

## THE IMPACTS OF TASK COMPLEXITY, OVERCONFIDENCE, CONFIRMATION BIAS, CUSTOMER INFLUENCE, AND ANCHORING ON VARIATIONS IN REAL ESTATE VALUATIONS

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**Abstract.** Real estate valuation relies on real estate appraisers' accurate assessments, which reflects the need to improve the objectivity of the valuation process. From the perspective of behavioral economics, appraisers are prone to numerous behavioral conflicts that could result in variations in their valuations. This study investigates the impacts of task complexity, overconfidence, confirmation bias, client influence, and anchoring on variations in real estate valuations. An online questionnaire was administered to 272 members of the Taiwan Real Estate Appraisers Association LINE group. Structural equation modeling was employed for analysis. A total of 150 valid responses were collected, yielding a valid response rate of 55.15%. The empirical results revealed that cognitive bias and client influence have significant and positive impacts on anchoring. Task complexity, overconfidence, and customer influence have significant and positive impacts on valuation variation. In addition to being the first study to explore the relationship between task complexity and valuation variation, this study also explored unconventional issues, such as the relationships between overconfidence, confirmation bias, and valuation variation. The results highlight the salience and value of behavioral economics-based analyses in empirical research on real estate valuation.

**Keywords:** task complexity, valuation variation, client influence, overconfidence, confirmation bias, anchoring.

### Introduction

Real estate valuation is a key part of decision-making processes in real estate investments, transactions, taxation, compensation for expropriation, loans from financial institutions, and securitization. Valuation relies on real estate appraisers (hereafter shortened to appraisers) to provide accurate value judgments (Chen, 2007). On the basis of the salience of valuation, Małkowska et al. (2019) suggested that the objectivity of the valuation process must be maintained, and valuation outcomes must accurately reflect the actual value of real estate properties. Kucharska-Stasiak et al. (2018) agreed that estimated values obtained through clear and objective approaches are key to ensure property safety, managerial rationality, and social fairness. Regarding the use of property safety, in Taiwan, it is the duty of appraisers to be an impartial third party grounded with objectivity and impartiality. Their actions are regulated by the law. Thus, their valuations must

be representative of the market, impartial, and secure. The RICS/IPD (2014) also pointed out that appraisers should act independently and objectively in their work to safeguard the citizens' properties.

Indeed, in the British real estate market, valuation data are often supervised jointly by the legislation and professional institutions. One of the most important professional supervisory institutions is the Royal Institution of Chartered Surveyors (RICS), as they have developed professional standards for real estate valuation (Crosby et al., 2018). In Taiwan, regulations recognize that valuation supervision is a joint effort between the government and the private sector. The government formulates the regulations on real estate valuation techniques while the Republic of China Real Estate Appraisers Association reports bulletins and provides guidelines on general provisions based on practical conditions (see Bulletin No. 10: Guidelines on the Valuation of Negotiated Land Price Prior to Land

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Expropriation, issued on October 15, 2021).<sup>1</sup> Regarding financial reporting standards, Taiwan adopts those delineated by the International Financial Reporting Standards (Taiwan-IFRSs)<sup>2</sup>, which are subject to review prior to release. The Taiwan-IFRSs serve as a reference for companies to create their financial reports. Regarding the sources of the valuations, the Taiwanese government in 2012 fully implemented an actual price registration scheme whereby the parties involved in a housing transaction (buying, selling, or renting) are legally required to register the actual price of the transaction on the system when they transfer or sign an agreement. The actual price registered on the system is deemed to have met market prices (thus excluding prices that are overly high or lower than market prices). Appraisers must not only register the actual price during their valuation, but they must also analyse the statistical data of the Ministry of Economic Affairs and Ministry of Finance. For non-arm's length transaction prices, the appraisers must perform comparative analyses by using the cost of construction and the housing transaction prices provided large construction companies such as Cathay Real Estate Development Co., Ltd. or large real estate broker companies such as Sinyi Housing.

Bellman (2018) mentioned that during the valuation process, appraisers must collect, analyze, and interpret vast amounts of market value-related information. In this regard, real estate valuation can be viewed as a decision-making process. Mohammad et al. (2018) argued that valuation is more of an art than a science because in scientific terms, no two appraisers are able to acquire the same estimate for the same target. Real estate is marked by costliness, high heterogeneity, lack of market information transparency, and information asymmetry (Liao et al., 2018). As a result, appraisers must make judgments and decisions in complex environments that they have little control over (Wyman et al., 2011). Wofford et al. (2011) pointed out that appraisers must invest a great deal of effort when they analyze markets or a specific media resource, as they are required to process a large amount of data that is often incomplete, inaccurate, and fluctuating. In other words, the valuation process takes place in complex, dynamic, and uncertain environments. Similarly, Klamer et al. (2017) agreed that valuation tasks often require appraisers to use information from various sources and with differing qualities to tackle unpredictable, non-routine, and complex situations. Additionally, Chen (2007) pointed out that appraisers often deal with time-, cost-, and valuation outcome-related stress.

Although it is normative for appraisers to comply with relevant valuation principles and procedures to generate valuation judgments in an objective manner, behavioral economists have delineated numerous reasons why this is

difficult to achieve, such as the various behavioral conflicts that appraisers are prone to when performing real estate valuation, which in turn results in valuation inaccuracy and variation (Evans et al., 2019). Valuation accuracy is highly dependent on an appraiser's knowledge, professional competence, and interpretation of multiple variables during the valuation process (Klamer et al., 2017). Chen (2007) proposed that it is important to study appraisers' valuation behaviors because the process consists of multiple non-normative self-perceptions that have no absolute rationality. Hence, this issue provides strong motivation for behavioral researchers to conduct relevant studies.

In recent years, studies pertaining to the factors that affect valuation variation have focused on the cognitive behavior of appraisers. Wofford et al. (2011) recognized Diaz's (1990) study as quintessential research on real estate valuation behaviors in the early 1990s. Pompian (2012) stated that perception refers to the attitudes, emotions, beliefs, and values of individuals. Over the years, research has demonstrated that the personal traits of appraisers are among the main drivers of real estate valuation inaccuracy, and that the uncertainty that exists in value estimates mainly arises from personal perception (Babawale, 2011; Kucharska-Stasiak, 2013). Klamer et al. (2017) asserted that any attempt to confirm asset value is riddled with subjectivism. Most of the concepts of these behavioral studies are closely correlated with the field of cognitive psychology.

