ABACUS A Journal of Accounting, Finance and Business Studies

ABACUS, 2024 doi: 10.1111/abac.12315

LE MA AND PETER WELLS

# Evaluation of Fair Value Relevance and Sensitivity to Valuation Assumptions

This paper evaluates whether the relevance of investment properties measured using Level 3 inputs is impacted by the assumptions underpinning the determination of fair values. Evidence is provided of investors generally finding investment property fair values determined with Level 3 inputs to be relevant, and the values are not discounted in market price. However, this is not the case when there is evidence of firms using optimistic assumptions in the determination of fair values. Specifically, there is a material price discount of recognized investment property values as well as fair value gains for these observations. Our research setting of real estate investment firms has several advantages as these firms typically have as their major assets investment properties whose fair value and rental income can be observed from financial reports. This allows investors to easily infer and compare the key valuation assumptions as captured by the capitalization rate. The implication for more general circumstances where valuation assumptions cannot be inferred from financial reports is that detailed disclosures of assumptions are necessary for users to assess the reliability of fair values determined with Level 3 inputs.

**Key words:** Fair value measurement; International Accounting Standard 40; International Financial Reporting Standard 13 Investment Property; Level 3 inputs; Valuation assumptions.

There is a substantial literature considering the application of fair value measurement and whether the amounts recognized are relevant to users of general purpose financial reports. In this literature, attention is directed at a range of concerns which include fundamental issues such as the relevance of assets measured at fair value relative to assets measured at historic cost (e.g., Dietrich *et al.*, 2000), as well as estimation issues including the impact of alternative techniques for estimating fair values (e.g., Vergauwe amd Gaeremynck, 2019), input types which might have differing reliability (e.g., Danbolt and Rees, 2008; Song *et al.*, 2010), and the amount of estimation-related disclosures (e.g., Vergauwe and Gaeremynck, 2019). There is also evidence that the relevance

LE MA (le.ma@uts.edu.au) and PETER WELLS are at University of Technology Sydney.

The authors gratefully acknowledge helpful comments from Joseph Weber, Martin Bugeja, Paul Healy, Stephen Penman, Stephen Taylor, Thorsten Sellhorn, Wayne Landsman, and attendees of the UTS Accounting Discipline Group Research Seminar.

of assets recognized at fair value is impacted by corporate governance mechanisms (e.g., Muller and Riedl, 2002; Vergauwe *et al.*, 2011). While these studies document various factors that could have implications for the reliability of firms' fair value estimation, little attention is focused on *directly* examining the actual assumptions underpinning the determination of fair values. These assumptions are often unobservable and significant judgement is required, which is particularly problematic for Level 3 fair value measurement. Hence, in this paper, we evaluate the relevance to investors of assets measured at fair value with Level 3 inputs and whether this is impacted by the valuation assumptions applied by firms.

Specifically, we examine whether investors are able to identify potentially inaccurate fair value assumptions and whether they discount the relevance of fair values if optimistic assumptions are disclosed or determinable. This question is important and has significant regulatory implications. If investors can efficiently evaluate the accuracy of assumptions underpinning the determination of fair values, the disclosures of such assumptions should be mandated, particularly in settings where the assumptions cannot be inferred from other financial report information. This would improve transparency and market efficiency. On the other hand, if investors are unable to recognize estimation biases or errors in fair value assumptions, the user benefits of mandatary disclosures of fair value assumptions would be in doubt. In this case, regulations focused on other measurement-related disclosures, external professional certifications, or corporate governance may instead be more effective in helping investors infer the reliability of fair value estimates.

Evaluating the impact of the underpinning assumptions on the value relevance of fair value assets presents a number of challenges. There are significant limitations and inconsistencies in disclosures across firms and for different types of assets.[1] To address these challenges, this research is undertaken in the context of real estate investment firms whose balance sheets are comprised mainly of a single asset type—investment properties measured at fair value. Furthermore, the fair value of investment properties in combination with disclosed rental income allows for reliable inferences about a key valuation assumption, the capitalization rate which is often used to estimate the market value of investment properties in the industry. Critically, this provides a consistent summary measure of the actual fair value assumptions that are directly determinable by investors. This allows us to examine the sensitivity of the market relevance of fair value estimates to the underlying assumptions without having to rely on incomplete and inconsistent disclosures across firms. Moreover, the fair value measurement problems are pronounced for real estate investment firms as the fair values are determined with Level 3 inputs where valuation inputs are unobservable and involve subjective judgement. Therefore, the focus of this study is on investment properties held by real estate investment firms.

We employ a sample of 743 firm-year observations for European and Australian real estate investment firms using international accounting standards. With balance sheet and income statement information, inferences are made about firms'

[1] While *IAS 36 Impairment of Assets* requires disclosures of key assumptions in the determination of fair value (para. 130 (f)), this is not required in *IFRS 13 Fair Value Measurement*.

assumed capitalization rate which essentially captures the combined effect of assumptions about expected rental growth and discount rates. Specifically, we obtain the capitalization rate assumption by dividing current rental income by the fair value of investment properties. To identify differences in assumptions underpinning the determination of fair values, firms are ranked on the basis of the capitalization rate. Firms with the lowest capitalization rates are identified as relying on 'optimistic' fair value assumptions. This determination is validated by several analyses including: (1) future realized growth in rental income; (2) reversal of fair value gains in future periods; and (3) comparisons with analyst estimates of net asset value.

To examine whether investors can recognize optimistic assumptions based on the capitalization rates used by firms in their fair value estimation, we compare the value relevance of fair value investment properties between firms with optimistic assumptions and the rest of the sample. We find that for firms where there is no evidence of optimistic assumptions, the coefficient of fair value investment properties is not materially different from one. That is, the estimated fair value of investment properties is fully reflected in the market value of the firm. Furthermore, changes in the fair value of investment properties are reflected in changes in the market value of the firm. This is broadly consistent with the expectation for the operation of fair value measurement, and indicates that the relevance of Level 3 fair values is generally not discounted by the market due to the use of unobservable valuation inputs. This contrasts with conclusions from prior research (e.g., Dietrich *et al.*, 2000; Danbolt and Rees, 2008; Song *et al.*, 2010). However, for firms that are identified as having optimistic assumptions, the value relevance of these investment properties is significantly reduced with the coefficient of investment properties being materially less than one. Furthermore, changes in the fair value of investment properties are not reflected in changes in the market value of the firm. This suggests that investors are able to identify optimistic fair value assumptions in our research context and the relevance of investment properties measured at fair value is sensitive to the underlying assumptions.

Additional analysis provides some insights into whether the discount of fair value investment properties is a consequence of temporary mispricing by investors or the market correcting fair valuation optimism. We find no evidence of subsequent positive stock returns following the release of financial reports for firms making optimistic assumptions. Nor is there evidence of increased stock price volatility in the post-earnings announcement period. Both would be expected if firms' optimistic assumptions mislead the market and/or contribute to uncertainty in the determination of fair values. These results provide further support to the argument that investors recognize optimism in fair value assumptions and perform independent valuation of firm assets.

This study contributes to the fair value literature in a number of ways. First, it confirms empirically that Level 3 fair values are generally relevant for investors' decision-making as suggested in the IASB's *Conceptual Framework*. However, our findings show that the relevance will be impacted by the actual assumptions made

in the determination of fair values. Prior literature identifies various factors, such as valuation techniques, input types, the amount of disclosures, and corporate governance, which can help investors indirectly assess the reliability of fair value estimates (e.g., Muller and Riedl, 2002; Danbolt and Rees, 2008; Song *et al*., 2010; Vergauwe *et al*., 2011; Vergauwe and Gaeremynck, 2019). This paper complements existing research by documenting that when the actual assumptions of fair values can be determined, investors are able to directly evaluate the accuracy of valuation assumptions which in turn impacts the relevance of fair values.

Second, it is argued in the literature that the use of fair value measurement in the balance sheet encapsulates information about expected future earnings and renders measures of performance, that is, current earnings in the statement of profit or loss, largely irrelevant (Danbolt and Rees, 2008). In this paper, we demonstrate that income statement information can be used together with balance sheet information to infer the underlying assumptions supporting fair value estimates. Hence it remains relevant and useful in reducing measurement uncertainty for investors in a context where fair value is applied.

Lastly, this paper raises concerns about the lack of disclosure requirements of fair value assumptions in the accounting standards that address the determination of fair values (*IFRS 13 Fair Value Measurement*) and the application of fair value measurement (e.g., *IAS 40 Investment Property*). In the context of real estate investment firms, the economic consequences of this limitation in disclosures are mitigated by the availability of information in financial reports which allows inferences about valuation assumptions. This would not be the case in most other circumstances where fair value measurement is undertaken and the underlying assumptions cannot be determined from alternative information sources. Given the market's ability to see through optimistic fair value assumptions as documented in this study, the implication for accounting standard-setters is that enhanced firm disclosure on valuation assumptions is likely to improve information transparency and limit mispricing.

