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How do appraisers absorb market information in property valuation?

Some experimental evidence

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Abstract

Purpose – Despite its popularity in practice, sales comparison is constantly criticized as subjective and even relegated to the least recommended method by some scholars. This paper aims to examine the validity of the above statement.

Design/methodology/approach – A number of statistical techniques have been proposed to improve the objectivity of the sales comparison approach. In contrast, property valuation can also be seen as an exercise of human problem solving with respect to market information. As a result, the approach of a controlled experiment is employed.

Findings – First, experienced appraisers tend to adopt an appraisal process that significantly differs from that specified in legal standards. Second, appraisers have developed a specific-to-general information inquiry path. Third, appraisers are likely to stop examining additional sales evidence early when the appraised subject is a typical product. Fourth, appraisers have a tendency to weigh the comparables that come to their attention earlier more heavily than those that come later. Finally, despite the different strategies of information absorption, value variations among appraisers are consistent between different residential properties. The evidence, taken together, strongly suggests that professional appraisers have developed some heuristics or short-cuts in digesting information relevant to appraisal.

Originality/value – This study is one of the very few that examine appraisers' decision making in Taiwan.

Keywords Sales comparison approach, Behavioural perspective, Property valuation, Market information, Experimental design, Property, Taiwan, Asset valuation, Property marketing

Paper type Research paper

The sales comparison approach to value has long been seen as one of the three primary approaches to value in real estate appraisal literature. Appraisal Institute (2001, p. 63) defines the sales comparison approach as:

> A set of procedures in which a value indication is derived by comparing the property being appraised to similar properties that have been sold recently, applying appropriate units of comparison, and making adjustments to the sale prices of the comparables based on the elements of comparison [. . .].

Lusht (2001, p. 115) states that this approach is rooted in two simple but powerful principles; market value is what the market says something is worth, and identical products should have identical prices. Though the principles are simple, substantial judgment is required in applying this approach. Brueggeman and Fisher (2001), among others, therefore suggest that the sales comparison approach is a subjective process and serious errors can result if justifiable adjustments are absent in selecting comparables, valuing attributes and weighting adjusted prices.

The sales comparison approach: statistical exercise or information processing

In order to "elevate" the sales comparison approach to become more scientific or objective, a variety of statistical methods have been developed. It is hoped through them to lessen the subjectivity of this approach. Regression analysis grounded on hedonic price theory was applied to price those attributes that are believed to affect property value. The implicit prices of individual attributes are added up to derive the expected value of a subject property. A total of nearly 200 pieces of empirical studies on property value using regression modelling are cited in a recent review article (Sirmans *et al.*, 2005). Regression analysis is now commonly taught in higher education, and it has become a standard tool in academic research to determine attribute values and the final value indication. Regression analysis has also been increasingly accepted as a scientific method in valuation disputes in the court (Colwell *et al.*, 2009).

Regression analysis, despite its popularity, is criticized for the lack of explicit consideration of comparables selection and assignment of value weights. Colwell *et al.* (1983) argues for the superiority of the grid-adjustment method over the regression model. Kang and Richert (1991) compare the accuracy of regression and grid-adjustment models in predicting property prices. The empirical study on Chicago suburban areas concludes that the grid-adjustment model overall slightly outperforms the regression model, particularly when the market is in equilibrium and neighbourhood characteristics are homogeneous. Isakson (1986) criticizes that grid-adjustment is not entirely objective in that empirical experience is needed to determine the weighting of adjusted prices. The nearest neighbour method is consequently proposed. Mahalanobis distances are used to measure the similarity (nearness) between the subject property and the potential comparables, and also to decide on weights for adjusted prices of comparables. Isakson's empirical study on Washington confirms the better performance of the nearest neighbour method over grid-adjustment so far as prediction errors of the subject price are concerned. Isakson is convinced that any number of appraisers who apply the technology he developed to the same property at the same point in time will get the exact same estimate of value. The "nearest neighbour" method was recently (Lin and Liao, 2010) applied to valuing condominiums on the outskirts of Taipei City, Taiwan. This approach also yielded favourable results.

The efforts put into improving the scientific nature of the sales comparison approach have to an extent succeeded. However, these studies largely focus on the technical improvements in the context of sufficient sales data. This is definitely not the situation an appraiser typically faces in everyday life. Constraints of time and lack of satisfactory comparables are more of the reality for appraisers. After all, few appraisers possess a large set of sales data and sophisticated knowledge in statistics.