New perspectives on such cognitive behaviors have gradually shaped the theoretical foundation of current behavioral economics or behavioral finance. These perspectives are generated from a combination of psychological and behavioral factors that occur in economic and financial decision-making processes, and they can be used to explain the irrational behaviors exhibited by an appraiser during the valuation process (Kumar & Goyal, 2015). Chen (2007) indicated that this behavioral research could shed light on phenomena that are technically indescribable. Regarding the growing interest in the field of personal cognitive behaviors, there is still much room for development in the empirical analysis aspect. To date, behavioural economics is widely applied in finance and economics. Many scholars have offered professional arguments on human behaviour. For instance, Hammond et al. (1998) proposed that several traps may exist in commercial decision-making behaviours, such as the anchoring trap, the status-quo trap, and the sunk-cost trap. Even though appraiser behaviour is an important issue, most real estate studies are quantitative (see Amidu et al., 2008; Baffour Awuah & Gyamfi-Yeboah, 2017; Eriksen et al., 2020, and Bellman, 2018). Generally speaking, there is a dearth of systematic and consolidated empirical research on appraiser behaviour. Thus, the objective of this study is to compensate this crucial missing information. Overconfidence, anchoring, and confirmation bias all fall within the scope of behavioral economics (Tversky & Kahneman, 1974; Salzman & Zwinkels, 2013). This study seeks to investigate the causal relationships between these three

<sup>1</sup> Source: Republic of China Real Estate Appraisers Association. Website: <http://www.rocreaa.org.tw/rule.php?sort=QD48PyomJTE1QCgrIyVeKw>

<sup>2</sup> Source: International Financial Reporting Standards. Website: <https://www.twse.com.tw/IFRS/aboutIFRS>

variables alongside task complexity, client influence, and valuation variation. Baffour Awuah and Gyamfi-Yeboah (2017) examined the relationship between task complexity and valuation errors. This differs from our study, which centered on the relationship between task complexity and valuation variation. Therefore, we viewed both task complexity and valuation variation as latent variables, and we analyzed them by SEM. The research also covers the relationships between lesser-discussed issues including overconfidence, confirmation bias, and valuation estimates. Finally, structural equation modeling (SEM) was adopted to empirically analyze the causal relationships between each latent variable. The results are expected to serve as a reference for subsequent studies on these issues.

## 1. Theoretical background and hypothesis development

### 1.1. Theoretical background

#### 1.1.1. Task complexity, overconfidence, confirmation bias, client influence, and anchoring

Bonner (1994) wrote that task complexity is derived from decision-making theories and refers to the attentional capacity or mental processes required to complete a task. Real estate valuation is a mental activity pertaining to information processing that not only requires collecting, sorting, and analyzing information but also entails complex psychological or cognitive processes, such as perception, attention, learning, memory, noise, and reasoning (Ma, 2016). It is a dynamic process in which appraisers must deal with the complexities and uncertainties that arise from imperfect market conditions and conflicting goals (Crosby et al., 2018). Appraisers are often influenced by numerous factors during the complex process of valuation, and the complexity of real estate valuation is influenced by the accessibility of market information and the remoteness of evidence (Mwasumbi & Tarimo, 2019; Babawale, 2013). Therefore, it is difficult to determine the accuracy of valuations. This implies that appraisers must handle their valuation tasks in complex situations, which increases their likelihood of developing bias and complicates the determination of valuation accuracy (Klamer et al., 2018).

Overconfidence stems from social psychology and is defined as an individual's belief that their knowledge is more accurate than facts (Gervais et al., 2002). In other words, they allocate more weight to their own information than to facts. Fellner and Krügel (2012) noted that overconfidence is often used to explain deleterious decision-making; in models of behavioral economics and behavioral finance, overconfidence is often a result of one's misperception toward the reliability of signals, which leads to the overweighting of personal information. Overconfidence is recognized as a key research topic in behavioral economics.

Confirmation bias refers to an individual's tendency to selectively recall or gather information that supports

their own existing opinions or assumptions while ignoring conflicting or confounding information. This leads individuals to gravitate toward choosing ideas that are more beneficial or having selective perceptions for rationalizing an event and attaining emotional and physical equilibrium by overcoming external stress. Gallimore (1996) pointed out that confirmation bias occurs because people have an inherent motivation to confirm their existing beliefs. More importantly, confirmation bias commonly exists in perception-related tasks because it is difficult for humans to authenticate negative evidence. Pompian (2012) expressed that the essence of confirmation bias lies within human nature, whereby one would gravitate toward upholding their own decisions and focusing on evidence that supports their decisions and views while ignoring conflicting evidence. Additionally, confirmation bias may overemphasize the beliefs of decision-makers to the point that they underestimate critical information that separates their standpoint from the evidence. Gallimore (1996) also indicated that because of the presence of confirmation bias, appraisers gravitate toward confirming their initial views instead of objectively validating other views.

Achu (2013) and Nwuba et al. (2015) concurred that different terms such as client influence, client pressure, and client feedback have a common problem—clients would attempt to alter the real estate valuation outcomes. Nwuba et al. (2015) defined client pressure as a client's control of valuation outcomes by adopting measures to ensure that the valuation would work in their favor. The factors that contribute to client pressure include competition in valuation businesses, poor discipline, lack of ethical codes, lack of experience in valuation, and small company size. Kucharska-Stasiak et al. (2018) pointed out that client pressure exists in various forms, including suggestions, persuasion, data manipulation, threats to cancel subsequent orders, refusal to pay, reduction of pay, and even violence. According to Crosby et al. (2018), although clients may sometimes provide better cases for comparison or important market information, client influence is mostly a form of intervention that results in biased valuation outcomes.

Lastly, anchor point setting is a behaviour whereby an individual who wishes to perform quantitative estimations for an event sets particular values as baseline values, and these act like anchors by restraining the estimations. Consequently, when one is making a decision, they unconsciously overemphasize the initial information. Following observations and theorizations, Tversky and Kahneman (1974) first proposed the anchoring and adjustment heuristic and regarded it as a mechanism present in one's judgment and decision-making. Costa et al. (2017) wrote that people perform estimations on the basis of initial values, which they adjust to produce final outcomes. However, these adjustments are insufficient because they gravitate toward the initial values, and different initial points have different estimates. Tidwell and Gallimore (2014) stated that because of the presence of inevitable objective factors that affect market value, aside from the high demand and

low availability of information especially when the target is in an unfamiliar geographical location, anchoring is easily employed in valuation practice. Therefore, the relationship between anchoring and estimation has attracted widespread interest among researchers.

