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PRIVATE EQUITY VALUATION BEFORE AND AFTER ASC 820

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We examine the effect of ASC 820 (formerly SFAS 157) on valuations reported by US private equity funds to their investors. In 2008, the FASB implemented ASC 820 to achieve more consistent measurement and increased transparency in fair value reporting. This new standard clarified the most critical accounting policy for private equity funds, which typically include highly illiquid investments. In a setting where we observe all cash flows over a fund's lifetime, we show that reported net asset valuations more accurately predict future net distributions following ASC 820, particularly for less experienced fund managers, and for smaller and high-performing funds.

1 Introduction

Investment in private equity continues to grow, reaching $3.4 trillion in North America and $6.5 trillion globally in 2019, according to McKinsey & Company (2020). While numerous studies in the finance literature evaluate private equity returns (e.g., Kaplan and Schoar, 2005), examination of the financial reporting of private equity performance has only very recently been published in the major accounting journals (Jenkinson *et al.*, 2020). We seek to better understand accounting in this large and opaque sector by examining the impact of ASC 820, *Fair Value Measurement*, on private equity fund net asset valuations (NAVs) and their relation to future cash flows. By clarifying the definition and measurement of fair values, ASC 820 (formerly known as SFAS 157) resulted in a change in 2008 to the most important accounting policy for private equity funds. Moreover, any effect of ASC 820 on private equity financial reporting would spill over to private equity limited partner investors, including pension funds, mutual funds, and endowments, which generally incorporate the fair value provided by the private equity fund into their own financial statements as a practical expedient.[1] As a result, private equity financial reporting, and the influence of ASC 820, potentially affects the financial reporting, asset allocation decisions, and returns of

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an economically significant cross-section of the capital markets—private equity funds, limited partners, and their beneficiaries.

Private equity offers a unique setting in which to study the impact of ASC 820 on reported valuations: we can observe all cash flows to and from investors over the lifetime of a fund, negating the need for terminal value estimates. At any given point in the fund's life, the NAV represents the sum of the cash contributions to date less any distributions of realized returns to date, plus accounting recognition of unrealized returns made on investments within the fund, net of fees. Thus, the NAV serves as an interim, reported fair value of the fund that can be assessed as an estimate of *ex post* fund net cash flows. Whereas in other settings, enhanced fair value guidance naturally leads to improved valuations, there is tension as to whether enhanced fair value guidance will lead to more accurate private equity NAVs. Private equity's underlying investments are both difficult to value and highly illiquid. In addition, some fair values were used prior to ASC 820 as discussed below, but application was inconsistent.

Why is the adoption of ASC 820 important for the private equity industry? Prior to ASC 820, US GAAP defined fair value as "the amount at which an investment could be exchanged in a current transaction between willing parties, other than in a forced or liquidation sale," but provided little or no guidance in estimating fair values. Industry practice pre-820 often focused on estimating fair value using an entry price. Practically speaking, this would (and did) result in investee companies being valued either at historical cost or at the value implied by the latest round of financing of the investee company.[2] As a result, there was significant diversity and inconsistency in fair value reporting in the private equity industry (Blaydon and Wainright, 2005; Mulvihill, 2007). These characteristics are the two highly cited reasons for the FASB's implementation of ASC 820, which provides direction on *how* private equity funds should fair-value investments in their portfolio (including using comparable company transactions and multiples-based approaches).[3] ASC 820 requires fair values based on an estimated exit price, i.e., the amount the fund would receive should it sell or exit an investment. However, the market-based approach in the new standard may prove problematic in valuing private equity investments, which are generally highly illiquid with non-transparent market prices (which leads to Level 3 estimates under the ASC 820 fair value hierarchy).[4] Indeed, the new standard was met with some skepticism in the private equity industry, given the difficulties and costs in implementation (Kreutzer, 2009; Mendelson, 2009; Rossa, 2009). According to a recent survey by Preqin (2018b), a data provider for the alternative assets industry, 88% of limited partners consider valuation to be the greatest issue in the private equity industry. Moreover, recent SEC inquiries of several private equity firms (Lattman, 2012; Maremont and Spector, 2014) highlight the importance of valuation and reporting in this industry.

We seek to better understand the effect of ASC 820 on the accuracy of the NAVs that are reported by private equity funds. We focus on valuation at the private equity fund level for several reasons. First, fund-level valuations are used by limited partners when making asset allocation decisions and, as mentioned above, they are the reported values that limited partners use in their own financial statements.[5] Second, most limited partners hold private equity investments until maturity and thus are most interested in the future cash return, which we can observe because of the availability of data for the entire lives of private equity

funds.[6] Finally, we are interested in how NAV accuracy differs in the cross-section with fund and fund manager characteristics in the private equity industry, where the application of ASC 820 is relatively unexplored.

We obtain quarterly NAVs, cash contributions, and cash distributions from Preqin's Private Equity Cash Flow Download and we form a sample of liquidated private equity funds from 2002 to 2016, where we can observe cash contributions and distributions over the lifetime of the fund.[7] First, we investigate changes to NAV estimates that are not explained by distributions from or contributions to the fund (we call these changes valuation adjustments) in the period surrounding ASC 820 adoption. Second, we investigate the accuracy of NAV estimates, i.e., the mapping between the reported NAV for the fund and the present value of net, *ex post* distributions/contributions to/from limited partners. Unlike prior literature, our primary discount rate in the present value estimation is the internal rate of return (IRR) ultimately realized by the fund from inception to liquidation, and our results are robust to using several other discount rates. In other words, we compare the quarterly reported NAV of the fund with its net present value (NPV)—that is, the discounted net distributions to limited partners based on perfect foresight. Analogous to the studies of analysts' forecasts of earnings (e.g., Fried and Givoly, 1982), we calculate a measure of the accuracy (i.e., absolute error) of the quarterly reported NAV of the fund based on the difference between the NAV of the fund and the NPV for the quarter of the report.

