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DISAGGREGATION OF THE INVESTMENT PROPERTY COMPONENTS
AND THE AGGREGATED RELIABILITY SCORE

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A Dissertation Submitted in Partial Fulfillment of the Requirements
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ธนาดล รักษาพล : การแยกองค์ประกอบของอสังหาริมทรัพย์เพื่อการลงทุน และ คะแนนรวมความน่าเชื่อถือ (DISAGGREGATION OF THE INVESTMENT PROPERTY COMPONENTS AND THE AGGREGATED RELIABILITY SCORE) อ.ที่ปรึกษาวิทยานิพนธ์หลัก: ผศ. ดร.พงศ์พรต ฉัตราภรณ์, 162 หน้า.

งานวิจัยฉบับนี้มีวัตถุประสงค์ที่จะศึกษามาตรฐานการบัญชีฉบับที่ 40 เรื่อง อสังหาริมทรัพย์เพื่อการลงทุน ซึ่งประกอบด้วยการศึกษาถึงลักษณะของกิจการที่จะเลือกปฏิบัติตามวิธีมูลค่ายุติธรรม และคุณค่าที่เกี่ยวข้องกับการตัดสินใจของอสังหาริมทรัพย์เพื่อการลงทุนโดยใช้ข้อมูลจากตลาดหลักทรัพย์แห่งประเทศไทยในช่วงปี 2554 ถึง 2557 งานวิจัยฉบับนี้นำเสนอทั้งมุมมองของกิจการและของนักลงทุนในประเทศไทยโดยการแยกองค์ประกอบของยอดรวมของอสังหาริมทรัพย์เพื่อการลงทุนเป็นอสังหาริมทรัพย์เพื่อการลงทุนที่ไม่มีการคิดค่าเสื่อมราคาและอสังหาริมทรัพย์เพื่อการลงทุนที่มีการคิดค่าเสื่อมราคา และการจัดกลุ่มข้อมูลที่นำมาศึกษาตามคะแนนรวมความน่าเชื่อถือของการวัดมูลค่ายุติธรรม เพื่อควบคุมความน่าเชื่อถือให้คงที่และแสดงให้เห็นถึงคุณค่าที่เกี่ยวข้องกับการตัดสินใจที่แฝงอยู่ในอสังหาริมทรัพย์เพื่อการลงทุนได้ชัดเจนยิ่งขึ้น

ในมุมมองของกิจการ ผลการวิจัยเปิดเผยให้เห็นถึงความสำคัญขององค์ประกอบของอสังหาริมทรัพย์เพื่อการลงทุน และความน่าเชื่อถือของการวัดมูลค่ายุติธรรมซึ่งส่งผลกระทบต่อทางเลือกในทางบัญชีของกิจการไม่ว่าจะเป็นวิธีมูลค่ายุติธรรมหรือวิธีราคาทุน ในส่วนของมุมมองของนักลงทุน ผลการวิจัยแสดงให้เห็นว่าอสังหาริมทรัพย์เพื่อการลงทุนที่เลือกใช้วิธีราคาทุนมีคุณค่าที่เกี่ยวข้องกับการตัดสินใจของนักลงทุนมากกว่าวิธีมูลค่ายุติธรรม เนื่องจากนักลงทุนในประเทศกำลังพัฒนาซึ่งรวมถึงประเทศไทยมีความยึดติดกับวิธีราคาทุนเป็นอย่างมาก อย่างไรก็ตามภายหลังการจัดกลุ่มกิจการตามคะแนนรวมความน่าเชื่อถือของการวัดมูลค่ายุติธรรม พบว่าวิธีมูลค่ายุติธรรมกลับมามีคุณค่าที่เกี่ยวข้องกับการตัดสินใจต่อนักลงทุนมากกว่าวิธีราคาทุนสำหรับกิจการที่มีความน่าเชื่อถือในการวัดมูลค่ายุติธรรมสูง อย่างไรก็ดี ผลการวิจัยดังกล่าวพบในยอดรวมของอสังหาริมทรัพย์เพื่อการลงทุน และอสังหาริมทรัพย์เพื่อการลงทุนที่มีการคิดค่าเสื่อมราคาเท่านั้น แต่ไม่พบความแตกต่างของทางเลือกในทางบัญชีในกลุ่มของอสังหาริมทรัพย์เพื่อการลงทุนที่ไม่มีการคิดค่าเสื่อมราคา จึงถือได้ว่าอสังหาริมทรัพย์เพื่อการลงทุนที่มีการคิดค่าเสื่อมราคาถือเป็นตัวแทนของยอดรวมของอสังหาริมทรัพย์เพื่อการลงทุนในการตัดสินใจของนักลงทุน นอกจากนี้ ความน่าเชื่อถือของการวัดมูลค่ายุติธรรมที่มากขึ้นส่งผลให้นักลงทุนมีความเชื่อมั่นและใช้ข้อมูลจากวิธีมูลค่ายุติธรรมมากขึ้นได้ ดังนั้นการแยกองค์ประกอบของอสังหาริมทรัพย์เพื่อการลงทุนและผลกระทบของความน่าเชื่อถือที่แฝงอยู่ในข้อมูลทางการเงินสามารถพัฒนาความรู้ใหม่ที่แตกต่างจากวรรณกรรมด้านคุณค่าที่เกี่ยวข้องกับการตัดสินใจในอดีตได้

ภาควิชา การบัญชี ลายมือชื่อนิสิต ....

สาขาวิชา การบัญชี ลายมือชื่อ อ.ที่ปรึกษาหลัก ....

ปีการศึกษา 2558

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KEYWORDS: INVESTMENT PROPERTY / DISAGGREGATION OF THE COMPONENTS / AGGREGATED RELIABILITY SCORES / MODIFIED VALUE RELEVANCE

THANADOL RUKSAPOL: DISAGGREGATION OF THE INVESTMENT PROPERTY COMPONENTS AND THE AGGREGATED RELIABILITY SCORE. ADVISOR: ASST. PROF. PONGPROT CHATRAPHORN, Ph.D., 162 pp.

This research is centered on the International Accounting Standard (IAS) 40: *Investment Property* to identify the additional characteristics of firms adopting the fair value model and to investigate the value relevance of investment property of firms in the Stock Exchange of Thailand during the years 2011 to 2014. This research presents, both firm views and investor views in Thailand, the concept of disaggregation deployed to classify the aggregated investment property into the non-depreciated and depreciated investment properties and the Aggregated Reliability Score (AR-score) initiative proposed for partitioning the sampled firms in accordance with their respective reliability of fair value measurements in order to hold constant the reliability effect and derive the modified value relevance of the investment properties. This research uses the secondary

From firm views, the research findings reveal that the investment property components and the fair value measurement reliability influence the firms' accounting choices (i.e. the fair value model versus the cost model). From investor views, the cost model is of greater value relevance vis-à-vis the fair value model due to the investors' vehement attachment to the cost model, a phenomenon prevalent in many less advanced economies, including Thailand. Nevertheless, the post-partitioning results, in which the sampled firms are partitioned by their respective AR-scores, show that the fair value model offers more value relevance in the high reliability group. Specifically, the relative superiority of the fair value model to the cost model is reportedly identified in the aggregated investment property and the depreciated investment property, whereas no such superiority exists in the non-depreciated investment property. It can be claimed that the depreciated investment property is a representative of the aggregated investment property for investors' decision-making. Furthermore, it is expected that the improved reliability in fair value measurements would contribute to investors' increased trust in and reliance on the fair value. Conclusively, the disaggregation of the investment property components and the use of AR-score develop a new set of knowledges that differ from prior value relevance publications.

Department:	Accountancy	Student's Signature	....
Field of Study:	Accountancy	Advisor's Signature	....
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CHAPTER I

INTRODUCTION

The official adoption of the International Accounting Standard No.40 (IAS40: *Investment Property*) by Thai listed companies commenced in 2011, following the implementation of the world convergence project. Under IAS40, adopting firms are required to classify a property held for its value appreciation or rental income as an *investment property*. In this regard, the listed firms are presented with two accounting choices for recognition of the investment property: the fair value and the cost models. Switching from the cost model to the fair value model is readily afforded under IAS40; however, it's difficult for the other way around, giving rise to the limitation on switching.

This research aims to improve upon existing research on investment property by incorporating in the test models the disaggregation of investment property into the non-depreciated and depreciated components; and the concept of the reliability effect extraction. The first element is motivated by the fact that investment property can further be disaggregated into the non-depreciated and depreciated investment properties (Christensen & Nikolaev, 2009). Existing research on investment property focused almost exclusively on the aggregated level, giving rise to the inconclusive results with regard to the relative superiority between the cost and fair value models (Deaconu, Buiga, & Nistor, 2010; Ishak, Saringat, Ibrahim, & El Wahab, 2012; Pappu & Devi, 2011; So & Smith, 2009). The limitation on the model switching has also cast doubt on its validity, particularly when the cost model offers more value relevance than the fair value model. Moreover, while property, plant and equipment (IASB, 2012a) are allowed to adopt accounting choice by category, investment property are not permitted to do so. They are to be chosen the same accounting choice for the aggregated level which is the limitation of the standard.

The second element is motivated by Holthausen and Watts (2001) and Power (2010), who argued that most research on value relevance deliberately omitted the reliability effect inherent in the accounting information. This current research has thus proposed a new reliability measurement, referred to as the Aggregated Reliability Score (AR-Score), which will subsequently be applied to determine the intrinsic value relevance of the aggregated and disaggregated investment properties. Furthermore, under the 2013 revised conceptual framework[1], reliability has been replaced with faithful representation(EFRAG, 2013), while relevance remains as a qualitative characteristic of the financial statements (IASB, 2013a), without empirical evidence supported by IASB[2]. In the standard setters' view, the importance of the reliability factor nonetheless remains controversial[3].

The last motivation of this research is to find out the fair value perspective from both firm side and investor side. Since most prior research usually study in one side or another, this research will integrate the fair value perspective of investment property both firms' view and investors' view to incorporate the results and contribute them better than prior literatures.

The first objective of this current research is to further explore characteristics of firms with a propensity to adopt the fair value model, similar to C. Chen, Lo, Tsang, and Zhang (2015),Gray and Fearnley (2011), Christensen and Nikolaev (2009), Quagli and Avallone (2010). In this research, both the investment property components and the reliability of fair value measurements are hypothesized as the antecedents of firms

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[1] Under the Accounting framework (FAP, 2009), the qualitative characteristics of financial statements are composed of relevance, reliability, understandability and comparability. However, under the revised conceptual framework (IASB, 2013a), the fundamental qualitative characteristics of financial statements are composed of relevance and faithful representation.

[2] The European Financial Reporting Advisory Group (EFRAG, 2013) claims that IASB tried to relief the trading-off argument between the reliability and the relevance by replacing the reliability with the faithful representation and suggested that the financial information should be composed of both "relevance" and "faithful representation". However, EFRAG believes that the reliability is more essential than the faithful representation and should be reinstated in the conceptual framework.

[3] Although the reliability is replaced, it is often identified in the recognition process of most accounting standards that assets and liabilities are to be accounted for the transactions only when it is reliably measured.

adopting the fair value model. The first determinant is considered as firm characteristic and the second one is considered as information usefulness characteristic of the firm's accounting choices.

Its second objective is to determine the relative superiority with regard to intrinsic value relevance between the fair value and the cost models. Prior research on investment property, e.g. Pappu and Devi (2011), Ishak et al. (2012), Deaconu et al. (2010), So and Smith (2009), largely relied upon the aggregated investment property contained in the financial statement. On the other hand, no publication has looked into the disaggregated investment property and the reliability in fair value measurements disclosed in the financial statements' notes.

Unlike existing research studies on investment property which have focused on the real estate industry, this current research will investigate all SET-listed firms (i.e. public companies listed on the Stock Exchange of Thailand (SET)) with disclosure of investment property in the financial statements between the years 2011 (i.e. the year when IAS40 was first adopted in Thailand) and 2014.

There are two principal reasons for focusing on Thailand: (1) despite being an emerging economy, the country is little researched in this regard and also the available research findings are mostly inconclusive; and (2) in spite of the global-wide adoption of the fair value model to account for the investment property, the cost model seems to be more preferable in Thailand. The research findings are thus expected to contribute to the country's standard setters in their efforts to harmonize the local accounting standards with the global standards.

To the first objective, the findings of this current research partially disagree with the prediction. The results reveal that firms with high proportion of non-depreciated investment property are significantly influenced by the value fluctuations attributable to the fair value measurement; and that, as a result, these firms have adopted the cost model. On the other hand, those with high proportion of depreciated investment property, the majority of which are real estate companies with familiarity with the fair value model, tend to adopt the fair value model to account for the investment property. In addition, businesses with high reliability in the fair value measurement exhibit a propensity to adopt the fair value model to mitigate the information asymmetry.

To the second objective, the research results reveal that the fair value model's value relevance is not superior to that of the cost model on the aggregated and disaggregated levels. This could be attributed to the vehement attachment of investors in many less advanced economies, including Thailand, to the cost model since they hold the view that the fair value model is less reliable (Ishak et al., 2012; Pappu & Devi, 2011). However, upon holding constant the reliability effect by partitioning the samples according to the firms' AR-scores, the results are reversed for the high reliability group; in other words, the fair value model exhibits greater intrinsic value relevance than does the cost model. This implies that investors would put more trust in the fair value model only if the measurement is reliable; and that the AR-score approach for holding constant the inherent reliability effect is effective as anticipated. According to Pappu and Devi (2011) and Ishak et al. (2012), the reliability information disclosed in the notes of the financial statement could lessen the investors' attachment to the cost model.

Following partitioning, the relative superiority of the fair value model in terms of value relevance to the cost model are present in the depreciated investment property and the aggregated investment property but absent in the non-depreciated investment property. The results suggest that investors use information belonging to the different components differently and that they regard the depreciated investment property as a proper representative of the aggregated investment property.

Based on the aforementioned, it is evident that, in less advanced economies, both firms and investors have developed a strong bond to the cost model. In other words, a greater proportion of firms would opt for the cost model and the investors would rely on the cost model-based information due to the wide fluctuation in the fair value of the investment property. In fact, the cost model fixation could be alleviated by the disclosure of high reliability information. This can also refer that the fair value might not be the best where the fair value of assets is fluctuating and can also be a signal to the standard setter for the improvement of the switching concept between the fair value and the cost value model.

Chapter 2 deals with the evolution of the accounting standard and a review of the investment property standard. Chapter 3 discusses the hypotheses of this current research, while Chapter 4 details the theoretical analysis models. Chapter 5 describes the research data as well as their descriptive statistics, and Chapter 6 reports the research findings. The concluding remarks, implications and recommendations are provided in Chapter 7.

CHAPTER II

BACKGROUND

2.1 The Convergence Project and the Fair Value Accounting Paradigm

In October 2002, the Financial Accounting Standard Board (FASB) and the International Accounting Standards Board (IASB) announced the issuance of a memorandum of understanding (the "Norwalk Agreement"), regarding the convergence of the U.S. and international accounting standards (FASB, 2013). The convergence project has integrated all accounting standards over the world to be a single set standard which is the “international financial reporting standard” or “IFRS”. This accounting standard will be accepted worldwide in order to make the financial information entirely comparable (Barth, 2006). The goals of the convergence project are the enhancement of the financial reporting comparability, the improvement of the corporate transparency, the increasing of the financial statements quality and, ultimately, the increasing of the benefits for investors (Daske, Hail, Leuz, & Verdi, 2008).

The core concept of IFRS is to use the fair value accounting in the preparation of the financial reporting (Barth, 2006; Da Costa, 2009; Ernst & Young, 2011; Gwilliam & Jackson, 2008; Landsman, 2007; Pappu & Devi, 2011). Emerson, Karim, and Rutledge (2010) also raise an issue that FASB and IASB are moving forward with increasing in the adoption of the fair value measurement in the accounting standard. This is widely called as the fair value paradigm (Barlev & Haddad, 2007), which can lead to the harmonization of the accounting standard and the usefulness of the financial information. Barth (2006) reminds to focus on the importance of the fair value accounting after the specific global standard setting, as well as points out the controversial effects of the fair value accounting adoption because there are arguments to the use of fair value. It can be said that the convergence project has led, more or less, fair value accounting trouble to the standard setters and the adopters heretofore.

2.2 The Fair Value Component

Recently in 2013, International Accounting Standard Board (IASB) issues a new accounting standard, International Financial Reporting Standard No.13: Fair Value Measurement (IFRS13). The main objectives of this standard are to define 'fair value', to set out a single IFRS framework for measuring fair value and to require disclosures regarding the fair value measurement (IASB, 2013b). This version defines fair value[4] as "the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date"

2.3 The Valuation Approach

According to IFRS13, there are three valuation approaches which are (1) the market approach using actual prices derived from the market transactions of identical or comparable assets (2) the income approach using the aggregated amount of discounted future cash flows or net income, and (3) the cost approach using the amount required currently to replace the economic benefit of such assets. Nonetheless, the fair value measurement can also be classified into two groups as follows[5] (Ernst & Young, 2005),

Mark-to-market approach : Fair value will be determined by hypothesizing what a market price would be if there is an active market for that identical assets or liabilities. This is called as level 1 of the fair value hierarchy. In addition, when there is an active market for similar assets or liabilities or there is an inactive market for identical assets or liabilities, this is called as level 2 of the fair value hierarchy (IASB, 2013b). This approach is based on observable inputs.

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[4] This fair value definition is referred in IFRS13, which has yet to be adopted in Thailand during a period of the study (2011-2014). The definition of fair value during the period of the study is "the amount for which an asset could be exchanged, or a liability settled, between knowledgeable, willing parties in an arm's length transaction" which is used to be fair value definition of IFRS before 2013.

[5] IFRS13 is adopted in Thailand in 2015, therefore, the levels of fair value measurement have not yet adopted during 2011-2014 which is the period of the study. The study thus follow the classification of fair value measurement of Ernst and Young (2005).

Mark-to-model approach : When there is no observable input, the measuring of fair value deals with a range of the valuation techniques such as, the discounted cash flow method (DCF), the dividend discount model (DDM), the constant-growth DDM, and the capitalization model (IASB, 2012c). The mark-to-model method, considered as level 3 of the fair value hierarchy, is a prediction but not an observation, thus, it affects the problem of the reliability of the fair value (IASB, 2013b). Below is a table summarizing level of fair value measurements from IFRS13,

Table 1 Level of fair value measurements from IFRS13[6]

Level of fair value measurements	Method	Inputs	Priority
Level 1	Mark to market from observable inputs	an active market for identical assets or liabilities	Highest
Level 2		an active market for similar assets or liabilities or an inactive market for identical assets or liabilities	Middle
Level 3	Mark to model from unobservable inputs	Valuation models	Lowest

Nonetheless, IASB (2013b) claims that there is no most appropriate technique when dealing with the choices. It depends on the nature of the underlying assets or liabilities and the availability of the information. Also, the valuation involves with a significant judgment and it is likely that different valuation techniques will provide

[6] IFRS13 introduce inputs of fair value measurements into observable and unobservable inputs which are better and modern than the classification into mark-to-market and mark-to-model class. However, since the study have been performed during 2011-2014 of which IFRS13 has not yet issued in Thailand, so the classification by marking-to-market and marking-to-model method are used in this study.

different results. Changing one of the assumptions, can affect massive number of appraised values. Nordlund (2008) concerns the use of the assumptions in valuing assets which can distort the financial report. Nordlund (2008) also claims that the assumptions might be affected by temporary economic circumstances, thus fair value is presented the non-persistent value. Ernst and Young (2005) interestingly points out that the mathematical model can cause the reliability problem.

2.4 Fair Value Accounting versus Cost Accounting

According to Barlev and Haddad (2003), the adoption of fair value accounting, by which assets and liabilities are measured at estimates of their current values, has diverse effects on the internal (i.e. the management and preparers of financial statements) and external concerned individuals (i.e. shareholders, auditors, creditors, regulators, standard setters and other stakeholders). Interestingly, despite extensive research studies on the relative superiority between the fair value and cost accounting practices, the results are inconclusive.

Aboody, Barth, and Kasznik (1999) investigated the adoption of the fair value of fixed assets by UK firms and reported that the recognized revaluation amount is positively associated with the market reactions or annual returns. Venkatachalam (1996) documented the relative superiority of the fair value accounting practice with regard to estimation of the financial derivatives to the cost accounting practice due to the former's higher explanatory power in the cross-sectional variation in the equity prices. In contrast, Barth, Beaver, and Wolfson (1990) found no relationship between the securities prices and gains (or losses) and concluded that the application of fair value accounting had no relevancy to the decision of equity investors. According to Barth, Beaver, and Landsman (1996), there existed a significant association between prices and fair value recognition for only three out of five components of the financial assets and liabilities (i.e. securities, loans and long-term debt had significant association but deposits and off-balance sheet items do not). C. Chen et al. (2015) noted that fair value is occasionally subjected to manipulation for earnings management purposes.

The negative findings point to a fact that fair value accounting is unnecessarily superior to the cost accounting practice.

R. Sloan (1996) argued that there remain some model specification problems, especially the lack of control variables, when researchers carried out tests on the usefulness of fair value accounting. In addition, Klimczak (2009) proved that several empirical research on the relationship between accounting numbers and the market value could be misinterpreted due to such econometric issues as the heteroskedasticity and multicollineality problems. The relative superiority between the fair value and cost accounting practices is thus largely questionable as a result of both the inconclusive results and econometric problems.

2.5 Relevance versus Reliability

According to the IASB (2010) , R. G. Sloan (1999), Holthausen and Watts (2001) and Barth, Beaver, and Landsman (2001), relevance and reliability in accounting are defined as:

“Relevance[7] refers to an ability of making a difference in the decisions made by users, when it has a confirmatory value or feedback value, a predictive value, or both, of which are interrelated. Also, relevance means the timeliness of accounting information which is available for decision makers in making a decision before it loses the ability to do so.”

“Reliability refers to the accounting amount which is measured and represented faithfully, verifiably, and neutrally. The faithfulness means that the amount represents what it purports to represent. The verifiability is that considerably amount would be obtained from using different measures, and, the neutrality is that

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[7] The relevance as stipulated in the framework and the value relevance in term of accounting research is close to but not in the same sense. The relevance in the framework refers to an ability of making a difference in the decisions made by users, e.g. creditors, investors, customers and etc., but the value relevance in term of accounting research refers to broader meaning, but specifies the results of the use of accounting information on investors reflecting into share price.

the information is free from bias intended to attain a predetermined result or to induce a particular behavior."

Under the revised conceptual framework (EFRAG, 2013), reliability has been replaced with faithful representation, but relevance remains as a qualitative characteristic of the financial statements (IASB, 2013a). According to the European Financial Reporting Advisory Group (EFRAG, 2013), the International Accounting Standards Board (IASB) addressed the trading-off argument between reliability and relevance by replacing the former with faithful representation; and also proposed that the financial information should comprise both relevance and faithful representation. EFRAG nonetheless insists that reliability is of greater significance than faithful representation and thereby should be reinstated in the conceptual framework. The IASB has recently issued an exposure draft of the 2015 revised conceptual framework and insists not to reinstate the reliability as suggested by EFRAG. The reason given by the IASB is that the alteration is to avoid confusion about the meaning of term "reliability" as people normally equate the word "reliability" solely with a tolerable level of measurement uncertainty, not with the intended broader notion (IASB, 2015a, 2015b). In addition, although the reliability is replaced, it is often identified in the recognition process of most accounting standards that assets and liabilities are to be accounted for the transactions only when it is reliably measured.

Previous research had attempted to identify the relationship, i.e. either consistent or contradictory, between relevance and reliability (Aboody et al., 1999; Barth et al., 1996; Barth et al., 1990; Venkatachalam, 1996). Despite the IASB's replacement with faithful representation for reliability (EFRAG, 2013), their conflicting relationship (i.e. between relevance and reliability) is still repeatedly mentioned. For instance, R. G. Sloan (1999) documented a conflicting relationship between the relevance and reliability of the amounts recognized and disclosed in the financial statements. Schipper (2003) focused on the trading-off relationship between relevance, where the reporting is based on estimates and judgments, and reliability, where the reporting is based on little or no estimation. Specifically, arguments on the relevance versus reliability issue are eventually translated into the accounting choices between fair value accounting and cost accounting (Aboody et al., 1999; Collins, Maydew, & Weiss, 1997; Landsman, 2007; Muller III, 1999). This research will follow the definition of "relevance" power of the accounting information as suggested by Barth et al. (2001)

2.6 Arguments on Fair Value versus Cost Accounting in the Context of Relevance and Reliability

The adoption of fair value accounting in place of cost accounting has reportedly contributed to higher relevance benefits from the information in the financial statements (Da Costa, 2009; Easton, Eddey, & Harris, 1993; Eccher, Ramesh, & Thiagarajan, 1996; Herrmann, Saudagaran, & Thomas, 2006; Lopes, 2006; Lourenço & Dias Curto, 2009; Venkatachalam, 1996). The principal drawback of fair value accounting is a deterioration of reliability since oftentimes the fair value estimates are subject to personal biased judgments (Barlev & Haddad, 2003; Cotter & Richardson, 2002; Cotter & Richardson, 1999; Danbolt & Rees, 2008; Dietrich, Harris, & Muller, 2000; Muller III & Riedl, 2002; Power, 2010). Thus, the levels of reliability could contribute positively or negatively to the relevance benefits of the fair value accounting practice, as per Barth (1994); Barth, Clinch, and Shibano (2003); Christensen and Nikolaev (2009); Khurana and Kim (2003); Landsman (2007); Müller, Riedl, and Sellhorn (2015); Nordlund (2008); Power (2010); Zülch and Nellessen (2010). Nevertheless, there exists no research study that definitively separates the reliability factor from the relevance.

2.7 International Accounting Standard No.40 (IAS40): Investment Property

Investment property is defined as *"property (land or a building or part of a building or both) held (by the owner or by the lessee under a finance lease) to earn (1) rentals or (2) for capital appreciation or (3) both rather than for (a) use in the production or supply of goods or services or for administrative purposes or (b) sale in the ordinary course of business (IAS 40.5)."* (IASB, 2012c)

Investment property refers to an asset that generates no direct or operational incomes but indirect incomes for a company in the form of rentals and/or appreciation of the property. Examples of investment property are land held for long term capital appreciation or for an undetermined future use, a building leased out or a vacant building held to be leased out, and property that is being constructed for future use as investment property. IAS40 also provides examples of non-investment property, e.g. property held for use in the main production or servicing or for administrative purposes, property held for sale in the ordinary course of business, property being constructed on behalf of a third party, owner-occupied property and property leased to another entity under a finance lease.

2.7.1 Measurement Subsequent to Initial Recognition

Unlike the measurements of other assets, IAS40 permits entities to choose between (a) the fair value model, under which the investment property is measured at fair value with the recognition of upward and downward changes in fair value in the income statement; or (b) the cost model, under which the investment property is measured at cost less accumulated depreciation (and/or allowance for impairment losses), which is consistent with IAS16. However, an entity adopting the cost model is required to disclose the fair value of its investment property in the notes of the financial statements. Typically, a firm is allowed to select only one model to which all investment properties are subsequently applied. Nevertheless, an exception exists for the investment property whose fair value is unreliably measurable on a continuing basis at the initial recognition date; and thus the cost model is deployed while the remaining property adopts the fair value model, according to paragraph 53 of IAS40.

A switch between both models is permissible only if the change results in a better informational presentation. IAS 40 notes that the switching from the cost model to the fair value model is more appropriate. This is because the fair value model is preferable from the perspective of IASB in that it offers more relevant information to investors (Barth, 2006). On the other hand, paragraph 31 of IAS 40 states that there is a very low probability that the switching from the fair value model to the cost model will improve the relevance of the financial information, practically giving rise to a rarity of this form of switching.

2.7.2 Fair Value Measurement under IAS40

IAS40 (revised 2009) identifies fair value as "the amount for which the property could be exchanged between knowledgeable, willing parties in an arm's length transaction". IAS40 also acknowleges that the best estimate of fair value is the current market value on an active market for such identical investment property in the same location and condition. The second-best fair value estimate is either (a) the market prices for dissimilar properties adjusted to reflect such differences, (b) prices from less active markets of identical assets which are adjusted to reflect economic changes, or (c) prices from discounting the estimated future net cash flows (DCF). Under IAS40, fair value is not enforced, but encouraged, to be revalued by an independent valuer.

2.7.3 Differences between the Revaluation Model (IAS16) and the Fair Value Model (IAS40)

Although, the revaluation method[8] (International Accounting Standard No.16) (IASB, 2012a) and fair value model (IAS40) is similar and rely on fair value of the underlying assets, there are many differences in terms of accounting treatment as summarized in the table 2.

While IAS40 enforce to apply only one model for the entire investment property, IAS16 require firms to adopt it for all assets in the same class. But not for all assets of firms. IAS40 also requires firms to revisit the fair value annually, while IAS16 only requires them to do on a regular basis (i.e. 3 to 5 years basis). When firm apply the fair value model, IAS40 does not require them to amortize its depreciation but IAS16 still require firms to do that. The switching concept of IAS16 is open widely, i.e. the revaluation model and the cost model are switchable. But, IAS40 supports only the switching from the cost model to the fair value model. Moreover, if assets have appreciation from their fair value, IAS40 allows firms to recognize that gain through profit or loss statement while IAS16 require firms to recognize them to other

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[8] IAS38 (Intangible assets) also provides choice for the revaluation model. However, the analysis include only IAS16 to reflect the comparison of tangible assets.

comprehensive income which will be subsequently recorded to other components of equity. Lastly, IAS40 requires firms to disclose its fair value even they apply the cost model while IAS16 does not require that when firms adopt the cost model.

Table 2 Differences between IAS16 and IAS40 in terms of accounting treatments of assets

Issues	IAS16 - Revaluation model (Property, plant and equipment)	IAS40 - Fair value model (Investment property)
Items in the categories	Class of assets	All assets
Frequency of revaluation	Regularity (every 3 to 5 years)	Annual basis
Depreciation	Depreciation required	No depreciation required
Switching to the cost model	No restriction	Very low probability to occur
Recognition of an increase from revaluation	Recorded to other comprehensive income	Recorded to profit or loss
Fair value disclosure when firms adopt the cost model	Not required	Required

2.7.4 Investment Property Disclosure

Both the fair value model and cost model adopters are required to disclose the reconciliation of the carrying values at the beginning and end of the period by category. Specifically, IAS40 requires that the reconciliation of the fair value model include the net gains or losses from changes in the fair values, the net exchange differences from the translation of the financial statements of a foreign entity, and the transfer amounts between investment property and other assets. On the other hand, the reconciliation of the cost model should include depreciations, impairment losses, net exchange differences for the investment property, and the transfer amounts between investment property and other categories. However, the cost model adopters are required to disclose a depreciation method, useful life and, most importantly, the fair value of the investment property (IAS40.79).

In addition, IAS40 requires that firms disclose information pertaining to their investment property regardless of the accounting choices. The disclosures include: (a) the chosen model, (b) the method of determining the fair values irrespective of whether the amounts are recognized or disclosed, (c) a qualified independent valuer with appropriate experience, (d) the rental amounts recognized in the income statement with a classification between properties that generated income and those that did not, (e) any restrictions on the investment property, and (f) the contractual obligations to purchase, construct or develop the investment property.

2.7.5 Importance of IAS40

IAS40 is claimed to be the first standard which International Accounting Standard Board (IASB) allows the fair value model for non-financial assets (Müller et al., 2015). The relevance and reliability of the fair value argument has long been concerned by both academics and standard setters or regulators. However, most research focus on the financial assets and claim that fair values considerably provide more value relevance (e.g., Barth (1994), Nelson (1996)). Non-financial assets, on the contrary, are not primarily focused by researchers as it should be. While IAS16: Property, plant and equipment(IASB, 2012a), and IAS38: Intangible assets (IASB, 2012b), provide the revaluation method for firms choosing the fair value accounting, appreciation of such assets is to be solely recognized through other component of equity. On the contrary, appreciation of the investment property under IAS40 will be directly recognized in the financial performance of firms. In addition, those standards do not require firm to measure fair value of the underlying assets when they apply the cost model. IAS40 however still requires them to disclose fair value of these assets even they apply the cost model. IAS40 is therefore the first accounting standard that fully applies the fair value fundamental with the non-financial assets.

Practically, an exclusion of the investment property from property, plant and equipment is important in analyzing firms' operating performance and firms' wealth. The fixed assets ratio and fixed assets turnover will be improved since fixed assets are excluded the investment property that does not generate main operating income.

Moreover, the investment property can inform users about the investment in a non-financial asset of the company that can generate non-operating profit in a long-term period and the wealth of the company. Also, since its change in fair value can be recognized both an increase and a decrease through profit or loss statement, investors are able to recognize changes of its wealth during the year from the long-term investment that is not the main operating activity. Therefore, information about the investment property has various useful to both management, firms, investors and other stakeholders.

CHAPTER III

HYPOTHESIS DEVELOPMENT

3.1 Characteristics of Fair Value Accounting Adopters

Under IAS40, firms are presented with two options for the recognition of investment property, i.e. at fair value or at cost. Extensive research related to investment property recognition has focused on the characteristics of firms that adopt the fair value model (e.g. H. M. Chen and Kuo (2004), Gray and Fearnley (2011), Christensen and Nikolaev (2009), Quagli and Avallone (2010)). These publications were motivated by the fact that fair value accounting is controversial in its usefulness and relevance (Barth, 2006). Although Cairns, Massoudi, Taplin, and Tarca (2011) found evidence that UK firms tend to adopt the fair value model for a relevance purpose, most firms in less advanced economies are likely to adopt the other model for a hidden purpose (Ishak et al., 2012; Pappu & Devi, 2011). According to IASB (2012c), the cost model-adopting firms are required to disclose the investment property's fair value, thereby resulting in similar revaluations between the two accounting choices. Thus, the determinants for firms' adoption of the fair value model are still indefinitive.

Muller et al. (2011) documented that firms would adopt fair value accounting for investment property when faced with an ownership dispersion and a commitment to transparent reporting. Quagli and Avallone (2010) reported that managerial opportunism is the main reason for the adoption of fair value for investment property; and that neither a leverage nor information asymmetry plays a crucial role in the adoption. The comparability of the financial statements (Cairns et al., 2011) and the disclosure quality (Edelstein, Fortin, & Tsang, 2012) also increased following the firms' adoption of the fair value model. In addition, Christensen and Nikolaev (2009) found that a high financially-leveraged firm likely adopts the fair value model. Interestingly, C. Chen et al. (2015) reported that, in the Chinese mainland, fair value accounting would typically be applied to the investment property located remotely from the central economic zones.

In this current research, our first hypothesis is concerned with two additional characteristics of firms that adopt the fair value model: (1) the investment property components and (2) the reliability level of fair value measurements.

3.1.1 Investment Property Components

The first characteristic under study is the composition of investment property, i.e. the investment property components. According to Christensen and Nikolaev (2009), investment property can be categorized into two principal groups: the non-depreciated and depreciated investment properties. This is consistent with Brown, Izan, and Loh (1992); Choi, Lee, and Pae (2012); Cotter and Zimmer (2003), who have classified land as a non-depreciated asset while buildings and other assets as the depreciated assets.

The non-depreciated investment property, i.e. land and leasehold rights under an operating lease[9], typically appreciates in value and its appropriate fair value is readily available. On the other hand, the depreciated investment property, i.e. buildings and equipment, is subject to deterioration and a subsequent refurbishment as well as is constrained by the limited observable market prices for fair value appraisal. Many researcher noted that the accounting choices might be influenced by the investment property components and that the components could affect the value relevance of investment property but failed to test the assumptions (Christensen & Nikolaev, 2009; Cotter & Zimmer, 2003; Kang & Zhao, 2010). This is consistent with the research findings relevant to property, plant and equipment by Kang and Zhao (2010) and Easton et al. (1993). Table 3 summarizes the classifications of investment property.

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[9] A property interest or leasehold right under an operating lease belongs to the non-depreciated property investment category. However, this kind of investment property is scoped out from this study due to the sense that it is not the real property of firms and can be treated under another accounting standard, i.e. IAS17 : Leases, which can confuse the results.

Table 3 Classification of investment property[10]

	Non-depreciated IP	Depreciated IP
Items	Land and leasehold rights	Buildings and equipment thereon
Nature	Tend to rise in value	Tend to depreciate over time
Measurement input	Mark to market (observable input)	Mark to model (unobservable input)
Accounting treatment	No depreciation required	Depreciation required

In addition, firms would opt for an alternative that offers more reliable information for valuation. The non-depreciated investment property can be readily marked to market because of the availability of active markets for the observable prices. According to IAS40.45, the observable market prices are regarded as the best measurements. Thus, this class of investment property provides reliable fair value (Watts, 2006). Furthermore, Nordlund (2008) noted that the mark-to-market approach is more readily implemented than the mark-to-model approach of the cost model.

On the contrary, the depreciated investment property is measured subjectively since it involves unobservable inputs and assumptions in calculating the mark-to-model prices due to the unavailability of active market for such assets (Barlev & Haddad, 2003). By comparison, the fair value of the depreciated investment property is thus less reliable vis-à-vis that of the non-depreciated investment property. The lower reliability contributes to a rise in the fair value measurement cost and a subsequent decrease in the net gain from adopting the fair value model (Christensen & Nikolaev, 2009). Khurana and Kim (2003) reported that the availability of market prices from an active market has a significant impact on the reliability of the fair value, while Danbolt and Rees (2008) pointed out that the application of the mark-to-model method to real estates contributed to an accounting bias.

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[10] Investment property can also be classified into assets that generate rental income and assets that generate appreciation in its value. However, there is a limitation in data collection and financial statement disclosure, so the study use the classification by accounting treatment as primary key concept.

According to Cotter and Zimmer (2003), firms with a high ratio of land to total assets tend to adopt fair value accounting for the reason that land can be objectively and reliably measured whereas the revaluation of buildings and equipment involves several assumptions. Choi et al. (2012) found a pecking order of the revaluation model of property, plant and equipment in South Korea and that Korean companies carried out the revaluation of depreciated assets in parallel to the revaluation of non-depreciated assets. Under the efficient contracting hypothesis, Holthausen (1990) argued that firms would opt for an accounting choice that could unearth hidden information and mitigate the information asymmetry. It is thus anticipated that the non-depreciated investment property is recorded at fair value and that the depreciated investment property at cost due to the former's higher level of reliability with regard to the fair value measurement.

