Lai

ABSTRACT

This presentation shows that some basic knowledge of maritime history is useful in dispelling the fogs generated by the differences in economic understanding between Nobel Laureates Paul Samuelson and Ronald Coase and their followers about the lighthouse as a maritime facility.

THREE TYPES OF PUBLIC GOODS

Three types of public goods have been identified by economists. They are not free goods as they are costly to produce and manage but:

- (A) Their consumption is non-exclusive;
- (B) The costs of enforcing payment are prohibitively high; and
- (C) The marginal cost of serving an extra consumer is zero.

Each of the three types of public goods has problems that may call for state intervention: 1) to “rob” the general taxpayer, whether or not he or she uses the good; and 2) to provide the good at the government’s expense and distributing it free or at an arbitrary price(s) to all consumers of the good.

The aggregate demand for a non-exclusive consumption public good (Type A) is obtained through a vertical, rather than a horizontal, summation of individual MV curves. This means that the provider must charge different individuals different prices to make sure that each MV equals MC. The practical difficulties of administering a great multitude of prices (especially when consumers conceal their preferences – as in the case of national defence – in the hope others will pay for them) are reasons for the state to intervene.

For a Type B public good, the revenue collected cannot cover the costs of

administering payment collection because of the serious problem of free riding (fee evasion). No private firm has any incentive to supply this type of good. Again, this calls for state intervention.

The zero marginal cost public good (Type C, like a tunnel) is often exclusively consumed and can be easily provided by a profit-maximizing firm, but it should not charge any price other than zero to follow the efficiency rule of $MV = MC$. Again, the state is called in to provide this type of good.

THE LIGHTHOUSE AS A PUBLIC GOOD

In his famous textbook *Economics*, Nobel laureate, Paul Samuelson explained to many generations of students that the lighthouse is a public good, which can only be provided by the state using tax payer money. Samuelson’s argument has two legs: free riding and zero marginal cost.

The archival research by **Coase (1974)**, later Nobel laureate, showed that a private lighthouse industry existed in England and Wales as early as the 16th Century, and hence, the lighthouse was definitely not a public good as free riding was avoided by having Crown agents collecting light dues. This answered the first leg of Samuelson’s argument.

Yet, Coase did not refute the second leg of Samuelson’s argument in support

of the state provision of a lighthouse (i.e., that it is a zero MC service) in serving an extra ship. This is strange as Coase actually quoted both legs in his 1974 work, as pointed out by **Lai, Davies and Lorne (2008)**, who also stressed that it is easy for Coase's ideas to overturn this surviving argument of Samuelson.

However, neither Samuelson nor Coase appeared to have taken into account that ships all over the world pay light dues when they leave port. Neither did they, nor subsequent economic studies on Coase's views on the lighthouse, appear to appreciate the fact that light dues have been levied mostly according to the tonnage of ships. This fact, explained below is crucial to address this question: Is the lighthouse a zero MC good or service?

Upon closer analysis, the financial problem (to meet the efficiency requirement of charging zero price so that all consumers are served) for a private firm that is tasked with providing a good or service the serving of an extra unit of which to consumer is zero MC (which calls for the production of an amount to serve all consumers irrespective of their MV) is real only if the firm charges a uniform price; it would be solved if the firm resorted to multiple pricing. That actually happens in the case of lighthouses. Light dues were levied by private light merchants in England and Wales not on a per ship basis, but on a per ton (the carrying capacity of a ship) basis. If Coase had

recognized this, then it would have been easy for him to borrow from his own arsenal of ideas to come up with an explanation that Samuelson's zero MC thesis was ahistorical.

KNOWLEDGE AND THEORY

What lessons may be drawn about the economic studies on the lighthouse generated by Coase? One important lesson is simple truism: there is a need to consult experts in the relevant field of studies when theorizing on a subject matter in that field. This may demand much patient learning. A lighthouse may be regarded as a real estate artifact, being "fixed to land", or a heritage object. However, it was primarily a major instrument of shipping. Neither Samuelson nor Coase is a sailor. Coase gained knowledge about exclusive rights to make profits out of lighthouses and ways of collecting light dues by examining archival materials on lighthouse charters. However, he did not have the benefit of advice by a maritime historian.

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