We find that, following ASC 820 adoption, private equity funds make more frequent upward valuation adjustments to their quarterly reported NAVs. We further find that private equity NAVs estimate future, realized net distributions with greater accuracy as they write up NAVs toward the net present value of future net cash distributions following ASC 820 implementation.[8] Our results are economically significant, as they suggest a post-ASC 820 accuracy improvement of 6–7% of NAV. We also find evidence of a greater increase in accuracy for the NAVs of smaller funds, funds with less experienced fund managers, and high-performing funds. Our results suggest that ASC 820 improved the information environment even more for these funds.

We acknowledge the difficulty in identifying the effects of a change in accounting standards that happened almost concurrently with the 2008 global financial crisis, which may also have affected the accuracy of private equity NAVs. Because we realize the inherent limitations this challenge poses from a research design perspective, we buttress our analyses with controls for concurrent market movement and a number of robustness checks.[9] We cannot completely rule out the possibility that our results may be due to changes in estimation of NAVs associated with the occurrence of the financial crisis. Nevertheless, we believe that the change in accuracy of NAVs, which we document, that was coincident with, by far, the most significant change in accounting to have occurred in this multi-trillion dollar industry, is important to our understanding of the effect of ASC 820 because the increase in accuracy may, indeed, have been triggered by this accounting standard.

Our results inform private equity investors and their beneficiaries, industry practitioners, and policy makers as to the effectiveness of the enhanced guidance in ASC 820 in a significant segment of the financial markets. We contribute to the growing literature on private equity reporting as well as to the literature exploring the use of fair value measurement in financial reporting.

We add to the private equity literature by examining a change in the accounting for its most important performance indicator, NAV, across a wide variety of fund styles (i.e., buyout, venture, real estate, and more). Some prior literature shows that managerial incentives related to fund raising for subsequent funds lead to the manipulation of reported private equity NAVs (e.g., Barber and Yasuda, 2017; Brown *et al.*, 2019). At the same time, higher quality legal and accounting systems may constrain overvaluation (Cumming and Walz, 2009). Related to fair value accounting, Brown *et al.* (2019) find that venture fund returns experienced decreased autocorrelation after ASC 820, and Welch and Stubben (2018) find increased co-movement between reported private equity returns and market returns following the implementation of IAS 39 in an international setting. Jenkinson *et al.* (2020) conclude that private equity fund NAVs forecast future fund cash flows relatively well, and they provide some evidence of the relation between private equity NAVs and cash flows on a year-by-year basis during their 1988 to 2013 sample period. We extend and refine the analyses in Jenkinson *et al.* (2020). We discount the private equity fund cash flows at the fund's own *ex post* realized internal rate of return rather than using the same discount rate for all funds, we implement controls for fund and fund-manager characteristics, and we examine the change in accuracy of fund-level NAVs (in terms of their reflection of future cash flows) following ASC 820. Our findings complement Crain and Law (2018), who provide evidence that enhanced fair value accounting guidance improved the valuations of the private companies in which buyout funds invest. Our evidence reflects changes in private equity NAV accuracy at the *fund-level*, which is the level most pertinent to private equity investors (i.e., limited partners) because they are ultimately interested in, and incorporate into their own financial statements, the performance of the fund as a whole rather than the valuation of the companies held by the fund. Moreover, we report differences according to fund and fund manager characteristics including fund size, fund manager experience, and fund performance, as we begin to understand the cross-sectional application of accounting in this large market segment.

We also contribute to the literature on fair valuation as we provide evidence on the usefulness of accounting information (i.e., the NAV) as an estimate of future net distributions under previous and new GAAP guidance. Fair value accounting has been examined in other contexts, typically focusing on financial institutions. Several studies explore differences *across* Level 1, 2, and 3 asset types (Song *et al.*, 2010; Riedl and Serafeim, 2011; Altamuro and Zhang, 2013; Lawrence *et al.*, 2016). Our analyses are within the Level 3 valuation category. While our private equity setting differs, our study is somewhat analogous to Dietrich *et al.*'s (2001) study of historical cost and mandatory appraisal-based fair value estimates for UK investment properties. Our results may shed light on the effect of fair value accounting standards on the measurement of similar Level 3 type assets held by other entities outside the private equity industry.

2 Private Equity, Fair Value, and ASC 820

Private equity investment continues to grow in the United States and globally. Figures 1a and b depict the sharp increase in both the number and size of US-focused private equity funds originated from 1980 to 2017. In particular, 230 new US private equity funds were originated in 2017, with an average fund size of $1.2 billion. This compares with 132 new funds with an average fund size of $818 million in 2000, and 190 new funds with an average fund size of $1.5 billion in 2006, during the pre-credit-crisis peak. As of 2017, nearly $3 trillion was invested in private equity in the

