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Reliability and Relevance of Fair Values: Private Equity Investments and Investee Fundamentals

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Abstract

We directly test the reliability and relevance of fair values reported by listed private equity firms (LPEs), where the unit of account for fair value measurement attribute (FVM) is an investment stake in an individual investee company. FVMs are observable for multiple investment stakes, fair values are economically important, and granular data on investee economic fundamentals that should underpin fair values are available in public disclosures. We find that LPE fund managers determine valuations based on accounting-based fundamentals—equity book value and net income—that are in line with those investors derive for listed companies. Additionally, our findings suggest that LPE fund managers apply a lower valuation weight to investee net income if direct market inputs are unobservable during investment value estimation. We interpret these findings as evidence that LPE fund managers do not appear mechanically to apply market valuation weights for publicly traded investees when determining valuations of non-listed. We also document that the judgments that LPE fund managers apply when determining investee valuations appear to be perceived as reliable by their investors.

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Reliability and Relevance of Fair Values: Private Equity Investments and Investee Fundamentals

1. Introduction

The fair value measurement attribute (FVM) has emerged as a prominent feature of both International Financial Reporting Standards (IFRS) and US Generally Accepted Accounting Principles (US GAAP). The International Accounting Standards Board (IASB) and Financial Accounting Standards Board (FASB) have issued various disclosure and recognition standards requiring or permitting the reporting of fair values of specific assets and liabilities. They have also issued supporting standards identifying methodologies for fair value measurement.[1] IAS 39, similar to SFAS 157, distinguishes between Level 1, 2, and 3 fair value inputs. Level 1 inputs are based on quoted prices for identical assets and liabilities, and are most applicable to those assets or liabilities that are actively traded (e.g., trading investment securities). Level 2 inputs are based on quoted market prices for similar or related assets and liabilities or those derived from or corroborated by observable market data by correlation or other means. Level 3 inputs are based on unobservable estimates and assumptions.

Proponents of FVM suggest that fair value reporting increases transparency and captures the effects of changing business conditions in financial statements in a timely manner. However, critics of FVM point to several limitations that potentially reduce its relevance to users.[2] A common concern is the reliability of FVM, especially when markets are inefficient, illiquid or non-existent, and when managers have the incentive and opportunity to act strategically when applying judgments and estimates in determining fair values.

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[1] See *Statement of Financial Accounting Standards No. 157, Fair Value Measurements* (FASB, 2006), and *IFRS 13, Fair Value Measurement*, (IASB, 2011).

[2] See, for example, Barth (2004), Benston (2008), Penman (2007), Landsman (2007), and Ryan (2008) for discussions of costs and benefits of FVM.

In this study, we develop direct tests of the reliability and relevance of fair values reported for illiquid assets. We exploit a novel experimental setting — that relating to listed private equity firms (LPEs) — where the unit of account for FVM is an investment stake in an individual investee company, FVMs are observable for multiple investment stakes, fair values are economically important, and granular data on the economic fundamentals that should underpin fair values are available in public disclosures made by private investee companies. Such disclosures permit us to explore the following two research questions unaddressed in prior literature.

First, how do investees' financial statement-based measures of economic fundamentals map into the fair value estimates of their fair value reported by investor funds? We address this research question by estimating a valuation equation relating a fund measure of investee fair value to investee earnings and equity book value. We find that the equity book value and net income coefficients are similar in magnitude to those obtained from prior research in which the dependent variable is equity market value. Thus, it appears that LPE fund managers determine valuations based on accounting-based fundamentals that are in line with those investors derive for listed companies. Findings from estimations in which we permit the equity book value and net income coefficients to differ for the amounts relating Level 1 vs. Level 3 assets reveal that the total coefficients applied to equity book value for Level 1 and Level 3 investments are insignificantly different, but only the net income coefficient is significantly positive for Level 1 investments.[3] These findings suggest that LPE fund managers apply a lower valuation weight to the investee's net income when determining its investment value if there are no direct market inputs available. Thus, LPE fund managers do not appear mechanistically to apply valuation weights the market uses for their publicly traded investees when determining valuations for their

[3] As explained below, our data permit us to distinguish Level 1 assets from non-Level 1 assets.

non-listed investees.

Second, do LPE fund investors assign a discount or a premium to reported Level 3 fair value estimates for funds that apply discretion when estimating investee asset values? We address this question by first aggregating investee-level estimates at the fund level, classifying funds into two categories: those that apply discretion when estimating Level 3 fair values and those that do not. We use the tendency to over- or under-value investments as a proxy for discretion. Then, we estimate a fund-level value relevance regression in which the dependent variable is the investor fund's equity market value and the independent variables are fund net income and equity book value, where we condition the equity book value coefficient to depend on whether the investor fund applies discretion. Our findings reveal that the equity book value coefficients relating to fund-years in which LPE fund managers do and do not apply discretion or tend to over- or under-value investments are insignificantly different from one another. Such findings suggest that when LPE fund managers use discretion and apply information beyond the investee's financial statement fundamentals to estimate portfolio company fair value, LPE fund investors do not assign a discount to account for such discretion when valuing their equity in the fund. Moreover, fund investors do not discount the value of their holdings if LPE fund managers tend to report valuations that are positively biased relative to valuations implied by fundamentals for listed investees. Hence, the judgments LPE fund managers apply appear to be perceived as reliable by their investors. In addition, findings from tests in which we permit coefficients to differ for funds with relatively high and low liquidity yield the same inferences.

The remainder of this paper is organized as follows. Section 2 discusses the institutional setting and related research. Section 3 develops the research design, Section 4 describes the sample, and Section 5 presents the results. Section 6 concludes the study.

2. Institutional Setting, Related Research, and Research Questions

2.1. Relevance and Reliability and Fair Values

The relevance of accounting information to users is the characteristic of financial statements most frequently emphasized by accounting standard setters. Information is relevant to financial statement users if it has the potential to affect user decisions, if it is material, and if it has predictive and/or confirmatory value (Hodder, Hopkins and Schipper, 2014, p.174; IASB, 2015, paragraph 2.7). Thus, FVM will be relevant to investors in private equity funds if they (1) affect investors' decisions by causing revisions in market expectations, (2) predict future cash flows from fund investments, or (3) confirm market expectations.

Prior research on the FVM decision relevance of documents evidence consistent with FVM being decision relevant for various asset classes, including financial assets of banks (Barth, 1994), real estate assets (Aboody, Barth and Kasznik, 1999), and financial, tangible and intangible assets (Barth and Clinch, 1996; 1998).[4] This prior research adopts different research designs in testing for decision relevance including both tests of the predictive ability of fair values for operating performance (Aboody et al., 1999) and value relevance tests based on the relations between market values of equity or debt securities and the fair values of different classes of assets. In a recent study in the context of private equity, Jenkinson, Landsman, Rountree and Soonawalla (2017) assess the accuracy of fair value estimates of fund net asset values by comparing fund estimates to the present value of all future realized cash flow and show that, on average, reported net asset values converge to discounted cash flows early in the life of the fund.