Brown et al. (1992) found that the asset type, in particular non-depreciated assets, influences the adoption of fair value since the non-depreciated assets tend to exhibit significant differences between the historical and current values, in comparison with the depreciated assets. The authors also documented that firms would adopt the fair value model to recognize the surplus on revaluation for debt contracting purposes. Under the debt contracting theory, the fair value model is more preferably applied to the non-depreciated investment property than is the cost model in order to benefit from the appreciation of the investment property (Watts and Zimmerman, 1978). Taken together, it is thus hypothesized that:

***Hypothesis 1a**: Firms with higher ratios of non-depreciated investment property to depreciated investment property will adopt the fair value model for recognizing the investment property, ceteris paribus.*

3.1.2 Reliability of Fair Value Measurements

Another characteristic of interest of fair value-model adopting firms is the ability to provide reliable fair value measurements. In other words, firms capable of provision of reliable fair value measurements would opt for the fair value model, while those less capable would instead adopt the cost model. This is consistent with the efficient contracting theory (Holthausen, 1990) in which an agent capable of providing reliable information would disclose the information in the financial results and thereby remove the principal-agent informational asymmetry.

According to Khurana and Kim (2003), fair value is of use if the market is efficient and the fair value measurement is reliable. Christensen and Nikolaev (2009) documented that real estate firms typically adopt the fair value model due to the extensive availability of fair market values, rendering their fair value measurements highly reliable. Quagli and Avallone (2010) and Gray and Fearnley (2011) investigated real estate firms and concluded that firms with ability to reliably appraise the fair value would do so. Moreover, Muller III, Riedl, and Sellhorn (2011), Quagli and Avallone (2010) and Gray and Fearnley (2011) reported that firms engaging the services of Big4 audit firms tended to adopt the fair value model since these established audit companies possess sufficient knowledge and expertise with regard to the fair value method.

Conversely, Barth (1994); Eccher et al. (1996); Pappu and Devi (2011) found that firms incapable of providing the reliable fair value measurement would instead adopt the cost model. The usefulness of accounting information is thus considerably subject to the fair value reliability which subsequently influences the accounting choice adopted by firms. In other words, the reliability in fair value measurements dictates the accounting choices. Specifically, firms with high levels of reliability in the fair value measurements opt for the fair value model; otherwise, they would adopt the cost model.

Hypothesis 1b: *Firms with higher levels of reliability in the fair value measurements will adopt the fair value model for recognizing the investment property, ceteris paribus.*

3.2 Value Relevance of Investment Property

Despite extensive research on the implications of International Financial Reporting Standards (IFRS) implementation under the convergence project, the findings with regard to the beneficial effects are still inconclusive. According to FAP (2009), Barth (2006); IASB (2010), as stipulated in the conceptual framework, the relevance of the accounting numbers is a qualitative characteristic of the financial statements. However, the relevance as stipulated in the framework and the value relevance in term of accounting research is close to but not in the same sense. The relevance in the framework refers to an ability of making a difference in the decisions made by users, e.g. creditors, investors, customers and etc., but the value relevance in term of accounting research refers to broader meaning, but specifies the results of the use of accounting information on investors reflecting into share price. Therefore, both terms must be used and read cautiously. Daske et al. (2008); Lourenço and Dias Curto (2009) Chalmers, Clinch, and Godfrey (2011); Clarkson, Hanna, Richardson, and Thompson (2011); Khanagha (2011) found evidence of increased value relevance of the accounting numbers upon the adoption of IFRS under the convergence project; however, Barlev and Haddad (2007) reported the opposite. In addition, subsequent research studies have investigated the constituent standards of IFRS with useful contributions to the financial statement users, standard setters and regulators. For instance, Paik (2009) investigated the effect of the adoption of revised IAS16: *Property, plant and equipment*, and Oliveira, Rodrigues, and Craig (2010)examined the effect of the adoption of revised IAS38: *Intangible assets*. They found that the information pertinent to non-current assets contains several levels of value relevance, depending on the circumstances and statistical models.

The IAS40 standard (investment property) is a product of the convergence project and has a considerable impact on its adopters in general and investors in particular with respect to value relevance (Ernst & Young, 2011). Da Costa (2009); Deaconu et al. (2010); Ishak et al. (2012); Lourenço and Dias Curto (2009); Owusu-Ansah and Yeoh (2006); Pappu and Devi (2011) are examples of the research studies on the effects of IAS40 implementation on the investors' decision-making. This type of research is commonly referred to as "value relevance" research.

According to the revised conceptual framework (IASB, 2013a), relevant financial information is "capable of making a difference in the decisions made by users. Information may be capable of making a difference in a decision even if some users choose not to take advantage of it or are already aware of it from other sources."

According to Beaver (1998), an accounting amount is deemed value relevant if it has a significant association with equity market value. In Barth et al. (2001), the authors made a reference to Amir, Harris, and Venuti (1993), whom they believed to be a first study that used the term ''value relevance'' to describe the association between price and the accounting information. The definition of "value relevance" was given as follows:

"Accounting amount will be value relevant, i.e. have a predicted significant relation with share prices, only if the amount reflects information that is relevant to investors in valuing the firm and is measured reliably enough to be reflected in share prices"

Ball and Brown (1968) and Barth et al. (2003) noted that examining share price behavior is an effective way to study the investment behaviors of large groups of investors. Watts and Zimmerman (1986) documented that, under the mechanistic hypothesis, the accounting information is assumed to be realized by investors in evaluating firms' value; and that changes in a stock price are thus attributable to changes in the accounting numbers. In addition, V. L. Bernard (1994)reported that stock prices are generally a function of book value and firms' earnings in accordance with the residual income model, while R. Sloan (1996) found that investors have a tendency to fixate on the firms' earnings numbers. Zeff (1978) documented that, under the economic consequences theory, the accounting numbers and accounting reports play a significant role in the decision-making process of such stakeholders as labor unions, investors and debtors.

Moreover, subsequent research studies on value relevance have made a comparison between the disclosed and recognized information and reported different levels of value relevance to investors (V. Bernard & Schipper, 1994). Ohlson (1995) examined the relationship between price and accounting numbers and subsequently proposed the Ohlson's model. The model has demonstrated that price is a function of book value, abnormal or current earnings and other information. According to Barth (2006), the Ohlson's model is regarded as superior to any other model for value relevance research purposes since it specifies a direct relationship between the accounting information and the firm value.

This current research builds upon the aforementioned studies to investigate in the Thai setting the effects of the IAS40 (investment property) adoption. It is expected that the findings would offer new perspectives, particularly with regard to the implications of accounting choices (i.e. the fair value and cost models) afforded by this standard, to the standard setters, regulators, accounting preparers and financial statement users.

3.2.1 Value Relevance of the Aggregated Investment Property

Lourenço and Dias Curto (2009)studied the association between prices and investment property in France, Germany, Sweden and the UK and reported that investors utilized the information from the cost and fair value models in appraising the firms' value differently and that they (i.e. the investors) viewed the recognized and disclosed investment property fair value information differently. Da Costa (2009) investigated the investment property of 75 Portuguese-listed companies that adopted IFRS in 2005 and reported that the recognized fair value exhibits more value relevance than the disclosed fair value and that no difference in value relevance exists between the recognized historical cost and the disclosed fair value. On the contrary, Pappu and Devi (2011) and Ishak et al. (2012) documented that, in Malaysian firms, the cost value of investment property has more value relevance than its recognized fair value.

Despite a common belief that the fair value adoption contributes to increased value relevance of the accounting numbers pertinent to investment property, So and Smith (2009) nevertheless documented the problems afflicting the application of fair value to investment property: (1) a lack of active markets for most assets, giving rise to highly subjective and potentially unreliable valuations, (2) the fair value accounting implementation is relatively costly for small enterprises, and (3) the direct recognition of unrealized gains or losses according to the fair value of assets in the income statements could lead to a greater volatility and unpredictability of the firms' operating results.

Fair value is believed to exert considerable influence over the decision-making process of investors, consistent with the statement in paragraph 17 of IAS40 (FAP, 2010) that in most cases, it is unlikely that a switch from the fair value model to the cost model improves the decision-making ability of the financial statement users. Moreover, the fair value model can recognize either an increase or a decrease in the investment property fair value, whereas the cost model can recognize only a decrease in the investment property value. Thus, the fair value model can reflect the true economic value of investment property and thereby offer relevant information to investors. It is possible to conclude that the fair value model is of greater value relevance than is the cost model with disclosure of fair value.

Hypothesis 2: *The investment property recognized at fair value has more value relevance than that recognized at cost with disclosure of fair value.*

3.2.2 Value Relevance of the Disaggregated Investment Property

According to Christensen and Nikolaev (2009), investment property can be categorized into two principal groups: the depreciated and non-depreciated investment property. Most prior value relevance research on investment property focused on the aggregated level (i.e. the bottom-line amount) of the investment property (Da Costa (2009); Deaconu et al. (2010); Ishak et al. (2012); Lourenço and Dias Curto (2009); Owusu-Ansah and Yeoh (2006); Pappu and Devi (2011)). This current research has nevertheless hypothesized that different asset components are of diverse value relevance and thereby refute the aforementioned study results. Specifically, the disaggregation could offer new useful perspectives although the practice is non-mandatory. For instance, Abdul-Shukor, Ibrahim, Kaur, and Md-Nor (2008); Aboody and Lev (1998) disaggregated the components of intangible assets and investigated their individual predictive ability of stock prices, while Khurana and Kim (2003) regressed the disaggregated components of financial investments. Kang and Zhao (2010) pointed out that the separation of land from other properties offers more accurate results regarding value relevance of depreciation. Easton et al. (1993) separated land and buildings for rent from plants and equipment and subsequently reported that the first group (i.e. land and buildings for rent) provided value relevance in the non-financial industry whereas the other group did not. In short, the knowledge of each component's value relevance contributes to a deeper understanding with respect to the accounting choices and usefulness of individual investment property.

The non-depreciated and depreciated investment properties are different in their respective nature and accounting treatment. According to Cotter and Zimmer (2003), the value of non-depreciated investment property (i.e. land) tends to appreciate over time while the depreciated investment property (i.e. buildings and equipment) suffers from a physical deterioration over time and requires a refurbishment. In addition, the revaluation of the non-depreciated group is straightforward by referencing to the readily available market prices, whereas the revaluation of the depreciated group is marked to model due to the unavailability of the active market, thereby most likely resulting in biased measurement (Nordlund, 2008). In addition, the recognition of the depreciation of depreciated investment property is, under the cost method, recorded directly in the income statement while the non-depreciated investment property has no depreciation to be recorded.

In general, the non-depreciated investment property exhibits an upward change in the fair value. Thus, in comparison with the cost model, the fair value model offers more value relevance since both upward and downward changes in the fair value would be recognized under the fair value model, while under the cost model only changes in the fair value attributable to impairment would be recognized. Interestingly, Da Costa (2009); Lourenço and Dias Curto (2009) and Muller III et al. (2011) documented that the fair value disclosure of investment property is of less value relevance than the fair value recognition. This is consistent with Barth et al. (2003); Espahbodi, Espahbodi, Rezaee, and Tehranian (2002); Landsman (2007) and Niu and Xu (2009), who reported that the recognition is more relevant to investors than disclosure. According to IAS40 (paragraph 17), the adoption of the fair value model provides more relevant information to investors than the cost model (Iatridis & Dalla, 2011), consistent with Hypothesis 2. Moreover, due to the availability of the active markets, the fair value of non-depreciated investment property is reliably measured (Nordlund, 2010) and thereby there should be minimal concern with regard to the measurement reliability. It is thus possible to conclude that the non-depreciated investment property recognized at fair value offers more value relevance than that recognized at cost with disclosure of fair value.

For the depreciated investment property, in comparison with the cost model, the fair value model seems to offer more value relevance since both upward and downward changes in the fair value are captured in the income statement, similar to the case of the non-depreciated investment property. Nevertheless, unlike the non-depreciated investment property, the value relevance of depreciated investment property suffers from the issue of reliability due to less availability of the active markets for fair value appraisal (Cotter & Zimmer, 2003; Kang & Zhao, 2010). The revaluation is thus carried out using the mark-to-model method (Barlev & Haddad, 2003; Ernst & Young, 2005), which is regarded to be of less reliability than the mark-to-market method from the points of view of investors (Nordlund, 2010) and standard setters (IASB, 2013b).

According to Khurana and Kim (2003), the reliability of the active markets has an influence on the reliability of fair value measurements. Danbolt and Rees (2008) pointed out that the application of the mark-to-model approach to real estate leads to biased accounting and thus adversely impacts the economic decision of the financial statement users. Interestingly, Cotter and Richardson (2002) documented that, in several occasions, the depreciated investment property could be better valued by the mark-to-model method performed by an internal appraiser with in-depth knowledge of the business. However, this valuation method is believed to reduce transparency, increase management opportunism (Dietrich et al., 2000), increase information asymmetry (Muller III & Riedl, 2002), decrease informativeness (Muller III et al., 2011) and ultimately decrease the reliability (Dietrich et al., 2000) of the fair value of the depreciated investment property. Thus, the mark-to-model method generally used with the depreciated investment property is regarded as unreliable (Nordlund, 2008) and biased (Emmanuel Iatridis & Kilirgiotis, 2012). Christensen and Nikolaev (2009)found that firms opt against applying the fair value model to non-financial assets unless there are available active markets because the measurements would suffer from the lack of reliability. Moreover, Pappu and Devi (2011) and Ishak et al. (2012) studied the investment property in Malaysian firms and found no value relevance of the investment property recorded at fair value due to the fact that investors in a less advanced economy attach greater importance to the cost model and thereby disregard the recognized fair value. This is consistent with Barth et al. (1996); Barth et al. (1990); Eccher et al. (1996); Gaynor, McDaniel, and Yohn (2011) and Collins et al. (1997).

Given the questionable nature of the reliability of fair value measurements, it is thus unnecessary that the depreciated investment property recorded at fair value would offer more value relevance in relation to that recorded at cost. Instead, investors might prefer the systematically-depreciated cost model-based information due to more value relevance to the investors (Cotter & Zimmer, 2003; Kang & Zhao, 2010). In addition, disclosure of the depreciated investment property fair value could be used by investors as substitute for the fair value information (Cotter, 1999). Thus, investors might gain no value relevance benefit from the use of fair value accounting since they would opt against reliance on the fair value measurement of the depreciated investment property but instead rely on the cost model-based value measurement of the depreciated investment property. It is thus hypothesized that:

Hypothesis 3a: *The non-depreciated investment property recognized at fair value has more value relevance than that recognized at cost with disclosure of fair value.*

Hypothesis 3b: *The depreciated investment property recognized at fair value has less value relevance than that recognized at cost with disclosure of fair value.*

3.3 Reliability of Fair Value Measurement and Extraction

Holthausen and Watts (2001) argued that prior research on value relevance of the fair value model has generally failed to account for the reliability. According to Beaver (1998), most value relevance research failed to address the verifiability and reliability of accounting information and thus requires further refinement.

Although the reliability is often identified in the recognition process of most accounting standards that assets and liabilities are to be accounted for the transactions only when it is reliably measured, in the revised conceptual framework (IASB, 2013a), reliability is replaced with faithful representation while relevance remains intact. According to the European Financial Reporting Advisory Group (EFRAG, 2013), IASB has attempted to mitigate the trading-off argument between reliability and relevance by replacing the former with faithful representation and simultaneously suggested that the financial information contain both relevance and faithful representation. EFRAG however holds the view that reliability is of greater significance than faithful representation and thus should be reinstated in the conceptual framework.

According to Power (2010), the level of reliability is a major determinant of the relevance benefits of fair value accounting. Previous value relevance research pertinent to the fair value of investment property however failed to incorporate the reliability of the fair value information into the model (e.g. Da Costa (2009); Deaconu et al. (2010); Ishak et al. (2012); Lourenço and Dias Curto (2009); Owusu-Ansah and Yeoh (2006); Pappu and Devi (2011)). Ishak et al. (2012) asserted that the statistically insignificant findings of their research on the fair value model are predominantly attributable to the preconception that the research setting (i.e. Malaysia) is prone to unreliable fair value measurements, a prejudice that led to the investors' disbelief in the information. The authors however failed to test such assertion.

According to Zülch and Nellessen (2010), the reliability of the investment property fair value significantly influences the prices and net asset value of European property companies. The authors however failed to further investigate the value relevance of the fair value upon exclusion of reliability. A study by Muller III et al. (2011), similar to Holthausen and Watts (2001), documented that an external appraiser contributes to greater reliability and thus increased value relevance of the disclosed fair value of investment property. These studies nevertheless have failed to offer evidence to support or refute the effect of reliability on the investment property value relevance. This current research thus attempts to separately investigate the reliability and relevance effects of investment property information. The research try to follow the relevance power of accounting information as described in Barth et al. (2001). In addition, this research attempts to identify a more suitable course of action with regard to the removal or reinstatement of the term "*reliability*" in the revised conceptual framework.

This current research has also proposed the Aggregated Reliability Score (AR-score), which is calculated based on the reliability fundamentals of prior publications. In addition, this current research ranks the reliability by investors' perception rather than according to the assets' true values. The research will then apply the AR-score to holding constant the effects of reliability from the value relevance of the investment property fair value estimates using the partitioning method. The post-extracting value relevance is referred to as *intrinsic value relevance*[11].

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[11] According to FAP (2009), the qualitative characteristics of financial statements encompass understandability, relevance, reliability and comparability. This research study holds understandability and comparability unchanged and focuses exclusively on relevance and reliability, consistent with Holthausen and Watts (2001) and Barth et al. (2001). With the understandability and comparability features held constant, the extraction of reliability remove the reliability effect and thus only relevance remains (i.e. intrinsic value relevance).

3.3.1 Intrinsic Value Relevance of the Aggregated Investment Property

In reference to Hypothesis 2, the aggregated investment property recognized at fair value possesses more value relevance than that recognized at cost with disclosure of fair value because the fair value model is better capable of reflecting the true economic value of investment property vis-à-vis the cost model, in addition to the former's ability to recognize the upward and downward changes in the value of investment property. Thus, it could be said that the fair value model offers more value relevance than the cost model irrespective of the reliability of measurements. To investigate the intrinsic value relevance of investment property fair value information, the reliability of fair value measurements is thus held constant and it is hypothesized that:

Hypothesis 4: *With reliability held constant from the fair value measurements, the investment property recognized at fair value is of greater intrinsic value relevance than that recognized at cost with disclosure of fair value.*

3.3.2 Intrinsic Value Relevance of the Disaggregated Investment Property

For the non-depreciated investment property, Hypothesis 3 stipulates that the investment property recognized at fair value offers more value relevance to investors than that recognized at cost with disclosure of fair value. This is because both upward and downward changes in the fair value can be captured under the fair value model, while under the cost model only the changes attributable to impairment would be recognized. In addition, no reliability issue arises with regard to the revaluation due to the availability of active markets (Nordlund, 2008). Thus, the controlling for the reliability factor would not lead to the rejection of Hypothesis 3.

On the other hand, it has been earlier hypothesized (i.e. Hypothesis 3) that the depreciated investment property recognized at fair value offers less value relevance than that recognized at cost with disclosure of fair value. Despite the ability of the fair value model to capture both upward and downward changes in the fair value, the issue of reliability emerges as a result of the unavailability of active markets and thus the use of the mark-to-model method. Investors therefore would have less trust in the subjective measurements and resort to the cost model with additional disclosed information. Nevertheless, upon controlling for reliability in the fair value measurements, the unreliability issue is thus mitigated and the post-extraction fair value model would outperform the cost model. It is thus hypothesized that:

Hypothesis 5: *With reliability held constant from the fair value measurements, both the non-depreciated and depreciated investment properties recognized at fair value are of grater intrinsic value relevance than those recognized at cost with disclosure of fair value.*

CHAPTER IV

RESEARCH DESIGN

4.1 Logistic Regression Model of Characteristics of Fair Value Adopters

To determine the characteristics of the fair value-adopting firms and also test hypotheses 1a and 1b, this current research has utilized the logistic regression model (C. Chen et al., 2015; Gray & Fearnley, 2011). The model is as follows:

$$FV_{it} = \beta_0 + \beta_1 COMP_{it} + \beta_2 ARS_{it} + \beta_3 LOC_{it} + \beta_4 REV_{it} + \beta_5 TREA_{it} + \beta_6 APPRE_{it} + \beta_7 SIZE_{it} + \beta_8 LEV_{it} + \beta_9 MTB_{it} + \beta_{10} SET100_{it} + \beta_{11} REAL_{it} + \varepsilon_{it}$$

where

FV_{it}	= 1 if firm i adopts the fair value model at time t, 0 otherwise
$COMP_{it}$	= Proportion of the non-depreciated investment property component to total investment property of firm i in year t
ARS_{it}	= Aggregated Reliability Score of firm i in year t
LOC_{it}	= 1 if firm i is located outside Bangkok at time t, 0 otherwise
REV_{it}	= 1 if firm i revalues its property, plant and equipment at time t, 0 otherwise
$TREA_{it}$	= 1 if firm i is a member of the Thai Real Estate Association at time t, 0 otherwise
$APPRE_{it}$	= Gain (loss) from revaluation of the investment property per share of firm i in year t[12]
$SIZE_{it}$	= Size of firm i proxied by natural logarithm of total assets at time t

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[12] For the fair value model, Appre is a gain (loss) in valuation recognized in the income statement. On the other hand, for the cost model, $Appre_{it}$ is a gain (loss) calculated from the disclosed investment property fair value in the notes to financial statements. The appreciation has been scaled by number of shares to control all sample in the same unit of measure (per share).

LEV_{it} = Leverage of firm i proxied by total liability divided by total assets at time t

MTB_{it} = Market to book ratio of firm i proxied by total market value of equity divided by book value of equity

$SET100_{it}$ = 1 if firm i is an SET100 company at time t, 0 otherwise (SET100 firms are the 100 largest firms in terms of market capitalization in the Stock Exchange of Thailand (SET))

$REAL_{it}$ = 1 if firm i is in the property and construction industry at time t, 0 otherwise

ε_{it} = firm i's residual value of year t

Control Variables of the Fair Value Adoption

This current research has employed prior studies' several characteristics that are antecedents of fair value-adopting firms and subsequently treated them as control variables. Those characteristics are: (1) Location of the investment property (LOC_{it}): C. Chen et al. (2015) and Christoffersen and Sarkissian (2009) found that firms located outside the economic areas are more likely to adopt the fair value accounting for their investment property; (2) Revaluation of property, plant and equipment (REV_{it}): Christensen and Nikolaev (2009) and Cotter and Zimmer (1995) reported that firms that regularly revalue their property, plant and equipment tend to adopt the fair value model for the investment property; (3) Membership of the Thai Real Estate Association ($TREA_{it}$): Quagli and Avallone (2010) reported that members of the European Public Real Estate Association (EPRA) who are regarded as experts in the fair value measurement have a propensity to adopt the fair value model to enhance the uniformity, comparability and transparency of the financial reporting; (4) The investment property appreciation in excess of the fair value measurement ($APPRE_{it}$): Christensen and Nikolaev (2009); Cotter and Richardson (1999) and Dietrich et al. (2000) documented that firms with an appreciation of the value of investment property in considerable excess of their fair valuation tend to switch from the cost model to the fair value model; (5) Firm size ($SIZE_{it}$): Quagli and Avallone (2010) found that larger firms tend to adopt the cost model for transparency whereas Muller III et al. (2011), Gray and Fearnley (2011) and C. Chen et al. (2015) argued that larger firms tend to adopt the fair value model; (6) Debt leverage ratio (LEV_{it}): Muller III et al. (2011), C. Chen et al. (2015), Gray and Fearnley (2011), Christensen and Nikolaev (2009) found that highly leveraged firms would adopt the fair value model to satisfy the lenders' demands; (7) Market-to-book ratio and information asymmetry (MTB_{it}): Quagli and Avallone (2010) discovered that the market-to-book ratio proxied for the information asymmetry significantly influences the fair value model adoption; (8) Market capitalization of the firm ($SET100_{it}$): Muller III et al. (2011) noted that firms' accounting choices are dictated by their commitment to transparency and thereby leading firms with a large number of investors tend to adopt the fair value model; (9) Real estate industry ($REAL_{it}$): Dietrich et al. (2000), Ishak et al. (2012), Muller III et al. (2011), Gray and Fearnley (2011) asserted that firms in the property and construction industry possess more expertise in and are more familiar with the fair value measurement than those in other industries, so they would choose the fair value model over the cost model.

The study divided above variables into 3 types of characteristics which are a firm characteristic and an information usefulness. The component of investment property is the representative of the firm characteristic and the reliability of fair value measurement is the representative of the information usefulness characteristic. The control variables included as the firm characteristic are the location of firms (LOC_{it}), firms as a member of the Thai Real Estate Association ($TREA_{it}$), size of firms ($SIZE_{it}$), leverage of firms (LEV_{it}), the market capital of firms ($SET100_{it}$) and the firms in property and construction industry ($REAL_{it}$). The control variables included as the information usefulness characteristic are the revaluation of property, plant and equipment (REV_{it}), gain or loss from revaluation of the investment property ($APPRE_{it}$) and the information asymmetry of firms (MTB_{it}).

4.2 Price-to-Book Models of the Value Relevance of Investment Property

Although variables used in measuring value relevance of the accounting number are various, many value relevance research use a stock price as a proxy of investors' behavior following the study of Ball and Brown (1968) showing that the stock price is one of the effective ways to study the behavior of investors. The stock price can be assumed as investors' consensus of the publicly available information and thus is the most common measure applied in the financial accounting research (Barth, 2006). The study starts instituting the theoretical model used in this paper following the Ohlson's model (Ohlson, 1995) which comprises of contemporaneous and future earnings, dividend and book value. It is based on the clean surplus relation. Then the study derives the price-to-book model to test for hypothesis 2 to 5.

4.2.1 Price-to-Book Models for the Aggregated Investment Property

Ohlson (1995) developed the residual income model of Edwards and Bell (1965) as following steps:

$$P_t = BV_t + \sum_{t=1}^{\infty} R_f^{-\tau} E_t[\tilde{e}_{t+\tau}^a] \quad (1)$$

where

P_t = the market value, or price, of the firm's equity at the end of year t

BV_t = (net) book value at the end of year t

R_f = the risk-free rate plus one

e_t^a = abnormal earnings for year t

The model (1) describes that a firm's value is a function of the book value and the present value of anticipated abnormal earnings (Ohlson, 1995). The author however argued that since the future (anticipated) abnormal earnings are derived based on other information, a new model that is capable of capturing the future abnormal earnings through a function of information dynamics is thus proposed:

$$P_t = BV_t + \alpha_1 e_t^a + \alpha_2 v_t \tag{2}$$

and

$$P_t = (1-k)BV_t + k(\varphi e_t - d_t) + \alpha_2 v_t \tag{3}$$

where

e_t = net earnings for year t

d_t = dividend payment for year t

v_t = value relevance information not captured by the accounting number at the end of year t

α_1 = $\omega/(\mathrm{R_f} - \omega)$

α_2 = $\mathrm{R_f}/(\mathrm{R_f} - \omega)(\mathrm{R_f} - \gamma)$

φ = $\mathrm{R_f}/(\mathrm{R_f} - 1)$

k = $(\mathrm{R_f} - 1)\alpha_1 = (\mathrm{R_f} - 1)\omega/(\mathrm{R_f} - \omega)$

ω, γ = fixed and known parameters

The above model (2) is transformed from the model (1) by substituting the expected future abnormal earnings to the current abnormal earnings and inserting the information dynamic variable, generally known as the "other information" ($\mathbf{v_t}$) terminology. This variable captures the future circumstances of the refined models(Lo & Lys, 2000). Since the abnormal earnings in the model (2) is assumed to be permanent over time, it is replaced by the current earnings in the model (3) as shown in Ohlson (1995). Barth (2006) claims that, so far, these models are superior to other models used in the value relevance research since they specify a direct relation between the accounting information and the firms' value.

For example, the work of *Graham, King, and Bailes* (2000) use the Ohlson's model to find the level of changing in value relevance of the accounting information around the financial crisis period in Thailand. They find that value relevance in earnings had decreased and subsequently recovered around the crisis. Collins et al. (1997) apply the incremental R^2 from the Ohlson's model and find that value relevance of the historical cost accounting information has not been decreased during the last 40 years of the 19th century. Francis and Schipper (1999) also apply the Ohlson's model to find changes in value relevance of the accounting information of US firms during 1952-1994 period. Zhao (2002) uses the Ohlson's model to find the differences in relative value relevance of research and development reporting in France, UK, USA and Germany.

The Ohlson's model is also applied to find out the effects of other accounting information that are included in the book value of firms. Aboody and Lev (1998) find out value relevance of the capitalized software cost by extracting from the book value of equity. Barth and Clinch (1996) find that the differences between domestic GAAP and SFAS of the foreign firms traded in US yield different results for different classes of assets. Barth and Clinch (1998) also adopt such model in testing value relevance of investment, property, plant and equipment and intangible assets which are extracted from the book value of equity. Lastly, Jaafar (2011) find value relevance of intangible assets that is isolated from the book value of equity.

Only the work of Jaafar (2011) is grounded on the model (2) using abnormal earnings as explanatory variable while the others are grounded on the model (3) using current earnings as explanatory variable. Therefore, researchers prefer using the current actual earnings than current abnormal earnings due to the inference and specification reasons of the model (Lo & Lys, 2000). Barth et al. (2001) and Graham et al. (2000) also claim that when there is a persistence in the current abnormal earnings in a short period of horizon time, the current earnings could be appropriately substituted. Moreover, Barth et al. (2001) raise that the Ohlson's model is better than other model in terms that (1) it can assume imperfect market in a finite period of time, (2) it can capture the economic rent and the abandonment option (Holthausen & Watts, 2001) in current earnings and the other information (3) it requires less assumptions than other model thus it is adoptable in a complex situation and (4) it captures both the statement of financial position base and income base. Therefore, the study will follow the Ohlson's model (3) using current earnings as the explanatory variable.

Following Ohlson's model (3), this current research extracts the investment property from the book value of firm i at time t and extracts the disclosed fair value under the cost model from other information (v_t), similar to Easton et al. (1993);

Aboody et al. (1999); Barth and Clinch (1998); Owusu-Ansah and Yeoh (2006) and Pappu and Devi (2011). In addition, an interaction term is deployed to account for the accounting choices, similar to Da Costa (2009) and Lourenço and Dias Curto (2009). Moreover, dividend and other information are treated as residual term due to their nonrecurring nature (Easton et al., 1993).

$$P_{it} = (1-k)(BV_{it} - IP_{it}) + (1-k)IP_{it} + k\varphi e_{it} + \alpha_2 DisIP_{it} + (\alpha_2(v_{it} - DisIP_{it}) - kd_{it}) \quad (4)$$

where

IP_{it} = the investment property of firm i at the end of year t

$DisIP_{it}$ = disclosure of the investment property of firm i at the end of year t

From (4), the model is rearranged as follows:

$$P_{it} = \alpha_0 + \beta_1 BVLIP_{it} + \beta_2 e_{it} + \beta_3 IP_{it} + \beta_4 DisIP_{it} + \varepsilon_{it} \quad (5)$$

where

$BVLIP_{it}$ = book value less the investment property of firm i at the end of year t

ε_{it} = residual value of firm i for year t

Lourenço and Dias Curto (2009) documented that the concurrent use of the disclosure of investment property ($DisIP_{it}$) with IP_{it} recorded at cost could contribute to the multicollinearity problem since it is possible in a number of cases that both are equal. Thus, it is assumed in this current research that, instead of relying on the disclosed fair value, investors would resort to the differential value between the disclosed fair value and the recognized cost of investment property for firms that adopt the cost method. This is to mitigate the econometric issues. The theoretical model for testing Hypotheses 2 and 4 is as below:

$$P_{it} = \alpha_0 + \beta_1 BVLIP_{it} + \beta_2 e_{it} + \beta_3 IP_{it} + \beta_4 DiffIP_{it} + \varepsilon_{it} \quad (6)$$

where

P_{it} = the stock price of firm i at the end of year t[13]

$BVLIP_{it}$ = book value less the investment property of firm i at the end of year t

e_{it} = net earnings of firm i for year t

IP_{it} = the investment property of firm i at the end of year t

$DiffIP_{it}$ = difference between the disclosure and the cost of investment property at the end of year t if firm i adopts the cost model ($DisIP_{it}$ – IP_{it})

4.2.2 Price-to-Book Models for the Disaggregated Investment Property

To test Hypotheses 3 and 5, this research has proposed the following models:

$$IP_{it} = IPND_{it} + IPD_{it} \quad (7)$$

$$DiffIP_{it} = DiffIPND_{it} + DiffIPD_{it} \quad (8)$$

Taken (6), (7) and (8) together, we derive

$$P_{it} = \alpha_0 + \beta_1 BVLIP_{it} + \beta_2 e_{it} + \beta_3 IPND_{it} + \beta_4 IPD_{it} + \beta_5 DiffIPND_{it} + \beta_6 DiffIPD_{it} + \varepsilon_{it} \quad (9)$$

where

$IPND_{it}$ = the non-depreciated investment property of firm i at the end of year t

IPD_{it} = the depreciated investment property of firm i at the end of year t

$DiffIPND_{it}$ = difference between the disclosure and the cost of the non-depreciated investment property at the end of year t when firm i adopts the cost model ($DisIPND_{it}$ – $IPND_{it}$)

$DiffIPD_{it}$ = difference between the disclosure and the cost of the depreciated investment property at the end of year t when firm i adopts the cost model ($DisIPD_{it}$ – IPD_{it})

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[13] The Stock Exchange of Thailand (SET) stipulates that SET-listed firms submit their year-end closing financial statements within 2 months after the year-ending date, so the price will be that of year t+2 months. In addition, this research treats P at time t plus 2 months as a dependent variable.

4.3 The Aggregated Reliability Score (AR-score) and the Model Partitioning

In order to test Hypotheses 4 and 5, this current research has determined the intrinsic value relevance of investment property using the reliability partitioning. This is quite in line with Barth and Clinch (1998) who partition external and internal appraisers of property, plant and equipment to control the reliability effect embedded in the value relevance of non-financial assets. The study also follows steps of Lev and Thiagarajan (1993) and Piotroski (2000) who apply the concept of the aggregated fundamental score (F-score) in estimating the earnings response coefficient, and in estimating the returns of high and low book-to-market firms, respectively. Their F-scores are generated from the simple-accounting based fundamental analysis and are used for partitioning firms under their studies. Their results also show that the partitioning of F-scores with a high-low portfolio strategy can provide more clarification and the correct prediction than the basic model. The study therefore gathers the reliability variables (or the reliability fundamentals) claimed by prior literatures and construct the "Aggregated Reliability Score" (AR-score) following such papers. The study, then, applies this index as a criterion for partitioning the sample in order to find out the intrinsic value relevance of the investment property after controlling the reliability effect of such information.

The Reliability Fundamentals

The reliability fundamentals will be based on the reliability variables that can affect the reliability perception of investors toward the fair value measurement of the investment property. According to Barth, Landsman, Lang, and Williams (2012), value relevance research should attempt to investigate the consensus of investors' perceptions not the true value of firms or firms' assets; therefore, the reliability variable analysis will be prioritized based on investors' perception with regard to the reliability of fair value measurements rather than on the reliability of true value of the investment property.

Based on Lev and Thiagarajan (1993) and Piotroski (2000), this current research proposes five reliability fundamentals as detailed below, against which the sampled firms will be assessed with respect to the fair value measurement of their investment property contained in the financial statements or disclosed in the financial statements' notes; and then assigned a reliability score of either 0 or 1. The Aggregated Reliability Score (AR-score or ARS), ranging from 0 to 5, of the five reliability fundamentals is calculated. This current research assigns an equal weight to all reliability fundamentals.

$$ARS_{it} = R\_Method_{it} + R\_Source_{it} + R\_Change_{it} + R\_Audit_{it} + R\_Time_{it} \qquad (10)$$

where

ARS_{it}	= Aggregated Reliability Score of firm i at time t
R_Method_{it}	= 1 if firm i uses the mark to market model at time t, 0 otherwise
R_Source_{it}	= 1 if firm i employs external appraiser(s) at time t, 0 otherwise
R_Change_{it}	= 1 if firm i's percentage of change in the fair value of investment property is below the median total percentage of change in the fair value of investment property at time t, 0 otherwise
R_Audit_{it}	=1 if firm i engages the services of Big4 audit firm at time t, 0 otherwise
R_Time_{it}	=1 if firm i appraises the fair value in year t, 0 otherwise

Subsequently, using the median of the AR-score as the threshold, the samples are partitioned into the high and low reliability groups, whereby a score of 1 is assigned if ARS_{it} of firm i is above the median of total ARS_{it} (i.e. the high reliability group) and 0 for otherwise (i.e. the low reliability group).

Under the accounting framework, the reliability refers to five components which consists of (1) "Neutrality" that is the information contained in the financial statements must be free from bias (2) "Substance over form" that is the transaction should be accounted for in accordance with its substance and economic reality if substance of transaction differs from its legal form (3) "Representational faithfulness" that is the correspondence or agreement between a measure or a description and the phenomenon that it purports to represent (4) "Prudence" that is the use of professional judgment with a degree of caution in the adoption of accountancy policy and estimates, and (5) "Completeness" that is a complete financial information with a material content is provided relevant to a decision making of users (IASB, 2010)[14]. The AR-score will be constructed based on such components. The reliability fundamentals are as follows,

(1) Method of measurement (R_Method_{it})

The mark-to-market method is claimed to provide more reliable information than other methods (Cotter & Zimmer, 2003; Danbolt & Rees, 2008) since it involves with less assumptions identified by appraisers (Nordlund, 2008). Nordlund (2010)also claims that an ideal estimation is when the mark-to-market approach and the mark-to-model approach provide equal value, but in the reality, the lateral approach yields the current value from the current assumption on which the future circumstances can affect such estimation. These uncertain assumptions can omit the completeness and prudence of the measurement. IFRS13 (IASB, 2013b) refers the mark-to-market method as the highest priority, while the mark-to-model as the lowest priority. Moreover, under the neutrality and representational faithfulness component, the estimation of the mark-to-model can lead to biased measurement (Ernst & Young, 2005). IAS40 encourages the use of mark-to-market as the best measure (IAS40.45). Thus, the mark-to-market approach yields more reliability than the mark-to-model approach from the investor perception (IASB, 2012c)[15].