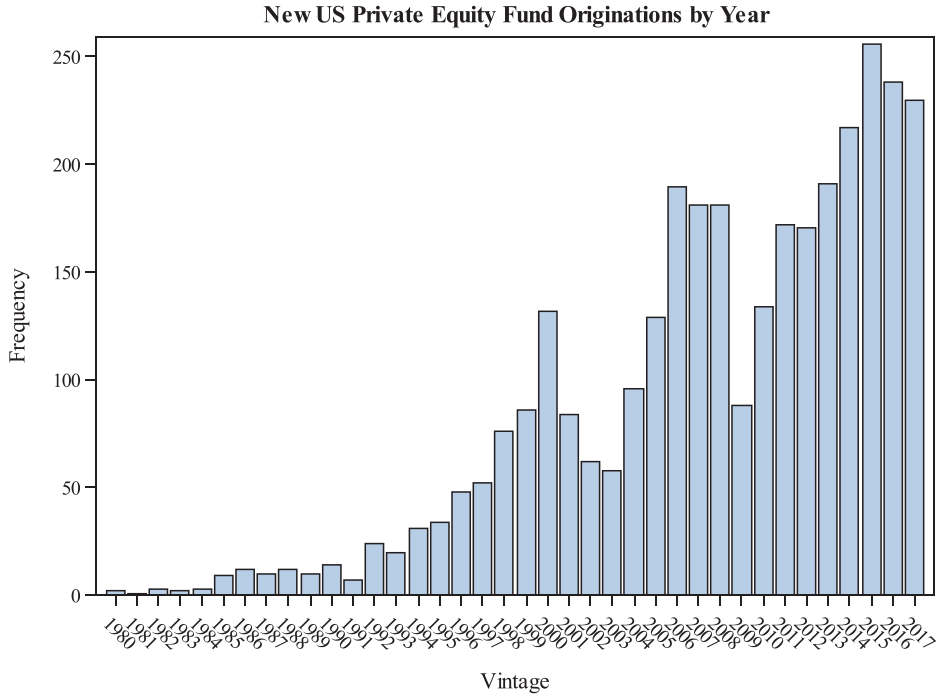

Figure 1a New US private equity fund originations by year.

Source: Unique new funds with a US fund focus by vintage as calculated from Preqin.

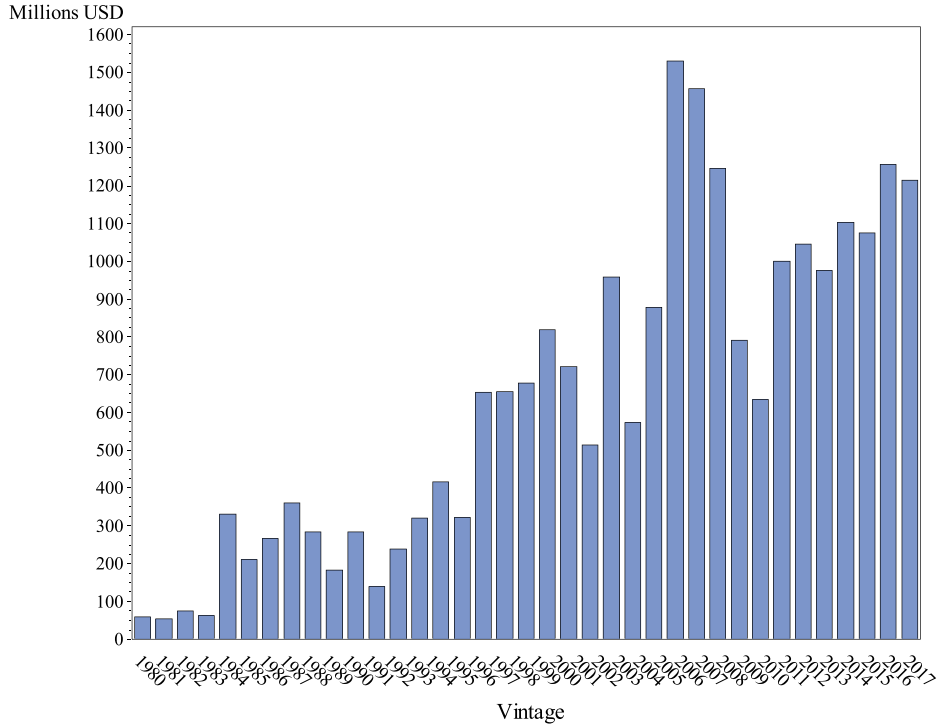

Figure 1b Average size of new US private equity fund originations by year.

Source: Unique new funds with a US fund focus by vintage as calculated from Preqin.

United States and, as of 2018, 359 investors globally each allocated $1 billion or more to private equity, according to Preqin (2018a). More recently, McKinsey & Company estimates $3.4 trillion of assets under management in North America, as of 2019.

Private equity represents an investment strategy characterized by purchasing the equity and, sometimes, the debt of private firms (see Kaplan and Strömberg, 2009 for an overview). The structure of the industry is as follows. The general partner (GP) creates and manages one or more private equity funds, while the limited partners (LPs) are the investors in these funds. In the life cycle of a typical fund, the general partner begins fundraising for a new fund and the limited partners invest by committing a specified amount of capital. When investing in a fund, the limited partner enters into a contractual commitment entitled the Limited Partner Agreement (LPA), which outlines the limited partner's monetary commitment, general partner compensation, and fund reporting requirements. As investment opportunities in portfolio companies arise, the general partner "calls" invested capital from limited partners and the fund subsequently invests in those portfolio companies. Finally, the fund returns capital and profit, less a general partner management fee and carried interest, to the limited partners as the fund matures and divests of its portfolio companies.[10] The LPA typically calls for return of capital and profit over a 10-year fund life but fund-life extensions are possible.