Alongside the development of statistical modelling, another strand of research takes a behavioural perspective. Diaz (2002) provides an excellent overview of four major themes of behavioural research into real estate appraisal: overall methods of valuation, comparable sales selection, biases and heuristics, and feedback and client influences. A well-constructed argument is posited at the outset; that is, before valuation improvement can be engineered, valuation behaviour must be understood. Along this line of behavioural research, Diaz (1990a) finds that experienced appraisers tend to adopt a specific-to-general data selection strategy for the subject property in residential valuation. The appraisers frequently seek site and improvement information but resort to neighbourhood or regional information only if the former are deemed insufficient. Appraisers' practices deviate from the general-to-specific procedure depicted in the professional standards. Apparently, appraisers, through their experience, have developed a shortcut or heuristic that varies from the normative model they are taught to follow. Diaz (1990b) further compares novice and expert appraisers in their selection of comparable sales for a residential valuation assignment. It is noted that novice appraisers examine more sales evidence (3.58 sales) than expert appraisers (2.96 sales). In addition, novices are reluctant to make final selection judgment until all sales evidence is examined. Experts instead employ a multiple stage selection strategy; they identify one or two best comparable sales at an early stage, and compare the best sales to the remaining candidates. This multiple stage strategy substantially shortens the comparison process and is also less cognitively demanding. This seemingly superior shortcut is however cautioned by Diaz in that it might overlook relevant comparable sales and thus contribute to systematic biases. Both Diaz's studies design an experiment in which to observe how appraisers behave when appraising residential properties. Wolverton (1996) provides another piece of experimental evidence. It is noted that the knowledge of a pending sale or listing price for the subject property affects appraisers' selection of comparable sales.

Appraiser (valuer) behaviour in different countries, with differing legal and professional standards, is also compared in an effort to examine the generalization of theoretical predictions. Gallimore and Wolverton (1997) extend Wolverton's (1996) work to make comparisons between US appraisers and UK valuers working in different legal and cultural settings. It is concluded that the impact of external price information on UK valuers' sale selection is weaker and final value estimate stronger as compared to their US counterparts. Despite the discrepancy in professional education, licensing requirements and others, the authors are convinced that the differing influences on appraisers and valuers can be largely accounted for by their contrasting task environments. Data availability and reporting requirements seem to have affected the appraisal process. In contrast to appraisers, valuers often work with poor sales data and thus have to make large value adjustments. Diaz *et al.* (2002, 2004) further study the valuation behaviour in the US, the UK, and New Zealand (NZ). Among these countries, prescribed valuation processes in the US and NZ are more rigid than in the UK. Their studies find that appraisers in all countries did not follow the US normative process. All appraisers appear to regard valuation as a cognitively demanding process; thus, they departed from prescribed processes in pursuit of efficiency to save time. It was noted that US and UK appraisers behave differently from one another; however, US appraisers exhibit similar behaviours to their NZ counterparts. Furthermore, US and NZ appraisers employ a serial process, while UK

appraisers adopt an iterative process. The authors suggest that the stricter and more elaborate reporting requirements of the US and NZ, compared with those of the UK, may account for the behavioural differences. One of the few cross-country behavioural studies of Asian areas was undertaken by Chen and Yu (2009). They study the effect of client influence in Taiwan and Singapore. Such influence was found to exist in both countries. However, the primary contributing factor was not attributable to indicative valuations, as found in previous studies. The lack of transparent market information is held responsible for client influence, and it is particularly prevalent in Taiwan.

We fully agree with Diaz's assertion – that a better understanding of appraisers' behaviour is a prerequisite for improving appraisal quality. Taiwan's real estate market has long been criticised for its lack of transparency. Price information is difficult to obtain and verify. Consequently, based on the behavioural theories reviewed above, appraisers will strive to develop a cognitively efficient valuation process, particularly following the institutionalization of the appraisal profession in the year 2000. Exploration of appraisers' behaviour in Taiwan will therefore put the behavioural theories to another empirical test in a country where the appraisal profession is at a critical stage of development.

The experimental setting

The beginning of the Taiwanese real estate appraisal service, which primarily dealt with commercial business, can be traced back to at least the late 1950s. Real estate appraisal was later listed for the first time in 1996 among the service sectors recognised by the Ministry of Economic Affairs (Chen, 2008). However, until 2000 when the new Real Estate Appraiser Act was promulgated, appraisals were only subject to a prior registration with the Ministry of Economic Affairs. Following the qualification requirement set out by the Real Estate Appraiser Act, the National Practical Standards of Real Estate Appraisal was initiated in 2001. As a result, after 2000, a national examination must be successfully passed in order to become a certificated real estate appraiser. In addition, the practice of a certified appraiser must comply with the National Practical Standards.