## CONTEXT, LITERATURE, AND HYPOTHESES DEVELOPMENT

### *The Context of Real Estate Investment Firms*

A number of challenges in evaluating the relevance of fair value assets are recognized in the literature. These include the application of mixed measurement models for different classes of assets (i.e., historic cost and fair value), differences in the basis on which fair values are determined, and limitations and inconsistencies in disclosures across firms and for different types of assets. However, the context of the real estate investment industry provides many research design advantages in dealing with these challenges (Ferreira *et al*., 2019).

First, the overwhelming majority of assets held by real estate investment firms are accounted for in accordance with *IAS 40 Investment Property* and are recognized at fair value determined in accordance with *IFRS 13 Fair Value Measurement.*

Consequently, the market value of firm assets is largely an aggregation of firm asset values, and this should be reflected in the market evaluation of the firm (Ferreira *et al.*, 2019). This contrasts with the financial industry, a commonly adopted avenue for fair value research (e.g., Song *et al.*, 2010; Goh *et al.*, 2015), where the proportion of assets recognized at fair value is potentially less than 15%. A consequence of this is that the results are susceptible to omitted correlated variable problems (Lawrence *et al.*, 2016).

Second, a distinguishing feature of real estate investment firms is that the return on fair value investment properties is observable as rental income in the statement of profit or loss (IAS 40, paras 75–76). Rental income is a critical input or starting point in the determination of fair values. In combination with fair values, this provides insights into the critical assumptions (i.e., growth in forecast returns and discount rates) underpinning the valuation. Accordingly, irrespective of the disclosures being made or inconsistencies in these disclosures, consistent inferences can be made about these assumptions based on the current rental yield.[2] These inferences cannot be made in other industry contexts where financial returns of the fair value assets are aggregated with other types of incomes and cannot be separately identified.

Third, there is a high level of transparency regarding investment properties held by real estate investment firms. Compared to assets that have high degrees of specificity, the performance and value of properties is to a large extent driven by market-wide factors such as economic environment, population demographics, and political interventions, and less so by firm-specific operations. There are sufficient firm disclosures and databases detailing specific properties held by real estate investment firms and many of the metrics necessary for valuation. This was confirmed by a senior executive of a major global real estate investment firm who acknowledged that analysts and investors were very cognizant of specific investment property assets, together with the relevant performance and valuation metrics. The valuation methodologies used for real estate properties are also well developed and relatively standardized (Muller *et al.*, 2011). These factors together enable investors to compare and independently evaluate assets (Barth *et al.*, 2018).

Finally, the fair values of investment properties are adjusted annually, in contrast with studies such as that of Barth and Clinch (1998) who considered periodic asset revaluations. The frequency of asset revaluations can be subjective,

[2] Assumptions about growth in forecast rental returns and the discount rate would both be critical in the determination of fair value for investment properties. But there is likely less flexibility in the discount rate assumption as this is not a firm-specific discount rate with the value estimated being a market value which would reflect the assumptions that market participants would make. This would emphasize general economic and industry factors, such as property type, and while this might vary over time, it is less likely to vary across firms within one industry (Ammer and Wongswan, 2007). Experts in investment property valuation are most likely to constrain biased assumptions about this discount rate. Furthermore, many systematic differences in discount rates would be addressed with the research design of identifying firms with biased assumptions within region, year, and property type. Hence, in the additional analysis, optimism in forecasts is attributed primarily to the growth rate in forecast rental returns. However, similar results would arise from optimism in the determination of discount rates and this would support enhanced disclosure of assumptions generally.

giving rise to a timing issue as the period over which increments or decrements in asset values should be evaluated is less clear.

Overall, real estate investment firms have relatively homogenous business models, asset types and accounting measurement models. This provides a robust context to evaluate the application of fair value measurement, and in particular fair values estimated with Level 3 inputs which have received the most concerns (Christensen, 2019). It also provides a unique opportunity to investigate the impact of assumptions on the determination of fair values, as these assumptions can be inferred and compared in this setting.

*Prior Literature and Hypotheses Development*

A number of prior studies have examined whether the fair value of investment properties is relevant for users of financial reports. These include Dietrich *et al.* (2000) who find that fair values provide more information about the selling prices of properties than historic values. Consistent with this, Danbolt and Rees (2008) find that income determined on the basis of fair value accounting is more relevant than income determined on an historic cost basis. There are also suggestions that fair value accounting improves market efficiency. For example, *Muller et al.* (2011) studied the impact of the compulsory adoption of fair value measurement under IAS 40 on information asymmetry across market participants. Their result suggests that the mandated provision of fair value measurement for investment properties contributed to a levelling of the playing field among investors with and without private information.

However, it has been suggested that the reliability of fair value estimates of assets varies with the types of inputs, and this likely impacts the relevance of this information. A higher measurement uncertainty associated with the use of Level 3 inputs in fair valuation relative to Level 1 and 2 inputs is documented in Danbolt and Rees (2008) who compare the use of fair value measurement by real estate investment firms and investment funds. The paper finds that fair value measures of investment properties, which are based on what would now be classified as Level 3 inputs, are less value-relevant in comparison to that of investment fund assets, which are more likely based on what would now be classified as Level 1 inputs. A similar result is reported in Song *et al.* (2010) where financial assets measured using inputs now categorized as Level 3 are found to be less relevant than those measured with Level 1 or Level 2 inputs. However, concerns have been expressed over the findings in Danbolt and Rees (2008) and Song *et al.* (2010), in particular, whether the documented discount of fair values determined with Level 3 inputs is caused by omitted variable bias, financial market uncertainties, or market pricing of liquidity (Goh *et al.*, 2015; Lawrence *et al.*, 2016; Freeman *et al.*, 2017). Therefore, evidence on whether the relevance of Level 3 fair values is discounted by investors due to measurement uncertainty is not conclusive. Hence, the first objective of this study is to re-examine this issue in the context of the real estate investment industry where these research design problems can be overcome.

Differences in the relevance of fair value assets are also evidenced across valuation techniques and the quantum of disclosures. Vergauwe and Gaeremynck (2019) find that firms using formal valuation models to determine fair values of investment properties and providing quantitatively more measurement-related disclosures have lower property gains and losses on realization, measured as the difference between sale price and fair value prior to sale. This suggests greater reliability for fair values determined with formal valuation models and accompanied by more disclosures. Given the considerable uncertainty and managerial discretion in the determination of fair values, prior research has also examined the impact of corporate governance mechanisms on constraining opportunistic financial reporting and enhancing the value relevance of fair value assets (Barth and Clinch, 1998; Muller and Riedl, 2002). For instance, Muller and Riedl (2002) report that the use of independent valuation experts improves the credibility of firms' fair value estimates of investment properties and hence increases their value relevance.

While these studies identify factors that can help investors imply the reliability of the underlying valuation assumptions, a fundamental question that remains unresolved is whether investors give consideration to the actual assumptions when evaluating the relevance of the fair value estimates. In other words, are investors able to directly identify potentially inaccurate assumptions applied in the fair value measurement if such assumptions are observable, with or without firm disclosures on valuation methods?

The answer to this question has important regulatory implications. If investors are unable to detect bias in the assumptions when they are provided, mandatary disclosure requirements on the actual valuation assumptions would not deliver the aimed-for benefits of improving market transparency and efficiency. Regulations focused on external professional certifications, good corporate governance practices, or other types of measurement-related disclosures may be more effective in signalling the market about the reliability of fair value estimation. On the other hand, if investors are able to independently evaluate whether the underlying assumptions are reasonable, then there is a case for compulsory firm disclosures about fair value assumptions so that investors can judge for themselves the accuracy of the valuation.

Given the limited discussion of this issue in the literature, this paper aims to evaluate whether investors' perceived relevance of assets measured at fair values is systematically impacted by the assumptions underpinning the determination of those values. Ample research evidence suggests that firms have stronger incentives to overvalue assets and profit than to undervalue them (e.g., Burgstahler and Dichev, 1997; Cheng and Warfield, 2005; Bergstresser and Philippon, 2006). From a user's perspective, investors are also more concerned about aggressive accounting policies and show stronger market reactions (e.g., Palmrose *et al.*, 2004; Desai *et al.*, 2006). Hence, in this study we focus on identifying optimistic fair value assumptions where the discount of the value relevance is likely to be most significant.

If fair value information of investment properties is relevant by investors and is generally considered to be reliable, we expect no discount of its value relevance when examining the association between firms' market value and asset value.

However, in situations when investors are able to recognize optimism in the assumptions required for the determination of fair values, we expect reduced relevance of investment properties at fair value. Following these arguments, we develop the following hypotheses which test first the value relevance of investment properties in general and second whether it is reduced where optimistic assumptions are made:

H1: Investment properties recognized at fair value provide relevant and not discounted information for investors where there is no evidence of optimistic assumptions.
H2: The relevance of investment properties recognized at fair value for investors is reduced where there is evidence of optimistic assumptions.