[4] The literature is extensive and is not covered comprehensively here. Several review papers and critiques are available. See, for example, Landsman (2007).

Recent fair value research attempts to identify whether FVM market valuations of reflect markets perceptions of differences in the reliability of different FVM inputs, i.e., Levels 1, 2 and 3. Several studies (Goh, Li, Ng and Yong, 2015; Kolev, 2009; Song, Thomas and Yi, 2010) conduct their tests using banks because investments subject to fair value measurement typically comprise a substantial portion of bank assets. A common result emerging from these studies is that the per dollar market valuation of Level 3 fair value amounts is less than dollar for dollar, i.e., the valuation coefficients are less than one, and also are lower than the per dollar market valuations of Level 1 and Level 2 fair value amounts. Hence, although investors regard the FVM of Level 3 assets as decision-relevant information, such information is less reliable. An important factor that can affect reliability is non-neutrality of measurement arising from regulatory pressures that can create incentives for bank managers to exercise discretion when applying FVM rules. Carroll, Linsmeier and Petroni (2003) and Lawrence, Siriviriyakul and Sloan (2016) avoid the regulatory capital influence on incentives by examining value relevance of fair value estimates for closed-end mutual funds. Both studies find that fair value estimates of investment fair values are value relevant, and Lawrence et al. (2016) also find that Level 3 fair values have similar value relevance to Level 1 and Level 2 fair values.[5]

Taken together, the evidence regarding the market's perception of reliability FVM is limited and incomplete. Moreover, previous studies do not address the question of whether value relevance of Level 3 fair values differs depending on the extent to which managerial judgment and discretion have been applied. This could be an important issue if Level 3 assets comprise an economically meaningful proportion of total assets. For example, in the Lawrence et al. (2016)

[5] Lawrence et al. (2016) further replicates and extends the Song et al. (2010) study for a set of banks and find evidence that the differences between value relevance of Level 3 fair values and those of Levels 1 and 2 are insignificant after controlling for an omitted variable.

study of closed-end mutual funds, Level 3 assets are, on average, only 2.2% of total assets despite nearly 100% of assets being subject to FVM. In contrast, in our sample of LPE firms, Level 2 or 3 assets comprise approximately 50% of assets for which we are able to construct a valuation.

Private equity investors holding economically significant stakes in investee companies normally define the asset to be valued (i.e., the unit of account) as the investee company itself. The fair value of an investment stake is, therefore, the relevant fraction of the estimated fair value of the investee company.[6] The challenges private equity fund managers face in deriving representationally faithful estimates of the fair values of private companies in which they have a stake are similar to the difficulties investors face in valuing typical listed companies. The main challenge is that intrinsic economic value is related to unknown and difficult-to-predict uncertain future cash flows. Hence the economic reality that FVM is attempting to capture is itself not directly observable.[7] This, in turn, makes empirical testing of the representational faithfulness of FVM using archival data challenging (Maines and Wahlen, 2006, p.405), and, as a result, there is little or no extant research that does so.

Our research addresses this challenge by identifying a setting where the economic reality that should be reflected in fair value estimates is partially observable, or estimable, using private company financial statements. In particular, as described more fully below, we match fair value estimates of Level 1 and Level 3 investments in individual investees reported by LPE funds with

[6] We note that the *unit of account* concept is potentially important in all FVM. For example, is a fair value estimate of an investment holding based on the value of a single share in a company, or is it a proportion of the estimated value for which a company could be sold? The resulting FVMs can be different. Clear guidance on this issue as it applies to private equity firms is not available from existing accounting standards. However, because representational faithfulness is a primary qualitative characteristic aimed at representing economic substance, valuation guidelines in the private equity sector usually focus on the investee company as the appropriate unit of account (see, for example, *International Private Equity and Venture Capital Valuation (IPEV) Guidelines* (International Private Equity Valuations Board, 2012).

[7] Even if fair value estimates exploit private information held by corporate management, there is still uncertainty in fair value estimates because of latent business uncertainty.

proxies for economic fundamentals derived from investees' financial statements that are publicly available. This enables us to test whether the reliability of Level 3 estimates is related to the extent to which private equity fund managers' fair value estimates of their investments correspond to economic fundamentals that can be independently verified by their investors.

2.2 Institutional Setting and Research Questions

Our institutional setting provides the opportunity to study the reliability of FVM dimensions using a research design based on archival data. We study LPE funds because their listing status requires them to apply the financial reporting standards applicable to listed companies in the relevant jurisdiction. In fact, as described in Section 4 below, all of the LPE funds we study are domiciled in the UK and hence have to prepare financial statements under either IFRS or UK GAAP.[8] However, since 2005, UK GAAP and IFRS include identical FVM standards (FRS 26 in UK GAAP is identical to IAS 39 in IFRS).[9] Hence from the perspective of FVM rules, the reporting regime in the UK is unimportant for our study. As long as fair values can be estimated reliably, listed funds after 2005 are required to account for their investments at fair value using valuation inputs equivalent to Levels 1, 2 or 3. In the case of private equity funds' portfolio holdings we expect most investments, other than those recently acquired or those recently subject to an IPO and still retained in a portfolio, to be investment stakes in unquoted companies valued using Level 2 or Level 3 inputs. We exploit the detailed disclosures on the valuation methods and assumptions used for each investment carried at fair value required by IAS 39 and IFRS 7.

[8] Since 2005, firms listed in the EU are required to report under IFRS if they report consolidated financial statements. However, listed firms that do not produce consolidated financial statements are permitted to report under domestic accounting standards.

[9] Since 2012 the authoritative body issuing UK GAAP standards is the Financial Reporting Council and UK GAAP have been consolidated under FRS 102.

Valuation methods applied in the private equity sector are varied. For example, *International Private Equity and Venture Capital Guidelines* (IPEV, 2012) identifies six potentially relevant valuation methods including net assets at cost, the price of recent investments, market multiples, industry valuation benchmarks, discounted cash flows, or earnings of the underlying business and discounted cash flows from an investment. The first two methods are essentially historical cost measures, with the second expected to be approximately equal to fair value if the transaction timing is close to the reporting date; the second two are based on observable market inputs and observable accounting numbers, and hence likely to be classified as Level 2. The two discounted cash flow approaches are based on unobservable inputs and should be classified as Level 3 inputs.