Throughout the life of the fund, the general partner submits reports to the limited partners of the fund, usually on a quarterly basis. These reports typically provide timely information on exited investments and realized returns, as well as on those investments still in the portfolio, any unrealized returns, and the valuation techniques used.[11] At the same time, private equity valuation poses challenges due to its unlisted, illiquid, and non-transparent nature. For example, in an interview with a large private equity investor, we learned that it is not uncommon for two different private equity funds invested in the same underlying asset to use different valuations for that same asset. In addition, interim valuations may facilitate future fundraising, as GPs often begin fundraising for the next fund before the current fund is liquidated. Future funds comprise a significant portion of long-run GP compensation, both in terms of management fees and carried interest (Chung *et al.*, 2012; Brown *et al.*, 2019).

Most private equity funds qualify as investment companies under the Investment Companies Act of 1940 and therefore must apply Investment Company accounting under ASC 946 (see Holmes and Hupp, 2011). Investment Company accounting requires reporting of investments in underlying portfolio companies at fair value. While ASC 820 provided additional guidance for how to determine fair value, the use of fair value in the private equity industry dates back to the 1970s when pension funds began to invest in private equity. Pension fund reporting required the use of fair value accounting for investments; thus, pension funds often included a GAAP (and thus, fair value) reporting requirement in the LPA. However, the lack of direction as to how to calculate fair values under GAAP plagued this industry. The AICPA Audit and Accounting Guide for Investment Companies, as well as various standards implemented by industry trade groups, provided further guidance on the use of fair value in reporting of investments. In 2003, the Private Equity Industry Guidelines Group (PEIGG; 2003) issued US Private Equity Valuation Guidelines which helped shape industry practice but formal adoption was limited (Blaydon and Wainright, 2005). These guidelines focused on estimating fair value of investments using an entry price and called for interim write-ups, even in the absence

of a new round of financing, which led to some controversy.

While the PEIGG guidelines, issued in 2003, were the industry standard, adoption was voluntary. In practice, many private equity funds did not adopt the PEIGG guidelines. Mulvihill (2007) reports that, in a 2005 survey of 102 private equity funds by the Tuck School of Business, only 19% of the respondents formally adopted the guidelines. Funds that did not adopt the guidelines reported their investments at cost and only reported write ups if a new round of financing had occurred. Thus, pre-ASC 820 private equity fund valuations were often stale and not based on *updated* fair values. This previous practice differs from ASC 820, which requires investments be fair valued based on an exit price—in other words, the amount the fund would receive should it sell or exit an investment.

Implemented in 2008, ASC 820 clarified the definition and measurement of fair values in an attempt to obtain consistent estimation of fair values. Importantly, the new standard focuses on a market-based approach. This focus may prove to be problematic in valuing private equity investments, which are generally highly illiquid and lack market prices (leading to Level 3 estimates under the ASC 820 fair value hierarchy). Along these lines, a comment letter from the National Venture Capital Association to the FASB written in April 2007 stated "we continue to be wary of the risk that application of Statement 157 to estimating portfolio company values, absent a financing event, could evolve into requirements that are burdensome and economically wasteful." Recently, *The Wall Street Journal* and *The New York Times* reported that the SEC's Enforcement Division has sent informal inquires to several private equity firms to gather information regarding their valuation techniques and how they report performance.[12] Given the controversy and recent lawsuits surrounding financial reporting transparency in this industry (EY, 2016), we seek to provide insight into the reporting of private equity performance before and after ASC 820.

Fair value allows general partners to monitor their investments, make asset allocation decisions, and provide timely information to their limited partner investors.[13] Limited partners may, in turn, monitor and compare fund performance, make asset allocation decisions, and report quarterly performance information to their own stakeholders (i.e., pension fund and endowment beneficiaries, fund of funds investors, etc.) As Jenkinson *et al.* (2020) point out, if private equity NAVs conservatively estimate fair value (whereas other investments can often be valued using observable market prices), then private equity limited partners might over-allocate to private equity.

That said, quarterly NAVs may not be the only channel by which LP investors obtain information from GPs. In our discussions with private equity industry participants, including investors, we learned that existing LP investors have access to a great deal of information from the fund GP above and beyond that contained in the quarterly report. Nevertheless, LPs largely rely on and use the GP-provided NAV estimates in their own financial reports. To verify this, we checked the financial reports of the four largest public investors in private equity—Canada Pension Plan Investment Board (CPPIB), Washington State Investment Board (WSIB), California Public Employees' Retirement System (CalPERS), and Teacher Retirement System of Texas—and we found that all of them use the NAV provided by the GP of the private equity fund. For example, CPPIB states that the primary valuation technique used for private equity fund investments is the NAV provided by the investment manager. WSIB bases fair value of individual private equity investments on the valuations reported by GPs.

At the same time, prospective investors receive very little information when they are considering investing in a private equity fund—sometimes they observe only the IRR of past or current funds of the GP (Phalippou, 2009; Phalippou and Gottschalg, 2009; Hochberg *et al.*, 2014).[14] This IRR would, in turn, be affected by the fund's reported, interim NAV.

Yet, there is little evidence on the effect of accounting standards, including those related to fair values, on this asset class, although several studies investigate the performance and risk of private equity funds (see, for example, Kaplan and Schoar, 2005; Harris *et al.*, 2014). An exception is Welch and Stubben (2018), who analyze the market co-movement of the returns on European private equity funds before and after the adoption of IAS 39; the authors conclude that fair value reporting requirements increased return co-movement with the public markets. In addition, Brown *et al.* (2019) include a test of whether private equity return autocorrelation changed following the adoption of ASC 820; they find a decrease in this autocorrelation for venture funds but not for buyout funds. Crain and Law (2018) evaluate the effect of fair value accounting on the valuations reported by the private companies in which buyout funds invest, while Ferreira *et al.* (2019) provide evidence on the reliability and relevance of estimates of fair values of private equity funds for their investee companies. Several studies suggest that managerial incentives may lead to the manipulation of reported NAVs (Barber and Yasuda, 2017; Brown *et al.*, 2019; Jenkinson *et al.*, 2013), while a cross-country study by Cumming and Walsh (2009) finds more stringent accounting standards and stronger legal systems reduce overvaluation in private equity reporting.