### 1.1.2. Valuation variation

According to Liao et al. (2018), appraisers should uphold an independent, objective, and fair stance and follow the principle of highest and best use when performing real estate valuations. However, because of the unobservable nature of the values of real estate properties (Geltner, 1993), valuation outcomes are often biased and deviate from actual market prices. Babawale (2011) agreed that the root cause of inaccurate real estate valuations is the unobservable nature of the market value that appraisers attempt to forecast. In addition to differences in market information, behavioral conflicts that arise throughout the valuation process could result in inaccuracies and variations in the estimates (Evans et al., 2019). The difference between valuation estimates and transaction prices is termed valuation accuracy and is distinct from valuation variation, which is the difference between estimates (Babawale & Omirin, 2012). Kucharska-Stasiak (2013) pointed out that the uncertainty of real estate valuation is not only regarded as the uncertainty of a single valuation but also as the discrepancy between numerous valuations of the same property performed at the same time and for the same purpose. Iroham et al. (2014) argued that the accuracy and variation in valuation should be collectively regarded as errors in valuation. Because valuation estimates and transaction prices often cannot coexist, which in turn reduces their observability, the consistency of estimates in this study is primarily aimed toward valuation variation, which serves as the focus of analysis.

## 1.2. Hypothesis development

### 1.2.1. Overconfidence, confirmation bias, client influence, and anchoring

Yang and Li (2016) found that the higher the level of uncertainty in a market, the stronger the personal beliefs of decision-makers and the more likely they are to become overconfident. In a study of 122 real estate valuation companies, Adegoke et al. (2012) demonstrated that anchoring is present when appraisers perform valuation, and this effect stems from the overconfidence shaped by the appraisers' knowledge and experience. Chapman and Johnson (2002) indicated that anchoring may occur spontaneously (e.g., due to overconfidence) or as a result of external influences (such as client influence). Comparatively speaking, the degree of bias resulting from spontaneous anchoring is lower than that of externally driven anchoring. On this basis, this study proposes Hypothesis 1 as follows:

H1: Overconfidence has a significant and positive impact on anchoring.

Confirmation bias is one's tendency to selectively seek or evaluate information and evidence to support preexist-

ing beliefs (Allahverdyan & Galstyan, 2014; Eriksen et al., 2020). Costa et al. (2017) argued that confirmation bias is a selective perception and stressed that it is a means of confirming one's beliefs while ignoring conflicting views. Gallimore (1996) wrote that because of confirmation bias, appraisers gravitate toward confirming their initial views (the anchor) instead of validating their views through objective approaches. During the valuation process, appraisers may subconsciously evoke this type of cognitive bias, which subsequently affects their valuations. On this basis, this study proposes Hypothesis 2 as follows:

H2: Confirmation bias has a significant and positive impact on anchoring.

In a systematic review of studies on client influence, Kinnard et al. (1997) wrote that before they appoint an appraiser, clients tend to engage in opinion shopping, demanding to receive an estimated value that reflects not the correct answer, but rather their desired answering behavior. Lee (2005) noted that because of the existence of pre-valuation services in Taiwanese valuation businesses, appraisers may have already settled on an estimated value (anchor) before completing the valuation process. Levy and Schuck (2005) wrote that before choosing an appraiser, clients not only negotiated on the basis of the terms of agreement and guiding procedures but also demanded that appraisers submit draft valuations. Chen (2007) also indicated that through the pre-valuation services provided by Taiwanese appraisers, clients are provided the possible estimates before a valuation formally begins, and they can refuse to commission the business if they are dissatisfied with the valuation outcomes. Amidu et al. (2008) demonstrated that the explicit or implicit demands of clients may alter appraisers' understanding of their valuation tasks before performing them. This suggests the occurrence of anchoring. In a study of valuations in Nigeria, Iroham et al. (2013) revealed that appraisers tend to be inclined toward their initial views on a property's price even before performing the valuation. Baffour Awuah and Gyamfi-Yeboah (2017) pointed out that the pervasiveness of client influence in valuation practice could result in anchoring. On the basis of the aforementioned arguments, this study proposes Hypothesis 3 as follows:

H3: Client influence has a significant and positive impact on anchoring.

### 1.2.2. Task complexity, overconfidence, anchoring, client influence, and valuation variation

When studying the association between forecasting and task complexity, Clement (1999) demonstrated the negative relationship between appraisers' forecast accuracy and task complexity. Wofford et al. (2011) asserted that real estate valuation is performed under complex environments in which appraisers must process inaccurate and incomplete data that constantly fluctuates over time. Indeed, when appraisers perform valuations, they make their judgments and decisions in complex environments that are difficult to control because of the coexistence of information ambiguity, low market transparency, and

the commercial interests of clients. This means that task complexity affects the quality of judgments and decisions (Klamer et al., 2018). Complex valuation tasks often end in over-variations of the final estimated value (Baffour Awuah & Gyamfi-Yeboah, 2017). On the basis of the aforementioned arguments, this study proposes Hypothesis 4 as follows:

H4: Task complexity has a significant and positive impact on valuation variation.

Pompian (2012) identified overconfidence as a form of bias that affects one's decision-making. It exists in many studies on bias and can be summarized as the direct reasoning of one's perception and judgment. Fellner and Krügel (2012) wrote that misjudging the reliability of signals may result in the overweighting of personal information, which in turn leads to harmful decisions. Kumar and Goyal (2015) revealed that overconfidence could cause one's behavior to deviate from rationality to the point that relevant risks during the decision-making process are overlooked, affecting the logicity and rationality of the decisions. Considering the information above, this study proposes Hypothesis 5 as follows:

H5: Overconfidence has a significant and positive impact on valuation variation.