The National Practical Standards detail valuation concepts and specify steps appraisers shall follow. For example, Article 18 of the National Practical Standards says:

> The sales comparison approach is a method which, based on the prices of the comparable properties, is through comparison, analysis, adjustment and other means to estimate the value of the subject property.

Moreover, Article 21 of the National Practical Standards states:

> The procedure of sales comparison approach are as follows: 1. Collecting and verifying data related to the comparable properties. 2. Selecting the comparable properties with same or similar characteristics to those of the subject property. 3. Undertaking condition adjustments and date adjustments to the values of the comparable properties. 4. Deciding to employ percentage or dollar adjustments after comparing and analysing the differences in local and individual factors between the comparable properties and the subject property. 5. Calculating the indicated value of the subject property. 6. Determining the sales comparison value of the subject property.

There are ten articles relating to the sales comparison approach alone. The principles and steps of the sales comparison approach in Taiwan are no different from those depicted in professional standards of other countries. Taiwan's National Practical Standards is, however, a piece of legislation that all practicing real estate appraisers must obey. As a result, compliance with the National Practical Standards is essential and legal penalties may be levied if they are violated. In order to understand how the National Practical Standards are implemented in practice, an experimental-type research approach is undertaken.

This experimental design largely follows that proposed in Diaz (1990b) but necessary adaptations are made to account for the institutional differences between the US and Taiwan. The hypothetical assignment is the appraisal of residential properties for a bank mortgage loan. This type of appraisal assignment is the most common one for appraisers in Taiwan, and every appraiser has sufficient experience. Two kinds of residential properties are assigned to be the subjects; a unit in high-rise condominium and a single-family house. High-rise condominiums make up the larger share of the housing stock in Taiwan, and the single-family houses the smaller share. The majority of Taipei residents live in high-rise condominiums in response to high land prices. In consequence, appraisers are expected to have more experience in appraising condominiums than houses. We intend to examine through appraisal experiments whether the appraisers' actual behaviour in appraising residential properties deviates from the prescriptive procedures in Standards, and whether they behave differently when appraising a typical product (a condominium) than an atypical product (a house). Appraisers' behaviour will be illustrated and explained, and its implication discussed. Our particular interest is in regards to the way in which market information flows into appraisal practices.

Wen-Sun district, a suburban residential area of Taipei City in Taiwan was chosen for this study. Taipei is among the most crowded cities worldwide, with 9,650 residents per square mile and an average living area of 31.67 square metres per person (Taipei City Government, 2010). The city's housing prices are also considered high by international standards. The ratio of the median housing price to the median yearly income has been on the rise from 5.5 in the early 1970s up to 9.06 in 2010 (Chen *et al.*, 2007; Construction and Planning Agency, Ministry of the Interior, 2010).

A total of 24 expert appraisers participated in experiments that took place during March and April 2005 in their offices. One condominium unit and one single-family house were chosen as subject properties. A total of 12 condominium units and 12 single-family houses served as potential comparable sales. Details of the subject properties and comparables are respectively supplied from property owners and the department of land administration, Taipei City government. The land administration department constantly collects information on property sales for the purposes of property tax assessment and expropriation compensation. These sales data are screened by government assessors after collection. In addition, all sales data are examined by two senior professional appraisers to ascertain their credibility. Information for those comparable properties included all items that appraisers often assembled for their appraisal practice; such as postal address, land size, floor areas, date and price of the previous sale, material and age of structure, trend of population and property price level in local areas, land use control applied, photos of properties, and other information.

A total of 12 experimental participants were asked to examine the condominium subject first, followed by the house subject, and the remaining 12 examined the properties in the reverse order. A total of 12 comparables were randomly assigned into four groups, each with three comparables. Prior to the start of the experiment, a list with all information items we prepared was given to the participants. The participants could ask for those items one at a time but without any limit on the amount of required items and time spent. They could look into all information items if they wished to do so. In addition, the appraisers were allowed to inspect as many comparables as they wished up to twelve. The standards require appraisers to include at least three comparables in the report when the sales comparison approach is employed. A total of 12 comparables are far more than sufficient to meet this requirement. A new group of three comparables were supplied if the appraisers asked for more. They could stop examining comparables any time and move on to estimating value.

Figure 1 shows those articles in respect to appraisal procedures depicted in Taiwan's Practical Standards of Real Estate Appraisal (Department of Land Administration, 2006). All appraisal practices are required to comply with this legislation. In other words, those articles constitute the normative or prescriptive appraisal process.