A number of accounting studies investigate the effect of ASC 820 on the measurement and use of fair values in financial reporting more generally. Several studies compare the value relevance of fair value measurements across different underlying asset types (e.g., Kolev, 2019; Song *et al.*, 2010; Goh *et al.*, 2015; Lawrence *et al.*, 2016). Song *et al.* (2010) find that the value relevance of fair values increases along the fair value hierarchy, from Level 1 to Level 2 to Level 3. The authors argue that while fair values may be relevant, investors assign differential weighting to fair values based on their measurement inputs, suggesting potential differences in the perceived reliability of those fair values. Similarly, Riedl and Serafeim (2011) find greater information risk associated with Level 3 assets than with Level 1 and 2 assets. On the other hand, Lawrence *et al.* (2016) find that, in a sample of closed-end funds, Level 3 fair values are of similar value relevance to Level 1 and 2 fair values. In a mortgage servicing setting, Altamuro and Zhang (2013) find that valuations based on Level 3 inputs are more positively related to the persistence of future cash flows than are valuations based on Level 2 inputs. Collectively, these findings suggest that fair value estimates provide relevant information; however, the results may vary across settings, measurement inputs, and assets.[15]

At the same time, fair value estimates are susceptible to managerial opportunism. Early work by Beaver and Venkatachalam (2003) suggest that managerial discretion can affect the reliability of bank loan fair values. As Cotter and Richardson (2002) discuss, insiders have greater expertise related to valuing firm-specific assets. Laux and Leuz (2009) point out that, while managers may use discretion in estimating fair values, managers' litigation concerns could rein in managerial fair value estimates. It is uncertain whether litigation concerns apply to the opaque private equity setting, but at the same time, reputation and fundraising efforts may dominate private equity managerial behavior. However, aside from a test related to return autocorrelation in the appendix

of Brown *et al.* (2019), and calendar year-by-year analysis of the relation between private equity fund discounted cash flows and NAVs from 1988 to 2013 in Jenkinson *et al.* (2020), we are unaware of any other study that explores the effect of ASC 820 on private equity funds. Thus, we seek to better understand any such effects.

We focus on two main research questions regarding private equity net asset valuation and the implementation of ASC 820. First, we focus on liquidated private equity funds for which we can observe the full set of contributions to and distributions from the fund in order to investigate the ability of private equity NAVs to predict future net distributions before and after ASC 820. On the one hand, fair value accounting could improve the relevance and reliability of private equity reporting. On the other hand, private equity investments are difficult to value making fair value accounting difficult to implement. Our first research question follows:

RQ1: *Do private equity net asset valuations equally predict future net distributions to limited partners before and after the implementation of ASC 820*?

Our second research question considers the characteristics of funds where we expect ASC 820 to, potentially, have a differing effect. In particular, we examine cross-sectional variation across fund strategy, fund size, fund performance and fundraising incentives, and fund manager experience.

We first consider fund strategy. For example, buyout funds generally invest in mature firms that, in turn, may have been easier to value, even before ASC 820, because they have an established pattern of cash flow generation and are more likely to have publicly-traded comparable companies. In contrast, venture funds invest in early stage companies—often without cash generation—many of which fail and operate in less transparent reporting environments (see Metrick and Yasuda, 2010). These difficult-to-value portfolio companies often undergo numerous rounds of financing and receive investments from a number of private equity funds. Many contended that venture investments are inherently too difficult to reliably fair value and argued ASC 820 would have little or no effect on these funds.[16] In their study of private equity fund NAVs, Jenkinson *et al.* (2020) find that venture funds set their NAVs more aggressively, relative to buyout funds. At the same time, venture funds frequently set interim valuations coincident with new financing rounds (whereas, in quarters without subsequent financing, the venture fund might carry the investment at cost until a subsequent round is undertaken). Thus, it is an empirical question as to whether ASC 820 may have a potentially stronger effect for venture funds through enhancing the guidance regarding interim valuation.

Second, we look for differences depending on fund size. Larger funds might have better systems in place to estimate the value of their underlying investments, either internally or by hiring valuation experts. As Khan *et al.* (2019) discuss, robust information and internal control systems are important for the monitoring and valuation of illiquid securities. While it is possible that large funds are more likely to hire and use external valuation experts, which might result in better valuations (Barth and Clinch, 1998; Hanley *et al.*, 2018), we are unable to observe *how* investments are valued in our sample due to the private nature of the private equity industry. Moreover, larger funds may in turn invest in larger investee companies, which may be more "efficiently priced" (Lopez-de-Silanes *et al.*, 2015). Thus, smaller

funds may be affected more by the implementation of ASC 820.