## RESEARCH DESIGN

### *Identification of Optimistic Valuation Assumptions*

The valuation of investment properties involves forecasting rental incomes in future periods and discounting them to present value based on risk-adjusted discount rates. This requires the estimation of rental returns to infinity which is impossible in practice. Hence, the valuation process is often simplified with reasonable assumptions to an earnings capitalization model or a basic valuation multiple (e.g., Dechow *et al.*, 1999; Penman, 2016). The valuation multiple is commonly referred to as a capitalization rate in the context of the real estate industry, which can be represented in a formal way as:

$$P_0 = \frac{Rent_0}{r - g}. \tag{1}$$

$P_0$ is the fair value of investment properties at the time of valuation. $Rent_0$ is current rental income. $r$ is the discount rate and $g$ is the forecast growth rate of future rental income. After re-arranging equation (1), we get:

$$\text{capitalization rate} = \frac{Rent_0}{P_0} = r - g \tag{2}$$

As shown in equation (2), the capitalization rate is essentially the current rental yield which reflects a firm's implicit assumptions about growth in future rental income and discount rates.[3] Given current levels of rental income, overestimation of the fair values of investment properties would be a

[3] Either directly through a valuation model or indirectly through a capitalization rate, the determination of fair values will involve assumptions about expected rental growth and discount rates.

manifestation of an optimistically low discount rate and/or an optimistically high growth rate, leading to a relatively low capitalization rate. Hence, we consider this as providing evidence of optimistic assumptions in fair value estimation.

Specifically, recognizing that rental returns may be sensitive to asset management or the extent to which property expenses are reimbursed which may be impacted by local custom, we define rental income as rental revenues net of operating expenses.[4] The capitalization rate is then calculated using rental net operating income for firm $i$ in financial year $t$ divided by the fair value of investment properties recognized at the end of year $t$. Firms that make optimistic valuation assumptions are identified by a dichotomous variable, $Opt_{it}$, which takes the value one if the capitalization rate is ranked in the lowest decile of the sample, and zero otherwise. Identifying optimistic firms in the lowest decile focuses attention on firms where there is likely the greatest bias in the valuation assumptions. As a robustness analysis, optimistic firms are alternatively identified if the capitalization rate is in the lowest quintile, lowest one third, or below median. This does not qualitatively change the results but only varies the significance level. The fundamental question is how pervasive firm optimism is in the sample and to what degree it is identified by investors. We only report results based on deciles as the impact of optimistic assumptions on valuation is expected to be the most extreme.

Firm-years with optimistic assumptions are in the first instance identified based on the pooled full sample. This approach is appropriate if the economic conditions faced by real estate firms are similar and relatively stable over time. Under such circumstances, the cross-sectional variations in the valuation assumptions are more likely due to subjective accounting judgement rather than differences in economic fundamentals. Considering that business fundamentals may be systematically different across countries, years, and property types which result in reasonable variations in valuation assumptions, optimistic firms are also separately identified as observations in the bottom decile of the capitalization rates by economic regions (European and non-European countries), years, and property categories (diversified and non-diversified real estate investment firms). We do not identify optimism on the basis of individual countries or specific property types due to the limited number of real estate investment firms in some categories and the expectedly limited differences in economic situations across these observations. Ranking capitalization rates within detailed categories runs the risk of mechanically identifying firms as making optimistic assumptions even if there is little variation across observations and no economically meaningful bias in valuation assumptions. We perform several tests to confirm the internal validity of our measure for optimistic firms which are discussed later in the paper.

[4] As a sensitivity test, the capitalization rate is also evaluated on the basis of total rental revenues. This does not materially impact our main results.

*The Value Relevance of Investment Properties at Fair Value*

The initial focus of our hypothesis testing is on the relevance of fair value investment properties, and whether this is reduced for firms identified as making optimistic assumptions. This is undertaken by evaluating the association of the fair value of investment properties with enterprise value and allowing it to differ for firms where there is evidence of optimistic forecasts.[5] This study's focus on a level regression on the valuation of the enterprise slightly differs from other value relevance studies which examine the market value of equity. It is worth pointing out that such an enterprise valuation model is theoretically equivalent to an equity valuation model, with the only difference being that the financial assets and liabilities are separated from the operating items, removed from the right-hand side of the equation and added into the left-hand side dependent variable (see Peek *et al*., 2019). Since the book value of financial assets and liabilities approximates their fair value, this model design does not alter the value relevance interpretation of the operating assets and liabilities remaining on the right-hand side of the equation. Estimating such an enterprise model allows us to focus on the market valuation of firm operating assets and liabilities. At the same time it avoids the high correlation typically observed between the amount of fair value investment properties and net financing liabilities for real estate investment firms, as the development and purchase of investment properties are mainly financed through borrowing in this industry (Sun *et al*., 2015). Estimating an equity model with investment properties and financing liabilities both appearing as independent variables creates a potential multicollinearity issue which likely inflates the variance of estimated coefficients and makes the coefficient estimates unstable and hard to interpret.

The estimation model of this level regression analysis is specified as follows:

$$\begin{aligned} EV_{it} = {} & \alpha_0 + \alpha_1 FVProp_{it} + \alpha_2 FVProp_{it} \times Opt_{it} + \alpha_3 Opt_{it} + \alpha_4 Associates_{it} + \alpha_5 JVs_{it} \\ & + \alpha_6 Inventory_{it} + \alpha_7 OtherAT_{it} + \alpha_8 OpLiab_{it} + \alpha_9 Lev_{it} + \alpha_{10} NOI_{it} \\ & + OtherControls + \varepsilon_{it}. \end{aligned} \tag{3}$$

The dependent variable $EV_{it}$ is enterprise value calculated as the sum of the market value of equity and the book value of total debt minus cash and cash equivalents. Following *Muller et al*. (2011), we assume that most firms release their annual reports in the fourth month following the fiscal year-end. Hence, in our main analysis we calculate the market value of equity using share price and shares outstanding information at the end of the fourth month following the fiscal year-end. Findings of this study remain robust when the second or third month

[5] We also estimate an equity valuation model to evaluate the value relevance of investment properties. Although the estimated coefficients of variable $FVProp_{it}$ and $FVProp_{it} \times Opt_{it}$ remain similar to the estimates of an enterprise model, there is obviously increased collinearity between the independent variable of investment and total liabilities (the sum of operating and debt liabilities), as reflected in an increase in VIF statistics.

following the fiscal year-end is considered as the release time of the financial reports.

The key variables of interest include variable $FVProp_{it}$, the fair value of investment properties recognized by firm $i$ in year $t$, and variable $Opt_{it}$, the indicator variable for firms making optimistic assumptions. The coefficient of variable $FVProp_{it}$ is expected to be one if investors do not consider Level 3 fair values to be unreliable in general, consistent with the operation of fair value accounting (H1). The coefficient of the interaction term $FVProp_{it} \times Opt_{it}$ is expected to be negative and significant if fair values are perceived to be less relevant for firms where the inferred capitalization rate suggests optimistic valuation assumptions (H2). The variable $Opt_{it}$ captures the overall valuation differences between optimistic firms and the rest of the sample. Other operating assets and liabilities are included in the model to control the valuation impact of other balance sheet items. They are variables $Associates_{it}$, $JVs_{it}$, $Inventory_{it}$, $OtherAT_{it}$, and $OpLiab_{it}$ which measure investment in associates, joint ventures, inventories and properties held for sale, other non-cash assets, and operating liabilities respectively. Rental net operating income ($NOI_{it}$) is also included to test whether contemporaneous aggregate performance information obtained from the income statement is incrementally value-relevant for investors. All continuous variables are scaled by the opening balance of total assets to address size differences across observations and potential heteroskedasticity. To address the concern that the association between market value and accounting value is impacted by a firm's financing risks, we include the variable $Lev_{it}$, total debt divided by the book value of total assets for firm $i$ at the end of financial year $t$, to control the influence of financial leverage on enterprise value.

Research on the value relevance of assets and liabilities is traditionally undertaken on a level basis (Brown and Sivakumar, 2003; Song *et al.*, 2010; Lawrence *et al.*, 2016). In the case of fair value measurement for investment properties, it is also possible to perform a change analysis as fair value gains/losses of investment properties are separately recognized from other earnings components on the statement of profit or loss. To provide further evidence for hypothesis testing, we next evaluate the relevance of changes in the fair value of investment properties. This is estimated with the following model:

$$DMV_{it} = \beta_0 + \beta_1 FVGain_{it} + \beta_2 FVGain_{it} \times Opt_{it} + \beta_3 Opt_{it} + \beta_4 OtherNI_{it} + OtherControls + \varepsilon_{it}. \quad (4)$$

The dependent variable $DMV_{it}$ is calculated as the annual change in the market value of equity plus net distributions to equity holders. As a consequence of trust structures being used and the associated tax issues, a special feature of the real estate investment industry is that it is common for a significant portion of earnings to be distributed to shareholders in the same period (Baum and Devaney, 2008). Therefore, we add back any equity distributions, calculated as the change in the book value of equity minus net income, to obtain the overall change in the market

value of equity before any distributions to shareholders. Emphasis here is given to change in equity value rather than enterprise value as the multicollinearity concern for the level regression analysis does not exist for the change analysis. Furthermore, the primary objective of equation (4) is to test the market valuation of fair value gains and other earnings components, which are attributable to equity holders only.