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[14] In 2013, IASB issues a revised version of "the Accounting framework", called "the Conceptual framework", of which the new qualitative characteristic of financial statement composes of (1) Fundamental qualitative characteristic, 'Relevance' and 'Faithful representation', and (2) Enhancing qualitative characteristic, comparability, verifiability, timeliness and understandability (IASB, 2013a). The reliability is downgraded under the faithful representation and is solely appeared on the other chapter ("Recognition of the elements of financial statement") (EFRAG, 2013). However, Thailand adopts this revised conceptual framework in 2015 while the sample set in the study is 2011 – 2014. Thus, the study will rely on the prior version of the Accounting framework.

[15] IFRS13 introduce inputs of fair value measurements into observable and unobservable inputs which are better and modern than the classification into mark-to-market and mark-to-model class. However, since the study have been performed during 2011-2014 of which IFRS13 has not yet issued in Thailand, so the classification by marking-to-market and marking-to-model method are used in this study.

(2) Source of appraiser (R_Source_{it})

According to IAS40, firms are encouraged, but not required, to employ an independent valuer with the relevant qualification and experience when determining fair value (IAS 40.32). The use of the external appraiser is one of methods to signal a commitment to reporting transparency of firms (Müller et al., 2015). This is considered to provide more faithful representation comparing with another source. Although Barth and Clinch (1998) and Cotter and Richardson (2002)find that internal appraiser can increase the reliability of property, plant and equipment revaluation due to the depth-knowledge in assets utilization and specification, the study prioritizes the analysis based on the reliability in the perception of investors than based on the perspective of an actual or accurate value of determined assets. Muller III and Riedl (2002) find that market perceives that firms using the external appraiser will provide more reliable investment property information than firms using the internal appraiser. This is reflected in lower bid-ask spreads and the higher market liquidity. Under the prudence and completeness components, using specialists in valuation provide more correct information with less judgment. Moreover, under the neutrality characteristic, using the internal appraiser might increase the biased estimation (Dietrich et al., 2000) of the investment property fair value and thus decrease the neutrality of the measurement. Taken together, employing the external appraiser could give higher reliability than employing the internal appraiser from the investor perception.

(3) Change in the fair value estimation (R_Change_{it})

Cotter and Richardson (1999) and Cotter and Richardson (2002) proxy the reliability in fair value measurements of property, plant and equipment by the subsequent percentage change in the fair value estimation, i.e. initial revaluation increment minus subsequent write downs plus any interim increments. The more percentage change in the fair value estimation, the lesser reliability of such estimation. The subsequent changes in fair value of assets showing the imprudent characteristic which is calculated from incomplete information. Under the neutrality characteristic, if the measurement is prepared unbiasedly, there should be no fluctuation in its fair value. Also, much changes in the revaluation of the investment property can omit the representational faithfulness characteristic. Overall, the lower percentage change in the fair value estimation shows higher reliability of the measurement from the investors' view.

(4) Big audit firm (R_Audit$_{it}$)

Audit firm is also one of the hottest debates regarding the reliability of the measurement. The bigger auditor name is, the more quality of the financial statements are (Ali & Hwang, 1999). Towards the IFRS convergence context, large audit firms are more likely to have experience and knowledge for the conversion of IFRS and the use of the fair value accounting, as well. Auditors also have incentives to minimize the potential litigation costs by the review of the recognized asset revaluations (Cotter & Richardson, 1999). Therefore, firms will choose bigger name auditor for a transparency and an expertise in the fair value accounting (Müller et al., 2015) which can accordingly increase the neutrality and the faithful representation of the measurement, respectively. Evidently, (Dietrich et al., 2000) find that big audit firms can significantly reduce the appraiser error. This is to increase the reliability by using complete information and prudent judgment. Moreover, Big4 audit firm is generally familiar with a substance over form concept, which can help in the verification of the measurement. Thus, using big audit firms (proxied by Big4 audit firm) can give higher reliability in fair value measurements than non-big audit firm, particularly in investors' view.

(5) Time of measurement (R_Time$_{it}$)

Since the conceptual framework of IFRS (IASB, 2013a) stated that the preparation of financial statements should be based on the cost constraint and the useful financial reporting, the reappraisal of the investment property is not restricted to do on an annually basis unless there is significant change in the assumption or circumstance. Certain Thai companies (approximately 33%) employ the investment property fair value appraised in the prior years as a representative for the current year's fair value. However, paragraph 38 of IAS40 claims that "Fair value of the investment property shall reflect market conditions at the end of the reporting period" and paragraph 39 of IAS40 claims that "Fair value is time-specific as of a given date" and "fair value may be incorrect or inappropriate if estimated as of another time". This obviously demonstrates that using prior year fair value might be inappropriate since it is impossible that there is no change in the circumstance or assumption used in valuation during the current year (Nordlund, 2010). This also omits the prudence, completeness and the representational faithfulness characteristics since such out-of-date fair value might not be the consensus of every measure. They might not represent the true economic circumstance of assets. Thus, fair value appraised in the current year has more reliability than fair value appraised in the past, particularly from the perception of investors.

However, the reliability components above are partial but not the whole components that can be characterized as the AR-score. The limitation of the data collection brings up the incomplete components of the AR-score. Moreover, these presented components can have measurement error into some senses. For example, the mark-to-model method might be better than the mark-to-market method when investment property is unique and relies on its appreciation. Also, investors may not always consider the use of non-big4 auditor as lower quality than the use of big4 auditors. In addition, the equally-weight method of this AR-score can lead to some error. Therefore, it might have measurement error of the AR-score that can deviate the research results. This should be noted to the contribution of this research.

CHAPTER V

DATA AND DESCRIPTIVE STATISTICS

5.1 Sample Selection and Data Collection

The study data are the financial statements of SET-listed firms for the entire four years of 2011-2014 with the disclosure of investment property since Thai Accounting Standard No. 40: *Investment property* (TAS40) was first adopted in Thailand in 2011(FAP, 2010)[16]. In addition, the sampled listed firms had investment property for the entire study period of four years to rule out the survivorship bias (Basu, 1997; Kothari, 2001).

Furthermore, excluded from the sample set are the delisted firms, initial public offering (IPO) firms and switching firms (from another market to the SET). Likewise, firms in the financial and insurance industry, those under rehabilitation, and the real estate investment trust or property funds were excluded since they are already closely supervised by different regulatory bodies (Pathan, Skully, & Wickramanayake, 2007). Firms suspended by Thailand's Securities and Exchange Commission (SEC) are also excluded due to the unavailability of relevant data. Firms with the ending period other than 31st December are not included to guarantee the identical market condition (Issarawornrawanich & Jaikengkit, 2012; Khurana & Kim, 2003), nor are those with the investment property in the form of leasehold rights which can be treated under this standard (IAS40) or another standard (i.e. IAS17 : Leases) which can confuse the results. Thus, there are 648 firm-years as the samples of the study as shown in table 4 (for the reconciliation of sample size) and in Appendix A (for the list of companies in the sample set).

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16 TAS40 (Thai Accounting Standard No.40): Investment property was first adopted in 2011 following the full implementation of IFRS in the country. Prior to the adoption, investment property was included in the property, plant and equipment account.

The collection of the financial data and trading transactions were carried out manually and digitally from the *Setsmart* and *Datastream* databases. The financial statements with comprehensive details of the notes were obtained from Thailand's Securities and Exchange Commission (SEC)'s database.

Table 4 Number of firm-years in the sample set

Number of firm-years	2011	2012	2013	2014	Total
Total SET firms	507	518	538	560	2123
Less Delisted firms	-6	-4	-1	-7	-18
IPO firms	-5	-8	-13	-17	-43
Switching firms**	-3	-2	-3	-5	-13
Firms in the financial industry	-58	-56	-57	-57	-228
Firms under rehabilitation plan	-19	-19	-19	-19	-76
Suspended or problematic firms	-19	-19	-19	-19	-76
Firms with year-end other than December	-11	-12	-12	-12	-47
Firms with or without investment property	**386**	**398**	**414**	**424**	**1,622**
Less Firms without investment property or incomplete data	-224	-236	-252	-262	-974
Firms with investment property*	**162**	**162**	**162**	**162**	**648**

* See list of companies in Appendix A

** Firms that switch from another market to the SET.

Reasons for Choosing the Stock Exchange of Thailand (SET)

While most investment property research choose only real estate firms as the samples (Dietrich et al., 2000; Gray & Fearnley, 2011; Ishak et al., 2012; Muller III et al., 2011), the study choose all firms regardless of its industry. This is because Nordlund (2008) claims that the effect of the investment property is spread over all firms and all industries. In addition, this study chooses the Stock Exchange of Thailand (SET) as the sample due to two main reasons. Firstly, most investment property research are set in developed countries, e.g. Muller III et al. (2011)'s setting is European Economic Area (EEA) stock exchanges, Quagli and Avallone (2010)'s setting is European real estate firms and Christensen and Nikolaev (2009)'s setting is UK and Germany. Only a limited number of research studying the emerging market as well as their results are inconclusive, e.g. while Pappu and Devi (2011) and Ishak et al. (2012) do not find the value relevance of the investment property in Malaysia, Deaconu et al. (2010) find the value relevance of the revaluation surplus from non-financial assets in Romania. Therefore, the study applies Thailand, where is considered as one of the emerging market members (sourced from MSCI list, FTSE list, International monetary Fund list, and etc.), to find more conclusive explanation to the usefulness of the investment property in the emerging market. Also, research set at the emerging market or the developing country can provide inputs to the solution for the successful implementation of the international converging project of the accounting standard from all over the world Pappu and Devi (2011).

Secondly, Muller III et al. (2011)'s work has 80% of the real estate firms that adopt the fair value accounting. Also, Quagli and Avallone (2010) explore European Real Estate firms listed in their own country and find that 66% of them adopting the fair value model. Christensen and Nikolaev (2009) find that 77% of UK firms use the fair value method for the investment property. Evidently, except Chinese emerging market as described in C. Chen et al. (2015), the investment property in a global market level seems to be chosen the fair value model in a considerable proportion. This research, on the contrary, is to find the evidence for firms in developing countries where the cost model seems to be preferable (Pappu and Devi (2011) and Ishak et al. (2012)). This is to contribute to the global level of the standard setting in regard that the accounting standard shall be generalized to either the fair value preferable country or the cost preferable country as suggested by Nichols and Buerger (2002).

5.2 Descriptive Statistics

Table 5 presents the descriptive statistics of the study samples. Of a total 648 firm-years with investment property disclosed in their respective financial statements for the period of 2011-2014, approximately 13% and 87% respectively adopt the fair value and the cost models. The proportion of non-depreciated investment property to total investment property of the sampled firms, on average, is 63%, suggesting that firms prefer investing in the non-depreciated to the depreciated investment property. The average Aggregated Reliability Score is 3.59 (out of 5.00) while the average post-partitioning median-based AR-score (ARSPart) is 0.58, indicating that over half (58%) of Thai SET-listed firms' fair value measurements are of high reliability.

Table 5 Descriptive statistics

	N	Minimum	Maximum	Sum	Mean	SD
Panel A : Variables for Hypothesis 1						
FV	648	0	1	83	0.13	0.33
HC	648	0	1	565	0.87	0.33
COMP	648	0	1	407	0.63	0.41
ARS	648	0	5	2327	3.59	1.04
ARSPart	648	0	1	376	0.58	0.49
LOC	648	0	1	108	0.17	0.37
REV	648	0	1	144	0.22	0.42
TREA	648	0	1	28	0.04	0.23
BIG4	648	0	1	404	0.62	0.49
APPRE	648	-0.56	224.36	1817.35	2.80	18.10
SIZE	648	19.56	28.21	14682.00	22.66	1.52
LEV	648	0.00	136.23	433.31	0.67	5.30
MTB	648	-2.07	74.52	1517.26	2.34	4.91
SET100	648	0	1	196	0.30	0.46
REAL	648	0	1	212	0.33	0.47

Table 5 Descriptive statistics (Con't)

	N	Minimum	Maximum	Sum	Mean	SD
Panel B : Variables for Hypotheses 2 to 5						
P	648	0.02	524.00	18157.21	28.02	56.08
BV	648	-0.50	244.22	11325.39	17.48	31.96
BVLIP	648	-6.40	242.09	9864.41	15.22	28.79
EPS	648	-13.47	38.69	1217.19	1.88	4.33
IPtoTA	648	0.001	0.71	45.09	0.07	0.12
IPtoBV	648	0.001	2.04	106.09	0.16	0.30
IP	648	0.01	161.70	1460.98	2.25	10.70
IPND	648	0.00	16.73	600.26	0.93	2.29
IPD	648	0.00	161.70	860.72	1.33	10.44
DIFFIP	648	-0.56	224.36	1797.17	2.77	18.09
DIFFIPND	648	-0.41	130.29	934.36	1.44	9.86
DIFFIPD	648	-2.17	102.72	862.80	1.33	8.64

where FV_{it} = 1 if firms adopt the fair value model for the investment property, and 0 otherwise; HC_{it} = 1 if firms adopt the cost model for the investment property, and 0 otherwise; $COMP_{it}$ is the proportion of the non-depreciated investment property to total investment property of firm i at time t; $ARSPart_{it}$ is the partitioned AR-Score of firm i at time t, where it is 1 if ARS_{it} is above the median of total ARS_{it} (high reliability group) and 0 for below the median (low reliability group); ARS_{it} is the Aggregated Reliability Score (AR-score) of firm i at time t, which is R_Method_{it} + R_Source_{it} + R_Change_{it} + R_Audit_{it} + R_Time_{it}, where R_Method_{it} = 1 if firm i uses the mark to market model at time t and 0 otherwise, R_Source_{it} = 1 if firm i employs external appraiser(s) at time t and 0 otherwise, R_Change_{it} = 1 if firm i's percentage of change in the fair value of the investment property is below the median total percentage of change at time t and 0 otherwise, R_Audit_{it} = 1 if firm i employs a Big4 audit firm at time t and 0 otherwise, R_Time_{it} = 1 if firm i appraise the fair value in year t and 0 otherwise; LOC_{it} = 1 if firm i is located outside Bangkok and 0 otherwise; REV_{it} = 1 if firm i revalues its property, plant and equipment at time t and 0 otherwise; $TREA_{it}$ = 1 if firm i is a member of the Thai Real Estate Association at time t and 0 otherwise; $BIG4_{it}$ = 1 if firm i employs a Big4 auditor at time t and 0 otherwise; $APPRE_{it}$ is the gain (loss) from valuation of the investment property per share of firm i proxied by natural logarithm of gain (loss) from valuation of the investment property at time t; $SIZE_{it}$ is the size of firm i proxied by natural logarithm of total assets of firm i at time t; LEV_{it} is the leverage proxied by total liability divided by total assets of firm i at time t; MTB_{it} is the market to book ratio; $SET100_{it}$ = 1 if firm i is classified as an SET100 company and 0 otherwise; $REAL_{it}$ = 1 if firm i is in the real estate and construction industry and 0 otherwise; P is the price per share at year t+2 months of firm i at time t; BV_{it} is the book value per share of firm i at time t; $BVLIP_{it}$ is the book value less the investment property per share of firm i at time t; EPS_{it} is the earnings per share of firm i for year t; $IPtoTA_{it}$ is the proportion of investment property to total assets of firm i at time t; $IPtoBV_{it}$ is the proportion of investment property to book value of firm i at time t; IP_{it} is the investment property per share of firm i at time t; $IPND_{it}$ is the non-depreciated investment property per share of firm i at time t; IPD_{it} is the depreciated investment property per share of firm i at time t; $DIFFIP_{it}$ is the difference between the disclosed value and recorded cost value of the investment property per share of firm i at time t; $DIFFIPND_{it}$ is the difference between the disclosed value and recorded cost value of the non-depreciated investment property per share of firm i at time t; $DIFFIPD_{it}$ is the difference between the disclosed value and recorded cost value of the depreciated investment property per share of firm i at time t.

Another interesting point is that a third (33%) of the samples are firms in the property and construction industry, consistent with Muller III et al. (2011) and Quagli and Avallone (2010), who documented that this particular industry possesses more expertise in and higher familiarity with investment property than do other industries. In addition, prior research on investment property mostly focused on real estate firms (Dietrich et al., 2000; Gray & Fearnley, 2011; Ishak et al., 2012; Muller III et al., 2011). This current research has thus treated this particular variable as a control variable to control for the so-called *"property and construction industry"* effect. Surprisingly, a mere 4% (28 out of 648 firm-years) is a member of the Thai Real Estate Association, hinting that the organization plays an unimportant role in the Thai real estate industry.

Approximately 62% of the samples engage the services of a Big4 audit firm, indicating that Thai SET-listed firms with investment property typically use the services of an international audit firm. In addition, as many as 30% of the sampled firms are 100 largest firms in terms of market capitalization (i.e. SET100 firms) and thereby are required to be investor-focused due to a large number of investors.

Meanwhile, in Panel B of Table 5, the average price is THB28.02 per share with a significantly large standard deviation of 56.08, indicating a considerable dispersion in the market value per share of the sampled firms. The average book value is THB17.48 per share, which is THB10.54 (37.62%) lower than its average price. This is consistent with the average market-to-book ratio of 2.34, suggesting that certain information has deliberately been omitted from the financial statements.

The average total investment property is approximately THB2.25 per share (i.e. equivalent to 7% of total assets and 16% of the book value), consisting of THB0.93 (41.33%) and THB1.33 (58.67%) per share, respectively, for the non-depreciated and depreciated investment properties. Even though the proportion of the non-depreciated to total investment property ($COMP_{it}$) is as high as 63% (i.e. 63% vs 37% for the depreciated investment property), the ratio is reversed for the investment property value per share.

In addition, the disclosed fair value of investment property for the cost model-adopting firms is greater than the carrying value by THB2.77 per share, which can be further disaggregated into THB1.44 and THB1.33 per share respectively for the non-depreciated and depreciated investment properties. Interestingly, the cost model-adopting firms would opt against recognition of gains from the appreciation of investment property (THB2.77 per share) and rather relegate it to the notes of the financial statements. Despite the similarity in the appreciation values per share of both types of investment properties, the standard deviations are significantly large (i.e. 9.86 and 8.64). This indicates the considerable variations in the value appreciation with the adoption of the cost model and could thereby lead to the decision not to adopt the fair value model.

Interestingly, some firms have its fair value of investment property less than its carrying value but they do not set up the impairment. This is because the value in use of their investment property is higher than the fair value of investment property. Therefore minimum amount of difference between fair values and carrying values of investment property can be minus.

5.3 Pairwise Correlations between Variables

In Table 6, the Pearson and Spearman correlation coefficients between variables in Hypothesis 1 are respectively presented above and below the diagonal line. It could be observed that most variables are correlated despite low magnitudes except for the correlations between the value appreciation and size variables. The results are attributable to the fact that firms with a large pool of assets tend to gain from the fair value measurement. Nonetheless, the correlations are below 0.80 (Gujarati, 2009) and thereby the correlation tests are satisfactory.

Table 6 Pearson and Spearman correlations of Hypothesis 1

	FV	HC	COMP	ARS	LOC	REV	TREA	APPRE	SIZE	LEV	MTB	SET100	REAL
FV		-1.00**	-0.09*	0.08*	0.08	0.32**	-0.04	-0.05	0.00	-0.01	-0.01	0.00	0.01
HC	-1.00**		0.09*	-0.08*	-0.08	-0.32**	0.04	0.05	0.00	0.01	0.01	0.00	-0.01
COMP	-0.06	0.06		0.16	0.09*	0.05	-0.24**	0.04	0.09*	0.03	0.03	-0.16**	-0.26**
ARS	0.08*	-0.08*	0.16		-0.06	0.07	0.00	-0.02	-0.08*	-0.02	-0.02	0.01	-0.02
LOC	0.08	-0.08	0.12**	-0.07		0.08*	-0.10*	-0.06	-0.04	-0.01	0.01	-0.11**	-0.17**
REV	0.32**	-.32**	0.05	0.07	0.08*		-0.11**	-0.06	-0.01	-0.03	0.02	-0.16**	-0.25**
TREA	-0.04	0.04	-0.22**	0.00	-0.10*	-0.11**		-0.03	-0.09*	-0.01	-0.04	0.06	0.31**
APPRE	-0.26**	.26**	0.11**	0.07	-0.18**	-0.05	0.02		0.13**	-0.01	-0.02	-0.05	-0.09*
SIZE	0.00	0.00	0.25**	0.05	-0.03	0.04	-0.16**	0.45**		-0.01	-0.07	0.11**	-0.17**
LEV	0.05	-0.05	-0.15**	0.04	0.10*	-0.11**	0.00	-0.18**	-0.10*		0.00	-0.01	-0.01
MTB	-0.04	0.04	-0.14**	-.08*	-0.02	-0.07	-0.06	-0.04	-0.17**	0.27**		0.07	0.06
SET100	0.00	0.00	-0.10**	0.02	-0.11**	-0.16**	0.06	0.11**	0.16**	0.34**	0.33**		0.26**
REAL	0.01	-0.01	-0.26**	-0.02	-0.17**	-0.25**	0.31**	-0.06	-0.33**	0.34**	0.09*	0.26**	

Note 1: * significant at the 5% level (2-tailed) ** significant at the 1% level (2-tailed)

Note 2: The numbers on the top-right and bottom-left sections respectively represent the Pearson and Spearman correlation coefficients.

where FV_{it} = 1 if firms adopt the fair value model for the investment property, and 0 otherwise; HC_{it} = 1 if firms adopt the cost model for the investment property, and 0 otherwise; $COMP_{it}$ is the proportion of the non-depreciated investment property to total investment property of firm i at time t; $ARSPart_{it}$ is the partitioned AR-Score of firm i at time t, where it is 1 if ARS_{it} is above the median of total ARS_{it} (high reliability group) and 0 for below the median (low reliability group); ARS_{it} is the Aggregated Reliability Score (AR-score) of firm i at time t, which is R_Method_{it} + R_Source_{it} + R_Change_{it} + R_Audit_{it} + R_Time_{it}, where R_Method_{it} = 1 if firm i uses the mark to market model at time t and 0 otherwise, R_Source_{it} = 1 if firm i employs external appraiser(s) at time t and 0 otherwise, R_Change_{it} = 1 if firm i's percentage of change in the fair value of the investment property is below the median total percentage of changes at time t and 0 otherwise, R_Audit_{it} = 1 if firm i employs a Big4 audit firm at time t and 0 otherwise, R_Time_{it} = 1 if firm i appraise the fair value in year t and 0 otherwise; LOC_{it} = 1 if firm i is located outside Bangkok and 0 otherwise; REV_{it} = 1 if firm i revalues its property, plant and equipment at time t and 0 otherwise; $TREA_{it}$ = 1 if firm i is a member of the Thai Real Estate Association at time t and 0 otherwise; $APPRE_{it}$ is the gain (loss) from valuation of the investment property per share of firm i proxied by natural logarithm of gain (loss) from valuation of the investment property at time t; $SIZE_{it}$ is the size of firm i proxied by natural logarithm of total assets of firm i at time t; LEV_{it} is the leverage proxied by total liability divided by total assets of firm i at time t; MTB_{it} is the market to book ratio; $SET100_{it}$ = 1 if firm i is classified as an SET100 company and 0 otherwise; $REAL_{it}$ = 1 if firm i is in the real estate and construction industry and 0 otherwise.

In Table 7, the Pearson and Spearman correlation coefficients between variables in Hypotheses 2 to 5 are respectively presented above and below the diagonal line. The correlation coefficients between book value per share and earnings per share of 0.71-0.87 could contribute to the multicollinearity problem. Both variables are however not excluded from the models which have been derived from Ohlson's model. In addition, the difference between the disclosed and carrying values of the non-depreciated investment property per share (DiffIPND) and that of the depreciated investment property per share (DiffIPD) are strongly correlated. Nonetheless, the regression results show no multicollinearity problem either by the VIF test (<10) or the tolerance test (>0.2) (Robert, 1975). To verify the result robustness, these variables are excluded in the sensitivity models (Tables 17 and 19 in the subsequent chapter) prior to re-testing. The sensitivity results correspond to those of the main test, indicating that the presence of these problematic variables has no significant impact on the outcomes[17]

Table 7 Pearson and Spearman correlations of Hypotheses 2 to 5

	P	BVLIP	EPS	IP	IPND	IPD	DIFFIP	DIFFIPND	DIFFIPD	ARS	COMP	REAL
P		0.81^{**}	0.86^{**}	0.15^{**}	0.21^{**}	0.11^{**}	0.23^{**}	0.20^{**}	0.25^{**}	-0.00	0.10^{*}	-0.15^{**}
BVLIP	0.83^{**}		0.87^{**}	0.13^{**}	0.25^{**}	0.08	0.21^{**}	0.22^{**}	0.18^{**}	0.01	0.17^{**}	-0.26^{**}
EPS	0.79^{**}	0.71^{**}		0.12^{**}	0.21^{**}	0.08	0.21^{**}	0.20^{**}	0.21^{**}	-0.02	0.10^{**}	-0.16^{**}
IP	0.50^{**}	0.38^{**}	0.35^{**}		0.22^{**}	0.98^{**}	0.08^{*}	0.07	0.10^{*}	-0.10^{*}	-0.11^{**}	-0.07
IPND	0.44^{**}	0.52^{**}	0.34^{**}	0.64^{**}		0.01	0.18^{**}	0.22^{**}	0.12^{**}	0.04	0.21^{**}	-0.14^{**}
IPD	0.05	-0.07	0.02	0.54^{**}	-0.02		0.05	0.02	0.08	-0.11^{**}	-0.16^{**}	-0.04
DIFFIP	0.37^{**}	0.30^{**}	0.34^{**}	0.43^{**}	0.29^{**}	0.32^{**}		0.98^{**}	0.98^{**}	-0.04	-0.04	-0.09^{*}
DIFFIPND	0.32^{**}	0.37^{**}	0.34^{**}	0.27^{**}	0.53^{**}	0.01	0.76^{**}		0.91^{**}	-0.02	0.01	-0.09^{*}
DIFFIPD	0.08	0.01	0.08^{*}	0.30^{**}	-0.01	0.67^{**}	0.63^{**}	0.24^{**}		-0.07	-0.10^{*}	-0.08^{*}
ARS	0.01	0.04	-0.01	-0.02	0.05	-0.07	0.03	0.03	0.01		0.15^{**}	-0.02
COMP	0.21^{**}	0.32^{**}	0.18^{**}	-0.11^{**}	0.49^{**}	-0.77^{**}	-0.08^{*}	0.28^{**}	-0.53^{**}	0.14^{**}		-0.26^{**}
REAL	-0.39^{**}	-0.49^{**}	-0.33^{**}	0.02	-0.18^{**}	0.22^{**}	-0.05	-0.13^{**}	0.09^{*}	-0.02	-0.26^{**}	

Note 1: * significant at the 5% level (2-tailed) ** significant at the 1% level (2-tailed)

Note 2: The numbers on the top-right and bottom-left sections respectively represent the Pearson and Spearman correlation coefficients.

where P_{it} is the price per share at year t+2 months of firm i at time t; BV_{it} is the book value per share of firm i at time t; $BVLIP_{it}$ is the book value less the investment property per share of firm i at time t; EPS_{it} is the earnings per share of firm i for year t; IP_{it} is the investment property per share of firm i at time t; $IPND_{it}$ is the non-depreciated investment property per share of firm i at time t; IPD_{it} is the depreciated investment property per share of firm i at time t; $DIFFIP_{it}$ is the difference between the disclosed value and recorded cost value of the investment property per share of firm i at time t; $DIFFIPND_{it}$ is the difference between the disclosed value and recorded cost value of the non-depreciated investment property per share of firm i at time t; $DIFFIPD_{it}$ is the difference between the disclosed value and recorded cost value of the depreciated investment property per share of firm i at time t; ARS_{it} is the Aggregated Reliability Score (AR-score) of firm i at time t, which is R_Method_{it} + R_Source_{it} + R_Change_{it} + R_Audit_{it} + R_Time_{it}, where R_Method_{it} = 1 if firm i uses the mark to market model at time t and 0 otherwise, R_Source_{it} = 1 if firm i employs external appraiser(s) at time t and 0 otherwise, R_Change_{it} = 1 if firm i's percentage of change in the fair value of the investment property is below the median total percentage of change at time t and 0 otherwise, R_Audit_{it} = 1 if firm i employs a Big4 audit firm at time t and 0 otherwise, R_Time_{it} = 1 if firm i appraise the fair value in year t and 0 otherwise; $COMP_{it}$ is the proportion of the non-depreciated investment property to total investment property of firm i at time t; $REAL_{it}$ = 1 if firm i is in the real estate and construction industry and 0 otherwise.

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[17] Appendix C shows the verification of econometric issues that may arise in these models of this paper.

CHAPTER VI

EMPIRICAL RESULTS AND ANALYSES

6.1 Characteristics of Firms Adopting the Fair Value Model

This section attempts to identify the characteristics of firms that adopt the fair value model. In this research, it has been hypothesized that the investment property components (H1a) and the reliability of fair value measurements (H1b) influence the firms' accounting choices (i.e. the fair value and cost models).

Table 8 presents the logistic regression results of the characteristics of fair value-adopting firms (Hypotheses 1a-1b)[18] which can be divided into firm characteristics and information usefulness characteristics. The analysis results reveal that a mere 13% of the sampled firms have adopted the fair value model, consistent with Pappu and Devi (2011) and Ishak et al. (2012), who documented that listed firms in less advanced economies are more prone to be fixated on the cost model. Another possible explanation for the low adoption is that in Thailand the application of IAS40 to investment property has recently begun in 2011 and that the familiarity with the standard is relatively limited.

In Table 8, the logistic regression results[19] indicate that the investment property components (i.e. the proportion of the non-depreciated investment property component to total investment property) and the reliability of fair value measurement are significantly correlated to the likelihood that firms would adopt the fair value

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[18] The study use "Propfund" variable (firms issuing property fund and real estate investment trust) to control results in hypothesis 1 (table 8). The result is not tabulated due to a low significant power of "Propfund".

[19] See Appendix B for the logistic regression analysis (the test of necessary conditions and the goodness of fit test). The necessary conditions are passed the test except the multicollinearity problem between independent variables. The study prepares a logistic regression with backward input method and a factor analysis. The results confirm the results in the main test shown in Table 8.

model. The significance of tests are identified in both the univariate (models 1 and 2) and multivariate tests (models 3 and 4) in the presence and absence of the control variables. The coefficients of the investment property components and the Aggregated Reliability Score are statistically significant at the 1% significance level. Nevertheless, the resulting sign of the coefficient of the investment property components is opposite to the expectation.

This research has proposed Hypothesis 1a on the assumption that the non-depreciated investment property normally appreciates in value and that its fair value measurements are readily available and reliable. Thus, the higher the proportion of the non-depreciated investment property, the greater the likelihood that the fair value model is adopted. In addition, the investment property component is significantly positively correlated to the use of market model which is the most priority level of fair value measurements according to IFRS13 (IASB, 2013b).

The non-depreciated investment property is thus appraised by the mark-to-market technique, which offers a more reliable value than the mark-to-model approach which is applicable to the depreciated investment property. This subsequently contributes to the fair value measurements of higher reliability of the non-depreciated investment property. In Table 6 (in the previous chapter), the investment property components are significantly positively correlated to the difference between the fair value and book value of the investment property at the 1% significance level. As anticipated, the non-depreciated investment property also exhibits a greater value appreciation than the depreciated investment property and thus the fair value model should be adopted.

Table 8 Logistic regressions of characteristics of firms applying the fair value model to investment property

$$FV_{it} = \beta_0 + \beta_1 COMP_{it} + \beta_2 ARS_{it} + \beta_3 LOC_{it} + \beta_4 REV_{it} + \beta_5 TREA_{it} + \beta_6 APPRE_{it} + \beta_7 SIZE_{it} + \beta_8 LEV_{it} + \beta_9 MTB_{it} + \beta_{10} SET100_{it} + \beta_{11} REAL_{it} + \varepsilon_{it}$$

Variables	Coefficient (1)	Coefficient (2)	Coefficient (3)	Coefficient (4)
Constant	-1.550 ***	-2.866 ***	-2.615 ***	2.766
COMP	-0.626 **		-0.745 ***	-1.106 ***
ARS		0.257 **	0.308 **	.307 ***
LOC				.461
REV				2.148 ***
TREA				-.895
APPRE				-.413 **
SIZE				-.275 *
LEV				-.022
MTB				-.025
SET100				.771 *
REAL				.682 *
-2Loglikelihood[20]	490.998	491.264	484.362	402.593
LR Chi^2	5.02 **	4.76 **	11.66 ***	93.43 ***
Pseudo R^2	0.010	0.010	0.024	0.188

Note : * partially significant at the 10% level (1-tailed) ** significant at the 5% level (1-tailed) *** significant at the 1% level (1-tailed)
where FV_{it} = 1 if firms adopt the fair value model for the investment property, and 0 otherwise; $COMP_{it}$ is the proportion of the non-depreciated investment property to total investment property of firm i at time t; ARS_{it} is the Aggregated Reliability Score (AR-score) of firm i at time t, which is R_Method$_{it}$ + R_Source$_{it}$ + R_Change$_{it}$ + R_Audit$_{it}$ + R_Time$_{it}$, where R_Method$_{it}$ = 1 if firm i uses the mark to market model at time t and 0 otherwise, R_Source$_{it}$ = 1 if firm i employs external appraiser(s) at time t and 0 otherwise, R_Change$_{it}$ = 1 if firm i's percentage of change in the fair value of the investment property is below the median total percentage of change at time t and 0 otherwise, R_Audit$_{it}$ = 1 if firm i employs a Big4 audit firm at time t and 0 otherwise, R_Time$_{it}$ = 1 if firm i appraise the fair value in year t and 0 otherwise; LOC_{it} = 1 if firm i is located outside Bangkok and 0 otherwise; REV_{it} = 1 if firm i revalues its property, plant and equipment at time t and 0 otherwise; $TREA_{it}$ = 1 if firm i is a member of the Thai Real Estate Association at time t and 0 otherwise; $APPRE_{it}$ is the gain (loss) from valuation of the investment property per share of firm i proxied by natural logarithm of gain (loss) from valuation of the investment property at time t; $SIZE_{it}$ is the size of firm i proxied by natural logarithm of total assets of firm i at time t; LEV_{it} is the leverage proxied by total liability divided by total assets of firm i at time t; MTB_{it} is the market to book ratio; $SET100_{it}$ = 1 if firm i is classified as an SET100 company and 0 otherwise; $REAL_{it}$ = 1 if firm i is in the real estate and construction industry and 0 otherwise.

[20] See Appendix B for the logistic regression analysis (test of necessary conditions and the goodness of fit test). The value of -2 log likelihood is approaching to zero (from 490.998 in the model 1 to 402.593 in the model 4). This shows that the last model which includes control variables are the most appropriate model. The pseudo R^2 of these models also increase from the model 1 to the model 4 (1% in the model 1 to 18.8% in the model 4). See the chi-square test and the Hosmer-Lameshow test in the Appendix B.

In Table 8, the investment property component variable is in contrast to the prediction. The result reveals that it is not correlated to the fair value model adoption. The findings also reveal that firms with high value appreciation have a tendency to adopt the cost model at the 1% significance level, inconsistent with Watts and Zimmerman (1978), who noted that firms would recognize the appreciation in value for debt contracting purposes. In addition, it suggests that Thai listed firms attach greater importance to the reputation than to the revalued appreciation.

In Table 5, the large standard deviations (SD) of value appreciation and the difference between the disclosed fair value and recognized cost value ($DiffIP_{it}$) contribute to too fluctuating the revalued amounts for recordkeeping and thereby are relegated to the notes of the financial statements. This also helps maintain the smoothness of earnings (Quagli & Avallone, 2010) and prevents managerial opportunistic behavior (Dietrich et al., 2000). Interestingly, the greater the appreciation of the investment property fair value, the lower the likelihood of the fair value model adoption.

In Table 6, the investment property components are positively correlated to the difference between the fair value and book value of the investment property at the 1% significance level. As anticipated, the value of the non-depreciated investment property thus appreciates more vis-à-vis the depreciated investment property. In addition, firms with the non-depreciated investment property with greater value appreciation would opt against the adoption of the fair value model to circumvent the recognition of considerably dispersed amounts in the financial statements. In the same table, the investment property components are inversely correlated to the variable of real estate firms at the 1% significance level. In other words, the proportion of the depreciated investment property is greater than the non-depreciated investment property for the real estate firms.

In Table 8, firms in the property and construction industry are more familiar with the fair value measurement and thus more likely to adopt the fair value model (Dietrich et al., 2000; Gray & Fearnley, 2011; Ishak et al., 2012; Muller III et al., 2011). In addition, real estate firms with considerable proportion of the depreciated investment property to total investment property are more likely to adopt the fair value model than those with large proportion of the non-depreciated investment property. In short, the findings with regard to the investment property components in the Thai setting are statistically significant but contradict Hypothesis 1a.

In addition, on the reliability of fair value measurements, it is significantly correlated to the adoption of the fair value model as expected. Firms with the fair value measurements of high reliability exhibit a greater tendency to adopt the fair value model as they are poised to provide reliable information to the investors. This is consistent with the contracting theory (Holthausen, 1990), which states that an agent capable of provision of reliable information would disclose the information to minimize the information asymmetry. The finding is also in line with Cotter and Zimmer (2003), who documented that firms would record the fair value only if the estimation is reliable. This is in accordance with Hypothesis 1b.

Moreover, from the reviewing of the management disclosure on annual reports and press releases of some example firms in Thailand, the managements of cost adopters do not try to use the accounting choice that has higher cost with doubts in investors' usefulness. Also, they consider that investment property should have the same method as property, plant and equipment revaluation choice. However, the managements of fair value adopters insist that the use of fair value method can help investor realizing the true value of companies' assets. As well, they record the appreciations from the assets revaluation to enhance their wealth. These are quite consistent with the results from the testing.

Furthermore, other firm characteristics and information usefulness characteristics influence firms to the choosing of accounting treatment as expected. For example, firms with expertise in the fair value measurement of non-financial assets, i.e. those adopting the revaluation method for property, plant and equipment (Christensen & Nikolaev, 2009; Cotter & Zimmer, 1995), are more likely to adopt the fair value model, and so are firms in the property and construction industry (Dietrich et al., 2000; Gray & Fearnley, 2011; Ishak et al., 2012; Muller III et al., 2011). On the contrary, as result of Quagli and Avallone (2010), this study find that larger firms tend to adopt the cost model for transparency. Firms engaging the reputation (SET100) by higher market capital also tend to adopt the fair value model (Gray & Fearnley, 2011; Muller III et al., 2011).