We summarize the required steps and their order with respect to the prescriptive appraisal process and convert them into the normative selection sequence (Table I) similar to that in Diaz (1990b). Diaz argues that the solution process of a real estate appraisal can be represented by the transition concept. This normative selection sequence prescribes the solution path that ought to be taken in an appraisal assignment. The steps of this prescribed solution are divided into seven categories that can be numbered sequentially. Steps within each category can be taken in various orders, nevertheless, all steps in a category should be exhausted before moving on to the next category. Movement between steps within a category constitutes no transition and is given a value of zero. A move from one step within a category to a step within another category constitutes transition. A value is assigned to this transition by subtracting from the current step number the previous step number. If the normative selection sequence is followed, all transitions are expected to be given a value of either 0 or 1. If the normative selection sequence is violated, some of the transition values will be those other than 0 or 1. Distribution of the proportion of transition values for the normative model and experimental subjects' actual solution process can be respectively established. Comparison of distributions of transition values consequently reveals the presence or absence of violation of normative (standards-specified) process. Kolmogorov-Smirnov (K-S) goodness-of-fit tests (Sprent and Smeeton, 2001) are employed here. The K-S one-sample test compares the ideal (standards-specified) cumulative distribution of transition values with real (experimental subjects') distribution. The K-S two-sample test compares the cumulative distributions of transition values when the appraised subjects are condominium unit and house.

Prescriptive versus actual appraisal process

Figure 2 represents the expected distribution of transition values for a prescriptive appraisal process. Figures 3 and 4 display the distributions of transition values for the subject condominium unit and subject house respectively. We further draw the three cumulative distributions against each other in Figure 5 to facilitate comparison.

The K-S one-sample test suggests that the appraisal process taken by the appraisers for valuing the subject condominium unit strays from the prescribed process. The

Article 8 The real estate appraisal procedures are as follows:				
1	**Identification of basic appraisal matters**		**Article 9** Basic appraisal matters identified are as follows:	
	Step1	1A The subject property	1. Contents of the subject property.	
		1B Property rights		
		1C Date of value opinion	2. Date of value opinion.	
		1D Type of value and its conditions	3. Type of value and its conditions.	
		1E Purpose of appraisal	4. Purpose of appraisal.	
2	**Drafting an appraisal plan**			
3	**Collecting data**		**Article 11** Data which should be collected for real estate appraisal are as follows:	**Article 13** The following matters should be investigated on-site to verify conditions of the subject property:
4	**Verification of the conditions of the subject property**			
	Step2	Regional and city data	1. Basic data of location description, right, legal use and zoning, etc. in respect to the subject property.	1. Verification of the basic data and legal status of the subject property.
	Step3	Neighbourhood data		2. Investigation of current use conditions of the subject property and comparable properties.
	Step4	4A Description of subject site	2. General factors, local factors, and individual factors, which affect the value of subject property.	
		4B Description of subject improvements		
		4C Subject taxes		3. Verification of individual data affecting property value.
		4D Legal use and zoning		
	Step5	Transactions (Comparable Sales)	3. Transactions, revenue, and cost data relevant to the subject property.	4. Taking records and photographing necessary pictures.

Figure 1.
Normative procedures specified in practical standards of real estate appraisal

(*Continued*)

5	Compiling, comparing and analyzing data	Article 21 The procedure of the sales comparison approach is as follows:
6	Appraising the subject property by applying appraisal approaches	1. Collecting and verifying data related to the comparable properties.
Step6	Sales comparison approach	2. Selecting the comparable properties with same or similar characteristics to those of the subject property. 3. Undertaking condition adjustments and date adjustments to the prices of the comparable properties. 4. Deciding to employ percentage or dollar adjustments after comparing and analysing the differences in local and individual factors between the comparable properties and the subject property. 5. Calculating the indicated value of the subject property. 6. Determining the sales comparison value of the subject property. The indicated value, stated in Subparagraph 5 of the previous paragraph, refers to the value reached after condition adjustments, date adjustments, local factor adjustments and individual factor adjustments to the prices of the comparable properties.
7	Reconciliation of the value of the subject property	
Step7	Reconciliation	
8	Writing up the appraisal report	

Figure 1.

absolute value of $F_c(X)$ less $F_p(X)$ is $0.381 > D_{312,0.01} = 0.092$; p-value < 0.01. The same finding applies to the case of single-family house where the absolute value of $F_h(X)$ less $F_p(X)$ is $0.356 > D_{312,0.01} = 0.092$; p-value < 0.01. Appraisers tend not to comply with the prescribed process no matter whether the subject property is a common or less common product. In contrast, the K-S two-sample test indicates that the processes appraisers employed in valuing the condominium unit and house do not significantly differ from each other. The absolute value of $F_c(X)$ less $F_h(X)$ is $0.038 < D_{312,0..20} = 0.061$, with p-value > 0.20. Appraisers seem to have developed their own appraisal process that deviates from the prescribed one, and this process applies to both typical and atypical residential properties. The empirical findings correspond to that reported in Diaz (1990b).