The key variables of interest in equation (4) are the variable $FVGain_{it}$, net valuation gains or losses on investment properties, and its interaction term with the variable $Opt_{it}$. As hypothesized in Hypothesis 1, if the fair value of investment properties is considered reliable and relevant, a change in the firm market value should be positively associated with the recognized valuation gains/losses. The coefficient of variable $FVGain_{it}$ is expected to be close to one. If investors are able to identify firms that make optimistic assumptions, the value relevance of fair value adjustments recorded by those observations is expected to reduce in comparison to that of other firms. Hypothesis 2 hence predicts a significantly negative coefficient of the interaction term $FVGain_{it} \times Opt_{it}$. The variable $OtherNI_{it}$ captures all other components of profit or loss recognized in the income statement which is calculated as net income excluding net valuation gains on investment property. All financial variables except $Opt_{it}$ are scaled by the opening balance of total assets.

There is a concern that some unobservable firm- and time-invariant factors other than accounting choices could simultaneously contribute to the variations in firm value and the use of optimistic assumptions. The failure to control such factors may result in an omitted variable problem. Hence, firm and year fixed effects are incorporated in equations (3) and (4) as other controls. It should be noted that if optimistic accounting assumptions are applied consistently over time by some firms, controlling firm fixed effects may bias against finding a significant result. This would be less of an issue if firm optimism is inconsistent from year to year, which arguably is more problematic for investors as there is no history of biased valuation assumptions for the market to appreciate. Overall, estimating models (3) and (4) with firm and year fixed effects provides a conservative estimate of the value relevance of optimistic fair value measurement. Firm cluster robust standard errors are reported for all analyses.[6]

## SAMPLE AND DATA

### *Sample Selection*

We collected data from two sources. All financial and property portfolio data were obtained from S&P Market Intelligence's SNL Real Estate database. Stock price information was sourced from Datastream. All variables are defined in Table 1. Our original sample consisted of 1,664 firm-year observations covering all

[6] Valuation residuals may be correlated within local markets, so we also use clustered standard errors at the country level to assess the robustness of the results. Key findings remain the same.

TABLE 1

VARIABLE DEFINITIONS

| Variable | Definition |
|---|---|
| $EV_{it}$ | Enterprise value for firm *i* in year *t*, calculated as the sum of the market value of equity and the book value of total debt minus cash and cash equivalents, scaled by the beginning balance of total assets. Market value of equity is calculated as share price times common shares outstanding at the end of the fourth month following the financial year end. Where data on common shares outstanding at the end of the fourth month following the financial year end is not available, common shares outstanding at the end of financial year is used |
| $DMV_{it}$ | Yearly change in market value and net distribution of equity for firm *i* in year *t*, scaled by the beginning balance of total assets. Market value of equity is calculated as share price times common shares outstanding at the end of the fourth month following the financial year-end. Where data on common shares outstanding at the end of the fourth month following the financial year end is not available, common shares outstanding at the end of financial year is used. Net distribution of equity is calculated as change in book value of equity minus net income |
| $FVProp_{it}$ | Investment properties measured at fair value for firm *i* in year *t*, scaled by the beginning balance of total assets. |
| $CapRate_{it}$ | Capitalization rate for firm *i* in year *t*, calculated as rental net operating income divided by the closing balance of investment properties in operation carried at fair value. Where data on investment properties in operation are not separately disclosed, total investment properties at fair value is used |
| $Opt_{it}$ | A dichotomous indicator variable equal to one if the capitalization rate for firm *i* in year *t* is in the bottom decile of sample distribution, zero otherwise. This is evaluated separately on the basis of the full sample, economic region (European and non-European countries), year, and property category (diversified and non-diversified real estate investment firms) |
| $Associates_{it}$ | Investment in associates for firm *i* in year *t*, scaled by the beginning balance of total assets |
| $JVs_{it}$ | Investment in joint ventures for firm *i* in year *t*, scaled by the beginning balance of total assets |
| $Inventory_{it}$ | Inventories and properties held for sale for firm *i* in year *t*, scaled by the beginning balance of total assets |
| $OtherAT_{it}$ | Other non-cash assets for firm *i* in year *t*, calculated as total assets minus cash and cash equivalents, investment properties, investment in associates, investment in joint ventures, inventories and properties held for sales, scaled by the beginning balance of total assets |
| $OpLiab_{it}$ | Operating liabilities for firm *i* in year *t*, calculated as total liabilities minus total debt, scaled by the beginning balance of total assets |
| $Lev_{it}$ | Book leverage calculated as total debt divided by book value of total assets for firm *i* at the end of year *t* |
| $InvPropRatio_{it}$ | Ratio of fair value investment properties to total assets for firm *i* at the end of year *t* |
| $NOI_{it}$ | Rental net operating income scaled by beginning balance of total assets for firm *i* in year *t* |
| $FVGain_{it}$ | Net valuation gains on investment properties scaled by the beginning balance of total assets for firm *i* in year *t* |
| $OtherNI_{it}$ | Net income excluding net valuation gains on investment property, scaled by the beginning balance of total assets for firm *i* in year *t* |

European and Australian real estate investment firms identified in SNL Real Estate database over the period 2011 to 2019. The beginning of our sample period coincides with the issue of *IFRS 13 Fair Value Measurement*, which currently guides the determination of fair values and ensures greater consistency in the

determination of fair values.[7] We note that our sample is in the period after the global financial crisis (GFC) and the economic conditions of the property market were relatively stable over the sample years. This gives us confidence in our first approach of identifying optimistic firms using the pooled sample as explained in the research design section. After limiting our sample to countries that adopt international accounting standards, to firm-years with data available, and excluding observations with material acquisitions or dispositions where the structural change may have a significant one-off impact on rental returns and fair values, our final sample contains 743 firm-year observations.[8]

An overview of the sample distribution is provided in Table 2. While the number of real estate investment firms increases in the most recent periods, they are well spread across the sample period, with the year 2011 (2019) providing 9.42% (12.65%) of the sample observations (Panel A). About 50% of the firm-year/firm observations are classified as having diversified property portfolios (Panel B). This suggests that our sample reflects a range of investment property types and is not unduly influenced by a particular investment property category. Finally, sample firms are geographically located in 12 countries (Panel C) with the greatest number of firm-year observations from Great Britain (280) and Australia (170).[9]

We perform the analysis without trimming or winsorizing the variables as these univariate outlier mitigation strategies do not deal with multivariate outliers and can create censored data leading to biased results. Instead, we examine any outlier effect on the results by investigating individual observations with extreme values. We also apply the DFITS (Welsch and Kuh, 1977) filter in data management software Stata to identify multivariate extreme observations.[10] Untabulated results show that the main results of this paper are not changed by dropping extreme observations. Unreported quantile regression analysis which is robust to outlier effects further confirms the mean results reported in this study.

[7] Although IFRS 15 only became effective from 2013, we chose to start our sample from 2011 due to the consideration that any guidance on how to measure fair value and the hierarchy levels was already publicly available in 2011. Equally important is that the fair value measurement of investment properties is also dictated by IAS 40 *Investment Property* which has prescribed how fair value of investment properties should be measured since 2005. A robust test of excluding years 2011–2012 returns the same results.

[8] Material acquisition or disposition is defined as more than 50% of net acquisition/disposition change in the balance of investment properties during a year.

[9] Exclusion of British and Australian firms from the sample does not materially change our main results. Analysis solely based on the sample of British or Australian firms also generates qualitatively similar findings. This suggests consistency in the application of these accounting standards across countries.

[10] DFITS (Welsch and Kuh, 1977) in STATA measures sample observations' leverage and residual effects on estimation results. It is a scaled difference between predicted values for each observation when the regression is fit with and without this particular observation. Observations with DFITS values greater than $2\sqrt{k/n}$ ($k$ is number of independent variables including the constant; $n$ is the sample size) is commonly considered as influential observations (Belsley *et al.*, 1980, p. 28).