It is thus possible to conclude that the selection of accounting choice for investment property of Thai listed firms is influenced by the relative proportion of investment property components (i.e. the non-depreciated vs depreciated investment property) and the reliability of the measurements, which correspond to the predictions. Specifically, a larger proportion of the non-depreciated investment property incentivizes firms to adopt the cost model to avoid recording the dispersed appreciation values of the investment property. On the other hand, firms with greater proportion of the depreciated investment property would adopt the fair value model due to the fact that a significant number of the sampled firms are in the property and construction industry with expertise in the fair value measurement. In addition, firms with ability to measure the fair value objectively and reliably would prefer the fair value model. This also reveals that both firm characteristics and information usefulness characteristics have an influence on the accounting treatment of firms.

Robustness Test of the Logistic Regression

Table 9 presents the logistic regression results of the characteristics of firms applying the fair value model to investment property, controlling for the industry and year fixed effects. This is to remove the industry and year effects which could influence the results (Aboody et al., 1999). The -2loglikelihood of the model ranges from 462.276 to 374.644, and the chi-square tests are statistically significant. The results are almost identical to those of the main test. Since the industry and year variables are insignificant, both variables thus have no effect on the characteristics of firms adopting the fair value model.

Table 9 Logistic regressions of characteristics of firms applying the fair value model to investment property controlling for the industry and year fixed effects

$$FV_{it} = \beta_0 + \sum_{k=1}^{7} \beta_{0k} IND_{kit} + \sum_{j=1}^{3} \beta_{0j} YEAR_{jit} + \beta_1 COMP_{it} + \beta_2 ARS_{it} + \beta_3 LOC_{it} + \beta_4 REV_{it} + \beta_5 TREA_{it} + \beta_6 APPRE_{it} + \beta_7 SIZE_{it} + \beta_8 LEV_{it} + \beta_9 MTB_{it} + \beta_{10} SET100_{it} + \varepsilon_{it}$$

Variables	Coefficient (1)		Coefficient (2)		Coefficient (3)		Coefficient (4)	
Constant	-14.433		-16.269		-16.364		-10.080	
COMP	-0.660	**			-0.797	***	-1.293	***
ARS			0.307	**	0.363	***	0.536	***
LOC							0.449	
REV							2.191	***
TREA							-0.952	
APPRE							-0.492	***
SIZE							-0.369	**
LEV							-0.009	
MTB							-0.040	
SET100							1.108	
IND_k	NS		NS		NS		NS	
$YEAR_j$	NS		NS		NS		NS	
-2Log likelihood	462.276		461.320		454.378		374.644	
LR Chi^2	18.84	**	19.80	**	26.74	***	106.47	***
Pseudo R^2	0.039		0.041		0.056		0.221	

Note : * partially significant at the 10% level (1-tailed) ** significant at the 5% level (1-tailed) *** significant at the 1% level (1-tailed) NS = Not significant

where FV_{it} = 1 if firms adopt the fair value model for the investment property, and 0 otherwise; $COMP_{it}$ is the proportion of the non-depreciated investment property to total investment property of firm i at time t; ARS_{it} is the Aggregated Reliability Score (AR-score) of firm i at time t, which is R_Method_{it} + R_Source_{it} + R_Change_{it} + R_Audit_{it} + R_Time_{it}, where R_Method_{it} = 1 if firm i uses the mark to market model at time t and 0 otherwise, R_Source_{it} = 1 if firm i employs external appraiser(s) at time t and 0 otherwise, R_Change_{it} = 1 if firm i's percentage of change in the fair value of the investment property is below the median total percentage of change at time t and 0 otherwise, R_Audit_{it} = 1 if firm i employs a Big4 audit firm at time t and 0 otherwise, R_Time_{it} = 1 if firm i appraise the fair value in year t and 0 otherwise; LOC_{it} = 1 if firm i is located outside Bangkok and 0 otherwise; REV_{it} = 1 if firm i revalues its property, plant and equipment at time t and 0 otherwise; $TREA_{it}$ = 1 if firm i is a member of the Thai Real Estate Association at time t and 0 otherwise; $APPRE_{it}$ is the gain (loss) from valuation of the investment property per share of firm i proxied by natural logarithm of gain (loss) from valuation of the investment property at time t; $SIZE_{it}$ is the size of firm i proxied by natural logarithm of total assets of firm i at time t; LEV_{it} is the leverage proxied by total liability divided by total assets of firm i at time t; MTB_{it} is the market to book ratio; $SET100_{it}$ = 1 if firm i is classified as an SET100 company and 0 otherwise; IND_{kit} is the industry fixed effect (i.e. 1 to 8); $YEAR_{jit}$ is the year fixed effect, i.e. years 2011 to 2014; ε_{it} is firm i's residual value of year t.

6.2 Value Relevance of Investment Property

This section attempts to investigate the value relevance of investment property at the aggregated (Hypothesis 2) and disaggregated levels (Hypothesis 3). The Aggregated Reliability Score (AR-score) will subsequently be applied to partitioning and/or holding constant the reliability effect from the value relevance. The post-extracting value relevance (i.e. with the reliability consideration held constant) is referred to as intrinsic value relevance of the investment property. The hypothesis testing is then carried out for Hypotheses 4 and 5 respectively for the aggregated and disaggregated investment properties.

6.2.1 Value Relevance of the Aggregated Investment Property

This research utilizes the model proposed in Chapter 4 to determine value relevance of the aggregated investment property. As previously stated, as many as 33% of total sampled samples are firms in the property and construction industry. Prior research on investment property has focused almost exclusively on real estate firms (Dietrich et al., 2000; Gray & Fearnley, 2011; Ishak et al., 2012; Muller III et al., 2011). This is consistent with Muller III et al. (2011) and Quagli and Avallone (2010), who documented that enterprises in the property and construction industry possess more expertise and are more familiar with the investment property accounting than those in other industries. This current research has thus treated this industry consideration as a control variable.

Table 10 summarizes the multiple regression results of the aggregated and disaggregated investment properties utilizing the ordinary least squares (OLS) estimation method. The assumptions of the best linear unbiased estimator (BLUE) are also tested as shown in Appendix C[21]. The dependent variable is required to be transformed from price at time t plus two months to natural logarithm of price at time t plus two months to address the non-normality distribution problem of the models.

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[21] Appendix C (Multiple regression analysis) shows the goodness of fit test and the management of econometric issues of the models step-by-step.

Table 10 Multiple regressions of the aggregated and disaggregated levels of investment property

Aggregated level model: $lnP_{it} = \beta_0 + \beta_1 BVLIP_{it} + \beta_2 EPS_{it} + \beta_3 IP_{it}xFV_{it} + \beta_4 IP_{it}xHC_{it} + \beta_5 DiffIP_{it} + \beta_6 REAL_{it} + \varepsilon_{it}$

Disaggregated level model: $lnP_{it} = \alpha_0 + \alpha_1 BVLIP_{it} + \alpha_2 EPS_{it} + \alpha_3 IPND_{it}xFV_{it} + \alpha_4 IPND_{it}xHC_{it} + \alpha_5 DiffIPND_{it} + \mu_6 IPD_{it}xFV_{it} + \mu_7 IPD_{it}xHC_{it} + \mu_8 DiffIPD_{it} + \alpha_9 REAL_{it} + \varepsilon'_{it}$

Level	Aggregated level			Disaggregated level		
Model Partition (Hypothesis)	Model 1 : All samples (H2)	Model 2.1 : ARSPart = 1 (H4)	Model 2.2 : ARSPart = 0 (H4)	Model 3 : All samples (H3)	Model 4.1 : ARSPart = 1 (H5)	Model 4.2 : ARSPart = 0 (H5)
BV	0.433 ***	0.503 ***	0.336	0.447 ***	0.530 ***	0.379**
EPS	0.112 ***	0.166 ***	0.077 ***	0.099 ***	0.144 ***	0.042**
IP x FV	0.063	0.176 **	0.098 *			
IP x HC	0.234 ***	0.139	0.331 ***			
DiffIP	0.012	-0.007	0.038 ***			
IPND x FV				0.087	0.100	0.047
IPND x HC				0.123	0.122	0.125
DiffIPND				0.002 **	-0.048	0.048
IPD x FV				0.056	-0.135 ***	0.095**
IPD x HC				0.191 **	0.042	0.305
DiffIPD				0.007 **	0.041	-0.016**
REAL	-0.226 ***	-0.199 ***	-0.276 ***	-0.232 ***	-0.198 ***	-0.276**
N	648	376	272	648	376	272
Adjusted R^2	52.02	58.16	50.94	63.93	69.62	62.41
Incremental R^2	-	6.14	(1.08)	-	5.69	(1.52)
Test hypothesis – Aggregated level						
Expected	$\beta_{FV} > \beta_{HC}$	$\beta_{FV} > \beta_{HC}$	$\beta_{FV} > \beta_{HC}$			
Result	$\beta_{FV} < \beta_{HC}$***	$\beta_{FV} > \beta_{HC}$*	$\beta_{FV} < \beta_{HC}$***			
Test hypothesis – Disaggregated level						
The non-depreciated investment property						
Expected				$\alpha_{FV} > \alpha_{HC}$	$\alpha_{FV} > \alpha_{HC}$	$\alpha_{FV} > \alpha_{HC}$
Result				$\alpha_{FV} < \alpha_{HC}$	$\alpha_{FV} > \alpha_{HC}$	$\alpha_{FV} < \alpha_{HC}$
The depreciated investment property						
Expected				$\mu_{FV} < \mu_{HC}$	$\mu_{FV} > \mu_{HC}$	$\mu_{FV} > \mu_{HC}$
Result				$\mu_{FV} < \mu_{HC}$***	$\mu_{FV} > \mu_{HC}$**	$\mu_{FV} < \mu_{HC}$**

Note 1: The coefficients of the models are standardized for direct comparison (constants are removed).

Note 2: * partially significant at the 10% level based on the robust standard deviation (HC_0)

** significant at the 5% level based on the robust standard deviation (HC_0)

*** significant at the 1% level based on the robust standard deviation (HC_0)

The significant levels are based on a 1-tailed test for hypothesis testing and a 2-tailed test otherwise.

Table 10 Multiple regressions of the aggregated and disaggregated levels of investment property (Con't)

where lnP_{it} is the price per share of firm i at year t+2months; $BVLIP_{it}$ is the book value less the investment property per share of firm i at year t; EPS_{it} is the earnings per share of firm i for year t; IP_{it} is the investment property per share of firm i at time t; $DIFFIP_{it}$ is the difference between the disclosed value and recorded cost value of the investment property per share of firm i at time t; $IPND_{it}$ is the non-depreciated investment property per share of firm i at time t; $DIFFIPND_{it}$ is the difference between the disclosed value and recorded cost value of the non-depreciated investment property per share of firm i at time t; IPD_{it} is the depreciated investment property per share of firm i at time t; $DIFFIPD_{it}$ is the difference between the disclosed value and recorded cost value of the depreciated investment property per share of firm i at time t; FV_{it} = 1 if firms adopt the fair value model for the investment property, and 0 otherwise; HC_{it} = 1 if firms adopt the cost model for the investment property, and 0 otherwise; $REAL_{it}$ = 1 if firm i is in the real estate and construction industry and 0 otherwise; $ARSPart_{it}$ is the partitioned AR-Score of firm i at time t, where it is 1 if ARS_{it} is above the median of total ARS_{it} (high reliability group) and 0 for below the median (low reliability group); ARS_{it} is the Aggregated Reliability Score (AR-score) of firm i at time t, which is R_Method_{it} + R_Source_{it} + R_Change_{it} + R_Audit_{it} + R_Time_{it}, where R_Method_{it} = 1 if firm i uses the mark to market model at time t and 0 otherwise, R_Source_{it} = 1 if firm i employs external appraiser(s) at time t and 0 otherwise, R_Change_{it} = 1 if firm i's percentage of change in the fair value of the investment property is below the median total percentage of change at time t and 0 otherwise, R_Audit_{it} = 1 if firm i employs a Big4 audit firm at time t and 0 otherwise, R_Time_{it} = 1 if firm i appraise the fair value in year t and 0 otherwise; ε_{it} is firm i's residual value of year t; $\beta_{FV} = |\beta_3|$ is the coefficient of the investment property recorded at fair value; $\beta_{HC} = |\beta_4+\beta_5|$ is the coefficient of the investment property recorded at cost; $\alpha_{FV} = |\alpha_3|$ is the coefficient of the non-depreciated investment property recorded at fair value; $\alpha_{HC} = |\alpha_4+\alpha_5|$ is the coefficient of the non-depreciated investment property recorded at cost; $\mu_{FV} = |\mu_6|$ is the coefficient of the depreciated investment property recorded at fair value; $\mu_{HC} = |\mu_7+\mu_8|$ is the coefficient of the depreciated investment property recorded at cost.

Due to the presence of the heteroscedasticity problem, the standard deviations are recalculated for the robust standard deviations (heteroscedasticity-consistent standard error or HC_0) to mitigate the significance test bias. In addition, the presence of collinearity problem between the disclosed fair values of the non-depreciated and depreciated investment properties (DiffIPND and DiffIPD) requires removal of certain independent variables. Interestingly, in the subsequent Tables 17 and 19, the analysis results are similar to those of the main test, indicating that the collinearity problem has no influence on the hypothesis testing. More information regarding the goodness of fit test and the econometric issues are described in the Appendix C. The coefficients from the models are subsequently standardized for direct comparison purposes.

It has been hypothesized in Hypothesis 2 that the fair value model offers more value relevance vis-à-vis the cost model since the former is capable of better reflecting the true economic value of the investment property. In addition, the fair value exerts more influence on the investors' decision-making process, as stated in paragraph 17 of IAS40 (IASB, 2012c).

The coefficients of the investment property recorded at fair value and at cost in Model 1 are respectively statistically insignificant and significant at the 1% significance level. The coefficients of the fair value model and the cost model can be directly compared since they have been standardized. Moreover, the Wald-test statistic[22] (Lourenço & Dias Curto, 2009; Owusu-Ansah & Yeoh, 2006) confirms that the magnitude of coefficient of the cost model adopters, i.e. the recognized cost and disclosed fair value ($|\beta_4+\beta_5|$) of the investment property, is significantly greater than that of the fair value model adopters ($|\beta_3|$) at the 1% significance level.[23] Investors thus have more trust in the aggregated investment property recorded at cost, with disclosure of fair value, than that recorded at fair value. This is inconsistent with the hypothesis but consistent with Ishak et al. (2012); Pappu and Devi (2011), who reported that, in the setting of a less advanced economy, the cost model exhibits more value relevance than the fair value model; and that investors in such a setting would attach greater importance to the cost model.

According to So and Smith (2009), the application of fair value to investment property could encounter the following drawbacks: (1) the unavailability of active markets for certain assets, (2) the fair value accounting is considered to be costly information, especially for small companies, and (3) the recognition of unrealized gains or losses from asset revaluations directly in the income statement results in a greater volatility and an unpredictability of firms' operating results.

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[22] Although the coefficients shown in the table are normalized for direct comparison between coefficients, it could not statistically confirm the comparison between groups of coefficients. Therefore, this research has applied the Wald-statistic for comparison between groups of coefficients. The STATA program uses Wald-statistic in testing or comparing two or more coefficients (Help file of STATA, accessed on October 14, 2015).

[23] After the normalization, this research assumes that fair value of investment property ($|\beta_3|$) is equal to the cost of investment property plus the difference between the fair value and cost value of investment property ($|\beta_4+\beta_5|$). Therefore, both represent the identical accounting information which is the fair value of investment property. The study can subsequently directly compare the magnitudes of value relevance of the fair value model and the cost model using the absolute values of the coefficients. This method is consistent with Owusu-Ansah and Yeoh (2006) and Lourenço and Dias Curto (2009). This current research also performs robustness checks, as shown in Table 18, and the results are similar.

The first drawback is not applicable to this current research due to a considerably high average AR-score of 3.59 (out of 5) (Table 5), indicating that the fair value could be reliably determined in the majority of the sampled firms. The second challenge could also be disregarded because regular measurement of the investment property fair value is required of both the fair value model and cost model adopters.

The last item however is relevant to this current research. In Table 5, the appreciation in fair value of the sampled firms is on average THB2.80 per share with a standard deviation (SD) of 18.10. The high SD indicates the volatility of gain or loss from the fair value measurement. In other words, the higher the standard deviation, the greater the volatility of the income statement, rendering the cost model superior to the fair value model. Furthermore, Table 6 indicates an inverse correlation between the fair value model adoption and the investment property appreciation, leading to firms adopting the fair value model only when the appreciation is insignificant. In Table 12, due to a considerably lower SD of the investment property recorded at cost (3.50) relative to that recorded at fair value (28.17), investors would put more trust in the investment property recorded at cost. These reasons have contributed to a significant majority of Thai investors and firms in Thailand being fixated on the cost model.

6.2.2 Value Relevance of the Aggregated Investment Property after Controlling for the Reliability Effect

According to Holthausen and Watts (2001), prior research on value relevance has yet to deal with the reliability issue of the accounting information. Power (2010) noted that the level of reliability can either promote or undermine the value relevance benefit of fair value accounting. For this reason, this current research has held constant the reliability effect by partitioning the sampled firms into 2 groups: the high (376 firm-years) and low reliability groups (272 firm-years), whereby the median AR-score (i.e. 4) is used as the partitioning threshold. The within-group reliability thus remains constant. The AR-score frequencies are tabulated below:

Table 11 AR-score frequencies

AR-score	0	1	2	3	4	5	Total	Median	Average
Firms*	4	12	85	171	248	128	648	4	3.59
AR-Partition	Low = 272				High = 376		648		

* Firms who have AR-score equal or greater than 4 will be classified as "High reliability group", otherwise will be classified as "Low reliability group"

It has been hypothesized that intrinsic value relevance of the fair value model is greater than that of the cost model in both the high and low reliability groups. The reasons are that the fair value model can better reflect the true economic value of investment property and that it exerts more influence over the investors' decision-making process, as stated in paragraph 17 of IAS40 (IASB, 2012c), particularly when reliability is held constant.

The analysis results (i.e. post-partitioning) are shown in the Models 2.1 and 2.2 of Table 10. It could be observed that, in the high reliability group (model 2.1), the coefficient of the investment property recorded at fair value is statistically significant at the 5% level, whereas those recorded at cost and its disclosed fair value are insignificant. In addition, the Wald-test statistic shows that the magnitude of the coefficient of the fair value model adopters ($|\beta_3|$) is slightly greater than that of the cost model adopters ($|\beta_4+\beta_5|$) at the 10% significance level. In contrast, in the low reliability group, the magnitude of the coefficient of the investment property recorded at fair value (model 2.2) is significantly less than that of the investment property recorded at cost with disclosure of fair value at the 1% significance level. The coefficient of the fair value model is partially significant at the 10% level, while those of the investment property recorded at cost and its disclosed fair value are significant at the 1% level.

If investors perceive of firms' fair value measurement as being of high reliability, they would incorporate the fair value in their decision, giving rise to the coefficients of the fair value model and the cost model being statistically significant and insignificant, respectively. On the contrary, in case of the low-reliability fair value measurement, the investors would resort to the cost value with disclosure of its fair value, contributing to the coefficient of the fair value and cost models partially significant at the 10% and 1% levels, respectively. The findings are thus in line with the high reliability group of Hypothesis 4; and also consistent with Christensen and Nikolaev (2009), who noted that the fair value model is of less use to investors with the increasing deterioration of the valuation reliability.

In short, investors in a less advanced economy would fervently adhere to the cost model and barely rely on the recognized fair value of the aggregated investment property. Nonetheless, upon taking into consideration the reliability of firms' value measurement, the fair value of the aggregated investment property would be deployed in the case of high reliability; otherwise, the cost value of the aggregated investment property with disclosure of fair value is used. This suggests that the use of reliability information could address the issue of investors' fixation on the cost model.

6.2.3 Value Relevance of the Disaggregated Investment Property

Table 10 also presents the multiple regression results of the disaggregated investment property (i.e. models 3 and 4). It is hypothesized in Hypothesis 3 that different investment property components influence the value relevance differently due to their differences in both nature and accounting practice. For the non-depreciated investment property, the fair value model would offer more value relevance vis-à-vis the cost model since the fair value of this component (i.e. the non-depreciated component) can be reliably measured due to the availability of active markets. On the contrary, in case of the depreciated investment property, the cost model would offer more value relevance because the fair value of this component is prone to bias due to the unavailability of active markets (Nordlund, 2008). Investors would instead resort to the cost value by a depreciation method and the disclosure of fair value as supplementary information. The arguments are rooted in the reliability effect inherent in the fair value measurement.

The results of model 3 however reveal that the difference in the coefficient magnitudes of the fair value model ($|\alpha_3|$) and cost model adopters ($|\alpha_4+\alpha_5|$) for the non-depreciated investment property is statistically insignificant, giving rise to the investors' indifference between the non-depreciated investment property recorded at fair value and at cost. The investors might also use the disclosed fair value of the cost model as supplementary information (i.e. the disclosed fair value is significant at the 5% level). The results on value relevance of the non-depreciated investment property are nonetheless inconsistent with the hypothesis.

On the other hand, the depreciated investment property recorded at cost and its disclosure of fair value are statistically significant at the 5% level whereas the coefficient of the fair value model is insignificant. The coefficient magnitude of the cost model adopters ($|\mu_7 + \mu_8|$) is significantly greater than that of the fair value model adopters ($|\mu_6|$) at the 1% significance level. This is consistent with Hypothesis 3, in which in the case of the depreciated investment property investors have more trust in the cost model than in the fair value model due to lower reliability of the latter's fair value measurement. The results also show that investors prefer the systematical depreciation to the recognition of gain or loss attributable to changes in the fair value in the income statement.

In Table 7, no correlation exists between the non-depreciated investment property (IPND) and the Aggregated Reliability Score (ARS) while a negative relationship is observed between the depreciated investment property (IPD) and ARS at the 1% significance level. The findings underscore the significance of the reliability issue pertaining to the fair measurement of the depreciated investment property. As anticipated, the investors thus rely on the depreciated investment property recorded at cost rather than at fair value due to the latter's issue of less reliability. Value relevance of the depreciated investment property recognized at cost is thus higher than that recorded at fair value. In short, the analysis results partially substantiate Hypothesis 3 in that the value relevance of the depreciated investment property is subject to the reliability effect; but do not validate that of the non-depreciated investment property over which reliability has no influence.

6.2.4 Value Relevance of the Disaggregated Investment Property after Controlling for the Reliability Effect

In Hypothesis 5, it is predicted that, given that the reliability factor is held constant, the investment property recorded at fair value would be of greater value relevance than recorded at cost for both the non-depreciated and depreciated investment properties. Meanwhile, previously it has been hypothesized in Hypothesis 3 that, due to the inherent reliability effect, the fair value model would be more applicable to the non-depreciated investment property while the cost model to the depreciated investment property. However, with the reliability effect held constant, the fair value model should be of more value relevance than the cost model for both investment property components.

The value relevance of each investment property component after the reliability-based partitioning is individually presented in the Models 4.1 and 4.2 of Table 10. For the non-depreciated investment property in both the high (model 4.1) and low (model 4.2) reliability groups, the investors hold the view that the investment property recorded at either fair value ($|\alpha_3|$) or cost ($|\alpha_4+\alpha_5|$) resembles each other. This particular finding corresponds to the analysis result of the non-partitioned non-depreciated investment property. It is thus possible to conclude that the accounting choice (i.e. the fair value vs cost model) has no effect on the value relevance of the non-depreciated investment property irrespective of whether the reliability effect is controlled.

In contrast, the post-partitioning results for the depreciated investment property (models 4.1 and 4.2) differ from the pre-partitioning (i.e. prior to controlling for the reliability effect) results (model 3). In addition, the analysis results resemble those belonging to the aggregated level of investment property (models 2.1 and 2.2). In the high reliability group, the coefficient of the fair value model is significant at the 1% level while that of the cost model is insignificant. The depreciated investment property recorded at fair value ($|\mu_6|$) is of greater value relevance than that recorded at cost with disclosure of fair value ($|\mu_7+ \mu_8|$) at the 5% significance level. Nonetheless, the results are reverse for firms in the low reliability group. The coefficients of the fair value and cost models, respectively, are partially significant at the 10% level and significant at the 1% level. The Wald-test also indicates that the coefficient of the cost model ($|\mu_7 + \mu_8|$) is greater than that of the fair value model ($|\mu_6|$) at the 1% significance level. Specifically, if the fair value is perceived as reliable, the investors would rely on the measurement; however, if the reliability in the fair value measurement is low, they would resort and adhere to the cost model. The findings thus partially validate Hypothesis 5 in that the fair value model is of greater value relevance than the cost model only in the case of depreciated investment property due to higher reliability in the fair value measurements.

As previously presented in Table 7, the correlation between the non-depreciated investment property (IPND) and the Aggregated Reliability Score (ARS) is insignificant, suggesting that investors did not take the reliability inherent in the fair value measurements of the non-depreciated investment property into consideration. On the contrary, a correlation is detected between the depreciated investment property (IPD) and ARS, implying that the reliability factor plays a significant role only in the depreciated investment property. Interestingly, the analysis results of the depreciated investment property are similar to those of the aggregated level of investment property.

Explanation on Statistical Insignificance of the Non-Depreciated Investment Property

As presented in Table 12, since the standard deviations (SD) of the non-depreciated investment property recorded at fair value and at cost are both relatively small, the investors are thus indifferent and subsequently ignore these information. On the other hand, the SDs of the depreciated investment property recorded at fair value and cost, respectively, are 28.28 and 2.25, indicating the former method's large fluctuation across firms and lower value relevance vis-à-vis that recorded at cost, as illustrated in the Model 3 of Table 10. In addition, the SDs of the depreciated investment property in the low reliability group are 48.21 and 3.15 for the fair value and cost models, respectively. In Model 4.2 of Table 10, the value relevance of the depreciated investment property recorded at cost is greater than at fair value due to a large variation across firms in the fair value model group. The findings are similar to those SDs of the aggregated investment property, contributing to a resemblance between the analysis results of Models 1 and 2.2 and those belonging to Models 3 and 4.2, respectively.

In the high reliability group of Table 12, there is no significant difference in the standard deviations across groups; therefore, the intrinsic value relevance belonging to the fair value model could be of greater use than that recorded at cost, as shown in the Models 2.1 and 4.1 of Table 10.

Interestingly, the analysis results of the depreciated investment property are similar to those of the aggregated investment property. The variation across the aggregated investment property is influenced by the variation across groups of the depreciated investment property. Meanwhile, the non-depreciated investment property has no variation across groups. Investors thus hold the view that the depreciated investment property could be an effective representative of the aggregated investment property. As a result, the value relevance outcomes of the aggregated investment property and the depreciated investment property are nearly identical.

Table 12 Analysis of standard deviations of the investment property

Standard deviation (No. of firms)	High reliability group		Low reliability group		Total	
	Fair value model	Cost model	Fair value model	Cost model	Fair value model	Cost model
IPND (648)	2.39 (56)	2.44 (320)	0.61 (27)	2.16 (245)	2.05 (83)	2.32 (565)
IPD (648)	1.16 (56)	1.07 (320)	48.21 (27)	3.15 (245)	28.28 (83)	2.25 (565)
Aggregated IP (648)	2.62 (56)	2.90 (320)	48.14 (27)	4.13 (245)	28.17 (83)	3.50 (565)

where IP_{it} is the investment property per share of firm i at time t; $IPND_{it}$ is the non-depreciated investment property per share of firm i at time t; IPD_{it} is the depreciated investment property per share of firm i at time t.

In Table 5, despite the proportion of the non-depreciated investment property component to total investment property of 65% and its per-share-basis proportion of 40%, no statistical difference in value relevance between the accounting choices is found in this asset component. In Table 10, the application of either the cost model or the fair value model to the non-depreciated investment property offers similar value relevance information in the views of investors. On the other hand, a dissimilarity exists between the value relevance of the depreciated investment property recorded at fair value and at cost, thus confirming the existence of variation in value relevance between the investment property components. Moreover, R^2 of the disaggregated investment property (Models 3-4) are greater than that of the aggregated investment property (Models 1-2). The disaggregation of investment property could thus provide a better insight into the equity price movements and also more useful information to the investors as strongly believed by the standard setters.

For the depreciated investment property, without controlling for the reliability factor, the cost model offers more value relevance than the fair value model. The results are reverse upon application of the AR-score. In the high reliability group, the depreciated investment property recorded at fair value is of greater intrinsic value relevance than at cost; and vice versa in the low reliability group, indicating that investors deploy the fair value measurement reliability information disclosed in the notes of the financial statements in valuation of the firms.

The findings also point to the similarity in the value relevance characteristics of the aggregated investment property and the depreciated investment property. This is attributable to the fact that the SD of the aggregated investment property is influenced by that of the depreciated investment property. In other words, the value relevance of the aggregated investment property seems to be driven by the depreciated investment property. The investors thus deploy the depreciated investment property as the proxy of the aggregated investment property.

6.3 Sensitivity Analysis

This section will test the robustness of the results derived from table 10. This is also to ensure various aspects of arguments that can be raised. The sensitivity analysis will includes the insertion of control variables into the main models, the insertion of fitness of firms' accounting choice, the insertion of industry and year fixed effect, the applying of price at time t and t plus 3 months as other dependent variables, the modification of the main models to avoid multicollinearity problem, the use of pairwise samples and the reforming of AR-score partitioning. The results of the sensitivity analyses are as follows,

6.3.1 Main Model with Control Variables

Venkatachalam (1996) incorporated in the model a number of control variables capable of capturing relevant information embedded in the residual value. In this current research, the control variables include the firm size (proxied by a natural logarithm of total assets), firms' leverage (proxied by the debt ratio), information asymmetry (proxied by the market to book ratio), and the firms' market capitalization (proxied by the SET100 firms). According to Muller III and Riedl (2002); Muller III et al. (2011); Quagli and Avallone (2010), these variables reportedly influence the investors' decision with regard to valuations. Table 13 presents the multiple regression results of the modified models (i.e. those with the additional control variables) whose analysis results are identical to those (i.e. the main models) in Table 10. By comparison, R^2 in Table 10 are nevertheless slightly higher than those in Table 13, suggesting that other information in the main model (i.e. residual values) (Ohlson, 1995) has no significant effect on the results.

Table 13 Multiple regression of the aggregated and disaggregated investment property controlling for firm size, leverage, information asymmetry and market capitalization

Aggregated level model: $lnP_{it} = \beta_0 + \beta_1 BVLIP_{it} + \beta_2 EPS_{it} + \beta_3 IP_{it} xFV_{it} + \beta_4 IP_{it} xHC_{it} + \beta_5 DiffIP_{it} + \beta_6 REAL_{it} + \beta_7 SIZE_{it} + \beta_8 MTB_{it} + \beta_9 LEV_{it} + \beta_{10} SET100_{it} + \varepsilon_{it}$

Disaggregated level model: $lnP_{it} = \alpha_0 + \alpha_1 BVLIP_{it} + \alpha_2 EPS_{it} + \alpha_3 IPND_{it} xFV_{it} + \alpha_4 IPND_{it} xHC_{it} + \alpha_5 DiffIPND_{it} + \mu_6 IPD_{it} xFV_{it} + \mu_7 IPD_{it} xHC_{it} + \mu_8 DiffIPD_{it} + \alpha_9 REAL_{it} + \alpha_{10} SIZE_{it} + \alpha_{11} MTB_{it} + \alpha_{12} LEV_{it} + \alpha_{13} SET100_{it} + \varepsilon'_{it}$

Level	Aggregated level			Disaggregated level		
Model	Model 1 :	Model 2.1 :	Model 2.2 :	Model 3 :	Model 4.1 :	Model 4.2 :
Partition	All samples	ARSPart = 1	ARSPart = 0	All samples	ARSPart = 1	ARSPart = 0
(Hypothesis)	(H2)	(H4)	(H4)	(H3)	(H5)	(H5)
BV	0.515 ***	0.475 ***	0.524	0.502 ***	0.481 ***	0.535*
EPS	-0.011 ***	0.097 ***	-0.107 ***	-0.009 ***	0.083 ***	-0.120**
IP x FV	0.074	0.191 *	0.121 *			
IP x HC	0.229 ***	0.095	0.278 ***			
DiffIP	0.031 *	0.010	0.046 ***			
IPND x FV				0.086	0.096	0.044
IPND x HC				0.174	0.203	0.145
DiffIPND				-0.021 **	-0.029	-0.016**
IPD x FV				0.069	0.041 ***	0.120
IPD x HC				0.123 *	0.015	0.199*
DiffIPD				0.062 **	0.022	0.070**
REAL	-0.300 **	-0.230 **	-0.368 ***	-0.299 **	-0.220 **	-0.364**
SIZE	-0.011 **	0.094	-0.156	0.006	0.104	-0.149
MTB	0.039 ***	0.054 **	0.072 **	0.042 ***	0.054 **	0.072*
LEV	0.003	-0.114	-0.001	0.004	-0.117	-0.001
SET100	0.301	0.227	0.450	0.292	0.225	0.444
N	648	376	272	648	376	272
Adjusted R^2	59.90	65.48	61.05	71.57	76.88	56.05
Incremental R^2	-	5.58	1.15	-	5.31	(15.52)
Test hypothesis – Aggregated level						
Expected	$\beta_{FV} > \beta_{HC}$	$\beta_{FV} > \beta_{HC}$	$\beta_{FV} > \beta_{HC}$			
Result	$\beta_{FV} < \beta_{HC}$ ***	$\beta_{FV} > \beta_{HC}$ *	$\beta_{FV} < \beta_{HC}$ ***			
Test hypothesis – Disaggregated level						
The non-depreciated investment property						
Expected				$\alpha_{FV} > \alpha_{HC}$	$\alpha_{FV} > \alpha_{HC}$	$\alpha_{FV} > \alpha_{HC}$
Result				$\alpha_{FV} < \alpha_{HC}$	$\alpha_{FV} < \alpha_{HC}$	$\alpha_{FV} < \alpha_{HC}$
The depreciated investment property						
Expected				$\mu_{FV} < \mu_{HC}$	$\mu_{FV} > \mu_{HC}$	$\mu_{FV} > \mu_{HC}$
Result				$\mu_{FV} < \mu_{HC}$ ***	$\mu_{FV} > \mu_{HC}$ **	$\mu_{FV} < \mu_{HC}$ **

Table 13 Multiple regression of the aggregated and disaggregated investment property controlling for firm size, leverage, information asymmetry and market capitalization (Con't)

Note 1: The coefficients of the models are standardized for direct comparison (with the constants removed).

Note 2: * partially significant at the 10% level based on the robust standard deviation (HC_0)

** significant at the 5% level based on the robust standard deviation (HC_0)

*** significant at the 1% level based on the robust standard deviation (HC_0)

The significant levels are based on a 1-tailed test for hypothesis testing and a 2-tailed test otherwise.

where lnP_{it} is the natural logarithm of price per share of firm i at year t+2months; $BVLIP_{it}$ is the book value less the investment property per share of firm i at year t; EPS_{it} is the earnings per share of firm i for year t; IP_{it} is the investment property per share of firm i at year t; $DiffIP_{it}$ is the difference between the disclosed value and recorded cost value of the investment property per share of firm i at year t; $IPND_{it}$ is the non-depreciated investment property per share of firm i at year t; $DiffIPND_{it}$ is the difference between the disclosed value and recorded cost value of the non-depreciated investment property per share of firm i at year t; IPD_{it} is the depreciated investment property per share of firm i at year t; $DiffIPD_{it}$ is the difference between the disclosed value and recorded cost value of the depreciated investment property per share of firm i at year t; FV_{it} = 1 if firms adopt the fair value model for the investment property, and 0 otherwise; HC_{it} = 1 if firms adopt the cost model for the investment property, and 0 otherwise; $REAL_{it}$ is equal to 1 if firm i is in the real estate and construction industry and 0 otherwise; $ARSPart_{it}$ is the partitioned AR-Score of firm i at time t, where it is 1 if ARS_{it} is above the median of total ARS_{it} (high reliability group) and 0 for below the median (low reliability group); ARS_{it} is the Aggregated Reliability Score (AR-score) of firm i at time t, which is R_Method_{it} + R_Source_{it} + R_Change_{it} + R_Audit_{it} + R_Time_{it}, where R_Method_{it} = 1 if firm i uses the mark to market model at time t and 0 otherwise, R_Source_{it} = 1 if firm i employs external appraiser(s) at time t and 0 otherwise, R_Change_{it} = 1 if firm i's percentage of change in the fair value of the investment property is below the median total percentage of change at time t and 0 otherwise, R_Audit_{it} = 1 if firm i employs a Big4 audit firm at time t and 0 otherwise, R_Time_{it} = 1 if firm i appraise the fair value in year t and 0 otherwise; ε_{it} is firm i's residual value of year t; $\beta_{FV} = |\beta_3|$ is the coefficient of the investment property recorded at fair value; $\beta_{HC} = |\beta_4+\beta_5|$ is the coefficient of the investment property recorded at cost; $\alpha_{FV} = |\alpha_3|$ is the coefficient of the non-depreciated investment property recorded at fair value; $\alpha_{HC} = |\alpha_4+\alpha_5|$ is the coefficient of the non-depreciated investment property recorded at cost; $\mu_{FV} = |\mu_6|$ is the coefficient of the depreciated investment property recorded at fair value; $\mu_{HC} = |\mu_7+\mu_8|$ is the coefficient of the depreciated investment property recorded at cost; $SIZE_{it}$ is the size of firm i proxied by natural logarithm of total assets of firm i at time t; LEV_{it} is the leverage proxied by total liability divided by total assets of firm i at time t; MTB_{it} is the market to book ratio; $SET100_{it}$ = 1 if firm i is classified as an SET100 company and 0 otherwise. **The results in bold are non-robust.**

6.3.2 Main Model with Firms' Characteristic Fitting and Selection Bias Remediation

According to C. Chen et al. (2015), investors, in using the investment property information, take into consideration the firms' characteristics together with their chosen accounting choices. In other words, the investors prefer that firms with the fair value-model characteristics adopt the fair value model. It is however unfavorable for investors for firms fitting the fair value model to adopt the cost model or vice versa. Thus, the fitness of firm characteristics could influence the value relevance of investment property. In this current research, this factor has been treated as a control variable in the main models.