Cheek and Norem (2017) agreed that anchoring refers to an appraiser's tendency to make judgments according to an initial reference point that is classically ambiguous or questionable in nature. Amidu et al. (2008) characterized anchoring as a form of bias caused by an appraiser's adjustments of an initial anchor, and such adjustments are often insufficient to compensate for the effects of the initial reference point, thereby reducing the accuracy of judgment. According to Bashir et al. (2019), decision-makers often neglect the possibility of making misjudgments and are easily influenced by multiple biased and erroneous factors. Iroham et al. (2013) demonstrated that utilizing anchoring would result in the inconsistency and inaccuracy of estimations. On the basis of the information above, this study proposes Hypothesis 6 as follows:

H6: Anchoring has a significant and positive impact on valuation variation.

A New Zealand study by Levy and Schuck (2005) revealed that client influence not only exists before the valuation has been commissioned but also in specific valuation processes. Appraisers informed clients of the valuation outcomes before issuing an official report. Chen (2007) indicated that draft valuation meetings exist in Taiwan to inform the client about the valuation outcomes beforehand. In other words, it is rather common to see clients requesting to discuss valuation outcomes. In reality, the impact of client influence is more significant prior to the appointment of an appraiser compared with the impact of the valuation techniques or approaches adopted during the valuation. Nwuba et al. (2015) demonstrated that because of client pressure, appraisers may change their estimated values at the last minute, thereby affecting the accuracy of the valuation because of the lack of data validation

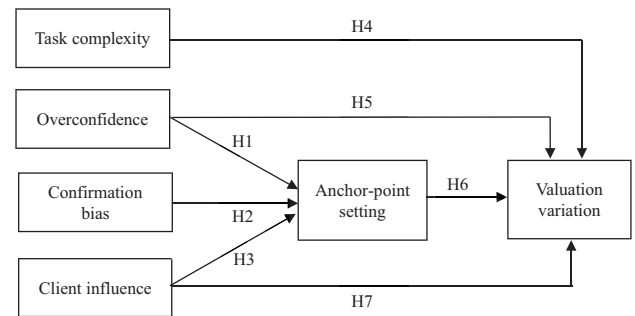


Figure 1. The research framework

and analysis. Nwuba and Salawu (2017) pointed out that to appease clients, appraisers produced biased valuation outcomes. Their empirical results also highlighted the detrimental effects of client influence on practical valuation. Crosby et al. (2018) delineated that the intrinsic uncertainty of real estate valuation would prompt clients to exert their influence, which may lead to higher valuation variance. Considering the information above, this study proposes Hypothesis 7 as follows:

H7: Client influence has a significant and positive impact on valuation variation.

## 2. Research design

### 2.1. Research framework

The research framework developed on the basis of the aforementioned hypotheses is presented in Figure 1. This study examines the effects of overconfidence, confirmation bias and client influence in anchoring. Interestingly, there are factors apart from these three that affect anchoring. Hammond et al. (1998) agreed that anchoring may stem from other independent forms of bias.

### 2.2. Questionnaire design

The questionnaire developed in this study consists of two sections. The first section comprises the participants' basic information, including their gender, age, education level, educational background, tenure, firm size, and mean annual income. The second section comprises items pertaining to the variables of task complexity, overconfidence, confirmation bias, client influence, anchoring, and valuation variation. All the items were measured on a five-point Likert scale (1, highly disagree; 2, disagree; 3, neutral; 4, agree; 5, highly agree). The eight items concerning task complexity were developed following Bonner's (2008) study and covered four concepts: information processing, task perception, professional competence, and task stress. The five items concerning overconfidence were developed in accordance with the studies by Moore and Healy (2008) and Yang and Li (2016) and covered three concepts: overestimation, better-than-average (BTA), and illusion of control (IOC). Overestimation is the overestimation of one's actual performance; BTA is the belief that one's own performance is superior to that of others; and IOC is one's

belief that they can control or influence others but are unable to achieve such effects in reality. The four items concerning confirmation bias were developed using the studies by Fellner and Krügel (2012) and Allahverdyan and Galstyan (2014) and covered the two concepts of information acquisition and information assimilation. Allahverdyan and Galstyan (2014) depicted information acquisition as the selective search for information that is consistent with one's pre-existing beliefs, expectations, or assumptions, whereas information assimilation is the strengthening of one's confidence in their pre-existing beliefs, expectations, or assumptions after acquiring relevant information. The six items concerning client influence were developed using the studies by Achu (2013) and Liao et al. (2018) and covered three concepts: valuation forecasting, draft valuation meetings, and valuation adjustment. In their

literature review, Achu (2013) wrote that because of client influence, appraisers often need to provide estimates and judgments before they are appointed, and they also must organize draft valuation meetings during the valuation process. Liao et al. (2018) measured the impacts of client influence on valuation independence by exploring the willingness of appraisers to adjust their estimates. The four items concerning anchoring were developed following Furnham and Boo's (2011) study and covered three concepts: knowledge and skills, practical experience, and motivational factors. The four items concerning valuation variation were developed on the basis of Adegoke's (2016) study and covered four concepts: information selection, valuation methods, assumptions and judgment of client influence, and appraisers' behaviors and perceptions. The questionnaire items are presented in Table 1.

Table 1. Questionnaire items and references

Measured dimension		Questionnaire items	References
(1) Task complexity			
Information processing	1.	To me, it is always time-consuming and strenuous to collect information from an environment where its availability is limited	Bonner (2008)
	2.	I feel that the information that I collected from an environment where its availability is limited is always inadequate and constrained	
Task perception	3.	To me, the valuation of typical real estate properties (including foreclosure) is a highly complex task	
	4.	To me, the valuation of atypical real estate properties (including large-scale commercial buildings, rights transfer, real estate securitization, loss in value for defects) is a highly complex task	
Professional competence	5.	I feel that real estate valuation is a highly professional task that requires continuous in-service education	
	6.	I feel that the various professional judgments required in the process of real estate valuation are derived through long-term experiences	
Task stress	7.	I feel stressed out whenever an valuation report has to be completed within a specified deadline	
	8.	I feel stressed out whenever an valuation report has to be approved following a review	
(2) Overconfidence			
Overestimation	1.	I feel that my valuation methods as well as the various judgments made during the valuation process are the most appropriate	Moore and Healy (2008)
	2.	I feel that the final estimates determined by me are closest to the actual price of the subject property	
Better-than-average	3.	I feel that my valuation methods as well as the performances of my professional judgments should be more superior than those of most other appraisers	Yang and Li (2016)
	4.	I feel that the final estimate determined by me is closer to the actual price of the subject property compared to the estimates of most other appraisers	
Illusion of control	5.	I feel that my professional competence is sufficient to overcome highly uncertain valuation environments	
(3) Confirmation bias			
Information acquisition	1.	To me, if I already have a pre-existing initial price for a subject property during the early stages of an valuation, then I will collect comparable properties with a price that is approximate to that of the subject property	Fellner and Krügel (2012); Allahverdyan and Galstyan (2014)
	2.	To me, if I already have a pre-existing initial price for a subject property, then I will constantly neglect comparable properties with higher price gaps with the initial price	
Information assimilation	3.	I will stop collecting information once I feel that the information I have pertaining to comparable properties is sufficient and close to the initial price of a subject property	
	4.	I often become more confident in the initial price of a subject property once I feel that the information I have pertaining to comparable properties is sufficient and close to the aforementioned initial price	