All limited liability companies in the EU (and hence, presently the UK) are required to file financial statements, regardless of their listing status. This permits us to exploit information on economic fundamentals in the financial statements filed by private investee companies to address two research questions heretofore unaddressed in prior literature. First, how do investees' financial statement-based measures of economic fundamentals map into the fair value estimates of their fair value reported by LPE funds? We address this research question by estimating a valuation equation relating a fund measure of investee fair value to investee earnings and equity book value. Second, do LPE investors assign a discount or premium to Level 3 FVMs depending on the extent of discretion that funds apply when estimating Level 3 fair values? We address this question by using output from the investee level estimation aggregated to the fund level, permitting us to develop a proxy for the degree of discretion exercised by the fund in the valuation process. We then estimate an investor-level value relevance regression in which the dependent variable is the LPE fund equity market value and

the independent variables are investor net income and equity book value, where we condition the equity book value coefficient to depend on whether the investor applies discretion or tends to over- or under-value its investments.

3. Research Design

3.1 Mapping investee economic fundamentals into investee valuations

We analyze the mapping of investees' economic fundamentals into the estimates of their fair values reported by the LPE funds by estimating the following valuation equation. We begin by regressing FVM relating to investee *j*, *FV*, on the investee's equity book value, *BVE*, and net income, *NI*:

$$FV_{ijt} = \alpha_0 + \alpha_1 BVE_{jt} + \alpha_2 NI_{jt} + \alpha_3 Loss_{jt} + \alpha_4 NI \times Loss_{jt} + \varepsilon_{ijt}, \quad (1)$$

where the *i*, *j* and *t* subscripts refer to a valuation made for investee *j* by fund *i* as of year *t*, *t* = 2005 through 2014. The fair value, *FV*, is calculated as the valuation as disclosed by the fund divided by the percentage of investee's equity held by the fund, *BVE* and *NI* are the investee's equity book value and net income, and *Loss* is an indicator variable that equals one if the investee reported a loss and zero otherwise. We include *Loss* and the interaction of *Loss* and *NI* based on prior research in equity valuation that indicates that earnings multiples of negative and positive earnings firms differ.[10] We estimate Equation (1) including year fixed effects and with and without fund fixed effects, and cluster standard errors by year and by fund.

We emphasize that the fair value estimate reflected by the dependent variable is measured at the level of the investee, *not* the level of the fund. An advantage of the regression approach to evaluating valuation multiples is that it controls for the average effects of other information not reflected by financial statement information that affects fair values. The

[10] See, for example, Hayn (1995) and Barth, Beaver and Landsman (1998).

valuation multiples on equity book value, α_1, and net income, α_2, can be viewed analogously to multiples estimated from a regression of equity market value on equity book value and net income for a typical publicly traded firm.

Our research design assumes that investee companies' financial statements contain information on economic fundamentals useful in assessing the reliability of reported FVM. In the case of Level 1 or 2 valuations described as being based on market or industry valuation multiples, fair values should be directly related to financial statement numbers. In the case of Level 3 valuations employing discounted cash flow techniques, we expect that resulting valuations will be associated with current financial statement numbers based on accounting-based valuation theory and empirical evidence from the value relevance literature (Landsman 2007, Song et al. 2010, Goh et al. 2015). Although private equity managers might have access to a broader set of private information beyond that contained in financial statements, we assume that information in investee companies' published financial statements is nevertheless useful in deriving fair value estimates and can therefore be used in estimating the reliability of Level 3 fair values.

To assess directly whether private equity fund managers assign valuation multiples for Level 3 investments based on the valuations implied by the investee economic fundamentals for investees for which Level 1 inputs, i.e., market prices, are available, we estimate the following extended version of Equation (1):

$$\begin{aligned} FV_{ijt} = {} & \alpha_0 + \alpha_1 BVE_{jt} + \alpha_2 NI_{jt} + \alpha_3 Loss_{jt} + \alpha_4 NI \times Loss_{jt} \\ & + \alpha_5 Level1_{jt} + \alpha_6 Level1 \times BVE_{jt} + \alpha_7 Level1 \times NI_{jt} \\ & + \alpha_8 Level1 \times Loss_{jt} + \alpha_8 Level1 \times NI \times Loss_{jt} + \varepsilon_{jt}. \end{aligned} \quad (2)$$

*Level*1 is an indicator variable for investments that the investor indicates the investee valuation is based on quoted market prices in active markets for identical assets, i.e., Level 1 inputs, or the investee is traded on the Alternative Investment Market (AIM).[11] As described below, our sample of LPE funds consists of Venture Capital Trusts, which are permitted to invest in either AIM-listed or unlisted firms. The default category is Level 3 investments. In many cases, funds disclose investments that are valued based on a Level 3 valuation, but in no case are investments classified as Level 2. We delete 191 observations for which no valuation level is provided or can be inferred from the financial statements. We classify all non-Level 3 investments as Level 1. As with Equation (1), we estimate Equation (2) including year fixed effects and with and without fund fixed effects.

3.2 Evaluating the user relevance of fair value measurements

Our next set of tests aims to examine the decision relevance of the FVM provided to investors in LPE funds using a value relevance design. In contrast to our main tasks focusing on the relations between FVM of private equity funds and the fundamentals of investees, the focus of this analysis is on the relation between the net asset values (NAVs) disclosed by LPE funds and the market pricing of the LPE funds' equity, including the discounts at which funds trade relative to the NAVs. When interpreting these fund-level regression tests we assume that private equity funds are valued in an efficient market, implying that investors fully incorporate information on investee fundamentals, including financial statement information, into the market values of funds. Under this assumption the relation between the market values of funds and aggregate investee fair value estimates reported by fund managers depends on investors'

[11] AIM is a trading platform set up in 1995 by the London Stock Exchange that is designed to permit a wide range of businesses including early stage, venture capital-backed, as well as more established companies to seek access to capital. Currently, over 3,600 firms have their shares traded on AIM.

assessments of the reliability of the fair value estimates reported by funds in capturing the fundamental values of investees owned by funds.

Following prior value research, we use as a starting point the following cross-sectional equity valuation and return equations to assess the value relevance of LPE funds' investments

$$MVE_{it} = \alpha_0 + \alpha_1 BVE\_other_{it} + \alpha_2 BVE\_FV_{it} + \alpha_3 NI_{it} + \alpha_4 Loss_{it} + \alpha_5 NI \times Loss_{it} + \varepsilon_{it} . \quad (3)$$

MVE is the LPE's market value of equity three months after fiscal year end, *BVE_FV* is the total fair value of investments recognized and for which valuation data are available, and *BVE_other* is the equity book value excluding *BVE_FV*. *NI* is net income before gains/losses on investments, and *i* and *t* subscripts denote private equity fund and year, respectively. Equation (3) (and Equations (4) and (5) that follow) includes year fixed effects and White robust standard errors.