This research has identified the fitness of fair value characteristics for the following variables of Hypothesis 1: the investment property components, the Aggregated Reliability Score, the firm location, firms adopting the revaluation method for property, plant and equipment, firms engaging the service of Big4 auditors, the appreciation of investment property, firm size, and firms in the real estate or construction service industry. The fitness of fair value characteristics can be derived from the residual value ($\varepsilon_{i,t}$) of the following model:

$$FV_{it} = \beta_0 + \beta_1 COMP_{it} + \beta_2 ARSPart_{it} + \beta_3 LOC_{it} + \beta_4 REV_{it} + \beta_5 BIG4_{it} + \beta_6 APPRE_{it} + \beta_7 Size_{it} + \beta_8 REAL_{it} + \varepsilon_{it}$$

The residual value can be proxied for the fitness of firms with regard to accounting choice, which could subsequently influence the investors' perception of appropriate firms' value. In general, the lower the residual value, the more fitting the firm characteristics are to their accounting choices. In this current research, the fitness variable is treated as a control variable, which is partially based on Heckman's inverse mill ratio for the remediation of the self-selection bias in a regression (Heckman, 1979). Specifically, this research is partly affected by the selection bias attributable to the selection of the fair value model for investment property.

Table 14 presents the multiple regression results of the aggregated and disaggregated investment properties, controlling for the fitness of firm characteristics ($CHAR_{it}$). In the table, the analysis results correspond to those of the main models except for the greater p-values. The findings indicate that the investors incorporate the fitness of firm characteristics with regard to the accounting choice into their valuations.

Table 14 Multiple regression of the aggregated and disaggregated investment property controlling for the fitness of firm characteristics with regard to accounting choices (selection bias remediation)

Aggregated level model: $lnP_{it} = \beta_0 + \beta_1 BVLIP_{it} + \beta_2 EPS_{it} + \beta_3 IP_{i,t} xFV_{it} + \beta_4 IP_{it} xHC_{it} + \beta_5 DiffIP_{it} + \beta_6 REAL_{it} + \beta_7 CHAR_{it} + \varepsilon_{it}$

Disaggregated level model: $lnP_{it} = \alpha_0 + \alpha_1 BVLIP_{it} + \alpha_2 EPS_{it} + \alpha_3 IPND_{it} xFV_{it} + \alpha_4 IPND_{it} xHC_{it} + \alpha_5 DiffIPND_{it} + \mu_6 IPD_{it} xFV_{it} + \mu_7 IPD_{it} xHC_{it} + \mu_8 DiffIPD_{it} + \alpha_9 REAL_{it} + \alpha_{10} CHAR_{it} + \varepsilon'_{it}$

Level	Aggregated level			Disaggregated level		
Model	Model 1 :	Model 2.1 :	Model 2.2 :	Model 3 :	Model 4.1 :	Model 4.2 :
Partition	All samples	ARSPart = 1	ARSPart = 0	All samples	ARSPart = 1	ARSPart = 0
(Hypothesis)	(H2)	(H4)	(H4)	(H3)	(H5)	(H5)
BV	0.427 ***	0.505 ***	0.335	0.445 ***	0.534 ***	0.380
EPS	0.116 ***	0.166 ***	0.078 ***	0.101 ***	0.143 ***	0.041**
IP x FV	0.052	0.139 ***	0.005 *			
IP x HC	0.239 ***	0.124	0.331 ***			
DiffIP	0.012	-0.008	0.038 ***			
IPND x FV				0.074	0.069	0.051
IPND x HC				0.124	0.126	0.125
DiffIPND				0.002 **	-0.064	0.048*
IPD x FV				0.050	-0.152 ***	0.098
IPD x HC				0.192 **	0.047	0.304**
DiffIPD				0.006 **	0.055	-0.015**
CHAR	0.061 ***	0.077 ***	0.010 ***	0.034 ***	0.080 ***	-0.011**
REAL	-0.234 ***	-0.206 ***	-0.277 ***	-0.236 ***	-0.207 ***	-0.274**
N	648	376	272	648	376	272
Adjusted R^2	52.38	58.61	50.95	64.02	70.10	62.42
Incremental R^2	-	6.23	(1.43)	-	6.08	1.60
Test hypothesis – Aggregated level						
Expected	$\beta_{FV} > \beta_{HC}$	$\beta_{FV} > \beta_{HC}$	$\beta_{FV} > \beta_{HC}$			
Result	$\beta_{FV} < \beta_{HC}$ ***	$\beta_{FV} > \beta_{HC}$ ***	$\beta_{FV} < \beta_{HC}$ ***			
Test hypothesis – Disaggregated level						
The non-depreciated investment property						
Expected				$\alpha_{FV} > \alpha_{HC}$	$\alpha_{FV} > \alpha_{HC}$	$\alpha_{FV} > \alpha_{HC}$
Result				$\alpha_{FV} < \alpha_{HC}$	$\alpha_{FV} < \alpha_{HC}$	$\alpha_{FV} < \alpha_{HC}$
The depreciated investment property						
Expected				$\mu_{FV} < \mu_{HC}$	$\mu_{FV} > \mu_{HC}$	$\mu_{FV} > \mu_{HC}$
Result				$\mu_{FV} < \mu_{HC}$ ***	$\mu_{FV} > \mu_{HC}$ **	$\mu_{FV} < \mu_{HC}$ **

Table 14 Multiple regression of the aggregated and disaggregated investment property controlling for the fitness of firm characteristics with regard to accounting choices (selection bias remediation) (Con't)

Note 1: The coefficients are standardized for direct comparison (with the constants removed).

Note 2: * partially significant at the 10% level based on the robust standard deviation (HC_0)

** significant at the 5% level based on the robust standard deviation (HC_0)

*** significant at the 1% level based on the robust standard deviation (HC_0)

The significant levels are based on a 1-tailed test for hypothesis testing and a 2-tailed test otherwise.

where lnP_{it} is the natural logarithm of price per share of firm i at year t+2months; $BVLIP_{it}$ is the book value less the investment property per share of firm i at year t; EPS_{it} is the earnings per share of firm i for year t; IP_{it} is the investment property per share of firm i at year t; $DiffIP_{it}$ is the difference between the disclosed value and recorded cost value of the investment property per share of firm i at year t; $IPND_{it}$ is the non-depreciated investment property per share of firm i at year t; $DiffIPND_{it}$ is the difference between the disclosed value and recorded cost value of the non-depreciated investment property per share of firm i at year t; IPD_{it} is the depreciated Investment property per share of firm i at year t; $DiffIPD_{it}$ is the difference between the disclosed value and recorded cost value of the depreciated investment property per share of firm i at year t; FV_{it} is 1 if firm i adopts the fair value model for the investment property and 0 otherwise; HC_{it} is 1 if firm i adopts the cost model for the investment property and 0 otherwise; $CHAR_{it}$ is the inverse mill ratio representing the characteristics of fair value-adopting firm, proxied by the residual value of characteristics of firm adopting the model in Hypothesis 1 (only significant variables), which is $FV_{it} = \beta_0 + \beta_1 COMP_{it} + \beta_2 ARSPart_{it} + \beta_3 LOC_{it} + \beta_4 REV_{it} + \beta_5 BIG4_{it} + \beta_6 APPRE_{it} + \beta_7 Size_{it} + \beta_8 REAL_{it} + \varepsilon_{it}$, where $COMP_{it}$ is the proportion of the non-depreciated investment property component to total investment property of firm i in year t; $ARSPart_{it}$ is the AR-Score partition of firm i at time t, where it is 1 ifARS_{it} is above the median of total ARS_{it} (high reliability group) and 0 otherwise (low reliability group); ARS_{it} is the Aggregated Reliability Score (AR-score) of firm i at time t, which is equal to R_Method_{it} + R_Source_{it} + R_Change_{it} + R_Audit_{it} + R_Time_{it}, where R_Method_{it} = 1 if firm i uses the mark to market model at time t and 0 otherwise, R_Source_{it} = 1 if firm i employs external appraiser(s) at time t and 0 otherwise, R_Change_{it} = 1 if firm i's percentage of change in the fair value of the investment property is below the median total percentage of change at time t and 0 otherwise, R_Audit_{it} = 1 if firm i employs a Big4 audit firm at time t and 0 otherwise, R_Time_{it} = 1 if firm i appraise the fair value in year t and 0 otherwise; LOC_{it} = 1 if firm i is located outside Bangkok and 0 otherwise; REV_{it} = 1 if firm i revalues its property, plant and equipment at time t and 0 otherwise; $BIG4_{it}$ = 1 if firm i employs a Big4 auditor at time t and 0 otherwise; $APPRE_{it}$ is the gain (loss) from valuation of the investment property per share of firm i proxied by natural logarithm of gain (loss) from valuation of the investment property at time t; $SIZE_{it}$ is the size of firm i proxied by natural logarithm of total assets of firm i at time t; $REAL_{it}$ = 1 if firm i is in the real estate and construction industry and 0 otherwise; $\varepsilon_{i,t}$ is firm i's residual value of year t; $\beta_{FV} = |\beta_3|$ is the coefficient of the investment property recorded at fair value; $\beta_{HC} = |\beta_4+\beta_5|$ is the coefficient of the investment property recorded at cost; $\alpha_{FV} = |\alpha_3|$ is the coefficient of the non-depreciated investment property recorded at fair value; $\alpha_{HC} = |\alpha_4+\alpha_5|$ is the coefficient of the non-depreciated investment property recorded at cost; $\mu_{FV} = |\mu_6|$ is the coefficient of the depreciated investment property recorded at fair value; $\mu_{HC} = |\mu_7+\mu_8|$ is the coefficient of the depreciated investment property recorded at cost. **The results in bold are non-robust.**

6.3.3 Main Model with the Industry and Year Fixed Effect Variables

Table 15 presents the multiple regression results of the aggregated and disaggregated investment properties, controlling for the industry and year fixed effects. In testing, the property and construction industry variable is replaced with the other seven industry fixed-effect variables (the industry codes numbering from 1 to 8); and three time (year) fixed-effect variables (2011-2014) are also included in the models.

Table 15 Multiple regression of the aggregated and disaggregated investment property controlling for the industry and year fixed effects

Aggregated level model : $lnP_{it} = \beta_0 + \sum_{k=1}^{7} \beta_{0k} IND_{kit} + \sum_{j=1}^{3} \beta_{0j} YEAR_{jit} + \beta_1 BVLIP_{it} + \beta_2 EPS_{it} + \beta_3 IP_{it} xFV_{it} + \beta_4 IP_{it} xHC_{it} + \beta_5 DiffIP_{it} + \varepsilon_{it}$

Disaggregated level model : $lnP_{it} = \alpha_0 + \sum_{k=1}^{7} \alpha_{0k} IND_{kit} + \sum_{j=1}^{3} \alpha_{0j} YEAR_{jit} + \alpha_1 BVLIP_{it} + \alpha_2 EPS_{it} + \alpha_3 IPND_{it} xFV_{it} + \alpha_4 IPND_{it} xHC_{it} + \alpha_5 DiffIPND_{it} + \mu_6 IPD_{it} xFV_{it} + \mu_7 IPD_{it} xHC_{it} + \mu_8 DiffIPD_{it} + \varepsilon'_{it}$

Level	Aggregated level			Disaggregated level		
Model	Model 1 :	Model 2.1 :	Model 2.2 :	Model 3 :	Model 4.1 :	Model 4.2 :
Partition	All samples	ARSPart = 1	ARSPart = 0	All samples	ARSPart = 1	ARSPart = 0
(Hypothesis)	(H2)	(H4)	(H4)	(H3)	(H5)	(H5)
BV	0.389 ***	0.466 ***	0.198	0.398 ***	0.504 ***	0.238
EPS	0.160 ***	0.187 ***	0.303 ***	0.150 ***	0.159 ***	0.270**
IP x FV	0.051	0.180 *	0.005 *			
IP x HC	0.222 ***	0.154	0.283 ***			
DiffIP	-0.001	-0.014	0.007 ***			
IPND x FV				0.096	0.119	0.035
IPND x HC				0.114	0.119	0.105
DiffIPND				0.013	-0.037 ***	0.041*
IPD x FV				0.043 **	-0.062	0.072
IPD x HC				0.188 **	0.065	0.268**
DiffIPD				-0.019 **	-0.014	-0.043**
IND_k	PS	PS	PS	PS	PS	PS
$YEAR_j$	PS	PS	PS	PS	PS	PS
N	648	376	272	648	376	272
Adjusted R^2	55.73	62.23	56.83	67.78	74.09	68.14
Incremental R^2	-	6.50	1.10	-	6.31	0.36
Test hypothesis – Aggregated level						
Expected	$\beta_{FV} > \beta_{HC}$	$\beta_{FV} > \beta_{HC}$	$\beta_{FV} > \beta_{HC}$			
Result	$\beta_{FV} < \beta_{HC}$ ***	$\beta_{FV} > \beta_{HC}$	$\beta_{FV} < \beta_{HC}$ ***			
Test hypothesis – Disaggregated level						
The non-depreciated investment property						
Expected				$\alpha_{FV} > \alpha_{HC}$	$\alpha_{FV} > \alpha_{HC}$	$\alpha_{FV} > \alpha_{HC}$
Result				$\alpha_{FV} < \alpha_{HC}$	$\alpha_{FV} > \alpha_{HC}$	$\alpha_{FV} < \alpha_{HC}$
The depreciated investment property						
Expected				$\mu_{FV} < \mu_{HC}$	$\mu_{FV} > \mu_{HC}$	$\mu_{FV} > \mu_{HC}$
Result				$\mu_{FV} < \mu_{HC}$ ***	$\mu_{FV} > \mu_{HC}$ **	$\mu_{FV} < \mu_{HC}$**

Table 15 Multiple regression of the aggregated and disaggregated investment property controlling for the industry and year fixed effects (Con't)

Note 1: The coefficients are standardized for direct comparison (with the constants removed)

Note 2: * partially significant at the 10% level based on the robust standard deviation (HC_0)

** significant at the 5% level based on the robust standard deviation (HC_0)

*** significant at the 1% level based on the robust standard deviation (HC_0)

PS significant for the partial effects

The significant levels are based on a 1-tailed test for hypothesis testing and a 2-tailed test otherwise.

where lnP_{it} is the natural logarithm of price per share of firm i at year t+2months; $BVLIP_{it}$ is the book value less the investment property per share of firm i at year t; EPS_{it} is the earnings per share of firm i for year t; IP_{it} is the investment property per share of firm i at year t; $DiffIP_{it}$ is the difference between the disclosed value and recorded cost value of the investment property per share of firm i at year t; $IPND_{it}$ is the non-depreciated investment property per share of firm i at year t; $DiffIPND_{it}$ is the difference between the disclosed value and recorded cost value of the non-depreciated investment property per share of firm i at year t; IPD_{it} is the depreciated Investment property per share of firm i at year t; $DiffIPD_{it}$ is the difference between the disclosed value and recorded cost value of the depreciated investment property per share of firm i at year t; FV_{it} is 1 if firm i adopts the fair value model for the investment property and 0 otherwise; HC_{it} is 1 if firm i adopts the cost model for the investment property and 0 otherwise; $REAL_{it}$ is 1 if firm i is in the real estate and construction industry and 0 otherwise; $ARSPart_{it}$ is the AR-Score partition of firm i at time t, where it is 1 ifARS_{it} is above the median of total ARS_{it} (high reliability group) and 0 otherwise (low reliability group); ARS_{it} is the Aggregated Reliability Score (AR-score) of firm i at time t, which is equal to R_Method_{it} + R_Source_{it} + R_Change_{it} + R_Audit_{it} + R_Time_{it}, where R_Method_{it} = 1 if firm i uses the mark to market model at time t and 0 otherwise, R_Source_{it} = 1 if firm i employs external appraiser(s) at time t and 0 otherwise, R_Change_{it} = 1 if firm i's percentage of change in the fair value of the investment property is below the median total percentage of change at time t and 0 otherwise, R_Audit_{it} = 1 if firm i employs a Big4 audit firm at time t and 0 otherwise, R_Time_{it} = 1 if firm i appraise the fair value in year t and 0 otherwise; LOC_{it} = 1 if firm i is located outside Bangkok and 0 otherwise; REV_{it} = 1 if firm i revalues its property, plant and equipment at time t and 0 otherwise; $BIG4_{it}$ = 1 if firm i employs a Big4 auditor at time t and 0 otherwise; $APPRE_{it}$ is the gain (loss) from valuation of the investment property per share of firm i proxied by natural logarithm of gain (loss) from valuation of the investment property at time t; $SIZE_{it}$ is the size of firm i proxied by natural logarithm of total assets of firm i at time t; $\varepsilon_{i,t}$ is firm i's residual value of year t; $\beta_{FV} = |\beta_3|$ is the coefficient of the investment property recorded at fair value; $\beta_{HC} = |\beta_4+\beta_5|$ is the coefficient of the investment property recorded at cost; $\alpha_{FV} = |\alpha_3|$ is the coefficient of the non-depreciated investment property recorded at fair value; $\alpha_{HC} = |\alpha_4+\alpha_5|$ is the coefficient of the non-depreciated investment property recorded at cost; $\mu_{FV} = |\mu_6|$ is the coefficient of the depreciated investment property recorded at fair value; $\mu_{HC} = |\mu_7+\mu_8|$ is the coefficient of the depreciated investment property recorded at cost; IND_{kit} is the industry fixed effect from 1-8; $YEAR_{jit}$ is the year fixed effect from years 2011 to 2014. **The results in bold are non-robust.**

It is found that, upon taking into consideration the year-by-year and industry-by-industry effects, the value relevance of the fair value and cost models for the aggregated investment property are similar. The remaining results are identical to those in Table 10. It is found that the effects of industry and year on the value relevance of investment property of the main models are insignificant.

6.3.4 Main Model with Prices at Time t and t plus 3 Months

In Thailand, SET-listed firms are required to file the yearly financial statements within two months following the year-ending date. This current research has thus utilized the price (P) at time t plus 2 months as the dependent variable. In other words, the prices in the main model are those in the month of February of the subsequent year. Due to the weak market efficiency, investors could suffer from a dearth of financial information between the yearend date and the end of February (Beaver, 1998). In Barth and Clinch (1996), the price at time t + 3 months was used as the dependent variable for the reason that investors require additional time to digest the information disclosed by firms. Thus, this current research has deployed the prices at time t and t+3 for verification of robustness.

The results in Tables 16 (price at time t) and 17 (price at time t+3 months) are similar to those of the main model (price at time t+2 months), indicating no price sensitivity around the year-end period. This is attributable to the fact that investment property is non-current assets characterized by the long-term nature.

6.3.5 Modified Model to Remove the Collinearity Problem

In the main models, $\beta_3 IP_{it} xFV_{it}$ and $\beta_4 IP_{it} xHC_{it}$ are identical, a phenomenon which leads to the collinearity problem, and so are $\alpha_3 IPND_{it} xFV_{it}$ and $\alpha_4 IPND_{it} xHC_{it}$; and $\mu_6 IPD_{it} xFV_{it}$and $\mu_7 IPD_{it} xHC_{it}$. To mitigate the problem of collinearity, $\beta_3 IP_{it} xFV_{it}$ and $\beta_4 IP_{it}$ are modified as substitute terms in the aggregated level models; and $\alpha_3 IPND_{it} xFV_{it}$ and $\alpha_4 IPND_{it}$ and $\mu_6 IPD_{it} xFV_{it}$ and $\mu_7 IPD_{it}$ as substitute terms in the disaggregated level models (Table 18). The proxy of the recognized fair value of investment property is changed from β_3 in the main model to $\beta_3 + \beta_4$ in the modified model. Meanwhile, the proxy of the recognized fair value of the non-depreciated investment property is changed from α_3 *i*n the main model to $\alpha_3 + \alpha_4$ in the modified model. In addition, the proxy of the recognized fair value of the depreciated investment property is changed from μ_6 in the main model to $\mu_6 + \mu_7$ in the modified model. Interestingly, the regression results of the modified models in Table 18 remain unchanged, thus refuting the existence of collinearity problem.

Table 16 Multiple regression of the aggregated and disaggregated investment property for price at time t

Aggregated level model: $lnP'_{it} = \beta_0 + \beta_1 BVLIP_{it} + \beta_2 EPS_{it} + \beta_3 IP_{it}\text{x}FV_{it} + \beta_4 IP_{it}\text{x}HC_{it} + \beta_5 DiffIP_{it} + \beta_6 REAL_{it} + \varepsilon_{it}$

Disaggregated level model: $lnP'_{it} = \alpha_0 + \alpha_1 BVLIP_{it} + \alpha_2 EPS_{it} + \alpha_3 IPND_{it}\text{x}FV_{it} + \alpha_4 IPND_{it}\text{x}HC_{it} + \alpha_5 DiffIPND_{it} + \mu_6 IPD_{it}\text{x}FV_{it} + \mu_7 IPD_{it}\text{x}HC_{it} + \mu_8 DiffIPD_{it} + \alpha_9 REAL_{it} + \varepsilon'_{it}$

Level	Aggregated level			Disaggregated level		
Model	Model 1 :	Model 2.1 :	Model 2.2 :	Model 3 :	Model 4.1 :	Model 4.2 :
Partition	All samples	ARSPart = 1	ARSPart = 0	All samples	ARSPart = 1	ARSPart = 0
(Hypothesis)	(H2)	(H4)	(H4)	(H3)	(H5)	(H5)
BV	0.431 ***	0.500 ***	0.342	0.445 ***	0.527 ***	0.387
EPS	0.113	0.171 ***	0.069 ***	0.100 ***	0.150 ***	0.032**
IP x FV	0.059 ***	0.076 *	0.092 *			
IP x HC	0.238 *	0.046	0.331 ***			
DiffIP	0.011	-0.009 *	0.038 ***			
IPND x FV				0.086	0.100	0.050
IPND x HC				0.122	0.123	0.121
DiffIPND				0.014 ***	-0.032	0.055**
IPD x FV				0.052	-0.132 ***	0.089
IPD x HC				0.199 **	0.049	0.311*
DiffIPD				-0.007 ***	0.022	-0.024**
REAL	-0.244 **	-0.222 **	-0.287 ***	-0.251 **	-0.222 **	-0.288**
N	648	376	272	648	376	272
Adjusted R^2	53.48	60.45	51.54	65.39	71.88	63.07
Incremental R^2	-	6.97	(1.94)	-	6.49	(2.32)
Test hypothesis – Aggregated level						
Expected	$\beta_{FV} > \beta_{HC}$	$\beta_{FV} > \beta_{HC}$	$\beta_{FV} > \beta_{HC}$			
Result	$\beta_{FV} < \beta_{HC}$ ***	$\beta_{FV} > \beta_{HC}$ *	$\beta_{FV} < \beta_{HC}$ ***			
Test hypothesis – Disaggregated level						
The non-depreciated investment property						
Expected				$\alpha_{FV} > \alpha_{HC}$	$\alpha_{FV} > \alpha_{HC}$	$\alpha_{FV} > \alpha_{HC}$
Result				$\alpha_{FV} < \alpha_{HC}$	$\alpha_{FV} > \alpha_{HC}$	$\alpha_{FV} < \alpha_{HC}$
The depreciated investment property						
Expected				$\mu_{FV} < \mu_{HC}$	$\mu_{FV} > \mu_{HC}$	$\mu_{FV} > \mu_{HC}$
Result				$\mu_{FV} < \mu_{HC}$ ***	$\mu_{FV} > \mu_{HC}$ *	$\mu_{FV} < \mu_{HC}$ **

Table 16 Multiple regression of the aggregated and disaggregated investment property for price at time t (Con't)

Note 1: The coefficients are standardized for direct comparison (with the constants removed).

Note 2: * partially significant at the 10% level based on the robust standard deviation (HC_0)

** significant at the 5% level based on the robust standard deviation (HC_0)

*** significant at the 1% level based on the robust standard deviation (HC_0)

The significant levels are based on a 1-tailed test for hypothesis testing and a 2-tailed test otherwise.

where lnP'_{it} is the natural logarithm of price per share of firm i at year t; $BVLIP_{it}$ is the book value less the investment property per share of firm i at year t; EPS_{it} is the earnings per share of firm i for year t; IP_{it} is the investment property per share of firm i at year t; $DiffIP_{it}$ is the difference between the disclosed value and recorded cost value of the investment property per share of firm i at year t; $IPND_{it}$ is the non-depreciated investment property per share of firm i at year t; $DiffIPND_{it}$ is the difference between the disclosed value and recorded cost value of the non-depreciated investment property per share of firm i at year t; IPD_{it} is the depreciated Investment property per share of firm i at year t; $DiffIPD_{it}$ is the difference between the disclosed value and recorded cost value of the depreciated investment property per share of firm i at year t; FV_{it} is 1 if firm i adopts the fair value model for the investment property and 0 otherwise; HC_{it} is 1 if firm i adopts the cost model for the investment property and 0 otherwise; $REAL_{it}$ is 1 if firm i is in the real estate and construction industry and 0 otherwise; $ARSPart_{it}$ is the AR-Score partition of firm i at time t, where it is 1 ifARS_{it} is above the median of total ARS_{it} (high reliability group) and 0 otherwise (low reliability group); ARS_{it} is the Aggregated Reliability Score (AR-score) of firm i at time t, which is equal to R_Method_{it} + R_Source_{it} + R_Change_{it} + R_Audit_{it} + R_Time_{it}, where R_Method_{it} = 1 if firm i uses the mark to market model at time t and 0 otherwise, R_Source_{it} = 1 if firm i employs external appraiser(s) at time t and 0 otherwise, R_Change_{it} = 1 if firm i's percentage of change in the fair value of the investment property is below the median total percentage of change at time t and 0 otherwise, R_Audit_{it} = 1 if firm i employs a Big4 audit firm at time t and 0 otherwise, R_Time_{it} = 1 if firm i appraise the fair value in year t and 0 otherwise; $\varepsilon_{i,t}$ is firm i's residual value of year t; $\beta_{FV} = |\beta_3|$ is the coefficient of the investment property recorded at fair value; $\beta_{HC} = |\beta_4+\beta_5|$ is the coefficient of the investment property recorded at cost; $\alpha_{FV} = |\alpha_3|$ is the coefficient of the non-depreciated investment property recorded at fair value; $\alpha_{HC} = |\alpha_4+\alpha_5|$ is the coefficient of the non-depreciated investment property recorded at cost; $\mu_{FV} = |\mu_6|$ is the coefficient of the depreciated investment property recorded at fair value; $\mu_{HC} = |\mu_7+\mu_8|$ is the coefficient of the depreciated investment property recorded at cost. **The results in bold are non-robust.**

Table 17 Multiple regression of the aggregated and disaggregated investment property for price at time t plus 3 months

Aggregated level model: $lnP''_{it} = \beta_0 + \beta_1 BVLIP_{it} + \beta_2 EPS_{it} + \beta_3 IP_{it}\text{x}FV_{it} + \beta_4 IP_{it}\text{x}HC_{it} + \beta_5 DiffIP_{it} + \beta_6 REAL_{it} + \varepsilon_{it}$

Disaggregated level model: $lnP''_{it} = \alpha_0 + \alpha_1 BVLIP_{it} + \alpha_2 EPS_{it} + \alpha_3 IPND_{it}\text{x}FV_{it} + \alpha_4 IPND_{it}\text{x}HC_{it} + \alpha_5 DiffIPND_{it} + \mu_6 IPD_{it}\text{x}FV_{it} + \mu_7 IPD_{it}\text{x}HC_{it} + \mu_8 DiffIPD_{it} + \alpha_9 REAL_{it} + \varepsilon'_{it}$

Level	Aggregated level			Disaggregated level		
Model	Model 1 :	Model 2.1 :	Model 2.2 :	Model 3 :	Model 4.1 :	Model 4.2 :
Partition	All samples	ARSPart = 1	ARSPart = 0	All samples	ARSPart = 1	ARSPart = 0
(Hypothesis)	(H2)	(H4)	(H4)	(H3)	(H5)	(H5)
Constant	2.245	-1.298	7.575 ***	2.515	-1.296	7.341**
BV	0.423 ***	0.496 ***	0.318	0.439 ***	0.522 ***	0.367
EPS	0.117 ***	0.169 ***	0.092 ***	0.103 ***	0.148 ***	0.051**
IP x FV	0.061	0.175 **	0.046 *			
IP x HC	0.234 ***	0.142	0.327 ***			
DiffIP	0.016 *	-0.001	0.040 ***			
IPND x FV				0.086	0.098	0.051
IPND x HC				0.123	0.128	0.120
DiffIPND				-0.011 **	-0.067	0.040**
IPD x FV				0.054	-0.132 ***	0.093
IPD x HC				0.187 **	0.042	0.302**
DiffIPD				0.024 ***	0.065	-0.005**
REAL	-0.228 ***	-0.201 ***	-0.277 ***	-0.233 ***	-0.200 ***	-0.277**
N	648	376	272	648	376	272
Adjusted R^2	51.75	58.13	50.35	63.65	69.55	61.91
Incremental R^2	-	6.38	(1.40)	-	5.90	(1.74)
Test hypothesis – Aggregated level						
Expected	$\beta_{FV} > \beta_{HC}$	$\beta_{FV} > \beta_{HC}$	$\beta_{FV} > \beta_{HC}$			
Result	$\beta_{FV} < \beta_{HC}$ ***	$\beta_{FV} > \beta_{HC}$ *	$\beta_{FV} < \beta_{HC}$ ***			
Test hypothesis – Disaggregated level						
The non-depreciated investment property						
Expected				$\alpha_{FV} > \alpha_{HC}$	$\alpha_{FV} > \alpha_{HC}$	$\alpha_{FV} > \alpha_{HC}$
Result				$\alpha_{FV} < \alpha_{HC}$	$\alpha_{FV} < \alpha_{HC}$	$\alpha_{FV} < \alpha_{HC}$
The depreciated investment property						
Expected				$\mu_{FV} < \mu_{HC}$	$\mu_{FV} > \mu_{HC}$	$\mu_{FV} > \mu_{HC}$
Result				$\mu_{FV} < \mu_{HC}$ ***	$\mu_{FV} > \mu_{HC}$ *	$\mu_{FV} < \mu_{HC}$ **

Note 1: The coefficients are standardized for direct comparison (with the constants removed).

Note 2: * partially significant at the 10% level based on the robust standard deviation (HC_0)

** significant at the 5% level based on the robust standard deviation (HC_0)

*** significant at the 1% level based on the robust standard deviation (HC_0)

The significant levels are based on a 1-tailed test for hypothesis testing and a 2-tailed test otherwise.

Table 17 Multiple regression of the aggregated and disaggregated investment property for price at time t plus 3 months (Con't)

where lnP''_{it+3} is the natural logarithm of price per share of firm i at year t+3 months; $BVLIP_{it}$ is the book value less the investment property per share of firm i at year t; EPS_{it} is the earnings per share of firm i for year t; IP_{it} is the investment property per share of firm i at year t; $DiffIP_{it}$ is the difference between the disclosed value and recorded cost value of the investment property per share of firm i at year t; $IPND_{it}$ is the non-depreciated investment property per share of firm i at year t; $DiffIPND_{it}$ is the difference between the disclosed value and recorded cost value of the non-depreciated investment property per share of firm i at year t; IPD_{it} is the depreciated Investment property per share of firm i at year t; $DiffIPD_{it}$ is the difference between the disclosed value and recorded cost value of the depreciated investment property per share of firm i at year t; FV_{it} is 1 if firm i adopts the fair value model for the investment property and 0 otherwise; HC_{it} is 1 if firm i adopts the cost model for the investment property and 0 otherwise; $REAL_{it}$ is 1 if firm i is in the real estate and construction industry and 0 otherwise; $ARSPart_{it}$ is the AR-Score partition of firm i at time t, where it is 1 ifARS_{it} is above the median of total ARS_{it} (high reliability group) and 0 otherwise (low reliability group); ARS_{it} is the Aggregated Reliability Score (AR-score) of firm i at time t, which is equal to R_Method_{it} + R_Source_{it} + R_Change_{it} + R_Audit_{it} + R_Time_{it}, where R_Method_{it} = 1 if firm i uses the mark to market model at time t and 0 otherwise, R_Source_{it} = 1 if firm i employs external appraiser(s) at time t and 0 otherwise, R_Change_{it} = 1 if firm i's percentage of change in the fair value of the investment property is below the median total percentage of change at time t and 0 otherwise, R_Audit_{it} = 1 if firm i employs a Big4 audit firm at time t and 0 otherwise, R_Time_{it} = 1 if firm i appraise the fair value in year t and 0 otherwise; $\varepsilon_{i,t}$ is firm i's residual value of year t; $\beta_{FV} = |\beta_3|$ is the coefficient of the investment property recorded at fair value; $\beta_{HC} = |\beta_4+\beta_5|$ is the coefficient of the investment property recorded at cost; $\alpha_{FV} = |\alpha_3|$ is the coefficient of the non-depreciated investment property recorded at fair value; $\alpha_{HC} = |\alpha_4+\alpha_5|$ is the coefficient of the non-depreciated investment property recorded at cost; $\mu_{FV} = |\mu_6|$ is the coefficient of the depreciated investment property recorded at fair value; $\mu_{HC} = |\mu_7+\mu_8|$ is the coefficient of the depreciated investment property recorded at cost. **The results in bold are non-robust.**

Table 18 Multiple regression of the aggregated and disaggregated investment property (modified model to mitigate the collinearity problem)

Aggregated level model: $lnP_{it} = \beta_0 + \beta_1 BVLIP_{it} + \beta_2 EPS_{it} + \beta_3 IP_{it} \text{x} FV_{it} + \beta_4 IP_{it} + \beta_5 DiffIP_{it} + \beta_6 REAL_{it} + \varepsilon_{it}$

Disaggregated level model: $lnP_{it} = \alpha_0 + \alpha_1 BVLIP_{it} + \alpha_2 EPS_{it} + \alpha_3 IPND_{it} \text{x} FV_{it} + \alpha_4 IPND_{it} + \alpha_5 DiffIPND_{it} + \mu_6 IPD_{it} \text{x} FV_{it} + \mu_7 IPD_{it} + \mu_8 DiffIPD_{it} + \alpha_9 REAL_{it} + \varepsilon'_{it}$

Level	Aggregated level			Disaggregated level		
Model	Model 1 :	Model 2.1 :	Model 2.2 :	Model 3 :	Model 4.1 :	Model 4.2 :
Partition	All samples	ARSPart = 1	ARSPart = 0	All samples	ARSPart = 1	ARSPart = 0
(Hypothesis)	(H2)	(H4)	(H4)	(H3)	(H5)	(H5)
BV	0.433 ***	0.503 ***	0.336	0.447 ***	0.530 ***	0.379
EPS	0.112 ***	0.166 ***	0.077 ***	0.099 ***	0.144 ***	0.042**
IP x FV	-0.171	0.037 **	-0.233 *			
IP	0.234 ***	0.139	0.331 ***			
DiffIP	0.012	-0.007	0.038 ***			
IPND x FV				-0.036	-0.022	-0.078
IPND				0.123	0.122	0.125
DiffIPND				0.002 **	-0.048	0.048**
IPD x FV				-0.135	-0.177 ***	-0.210**
IPD				0.191 **	0.042	0.305**
DiffIPD				0.007 **	0.041	-0.016**
REAL	-0.226 ***	-0.199 ***	-0.276 ***	-0.232 ***	-0.198 ***	-0.276**
N	648	376	272	648	376	272
Adjusted R^2	52.02	58.16	50.94	63.93	69.62	62.41
Incremental R^2	-	6.14	(1.08)	-	5.69	(1.52)
Test hypothesis – Aggregated level						
Expected	$\beta_{FV} > \beta_{HC}$	$\beta_{FV} > \beta_{HC}$	$\beta_{FV} > \beta_{HC}$			
Result	$\beta_{FV} < \beta_{HC}$ ***	$\beta_{FV} > \beta_{HC}$ *	$\beta_{FV} < \beta_{HC}$ ***			
Test hypothesis – Disaggregated level						
The non-depreciated investment property						
Expected				$\alpha_{FV} > \alpha_{HC}$	$\alpha_{FV} > \alpha_{HC}$	$\alpha_{FV} > \alpha_{HC}$
Result				$\alpha_{FV} > \alpha_{HC}$	$\alpha_{FV} > \alpha_{HC}$	$\alpha_{FV} < \alpha_{HC}$
The depreciated investment property						
Expected				$\mu_{FV} < \mu_{HC}$	$\mu_{FV} > \mu_{HC}$	$\mu_{FV} > \mu_{HC}$
Result				$\mu_{FV} < \mu_{HC}$ ***	$\mu_{FV} > \mu_{HC}$ **	$\mu_{FV} < \mu_{HC}$**

Note 1: The coefficients are standardized for direct comparison (with the constants removed).

Note 2: * partially significant at the 10% level based on the robust standard deviation (HC_0)

** significant at the 5% level based on the robust standard deviation (HC_0)

*** significant at the 1% level based on the robust standard deviation (HC_0)

The significant levels are based on a 1-tailed test for hypothesis testing and a 2-tailed test otherwise.