End of Table 1

Measured dimension	Questionnaire items		References
(4) Client influence			
Valuation forecasting	1.	I feel that I often need to provide a client with a rough forecasted estimate before I accept their appointment	Achu (2013)
	2.	I feel that a client will often provide me with an expected price which they deem appropriate before I accept their appointment	
	3.	I feel that the difference between the forecasted estimate provided by me and the client's expected price is considerably related to my appointment by the client	
Draft valuation meetings	4.	I feel that I often need to orally inform the client about the final estimate before submitting my official valuation report	
Valuation adjustment	5.	I feel that I will try to acquire a client's appointment even when their expected price differs substantially with the market value	Liao et al. (2018)
	6.	I feel that I will often consider cooperating with a client when they wish to adjust the final estimate	
(5) Anchoring			
Knowledge and skills	1.	I feel that I will often establish a discount rate which is adjusted according to valuation procedures whenever the information that I have collected is deemed sufficient	Furnham and Boo (2011)
Practical experience	2.	I feel that I will often establish an initial price which is adjusted according to valuation procedures whenever I encounter cases which I am familiar with	
	3.	I feel that I will often establish a discount rate which is adjusted according to valuation procedures whenever I encounter a defective property	
Motivational factors	4.	I feel that I will often establish an initial price which is adjusted according to valuation procedures after the client has informed me about their expected price	
(6) Valuation variation			
Information selection	1.	The items I choose (suitability and sufficiency), as well as my interpretation and use of data, often result in valuation instability	Adegoke (2016)
Valuation methods	2.	The methods I choose for estimating real estate prices and real estate rental rates often differ from pre-valuations	
Assumptions and judgment	3.	I feel that my capacity to make assumptions and judgments (adjustment rate, interest rate, profit rate, weighting), shaped by my skills and experience, often increases the difficulty of valuation confirmation	
Behaviors and perceptions	4.	I feel that individual perception often results in large differences in valuation	

### 3. Data collection and descriptive statistics analysis of the sample

#### 3.1. Data collection

The participants of this study were real estate appraisers who passed the Taiwan Real Estate Appraiser Certification Examination, were members of the real estate appraisers associations in their respective cities/counties, and were licensed to legally conduct valuation tasks. As of January 11, 2021, 440 appraisers met these criteria in Taiwan. Considering the poor response rates of previous paper-and-pen questionnaires, this study developed an online questionnaire and administered it to 272 members of the Taiwan Real Estate Appraisers Association LINE group. The survey period lasted from 9 a.m. on January 11, 2021, to 6 p.m. on January 17, 2021. A total of 152 responses were returned, yielding a response rate of 55.88%. Two invalid responses were removed, resulting in 150 valid responses and a valid response rate of 55.15%.

#### 3.2. Descriptive statistics of the sample

The sample consisted of 120 men and 28 women, and two participants preferred to not disclose their gender. The mean age of the participants was 47.98 years old. The eldest participant was 71 years old and the youngest was 27 years old. The most common level of education was a master's degree. In terms of tenure, it was most common for the participants to have more than 14 years of experience. In terms of firm size, 66 of the valuation firms had two appraisers or fewer, 53 firms had three to six appraisers, 14 firms had 7 to 10 appraisers, nine firms had 11 to 20 appraisers, and eight firms had more than 21 appraisers. Regarding average annual income, 52 of the participants had an average annual income of more than NT\$1.2 million, 38 participants had incomes between NT\$600,000 and NT\$900,000, 29 participants had incomes between NT\$300,000 and NT\$600,000, 25 participants had incomes between NT\$900,000 and NT\$1.2 million, and six participants had incomes of less than NT\$300,000 (Table 2).

Table 2. Descriptive statistics of the sample

Variable	Item	Number of responses	Percentage (%)
Gender	Male	120	80.0
	Female	28	18.7
	Not disclosed	2	1.3
Age	Mean	47.98	
	Maximum	71	
	Minimum	27	
Education level	Specialized education	14	9.3
	Bachelor's degree	63	42.0
	Master's degree	70	46.7
	Doctorate	3	2.0
Educational background	Departments related to land economics	72	48.0
	Departments not related to land economics	78	52.0
Tenure	2 years or less	7	4.7
	2 to 6 years	30	20.0
	6 to 10 years	31	20.7
	10 to 14 years	20	13.3
	14 years or above	62	41.3
Firm size (number of appraisers)	2 or fewer	66	44.0
	3 to 6	53	35.3
	7 to 10	14	9.3
	11 to 20	9	6.0
	21 and above	8	5.3
Average annual income	Less than NT\$300,000	6	4.0
	NT\$300,000 to NT\$600,000	29	19.3
	NT\$600,000 to NT\$900,000	38	25.3
	NT\$900,000 to NT\$1.2 million	25	16.7
	NT\$1.2 million and above	52	34.7

Besides checking the reliability and validity of the results, we examined the presence of response bias and common method variance (CMV) in the responses. First, to ensure that the results from analyzing the sample data can be generalized to the sampled population, the non-response bias test protocol developed by Armstrong and Overton (1977) was used to check for nonresponse bias. The chi-square test of homogeneity (Armstrong & Overton, 1977) was used to test whether the participants' basic information (gender, age, education level, etc.) in their responses were proportionally homogenous or consistent. The results revealed that the p-values of all items were larger than 0.05, so the null hypothesis was not rejected. This shows that nonresponse bias was not prominent in the questionnaire. Next, Harman's single factor test was used to check from CMV. We used principal component analysis, for which 10 factors with eigenvalues larger than 1 were retained. The first factor explained 17.47% of the variance of all items. The general rule is that CMV is severe if a factor explains 50% of the variance of all items (Podsakoff et al., 2003). Therefore, based on the results, CMV was not severe in this study.