To address our second research question, we estimate the following modified versions of Equation (3) that permit the *BVE_FV* coefficient to differ for funds we identify as tending to apply discretion:

$$MVE_{it} = \alpha_0 + \alpha_1 BVE\_other_{it} + \alpha_2 BVE\_FV_{it} + \alpha_3 High\_resid_{it} + \alpha_4 BVE\_FV \times High\_resid_{it} + \alpha_5 NI_{it} + \alpha_6 Loss_{it} + \alpha_7 NI \times Loss_{it} + \varepsilon_{it} , \quad (4)$$

and

$$MVE_{it} = \alpha_0 + \alpha_1 BVE\_other_{it} + \alpha_2 BVE\_FV_{it} + \alpha_3 Pos\_resid_{it} + \alpha_4 BVE\_FV \times Pos\_resid_{it} + \alpha_5 NI_{it} + \alpha_6 Loss_{it} + \alpha_7 NI \times Loss_{it} + \varepsilon_{it}. \quad (5)$$

High_resid (*Pos_resid*) is an indicator variable that equals one if the LPE fund's weighted average absolute residual ratio (signed residual ratio) obtained from Equation (2) is above the sample median in a given year and zero otherwise. The ratios are weighted by the valuation for each of the LPE's investee valuations for which data are available. In particular, for a given LPE fund *i* and time *t*, we first obtain the residuals from Equation (2) corresponding to each of its investments $j = 1, \ldots, J$, i.e., each residual (Res_j) is the FV_j less the fitted value (FV_fit_j) from Equation (2). To obtain a value for *High_resid*, we divide the absolute value of Res_j by the absolute value of FV_fit_j for an error ratio per investment, i.e., $|Res_j| \,/\, |FV\_fit_j|$. We then weight the error ratio by multiplying it by the ratio of FV_j to the sum of all investments with investee valuations in the disclosed by the LPE fund for the year, i.e., $FV_j / \sum_{j=1}^{J} FV_j$. Summing the resulting error ratios for all J investees, we calculate a residual ratio for each investor-year observation (*Res_ratio*):

$$Res\_ratio_{it} = \sum_{j=1}^{J} \frac{|Res_j|}{|FV\_fit_j|} \times \frac{FV_j}{\sum_{j=1}^{J} FV_j}. \tag{6}$$

Finally, *High_resid* equals one if *Res_ratio* for year *t* is above the median value for that year and zero otherwise. We follow a similar process to determine whether the weighted *Res* for each investor-year observation is negative or positive and calculate *Pos_resid* using a similar method, replacing the absolute value of $|Res_j| \,/\, |FV\_fit_j|$ with signed residual, i.e., Res_j:

$$Res\_sign_{it} = \sum_{j=1}^{J} Res_j \times \frac{FV_j}{\sum_{j=1}^{J} FV_j}. \tag{7}$$

Pos_resid equals one if *Res_sign* for year *t* is above the median value for that year and zero otherwise.

If investors believe that the application of discretion in determining valuation weights for Level 3 investments leads to unreliable valuations, then they will assign a lower valuation weight to equity book value relating to Level 3 investments. In this case, the coefficient on $BVE\_FV \times High\_resid_{it}$ will be negative. On the other hand, if investors believe that the application of discretion in determining valuation weights for Level 3 investments leads to reliable valuations, then they will assign similar valuation weights to equity book values relating to Level 3 and Level 1 investments. In this case, the coefficient on $BVE\_FV \times High\_resid_{it}$ will be zero.

4. Sample and Descriptive Statistics

The investor sample includes all UK companies that were classified as VCTs Equity Investment Instruments and that existed at some point during the period 2005 to 2016 on the London Business School Share Price Database (LSPD). VCTs comprise approximately 80% of all LPE investments in the UK. They receive special tax status in return for meeting the requirement to invest in small- and medium-sized UK companies and were limited to initial investments below £ 7-15 million in each investee (the limit varied during our sample period). In addition, VCTs are required to invest in unlisted companies, where companies listed on the AIM market segment of the London Stock Exchange are considered as unlisted for purposes of VCT investment qualification.

The potential sample consists of 149 unique funds, representing 1,058 fund-year observations. We selected 561 of these fund-year observations for hand collection by obtaining financial statements from the *Companies House* website, investor websites, and by contacting the fund managers directly. This sample represents 81 unique funds with an average of 7 years of financial statements per fund.

To construct the investee sample, we hand-collect data on ownership stake sizes and valuations from the funds' financial reports. Our initial sample comprises 22,323 unique investee-year observations, representing approximately 40 investments per fund-year. Of these 22,323 observations, we obtained 16,056 investee annual financial statements from the Bureau van Dijk FAME database, which contains financial statement information for UK and Irish firms.

Because investors do not disclose the percentage held in or the value of every investment separately, we eliminate 5,204 investee-year observations where either the percentage held or the value is not disclosed by the fund. We further eliminate observations for which FAME does not provide investee net income or equity book value, investee equity book value is negative, or the investment represents an investment in loan stock or preference shares or a loan granted. The final sample includes 6,599 investee-year observations.

Estimation of the investor valuation models, Equations (3) and (4) requires investor equity book value, net income, and equity market value and that the fund has only one share class. These requirements reduce the potential sample of fund-years from 433 to 334 investor-year observations.

Tables 1 and 4 present sample summary statistics relating to investee and fund firm-year observations, respectively. Table 1 indicates that across all sample years, the mean valuation, *FV*, applied by funds, is £32,940,000, which is substantially larger than the mean equity book, *BVE*, value of £18,912,000. The mean investee net income, *NI*, equals £312,000. Table 1 also indicates that investees valued as Level 3 investments are substantially smaller than those valued as Level 1 investments. For example, the mean values of *BVE* for Level 1 and 3 investments are £27,307,000 and £3,478,000.

Table 4 indicates that the mean fund equity book and market values, *BVE* and *MVE*, are of similar magnitude, £26,816,000 and £24,260,000. The mean equity book value attributable to assets for which we can construct investee valuations, *BVE_FV*, is £9,058,000, which represents approximately one-third of total equity book value. The mean *BVE_FV_Level*1 and *BVE_FV_Level3* are £4,351,000 and £4,707,000, or 48% and 52% of *BVE_FV*. The mean and median net income, –£61,000 and £145,000, are less than one-tenth of 1% of equity book value, suggesting that net income is an insignificant contributor to investor value. The average fund has been in existence for nine years, i.e., mean *AGE* = 9, and has an annual mean turnover deflated by annual mean market capitalization of 0.455%, i.e., *LIQUIDITY* = 0.00455.