Third, we consider the incentives of private equity GPs. General partner compensation stems from both the performance of current funds and the GP's ability to raise capital for subsequent funds (Chung *et al.*, 2012; Barber and Yasuda, 2017). As Chung *et al.* (2012), Hochberg *et al.* (2014), and Barber and Yasuda (2017) show, a current fund's performance has a significant positive impact on the ability of the fund's GP to successfully raise a follow-on fund. Barber and Yasuda (2017) further describe how successful GPs raise a new fund every three to six years. Jenkinson *et al.* (2013) conclude that, during fundraising periods, private equity valuations are inflated. At the same time, limited partners may place more weight on the returns of prior, liquidated funds than on existing funds when making reinvestment decisions. Dietrich *et al.* (2001) find that incentives affect historical cost and mandatory appraisal-based fair value estimates for UK investment properties. Thus, it is possible that both current fund performance and the act of fundraising affect the accuracy of private equity valuations and, moreover, that ASC 820 could have had a differing effect on NAV accuracy based on both fund performance and fundraising incentives.

Finally, we consider fund manager experience. It is possible that ASC 820 implementation differentially affected managers based on their level of experience. Prior literature suggests that private equity managers are more likely to "game" returns when the fund manager has less experience (Barber and Yasuda, 2017). Moreover, fund managers with more experience might be in a better position to raise funds, and less sensitive to the interim performance of their current funds (Chung *et al.*, 2012).

Thus, our second research question is as follows:

RQ2: *Did ASC 820 implementation differentially affect private equity net asset valuations based on fund and fund manager characteristics*?

3 Sample Description and Variable Definitions

3.1 Sample description

To test for differences in reported net asset valuations before, during, and after the implementation of ASC 820 in 2008, we focus on the years 2002 through 2016. In most of our tests, we exclude the years 2007 and 2008 from our analysis as they overlap not only with the implementation of ASC 820 but also with the global financial crisis, which likely affected private equity valuations.[17]

The Preqin Private Equity Cash Flow Download is the primary data source for our sample. These data have been used in other academic studies, including Ewen *et al.* (2013) and Ang *et al.* (2018). Private equity fund NAVs, contributions, and distributions (all net of fees) as well as fund size, fund manager, and fund type are obtained by Preqin from public investors in private equity via the Freedom of Information Act.[18] Data in the cash flow download are scaled by Preqin to be representative of a $10 million commitment to the fund. As of July 2019, when we obtained the Preqin download, 155,064 fund quarters from 4,586 private equity funds from 1985 to June of 2019 were available on Preqin. For each fund, we obtain from Preqin the amount of capital committed, the fund strategy and geographic fund focus, the general partners or firm with which the fund is affiliated, fund size, cash contributions and distributions by date, and NAVs by quarter. We require a US fund focus, because funds with Europe or Rest-of-World focus may be less likely to follow US GAAP and are more likely

to be affected by foreign exchange fluctuations. Our main tests explore the predictive power of NAVs and adjustments to NAVs; therefore, we require a non-zero NAV at the end of the current and lagged fund-quarter.[19] Following Phalippou and Gottschalg (2009) and Brown *et al.* (2019), we examine NAVs for the first 10 years of the life of the private equity fund. When we extend the sample to include all fund-quarters from the first 15 years of the fund's life, our main inferences are unchanged.

In order to assess private equity fund NAVs as predictors of future distributions and contributions, we limit our sample to liquidated funds, as defined by Preqin.[20] While we do not delete private equity funds from our sample based on their performance, our sample is subject to potential selection bias, as in Kaplan and Schoar (2005). In particular, our sample may include only the more successful funds that ultimately distribute cash flows to their LP investors, allowing us to calculate a fund-level internal rate of return. The sample of liquidated private equity fund-quarters from 2002 to 2016 represents 13,708 fund-quarters from 586 funds.[21] Panel A of Table 1 outlines our sample selection procedures.

3.2 *Net asset valuations* (*NAVs*)

Given that Preqin's private equity data are relatively new to the accounting literature, we provide a simple description of reported NAVs of private equity funds. At any given point in the life of a fund, the NAV represents the sum of its cash contributions from limited partners to date (*Contributions*), less any distributions of realized returns to limited partners to date (*Distributions*), plus accounting recognition of estimated unrealized returns made on investments within the fund (*Valuation adjustment*), net of fees. Thus, in a given quarter, *Valuation adjustment*$_q$ is the change in NAV from quarter $q-1$ to quarter q that is not explained by contributions, distributions, and fees during the quarter. Funds usually do not hold onto cash and thus distribute any realized returns almost immediately; therefore, the valuation adjustment should largely represent unrealized returns. Under conservative accounting, *Valuation adjustment*$_q$ will represent only those returns that have been realized through an explicit valuation change (e.g., through the sale of assets) but have not yet been distributed. Under fair value accounting, however, *Valuation adjustment*$_q$ will represent both undistributed, realized returns and the recognition of some or all unrealized returns in the form of changed (fair) value of ongoing investments.

3.3 *Calculation of net present value* (*NPV*) *of future cash flows*

Our research questions consider the accuracy with which reported NAVs of private equity funds predict future discounted cash distributions and contributions. We compute the NPV of future distributions to investors less future contributions from investors, discounted by an assumed discount rate. The computation differs from more typical applications of the net present value model that requires estimation of terminal values for a lengthy, sometimes infinite, stream of future cash flows. Private equity funds with their short lifespans (averaging 13.2 years, with a standard deviation of 3.7 years in our dataset) allow for observation of all future net distributions through to the end of the life of the fund.

We depart from prior literature in using a discount rate for each fund in our sample that represents the internal rate of return over the entire life of the fund (which we refer to as *END_IRR*). That is, we solve for the rate of return that yields an NPV of zero as of time zero, which is the date of the initial investment in the fund. For each quarter following the initial investment in the fund,

we use the fund's *END_IRR* as the discount rate to determine the net present value of future distributions and contributions from that quarter q until the end of the life of the fund, T. Thus, we obtain a fund-specific, perfect-foresight, net present value (*NPV*) at each quarter-end in the life of the fund.