## 4. Empirical results and analysis

### 4.1. Reliability and validity analysis

Before administering a questionnaire, a reliability analysis must be performed to assess the reliability and consistency of the measurement data. A reliability analysis is often measured using Cronbach's  $\alpha$ . Nunnally and Bernstein (1994) proposed that reliability and consistency are sufficient if Cronbach's  $\alpha$  is greater than 0.70 for each latent variable. In this study, the Cronbach's  $\alpha$  of each latent variable ranged from 0.711 to 0.772, suggesting an acceptable level of reliability.

A validity analysis must be performed following a reliability analysis. In this study, validity consisted of content validity, convergent validity, and discriminant validity. After collecting the relevant data for each variable in the questionnaire, the researchers self-developed the items on the basis of the operational definitions of suitable variables that were selected. Then, in a rigorous questionnaire development process, the researchers discussed the items with several experts and invited three appraisers to complete the draft questionnaire to review the phrasing



of each item related to each variable. Subsequently, the questionnaire was revised to ensure that the questionnaire had an acceptable level of content validity. Hair et al. (2006, 2009) pointed out that a measured variable has sufficient convergent validity when all its standardized factor loadings are greater than 0.5 and statistically significant. As shown in Table 3, all the standardized factor loadings of the measured variables attained a 5% level of significance, and only two latent variables had a factor loading slightly smaller than 0.5. Furthermore, Hair et al. (2019) stated that the average variance extracted (AVE) from each latent variable should be greater than 0.5, indicating that the latent variable is capable of explaining at least 50% of the variance of its measured variables (items). As demonstrated in Table 3, the AVE of the latent variables ranged from 0.458 to 0.708; however, Fornell and Larcker (1981) claimed that convergent validity is acceptable with

an AVE of less than 0.5 if the composite reliability (CR) exceeds 0.6. The CRs of the latent variables ranged from 0.712 to 0.900, attesting to the high level of convergent validity of the measured variables. Finally, the square root of the AVE of a latent variable that exceeds its correlation coefficient with the other latent variables indicates a good discriminant validity between the latent variables (Fornell & Larcker, 1981). This requirement was met in this study, as demonstrated by the data in Table 4. Henseler et al. (2015) proposed that discriminant validity can also be determined using the heterotrait–monotrait ratio of correlations (HTMT). The HTMT has higher sensitivity and specificity, and an HTMT smaller than 0.85 indicates robust discriminant validity between each latent variable. This requirement was met in this study, as demonstrated by the data in Table 5, suggesting that the questionnaire has good discriminant validity.

Table 3. Analysis of the questionnaire's reliability, factor loading, and AVE

Variable	Factor loading (unstandardized)	Factor loading (standardized)	Error variance	Reliability of measured variable	CR	AVE	Structural equation assessment $R^2$
Task complexity					0.763	0.458	
Task processing	1.000	0.533	0.397	0.284			
Task perception	1.182	0.658**	0.289	0.433			
Professional competence	0.382	0.333**	0.185	0.111			
Task stress	0.881	0.489**	0.390	0.239			
Overconfidence					0.802	0.610	
Overestimation	1.766	0.952**	0.024	0.905			
Better-than-average (BTA)	1.270	0.510**	0.344	0.261			
Illusion of control (IOC)	1.000	0.373	0.465	0.139			
Confirmation bias					0.828	0.708	
Information acquisition	1.322	0.810**	0.199	0.657			
Information assimilation	1.000	0.676	0.259	0.457			
Client influence					0.712	0.468	
Valuation forecasting	1.147	0.777**	0.234	0.603			
Draft valuation meetings	1.000	0.565	0.576	0.319			
Valuation adjustment	0.569	0.410**	0.432	0.168			
Anchoring					0.830	0.627	0.359
Knowledge and skills	0.965	0.736**	0.338	0.542			
Practical experience	1.000	0.894	0.108	0.261			
Motivational factors	0.790	0.573**	0.549	0.328			
Valuation variation					0.900	0.693	0.267
Information selection	0.819	0.590**	0.155	0.348			
Valuation methods	1.180	0.726**	0.154	0.527			
Assumptions and judgment	0.969	0.606**	0.200	0.367			
Behaviors and perceptions	1.000	0.624	0.193	0.390			

Note: \*\* denotes  $p < 0.05$ .

Table 4. Correlational matrix of the latent variables

	Task complexity	Overconfidence	Confirmation bias	Client influence	Anchoring	Valuation variation
Task complexity	0.677					
Overconfidence	0.233	0.781				
Confirmation bias	0.117	-0.094	0.842			
Client influence	0.230	-0.002	0.510	0.684		
Anchoring	0.110	-0.023	0.564	0.461	0.792	
Valuation variation	0.406	0.292	0.154	0.320	0.173	0.833

Note: The diagonals represent the square root of the AVE of the latent variables.

Table 5. HTMT of the latent variables

	Task complexity	Overconfidence	Confirmation bias	Client influence	Anchoring
Overconfidence	0.463				
Confirmation bias	0.299	0.155			
Client influence	0.301	0.221	0.566		
Anchoring	0.313	0.230	0.653	0.599	
Valuation variation	0.498	0.333	0.275	0.373	0.183

## 4.2. Analysis of the empirical results

### 4.2.1. Fit of the conceptual framework

Hair et al. (1998) stated that a model's fit can be measured through absolute fit measures, incremental fit measures, and parsimonious fit measures.