5. Results

5.1 Mapping investee economic fundamentals into investee valuations

Table 2 presents regression summary statistics associated with the estimation of Equation (1), with separate estimations using year fixed effects or alternatively year and fund fixed effects. The findings reveal that the *BVE* coefficients, 0.92 and 0.89, and *NI* coefficients, 7.54 and 6.96, are significantly positive (*p*-values all less than 0.01).[12] Moreover, the coefficients are similar in magnitude to those obtained from prior research in which the dependent variable is equity market value (Barth et al., 1998). Thus, it appears that LPE fund managers determine valuations based on accounting-based fundamentals that are in line with those investors derive for listed companies. This is not altogether surprising because, as Table 1 reveals, nearly 2/3 of the sample includes observations relating to listed companies, i.e., those for which the LPE's valuation is a quoted market price.

[12] Throughout we use a five percent significance level under a one-sided alternative when we have a signed prediction, and under a two-sided alternative otherwise.

The *Loss* coefficients, 3,167 and 2,771, are marginally significantly positive, which is consistent with such firms having larger valuations. In addition, the *Loss*×*NI* coefficients, –9.05 and –8.34, are significantly negative, and if added to the *NI* coefficients indicate that net income receives essentially no weight when determining valuations of loss-making firms, i.e., valuations for such firms derive entirely from equity book value.

The findings in Table 2 relate to estimations that do not permit equity book value and net income for investees whose valuations are based on Level 1 and Level 3 inputs to have different valuation coefficients. Table 3 presents regression summary statistics associated with the estimation of Equation (2), in which this restriction is relaxed. The first two columns present separate findings for subsamples of observations based on Level 1 and Level 3 inputs; the second two columns present findings for the full sample of observations in which all coefficients are permitted to differ for valuations based on Level 1 or Level 3 inputs using a Level 1 indicator variable and interactions of this indicator variable with other regressors. Focusing on the interactive model, the *Level*1 coefficients, –8,931.82 and –14,954.50, are significantly negative, indicating that listed investees, e.g., those trading on AIM, are smaller than non-listed investees.

More importantly regarding our research questions, there are three key findings in Table 3. The first is that the *BVE* coefficients are significantly positive (all *p*-values at less than the 0.05 level). The second is that the *BVE*×*Level*1 coefficients, 0.06 and 0.09, are insignificantly different from zero. Hence, the total coefficients applied to *BVE* for Level 1 and Level 3 investments are not significantly different. Thus, LPE fund managers apply the same valuation weight to the investee's equity book value when determining its investment value regardless of whether there are no direct market inputs available. The third key finding is that the *NI* coefficients are insignificantly different from zero, but the *NI*×*Level*1 coefficients, 7.43 and

6.81, are significantly positive, indicating that the *NI* coefficient is significantly larger for Level 1 investments. This can also be seen by comparing the *NI* coefficients in columns 1 and 2, where the *NI* coefficients for Level 1 and Level 3 investments are 7.80 and 2.01, but only the former amount is significantly positive. Thus, LPE fund managers do not appear to apply mechanistically valuation weights the market uses for their publicly traded investees when determining valuations for their non-listed investees. Whether this application of discretion leads their investors to discount their disclosed investments when valuing their equity is a question to which we now turn.

5.2 Evaluating the user relevance of fair value measurements

Table 5 presents regression summary statistics associated with the estimation of Equation (3). The estimation is based on 327 LPE fund-year observations that had only one class of shares per issue during a given firm year.[13] The coefficients relating to net income are near zero for both profit and loss firms. This is not particularly surprising because net income is quite small and irrelevant for private equity funds. This is because the private equity funds studied have low asset turnover and hence income realizations throughout the life of the fund before liquidation (Bergmann, Christophers, Huss, and Zimmermann, 2011).

The key finding in Table 5 is that the *BVE_FV* and *BVE_Other* coefficients, respectively 0.91 vs. 1.00, are close to one, and insignificantly different from each other (F-statistic = 1.11, *p*-value > 0.32). Thus, LPE fund investors appear to apply the same multiple to investments in investees for which they disclose investment valuations and to those for which they do not.[14]

[13] Because Equation (3) is estimated using investor fixed effects, 7 investor-year observations relating to investors with only one year of data are excluded.

[14] We also estimated a version of Equation (3) that permits *BVE_FV* to differ for investments measured as Level 1 or Level 3. Untabulated statistics reveal that although the *BVE_FV* coefficient relating to Level 1 investments is larger than the $BVE\_FV \times Pos\_resid$ coefficient, 0.98 vs. 0.84, the difference is not statistically significant.

Table 6 presents regression summary statistics associated with estimation of Equations (4) and (5), which are based on the 327 investor-year observations used in Table 5. The key finding in Table 6 is that the incremental slope coefficients for *BVE_FV* associated with investor-years in which investee valuation errors obtained from the investee valuation model, Equation (2), are either above the median in absolute value or positive, and are insignificantly different from zero. Regarding Equation (4), the $BVE\_FV \times High\_resid$ coefficient (*t*-statistic) is 0.07 (0.89); regarding Equation (5), the $BVE\_FV \times Pos\_resid$ coefficient (*t*-statistic) is 0.13 (1.01). Taken together, these findings suggest that LPE fund investors do not assign a discount to investments when valuing their equity if LPE fund managers apply discretion — using information beyond the investee's financial statement fundamentals — when determining investee valuations. This is true if such discretion manifests as unusually large valuation errors or as positively biased relatively valuations relative to valuations implied by fundamentals for listed investees. Hence, the judgments LPE fund managers apply appear to be judged to be reliable by their investors.

5.3 Additional tests: User relevance of fair value measurements

Although Table 6 reveals that investors do not discount LPE funds for which fund managers apply discretion when valuing the investees, its illiquidity masks a discount that investors would otherwise apply. To test whether this is the case, we re-estimated Equations (4) and (5) partitioning sample observations using two proxy measures of liquidity. The first proxy is fund age, *AGE*, which prior research shows is positively correlated with liquidity (Lahr and Kaserer, 2010)). The second proxy is annual mean turnover value deflated by annual mean market capitalization, *LIQUIDITY* (Datar, Naik and Radcliffe 1998). Tables 7 and 8 present findings based on the *AGE* and *LIQUIDITY* partitions. The key finding in each table is that the

$BVE\_FV \times High\_resid$ and $BVE\_FV \times Pos\_resid$ coefficients are insignificantly different from zero for all specifications. Thus, the findings in Tables 7 and 8 suggest that illiquidity does not account for our failure to find that investors do not apply a discount to LPE funds for which managers apply discretion when valuing investees.