3.4 NAV accuracy

The reported NAV reflects the private equity fund managers' assessment of the value of the expected future distributions and contributions and, as such, it is a forecast of these net distributions (i.e., distributions less contributions). Thus, the difference between the NAV and our calculated NPV is a measure of the forecast error just as the difference between any forecast (such as an earnings forecast) and the realized amount is an indicator of forecast error.

We define $NAV\ Accuracy_{iq}$ as the absolute value of fund i's quarter q reported NAV less our calculated NPV for the quarter, scaled by NAV and multiplied by -1 so that the variable is increasing in accuracy relative to the perfect foresight NPV. This variable definition is similar to the accuracy measure used in the analyst forecast setting; for example, in Fried and Givoly (1982), accuracy is the absolute value of forecasted EPS less actual EPS, scaled by the absolute value of actual EPS.[22] While bias and accuracy in private equity NAVs relative to *ex post* future distributions are assessed by Jenkinson *et al.* (2020), we seek to extend this analysis of NAV accuracy in the context of ASC 820 as well as taking into account fund and fund manager characteristics, which we discuss next.

3.5 Fund and fund manager characteristics

In our analyses, we consider the following fund and fund manager characteristics. *Fund Size* represents the total commitments to a private equity fund, according to Preqin. *Experience* is the number of prior private equity funds raised by the GP. *Fundraising* is an indicator variable that equals one if the GP's next private equity fund makes its first cash call within the next year, zero otherwise. The variable *Venture* equals one for venture funds, zero otherwise (including funds that invest following strategies such as buyout, real estate, and distressed debt). *Quartile* is a measure of private equity fund performance, set by Preqin to compare funds with other funds in their benchmark grouping, where the benchmark is created based on funds' vintage, investment strategy, and geographic focus.

4 Descriptive Statistics and Empirical Tests

4.1 Descriptive statistics

Panel B of Table 1 shows the composition of the types of funds in our sample. The funds in our sample represent a broad range of styles, with 33.1% of funds labeled as Buyouts and 18.1% as Venture. The remaining style categories include real estate (14.3% of funds), early stage (8.5% of funds), and such other categories as distressed debt, growth, mezzanine, and natural resources.

Panel C of Table 1 presents descriptive statistics for the sample of 586 liquidated funds and 13,708 fund-quarters from 2002 to 2016. While the mean (median) fund in our sample raises $578 ($318) million of committed capital, there is a wide range of funds with an un-tabulated minimum (maximum) size of $5 ($6,114) million. The mean (median) total fund life is approximately 13 (14) years. As Figure 2 shows, cash contributions are generally largest in the early years of the life of a fund, while cash distributions generally tend to be more normally distributed. As Metrick and Yasuda (2010) explain, private equity funds typically call in contributions, and invest in new companies, in the first five years of the life of the

Table 1 Sample selection and descriptive statistics.

	Fund quarters	Unique funds	Unique firms	Unique years	Unique vintage years
Panel A: Sample selection					
Initial Preqin sample	155,064	4,586	1,715	40	39
Require US fund focus	122,651	3,385	1,227	40	39
Require NAV > 0	99,325	3,369	1,227	37	36
Require lag NAV	91,976	3,228	1,178	37	35
Require non-missing fund size	88,792	3,055	1,136	37	35
Limit sample to 2002–2016	68,438	2,678	1,052	15	32
Funds with fund-age ≤ 10, 2002–2016	56,375	2,633	1,037	15	25
Liquidated funds with fund-age ≤ 10, 2002–2016	13,708	586	368	15	23

Panel B: Breakdown of funds by strategy

	Unique funds	
Investment strategy	#	%
Balanced	11	1.9
Buyout	194	33.1
Co-investment	2	0.3
Direct lending	1	0.2
Distressed debt	22	3.8
Early stage	50	8.5
Expansion/late stage	16	2.7
Fund of funds	8	1.4
Growth	16	2.7
Infrastructure	9	1.5
Mezzanine	33	5.6
Natural resources	14	2.4
Real estate	84	14.3
Secondaries	11	1.9
Special situations	3	0.5
Timber	2	0.3
Turnaround	2	0.3
Venture (general)	106	18.1
Venture debt	2	0.3
Total	586	100

Table 1 (*Continued*)