Table 18 Multiple regression of the aggregated and disaggregated investment property (modified model to mitigate the collinearity problem) (Con't)

where lnP_{it} is the natural logarithm of price per share of firm i at year t+2 months; $BVLIP_{it}$ is the book value less the investment property per share of firm i at year t; EPS_{it} is the earnings per share of firm i for year t; IP_{it} is the investment property per share of firm i at year t; $DiffIP_{it}$ is the difference between the disclosed value and recorded cost value of the investment property per share of firm i at year t; $IPND_{it}$ is the non-depreciated investment property per share of firm i at year t; $DiffIPND_{it}$ is the difference between the disclosed value and recorded cost value of the non-depreciated investment property per share of firm i at year t; IPD_{it} is the depreciated Investment property per share of firm i at year t; $DiffIPD_{it}$ is the difference between the disclosed value and recorded cost value of the depreciated investment property per share of firm i at year t; FV_{it} is 1 if firm i adopts the fair value model for the investment property and 0 otherwise; HC_{it} is 1 if firm i adopts the cost model for the investment property and 0 otherwise; $REAL_{it}$ is 1 if firm i is in the real estate and construction industry and 0 otherwise; $ARSPart_{it}$ is the AR-Score partition of firm i at time t, where it is 1 ifARS_{it} is above the median of total ARS_{it} (high reliability group) and 0 otherwise (low reliability group); ARS_{it} is the Aggregated Reliability Score (AR-score) of firm i at time t, which is equal to R_Method_{it} + R_Source_{it} + R_Change_{it} + R_Audit_{it} + R_Time_{it}, where R_Method_{it} = 1 if firm i uses the mark to market model at time t and 0 otherwise, R_Source_{it} = 1 if firm i employs external appraiser(s) at time t and 0 otherwise, R_Change_{it} = 1 if firm i's percentage of change in the fair value of the investment property is below the median total percentage of change at time t and 0 otherwise, R_Audit_{it} = 1 if firm i employs a Big4 audit firm at time t and 0 otherwise, R_Time_{it} = 1 if firm i appraise the fair value in year t and 0 otherwise; $\varepsilon_{i,t}$ is firm i's residual value of year t; $\beta_{FV} = |\beta_3+\beta_4|$ is the coefficient of the investment property recorded at fair value; $\beta_{HC} = |\beta_4+\beta_5|$ is the coefficient of the investment property recorded at cost; $\alpha_{FV} = |\alpha_3+\alpha_4|$ is the coefficient of the non-depreciated investment property recorded at fair value; $\alpha_{HC} = |\alpha_4+\alpha_5|$ is the coefficient of the non-depreciated investment property recorded at cost; $\mu_{FV} = |\mu_6+\mu_7|$ is the coefficient of the depreciated investment property recorded at fair value; $\mu_{HC} = |\mu_7|$ is the coefficient of the depreciated investment property recorded at cost. **The results in bold are non-robust.**

6.3.6 Robustness Check for Pairwise Samples

In this research, the number of the cost model adopters (565 firm-years) is almost seven times as many as the fair value model adopters (83 firm-years). To overcome the effect of the significantly unequal numbers of the accounting choice adopters, this current research has thus utilized the pairwise concept of Clarkson et al. (2011) in matching firms adopting different accounting choices. The final number of samples is thus reduced a combined 166 firm-years, with 83 firm-years each. The entire fair value model adopters are included in the test, while the paired firms are selected from the cost model adopters with similar characteristics to the fair-value firms, i.e. the same industry, similar locations (metropolitan or rural area), same auditor type (Big4 or non-Big4 auditors), similar size (total assets) and similar market capitalization, consistent with Lev and Penman (1990). Re-testing of Hypotheses 1-5 are subsequently carried out to rule out the argument of such effect.

Table 19 Logistic regression of characteristics of pairwise firms applying the fair value model to investment property

$$FV_{it} = \beta_0 + \beta_1 COMP_{it} + \beta_2 ARS_{it} + \beta_3 LOC_{it} + \beta_4 REV_{it} + \beta_5 TREA_{it} + \beta_6 BIG4_{it} + \beta_7 APPRE_{it} + \beta_8 SIZE_{it} + \beta_9 LEV_{it} + \beta_{10} MTB_{it} + \beta_{11} SET100_{it} + \beta_{12} REAL_{it} + \varepsilon_{it}$$

Variables	Coefficient (1)		Coefficient (2)		Coefficient (3)		Coefficient (4)	
Constant	4.071		-1.123	*	-.964		-2.354	**
COMP	-.680	*			-.932	**	-1.358	***
ARS			.305	*	.415	**	0.556	**
LOC							-0.201	
REV							1.257	**
BIG4							0.516	**
APPRE							-0.506	**
SIZE							-0.013	**
LEV							0.935	
MTB							-0.026	
SET100							0.915	*
REAL							0.214	

Note 1: The coefficients are standardized for direct comparison (with the constants removed).

Note 2: * partially significant at the 10% level based on the robust standard deviation (HC_0)

** significant at the 5% level based on the robust standard deviation (HC_0)

*** significant at the 1% level based on the robust standard deviation (HC_0)

The significant levels are based on a 1-tailed test for hypothesis testing and a 2-tailed test otherwise.

where FV_{it} = 1 if firms adopt the fair value model for the investment property, and 0 otherwise; $COMP_{it}$ is the proportion of the non-depreciated investment property to total investment property of firm i at time t; ARS_{it} is the Aggregated Reliability Score (AR-score) of firm i at time t, which is R_Method_{it} + R_Source_{it} + R_Change_{it} + R_Audit_{it} + R_Time_{it}, where R_Method_{it} = 1 if firm i uses the mark to market model at time t and 0 otherwise, R_Source_{it} = 1 if firm i employs external appraiser(s) at time t and 0 otherwise, R_Change_{it} = 1 if firm i's percentage of change in the fair value of the investment property is below the median total percentage of change at time t and 0 otherwise, R_Audit_{it} = 1 if firm i employs a Big4 audit firm at time t and 0 otherwise, R_Time_{it} = 1 if firm i appraise the fair value in year t and 0 otherwise; LOC_{it} = 1 if firm i is located outside Bangkok and 0 otherwise; REV_{it} = 1 if firm i revalues its property, plant and equipment at time t and 0 otherwise; $TREA_{it}$ = 1 if firm i is a member of the Thai Real Estate Association at time t and 0 otherwise; $BIG4_{it}$ = 1 if firm i employs a Big4 auditor at time t and 0 otherwise; $APPRE_{it}$ is the gain (loss) from valuation of the investment property per share of firm i proxied by natural logarithm of gain (loss) from valuation of the investment property at time t; $SIZE_{it}$ is the size of firm i proxied by natural logarithm of total assets of firm i at time t; LEV_{it} is the leverage proxied by total liability divided by total assets of firm i at time t; MTB_{it} is the market to book ratio; $SET100_{it}$ = 1 if firm i is classified as an SET100 company and 0 otherwise; $REAL_{it}$ = 1 if firm i is in the real estate and construction industry and 0 otherwise; ε_{it} is firm i's residual value of year t.

In Table 19, the re-test results with the pairwise samples for Hypothesis 1 remain unchanged. The investment property components and the Aggregated Reliability Score are, respectively, negatively and positively significantly correlated to the fair value model adoption, consistent with the findings in Table 8. Thus, the unequal numbers of the adopters between the two accounting choices have no influence on the analysis results.

Table 20 presents the analysis results of value relevance of 166 pairwise samples (83 firm-years each). The pre-ARS-partitioning results (Models 1 and 3) and the results belonging to the low reliability group (Models 2.2 and 4.2) are in line with those in Table 10 in which the cost model is of greater value relevance than the fair value model.

The results are however reverse in the high reliability group. In Table 10, the fair value model is of greater value relevance than the cost model as the investors hold the view that the fair value measurement is of high reliability. In Table 20, the results nevertheless are insignificant in both the aggregated (Model 2.1) and disaggregated levels (Model 4.1). This is attributable to the lower degree of freedom and the subsequent reduction in the explanatory power of the model (R^2). Specifically, the degree of freedom decreases from 369 to 93; and the range of R^2 decreases from 50.94 - 69.62 in Table 10 to 41.84 - 65.40 in Table 20. The statistical issues have therefore contributed to the insignificant results of the high reliability group.

Surprisingly, the results of the non-depreciated investment property are significant only when the AR-score is used to partition the pairwise samples. The results are however opposite to the hypothesis in that the cost model in the high (Model 4.1) and low reliability groups (Model 4.2) is of greater value relevance vis-à-vis the fair value model. This suggests that investors normally rely more on the cost model than the fair value model for the non-depreciated investment property. In addition, the standard deviation of the fair value model is twice as great as that of the cost model, giving rise to the perception that the investment property recorded at fair value is highly fluctuating. Thus, the investors would instead rely more on the cost value, according to Ishak et al. (2012); Pappu and Devi (2011). Moreover, the results confirm that investors in a less advanced economy are more attached to the cost model.

Table 20 Multiple regression of the aggregated and disaggregated investment property of the pairwise firms

Aggregated level model: $lnP_{it} = \beta_0 + \beta_1 BVLIP_{it} + \beta_2 EPS_{it} + \beta_3 IP_{it}\text{x}FV_{it} + \beta_4 IP_{it}\text{x}HC_{it} + \beta_5 DiffIP_{it} + \beta_6 REAL_{it} + \varepsilon_{it}$

Disaggregated level model: $lnP_{it} = \alpha_0 + \alpha_1 BVLIP_{it} + \alpha_2 EPS_{it} + \alpha_3 IPND_{it}\text{x}FV_{it} + \alpha_4 IPND_{it}\text{x}HC_{it} + \alpha_5 DiffIPND_{it} + \mu_6 IPD_{it}\text{x}FV_{it} + \mu_7 IPD_{it}\text{x}HC_{it} + \mu_8 DiffIPD_{it} + \alpha_9 REAL_{it} + \varepsilon'_{it}$

Level	Aggregated level			Disaggregated level		
Model	Model 1 :	Model 2.1 :	Model 2.2 :	Model 3 :	Model 4.1 :	Model 4.2 :
Partition	All samples	ARSPart = 1	ARSPart = 0	All samples	ARSPart = 1	ARSPart = 0
(Hypothesis)	(H2)	(H4)	(H4)	(H3)	(H5)	(H5)
BV	0.286 ***	0.365 ***	0.240 ***	0.267 ***	0.500 ***	0.222**
EPS	0.264 ***	0.308 ***	0.236 ***	0.249 ***	0.231 ***	0.246**
IP x FV	-1.750	-0.195	-1.173 *			
IP x HC	1.821	0.153	3.285			
DiffIP	0.119 *	0.068	0.183 **			
IPND x FV				0.153	0.100	0.133
IPND x HC				0.012	-0.109 **	0.052
DiffIPND				0.133	0.231	0.282*
IPD x FV				0.072	-0.153	0.139
IPD x HC				0.358 ***	0.235	0.179**
DiffIPD				-0.039	-0.164	0.286
REAL	-0.294 ***	-0.179 ***	-0.440 ***	-0.320 ***	-0.187 ***	-0.420**
N	166	100	66	166	100	66
Adjusted R^2	41.84	45.01	51.49	55.35	59.42	65.40
Incremental R^2	-	3.17	9.65	-	4.07	10.05
Test hypothesis – Aggregated level						
Expected	$\beta_{FV} > \beta_{HC}$	$\beta_{FV} > \beta_{HC}$	$\beta_{FV} > \beta_{HC}$			
Result	$\beta_{FV} < \beta_{HC}$ **	**$\beta_{FV} > \beta_{HC}$**	$\beta_{FV} < \beta_{HC}$ ***			
Test hypothesis – Disaggregated level						
The non-depreciated investment property						
Expected				$\alpha_{FV} > \alpha_{HC}$	$\alpha_{FV} > \alpha_{HC}$	$\alpha_{FV} > \alpha_{HC}$
Result				$\alpha_{FV} < \alpha_{HC}$	**$\alpha_{FV} < \alpha_{HC}$** *	**$\alpha_{FV} < \alpha_{HC}$**
The depreciated investment property						
Expected				$\mu_{FV} < \mu_{HC}$	$\mu_{FV} > \mu_{HC}$	$\mu_{FV} > \mu_{HC}$
Result				$\mu_{FV} < \mu_{HC}$ **	**$\mu_{FV} > \mu_{HC}$**	$\mu_{FV} < \mu_{HC}$ **

Note 1: The coefficients are standardized for direct comparison (with the constants removed).

Note 2: * partially significant at the 10% level based on the robust standard deviation (HC_0)

** significant at the 5% level based on the robust standard deviation (HC_0)

*** significant at the 1% level based on the robust standard deviation (HC_0)

The significant levels are based on a 1-tailed test for hypothesis testing and a 2-tailed test otherwise.

Table 20 Multiple regression of the aggregated and disaggregated investment property of the pairwise firms (Con't)

where **lnP_{it}** is the natural logarithm of price per share of firm i at year t+2 months; **$BVLIP_{it}$** is the book value less the investment property per share of firm i at year t; **EPS_{it}** is the earnings per share of firm i for year t; **IP_{it}** is the investment property per share of firm i at year t; **$DiffIP_{it}$** is the difference between the disclosed value and recorded cost value of the investment property per share of firm i at year t; **$IPND_{it}$** is the non-depreciated investment property per share of firm i at year t; **$DiffIPND_{it}$** is the difference between the disclosed value and recorded cost value of the non-depreciated investment property per share of firm i at year t; **IPD_{it}** is the depreciated Investment property per share of firm i at year t; **$DiffIPD_{it}$** is the difference between the disclosed value and recorded cost value of the depreciated investment property per share of firm i at year t; **FV_{it}** is 1 if firm i adopts the fair value model for the investment property and 0 otherwise; **HC_{it}** is 1 if firm i adopts the cost model for the investment property and 0 otherwise; **$REAL_{it}$** is 1 if firm i is in the real estate and construction industry and 0 otherwise; **$ARSPart_{it}$** is the AR-Score partition of firm i at time t, where it is 1 ifARS_{it} is above the median of total ARS_{it} (high reliability group) and 0 otherwise (low reliability group); **ARS_{it}** is the Aggregated Reliability Score (AR-score) of firm i at time t, which is equal to R_Method_{it} + R_Source_{it} + R_Change_{it} + R_Audit_{it} + R_Time_{it}, where **R_Method_{it}** = 1 if firm i uses the mark to market model at time t and 0 otherwise, **R_Source_{it}** = 1 if firm i employs external appraiser(s) at time t and 0 otherwise, **R_Change_{it}** = 1 if firm i's percentage of change in the fair value of the investment property is below the median total percentage of change at time t and 0 otherwise, **R_Audit_{it}** = 1 if firm i employs a Big4 audit firm at time t and 0 otherwise, **R_Time_{it}** = 1 if firm i appraise the fair value in year t and 0 otherwise; e is firm i's residual value of year t; $\beta_{FV} = |\beta_3|$ is the coefficient of the investment property recorded at fair value; $\beta_{HC} = |\beta_4+\beta_5|$ is the coefficient of the investment property recorded at cost; $\alpha_{FV} = |\alpha_3|$ is the coefficient of the non-depreciated investment property recorded at fair value; $\alpha_{HC} = |\alpha_4+\alpha_5|$ is the coefficient of the non-depreciated investment property recorded at cost; $\mu_{FV} = |\mu_6|$ is the coefficient of the depreciated investment property recorded at fair value; $\mu_{HC} = |\mu_7+\mu_8|$ is the coefficient of the depreciated investment property recorded at cost. **The results in bold are non-robust.**

6.3.7 Robustness Check for AR-score partitioning

In this research, AR-score which are lower than 4 are classified as low reliability partitioning while the other are classified as high reliability partitioning. Table 11 shows that the low AR-partition has 272 samples while the high AR-partition has 376 samples which are unequal. There might be a skewness of the AR-partitioning because the median is around AR-score at 3 and at 4. The study robusts the hypothesis testing by classify samples that have AR-score lower than 3 (AR-score = 0,1,2) to be a low reliability partition and samples that have AR-score higher than 4 (AR-score = 5) to remove mixing group (AR-score at 3 and 4). This yields a low reliability group for 101 samples and the high reliability group for 128 samples. The study retest the hypothesis again and the results are shown in Table 21.

Table 21 Multiple regressions of the aggregated and disaggregated levels of investment property after revising the AR-score partitioning

Aggregated level model: $lnP_{it} = \beta_0 + \beta_1 BVLIP_{it} + \beta_2 EPS_{it} + \beta_3 IP_{it} \text{x} FV_{it} + \beta_4 IP_{it} \text{x} HC_{it} + \beta_5 DiffIP_{it} + \beta_6 REAL_{it} + \varepsilon_{it}$

Disaggregated level model: $lnP_{it} = \alpha_0 + \alpha_1 BVLIP_{it} + \alpha_2 EPS_{it} + \alpha_3 IPND_{it} \text{x} FV_{it} + \alpha_4 IPND_{it} \text{x} HC_{it} + \alpha_5 DiffIPND_{it} + \mu_6 IPD_{it} \text{x} FV_{it} + \mu_7 IPD_{it} \text{x} HC_{it} + \mu_8 DiffIPD_{it} + \alpha_9 REAL_{it} + \varepsilon'_{it}$

Level	Aggregated level			Disaggregated level		
Model Partition (Hypothesis)	Model 1 : All samples (H2)	Model 2.1 : ARSPart'= 1 (H4)	Model 2.2 : ARSPart'= 0 (H4)	Model 3 : All samples (H3)	Model 4.1 : ARSPart'= 1 (H5)	Model 4.2 : ARSPart'= 0 (H5)
BV	0.433 ***	0.045 ***	0.019 ***	0.447 ***	0.438 ***	0.020***
EPS	0.112 ***	0.886 ***	-0.015	0.099 ***	0.110	-0.022
IP x FV	0.063	0.038	0.010 ***			
IP x HC	0.234 ***	0.103 ***	0.160 ***			
DiffIP	0.012	-0.038	0.175 ***			
IPND x FV				0.087	0.048	0.001
IPND x HC				0.123	-0.016	0.115
DiffIPND				0.002 **	0.169	0.150*
IPD x FV				0.056	-0.446	0.010
IPD x HC				0.191 **	0.243 ***	0.255
DiffIPD				0.007 **	-0.364	0.161
REAL	-0.226 ***	-0.246 ***	-0.934 ***	-0.232 ***	-0.213	-0.943***
N	648	128	101	648	128	101
Adjusted R^2	52.02	16.34	32.35	63.93	61.49	45.30
Test hypothesis – Aggregated level						
Expected	$\beta_{FV} > \beta_{HC}$	$\beta_{FV} > \beta_{HC}$	$\beta_{FV} > \beta_{HC}$			
Result	$\beta_{FV} < \beta_{HC}$***	$\boldsymbol{\beta_{FV} < \beta_{HC}}$	$\beta_{FV} < \beta_{HC}$***			
Test hypothesis – Disaggregated level						
The non-depreciated investment property						
Expected				$\alpha_{FV} > \alpha_{HC}$	$\alpha_{FV} > \alpha_{HC}$	$\alpha_{FV} > \alpha_{HC}$
Result				$\alpha_{FV} < \alpha_{HC}$	$\boldsymbol{\alpha_{FV} < \alpha_{HC}}$	$\alpha_{FV} < \alpha_{HC}$
The depreciated investment property						
Expected				$\mu_{FV} < \mu_{HC}$	$\mu_{FV} > \mu_{HC}$	$\mu_{FV} > \mu_{HC}$
Result				$\mu_{FV} < \mu_{HC}$***	$\mu_{FV} > \mu_{HC}$	$\mu_{FV} < \mu_{HC}$***

Note 1: The coefficients of the models are standardized for direct comparison (constants are removed).

Note 2: * partially significant at the 10% level based on the robust standard deviation (HC_0)

** significant at the 5% level based on the robust standard deviation (HC_0)

*** significant at the 1% level based on the robust standard deviation (HC_0)

The significant levels are based on a 1-tailed test for hypothesis testing and a 2-tailed test otherwise.

Table 21 Multiple regressions of the aggregated and disaggregated levels of investment property after revising the AR-score partitioning (Con't)

where lnP_{it} is the price per share of firm i at year t+2months; $BVLIP_{it}$ is the book value less the investment property per share of firm i at year t; EPS_{it} is the earnings per share of firm i for year t; IP_{it} is the investment property per share of firm i at time t; $DIFFIP_{it}$ is the difference between the disclosed value and recorded cost value of the investment property per share of firm i at time t; $IPND_{it}$ is the non-depreciated investment property per share of firm i at time t; $DIFFIPND_{it}$ is the difference between the disclosed value and recorded cost value of the non-depreciated investment property per share of firm i at time t; IPD_{it} is the depreciated investment property per share of firm i at time t; $DIFFIPD_{it}$ is the difference between the disclosed value and recorded cost value of the depreciated investment property per share of firm i at time t; FV_{it} = 1 if firms adopt the fair value model for the investment property, and 0 otherwise; HC_{it} = 1 if firms adopt the cost model for the investment property, and 0 otherwise; $REAL_{it}$ = 1 if firm i is in the real estate and construction industry and 0 otherwise; $ARSPart'_{it}$ is the partitioned AR-Score of firm i at time t, where it is 1 if ARS_{it} is above 4 (high reliability group) and 0 for below 3 (low reliability group); ARS_{it} is the Aggregated Reliability Score (AR-score) of firm i at time t, which is R_Method_{it} + R_Source_{it} + R_Change_{it} + R_Audit_{it} + R_Time_{it}, where R_Method_{it} = 1 if firm i uses the mark to market model at time t and 0 otherwise, R_Source_{it} = 1 if firm i employs external appraiser(s) at time t and 0 otherwise, R_Change_{it} = 1 if firm i's percentage of change in the fair value of the investment property is below the median total percentage of change at time t and 0 otherwise, R_Audit_{it} = 1 if firm i employs a Big4 audit firm at time t and 0 otherwise, R_Time_{it} = 1 if firm i appraise the fair value in year t and 0 otherwise; ε_{it} is firm i's residual value of year t; $\beta_{FV} = |\beta_3|$ is the coefficient of the investment property recorded at fair value; $\beta_{HC} = |\beta_4+\beta_5|$ is the coefficient of the investment property recorded at cost; $\alpha_{FV} = |\alpha_3|$ is the coefficient of the non-depreciated investment property recorded at fair value; $\alpha_{HC} = |\alpha_4+\alpha_5|$ is the coefficient of the non-depreciated investment property recorded at cost; $\mu_{FV} = |\mu_6|$ is the coefficient of the depreciated investment property recorded at fair value; $\mu_{HC} = |\mu_7+\mu_8|$ is the coefficient of the depreciated investment property recorded at cost.

The results from Table 21 robust for the low reliability group that the cost model can provide more value relevance to investors than the fair value model adopter and for the depreciated investment property group as results shown in Table 10. However, there is no significant results for difference in value relevance of the fair value model and the cost model adopters for high reliability group and non-depreciated investment property. This is because the number of samples in the high reliability group decrease from 376 to 128 samples and the R^2 is dramatically decrease to 16.34. Therefore, the results are robusted in only low reliability group of the aggregated and the depreciated investment property. The revised AR-score partitioning does not significantly deviate the results.

6.4 Other Analyses

6.4.1 Comparison of Value Relevance between the Recognized Fair value and Disclosed Fair Value

According to Barth et al. (2003), the recognition of fair value exhibits a greater significant effect vis-à-vis the disclosure of fair value. Interestingly, the recognition of an *unreliable* fair value amount is of informative superiority to the disclosure of a *reliable* fair value amount. Landsman (2007) investigated the level of informativeness of the disclosed and recognized fair values and found that both the measurement error and the source of estimates could contribute to different levels of informativeness.

Gaynor et al. (2011) documented a complementary relationship between the recognition and disclosure of liabilities' fair value in the investors' evaluation of firms' credit risk. Espahbodi et al. (2002) focused their investigation on the exposure draft of IFRS No.2: *Share-based payment*; and reported the significant abnormal returns when the draft was aimed to recognize the share-based compensation cost; however, the outcome was reversed when the draft was intended to solely disclose such cost. The disclosure is therefore not a suitable substitute for the fair value recognition. On the other hand, according to Cotter (1999), the disclosure of property, plant and equipment at fair value is of greater conservativeness than is the recognition and thus is more credible than the recognition.

The superiority of the recognized fair value under the fair value model to the disclosed fair value under the cost model has been little researched. In addition, to the best of the researcher's knowledge, none of the prior research has extended to the disaggregated level of investment property and/or attempted to partition the reliability factor inherent in the fair value measurement. This research has thus striven to determine whether the recognized fair value of the investment property is of greater value relevance than the disclosed fair value of the investment property. In this regard, this current research has altered these cost model variables (i.e. $IP_{it}xHC_{it} + DiffIP_{it}$, $IPND_{it}xHC_{it} + DiffIPND_{it}$, $IPD_{it}xHC_{it} + DiffIPD_{it}$) to the respective disclosed fair value under the cost model variables (i.e. $DisIP_{it}$, $DisIPND_{it}$, $DisIPD_{it}$). For instance, $DisIP_{it}$ replaces $IP_{it}xHC_{it} + DiffIP_{it}$ since $DiffIP_{it}$ is the difference between the disclosed value and the recorded cost value of the investment property.

In addition, the collinearity problem of $DiffIPND_{it}$ and $DiffIPD_{it}$ (i.e. the tolerance value <0.200) is removed as shown in the test of assumptions in Appendix C. It is found that the tolerance and VIF values are within the multicollinearity threshold; thus, the problem of multicollinearity is resolved and the analysis results confirm the results in Table 10.

In Table 22, the analysis results are relatively similar to those of the main models in which the recognized fair value under the fair value model is of more value relevance than the disclosed fair value under the cost model only in the high reliability group where the investors trust in the firms' fair value measurement[24]. In addition, the findings imply that investors generally have more trust in the disclosed fair value under the cost model than the recognized fair value under the fair value model. The results are also in line with prior literature which documented that fair value disclosure is superior to fair value recognition if the fair value measurement is unreliable. For instance, according to Barth (1994), the fair value measurement occasionally contains a measurement error and thus the disclosure of fair value offers more value relevance than the recognition of fair value. Eccher et al. (1996) reported that the disclosure of discrepancies between fair value and book value has value relevance for investors' decision-making. Moreover, Pappu and Devi (2011) examined the value relevance of investment property information in Malaysia and documented that the fair value recognition is unreliable and thereby offers less useful information to the investors relative to the fair value disclosure. In short, the disclosure of fair value would offer value relevance to the investors only if the fair value is less reliable.

[24] Although the disclosed fair value (DisIP) of the cost model adopters is not significantly greater than the recognized fair value (IPxFV) of the fair value model adopters, DisIP is statistically significant at the 1% level whereas IPxFV is insignificant. Therefore, the investors put more trust in the disclosed fair value than the recognized fair value for the aggregated investment property prior to the reliability partitioning.

Table 22 Multiple regression of the aggregated and disaggregated investment property-Comparison between the recognized fair value and disclosed fair value of investment property

Aggregated level model : $lnP_{it} = \beta_0 + \beta_1 BVLIP_{it} + \beta_2 EPS_{it} + \beta_3 IP_{it} xFV_{it} + \beta_4 DisIP_{it} + \beta_5 REAL_{it} + \varepsilon_{it}$

Disaggregated level model : $lnP_{it} = \alpha_0 + \alpha_1 BVLIP_{it} + \alpha_2 EPS_{it} + \alpha_3 IPND_{it} xFV_{it} + \alpha_4 DisIPND_{it} + \mu_5 IPD_{it} xFV_{it} + \mu_6 DisIPD_{it} + \alpha_7 REAL_{it} + \varepsilon'_{it}$

Level	Aggregated level			Disaggregated level		
Model	Model 1 :	Model 2.1 :	Model 2.2 :	Model 3 :	Model 4.1 :	Model 4.2 :
Partition	All samples	ARSPart = 1	ARSPart = 0	All samples	ARSPart = 1	ARSPart = 0
(Hypothesis)	(H2)	(H4)	(H4)	(H3)	(H5)	(H5)
BV	0.417 ***	0.526 ***	0.171 *	0.449 ***	0.537 ***	0.353
EPS	0.155 ***	0.164 ***	0.278 ***	0.126 ***	0.141 ***	0.099**
IP x FV	0.055	0.062 **	0.088 *			
DisIP	0.093 ***	0.045	0.183 ***			
IPND x FV				0.074	0.095	0.040
DisIPND				-0.076	0.193	-0.142
IPD x FV				0.048	-0.141 ***	0.025
DisIPD				0.197 ***	-0.106	0.348**
REAL	-0.231 ***	-0.206 ***	-0.276 ***	-0.235 ***	-0.197 ***	-0.266**
N	648	376	272	648	376	272
Adjusted R^2	47.88	56.59	43.58	49.06	57.57	46.38
Incremental R^2	-	8.71	(4.30)	-	8.51	(2.68)
Test hypothesis – Aggregated level						
Expected	$\beta_{FVR} > \beta_{FVD}$	$\beta_{FVR} > \beta_{FVD}$	$\beta_{FVR} > \beta_{FVD}$			
Result	$\boldsymbol{\beta_{FVR} < \beta_{FVD}}$	$\beta_{FVR} > \beta_{FVD}$ *	$\beta_{FVR} < \beta_{FVD}$ **			
Test hypothesis – Disaggregated level						
The non-depreciated investment property						
Expected				$\alpha_{FVR} > \alpha_{FVD}$	$\alpha_{FVR} > \alpha_{FVD}$	$\alpha_{FVR} > \alpha_{FVD}$
Result				$\alpha_{FVR} < \alpha_{FVD}$	$\alpha_{FVR} < \alpha_{FVD}$	$\alpha_{FVR} < \alpha_{FVD}$
The depreciated investment property						
Expected				$\mu_{FVR} < \mu_{FVD}$	$\mu_{FVR} > \mu_{FVD}$	$\mu_{FVR} > \mu_{FVD}$
Result				$\mu_{FVR} < \mu_{FVD}$ ***	$\mu_{FVR} > \mu_{FVD}$ ***	$\mu_{FVR} < \mu_{FVD}$ **

Note 1: The coefficients are standardized for direct comparison (with the constants removed).

Note 2: * partially significant at the 10% level based on the robust standard deviation (HC_0)

** significant at the 5% level based on the robust standard deviation (HC_0)

*** significant at the 1% level based on the robust standard deviation (HC_0)

The significant levels are based on a 1-tailed test for hypothesis testing and a 2-tailed test otherwise.

Table 22 Multiple regression of the aggregated and disaggregated investment property-Comparison between the recognized fair value and disclosed fair value of investment property (Con't)

where lnP_{it} is the natural logarithm of price per share of firm i at year t+2 months; $BVLIP_{it}$ is the book value less the investment property per share of firm i at year t; EPS_{it} is the earnings per share of firm i for year t; IP_{it} is the investment property per share of firm i at year t; $DiffIP_{it}$ is the difference between the disclosed value and recorded cost value of the investment property per share of firm i at year t; $IPND_{it}$ is the non-depreciated investment property per share of firm i at year t; $DiffIPND_{it}$ is the difference between the disclosed value and recorded cost value of the non-depreciated investment property per share of firm i at year t; IPD_{it} is the depreciated Investment property per share of firm i at year t; $DiffIPD_{it}$ is the difference between the disclosed value and recorded cost value of the depreciated investment property per share of firm i at year t; FV_{it} is 1 if firm i adopts the fair value model for the investment property and 0 otherwise; $REAL_{it}$ is 1 if firm i is in the real estate and construction industry and 0 otherwise; $ARSPart_{it}$ is the AR-Score partition of firm i at time t, where it is 1 ifARS_{it} is above the median of total ARS_{it} (high reliability group) and 0 otherwise (low reliability group); ARS_{it} is the Aggregated Reliability Score (AR-score) of firm i at time t, which is equal to R_Method_{it} + R_Source_{it} + R_Change_{it} + R_Audit_{it} + R_Time_{it}, where R_Method_{it} = 1 if firm i uses the mark to market model at time t and 0 otherwise, R_Source_{it} = 1 if firm i employs external appraiser(s) at time t and 0 otherwise, R_Change_{it} = 1 if firm i's percentage of change in the fair value of the investment property is below the median total percentage of change at time t and 0 otherwise, R_Audit_{it} = 1 if firm i employs a Big4 audit firm at time t and 0 otherwise, R_Time_{it} = 1 if firm i appraise the fair value in year t and 0 otherwise; $\varepsilon_{i,t}$ is firm i's residual value of year t; $\beta_{FVR} = |\beta_3|$ is the coefficient of the investment property recorded at fair value; $\beta_{FVD} = |\beta_4|$ is the coefficient of the investment property disclose at fair value; $\alpha_{FVR} = |\alpha_3|$ is the coefficient of the non-depreciated investment property recorded at fair value; $\alpha_{FVD} = |\alpha_4|$ is the coefficient of the non-depreciated investment property disclosed at fair value; $\mu_{FVR} = |\mu_5|$ is the coefficient of the depreciated investment property recorded at fair value; $\mu_{FVD} = |\mu_6|$ is the coefficient of the depreciated investment property disclosed at fair value. **The results in bold are non-robust**.

It is found that the average R^2 of these models in Table 22 remains relatively similar to those of the main models in Table 10. Thus, a question emerges that the relationship between the disclosed fair value and the recorded cost value is that of a complementary or substitution one. In addition, prior research has yet to find out if it is the recorded cost or disclosed fair value of investment property that acts as the true driver of the cost model. This current research has thus re-modified the models to investigate the superiority of the recognized cost to the disclosed fair value of the investment property or vice versa. The regression is nonetheless restricted to the cost model adopters, in which the samples are reduced to a mere 565 firm-years. In addition, the variables pertinent to the fair value model adopters (i.e. *IPxFV, IPNDxFV, IPDxFV*) are removed from the modified models. The results are shown in Table 23.

Table 23 Multiple regression of the aggregated and disaggregated investment property–Comparison between the recorded cost value and the disclosed fair value of investment property (the cost model adopters)

Aggregated level model: $lnP_{it} = \beta_0 + \beta_1 BVLIP_{it} + \beta_2 EPS_{it} + \beta_3 IP_{it} xHC_{it} + \beta_4 DiffIP_{it} + \beta_5 REAL_{it} + \varepsilon_{it}$

Disaggregated level model: $lnP_{i,t} = \alpha_0 + \alpha_1 BVLIP_{it} + \alpha_2 EPS_{it} + \alpha_3 IPND_{it} xHC_{it} + \alpha_4 DiffIPND_{it} +$

$$\mu_5 IPD_{it} xHC_{it} + \mu_6 DiffIPD_{it} + \alpha_7 REAL_{it} + \varepsilon'_{it}$$

Level	Aggregated level			Disaggregated level		
Model	Model 1 :	Model 2.1 :	Model 2.2 :	Model 3 :	Model 4.1 :	Model 4.2 :
Partition	All samples	ARSPart = 1	ARSPart = 0	All samples	ARSPart = 1	ARSPart = 0
(Hypothesis)	(H2)	(H4)	(H4)	(H3)	(H5)	(H5)
BV	0.439 ***	0.523 ***	0.354	0.460 ***	0.524 ***	0.402
EPS	0.110 ***	0.154 ***	0.067 ***	0.094 ***	0.154 ***	0.026**
IP x HC	0.232 ***	0.130	0.326 ***			
DiffIP	0.011	-0.009	0.036 ***			
IPND x HC				0.095	0.119	0.087
DiffIPND				-0.103 **	-0.052	0.151
IPD x HC				0.187	0.069	0.307**
DiffIPD				0.009	0.044	-0.022**
REAL	-0.228 ***	-0.198 ***	-0.280 ***	-0.233 ***	-0.196 ***	-0.283**
N	565	320	245	565	320	245
Adjusted R^2	51.64	57.61	66.39	51.89	57.62	50.31
Incremental R^2	-	5.94	14.75	-	5.73	(1.58)
Test hypothesis – Aggregated level						
Result	$\beta_{HCR} > \beta_{FVD}$ ***	$\beta_{HCR} < \beta_{FVD}$	$\beta_{HCR} > \beta_{FVD}$ ***			
Test hypothesis – Disaggregated level						
The non-depreciated investment property - result				$\alpha_{HCR} < \alpha_{FVD}$ *	$\alpha_{HCR} > \alpha_{FVD}$	$\alpha_{HCR} < \alpha_{FVD}$
The depreciated investment property - result				$\mu_{HCR} > \mu_{FVD}$	$\mu_{HCR} > \mu_{FVD}$	$\mu_{HCR} > \mu_{FVD}$ **

Note 1: The coefficients are standardized for direct comparison (with the constants removed).

Note 2: * partially significant at the 10% level based on the robust standard deviation (HC_0)

** significant at the 5% level based on the robust standard deviation (HC_0)

*** significant at the 1% level based on the robust standard deviation (HC_0)

The significant levels are based on a 1-tailed test for hypothesis testing and a 2-tailed test otherwise.

where $\mathbf{lnP_{it}}$ is the natural logarithm of price per share of firm i at year t+2 months; $\mathbf{BVLIP_{it}}$ is the book value less the investment property per share of firm i at year t; $\mathbf{EPS_{it}}$ is the earnings per share of firm i for year t; $\mathbf{IP_{it}}$ is the investment property per share of firm i at year t; $\mathbf{DiffIP_{it}}$ is the difference between the disclosed value and recorded cost value of the investment property per share of firm i at year t; $\mathbf{IPND_{it}}$ is the non-depreciated investment property per share of firm i at year t; $\mathbf{DiffIPND_{it}}$ is the difference between the disclosed value and recorded cost value of the non-depreciated investment property per share of firm i at year t; $\mathbf{IPD_{it}}$ is the depreciated Investment property

Table 23 Multiple regression of the aggregated and disaggregated investment property–Comparison between the recorded cost value and the disclosed fair value of investment property (the cost model adopters) (Con't)

per share of firm i at year t; $DiffIPD_{it}$ is the difference between the disclosed value and recorded cost value of the depreciated investment property per share of firm i at year t; HC_{it} is 1 if firm i adopts the cost model for the investment property and 0 otherwise; $REAL_{it}$ is 1 if firm i is in the real estate and construction industry and 0 otherwise; $ARSPart_{it}$ is the AR-Score partition of firm i at time t, where it is 1 ifARS_{it} is above the median of total ARS_{it} (high reliability group) and 0 otherwise (low reliability group); ARS_{it} is the Aggregated Reliability Score (AR-score) of firm i at time t, which is equal to R_Method_{it} + R_Source_{it} + R_Change_{it} + R_Audit_{it} + R_Time_{it}, where R_Method_{it} = 1 if firm i uses the mark to market model at time t and 0 otherwise, R_Source_{it} = 1 if firm i employs external appraiser(s) at time t and 0 otherwise, R_Change_{it} = 1 if firm i's percentage of change in the fair value of the investment property is below the median total percentage of change at time t and 0 otherwise, R_Audit_{it} = 1 if firm i employs a Big4 audit firm at time t and 0 otherwise, R_Time_{it} = 1 if firm i appraise the fair value in year t and 0 otherwise; $\varepsilon_{i,t}$ is firm i's residual value of year t; $\beta_{HCR} = |\beta_3|$ is the coefficient of the investment property recorded at cost; $\beta_{FVD} = |\beta_4|$ is the coefficient of the investment property disclose at fair value; $\alpha_{HCR} = |\alpha_3|$ is the coefficient of the non-depreciated investment property recorded at cost; $\alpha_{FVD} = |\alpha_4|$ is the coefficient of the non-depreciated investment property disclosed at fair value; $\mu_{HCR} = |\mu_5|$ is the coefficient of the depreciated investment property recorded at cost; $\mu_{FVD} = |\mu_6|$ is the coefficient of the depreciated investment property disclosed at fair value. **The results in bold are non-robust.**

In Table 23, the recorded cost value of the aggregated investment property exhibits more value relevance than its disclosed fair value, except in the high reliability group in which both are of similar value relevance. For the disaggregated investment property, the recorded cost value of the investment property is of greater value relevance than the disclosed fair value only for the depreciated investment property belonging to the low reliability group. Interestingly, the disclosed fair value is of greater value relevance vis-à-vis the recorded cost value of investment property only in the case of the pre-partitioning non-depreciated investment property.