Absolute fit measures directly test the difference between the model-implied covariate matrix and the observed covariate matrix. The chi-square statistic ( $\chi^2$ ) was 283.763 and attained a 1% level of significance, which suggests that the theoretical model was inconsistent with the distribution of the sample data. Chiou (2019) noted that the null hypothesis is easily rejected when the chi-square statistic is influenced by a large sample size. Therefore, a ratio of the chi-square statistic to the degrees of freedom ( $\chi^2 / df$ ) smaller than 3 indicates a good fit between the

model and the data. As shown in Table 6,  $\chi^2 / df$  was 2.041 and was within an acceptable range. Moreover, the other measures were close to their respective fit requirements ( $GFI = 0.844$ ,  $RMR = 0.048$ , and  $RMSEA = 0.084$ ). Incremental fit measures are derived by comparing the theoretical model with the independent (null) model, and its value represents the amount of fit that can be increased based on the comparison of the fit of the theoretical model with that of the independent (null) model. In this study, the fit measures were approximately within an acceptable range ( $AGFI = 0.787$ ,  $NFI = 0.663$ ,  $CFI = 0.784$ ). Finally, parsimonious fit measures are used to measure the degree of parsimony of the conceptual model. The fit measures in this study were all within an acceptable range ( $PNFI = 0.539$ ,  $PCFI = 0.617$ ). In short, the conceptual model of this study had a good overall fit (Table 6).

Table 6. List of fit measures of the model

Statistic	Criteria for an ideal fit	Results
Absolute fit measures	$\chi^2$ ( <i>p</i> -value)	283.763 (0.0001)
	$\chi^2 / df$	Smaller than 3
	GFI	Greater than 0.90
	RMR	Smaller value indicates better fit
	RMSEA	Smaller value indicates better fit, ideally smaller than 0.05
Incremental fit measures	AGFI	Greater than 0.90
	NFI	Greater than 0.90
	CFI	Greater than 0.90
Parsimonious fit measures	PNFI	Greater than 0.50
	PCFI	Greater than 0.50

4.2.2. Empirical results and discussion

The empirical results are presented in Table 7 and Figure 2. The estimated coefficient of the impact of overconfidence on anchoring was 0.020 but failed to attain a level of significance. Thus, the empirical results do not support H1. Despite the scarcity of studies from abroad that support this hypothesis (Adegoke et al., 2012; Yang & Li, 2016; Chapman & Johnson, 2002), overconfidence and anchoring were both regarded as important latent variables in this study, and hence, investigation of their causal relationship is warranted. The empirical results indicated that although overconfidence had a positive impact on anchoring, there was no significance in the initiation of anchoring by overconfidence.

The estimated coefficient of the impact of confirmation bias on anchoring was 0.447 and attained a 1% level of significance; these empirical results support H2. Gallimore (1996) noted that appraisers have a high propensity to confirm their initial opinions (anchors). Similarly, Allahverdyan and Galstyan (2014) pointed out that confirmation bias is the tendency to support pre-existing beliefs, and Costa et al. (2017) asserted that confirmation bias is one’s confirmation of their personal beliefs and ideas. The empirical results are in line with the statements of Gallimore (1996), Allahverdyan and Galstyan (2014), and Costa et al. (2017).

The estimated coefficient of the impact of client influence on anchoring was 0.233 and attained a 10% level of significance; these empirical results support H3. Amidu et al. (2008) highlighted that appraisers may already have an anchor before their clients influence their valuations, and Baffour Awuah et al. (2017) argued that client influence may contribute to anchored estimates. Thus, the empirical results of this study corroborate the findings of Amidu et al. (2008) and Baffour Awuah et al. (2017).

The estimated coefficient of the impact of task complexity on valuation variation was 0.296 and attained a 5% level of significance. Therefore, the empirical results support H4. Because of the complex nature of real estate valuation, Babawale (2013) asserted that accurate estimates are difficult to obtain. Baffour Awuah et al. (2017) agreed that complex valuation tasks often result in large variations in

estimates. These findings are supported by the empirical results of the present study.

The estimated coefficient of the impact of overconfidence on valuation variation was 0.224 and attained a 5% level of significance. Thus, the empirical results support H5. Bellman (2018) argued that the uncertainty of real estate valuations results from appraisers’ overconfidence. Fellner and Krügel (2012) concurred that overconfident individuals are prone to making bad decisions. Similarly, Kumar and Goyal (2015) stated that overconfidence affects the quality of decision-making. These findings are in line with the empirical results of this study.

The estimated coefficient of the impact of anchoring on valuation variation was 0.036 but failed to attain a level of significance. Hence, H6 is not supported by the empirical results. This finding is contradictory to Iroham et al.’s (2013) work, in which anchoring influenced valuation inconsistency and accuracy. An empirical study by Liao et al. (2018) on the valuation behaviors of Taiwanese appraisers demonstrated that appraisers may establish an anchor when they become aware of their clients’ expected prices. However, the impacts of this anchor on valuation failed to attain a level of significance, as was the case in the present study.

The estimated coefficient of the impact of client influence on valuation variation was 0.236 and attained a 10% level of significance. Hence, H7 is supported by the empirical results. Nwuba and Salawu (2017) wrote that appraisers become biased when they give in to their clients’ influence. Crosby et al. (2018) further asserted that client influence could result in higher valuation variations. Thus,

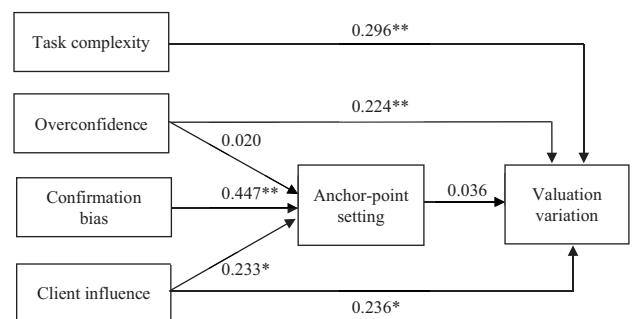


Figure 2. Results of the structural equation modeling

Table 7. Estimation results derived from SEM

Hypothesis	Relationship between variables	Estimated coefficient	Standard error	t-statistic	p-value
H1	Overconfidence → Anchoring	0.020	0.199	0.235	0.814
H2	Confirmation bias → Anchoring	0.447	0.181	3.466	0.001**
H3	Client influence → Anchoring	0.233	0.161	1.829	0.067*
H4	Task complexity → Valuation variation	0.296	0.123	2.135	0.033**
H5	Overconfidence → Valuation variation	0.224	0.143	2.005	0.045**
H6	Anchoring → Valuation variation	0.036	0.062	0.314	0.754
H7	Client influence → Valuation variation	0.236	0.094	1.706	0.088*

Note: \*\* denotes  $p < 0.05$ ; \* denotes  $p < 0.1$ .

the empirical results of the present study support the findings of Nwuba and Salawu (2017) and Crosby et al. (2018)

In the research framework, anchoring was set as a mediator variable through which overconfidence, confirmation bias, and client influence indirectly impact valuation variation. However, the impacts of anchoring on valuation variation were not significant. Additionally, the results showed that anchoring does not have any mediating effects. This may be because, even though appraisers already set the value of their anchor, that did not significantly affect valuations when the appraisers performed appraisal tasks such as surveys, observations, comparisons, analyses, and adjustments. As Liao et al. (2018) explained, these studies are associated with ethical risks, as appraisers may refuse to answer controversial questions truthfully.