The measures of discretion we use when estimating Equations (4) and (5) are based on all investee valuations, i.e., Leve1 and Level 3. It is possible that the resulting residuals used to create the proxy measures, *High_resid* and *Pos_resid*, measure the underlying constructs with error because investors do not include Level 1 investments when assessing the quality of a fund manager's valuation. Therefore, we recalculated *High_resid* and *Pos_resid* using only Level 3 investment valuation errors, and re-estimated Equations (4) and (5) using these updated proxy measures. Untabulated findings reveal the $BVE\_FV \times High\_resid$ and $BVE\_FV \times Pos\_resid$ coefficients are insignificantly different from zero, and hence the inferences are the same as those based on the Table 6 findings.[15]

6. Conclusion

The fair value measurement attribute (FVM) has emerged as a prominent feature of both International Financial Reporting Standards (IFRS) and US Generally Accepted Accounting Principles (US GAAP). Proponents of FVM suggest that reporting fair values increases transparency and captures the effects of changing business conditions in financial statements in a timely manner. However, critics of FVM point to several limitations that potentially reduce its relevance to users. A common concern is the reliability of FVM, especially when markets are inefficient, illiquid or non-existent, and when managers have incentives to act strategically when judgments and estimates are used in estimating fair values.

[15] The versions of Equations (4) and (5) we estimated are based on interactions of *High_resid* and *Pos_resid* with *BVE_Level*3.

In this study we develop direct tests of the reliability and relevance of fair values reported for illiquid assets using a novel experimental setting — that relating to listed private equity (LPE) firms — where the unit of account for FVM is an investment stake in an individual investee company, FVMs are observable for multiple investment stakes, fair values are economically important, and granular data on the private companies' economic fundamentals that should underpin their LPE fund-estimated fair values are available in public disclosures.

First, we explore the mapping of investee's financial statement-based measures of economic fundamentals into the fund-reported estimates of their fair value. We find that the equity book value and net income coefficients are similar in magnitude to those obtained from prior research in which the dependent variable is equity market value. This finding suggests that LPE fund managers determine valuations based on accounting-based fundamentals that are in line with those investors derive for listed companies. Findings from estimations in which we permit the equity book value coefficient to differ for the amounts relating Level 1 vs. Level 3 assets reveal that the total coefficients applied to equity book value are the same, but only the net income coefficient for Level 1 investments is positive and significant. These findings suggest that LPE fund managers apply a lower valuation weight to the investee's net income when determining its investment value if there are no direct market inputs available. Thus, LPE fund managers do not appear to mechanistically apply valuation weights the market uses for their publicly traded investees when determining valuations for their non-listed investees.

Second, we examine whether LPE fund investors assign a discount or a premium to reported Level 3 fair value estimates for funds that apply discretion when estimating investee asset values. We address this question estimating a fund-level value relevance regression in which the dependent variable is the investor fund's equity market value and the independent

variables are fund net income and equity book value, where we condition the equity book value coefficient to depend on whether the investor fund applies discretion when estimating investee net asset values. Our findings reveal that the equity book value coefficients relating to investor-years in which LPE fund managers do and do not apply discretion are insignificantly different from one another. Such findings suggest that when LPE fund managers use discretion and apply information beyond the investee's financial statement fundamentals to estimate portfolio company fair value, LPE fund investors do not assign a discount to account for such discretion when valuing their equity in the fund. Moreover, fund investors do not discount value of their holdings if LPE fund managers tend to report valuations that are positively biased relative to valuations implied by fundamentals for listed investees. Hence, the judgments LPE fund managers apply appear to be perceived as reliable by their investors.

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Table 1A
Descriptive Statistics - Investees

Variable	*N*	*Mean*	*Bottom Quartile*	*Median*	*Top Quartile*	*SD*
BVE_{ij}	6,599	18,912	2,179	8,249	21,044	29,381
NI_{ij}	6,599	312	-468	357	1,554	3,831
FV_{ij}	6,599	32,940	7,302	15,783	33,190	52,465

Table 1A presents descriptive statics for variables used in our tests. *BVE* is book value of equity after minority interest. *NI* is the Profit (Loss) after tax for the year ended. *FV* is the grossed up value of the investment as estimated by the investor. All continuous variables are winsorized at the 1st and 99th percentiles. All figures represent GBP in thousands.

Table 1B
Descriptive Statistics - Investees (Level 1)

Variable	*N*	*Mean*	*Bottom Quartile*	*Median*	*Top Quartile*	*SD*
BVE_j	4,274	27,307	7,822	16,257	30,621	32,994
NI_j	4,274	359	-663	669	2,131	4,595
FV_j	4,274	43,266	10,050	21,700	46,400	60,497

Table 1B presents descriptive statics for Level 1 investments variables used in our tests. *BVE* is book value of equity after minority interest. *NI* is the Profit (Loss) after tax for the year ended. *FV* is the grossed up value of the investment as estimated by the investor. All continuous variables are winsorized at the 1st and 99th percentiles. All figures represent GBP in thousands.

Table 1C
Descriptive Statistics - Investees (Level 3)

Variable	*N*	*Mean*	*Bottom Quartile*	*Median*	*Top Quartile*	*SD*
BVE_j	2,325	3,478	787	1,832	3,769	9,017
NI_j	2,325	226	-260	77	642	1,683
FV_j	2,325	13,957	4,650	9,358	17,315	23,000

Table 1C presents descriptive statics for Level 3 investments variables used in our tests. *BVE* is book value of equity after minority interest. *NI* is the Profit (Loss) after tax for the year ended. *FV* is the grossed up value of the investment as estimated by the fund. All continuous variables are winsorized at the 1st and 99th percentiles. All figures represent GBP in thousands.