TABLE 2

SAMPLE DISTRIBUTION

**Panel A: By year**

| Year | Number of firms | Percentage (%) |
|---|---|---|
| 2011 | 70 | 9.42 |
| 2012 | 76 | 10.23 |
| 2013 | 73 | 9.83 |
| 2014 | 76 | 10.23 |
| 2015 | 78 | 10.5 |
| 2016 | 93 | 12.52 |
| 2017 | 99 | 13.32 |
| 2018 | 84 | 11.31 |
| 2019 | 94 | 12.65 |
| Total | 743 | 100.00 (%) |

**Panel B: By property type**

| Type | Number of firm-years (%) | Number of firms (%) |
|---|---|---|
| Diversified | 373 (50.2) | 65 (48.51) |
| Healthcare | 43 (5.79) | 7 (5.22) |
| Hotel | 10 (1.35) | 2 (1.49) |
| Industrial | 43 (5.79) | 9 (6.72) |
| Multifamily | 20 (2.69) | 7 (5.22) |
| Office | 83 (11.17) | 14 (10.45) |
| Other retail | 26 (3.5) | 4 (2.99) |
| Regional mall | 10 (1.35) | 2 (1.49) |
| Self-storage | 22 (2.96) | 3 (2.24) |
| Shopping centre | 92 (12.38) | 14 (10.45) |
| Specialty | 21 (2.83) | 7 (5.22) |
| Total | 743 (100) | 134 (100) |

**Panel C: By country**

| Country | Number of firm-years (%) | Number of firms (%) |
|---|---|---|
| Australia | 170 (22.88) | 35 (26.12) |
| Belgium | 75 (10.09) | 11 (8.21) |
| Germany | 17 (2.29) | 2 (1.49) |
| Spain | 15 (2.02) | 4 (2.99) |
| Finland | 4 (0.54) | 2 (1.49) |
| France | 84 (11.31) | 14 (10.45) |
| Great Britain | 280 (37.69) | 49 (36.57) |
| Greece | 7 (0.94) | 1 (0.75) |
| Ireland | 7 (0.94) | 3 (2.24) |
| Italy | 17 (2.29) | 3 (2.24) |
| Netherlands | 33 (4.44) | 4 (2.99) |
| Turkey | 34 (4.58) | 6 (4.48) |
| Total | 743 (100) | 134 (100) |

### *Descriptive Statistics*

Descriptive statistics of key variables in the sample are presented in Table 3. The mean (median) value of variable $EV_{it}$, measuring the enterprise value relative to

TABLE 3

SUMMARY STATISTICS

| Variable | Mean | SD | P25 | P50 | P75 |
|---|---|---|---|---|---|
| $EV_{it}$ | 1.000 | 0.350 | 0.778 | 0.972 | 1.178 |
| $DMV_{it}$ | 0.058 | 0.185 | –0.036 | 0.043 | 0.141 |
| $FVProp_{it}$ | 0.916 | 0.263 | 0.789 | 0.929 | 1.043 |
| $CapRate_{it}$ | 0.060 | 0.045 | 0.048 | 0.058 | 0.066 |
| $Associates_{it}$ | 0.017 | 0.066 | 0.000 | 0.000 | 0.000 |
| $JVs_{it}$ | 0.030 | 0.075 | 0.000 | 0.000 | 0.009 |
| $Inventory_{it}$ | 0.024 | 0.048 | 0.000 | 0.002 | 0.028 |
| $OtherAT_{it}$ | 0.060 | 0.077 | 0.017 | 0.036 | 0.066 |
| $OpLiab_{it}$ | 0.061 | 0.047 | 0.033 | 0.047 | 0.072 |
| $Lev_{it}$ | 0.357 | 0.138 | 0.264 | 0.352 | 0.455 |
| $InvPropRatio_{it}$ | 0.848 | 0.164 | 0.799 | 0.908 | 0.954 |
| $NOI_{it}$ | 0.044 | 0.017 | 0.033 | 0.044 | 0.054 |
| $FVGain_{it}$ | 0.027 | 0.047 | 0.000 | 0.019 | 0.045 |
| $OtherNI_{it}$ | 0.032 | 0.031 | 0.019 | 0.033 | 0.047 |

This table reports the summary statistics of key variables in the sample including the sample mean, standard deviation, 25th percentile, 50th percentile, and 75th percentile. All variables are as defined in Table 1.

the book value of assets, is 1.000 (0.972), which is consistent with our expectation for real estate investment firms whose major operating assets are measured at the market value. The mean (median) ratio of fair value investment properties relative to the beginning balance of total assets (variable $FVProp_{it}$) and the closing balance of total assets (variable $InvPropRatio_{it}$) is 0.916 (0.929) and 0.848 (0.908) respectively. This suggests that the overwhelming majority of sample firms' assets are investment properties measured at fair value, which was a critical factor in choosing this research context. Besides properties held for investment purposes, properties held for sale are recognized by firms as inventories and are typically recorded on a historic cost basis.[11] Measured by the variable $Inventory_{it}$, this type of property takes up a minimal proportion of firm assets with a mean (median) value of 0.024 (0.002). This confirms that the real estate investment firms in our sample are focused on property investment and not property development. This reduces the concern of omitted variable bias in estimating the value relevance of investment properties. The mean (median) of the variable $Lev_{it}$ is 0.357 (0.352), suggesting a relatively moderate level of leverage for firms in the sample.[12] The distribution of all other variables is as expected.

[11] Inventory properties are not included in the variable $FVProp_{it}$. Hence, it does not influence the calculation of capitalization rates and the identification of optimistic firms.

[12] This probably distinguishes sample firms in this study with prior studies where many firms could have been described as leveraged property developers (e.g., Sun *et al*., 2015). Financial distress was common among these firms during the GFC.

*Determination of Optimistic Assumptions: Validation Tests*

A critical issue in the research design is whether firms with low capitalization rates are actually those relying on optimistic assumptions in the estimation of fair values. Recognizing the significance of this identification, we undertake several *ex-post* validation tests of our optimism measure. As discussed in the research design section, the capitalization rate, calculated from current rental net operating income and fair value of investment properties, reflects a firm's combined assumptions about future rental growth and discount rate, that is, $r-g$. While both are important in the determination of fair value estimates, there is relatively less flexibility in making subjective assumptions about discount rate than growth rate. The estimation of discount rate should reflect the expected return by market participants which are mainly influenced by general economic and industry factors, and less likely to vary much over a short time period and across firms within the same real estate investment industry (Ammer and Wongswan, 2007). Given the constraint on making optimistic assumptions about the discount rate, we argue that firms exercise most discretion over the estimation of the growth rate in rental income. Indeed, compared to the discount rate, much of the emphasis in the literature has been on bias in growth forecasts which leads to errors in asset valuation (e.g., Bordalo *et al.*, 2019; Chan *et al.*, 2003). Unreported analyses also show that observations identified as having optimistic valuation assumptions are not more likely to hold diversified or larger property portfolios and the credit risk of top 10 tenants is not lower than the other firms. These results indicate that optimistic firms do not have a significantly lower level of business risk and a lower expected discount rate. Hence, our first validation test is to investigate whether there is *ex-post* evidence of greater future rental growth for firms identified as making optimistic assumptions. If these firms do not experience significantly higher rental income in future years relative to other firms, then our identification is consistent with these firms being optimistic in the fair value measurement.

The following cross-sectional model is developed to test rental income in the subsequent years $t+1$, $t+2$, and $t+3$:

$$NOI_{it+1,2,3} = \gamma_0 + \gamma_1 NOI_{it} + \gamma_2 NOI_{it} \times Opt_{it} + \gamma_3 Opt_{it} + OtherControls + \varepsilon_{it}. \quad (5)$$

Variable $NOI_{it+1,2,3}$ represents the realised rental net operating income in the subsequent one to three years, scaled by the opening balance of total assets. The coefficient of variable $NOI_{it}$ estimates the average growth rate of rental income in the sample. The difference in the growth of future rental income between firms with optimistic assumptions and the rest is captured by the coefficient of the interaction term $NOI_{it} \times Opt_{it}$. We also control the overall asset base of investment properties ($FVProp_{it}$), leverage ($Lev_{it}$), and year fixed effect. The results of this analysis are presented in Table 4, Panel A. As expected, the most significant determinant of subsequent years' rental income (i.e., years $t+1$, 2, 3) is current rental income. However, the coefficient of the

TABLE 4

DETERMINATION OF OPTIMISTIC ASSUMPTIONS: VALIDATION TESTS

**Panel A: Realized growth in future rental net operating income for firms relying on optimistic fair value assumptions**

| | (1) $NOI_{it+1}$ | | (2) $NOI_{it+2}$ | | (3) $NOI_{it+3}$ | |
|---|---|---|---|---|---|---|
| | Coef. | *t*-stat. | Coef. | *t*-stat. | Coef. | *t*-stat. |
| $NOI_{it}$ | 0.882 | 20.06*** | 0.841 | 16.90*** | 0.729 | 9.94*** |
| $NOI_{it} \times Opt_{it}$ | –0.246 | –1.66 | –0.235 | –1.67* | –0.135 | –0.92 |
| $Opt_{it}$ | 0.008 | 1.46 | 0.008 | 1.52 | 0.002 | 0.36 |
| $FVProp_{it}$ | –0.006 | –2.04** | –0.005 | –1.12 | –0.003 | –0.38 |
| $Lev_{it}$ | 0.001 | 0.36 | 0.001 | 0.30 | 0.003 | 0.55 |
| Year fixed effect | Yes | | Yes | | Yes | |
| No. of observations | 710 | | 687 | | 581 | |
| Adjusted $R^2$ | 0.713 | | 0.618 | | 0.523 | |