The disclosed fair value is of equal value relevance to investors as the recorded cost value of investment property if the fair value measurement is of high reliability. Otherwise, the recorded cost value generally is of more value relevance than the disclosed fair value, except for the case of the pre-partitioning non-depreciated investment property. From Table 23, it could be concluded that the disclosed fair value is an improper substitute for the recorded cost value of investment property. In other words, the information is of complementary nature.

6.4.2 Comparison of Value Relevance between the Investment Property Recorded at Fair Value and at Cost

According to Lourenço and Dias Curto (2009), the disclosed fair value and the recorded cost value of investment property for the cost model refer to the same assets and information, giving rise to the possibility of multicollinearity problem. In this current research, this issue has been circumvented by the use of the difference between the disclosed value and recorded cost value of the investment property ($DiffIP_{it}$) as the proxy for the disclosure of its fair value. Table 7 however indicates a possibility of the collinearity problem between the variables of the cost model (i.e. $IP_{it}xHC_{it}$, $DiffIP_{it}$, $IPND_{it}xHC_{it}$, $DiffIPND_{it}$, $IPD_{it}xHC_{it}$, $DiffIPD_{it}$). This current research has thus exclude certain variables pertinent to the disclosure of investment property fair value (i.e. $DiffIP_{it}$, $DiffIPND_{it}$, $DiffIPD_{it}$) to mitigate the possible collinearity problem. This is consistent with Lourenço and Dias Curto (2009).

Table 24 presents the multiple regression results of the aggregated and disaggregated investment properties in which comparisons between the investment property recorded at fair value and at cost are made but without the comparison of the disclosed fair value under the cost model. The analysis results remain unchanged in relation to those of the main models, except for the aggregated investment property in the high reliability group in which the fair value and cost models are of similar value relevance. Despite the omission of the information on the disclosure of investment property, the results are similar to those of the main models. This thus confirms the findings in Table 23 that the recorded cost is of greater importance to investors than the disclosed fair value.

Table 24 Multiple regression of the aggregated and disaggregated investment property–Comparison between the investment property recorded at fair value and at cost

Aggregated level model : $lnP_{it} = \beta_0 + \beta_1 BVLIP_{it} + \beta_2 EPS_{it} + \beta_3 IP_{it} xFV_{it} + \beta_4 IP_{it} xHC_{it} + \beta_5 REAL_{it} + \varepsilon_{it}$

Disaggregated level model : $lnP_{it} = \alpha_0 + \alpha_1 BVLIP_{it} + \alpha_2 EPS_{it} + \alpha_3 IPND_{it} xFV_{it} + \alpha_4 IPND_{it} xHC_{it} + \mu_5 IPD_{it} xFV_{it} + \mu_6 IPD_{it} xHC_{it} + \alpha_7 REAL_{it} + \varepsilon'_{it}$

Level	**Aggregated level**			**Disaggregated level**		
Model	Model 1 :	Model 2.1 :	Model 2.2 :	Model 3 :	Model 4.1 :	Model 4.2 :
Partition	All samples	ARSPart = 1	ARSPart = 0	All samples	ARSPart = 1	ARSPart = 0
(Hypothesis)	(H2)	(H4)	(H4)	(H3)	(H5)	(H5)
BV	0.434 ***	0.502 ***	0.339	0.447 ***	0.528 ***	0.385
EPS	0.113 ***	0.165 ***	0.081 ***	0.099 ***	0.143 ***	0.041**
IP x FV	0.062	0.076 *	0.097 *			
IP x HC	0.238 ***	0.138	0.342 ***			
IPND x FV				0.086	0.101	0.047
IPND x HC				0.123	0.116	0.134
IPD x FV				0.055	-0.074 ***	0.094
IPD x HC				0.194 ***	0.044 *	0.300**
REAL	-0.226 ***	-0.198 ***	-0.278 ***	-0.232 ***	-0.198 ***	-0.276**
N	648	376	272	648	376	272
Adjusted R^2	52.01	58.15	50.82	52.92	58.61	51.30
Incremental R^2	-	6.14	(1.19)	-	5.69	(1.62)
Test hypothesis – Aggregated level						
Expected	$\beta_{FV} > \beta_{HC}$	$\beta_{FV} > \beta_{HC}$	$\beta_{FV} > \beta_{HC}$			
Result	$\beta_{FV} < \beta_{HC}$ ***	**$\beta_{FV} > \beta_{HC}$**	$\beta_{FV} < \beta_{HC}$ ***			
Test hypothesis – Disaggregated level						
The non-depreciated investment property						
Expected				$\alpha_{FV} > \alpha_{HC}$	$\alpha_{FV} > \alpha_{HC}$	$\alpha_{FV} > \alpha_{HC}$
Result				$\alpha_{FV} < \alpha_{HC}$	$\alpha_{FV} < \alpha_{HC}$	$\alpha_{FV} < \alpha_{HC}$
The depreciated investment property						
Expected				$\mu_{FV} < \mu_{HC}$	$\mu_{FV} > \mu_{HC}$	$\mu_{FV} > \mu_{HC}$
Result				$\mu_{FV} < \mu_{HC}$ ***	$\mu_{FV} > \mu_{HC}$ *	$\mu_{FV} < \mu_{HC}$**

Table 24 Multiple regression of the aggregated and disaggregated investment property–Comparison between the investment property recorded at fair value and at cost (Con't)

Note 1: The coefficients are standardized for direct comparison (with the constants removed).

Note 2: * partially significant at the 10% level based on the robust standard deviation (HC_0)

** significant at the 5% level based on the robust standard deviation (HC_0)

*** significant at the 1% level based on the robust standard deviation (HC_0)

The significant levels are based on a 1-tailed test for hypothesis testing and a 2-tailed test otherwise.

where lnP_{it} is the natural logarithm of price per share of firm i at year t+2 months; $BVLIP_{it}$ is the book value less the investment property per share of firm i at year t; EPS_{it} is the earnings per share of firm i for year t; IP_{it} is the investment property per share of firm i at year t; $IPND_{it}$ is the non-depreciated investment property per share of firm i at year t; IPD_{it} is the depreciated Investment property per share of firm i at year t; FV_{it} is 1 if firm i adopts the fair value model for the investment property and 0 otherwise; HC_{it} is 1 if firm i adopts the cost model for the investment property and 0 otherwise; $REAL_{it}$ is 1 if firm i is in the real estate and construction industry and 0 otherwise; $ARSPart_{it}$ is the AR-Score partition of firm i at time t, where it is 1 ifARS_{it} is above the median of total ARS_{it} (high reliability group) and 0 otherwise (low reliability group); ARS_{it} is the Aggregated Reliability Score (AR-score) of firm i at time t, which is equal to R_Method_{it} + R_Source_{it} + R_Change_{it} + R_Audit_{it} + R_Time_{it}, where R_Method_{it} = 1 if firm i uses the mark to market model at time t and 0 otherwise, R_Source_{it} = 1 if firm i employs external appraiser(s) at time t and 0 otherwise, R_Change_{it} = 1 if firm i's percentage of change in the fair value of the investment property is below the median total percentage of change at time t and 0 otherwise, R_Audit_{it} = 1 if firm i employs a Big4 audit firm at time t and 0 otherwise, R_Time_{it} = 1 if firm i appraise the fair value in year t and 0 otherwise; $\varepsilon_{i,t}$ is firm i's residual value of year t; $\beta_{FV} = |\beta_3|$ is the coefficient of the investment property recorded at fair value; $\beta_{HC} = |\beta_4|$ is the coefficient of the investment property disclose at cost; $\alpha_{FV} = |\alpha_3|$ is the coefficient of the non-depreciated investment property recorded at fair value; $\alpha_{HC} = |\alpha_4|$ is the coefficient of the non-depreciated investment property disclosed at cost; $\mu_{FV} = |\mu_5|$ is the coefficient of the depreciated investment property recorded at fair value; $\mu_{HC} = |\mu_6|$ is the coefficient of the depreciated investment property disclosed at cost. **The results in bold are non-robust.**

6.5 The Summary of Findings

Based on the aforementioned results, it is evident that the fair value model would be adopted if the firms' proportion of depreciated investment property to total investment property is greater and if the fair value measurements are of high reliability. Although in contrast with Hypothesis 1a, the first characteristic is not significant since firms with a high proportion of the non-depreciated investment property typically experience greatly dispersed fair value appreciation. To circumvent the recognition of fluctuating amounts in the financial statement, the cost model is thus adopted. Moreover, firms with high proportion of the depreciated investment property have a tendency to adopt the fair value model as most are in the real estate sector with expertise and familiarity with the fair value measurement. The second characteristic is consistent with Hypothesis 1b in that firms with ability to reliably measure the investment property fair value have a greater propensity to choose the fair value model. This is also consistent with the contracting theory (Holthausen, 1990) that if the agent has an ability to provide reliable information they would record the information to lessen the information asymmetry. Nevertheless, a mere 13% of total sampled firms have adopted the fair value model, indicating that a majority of Thai listed firms remain attached to the cost model. This also confirms that both firm characteristics (investment property component) and information usefulness characteristics (reliability in fair value measurement) influence firms to the choosing of accounting treatment.

The results of the main tests and sensitivity analysis also confirm that the cost model generally are of greater value relevance to investors vis-à-vis the fair value model due to the investors' attachment to the cost model, which contradicts Hypothesis 2. The finding that Thai investors are attached to the cost model, like Thai listed firms, could be attributed to the use of the conventional value relevance model. To address, this current research has thus introduced two additional elements into the conventional model: the disaggregation of investment property and the partitioning in accordance with the fair value measurement reliability.

Following the disaggregation of investment property into the non-depreciated and depreciated components, the value relevance of the non-depreciated investment property of the fair value model and that of the cost model are insignificantly different. This is attributable to a small variation across the non-depreciated investment property of the sampled firms. However, the results for the depreciated investment property are similar to those of the aggregated investment property due to the former's large variation across firms. In addition, investors have clung to the cost model, rendering the cost model of greater value relevance than the fair value model. The test of hypothesis 3, pertaining to the depreciated investment property, suggests that the disaggregation of investment property facilitates the investors' decision-making.

After partitioning firms by the AR-score, the fair value model in the high reliability group is of greater intrinsic value relevance than the cost model as predicated since the investors perceive that the fair value of investment property is reliable. The result however reverses in the low reliability group. The findings pertaining only to the high reliability group are in agreement with Hypothesis 4. Thus, the disclosure of reliability levels of the fair value measurements could facilitate the investors' decision-making.

Interestingly, the reliability-partitioning exhibits no effect on the non-depreciated investment property. Meanwhile, for the depreciated investment property, the intrinsic value relevance of the fair value model is greater than the cost model's only in the high reliability value measurement group. Hypothesis 5 is thus true only in the case of the depreciated investment property in the high reliability group.

It is also found that the analysis results of the aggregated investment property and the depreciated investment property are similar and that the outcomes belonging to the non-depreciated investment property are always insignificant. This is partly attributable to the domination of the depreciated investment property amount over that of the aggregated investment property, contributing to the conclusion that the depreciated investment property could be a suitable representative of the aggregated investment property. In addition, the disaggregation of investment property increases the explanatory power of the models (R2).

Furthermore, this research has discovered that investors generally have more trust in the disclosed fair value under the cost model than the recognized fair value under the fair value model. In Tables 18 and 19, it is however found that the disclosed fair value cannot substitute the recorded cost value of the investment property since the former could offer merely complementary information to the investors. It is thus possible to rank the investment property value measurements by the investors' trust as follows: (1) the recorded cost value, (2) the disclosed fair value and (3) the recorded fair value of the investment property. As previously mentioned, both investors and Thai listed firms are vehemently attached to the cost model, an issue that could be addressed with the application of the reliability information (i.e. the reliability partitioning).

In short, this empirical research has found that both the investment property components (i.e. the non-depreciated and depreciated investment property) and the reliability score influence the firms' accounting choices (i.e. the fair value versus cost models). In addition, it has determined that the reliability score increases the explanatory power with regard to intrinsic value relevance of the investment property information.

However, there is a limitation from the data collection which brings up the incomplete components of the AR-score. In addition, the equally-weight method of the AR-score formation can lead to some error. Also, these presented components can have measurement error into some senses which can deviate the research results. Therefore, the contribution of the results should be used cautiously.

CHAPTER VII

CONCLUDING REMARKS

This current research is among the first to introduce the concept of investment property classification (i.e. disaggregation), by which the assets are classified into the non-depreciated and depreciated investment property components; and also to apply the Aggregated Reliability Score (AR-score) to hold constant the reliability inherent in the fair value measurements of investment property.

There exist two accounting choices to account for investment property: the fair value and the cost models. One of the aims of this research is to identify the additional characteristics of firms that adopt the fair value model (i.e. the fair value-model adopters). The findings, in contrast to the prediction, reveal that firms with high proportion of the non-depreciated investment property to the depreciated investment property exhibit a greater propensity to adopt the cost model, a phenomenon attributable to the unfamiliarity with the fair value model and the desired subsequent financial smoothness. As anticipated, the reliability in fair value measurement is positively correlated to the firms' accounting choices, i.e. the higher the reliability of the fair value measurement, the greater the likelihood of the fair value model adoption. This also confirms that both firm characteristics (investment property component) and information usefulness characteristics (reliability in fair value measurement) influence firms to the choosing of accounting treatment.

This research also aims to investigate the relative superiority in terms of value relevance between the two accounting choices for investment property from the investors' point of view. To this end, the disaggregation of investment property and the extraction of the fair value measurement reliability have been factored into the test models. Moreover, the first research question of this research reflects firms' perspective on the fair value measurement of investment property while the second research question reflects investors' perspective on this issue. Therefore this is the first paper representing both firms' view and investors' views.

The analysis results indicated that investors opt for the aggregated investment property recorded at cost over that belonging to the fair value model. This is consistent with prior literature in which investors in a less advanced economy are vehemently attached to the cost model (Ishak et al., 2012; Pappu & Devi, 2011). The finding however contradicts the standard setters' conviction that the fair value model is of greater use to investors in valuation of the firms.

The application of the Aggregated Reliability Score (AR-score) to partitioning the sampled firms by the reliability of the fair value measurements has contributed to changes in the analysis results. In the high reliability group, the investment property under the fair value model is of more value relevance than under the cost model due to the investors' increased confidence in the fair value information. In the low reliability group, the investors nevertheless have less trust in the disclosed fair value and thereby opt for the cost model. Thus, the disclosure of information with high reliability would facilitate the investors' decision-making and also lessen their attachment to the cost model.

On the value relevance of the disaggregated investment property, it has been found that the cost model offers more value relevance than the fair value model only for the depreciated investment property; and that the value relevance between both accounting choices are similar for the non-depreciated investment property. The finding confirms the differences in the investors' utilization of information of different investment property components.

Following the partitioning of the disaggregated investment property by the fair value measurement reliability for intrinsic value relevance, no difference is detected for the non-depreciated investment property regardless of the reliability levels. On the other hand, the depreciated investment property under the fair value model is of greater intrinsic value relevance than under the cost model in the high reliability group and the result is reverse in the low reliability group. In short, investors rely on both the fair value measurement reliability and the disaggregation of investment property in their valuation decision-making. As anticipated, both items help unleash intrinsic value relevance of the investment property.

It is also found that the results of the aggregated investment property and the depreciated investment property are identical; and that those belonging to the non-depreciated investment property is always insignificant. This is partly attributable to the predominance of the depreciated investment property amount over that of the aggregated investment property and thus the subsequent presumption that the depreciated investment property is an effective representation of the aggregated investment properties.

Due partly to the investment property fair value fluctuations, Thai investors collectively rank the investment property value measurements as follows: (1) the recorded cost value, (2) the disclosed fair value and (3) the recorded fair value of the investment property. In addition, it is possible to conclude that both the investors, as reflected by the greater value relevance of the cost model vis-à-vis the fair value model; and the sampled firms, as reflected by a mere 13% have adopted the fair value model, have a strong bond with the cost model.

It is anticipated that the contributions and implications of this empirical research are multifaceted. The first contribution is the insight that the investment property components (i.e. the non-depreciated and depreciated investment properties) and the reliability of fair value measurements are the additional characteristics of the fair value-adopting firms. The knowledge is of great use to the standard setters and regulatory bodies for refinement of existing standards and accounting choices.

Secondly, due to the relative superiority of the cost model to the fair value model in certain cases where the fair value is fluctuating and the cost model yield more power as in the case of developing country like Thailand, the standard setters could thus apply the finding to streamlining the accounting practices. There should have been, for instance, a special clause that permits a switch from the fair value to the cost model (contrary to what is allowed in IAS40) in cases, e.g. that the investors vehemently attach to the cost model or that the fair value is highly dispersed, where the cost model exhibits more explanatory power than does the fair value model. In other words, the restraint on the switchability should be either abandoned or commuted.

Thirdly, the research also points to the importance of the disaggregated investment property and the reliability information disclosed in the notes of the financial statements in the investors' valuation of the firms. The disaggregation of investment property also unleashes numerous findings previously hidden from view in the aggregated level of investment property.

Fourthly, this research has proved that the reliability of fair value measurement influences the relevancy of the accounting numbers and thus it is necessary that the measurement reliability be maintained and further improved. In addition, the increased reliability could alleviate the investors' fixation on the cost model. This also represents the importance of the reliability. Therefore, although the reliability is often identified by IASB in the recognition process of most accounting standards that assets and liabilities are to be accounted for the transactions only when it is reliably measured, the reinstatement of the term "*reliability*" in the revised conceptual framework as suggested by EFRAG's assertion should be considered.

Lastly, the financial statement preparers and users could utilize the findings in dealing with the investment property, whereby the former would attempt to make available such information to investors while the latter would more effectively use the disclosed information. As previously stated, the investors are attached to the cost model when it comes to the investment property information but would rely on the fair value information if the fair value measurement is of high reliability. Thus, to convince the investors to use the fair value information, firms are required to increase the reliability levels in the fair value measurements and disclose such reliability attributes in the financial statements.

In this research, intrinsic value relevance is derived upon the extraction or holding constant of the reliability effect. In addition to the disaggregation of investment property, this research has proposed the Aggregated Reliability Score (ARS) for partitioning the firms in accordance with their value measurement reliability levels.

Future research could extend the application of the ARS-based partitioning and the concept of disaggregation to other assets, e.g. financial instruments, intangible assets. In addition, the specific focus of this current research on Thailand, which is a less advanced economy, has inadvertently contributed to a low rate of the fair value model adoption of merely 13% of the total sampled firms. Future research should thus focus on different settings where the fair value model adoption is prevalent. Moreover, future research could attempt to figure out other possible reasons that cause investors to become fixated on the cost model.

There are certain caveats though. Since *investment property*, *property, plant and equipment*, and *assets held for sales* are similar in certain aspects but they are not identical in their respective nature and accounting treatment, it is thus possible that, if improperly carried out, firms could misclassify them and thereby adversely affect the research results. It is also possible that some firms fail to comply with IAS40, by which the information on the disaggregated components and the fair value measurement reliability is inadequately disclosed, resulting in the removal of the samples and the use of estimates which could bias the research results. In addition, an exception exists for the investment property whose fair value cannot be reliably measured on a continuing basis and thus alternatively measured by the cost model despite the fact that the remaining investment property is determined using the fair value model, according to paragraph 53 of IAS40. Moreover, Investment property can also be classified into assets that generate rental income and assets that generate appreciation in its value. However, there is a limitation in data collection and financial statement disclosure, so the study use the classification by accounting treatment as primary key concept. Lastly, leasehold rights are scoped out from this study due to the senses that it is not the real property of firms and can be treated under another accounting standard, i.e. IAS17 : Leases, which can confuse the results. However, the reliability components above are partial but not the whole components that can be characterized as the AR-score. Moreover, the limitation of the data collection and the formation of AR-score brings up the incomplete components of the score. Moreover, these presented components can have measurement error into some senses which can deviate the research results.

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APPENDIX

APPENDIX A

List of Companies in Sample Set

No.	Initial	Company Name	Industry
1	A	AREEYA PROPERTY PLC.	5
2	AKR	EKARAT ENGINEERING PLC.	6
3	AMATA	AMATA CORPORATION PLC.	5
4	AP	ASIAN PROPERTY DEVELOPMENT PLC.	5
5	ASIA	ASIA HOTEL PLC.	7
6	ASIAN	ASIAN SEAFOODS COLDSTORAGE PLC.	1
7	BAFS	BANGKOK AVIATION FUEL SERVICES PLC.	6
8	BANPU	BANPU PLC.	6
9	BAT-3K	THAI STORAGE BATTERY PLC.	4
10	BCP	THE BANGCHAK PETROLEUM PLC.	6
11	BEC	BEC WORLD PLC.	7
12	BECL	BANGKOK EXPRESSWAY PLC.	7
13	BIGC	BIG C SUPERCENTER PLC.	7
14	BJC	BERLI JUCKER PLC.	7
15	BTNC	BOUTIQUE NEWCITY PLC.	2
16	CCP	CHONBURI CONCRETE PRODUCT PLC.	5
17	CEN	CAPITAL ENGINEERING NETWORK PLC.	4
18	CENTEL	CENTRAL PLAZA HOTEL PLC.	7
19	CI	CHARN ISSARA DEVELOPMENT PLC.	5
20	CK	CH. KARNCHANG PLC.	5
21	CNT	CHRISTIANI & NIELSEN (THAI) PLC.	5
22	CPF	CHAROEN POKPHAND FOODS PLC.	1
23	CPH	CASTLE PEAK HOLDINGS PLC.	2
24	CPN	CENTRAL PATTANA PLC.	5

No.	Initial	Company Name	Industry
25	CSC	CROWN SEAL PLC.	4
26	CSP	CSP STEEL CENTER PLC.	4
27	CSR	CITY SPORTS AND RECREATION PLC.	7
28	CTW	CHAROONG THAI WIRE & CABLE PLC.	4
29	DCON	DCON PRODUCTS PLC.	5
30	DEMCO	DEMCO PLC.	5
31	DRT	DIAMOND BUILDING PRODUCTS PLC.	5
32	DTC	DUSIT THANI PLC.	7
33	EASTW	EASTERN WATER RESOURCES DEVELOPMENT AND MANAGEMENT PLC.	6
34	EGCO	ELECTRICITY GENERATING PLC.	6
35	ESTAR	EASTERN STAR REAL ESTATE PLC.	5
36	GC	GLOBAL CONNECTIONS PLC.	4
37	GFPT	GFPT PLC.	1
38	GLAND	GRAND CANAL LAND PLC.	5
39	GOLD	GOLDEN LAND PROPERTY DEVELOPMENT PLC.	5
40	GRAND	GRANDE ASSET HOTELS AND PROPERTY PLC.	7
41	HEMRAJ	HEMARAJ LAND AND DEVELOPMENT PLC.	5
42	HMPRO	HOME PRODUCT CENTER PLC.	7
43	HTC	HAAD THIP PLC.	1
44	ICC	I.C.C. INTERNATIONAL PLC.	2
45	IFEC	INTER FAR EAST ENGINEERING PLC.	2
46	IHL	INTERHIDES PLC.	4
47	INOX	POSCO-THAINOX PLC.	4
48	IRPC	IRPC PLC.	6
49	ITD	ITALIAN-THAI DEVELOPMENT PLC.	5
50	JAS	JASMINE INTERNATIONAL PLC.	8
51	JCT	JACK CHIA INDUSTRIES (THAILAND) PLC.	2
52	KAMART	KARMARTS PLC.	4

No.	Initial	Company Name	Industry
53	KMC	KRISDAMAHANAKORN PLC.	5
54	KTP	KEPPEL THAI PROPERTIES PLC.	5
55	KWC	KRUNGDHEP SOPHON PLC.	7
56	LANNA	THE LANNA RESOURCES PLC.	6
57	LEE	LEE FEED MILL PLC.	1
58	LH	LAND AND HOUSES PLC.	5
59	LPN	L.P.N. DEVELOPMENT PLC.	5
60	LRH	LAGUNA RESORTS & HOTELS PLC.	7
61	LST	LAM SOON (THAILAND) PLC.	1
62	M-CHAI	MAHACHAI HOSPITAL PLC.	7
63	MAKRO	SIAM MAKRO PLC.	7
64	MANRIN	THE MANDARIN HOTEL PLC.	7
65	MATCH	MATCHING MAXIMIZE SOLUTION PLC.	7
66	MBK	MBK PLC.	5
67	MCOT	MCOT PLC.	7
68	MINT	MINOR INTERNATIONAL PLC.	1
69	MJD	MAJOR DEVELOPMENT PLC.	5
70	MODERN	MODERNFORM GROUP PLC.	2
71	N-PARK	NATURAL PARK PLC.	5
72	NC	NEWCITY (BANGKOK) PLC.	2
73	NEP	NEP REALTY AND INDUSTRY PLC.	4
74	NIPPON	NIPPON PACK (THAILAND) PLC.	4
75	NMG	NATION MULTIMEDIA GROUP PLC.	7
76	NNCL	NAVANAKORN PLC.	5
77	NOBLE	NOBLE DEVELOPMENT PLC.	5
78	NUSA	NUSASIRI PLC.	5
79	NWR	NAWARAT PATANAKARN PLC.	5
80	P-FCB	PRAKIT HOLDINGS PLC.	7
81	PAE	PAE (THAILAND) PLC.	5

No.	Initial	Company Name	Industry
82	PAF	PAN ASIA FOOTWEAR PLC.	2
83	PG	PEOPLE'S GARMENT PLC.	2
84	PLE	POWER LINE ENGINEERING PLC.	5
85	PR	PRESIDENT RICE PRODUCTS PLC.	1
86	PRANDA	PRANDA JEWELRY PLC.	2
87	PRECHA	PREECHA GROUP PLC.	5
88	PRG	PATUM RICE MILL AND GRANARY PLC.	1
89	PS	PRUKSA REAL ESTATE PLC.	5
90	PT	PREMIER TECHNOLOGY PLC.	8
91	PTT	PTT PLC.	6
92	QH	QUALITY HOUSES PLC.	5
93	RICH	RICH ASIA STEEL PLC.	4
94	RML	RAIMON LAND PLC.	5
95	ROBINS	ROBINSON DEPARTMENT STORE PLC.	7
96	ROCK	ROCKWORTH PLC.	2
97	ROJNA	ROJANA INDUSTRIAL PARK PLC.	5
98	S & J	S & J INTERNATIONAL ENTERPRISES PLC.	2
99	SAMCO	SAMMAKORN PLC.	5
100	SAT	SOMBOON ADVANCE TECHNOLOGY PLC.	4
101	SAWANG	SAWANG EXPORT PLC.	2
102	SC	SC ASSET CORPORATION PLC.	5
103	SCC	THE SIAM CEMENT PLC.	5
104	SEAFCO	SEAFCO PLC.	5
105	SENA	SENADEVELOPMENT PLC.	5
106	SF	SIAM FUTURE DEVELOPMENT PLC.	5
107	SFP	SIAM FOOD PRODUCTS PLC.	1
108	SGP	SIAMGAS AND PETROCHEMICALS PLC.	6
109	SIRI	SANSIRI PLC.	5
110	SITHAI	SRITHAI SUPERWARE PLC.	2

No.	Initial	Company Name	Industry
111	SKR	SIKARIN PLC.	7
112	SMIT	SAHAMIT MACHINERY PLC.	4
113	SNC	SNC FORMER PLC.	4
114	SORKON	S. KHONKAEN FOODS PLC.	1
115	SPACK	S. PACK & PRINT PLC.	4
116	SPALI	SUPALAI PLC.	5
117	SPC	SAHA PATHANAPIBUL PLC.	7
118	SPG	THE SIAM PAN GROUP PLC.	4
119	SPI	SAHA PATHANA INTER-HOLDING PLC.	7
120	SPORT	SIAM SPORT SYNDICATE PLC.	7
121	SSC	SERM SUK PLC.	1
122	SSF	SURAPON FOODS PLC.	1
123	SSSC	SIAM STEEL SERVICE CENTER PLC.	4
124	SST	SUB SRI THAI PLC.	7
125	STA	SRI TRANG AGRO-INDUSTRY PLC.	1
126	STEC	SINO-THAI ENGINEERING AND CONSTRUCTION PLC.	5
127	SUC	SAHA-UNION PLC.	2
128	SUSCO	SUSCO PLC.	6
129	SYNTEC	SYNTEC CONSTRUCTION PLC.	5
130	TASCO	TIPCO ASPHALT PLC.	5
131	TC	TROPICAL CANNING (THAILAND) PLC.	1
132	TCCC	THAI CENTRAL CHEMICAL PLC.	4
133	TCJ	T.C.J. ASIA PLC.	4
134	TF	THAI PRESIDENT FOODS PLC.	1
135	TFD	THAI FACTORY DEVELOPMENT PLC.	5
136	TFI	THAI FILM INDUSTRIES PLC.	4
137	TGCI	THAI-GERMAN CERAMIC INDUSTRY PLC.	5
138	THANI	RATCHTHANI LEASING PLC.	3
139	THIP	THANTAWAN INDUSTRY PLC.	4

No.	Initial	Company Name	Industry
140	TICON	TICON INDUSTRIAL CONNECTION PLC.	5
141	TKS	T.K.S. TECHNOLOGIES PLC.	7
142	TLUXE	THAILUXE ENTERPRISES PLC.	1
143	TMD	THAI METAL DRUM MANUFACTURING PLC.	4
144	TMT	THAI METAL TRADE PLC.	4
145	TNL	THANULUX PLC.	2
146	TOP	THAI OIL PLC.	6
147	TPIPL	TPI POLENE PLC.	5
148	TPOLY	THAI POLYCONS PLC.	5
149	TPP	THAI PACKAGING & PRINTING PLC.	4
150	TRU	THAI RUNG UNION CAR PLC.	4
151	TRUBB	THAI RUBBER LATEX CORPORATION (THAILAND) PLC.	1
152	TRUE	TRUE CORPORATION PLC.	8
153	TSTE	THAI SUGAR TERMINAL PLC.	7
154	TTI	THAI TEXTILE INDUSTRY PLC.	2
155	UMI	THE UNION MOSAIC INDUSTRY PLC.	5
156	UP	UNION PLASTIC PLC.	4
157	UT	UNION TEXTILE INDUSTRIES PLC.	2
158	UV	UNIVENTURES PLC.	5
159	VIBHA	VIBHAVADI MEDICAL CENTER PLC.	7
160	WACOAL	THAI WACOAL PLC.	2
161	WAT	WATTANA CAPITAL PLC.	5
162	WG	WHITE GROUP PLC.	4

Lists of industries in the Stock Exchange of Thailand are as follows,

1 = Agro & Food Industry
2 = Consumer Products
3 = Financials
4 = Industrials
5 = Property & Construction
6 = Resources
7 = Services
8 = Technology

APPENDIX B

Logistic regression analysis

In the first hypothesis, the study applies the binary logistic regression to find the characteristics of the fair value adopter firms. Vanichbancha (2003) notes that when a dependent variable are dichotomous variable, the binary logistic regression is more appropriate than the multiple regression. The results are as shown in Table 8 of the paper.

In this appendix, the study will analyze the appropriateness of the models in Table 8, particularly the model (4) which are the main model used in the study's interpretation. The analyses include the test of the logistic regression conditions and the goodness of fit test of the models. The analysis will follow the Vanichbancha (2003) steps.

1. The Condition and Assumption Test

For the first condition, the dependent variable in the first hypothesis (H1) is FV_{it} which is a dichotomous variable as well as the independent variables in H1 are dichotomous scale (LOC_{it}, REV_{it}, $TREA_{it}$, $SET100_{it}$, $REAL_{it}$), interval scale (ARS_{it}), or ratio scale ($COMP_{it}$, $APPRE_{it}$, $SIZE_{it}$, LEV_{it}, MTB_{it}). For the second condition, the logistic regression should have sample size (n) more than thirty times of numbers of independent variables (p), i.e. n ≥ 30p. Table 8 shows that there is 648 samples in our regression which is more than 30 times of number of independent variables (360). For the third condition, the expected value of the error terms is equal to zero as following table.

For the fourth condition, the error terms e_{it} and e_{it+1} are independent and the error terms e_i and X_j are independent. Below figures in table Appendix B-2 are Pearson's correlation of the residuals and the independent variables. There is no significant correlation between residuals from the logistic regression and the independent variables as restricted.

Table Appendix B-1 Descriptive statistics for the logistic regression of Table 8 in the study

$$FV_{it} = \beta_0 + \beta_1 COMP_{it} + \beta_2 ARS_{it} + \beta_3 LOC_{it} + \beta_4 REV_{it} + \beta_5 TREA_{it} + \beta_6 APPRE_{it} + \beta_7 SIZE_{it} + \beta_8 LEV_{it} + \beta_9 MTB_{it} + \beta_{10} SET100_{it} + \beta_{11} REAL_{it} + \varepsilon_{it}$$

	N	Minimum	Maximum	Mean	Std. Deviation
residuals	648	-.64204	.99597	0E-7	.30913063
Valid N (listwise)	648				

Table Appendix B-2 Pearson's correlation for the logistic regression of Table 8 in the study

Pearson	COMP	ARS	LOC	REV	TREA	APPRE	SIZE	LEV	MTB	SET100	REAL	e
COMP	1.00	.161	.092*	0.05	-.236**	-0.04	-.149**	0.03	0.03	-.163**	-.258**	0.00
ARS	.161	1.00	-0.06	0.07	0.00	-0.02	0.07	-0.02	-0.02	0.01	-0.01	0.00
LOC	.092*	-0.06	1.00	.080*	-.095*	-0.06	-.163**	-0.01	0.01	-.114**	-.171**	0.06
REV	0.05	0.07	.080*	1.00	-.114**	-0.06	-.148**	-0.03	0.02	-.158**	-.246**	0.00
TREA	-.236**	0.00	-.095*	-.114**	1.00	-0.03	0.01	-0.01	-0.04	0.06	.305**	-0.04
APPRE	-0.04	-0.02	-0.06	-0.06	-0.03	1.00	-.139**	-0.01	-0.02	-0.05	-.089*	0.00
LNSIZE	-.149**	0.07	-.163**	-.148**	0.01	-.139**	1.00	-0.05	0.01	.750**	.186**	-0.03
LEV	0.03	-0.02	-0.01	-0.03	-0.01	-0.01	-0.05	1.00	0.00	-0.01	-0.01	-0.01
MTB	0.03	-0.02	0.01	0.02	-0.04	-0.02	0.01	0.00	1.00	0.07	0.06	-0.03
SET100	-.163**	0.01	-.114**	-.158**	0.06	-0.05	.750**	-0.01	0.07	1.00	.257**	0.00
REAL	-.258**	-0.01	-.171**	-.246**	.305**	-.089*	.186**	-0.01	0.06	.257**	1.00	0.00
e	0.00	0.00	0.06	0.00	-0.04	0.00	-0.03	-0.01	-0.03	0.00	0.00	1.00

where FV_{it}= 1 when firm i adopts the fair value model at time t, 0 otherwise, $COMP_{it}$= Proportion of the non-depreciated investment property component to total investment property of firm i in year t, ARS_{it} = Aggregated Reliability Score (AR-score) of firm i at time t = R_Method_{it} + R_Source_{it} + R_Change_{it} + R_Audit_{it} + R_Time_{it}, R_Method_{it} = 1 when firm i uses the mark to market model at time t, 0 otherwise, R_Source_{it} = 1 when firm i employs external appraiser at time t, 0 otherwise, R_Change_{it} = 1 when firm i have lower of percentage changes in the fair value of the investment property than median of total percentage change at time t, 0 otherwise, R_Audit_{it} = 1 when firm i employs Big4 audit firm at time t, 0 otherwise, R_Time_{it} = 1 when firm i appraise the fair value in year t, 0 otherwise, LOC_{it} = 1 when firm located outside Bangkok, 0 otherwise, REV_{it} = 1 when firm i revalue its property, plant and equipment at time t, 0 otherwise, $TREA_{it}$ = 1 when firm i is member of Thai Real Estate Association at time t, 0 otherwise, $APPRE_{it}$ = Gain (loss) from valuation of the investment property per share of firm i proxied by natural logarithm of gain (loss) from valuation of the investment property in year t, $SIZE_{it}$ = Size of firm i proxied by natural logarithm of total assets at time t, LEV_{it} = Total liability divided by total assets at time t, MTB_{it} = Total market value of equity divided by book value of equity, $SET100_{it}$ = 1 when firm i classified as SET100 company, 0 otherwise, $REAL_{it}$ = 1 when firm i is in real estate and construction industry, 0 otherwise, e_{it}= firm i's the residual value of year t.

However, the independent variables have some multicollinearity issue which omit the last condition. So, the study will use (1) the backward (LR) method to remove redundant variables from the model and (2) the factor analysis to re-specify the model, but holding the interesting (tested) variables in the model which are component of the investment property component and the Aggregated Reliability Score. Results of the backward (LR) method are as follows,

Table Appendix B-3 Results of the logistic regression using the backward(LR) method

Variables	B	S.E.	Wald	df	Sig.	Exp(B)
COMP	-1.062	.307	11.961	1	.001	.346
ARS	.304	.134	5.148	1	.023	1.355
REV	1.974	.269	53.887	1	.000	7.202
APPRE	-.465	.181	6.639	1	.010	.628
SIZE	-.264	.142	3.482	1	.062	.768
SET100	.865	.437	3.916	1	.048	2.376

where $COMP_{it}$= Proportion of the non-depreciated investment property component to total investment property of firm i in year t, ARS_{it} = Aggregated Reliability Score (AR-score) of firm i at time t = R_Method_{it} + R_Source_{it} + R_Change_{it} + R_Audit_{it} + R_Time_{it}, R_Method_{it} = 1 when firm i uses the mark to market model at time t, 0 otherwise, R_Source_{it} = 1 when firm i employs external appraiser at time t, 0 otherwise, R_Change_{it} = 1 when firm i have lower of percentage changes in the fair value of the investment property than median of total percentage change at time t, 0 otherwise, R_Audit_{it} = 1 when firm i employs Big4 audit firm at time t, 0 otherwise, R_Time_{it} = 1 when firm i appraise the fair value in year t, 0 otherwise, REV_{it} = 1 when firm i revalue its property, plant and equipment at time t, 0 otherwise, $APPRE_{it}$ = Gain (loss) from valuation of the investment property per share of firm i proxied by natural logarithm of gain (loss) from valuation of the investment property in year t, $SIZE_{it}$ = Size of firm i proxied by natural logarithm of total assets at time t, $SET100_{it}$ = 1 when firm i classified as SET100 company, 0 otherwise.