Table 2
Fair Value regression equations - Investees

$$FV_{ijt} = \alpha_0 + \alpha_1 BVE_{jt} + \alpha_2 NI_{jt} + \alpha_3 Loss_{jt} + \alpha_4 NI \times Loss_{jt} + \varepsilon_{ijt} \quad (1)$$

Variables	FV_{ijt}	FV_{ijt}
BVE_{jt}	0.92***	0.89***
	(11.51)	(11.16)
NI_{jt}	7.54***	6.96***
	(4.45)	(4.41)
$Loss_{jt}$	3,166.70	2,771.38
	(1.82)	(1.74)
$NI \times Loss_{jt}$	-9.05***	-8.34***
	(-4.26)	(-4.38)
R^2	0.582	0.608
Year FE	Yes	Yes
Investor FE	No	Yes
Observations	6,599	6,595

This table presents regression summary statistics for the estimation of Equation (1). *t*-statistics are presented in parentheses. Standard errors are clustered by year and fund. All continuous variables are winsorized at the 1st and 99th percentiles. The superscript asterisks *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 3
Fair value regression equations - Investees (by Levels)

$$FV_{ijt} = \alpha_0 + \alpha_1 BVE_{jt} + \alpha_2 NI_{jt} + \alpha_3 Loss_{jt} + \alpha_4 NI \times Loss_{jt} + \varepsilon_{ijt} \quad (1)$$

$$FV_{ijt} = \alpha_0 + \alpha_1 BVE_{jt} + \alpha_2 NI_{jt} + \alpha_3 Loss_{jt} + \alpha_4 NI \times Loss_{jt} + \alpha_5 Level1_{jt} + \alpha_6 Level1 \times BVE_{jt} + \varepsilon_{ijt} \quad (2)$$

Variables	*Level*1: FV_{ijt}	*Level*3: FV_{ijt}	FV_{ijt}	FV_{ijt}
BVE_{jt}	0.92***	0.84**	0.84**	0.82**
	(11.04)	(2.99)	(2.82)	(2.52)
NI_{jt}	7.80***	2.01	1.24	1.02
	(5.22)	(0.96)	(0.63)	(0.46)
$Loss_{jt}$	1,767.71	-143.74	-4,903.83*	-3,597.87
	(0.76)	(-0.08)	(-1.91)	(-1.60)
$NI \times Loss_{jt}$	-9.35***	-3.46	-7.72*	-6.49
	(-5.16)	(-1.24)	(-1.99)	(-1.71)
$Level1_{jt}$			-8,931.82***	-14,954.50***
			(-3.98)	(-5.12)
$Level1 \times BVE_{jt}$			0.06	0.09
			(0.21)	(0.30)
$Level1 \times NI_{jt}$			7.43**	6.81**
			(2.97)	(2.57)
$Level1 \times Loss_{jt}$			9,354.57*	6,800.68
			(1.97)	(1.59)
$Level1 \times Loss \times NI_{jt}$			-2.50	-2.84
			(-0.72)	(-0.80)
R^2	0.626	0.367	0.593	0.619
Year FE	Yes	Yes	Yes	Yes
Fund FE	Yes	Yes	No	Yes
Observations	4,271	2,318	6,599	6,595

This table presents regression summary statistics for the estimations of Equation (1) by Level and Equation (2). *t*-statistics are presented in parentheses. Standard errors are clustered by fund and year. All continuous variables are winsorized at the 1st and 99th percentiles. The superscript asterisks *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Level 1 is an indicator variable where an investment was measured using Level 1 inputs.

Table 4
Descriptive Statistics - Funds

Variable	*N*	*Mean*	*Bottom Quartile*	*Median*	*Top Quartile*	*SD*
BVE_i	334	26,816	13,142	23,069	35,089	18,857
BVE_FV_i	334	9,058	1,122	5,046	11,847	11,257
$BVE\_FV\_Level1_i$	334	4,351	0	659	3,496	7,875
$BVE\_FV\_Level3_i$	334	4,707	200	2,312	7,218	5,993
BVE_other_i	334	17,758	8,344	15,147	25,055	12,286
NI_i	334	-61	-199	145	589	1,937
MVE_i	334	24,260	9,601	19,405	32,823	19,103
AGE_i	334	9	4	8	12	5
$LIQUIDITY_i$	334	4.55	1.14	3.25	5.41	6.56

Table 4 presents descriptive statics for investor level variables used in our tests. *BVE* represents book value of equity after minority interest. *BVE_FV* represents the sum of the values of the investments of the fund included in the sample. *BVE_FV_Level*1 represents the sum of the Level1 fair values of the investments of the fund included in the sample. *BVE_FV_Level*3 represents the sum of the Level3 fair values of the investments of the fund included in the sample. *BVE_other* is the difference between *BVE* and *BVE_FV*. *NI* is the Profit (Loss) after tax for the year ended. *MVE* represents the market capitalization three months after year end. *AGE* represents the age of the fund rounded to the nearest year. *LIQUIDITY* is the annual mean turnover / annual mean market capitalization x 1,000. All continuous variables are winsorized at the 1st and 99th percentiles.

Table 5
Equity valuation regression equations - Funds

$$MVE_{it} = \alpha_0 + \alpha_1 BVE\_other_{it} + \alpha_2 BVE\_FV_{it} + \alpha_3 NI_{it} + \alpha_4 Loss_{it} + \alpha_5 NI \times Loss_{it} + \varepsilon_{it} \quad (3)$$

Variables	MVE_{it}
BVE_other_{it}	1.00***
	(16.11)
BVE_FV_{it}	0.91***
	(13.91)
NI_{it}	-0.28
	(-1.12)
$Loss_{it}$	162.67
	(0.30)
$NI \times Loss_{it}$	0.51
	(1.41)
R^2	0.963
Year FE	Yes
Fund FE	Yes
Observations	327

This table presents regression summary statistics for the estimation of Equation (3). *t*-statistics are presented in parentheses. Standard errors are clustered by fund and year. All continuous variables are winsorized at the 1st and 99th percentiles. The superscript asterisks *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Also, fail to reject the null that *BVE_other* = *BVE_FV* (p = 0.319).

Table 6
Equity valuation regression equations - Funds (partitioned by residuals)

$$MVE_{it} = \alpha_0 + \alpha_1 BVE\_other_{it} + \alpha_2 BVE\_FV_{it} + \alpha_3 High\_resid_{it} + \alpha_4 BVE\_FV \times High\_resid_{it} + \alpha_5 NI_{it} + \alpha_6 Loss_{it} + \alpha_7 NI \times Loss_{it} + \varepsilon_{it} \quad (4)$$

$$MVE_{it} = \alpha_0 + \alpha_1 BVE\_other_{it} + \alpha_2 BVE\_FV_{it} + \alpha_3 Pos\_resid_{it} + \alpha_4 BVE\_FV \times Pos\_resid_{it} + \alpha_5 NI_{it} + \alpha_6 Loss_{it} + \alpha_7 NI \times Loss_{it} + \varepsilon_{it} \quad (5)$$

Variables	*High_resid* MVE_{it}	*Pos_resid* MVE_{it}
BVE_other_{it}	0.99***	1.00***
	(18.30)	(17.87)
BVE_FV_{it}	0.87***	0.80***
	(8.24)	(7.80)
$High\_resid_{it}$	-1,474.75	
	(-1.47)	
Pos_resid_{it}		-980.34
		(-1.12)
$BVE\_FV \times High\_resid_{it}$	0.07	
	(0.89)	
$BVE\_FV \times Pos\_resid_{it}$		0.13
		(1.01)
NI_{it}	-0.18	-0.29
	(-0.69)	(-1.40)
$Loss_{it}$	279.74	186.91
	(0.37)	(0.31)
$NI \times Loss_{it}$	0.39	0.53
	(0.94)	(1.45)
R^2	0.964	0.964
Year FE	Yes	Yes
Fund FE	Yes	Yes
Observations	327	327

This table presents regression summary statistics for the estimations of Equation (4) and Equation (5). *t*-statistics are presented in parentheses. Standard errors are clustered by year. All continuous variables are winsorized at the 1st and 99th percentiles. The superscript asterisks *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. *High_resid* is an indicator variable where a fund's *Res_ratio* defined in equation (6) is above the year median; *Pos_resid* is an indicator variable where the weighted residuals for the fund-year defined in equation (7) is positive.