Category	Transition	Step	Step description
1	–	1A	Identification of the subject
	0	1B	Identification of property rights
	0	1C	Date of appraisal
	0	1D	Purpose of appraisal
	0	1E	Definition of value
2	+1		Regional and city data
3	+1		Neighbourhood data
4	+1	4A	Description of subject site
	0	4B	Description of subject improvements
	0	4C	Taxes
	0	4D	Legal use and zoning
5	+1		Comparable sales
6	+1		Sales comparison approach
7	+1		Reconciliation

Table I.
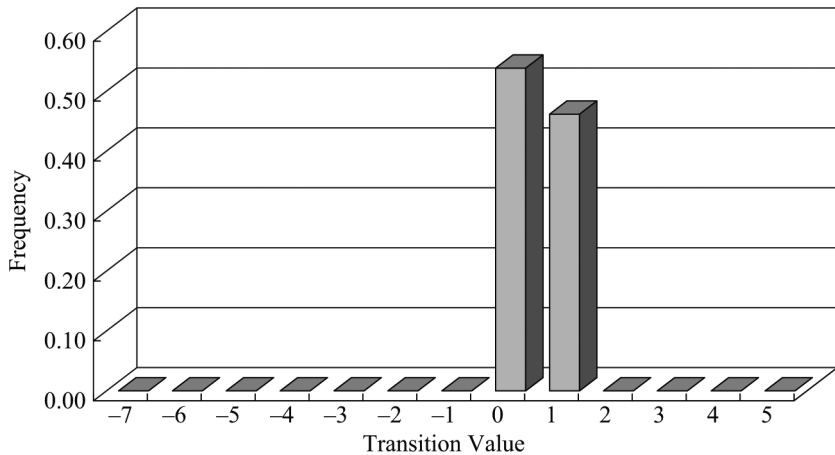Normative selection
sequence based on
practical standards

Figure 2.
Expected distribution of
transition values for the
normative model

The order and amount of information considered

Even though K-S tests uncover the divergence between the prescriptive and actual
appraisal processes, how the appraisers actually absorb the information and in what
order deserve more discussion. We therefore demonstrate the track of information
absorption. Italicised figures in Tables II and III highlight the perfect matches between
information category and steps taken based on the prescriptive model. For example,
information in category 1 shall be asked for by appraisers during the first five steps.
Numbers that fall outside of the boxes represent steps that are not properly or correctly
taken, either taken too early or too late. Table II indicates that some appraisers, in
appraising the condominium unit, have an inclination to postpone examining category
1 information. Some appraisers seem to believe that the basic nature of the appraisal
problem, such as property rights appraised, date and purpose of appraisal and value
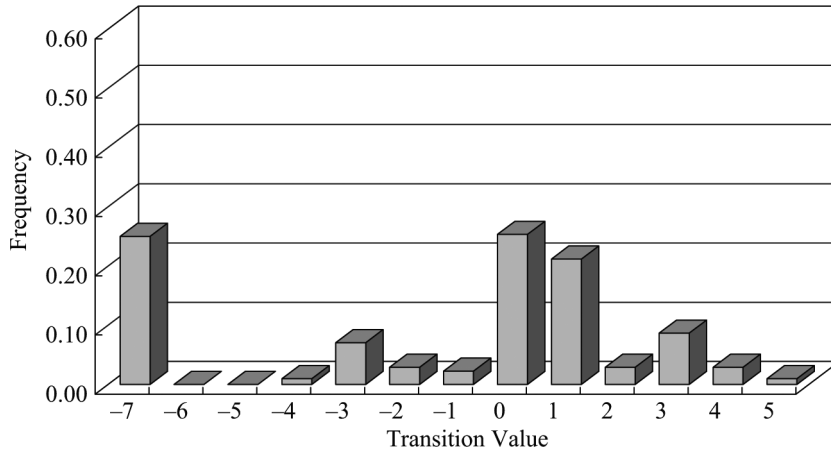
Figure 3.
Distribution of transition
values for condominium
unit
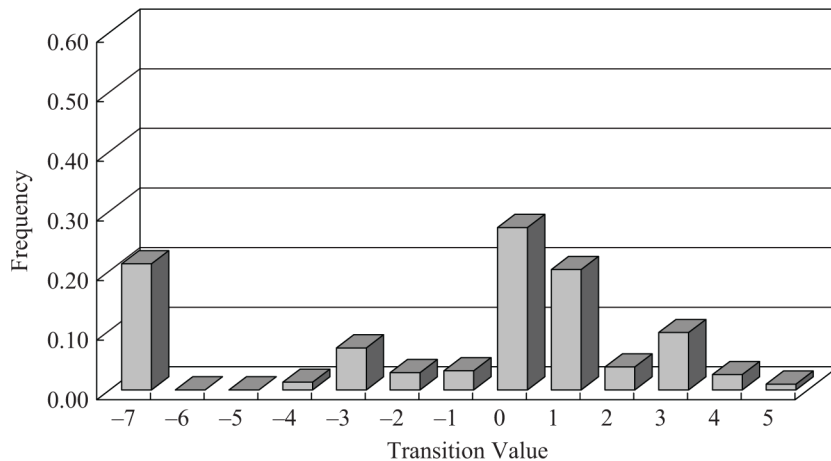
Figure 4.
Distribution of transition
values for single-family
house