**Panel B: Reversal of future fair value gains for firms relying on optimistic fair value assumptions**

| | (1) $FVGain_{it+1}$ | | (2) $FVGain_{it+2}$ | | (3) $FVGain_{it+3}$ | |
|---|---|---|---|---|---|---|
| | Coef. | *t*-stat. | Coef. | *t*-stat. | Coef. | *t*-stat. |
| $FVGain_{it}$ | 0.617 | 11.54*** | 0.492 | 6.02*** | 0.576 | 4.00*** |
| $FVGain_{it} \times Opt_{it}$ | –0.172 | –2.02** | –0.225 | –2.24** | –0.339 | –1.66* |
| $Opt_{it}$ | 0.011 | 1.40 | 0.005 | 0.57 | 0.004 | 0.34 |
| $FVProp_{it}$ | 0.001 | 0.23 | –0.004 | –0.36 | –0.020 | –1.45 |
| $Lev_{it}$ | –0.022 | –2.07** | –0.014 | –0.47 | 0.010 | 0.24 |
| Year fixed effect | Yes | | Yes | | Yes | |
| No. of observations | 713 | | 693 | | 589 | |
| Adjusted $R^2$ | 0.437 | | 0.198 | | 0.200 | |

This table reports the validation test results for the identification of optimistic firms. In Panel A, equation (5) is estimated and reported. It evaluates the association between realized rental net operating income in subsequent periods with realized rental net operating income in the current period, and whether there is evidence of greater rental increases for firms with optimistic assumptions ($Opt_{it}$). Rental growth is considered over the subsequent one, two, and three years (columns (1), (2), and (3) respectively). In Panel B, equation (6) is estimated and reported. It evaluates the association between fair value gains/losses in subsequent periods with fair value gains on investment properties recognized in the current period, and whether there is evidence of valuation gain reversals for firms with optimistic assumptions ($Opt_{it}$). Valuation reversals are considered over the subsequent one, two, and three years (columns (1), (2), and (3) respectively). All variables are as defined in Table 1. ***, **, and * respectively indicate significance levels of 1%, 5%, and 10%.

interaction term is not statistically significant, suggesting that firms identified as relying on optimistic valuation assumptions do not seem to realize higher rental growth.[13]

[13] Even when we control the potential systematic differences in firms' discount rates by identifying optimistic firms within region, year, and property category, there is still no evidence that optimistic firms experience higher rental income growth in future years.

Second, the earnings management literature has documented a reverse of income-increasing accounting accruals in the subsequent years following upward earnings management (e.g., DeFond and Park, 2001; Baber *et al.*, 2011). Based on the same argument, it is unlikely that optimistic assumptions can be maintained for extended periods in the absence of higher realized rental growth. A consequence of this would be lower fair value gains in subsequent periods for firms whose estimation of investment properties is already optimistic in the current period. To provide insights into this, we test whether firms identified as making optimistic assumptions recognize lower fair value gains in the subsequent three-year period using the following cross-sectional model:

$$FVGain_{it+1,2,3} = \rho_0 + \rho_1 FVGain_{it} + \rho_2 FVGain_{it} \times Opt_{it} + \rho_3 Opt_{it} + OtherControls + \varepsilon_{it}. \quad (6)$$

The variable $FVGain_{it}$ is calculated as net valuation gains or losses on investment properties in year $t$ scaled by the opening balance of total assets. The coefficient of variable $FVGain_{it}$ captures the overall persistence of recognized net valuation gains. Whether firms with optimistic assumptions recognize less subsequent valuation gains is captured by the coefficient of the interaction term $FVGain_{it} \times Opt_{it}$. Investment properties ($FVProp_{it}$), leverage ($Lev_{it}$), and year fixed effect are included in the model as other controls. As reported in Table 4, Panel B, the coefficient of the interaction term is negative and significant when fair value gains in the subsequent three years are considered. Therefore, there is some evidence that optimistic fair value gains recognized in the current year reverse in the future.[14]

Our third validation test compares analyst estimation of asset value with that reported by the firm. We identify a subsample of 193 firm-year observations where analyst consensus estimates of net asset values are available in the S&P Real Estate database.[15] For 73% of firms identified as adopting optimistic valuation assumptions, the analyst estimate of net asset value on balance sheet is less than the firm's reported number. This compares to only 51% for firms not identified as being optimistic. This difference in proportions is statistically significant ($p$-value <0.068). On average, optimistic firms over-report their net asset values by 2.45%, which is calculated as reported value minus analyst estimate and then scaled by the market value of equity at the end of the fiscal year. In contrast, the rest observations under-report their net asset values by an average of 1.1%.

We recognize that investment properties can be held to generate rental returns as well as development and management revenue, and capital gains from property appreciation. To alleviate the concern that our identification of optimistic firms

[14] We acknowledge that a limitation of the analyses on future realized rental income growth and reversal of fair value gains is that results are potentially subject to model misspecifications.

[15] Out of the 193 observations, 19 are identified as being optimistic and 174 are not.

captures different investment strategies among the sampled real estate investment firms, we test whether rental revenue is a less significant source of operating revenue for firms identified to be optimistic.[16] Our analysis shows that rental revenue makes up a similar 90% of total operating revenue for firms identified as making optimistic assumptions as well as for the remaining firms. A mean test and a Wilcoxon rank-sum test reject the null that the mean and distribution of rental revenue relative to total operating revenue is significantly different between the two identified groups. This suggests that real estate investment firms in our sample pursue similar operation strategies and their dominating purpose for holding investment properties is to generate rental returns.

Altogether, these validation tests reveal that firms with extremely low capitalization rates do not realize higher growth in future rental income, do not have lower business risks, experience a reversal in recognized valuation gains on investment properties, and exceed analyst estimates of net asset value in proportion and magnitude. Given that our sample firms adopt similar operation strategies in relation to investment properties, these results confirm that the identified firms are indeed optimistic in their fair value estimation.

## RESULTS AND ANALYSIS

### *Main Results*

We report the results on whether investment properties measured at fair value are relevant for investors (H1), and whether this is reduced where there is evidence that firms are making optimistic forecasts (H2) in Table 5. In column (1) where our optimism measure $Opt_{it}$ is determined on the basis of a firm's capitalization rate relative to the full sample, the coefficient of $FVProp_{it}$ is positive and significant ($\alpha_1 = 1.079$, $t$-stat $= 19.57$). More importantly, the estimated coefficient is not statistically different from one as demonstrated in the Wald test. This result suggests that the enterprise value of real estate investment firms generally varies with fair value investment properties, which supports Hypothesis 1 that investors do not necessarily discount the relevance of investment properties measured with Level 3 inputs if the determination of fair values does not seem to be biased. Critically, the coefficient of the interaction term between variable $FVProp_{it}$ and $Opt_{it}$ is significantly negative ($\alpha_2 = -0.158$, $t$-stat $= -2.19$). This provides strong support for Hypothesis 2 that where there is evidence that optimistic assumptions are made, fair values are less relevant to financial statement users. The discount in the value relevance is also economically material, with only a 92.1% increase in estimated fair value investment properties being reflected in the firm value (i.e., $\alpha_1 - \alpha_2$). It is worth noting that the coefficient of variable $NOI_{it}$ is positive but not significant, which is consistent with the results in Danbolt and Rees (2008) that

[16] Total operating revenue reported by real estate investment firms generally includes rental revenue, profit from disposals of investment properties, revenue from sale of trading properties, property development revenue, and management revenue.

TABLE 5

RELEVANCE OF INVESTMENT PROPERTIES MEASURED AT FAIR VALUE AND IMPACT OF OPTIMISTIC ASSUMPTIONS

| | (1) Overall sample | | (2) Region | | (3) Year | | (4) Property category | |
|---|---|---|---|---|---|---|---|---|
| | Coef. | *t*-stat. | Coef. | *t*-stat. | Coef. | *t*-stat. | Coef. | *t*-stat. |
| $FVProp_{it}$ | 1.079 | 19.57*** | 1.096 | 19.75*** | 1.082 | 19.36*** | 1.061 | 18.53*** |
| $FVProp_{it} \times Opt_{it}$ | –0.158 | –2.19** | –0.208 | –2.76*** | –0.167 | –2.25** | –0.133 | –1.87* |
| $Opt_{it}$ | 0.162 | 1.89* | 0.233 | 2.62*** | 0.172 | 1.92* | 0.159 | 1.89* |
| $Associates_{it}$ | 1.115 | 4.70*** | 1.127 | 4.99*** | 1.116 | 4.74*** | 1.107 | 4.63*** |
| $JVs_{it}$ | 1.665 | 4.68*** | 1.646 | 4.83*** | 1.667 | 4.70*** | 1.659 | 4.64*** |
| $Inventory_{it}$ | 0.844 | 5.98*** | 0.870 | 5.94*** | 0.852 | 5.94*** | 0.836 | 5.75*** |
| $OtherAT_{it}$ | 0.917 | 3.12*** | 0.917 | 3.15*** | 0.926 | 3.13*** | 0.900 | 3.04*** |
| $OpLiab_{it}$ | –0.910 | –2.38** | –0.889 | –2.33** | –0.922 | –2.42** | –0.900 | –2.37** |
| $Lev_{it}$ | –0.091 | –0.54 | –0.091 | –0.53 | –0.090 | –0.53 | –0.098 | –0.58 |
| $NOI_{it}$ | 1.133 | 0.96 | 1.204 | 0.96 | 1.195 | 0.96 | 1.290 | 1.09 |
| Firm fixed effect | Yes | | Yes | | Yes | | Yes | |
| Year fixed effect | Yes | | Yes | | Yes | | Yes | |
| No. of observations | 743 | | 743 | | 743 | | 743 | |
| Adjusted $R^2$ | 0.642 | | 0.647 | | 0.643 | | 0.642 | |
| Wald test: Coefficient of $FVProp_{it} = 1$ | | | | | | | | |
| Prob > F = | 0.197 | | 0.120 | | 0.184 | | 0.334 | |

This table reports the estimation results of model (3). It evaluates the association between the market value of the firm with the book value of operating assets and liabilities, including investment properties at fair value conditional on whether firm observations are identified to make optimistic valuation assumptions ($Opt_{it}$). Variable $Opt_{it}$ is determined separately relative to the full sample (column (1)), economic region (column (2)), year (column (3)), and property category (column (4)). Wald tests on whether the estimated coefficient of variable $FVProp_{it}$ is statistically different from one are also reported. All variables are as defined in Table 1. ***, **, and * respectively indicate significance levels of 1%, 5%, and 10%.

fair value measurement of assets encapsulates information about expected future performance, leading to a loss of relevance for current earnings.