Table 7

Equity valuation regression equations - Funds (partitioned by liquidity)

$$MVE_{it} = \alpha_0 + \alpha_1 BVE\_other_{it} + \alpha_2 BVE\_FV_{it} + \alpha_3 High\_resid_{it} + \alpha_4 BVE\_FV \times High\_resid_{it} + \alpha_5 NI_{it} + \alpha_6 Loss_{it} + \alpha_7 NI \times Loss_{it} + \varepsilon_{it} \quad (4)$$

$$MVE_{it} = \alpha_0 + \alpha_1 BVE\_other_{it} + \alpha_2 BVE\_FV_{it} + \alpha_3 Pos\_resid_{it} + \alpha_4 BVE\_FV \times Pos\_resid_{it} + \alpha_5 NI_{it} + \alpha_6 Loss_{it} + \alpha_7 NI \times Loss_{it} + \varepsilon_{it} \quad (5)$$

LIQUIDITY *Variables*	*High_resid* *Below median* MVE_{it}	*High_resid* *Above median* MVE_{it}	*Pos_resid* *Below median* MVE_{it}	*Pos_resid* *Above median* MVE_{it}
BVE_other_{it}	0.97***	0.98***	1.01***	0.97***
	(14.00)	(9.60)	(12.83)	(8.57)
BVE_FV_{it}	0.83***	0.88***	0.76***	1.04***
	(4.45)	(7.10)	(7.95)	(5.97)
$High\_resid_{it}$	-3,109.61	-669.20		
	(-1.78)	(-1.11)		
Pos_resid_{it}			-1,337.37	575.03
			(-0.70)	(0.62)
$BVE\_FV \times High\_resid_{it}$	0.17	0.06		
	(1.13)	(0.67)		
$BVE\_FV \times Pos\_resid_{it}$			0.23	-0.13
			(1.58)	(-0.74)
NI_{it}	0.20	-0.15	-0.16	-0.18
	(0.31)	(-0.76)	(-0.36)	(-1.03)
$Loss_{it}$	205.93	1,088.97	401.91	1,140.89
	(0.10)	(1.25)	(0.19)	(1.35)
$NI \times Loss_{it}$	-0.22	0.19	0.24	0.26
	(-0.30)	(0.52)	(0.43)	(0.73)
R^2	0.966	0.966	0.965	0.978
Year FE	Yes	Yes	Yes	Yes
Fund FE	Yes	Yes	Yes	Yes
Observations	158	158	158	159

This table presents regression summary statistics for the estimations of Equation (4) and Equation (5) partitioned by *LIQUIDITY* above and below the the mean. *t*-statistics are presented in parentheses. Standard errors are clustered by year. All continuous variables are winsorized at the 1st and 99th percentiles. The superscript asterisks *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. *High_resid* is an indicator variable where a fund's *Res_ratio* defined in equation (6) is above the year median; *Pos_resid* is an indicator variable where the weighted residuals for the fund -year defined in equation (7) is positive.

Table 8

Equity valuation regression equations - Funds (partitioned by age)

$$MVE_{it} = \alpha_0 + \alpha_1 BVE\_other_{it} + \alpha_2 BVE\_FV_{it} + \alpha_3 High\_resid_{it} + \alpha_4 BVE\_FV \times High\_resid_{it} + \alpha_5 NI_{it} + \alpha_6 Loss_{it} + \alpha_7 NI \times Loss_{it} + \varepsilon_{it} \quad (4)$$

$$MVE_{it} = \alpha_0 + \alpha_1 BVE\_other_{it} + \alpha_2 BVE\_FV_{it} + \alpha_3 Pos\_resid_{it} + \alpha_4 BVE\_FV \times Pos\_resid_{it} + \alpha_5 NI_{it} + \alpha_6 Loss_{it} + \alpha_7 NI \times Loss_{it} + \varepsilon_{it} \quad (5)$$

AGE	*High_resid*	*High_resid*	*Pos_resid*	*Pos_resid*
	Below median	*Above median*	*Below median*	*Above median*
Variables	MVE_{it}	MVE_{it}	MVE_{it}	MVE_{it}
BVE_other_{it}	0.97***	0.98***	1.01***	0.97***
	(14.07)	(9.64)	(12.89)	(8.61)
BVE_FV_{it}	0.83***	0.88***	0.76***	1.04***
	(4.47)	(7.13)	(7.99)	(6.00)
$High\_resid_{it}$	-3,109.61	-669.20		
	(-1.79)	(-1.12)		
Pos_resid_{it}			-1,337.37	575.03
			(-0.70)	(0.62)
$BVE\_FV \times High\_resid_{it}$	0.17	0.06		
	(1.13)	(0.67)		
$BVE\_FV \times Pos\_resid_{it}$			0.23	-0.13
			(1.58)	(-0.74)
NI_{it}	0.20	-0.15	-0.16	-0.18
	(0.31)	(-0.77)	(-0.36)	(-1.04)
$Loss_{it}$	205.93	1,088.97	401.91	1,140.89
	(0.10)	(1.26)	(0.19)	(1.36)
$NI \times Loss_{it}$	-0.22	0.19	0.24	0.26
	(-0.30)	(0.52)	(0.43)	(0.74)
R^2	0.966	0.966	0.965	0.978
Year FE	Yes	Yes	Yes	Yes
Fund FE	Yes	Yes	Yes	Yes
Observations	158	158	158	159

This table presents regression summary statistics for the estimations of Equation (4) and Equation (5) partitioned by *AGE* above and below the mean. *t*-statistics are presented in parentheses. Standard errors are clustered by year. All continuous variables are winsorized at the 1st and 99th percentiles. The superscript asterisks *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. *High_resid* is an indicator variable where a fund's *Res_ratio* defined in equation (6) is above the year median; *Pos_resid* is an indicator variable where the weighted residuals for the fund-year defined in equation (7) is positive.

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