From table Appendix B-3 and Appendix B-4, after using the backward method to reduce multicollinearity problem of the independent variables, the remaining variables are $COMP_{it}$, ARS_{it}, REC_{it}, $APPRE_{it}$, $SIZE_{it}$ and $SET100_{it}$. The interesting variables (Comp and ARS) are still remain in the result. However, there are some independent variables that have multicollinearity problems. So, the study applies the factor analysis to remove such problems. The factor analysis using the principle components method which is based on eigen values that is above 1 and based on the varimax method. The included variables are controlled variables of the main model (model 4) in Table 8. The tested variables ($Comp_{it}$ and ARS_{it}) are not included in the factor analysis.

Table Appendix B-4 Pearson's correlation for the logistic regression using the backward(LR) method

Pearson	COMP	ARS	REV	APPRE	SIZE	SET100
COMP	1.00	.161	0.05	-0.04	-.149**	-.163**
ARS	.161	1.00	0.07	-0.02	0.07	0.01
REV	0.05	0.07	1.00	-0.06	-.148**	-.158**
APPRE	-0.04	-0.02	-0.06	1.00	-.139**	-0.05
SIZE	-.149**	0.07	-.148**	-.139**	1.00	.750**
SET100	-.163**	0.01	-.158**	-0.05	.750**	1.00

where $COMP_{it}$= Proportion of the non-depreciated investment property component to total investment property of firm i in year t, ARS_{it} = Aggregated Reliability Score (AR-score) of firm i at time t = R_Method_{it} + R_Source_{it} + R_Change_{it} + R_Audit_{it} + R_Time_{it}, R_Method_{it} = 1 when firm i uses the mark to market model at time t, 0 otherwise, R_Source_{it} = 1 when firm i employs external appraiser at time t, 0 otherwise, R_Change_{it} = 1 when firm i have lower of percentage changes in the fair value of the investment property than median of total percentage change at time t, 0 otherwise, R_Audit_{it} = 1 when firm i employs Big4 audit firm at time t, 0 otherwise, R_Time_{it} = 1 when firm i appraise the fair value in year t, 0 otherwise, , REV_{it} = 1 when firm i revalue its property, plant and equipment at time t, 0 otherwise, $APPRE_{it}$ = Gain (loss) from valuation of the investment property per share of firm i proxied by natural logarithm of gain (loss) from valuation of the investment property in year t, $SIZE_{it}$ = Size of firm i proxied by natural logarithm of total assets at time t, $SET100_{it}$ = 1 when firm i classified as SET100 company, 0 otherwise.

Table Appendix B-5 Rotated Component Matrix for the logistic regression using the principle components method

	Component		
	1	2	3
LOC	-.164	-.366	.407
REV	-.108	-.522	.287
TREA	-.158	.681	.120
APPRE	-.134	-.044	-.803
SIZE	.892	.179	.040
LEV	-.105	.058	-.017
MTB	.022	.047	.377
SET100	.820	.264	.038
REAL	.076	.788	.167

where LOC_{it} = 1 when firm located outside Bangkok, 0 otherwise, REV_{it} = 1 when firm i revalue its property, plant and equipment at time t, 0 otherwise, $TREA_{it}$ = 1 when firm i is member of Thai Real Estate Association at time t, 0 otherwise, $APPRE_{it}$ = Gain (loss) from valuation of the investment property per share of firm i proxied by natural logarithm of gain (loss) from valuation of the investment property in year t, $SIZE_{it}$ = Size of firm i proxied by natural logarithm of total assets at time t, LEV_{it} = Total liability divided by total assets at time t, MTB_{it} = Total market value of equity divided by book value of equity, $SET100_{it}$= 1 when firm i classified as SET100 company, 0 otherwise, $REAL_{it}$ = 1 when firm i is in real estate and construction industry, 0 otherwise, e_{it}= firm i's the residual value of year t.

Table Appendix B-5 provides that the first component is composed of size of firms and SET100 firm which refer to popularity of firms. The second component is composed of firms adopting revaluation method for PPE, firms who is member of Thai real estate association and firms from property and construction industry which refer to the specialist in real estate. The last component is composed of location of firms, appreciation for its investment property and market to book ration of firms which refer to transparency of firms. The extraction sums of squared loadings is cumulative at 71.50%. Then, the study do the revised logistic regression which yield a result as follows,

Table Appendix B-6 Results for the logistic regression using the new factors

	B	S.E.	Wald	df	Sig.	Exp(B)
COMP	-1.135	.304	13.964	1	.000	.321
ARS	.372	.136	7.511	1	.006	1.451
Popularity	-.126	.142	.786	1	.375	.882
Real estate specialist	-.440	.130	11.536	1	.001	.644
Transparency	.692	.171	16.365	1	.000	1.997
Constant	-2.797	.521	28.820	1	.000	.061

where $COMP_{it}$= Proportion of the non-depreciated investment property component to total investment property of firm i in year t, ARS_{it} = Aggregated Reliability Score (AR-score) of firm i at time t = R_Method_{it} + R_Source_{it} + R_Change_{it} + R_Audit_{it} + R_Time_{it}, R_Method_{it} = 1 when firm i uses the mark to market model at time t, 0 otherwise, R_Source_{it} = 1 when firm i employs external appraiser at time t, 0 otherwise, R_Change_{it} = 1 when firm i have lower of percentage changes in the fair value of the investment property than median of total percentage change at time t, 0 otherwise, R_Audit_{it} = 1 when firm i employs Big4 audit firm at time t, 0 otherwise, R_Time_{it} = 1 when firm i appraise the fair value in year t, 0 otherwise, $Popularity_{it}$ = a component derived from the factor analysis which comprise of $Size_{it}$, and $SET100_{it}$. Real estate $specialist_{it}$ = a component derived from the factor analysis which comprise of REV_{it}, $TREA_{it}$, $REAL_{it}$. $Transparency_{it}$ = a component derived from the factor analysis which comprise of LOC_{it}, $APPRE_{it}$, and MTB_{it}.

The results show that the component of investment property and the Aggregated Reliability Score are still significant while the other factors which are real estate specialist and transparency of firms are also significant. These results reveal that firm will adopt the fair value model when they have more propensity on depreciated investment property, high reliability in fair value measurement, not being a real estate specialist and need more transparency.

2. The Goodness of Fit Test

Then, the study performs the goodness of fit test for the logistic model. First, from the model 1 to the model 4 of the Table 8 in the study, the value of -2 log likelihood is approaching to zero (from 490.998 in the model 1 to 399.186 in the model 4). This shows that the last model which includes both interesting variables (the component of investment property and the AR-Score) and other control variables are the most appropriate model. The pseudo R^2 of these models also increase from the model 1 to the model 4 (1% in the model 1 to 19.5% in the model 4). This also reveals that the explanation power of these model increase when the independent variables are inserted.

The Hosmer and Lameshow test of the model 4 in the logistic regression of Table 8 as shown in table Appendix B-7 notes that the null hypothesis are not rejected (not significant). So, the model is appropriate. Moreover, as shown in Table 8 and table Appendix B-8 that the null hypothesis of the chi-square test for the overall models are rejected which shows that not all the coefficient of independent variables are equal to zero. Lastly, table Appendix B-9 shows that it is 88.3 percentage of predicting correct.

Table Appendix B-7 Hosmer and Lemeshow Test for the model 4 in the logistic regression of Table 8 in the study

Step	Chi-square	df	Sig.
1	27.745	8	.123

Table Appendix B-8 The Chi-square Test for the model 4 in the logistic regression of Table 8 in the study

		Chi-square	df	Sig.
Step 1	Step	93.429	12	.000
	Block	93.429	12	.000
	Model	93.429	12	.000

Table Appendix B-9 Classification table for the model 4 in the logistic regression of Table 8 in the study

Observed			Predicted		
			FV		Percentage Correct
			0	1	
Step 1	FV	0	562	3	99.5
		1	73	10	12.0
	Overall Percentage				88.3

In conclusion, the logistic regression of the main model (4) in Table 8 (and also Table 9) are almost in line with all conditions and qualifying the goodness of fit test. So, the study can ensure that the results of the interesting variables (the component of investment property and the AR-Score) are trustable. Both of them have a significant impact to the adoption of the fair value model of the sample firms.

APPENDIX C

Multiple regression analysis

In the second to fifth hypothesis, the study applies the multiple regression to find the value relevance of the investment property. In this appendix, the study will analyze the appropriateness of the regression models. The analysis will follow the Vanichbancha (2003) steps. Table Appendix C-1 reports multiple regressions of the aggregated and disaggregated investment property. The study applies the ordinary least square (OLS) estimators in the regression. The assumptions or conditions of best linear unbiased estimator (BLUE) are tested as follows,

Table Appendix C-1 Multiple regressions of the aggregated and disaggregated level of the investment property when dependent variable is price at time t plus two months

Aggregated level model : $P_{it} = \beta_0 + \beta_1 BVLIP_{it} + \beta_2 EPS_{it} + \beta_3 IP_{it} x FV_{it} + \beta_4 IP_{it} x HC_{it} + \beta_5 DiffIP_{it} + \beta_6 REAL_{it} + \varepsilon_{it}$

Disaggregated level model : $P_{it} = \alpha_0 + \alpha_1 BVLIP_{it} + \alpha_2 EPS_{it} + \alpha_3 IPND_{it} x FV_{it} + \alpha_4 IPND_{it} x HC_{it} + \alpha_5 DiffIPND_{it} + \mu_6 IPD_{it} x FV_{it} + \mu_7 IPD_{it} x HC_{it} + \mu_8 DiffIPD_{it} + \alpha_9 REAL_{it} + \varepsilon'_{it}$

Level	Aggregated level			Disaggregated level		
Model	Model 1 :	Model 2.1 :	Model 2.2 :	Model 3 :	Model 4.1 :	Model 4.2 :
Partition	All samples	ARSPart = 1	ARSPart = 0	All samples	ARSPart = 1	ARSPart = 0
(Hypothesis)	(H2)	(H4)	(H4)	(H3)	(H5)	(H5)
Constant	1.977	-1.553	7.331 ***	2.239	-1.529	7.124**
BV	.521 ***	.920 ***	-.068	.608 ***	.967 ***	.162
EPS	7.809 ***	7.609 ***	9.491 ***	7.354 ***	7.314 ***	8.097**
IP x FV	.131	-2.485 **	.214 *			
IP x HC	1.573 ***	-.147	2.319 ***			
DiffIP	.071	-.144	.278 ***			
IPND x FV				-.272	-.721	3.015
IPND x HC				.515	.468	.387
DiffIPND				-.949 **	-.499	-.907**
IPD x FV				.120	-9.094 ***	.195
IPD x HC				1.867 **	-2.285	1.960**
DiffIPD				1.262 **	.308	1.772**
REAL	3.047	8.980 ***	-7.690 ***	2.733	9.709 ***	-6.497**

Table Appendix C-1 Multiple regressions of the aggregated and disaggregated level of the investment property when dependent variable is price at time t plus two months (Con't)

Level	Aggregated level			Disaggregated level		
Model	Model 1 :	Model 2.1 :	Model 2.2 :	Model 3 :	Model 4.1 :	Model 4.2 :
Partition	All samples	ARSPart = 1	ARSPart = 0	All samples	ARSPart = 1	ARSPart = 0
(Hypothesis)	(H2)	(H4)	(H4)	(H3)	(H5)	(H5)
Test of Goodness of fit						
N	648	376	272	648	376	272
Adjusted R^2	76.2	74.7	88.2	77.0	74.9	90.2
Incremental R^2	-	(1.5)	12.0	-	(2.1)	13.2
F test	345.800 ***	185.356 ***	337.161 ***	242.142 ***	125.578 ***	278.453**
Test of necessary conditions						
Sum of e_{it}	0.000	0.000	0.000	0.000	0.000	0.000
Kolmogorov-Smirnov test	0.266 *** (Non-normal)	0.263 *** (Non-normal)	0.254 *** (Non-normal)	0.309 *** (Non-normal)	0.350 *** (Non-normal)	0.265** (Non-normal)
Cook's D>4/n	22 Obs	31 Obs	28 Obs	28 Obs	35 Obs	31 Obs
SDR > $t_{0.05,640}$	25 Obs	29 Obs	36 Obs	32 Obs	38 Obs	35 Obs
Durbin Watson (d_u<d<4-d_u)	1.917 (No AR(1))	1.978 (No AR(1))	1.857 (No AR(1))	1.920 (No AR(1))	2.022 (No AR(1))	1.893 (No AR(1))
Residual plot of homoskedasticity	Not constant	Not constant	Not constant	Not constant	Not constant	lot constant
Eigenvalue (Max)	2.720	2.752	2.748	3.115	3.125	3.201
Tolerance						
- BV	0.227	0.323	0.114	0.216	0.305	0.103 X
- EPS	0.233	0.347	0.114	0.227	0.335	0.105 X
- IP x FV	0.991	0.964	0.984			
- IP x HC	0.872	0.876	0.807			
- DiffIP	0.879	0.909	0.854			
- IPND x FV				0.992	0.963	0.993
- IPND x HC				0.655	0.593	0.667
- DiffIPND				0.062 X	0.037 X	0.071 X
- IPD x FV				0.991	0.898	0.982
- IPD x HC				0.323	0.750	0.212
- DiffIPD				0.054 X	0.037 X	0.055 X
- REAL	0.913	0.929	0.884	0.886	0.895	0.849

Note 1 : * partially significant at the 10% level (2-tailed) ** significant at the 5% level (2-tailed) *** significant at the 1% level (2-tailed)

Note 2 : x - Collinearity problem

where P_{it} = Price per share of firm i at year t+2months, $BVLIP_{it}$ = Book value less the investment property per share of firm i at year t, EPS_{it} = Earnings per share of firm i for year t, IP_{it} = The investment property per share of firm i at year t, $DiffIP_{it}$ = Difference between disclosed value and recorded cost value of the investment property per

Table Appendix C-1 Multiple regressions of the aggregated and disaggregated level of the investment property when dependent variable is price at time t plus two months (Con't)

share of firm i at year t, $IPND_{it}$ = The non-depreciated investment property per share of firm i at year t, $DiffIPND_{it}$ = Difference between disclosed value and recorded cost value of the non-depreciated investment property per share of firm i at year t, IPD_{it} = The depreciated investment property per share of firm i at year t, $DiffIPD_{it}$ = Difference between disclosed value and recorded cost value of the depreciated investment property per share of firm i at year t, FV_{it} = 1 when firm adopt the fair value model for the investment property, 0 otherwise, HC_{it} = 1 when firm adopt the cost model for the investment property, 0 otherwise, $REAL_{it}$ = 1 when firm i is in real estate and construction industry, 0 otherwise, $ARSPart_{it}$ = AR-Score partition of firm i at time t where 1 when ARS_{it} is over median of total firms' ARS_{it} ("high reliability group"), 0 otherwise ("low reliability group"), ARS_{it} = Aggregated Reliability Score (AR-score) of firm i at time t = R_Method_{it} + R_Source_{it} + R_Change_{it} + R_Audit_{it} + R_Time_{it}, R_Method_{it} = 1 when firm i uses the mark to market model at time t, 0 otherwise, R_Source_{it} = 1 when firm i employs external appraiser at time t, 0 otherwise, R_Change_{it} = 1 when firm i have lower of percentage changes in the fair value of the investment property than median of total percentage change at time t, 0 otherwise, R_Audit_{it} = 1 when firm i employs Big4 audit firm at time t, 0 otherwise, R_Time_{it} = 1 when firm i appraise the fair value in year t, 0 otherwise, ε_{it} = firm i's the residual value of year t,

1. The Condition and Assumption Test

The first condition is that the independent variables and the dependent variable should be the interval scale. The model 1 to model 4 above has the dependent variable which is price of firms' stock which is an interval scale. Also, the independent variables are an interval scale since they are the accounting information shown in the financial statement except the $REAL_{it}$ which is an indicator for firms that are come from the property and construction industry. The second condition is that the sum of residuals from all model are equal to zero. This condition is qualified by all six models in Table Appendix C-1. Overall, the model is a linear function following the ordinary least square (OLS) estimators in the regression.

Normality Check

The next condition is that the residual should have a normal distribution. However, the Kolmogorov-Smirnov test shown in Table Appendix C-1 that all models do not result in a normality scheme, i.e. all models do reject the null hypothesis that the functions are normally distributed. Therefore, the models need to be transformed. Vanichbancha (2003) suggests to transform the dependent variable by taking natural logarithm function. Figure Appendix C-1 and Figure Appendix C-2 show the normality plot before and after transforming the dependent variable.

The results after transforming the dependent variable from price at time t plus two months (P_{it}) to natural logarithm of price at time t plus two months (lnP_{it}) are shown in Table Appendix C-2. Consequently, The Kolmogorov-Smirnov test now showing that the all models do not reject the null hypothesis. So, the function are normally distributed. This study therefore use the natural logarithm of price at time t plus two months for all the models in this paper.

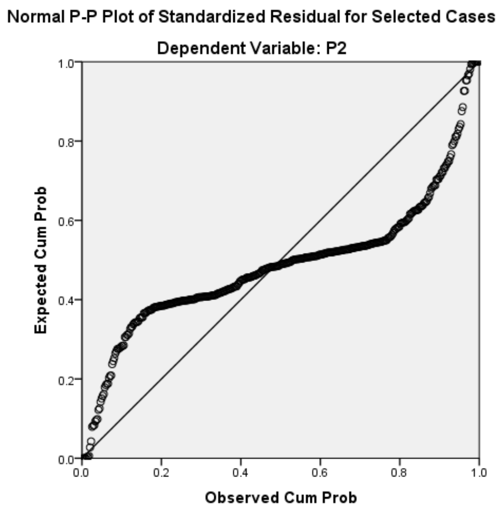

Figure Appendix C-1 Normal P-P plot before transforming the dependent variable from price to natural logarithm of price at time t plus 2 months from the model 1 in Table 10

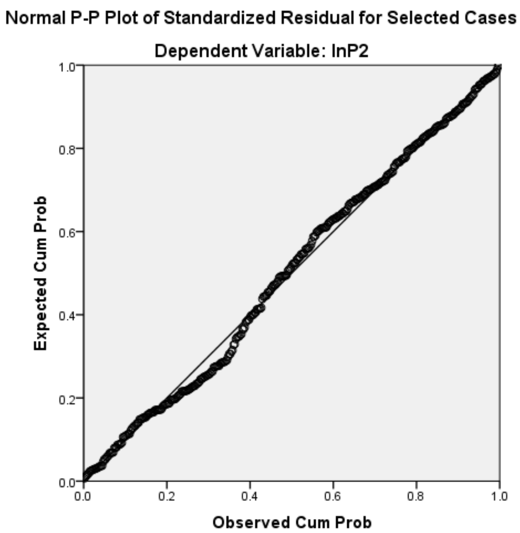

Figure Appendix C-2 Normal P-P plot after transforming the dependent variable from price to natural logarithm of price at time t plus 2 months from the model 1 in Table 10

Table Appendix C-2 Multiple regressions of the aggregated and disaggregated level of the investment property when dependent variable is natural logarithm of price at time t plus two months

Aggregated level model : $lnP_{it} = \beta_0 + \beta_1 BVLIP_{it} + \beta_2 EPS_{it} + \beta_3 IP_{it} xFV_{it} + \beta_4 IP_{it} xHC_{it} + \beta_5 DiffIP_{it} + \beta_6 REAL_{it} + \varepsilon_{it}$

Disaggregated level model : $lnP_{it} = \alpha_0 + \alpha_1 BVLIP_{it} + \alpha_2 EPS_{it} + \alpha_3 IPND_{it} xFV_{it} + \alpha_4 IPND_{it} xHC_{it} + \alpha_5 DiffIPND_{it} +$

$\mu_6 IPD_{it} xFV_{it} + \mu_7 IPD_{it} xHC_{it} + \mu_8 DiffIPD_{it} + \alpha_9 REAL_{it} + \varepsilon'_{it}$

Level	Aggregated level (Standardized coefficients)			Disaggregated level (Standardized coefficients)		
Model	Model 1 :	Model 2.1 :	Model 2.2 :	Model 3 :	Model 4.1 :	Model 4.2 :
Partition	All samples	ARSPart = 1	ARSPart = 0	All samples	ARSPart = 1	ARSPart = 0
(Hypothesis)	(H2)	(H4)	(H4)	(H3)	(H5)	(H5)
Constant	N/A	N/A	N/A	N/A	N/A	N/A
BV	0.433 ***	0.503 ***	0.336	0.447 ***	0.530 ***	0.379**
EPS	0.112 ***	0.166 ***	0.077 ***	0.099 ***	0.144 ***	0.042**
IP x FV	0.063	0.176 **	0.098 *			
IP x HC	0.234 ***	0.139	0.331 ***			
DiffIP	0.012	-0.007	0.038 ***			
IPND x FV				0.087	0.100	0.047
IPND x HC				0.123	0.122	0.125
DiffIPND				0.002 **	-0.048	0.048
IPD x FV				0.056	-0.135 ***	0.095**
IPD x HC				0.191 **	0.042	0.305
DiffIPD				0.007 **	0.041	-0.016**
REAL	-0.226 ***	-0.199 ***	-0.276 ***	-0.232 ***	-0.198 ***	-0.276**
Test of Goodness of fit						
N	648	376	272	648	376	272
Adjusted R^2	52.02	58.16	50.94	63.93	69.62	62.41
Incremental R^2	-	6.14	(1.08)	-	5.69	(1.52)
F test	115.849 ***	85.487 ***	45.867 ***	79.699 ***	57.614 ***	30.801**
Test of necessary conditions						
Sum of e_{it}	0.00	0.00	0.00	0.00	0.00	0.00
Kolmogorov-Smirnov	0.035 (Normal)	0.031 (Normal)	0.027 (Normal)	0.034 (Normal)	0.027 (Normal)	0.027 (Normal)
Cook's D>4/n	14 Obs	21 Obs	18 Obs	17 Obs	28 Obs	24 Obs
SDR > $t_{0.05,640}$	18 Obs	28 Obs	24 Obs	24 Obs	29 Obs	26 Obs
Durbin Watson (d_u<d<4-d_u)	1.901 (No AR(1))	1.951 (No AR(1))	1.857 (No AR(1))	1.915 (No AR(1))	1.937 (No AR(1))	1.893 (No AR(1))
Residual plot of homoskedasticity	Not constant	Not constant	Not constant	Not constant	Not constant	Not constant

Table Appendix C-2 Multiple regressions of the aggregated and disaggregated level of the investment property when dependent variable is natural logarithm of price at time t plus two months (Con't)

Level	Aggregated level (Standardized coefficients)			Disaggregated level (Standardized coefficients)		
Model	Model 1 :	Model 2.1 :	Model 2.2 :	Model 3 :	Model 4.1 :	Model 4.2 :
Partition	All samples	ARSPart = 1	ARSPart = 0	All samples	ARSPart = 1	ARSPart = 0
(Hypothesis)	(H2)	(H4)	(H4)	(H3)	(H5)	(H5)
Test of necessary conditions (Con't)						
Eigenvalue (Max)	2.720	2.752	2.748	3.115	3.125	3.201
Tolerance						
- BV	0.227	0.323	0.114	0.216	0.305	0.103 X
- EPS	0.233	0.347	0.114	0.227	0.335	0.105 X
- IP x FV	0.991	0.964	0.984			
- IP x HC	0.872	0.876	0.807			
- DiffIP	0.879	0.909	0.854			
- IPND x FV				0.992	0.963	0.993
- IPND x HC				0.655	0.593	0.667
- DiffIPND				0.062 X	0.037 X	0.071 X
- IPD x FV				0.991	0.898	0.982
- IPD x HC				0.323	0.750	0.212
- DiffIPD				0.054 X	0.037 X	0.055 X
- REAL	0.913	0.929	0.884	0.886	0.895	0.849

Note 1 : * partially significant at the 10% level based on robusted-standard deviation (HC_0) ** significant at the 5% level based on robusted-standard deviation (HC_0) *** significant at the 1% level based on robusted-standard deviation (HC_0)

Note 2 : X - Collinearity problem

where **lnP_{it}** = Natural logarithm of price per share of firm i at year t+2months, **$BVLIP_{it}$** = Book value less the investment property per share of firm i at year t, **EPS_{it}** = Earnings per share of firm i for year t, **IP_{it}** = The investment property per share of firm i at year t, **$DiffIP_{it}$** = Difference between disclosed value and recorded cost value of the investment property per share of firm i at year t, **$IPND_{it}$** = The non-depreciated investment property per share of firm i at year t, **$DiffIPND_{it}$** = Difference between disclosed value and recorded cost value of the non-depreciated investment property per share of firm i at year t, **IPD_{it}** = The depreciated investment property per share of firm i at year t, **$DiffIPD_{it}$** = Difference between disclosed value and recorded cost value of the depreciated investment property per share of firm i at year t, **FV_{it}** = 1 when firm adopt the fair value model for the investment property, 0 otherwise, **HC_{it}** = 1 when firm adopt the cost model for the investment property, 0 otherwise, **$REAL_{it}$** = 1 when firm i is in real estate and construction industry, 0 otherwise, **$ARSPart_{it}$** = AR-Score partition of firm i at time t where 1 when ARS_{it} is over median of total firms' ARS_{it} ("high reliability group"), 0 otherwise ("low reliability group"), **ARS_{it}** = Aggregated Reliability Score (AR-score) of firm i at time t = R_Method_{it} + R_Source_{it} + R_Change_{it} + R_Audit_{it} + R_Time_{it}, **R_Method_{it}** = 1 when firm i uses the mark to market model at time t, 0 otherwise, **R_Source_{it}** = 1 when firm i employs external appraiser at time t, 0 otherwise, **R_Change_{it}** = 1 when firm i have lower of percentage changes in the fair value of the investment property than median of total percentage change at time t, 0 otherwise, **R_Audit_{it}** = 1 when firm i employs Big4 audit firm at time t, 0 otherwise, **R_Time_{it}** = 1 when firm i appraise the fair value in year t, 0 otherwise, ε_{it} = firm i's the residual value of year t.

Influential and Outlier observation checking

The sample set should not include outlier data or influential data which can cause bias in the estimation. The study therefore use the Studentized deleted residual values (SDR) analysis and Cook's distance analysis to find the influential and outlier data, respectively. The influential data will have its SDR over t-critical value using the alpha and n-p-1 degrees of freedom and the outlier data will have Cook's distance over 4/n (number of observation). As shown in Table Appendix C-1, there are influential data ranging from 25-38 observations and decreasing to 14-28 observations in Table Appendix C-2. Also, the range of Cook's distances of all models in Table Appendix C-1 is 22–35 observations and decreases to 18-27 observations. Accordingly, there are influential and outlier data in the models. However, after the study removes those influential data and outlier data and regresses again, there is no different in result of all models. The study accordingly remains those data in the regression since all of them do not affect the result of the model.

Independent check

The unbiased estimators should result in a regression is not affected from the autocorrelation problem. The study use the Durbin-Watson to test the autocorrelation of all models. Table Appendix C-1 and Table Appendix C-2 show that all models either before transforming the dependent variable or after transforming the dependent variable are not detected the autocorrelation problem. All the Durbin-Watson statistics (d) are between d_u and $4\text{-}d_u$. Therefore, the paper can ensure that there is no correlation between residuals of all models.

Homoscedasticity check

As shown in Table Appendix C-1, the scatterplot for residuals from all models are not constant. Likewise, Figure Appendix C-3 show the example of the scatterplot of residuals from model 1 which are not constantly dispersed. After transforming the dependent variable to natural logarithm of price, the results shown in Table Appendix C-2 and Figure Appendix C-4 also reveal that the heteroscedasticity problem still exists.

Therefore, the variance of all models are not constant, regardless of transformation of dependent variable. The study then use the robusted standard deviation derived from the HC_0 (Heteroscedasticity-constant standard error) (Vanichbancha, 2003) for all significant tests in which the results shown (Table 10 to Table 24 on the main paper). This robusted standard deviation result in unbiased test of significance of coefficient.

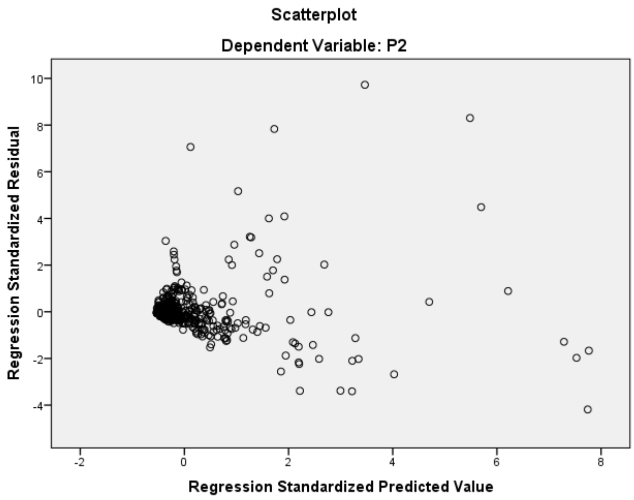

Figure Appendix C-3 Scatterplot of residual before transforming the dependent variable from price to natural logarithm of price at time t plus 2 months from model 1 in Table 10

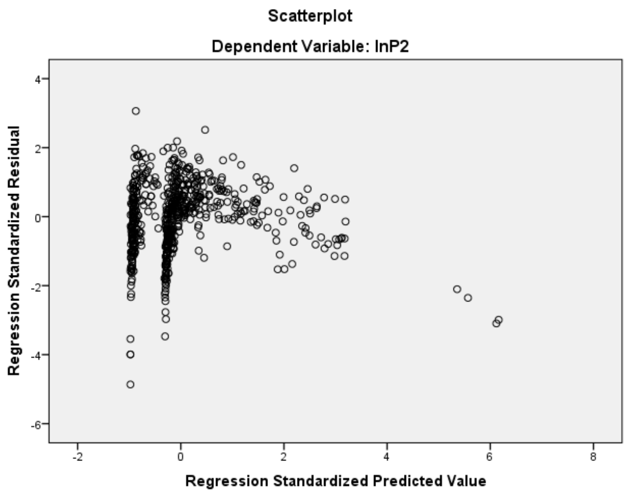

Figure Appendix C-4 Scatterplot of residual after transforming the dependent variable from price to natural logarithm of price at time t plus 2 months from the model 1 in Table 10

Multicollinearity check

As shown in Table Appendix C-1, the maximum eigenvalue of all models are ranging from 2.720 to 3.201 which are not over 10. So, the overall models do not find the multicollinearity problem. However, the Tolerance values of some coefficients are under 0.200 which cause the multicollinearity problem between difference between disclosed value and recorded cost value of the non-depreciated and depreciated investment property per share of firm ($DiffIPND_{it}$ and $DiffIPD_{it}$). So, the paper re-specify the models as shown in Table 22 on the main paper by removing problematic variables. In this regard, the study changes the cost model variable ($IP_{it}xHC_{it} + DiffIP_{it}$, $IPND_{it}xHC_{it} + DiffIPND_{it}$, $IPD_{it}xHC_{it} + DiffIPD_{it}$) to the disclosed fair value under the cost model variable ($DisIP_{it}$, $DisIPND_{it}$, $DisIPD_{it}$, respectively). The tolerance and VIF after applying these set of variables are shown in Table Appendix C-3. The multicollinearity problems between interesting variables are removed, although multicollinearity problem between control variables still exists. The results from Table 22 which are the re-specifying models and the results from the main model in Table 10 are quite similar. Therefore, the multicollinearity problem found in the main model does not deviate the results in the main models. Moreover, Table 23 shows the removal of these variables ($DiffIPND_{it}$ and $DiffIPD_{it}$) again. The results shown in Table 24 are quite indifferent with the results in the main model.

2. The Goodness of fit tests

The results from Table Appendix C-1 are coefficients estimated from the firstly-developed models in the study. The coefficients derived from these results are not standardized while the results in the main paper will be standardized for comparative purpose of each coefficients. The models have enough samples (at least 272 samples) and degree of freedom to perform the tests and the multiple linear regression. The F test ANOVA of all models show that all independent variables of the models have the coefficients that is not equal to zero. All models are significant at 1% significant level. Although the R^2 of all models after transforming the dependent variable decrease from the R^2 of prior models which the dependent variable is price, the residual from the regression does not affect the normality problem. The decreasing in R^2 of revised models due to the decreasing in explanation of natural logarithm of price.

Table Appendix C-3 Multiple regression of the aggregated and disaggregated level of the investment property – Comparison between the recognized fair value and the disclosed fair value of the investment property as performed in Table 22

Aggregated level model : $lnP_{it} = \beta_0 + \beta_1 BVLIP_{it} + \beta_2 EPS_{it} + \beta_3 IP_{it} x FV_{it} + \beta_4 DisIP_{it} + \beta_5 REAL_{it} + \varepsilon_{it}$

Disaggregated level model : $lnP_{it} = \alpha_0 + \alpha_1 BVLIP_{it} + \alpha_2 EPS_{it} + \alpha_3 IPND_{it} x FV_{it} + \alpha_4 DisIPND_{it} + \mu_5 IPD_{it} x FV_{it} + \mu_6 DisIPD_{it} + \alpha_7 REAL_{it} + \varepsilon'_{it}$

Level	Aggregated level			Disaggregated level		
Model	Model 1 :	Model 2.1 :	Model 2.2 :	Model 3 :	Model 4.1 :	Model 4.2 :
Partition	All samples	ARSPart = 1	ARSPart = 0	All samples	ARSPart = 1	ARSPart = 0
(Hypothesis)	(H2)	(H4)	(H4)	(H3)	(H5)	(H5)
Eigenvalue(Max)	2.481	2.539	2.493	2.763	2.790	2.778
Tolerance						
- BV	.227	.327	.119 X	.216	.306	.103 X
- EPS	.236	.347	.121 X	.228	.335	.105 X
- IP x FV	.993	.975	.985			
- DisIP	.939	.948	.913			
- IPND x FV				.996	.966	.995
- DisIPND				.315	.246	.397
- IPD x FV				.993	.901	.985
- DisIPD				.320	.253	.374
- REAL	0.914	.932	0.884	.913	.913	.880

Note : X – Collinearity problem

where lnP_{it} = Natural logarithm of price per share of firm i at year t+2months, $BVLIP_{it}$ = Book value less the investment property per share of firm i at year t, EPS_{it} = Earnings per share of firm i for year t, IP_{it} = The investment property per share of firm i at year t, $DisIP_{it}$ = Disclosed fair value of the investment property per share of firm i at year t, $IPND_{it}$ = The non-depreciated investment property per share of firm i at year t, $DisIPND_{it}$ = Disclosed fair value of the non-depreciated investment property per share of firm i at year t, IPD_{it} = The depreciated investment property per share of firm i at year t, $DisIPD_{it}$ = Disclosed fair value of the depreciated investment property per share of firm i at year t, FV_{it} = 1 when firm adopt the fair value model for the investment property, 0 otherwise, $REAL_{it}$ = 1 when firm i is in real estate and construction industry, 0 otherwise, $ARSPart_{it}$ = AR-Score partition of firm i at time t where 1 when ARS_{it} is over median of total firms' ARS_{it} ("high reliability group"), 0 otherwise ("low reliability group"), ARS_{it} = Aggregated Reliability Score (AR-score) of firm i at time t = R_Method_{it} + R_Source_{it} + R_Change_{it} + R_Audit_{it} + R_Time_{it}, R_Method_{it} = 1 when firm i uses the mark to market model at time t, 0 otherwise, R_Source_{it} = 1 when firm i employs external appraiser at time t, 0 otherwise, R_Change_{it} = 1 when firm i have lower of percentage changes in the fair value of the investment property than median of total percentage change at time t, 0 otherwise, R_Audit_{it} = 1 when firm i employs Big4 audit firm at time t, 0 otherwise, R_Time_{it} = 1 when firm i appraise the fair value in year t, 0 otherwise, ε_{it} = firm i's the residual value of year t.

Conclusion

In conclusion, the models used in these analyses are passed the goodness of fit test and are almost in line with the conditions of the ordinary least square (OLS) estimators and best linear unbiased estimator assumption (BLUE). Other models in other tables are also passed these verification, but are not tabulated in this appendix. Thus, the results from the paper can be confirmed that there is no econometric issues that can affect or deviate the results.

VITA

Thanadol Ruksapol was born in Bangkok, Thailand. After completing a schoolwork at Debsirin School, Bangkok, in 2001, he entered Chulalongkorn University in Bangkok, Thailand. During the summers of 2004, He worked as a trainee at KPMG Phoomchai Audit Limited, Thailand. He received a Bachelor of Accountancy (first class honours) with a major in auditing from Chulalongkorn University in May 2005. During the following 6 years, he was employed as an auditor at Ernst&Young Office Limited, Thailand. He has become a Certified Public Accountant (CPA) of Thailand number 8910 since 2007. In June 2010, he graduated the Master of Accountancy from Chulalongkorn Business School. Since 2011, he has been a partner of Thirty-Four Audit Office Limited and Thana Accounting Group, as well as, has studied the Doctoral program in Accounting at Chulalongkorn Business School. In 2013, he was accredited the “Diploma in Thai financial and reporting (Dip TFR)” by the Federation of Accounting Professions under the royal patronage of his majesty the king (FAP), Thailand, and was accredited as the “Cooperative Internal auditor” by the Cooperative Auditing Department, the Ministry of Agricultural and Cooperatives, Thailand. Since 2014, he has started working part-time as an academician at FAP and a guest lecturer at leading universities, FAP, the Ministry of Commerce, companies and cooperatives in Thailand.