## Conclusions and suggestions

### Theoretical implications

Alongside the two exogenous variables of overconfidence and client influence, this study explored whether their combination with task complexity, a commonly discussed issue in international studies, has any impact on the endogenous latent variable of valuation variation. The empirical results were in line with the hypotheses; task complexity, overconfidence, and client influence have positive impacts on valuation variation. This indicates that highly complex tasks, a high level of overconfidence, and strong client influence could increase variation in real estate valuations. The results of this study are in line with practical applications. Despite the raging COVID-19 pandemic, the housing market in Taiwan still remains robust, marked by the soaring prices of presale houses<sup>3</sup>. This is because of customer influence, specifically the anticipatory price effects among consumers (as they prefer to make a purchase quickly in fear of higher prices in the future). This mind-set inconspicuously increases both housing prices and task complexity, thereby increasing the variation in the valuations.

In addition, anchoring was set as a mediating variable in this study to explore whether the three exogenous variables (overconfidence, confirmation bias, and client influence) have any indirect impacts on valuation variation through anchoring. The results reveal that confirmation bias and client influence have positive impacts on anchoring, which suggests that stronger confirmation bias and client influence can prompt appraisers to establish an anchor before performing a valuation. Real estate prices in Taiwan are based on the prices registered on the actual price registration system. Therefore, any policy can be advantageous or disadvantageous toward housing prices. As Taiwan's real estate prices continue to rise, the publicly registered prices serve as an indicator of the economic situation. Thus, new transaction prices result in new an-

choring, creating the cognitive bias that enhance client influence.

However, the impact of overconfidence on evoking anchoring was not significant, and the relevant hypothesis was not supported. This implies that overconfidence is manifested in appraisers' confidence in their final estimate instead of in their anchor. Chen (2007) noted that the data collected and valuation selected by appraisers generate valuation perceptions that differ by region. Therefore, in addition to the assistance of an automatic valuation model, the appraisers must rely on their own experience to develop their own principles for data collection and selection. Therefore, overconfidence does not result in anchoring.

Anchoring also had a positive but insignificant impact on valuation variation, and the relevant hypothesis was not supported. This shows that confirmation bias and client influence do not affect valuation variation indirectly through anchoring, though both variables do directly affect valuation variation.

### Practical implications

The empirical results of this study were in line with the argument in the literature that it is difficult to achieve accuracy in highly complex valuation tasks. This is because it is impossible to conceptualize complex factors or standardize valuation tasks, and it is also difficult to verify the authenticity of the estimates for future adjustments. For this reason, it is crucial to train or increase the appraisers' skills in data collection, surveying, analysis, interpretation, and comprehensive judgment. Furthermore, highly complex tasks should be completed by an appraiser assigned by a local appraiser association, and the final estimate should be derived after the valuation outcomes have been reviewed by a board of reviewers to enhance the quality of valuation. The empirical results also demonstrated that client influence has direct, positive, and significant impacts on valuation variation. According to Lee and Yu (2007), an individual who is more aware of ethical norms is less likely to develop unethical intentions in practice. Levy and Schuck (2005) agreed that the only way to reduce client influence is to implement rigorous supervision. Therefore, in addition to increasing appraisers' self-discipline, appraiser associations should establish higher standards for ethical norms and implement clear and quick supervisory measures. Finally, concerning the psychological and cognitive aspects, Bashir et al. (2019) highlighted that behavioral biases are associated with feelings, perceptions, affection, intelligence, and personality. Pompian (2012) classified behavioral biases into cognitive errors and emotional biases and noted that the former can be corrected more easily than the latter. In the present study, confirmation bias significantly and positively impacted anchoring. Confirmation bias is a form of behavioral bias. In practice, it is manifested as one's weakness in data collection, appropriate reasoning, and rational judgement. Cognitive bias can be mitigated through professional training, experience,

<sup>3</sup> Source: Presale housing prices continue to skyrocket. Website: <https://udn.com/news/story/7241/5989965>

information sufficiency, and information wealth. The empirical results suggest that overconfidence has significant and positive impacts on valuation variation. As a form of emotional bias, overconfidence is derived from an individual's intuition, impulses, and feelings. When an overconfident appraiser experiences skepticism about their valuation, they may act defiantly as a psychological response. Such emotional bias should be corrected through review or supervisory measures.

### Recommendations for further study

Between 1999 and 2021, there were only 440 real estate appraisers in Taiwan, which is a rather low number (Ministry of the Interior, 2022). There were 150 valid responses gathered from the appraisers in the LINE app group. Because of the low sample size and the nonsignificant effects of specific variables on valuation variation, administering the questionnaire through the LINE app group was the only way to gather a large number of responses, as the group members are usually active. Thus, one limitation of this study is the inability to administer the questionnaire to the entire appraiser population in the country. Another limitation is the inevitable differences in the variance of the valuation targets as a result of the appraisers' business locations (municipalities, townships, villages, districts).

Behavioral economics and behavioral finance emphasize research on psychology, cognition, emotion, and other irrational factors such as framing dependence, herd behaviors, the Dunning–Kruger effect, and gambler's fallacy. These factors can be included in the conceptual model to uncover their relationships with real estate valuation. Studies on task complexity and real estate valuation have received significant attention abroad, which highlights the integration of these concepts with irrational cognitive behaviors, such as emotions, availability heuristic, illusion of control, and the paradox of choice, as topics for future in-depth study. Finally, most credit-related affairs in local Taiwanese banks are completed by internal appraisers, whereas some valuation tasks in appraiser firms are completed by appraiser assistants and then submitted for appraiser review. Therefore, bank appraisers and appraiser assistants should be included as participants in future studies.

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