definition, are not the first things to look at. The same situation happens to information in categories 2 and 3. Data regarding the region and city and neighbourhood are often left for inspection at a later stage. Compared to those, information in category 4 with respect to conditions of the subject site, subject improvements, tax and land use control are generally examined much earlier than the prescriptive model suggests. Overall, information in category 4 (specific conditions of a property) came into appraisers' attention much earlier than information in categories 2 and 3 (the broad market conditions).

A very similar pattern of information absorption is noted in appraising the single-family house. Information in category 4 (specific conditions of a property) were considered much earlier than information in categories 2 and 3 (the broad market conditions). Moreover, over half of the appraisers study the property's specific

Figure 5.
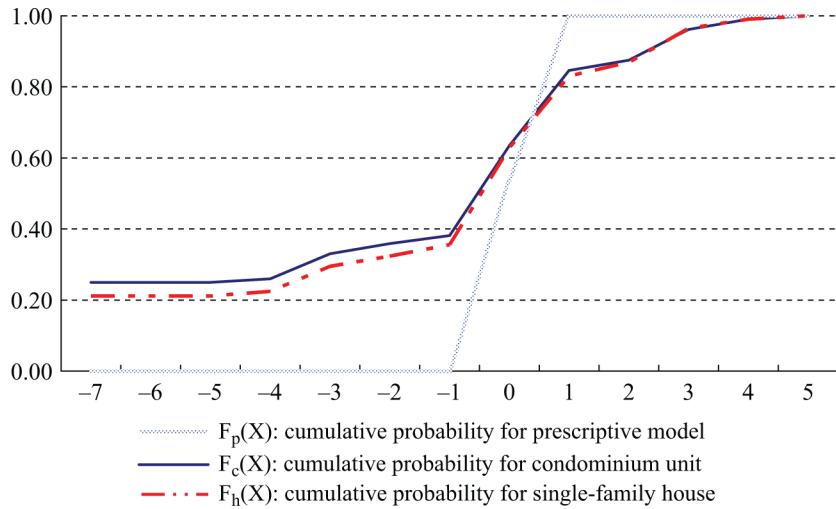Cumulative probability of transition values

					Category			
Step	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	6 (%)	7 (%)	Total (%)
Step1	*59*			41				100
Step2	*21*			71	8			100
Step3	*46*	4	4	38	4	4		100
Step4	*55*	4	4	29	4		4	100
Step5	*59*	4		25	4	4		96
Step6	46	*4*	4	25	4	8	4	95
Step7	38		*4*	20	17	4	8	91
Step8	25	13	4	*16*	8	13	4	83
Step9	17	21	8	*8*	4	8	13	79
Step10	8	4	17	*4*	17	8	8	66
Step11	4		8	*4*	21	13	8	58
Step12	4				*9*	25	13	50
Step13				4		*13*	21	38
Step14							*17*	17

Table II.
Actual path of information absorption in appraisal of a condominium unit

Note: Italicised figures highlight the perfect matches between information category and steps taken based on the prescriptive model

conditions in their first step. One possible explanation for this is the product difference between the condominium and the house. In Taiwan, units in a condominium are often fairly homogeneous and comparatively easy to price. In contrast, the configurations of site and structure, the ratio of floor space to site size and many other details for a single-family house affect its price substantially. In consequence, the appraisers are cautious about those specific price-affecting factors and examine them at an early stage.