The sensitivity of the results to alternative determinations of $Opt_{it}$ is considered in columns (2)–(4), where firms with optimistic valuation assumptions are identified relative to firms from the same economic region, year, and property category. This largely controls any potential differences in firms' risk-adjusted rental growth which may result in reasonable variations in assumed capitalization rates. As shown in the table, there is little variation in the estimated coefficient of variable $FVProp_{it}$ which remains close to one and statistically significant ($\alpha_1 = 1.096$, 1.082, and 1.061 respectively from column (2) to (4)) irrespective of how $Opt_{it}$ is measured. Moreover, the coefficient of the interaction of $FVProp_{it}$ and $Opt_{it}$ also stays negatively significant and is estimated with similar magnitude ($\alpha_2 = -0.208$, –0.167, and –0.133 respectively from column (2) to (4)). These results again suggest that where investors are able to identify optimistic valuation assumptions, assets recognized at fair value are considered less relevant. Otherwise, the market's perceived relevance of Level 3 fair values does not seem to reduce in general. It should also be noted that the reduction in value relevance may be underestimated here in that inclusion of firm fixed effect potentially biases against finding this result if firms systematically adopt optimistic assumptions.

Further insights into the relevance of fair value measurement for investment properties and whether this is impacted by optimistic assumptions are provided by evaluating the association between change in market value and earnings components. The results are presented in Table 6, where $Opt_{it}$ is determined on the basis of the full sample, economic region, year, or property category (from columns (1) to (4) respectively). Consistent with Hypothesis 1 the coefficient of variable $FVGain_{it}$ is significantly positive with a magnitude close to one (e.g., in column (1), $\beta_1 = 0.912$, $t$-stat = 2.75), with fair value adjustments of investment properties mirrored in changes in equity value. Similar to the level regression analysis, the relevance of net fair value gains for firms with optimistic assumptions is significantly lower (e.g., in column 1, $\beta_2 = -0.943$, $t$-stat = –1.90). In fact, for optimistic firms the estimated marginal effect of recognized net valuation gains on the change in market value is not significantly different from 0 ($\beta_1 + \beta_2$), implying that investors heavily discount any fair valuation gains recognized on the statement of profit or loss if current year's fair value assumptions are considered to be optimistic. The results are robust across all columns in Table 6 when $Opt_{it}$ is determined on various bases. Overall, these findings confirm that fair values, and hence fair value gains, are generally relevant, but significantly less relevant where there is evidence of optimistic assumptions being made.

*Rational Discounting or Market Mispricing*

Given our findings of reduced value relevance for firms identified as making optimistic assumptions, a natural follow-up question is whether it reflects investors rationally discounting firms' optimistic fair value reporting or temporary market mispricing (Barth *et al.*, 2018). The previous validation tests of our optimism measure have shed some light on this question as we document evidence of these

TABLE 6

RELEVANCE OF FAIR VALUE GAINS AND IMPACT OF OPTIMISTIC ASSUMPTIONS

| | (1) Overall sample | | (2) Region | | (3) Year | | (4) Property type | |
|---|---|---|---|---|---|---|---|---|
| | Coef. | *t*-stat. | Coef. | *t*-stat. | Coef. | *t*-stat. | Coef. | *t*-stat. |
| $FVGain_{it}$ | 0.912 | 2.75*** | 0.871 | 2.70*** | 0.905 | 2.76*** | 0.864 | 2.76*** |
| $FVGain_{it} \times Opt_{it}$ | –0.943 | –1.90* | –0.936 | –1.78* | –0.947 | –1.86* | –1.141 | –2.09** |
| $Opt_{it}$ | 0.016 | 0.49 | 0.016 | 0.46 | –0.001 | –0.03 | 0.025 | 0.68 |
| $OtherNI_{it}$ | 0.390 | 1.02 | 0.399 | 1.05 | 0.410 | 1.08 | 0.456 | 1.22 |
| Firm fixed effect | Yes | | Yes | | Yes | | Yes | |
| Year fixed effect | Yes | | Yes | | Yes | | Yes | |
| No. of observations | 737 | | 737 | | 737 | | 737 | |
| Adjusted $R^2$ | 0.082 | | 0.082 | | 0.083 | | 0.084 | |
| Wald test: Coefficient of $FVGain_{it} = 1$ | | | | | | | | |
| Prob > F = | 0.792 | | 0.691 | | 0.772 | | 0.663 | |

This table reports the estimation results of model (4). It evaluates the association between change in market value and earnings components, conditional on whether firm observations are identified to make optimistic valuation assumptions ($Opt_{it}$). Variable $Opt_{it}$ is determined separately relative to the full sample (column (1)), economic region (column (2)), year (column (3)), and property category (column (4)). Wald tests on whether the estimated coefficient of $FVGain_{it}$ is statistically different from one are also reported. All variables are as defined in Table 1. ***, ** and * respectively indicate significance levels of 1%, 5%, and 10%.

firms' valuation assumptions being optimistic. In this section, we perform some additional analyses on firms' subsequent stock performance in order to reveal further evidence on the market impact of firms marking optimistic fair value estimation.

We first investigate if there is any difference in subsequent stock returns following the release of financial reports between firms identified as making optimistic forecasts and the remainder of the sample. If subsequent stock returns are systematically more positive for firms with optimistic valuation assumptions, a lower association between the market price and fair values of investment properties potentially identifies a temporary market mispricing and the firm undervaluation is subsequently resolved in the period following the release of the financial report. On the other hand, if there are no differences in subsequent stock returns, it confirms that investors see through the biased accounting assumptions underpinning the firms' fair value estimates and that market pricing is efficient.

We regress firms' buy-and-hold stock returns, with or without dividends, during a one/two/three-month period commencing in the fourth month following the end of the financial year on our key independent variable $Opt_{it}$ with firm and year fixed effects.[17] Untabulated results show no evidence of any difference in

[17] Our results still hold when subsequent stock returns are determined over a three-month period after the end of the second or the third month following the fiscal year-end. Considering that controlling the firm fixed effect may underestimate the subsequent reversion of mispricing, we also estimate the model without the firm fixed effect and obtain the same result.

subsequent stock returns between firms identified to be optimistic in valuing investment properties and others. These findings are inconsistent with investors' discount of fair value investment properties being market mispricing, but support that investors see through the optimistic accounting assumptions made by firms.

In our final inquiry of the economic consequences of optimistic fair value estimation in the real estate investment industry, we examine whether firms' inappropriate accounting valuation assumptions induce measurement uncertainty for investors. If the subjective and biased measurement of investment properties causes confusion and uncertainty in the market as it differs from investor expectations, we expect to see increased stock return volatility following the release of financial reports. On the other hand, if fair value assumptions are recognized to be biased and ignored by investors, we expect to see no difference in the change of subsequent stock return volatility between firms with optimistic forecasts and the rest. This is evaluated by considering the association between subsequent stock return volatility and the identification of optimistic firms. Again, untabulated analysis shows no evidence of firms with optimistic valuation assumptions subsequently experiencing higher stock returns volatility, indicating no increased measurement uncertainty faced by investors.

*Discussions*

All in all, investors seem to ignore the biased fair value estimates of investment properties provided by firms and perform independent evaluations of asset value and hence firm value. The ability of investors to identify unreasonable fair value measurement with Level 3 inputs and not to be misled has not been documented in the existing literature. The real estate investment industry provides a unique setting where the fair value assumptions underlying a firm's major assets can be easily determined by investors using financial report information. This allows us to study whether investors would use the information about actual valuation assumptions, if provided or determinable, to assess the reliability of fair value estimates. Investors' ability to do so is further enhanced by the transparency around investment property valuations in the real estate investment industry (Barth *et al.*, 2018). Real estate investment firms have relatively homogenous business models and assets. The abundant disclosures about firms' investment property portfolios via financial reports, company websites, and commercial databases, together with the well-developed valuation methodologies in the industry, make it easy to compare and judge the appropriateness of valuation estimates. Consequently, the market is able to detect optimistic forecast assumptions and to correctly price the real estate investment firms.

One may wonder why real estate investment firms would provide optimistic valuation estimates if they can be seen through by the market. An ample amount of accounting empirical research has documented various firm and managerial incentives to inflate assets and profit, despite that investors are not fooled (e.g., Stein, 1989; Shivakumar, 2000; Caton, Chiyachantana *et al.*, 2011). In particular, Stein (1989) develops a theoretical model which predicts that corporate myopic behaviours would persist even though stock market participants are

rational and not misled. The paper also questions the statement that since managers cannot systematically fool the market they will not bother trying (Stein, 1989). In this study, we do not suggest that the nature of optimistic valuation estimates is always intentional or opportunistic. Managers' tendency to be optimistic in their forecasts has been reported in many previous studies and this may reflect poor managerial ability or honest forecast errors (e.g., Kimbrough *et al*., 2021). Evaluation of the nature of the optimism is beyond the scope of this paper and future studies may investigate this question in detail.

With regards to the generalizability of our results, we believe that investors' ability to identify unreasonable Level 3 fair value estimates is likely to be impaired in other contexts where valuation assumptions cannot be consistently inferred from balance sheet and income statement information. This raises concerns about the lack of disclosure requirements of fair value assumptions in the current accounting standards, for example, *IFRS 13 Fair Value Measurement*. While the economic consequences of this limitation in disclosures are mitigated in our setting of real estate investment firms, it is likely to lead to misevaluation and information uncertainty in other circumstances. Considering that investors are well aware of the subjectivity in fair value measurement and have the ability to identify potentially biased assumptions, enhanced firm disclosures on valuation assumptions are expected to introduce market-wide improvements in information transparency and limit mispricing.

## CONCLUSION

Based on a sample of European and Australian real estate investment firms that adopt international accounting standards, this paper has re-examined the relevance of assets measured at Level 3 fair values, with a focus on the critical assumptions underpinning the fair value measurement of investment properties, that is, the capitalization rate which reflects the assumed growth rate in future rental income and the discount rate. We have extended prior research on the value relevance of fair values by investigating the ability of investors to directly assess the truthfulness of the actual assumptions if observable.

We find that investment properties recognized with Level 3 fair value inputs are relevant to investors. This contrasts with some prior research which finds evidence that the relevance of Level 3 fair values is discounted by the market due to the use of unobservable valuation inputs. We do not find evidence of reduced value relevance in general. For most of the sample firms, changes in fair value investment properties result in the same degree of variations in firm value. These findings support the argument in Lawrence *et al*. (2016) that the discounted relevance of Level 3 fair values relative to Level 1 and 2 reported in prior studies is likely to be a result of omitted variable bias.

However, for firms where there is evidence of optimistic assumptions being made, the relevance of their investment properties is significantly reduced. The effect is economically significant as investors on average discount the value of

investment properties by roughly 20% and completely ignore the fair valuation gains. These results suggest that the relevance of Level 3 fair values is sensitive to the actual underlying assumptions. We argue that investors are able to see through firms' optimistic assumptions in the determination of fair value for investment properties and make corresponding valuation adjustments given that valuation assumptions can be easily inferred from information in the financial reports. Our interpretation of these results is confirmed in a number of additional tests which report no evidence of subsequent stock price reversals nor increased information uncertainty for firms making optimistic assumptions.

This study makes important contributions to the existing fair value literature. It demonstrates that the actual valuation assumptions made in the determination of fair values are an important consideration for investors in evaluating the reliability of fair value measurement. The calls for accounting standard-setters and regulators to mandate disclosures about fair value assumptions in the financial reports are justified as our research implies that the information is useful to investors and can improve market transparency and efficiency. This study also shows that income statement information can be used together with balance sheet information to infer the underlying assumptions in fair value estimates, and hence remains useful when the balance of fair value assets is reported.

Future studies can be conducted to further investigate the motivations behind real estate firms' optimism in fair value estimation despite that investors are not misled. With the availability of data and proper research designs, the analysis of this study can also be extended to other industry settings or asset types where fair value measurement is applied.

## ACKNOWLEDGEMENT

Open access publishing facilitated by University of Technology Sydney, as part of the Wiley - University of Technology Sydney agreement via the Council of Australian University Librarians.

## REFERENCES

Ammer, J. and J. Wongswan (2007) 'Cash Flows and Discount Rates, Industry and Country Effects and Co-Movement in Stock Returns', *Financial Review*, Vol. 42, No. 2, pp. 211–26.

Barth, M. E. (2018), 'The Future of Financial Reporting: Insights from Research', *Abacus*, Vol. 54, No. 1, pp. 66–78.

Barth, M. E. and G. Clinch (1998), 'Revalued Financial, Tangible, and Intangible Assets: Associations with Share Prices and Non-market-based Value Estimates', *Journal of Accounting Research*, Vol. 36, No. 3, pp. 199–233.

Barth, M. E., D. Israeli, and S. Sridharan (2018), *Equity Book Values Greater Than Market Values: Accounting, Risk, or Mispricing?*, retrieved from https://ssrn.com/abstract=3306503 or https://doi.org/10.2139/ssrn.3306503

Baum, A. and S. Devaney (2008) 'Depreciation, Income Distribution and the UK REIT', *Journal of Property Investment & Finance*, Vol. 26, No. 3, pp. 195–209.

Bordalo, P., N. Gennaioli, R. L. Porta, and A. Shleifer (2019), 'Diagnostic Expectations and Stock Returns', *The Journal of Finance*, Vol. 74, No. 6, pp. 2839–74.

Chan, L. K. C., J. Karceski, and J. Lakonishok (2003), 'The Level and Persistence of Growth Rates', *The Journal of Finance*, Vol. 58, No. 2, pp. 643–84.

Christensen, H. B. (2019), 'Broad- Versus Narrow-sample Evidence in Disclosure Regulation Studies: A Discussion of Badia, Duro, Jorgensen, and Ormazabal (2018)', *Contemporary Accounting Research.* https://ssrn.com/abstract=3432676 or https://doi.org/10.2139/ssrn.3432676

Danbolt, J. and W. Rees (2008), 'An Experiment in Fair Value Accounting: UK Investment Vehicles', *European Accounting Review*, Vol. 17, No. 2, pp. 271–303.

Dietrich, R. J., M. S. Harris, and K. A. Muller (2000), 'The Reliability of Investment Property Fair Value Estimates', *Journal of Accounting and Economics*, Vol. 30, No. 2, pp. 125–58.

Ferreira, P. H., R. Kräussl, W. R. Landsman, M. N. Borysoff, and P. F. Pope (2019), 'Reliability and Relevance of Fair Values: Private Equity Investments and Investee Fundamentals', *Review of Accounting Studies*, Vol. 24, No. 4, pp. 1427–49.

Freeman, W., P. Wells, and A. Wyatt (2017), 'Measurement Model or Asset Type: Evidence from an Evaluation of the Relevance of Financial Assets', *Abacus*, Vol. 53, No. 2, pp. 180–210.

Goh, B. W., D. Li, J. Ng, and K. Ow Yong (2015), 'Market Pricing of Banks' Fair Value Assets Reported Under SFAS 157 Since the 2008 Financial Crisis', *Journal of Accounting and Public Policy*, Vol. 34, No. 2, pp. 129–45.

Lawrence, A., S. Siriviriyakul, and R. G. Sloan (2016), 'Who's the Fairest of Them All? Evidence from Closed-end Funds', *Accounting Review*, Vol. 91, No. 1, pp. 207–27.

Muller, K. A. and E. J. Riedl (2002), 'External Monitoring of Property Appraisal Estimates and Information Asymmetry', *Journal of Accounting Research*, Vol. 40, No. 3, pp. 865–81.

Muller, K. A., E. J. Riedl, and T. Sellhorn (2011), 'Mandatory Fair Value Accounting and Information Asymmetry: Evidence from the European Real Estate Industry', *Management Science*, Vol. 57, No. 6, pp. 1138–53.

Song, C. J., W. B. Thomas, and H. Yi (2010), 'Value Relevance of FAS No. 157 Fair Value Hierarchy Information and the Impact of Corporate Governance Mechanisms', *Accounting Review*, Vol. 85, No. 4, pp. 1375–410.

Sun, L., S. D. Titman, and G. J. Twite (2015), 'REIT and Commercial Real Estate Returns: A Postmortem of the Financial Crisis', *Real Estate Economics*, Vol. 43, No. 1, pp. 8–36.

Vergauwe, S. and A. Gaeremynck (2019), 'Do Measurement-related Fair Value Disclosures Affect Information Asymmetry?', *Accounting and Business Research*, Vol. 49, No. 1, pp. 68–94.

Vergauwe, S., A. Gaeremynck, and D. Stokes (2011), *The Impact of Disclosure and Auditing on the Reliability of Fair Value Estimates in the Real Estate Industry*. doiI: 10.2139/ssrn.1975669

Verrecchia, R. E. (1983), 'Discretionary Disclosure', *Journal of Accounting and Economics*, Vol. 5, 179–94.

Welsch, R. and E. Kuh (1977), 'Linear Regression Diagnostics', *National Bureau of Economic Research Working Paper Series*, No. 173. doi: https://doi.org/10.3386/w0173