	Category							
Step	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	6 (%)	7 (%)	Total (%)
Step1	*45*			55				100
Step2	*29*			71				100
Step3	*38*	4		50	8			100
Step4	*71*	8		17	4			100
Step5	*55*		17	24	4			100
Step6	42	*4*		33	13	8		100
Step7	38		*4*	24	13	13	8	100
Step8	34	13	8	*16*	4	4	13	92
Step9	13	17	8	*13*	12	13	4	81
Step10	21	8	13		8	13	13	76
Step11		4	13	*17*	13	8	8	63
Step12		4			*21*	16	13	55
Step13				4		*25*	13	42
Step14							*28*	28

Note: Italicised figures highlight the perfect matches between information category and steps taken based on the prescriptive model

Table III.
Actual path of information absorption in appraisal of a single-family house

The actual appraisal process recorded for both types of properties substantiates the findings of Diaz (1990b). The information that flows into appraisers follows the specific-to-general route instead of the general-to-specific one advised in legal standards.

In addition to the order in which a specific category of information is considered, how much of every individual data set is used also matters. As the patterns of information absorption for the condominium and the house are similar, we combine these two together for the following analysis. Table IV provides the frequency of individual data sets considered in the appraisal experiment. Except the data of comparable sales, the data sets considered most frequently are subject improvements, subject site and appraisal date. The data sets used most infrequently are tax, regional and city and neighbourhood statistics. The combination of appraisers' revealed preference for order and amount of information suggests that the general, non property-specific information is often regarded as supplementary to property-specific

Step	Step description	Percentage of individual step taken
1A	Identification of real estate to be appraised	81
1B	Identification of property rights	60
1C	Date of appraisal	90
1D	Purpose of appraisal	84
1E	Definition of value	65
2	Regional and city data	58
3	Neighbourhood data	58
4A	Description of subject site	92
4B	Description of subject improvements	100
4C	Taxes	38
4D	Legal use and zoning	77
5	Comparable sales	100

Table IV.
Frequency of individual steps used

information, and only if it is even considered. The tendency to ignore the broad market information might not lead to significant value errors, but indeed violates the legal standards.

All sales evidenced in the experiment are judged as qualified comparables to the subject property. In consequence, the number of comparables appraisers examined and later selected can reveal the amount of comparable information they believe they need prior to deciding on value. The number of condominium comparables inspected diminished from group A through D first gradually and finally at a larger rate (Table V). A total of 12 participating appraisers inspected all 12 comparables. In other words, half of them felt confident to determine the value without having examined all comparables they knew were available. Despite the fact that comparables supplied later were more likely to be ignored, the chance of being selected for those examined comparables was no different. The chance of being examined and selected for individual comparables is computed in the fourth column. Comparables in group A are much more likely than those in groups B, C and D to be selected for the final value determination.

As compared to condominiums, the number of house comparables inspected diminished much more gently from group A through D (Table VI). A far higher twenty-three appraisers examined three groups of comparables. More house comparables, as opposed to condominiums, were demanded by the same appraisers before moving on to value determination. Also, 18 appraisers examined all comparables compared to the figure of 12 for condominiums. Far fewer appraisers were confident to determine the value prior to receiving more comparable information. The aforementioned findings are likely accounted for by the comparative rarity of single-family houses in the Taipei market. An alternative explanation, which was pointed out by a reviewer, is that condominiums exhibit less product, and consequently, less price variation. Therefore, there is less ambiguity in the condominium market in contrast to the single-family house market. Less ambiguity leads the appraisers to maintain more confidence and require less information. Again, despite the fact that comparables supplied later were more likely to be ignored, the

Comparables	Examined	Selected	Chance of being selected (%)	Average chance of being selected for this group of comparables (%)
A1	24	20	83.3 (20/24)	56.9
A2	24	10	41.7	
A3	24	11	45.8	
B1	22	4	18.1	19.7
B2	22	1	4.6	
B3	22	8	36.4	
C1	18	4	22.2	24.1
C2	18	6	33.3	
C3	18	3	16.7	
D1	12	0	0	0
D2	12	0	0	
D3	12	0	0	

Table V.
Comparable condominium units examined and selected by appraisers

Notes: Number of appraisers who examined all comparables (12, 50 per cent); average number of comparables examined (8.4)

Comparables	Examined	Selected	Chance of being selected (%)	Average chance of being selected for this group of comparables (%)
A1	24	20	83.3 (20/24)	63.9
A2	24	14	58.3	
A3	24	12	50	
B1	23	14	60.9	26.1
B2	23	3	13.1	
B3	23	1	4.4	
C1	23	1	4.4	2.9
C2	23	0	0	
C3	23	1	4.4	
D1	18	1	5.6	7.4
D2	18	1	5.6	
D3	18	2	11.11	

Notes: Number of appraisers who examined all comparables (18, 75 per cent); average number of comparables examined (8.7)

Table VI.
Comparable single-family houses examined and selected by appraisers

chance of being selected for those examined comparables was no different. Comparables in groups A and B are much more likely than those in groups C and D to be selected for the final value determination. Evidence presented in Tables V and VI suggest that the appraisers tend to rely more on the information, no matter for a typical or atypical property, that is received earlier rather than later. This tendency might lead to ignorance of some critical information. In summary, the comparables that were examined and selected should be independent of their order of appearance, but the empirical evidence for condominiums and houses suggests otherwise.

Despite the different strategy of absorbing information for condominiums and houses, the value variations among appraisers for these two subjects are not much different. As far as the results (value variation) are concerned, appraisers performed fairly consistently between the two appraisal assignments (see Table VII). The ratios of standard deviation to average value (Eckert, 1990, pp. 171-2) are rather close.

Concluding remarks

In 2000 the practice of real estate appraisal in Taiwan became regulated by legal standards. It is intriguing, from both an academic and a practical perspective, to examine the real-world behaviour of appraisers since the implementation of the National Standards. The accumulated evidence from our experiments enables us to make the following observations. First, experienced appraisers tend to adopt an appraisal process that significantly differs from that specified in legal standards. Practices clearly deviate from the normative model. Nevertheless, the appraisers'

	Average value	Min. value	Max. value	SD	SD/average value (%)
Condominium unit	539.6	445.5	664	65.6	12.2
Single-family house	1,027.5	716.8	1,344.2	142.6	13.9

Note: In New Taiwan dollars

Table VII.
Value variations among appraisers (in 10,000)

appraisal processes for both condominiums and houses are consistent. These findings correspond with those reported in Diaz (1990b). Second, appraisers have developed a specific-to-general information inquiry path. Immediate attention is paid to the property-specific information, and the broader information for the city, region and neighbourhood only acts as supplemental at a later stage if needed. This specific-to-general process resembles that found in Diaz (1990a). This specific-to-general strategy is particularly evident in the valuation of a single-family house. Third, appraisers are likely to stop examining additional sales evidence early when the subject property is a typical product in the market. They feel confident in determining the final value, even knowing that more evidence is available. This observation implies the existence of over-confidence. Fourth, appraisers have a tendency to weigh the comparables heavier that come to their attention earlier than those that come later even though all the comparables are fairly alike. This observation was also, at the very least, anticipated by Diaz (1990a) and Gallimore (1994). Finally, despite the different strategies of information absorption, value variations among appraisers are consistent between valuing a condominium and a house.

Together with the present study, numerous pieces of empirical research in different countries provide evidence of the divergence between appraisers' behaviour and practical standards. However, this divergence does not necessarily imply an incorrect value conclusion. Colwell (1979), Evans (1995) and Kummerow (2000, 2002) have repeatedly pointed out, the market value of a property is an expected value, or a range of possible prices. That is to say, the sales price observed in the market is best seen as one of the many potential transaction prices. A certain degree of price dispersion for a property is expected. In contrast to the above perspective, the divergence between behaviour and standards might be a causal agent of the value dispersion, and consequently an inaccurate value conclusion. This line of reasoning leads us to the issue of professional negligence. Crosby (2000) concludes that the UK courts are generally willing to accept a reasonable margin of error (around 10 to 15 percent) on either side of a notional correct value.

The present study represents one of the few attempts in Taiwan to address the behavioural issues of appraisers. Overall, our Taiwanese findings correspond with those in other countries. However, it is unfortunate that we are not able to draw any definite comparative conclusions with previous studies in terms of geographical or cultural differences. After this study was undertaken in 2005, 104 Articles of the National Practical Standards were amended and 18 new Articles were added in 2006. In general, the National Standards have grown more and more sophisticated and intend to cover as many appraisal purposes as possible. There is no sign for this trend to be changed. That is to say, appraisers' behaviour will continue to be strictly regulated. In consequence, a promising next stage for research would be to investigate the causality between appraisers' behaviour and valuation results or accuracy. In addition, further rigorous cross-country comparisons that incorporate geographical and institutional factors are warranted.

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