	Mean	Std. Dev	P5	*Q1*	Median	*Q*3	P95
Panel C: Descriptive statistics for funds and fund-quarters							
Funds ($N = 586$)							
Fund size ($ million)	578	789	54	167	318	640	1,927
Total fund life (in years)	13.2	3.7	6	11	14	16	18
Total contributions	9,830,685	1,336,593	8,047,613	9,624,038	10,000,000	10,017,184	11,407,922
Total distributions	16,306,422	19,684,116	2,038,039	9,060,000	13,311,481	18,226,081	34,944,182
Total distributions/ total contributions	1.669	2.145	0.220	0.936	1.378	1.840	3.506
END_IRR	0.120	0.368	−0.211	−0.008	0.087	0.187	0.547
Fund-quarters ($N = 13{,}708$)							
NAV_{iq}	4,337,760	3,033,280	339,560	1,996,040	3,844,685	6,153,055	9,976,680
Net present value (NPV_{iq})	3,939,388	3,804,960	−310,616	933,170	3,143,595	6,447,790	10,972,591
$NAV\ Accuracy_{iq}$	−0.864	18.484	−1.681	−0.686	−0.326	−0.129	−0.021
$NAV\ Signed\ Error_{iq}$	−0.135	18.504	−1.050	−0.225	0.049	0.465	1.129
$Valuation\ adjustment_{iq}/ NAV_{iq-1}$	0.185	11.868	−0.201	−0.031	0.001	0.048	0.251
$\Delta NAV_{iq}/NAV_{iq-1}$	0.202	14.014	−0.377	−0.086	−0.003	0.055	0.385
$Contributions_{iq}/NAV_{iq-1}$	0.089	3.000	0.000	0.000	0.000	0.016	0.277
$Distributions_{iq}/NAV_{iq-1}$	−0.072	0.246	−0.383	−0.060	0.000	0.000	0.000
$S\&P500_q$	0.012	0.081	−0.142	−0.026	0.016	0.058	0.149
$Russell2000_q$	0.021	0.102	−0.178	−0.034	0.027	0.086	0.189
$Q4_q$	0.228	0.419	0.000	0.000	0.000	0.000	1.000

Note: This table contains details regarding sample selection strategy (in Panel A), the breakdown of funds by investment strategy (in Panel B); and descriptive statistics for the sample of funds (in Panel C). Variable definitions are in the Appendix. Note that contributions and distributions are scaled by Preqin to be representative of a $10 million commitment to the fund.

fund, with some follow-on investments in later years. The mean (median) liquidated fund in our sample returns (i.e., distributes) 167% (138%) of its investors' total cash contributions over the life of the fund.

The mean (median) values of *Contributions* and *Distributions*, both scaled by lagged NAV, are 0.089 (0.000) and −0.072 (0.000), respectively. Of the two measures that we use to proxy for the broader market quarterly return, *S&P500* has a mean (median) value of 0.012 (0.016) across all fund-quarters in our sample, while *Russell2000* has a mean (median) value of 0.021 (0.027). Mean (median) *END_IRR* is 0.120 (0.087) per annum and the mean and median values of *NAV Accuracy* are −0.864 and −0.326. Given the obvious skewness in these data, our regression analyses are based on median and robust regressions and we will focus on the median regressions for most of our inferences.

4.2 Analysis of private equity fund NAV valuation adjustments

Before proceeding to the examination of our main research questions, we provide, in Table 2, a descriptive analysis of the valuation adjustments

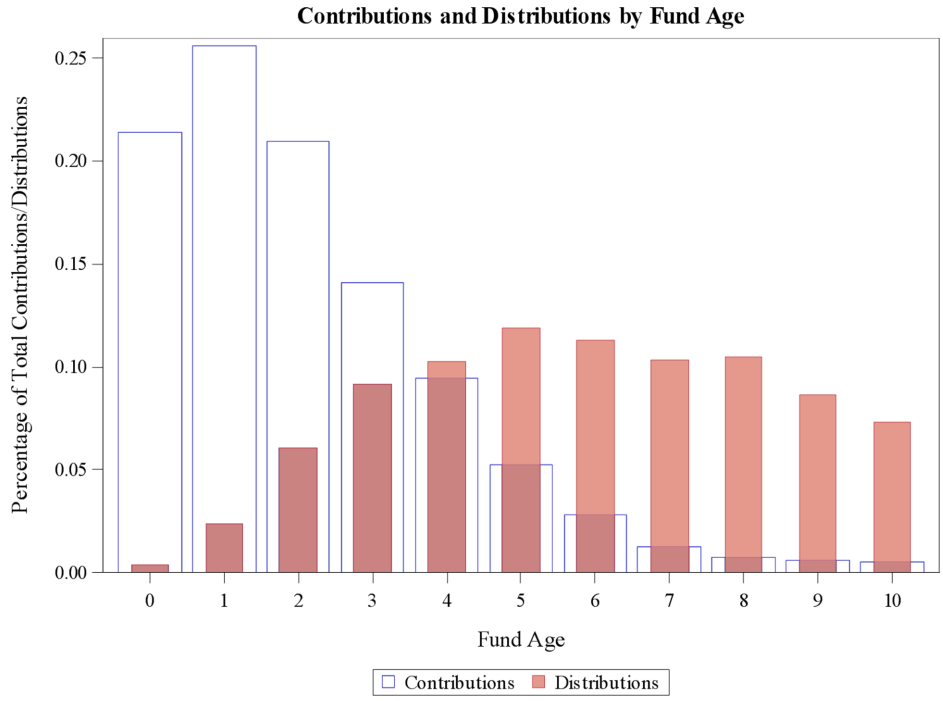

Figure 2 Contributions and distributions by fund age.

Note: This graph represents data from liquidated funds with a US fund focus and fund-age ≤10.

before and after the implementation of ASC 820. Column 1 reports that 96.9% of fund-quarters include a non-zero valuation adjustment in the sample of all 13,708 fund-quarters and this percentage significantly increases from 96.4% in the pre-2007 period (i.e., prior to ASC 820) to 97.2% in the post-2008 period. In additional, un-tabulated analyses, we observe that the percentage of non-zero valuation adjustments increases significantly in the post-2008 period in each of the second and third fiscal quarters; the difference is insignificant in the first and fourth fiscal quarters. We also observe a significant increase in the percentage of quarters with non-zero valuation adjustments in the post-2008 period for the sub-sample of quarters without contributions or distributions—these are the quarters when valuation adjustments are more likely to represent unrealized gains.

For the overall sample of fund-quarters that do include valuation adjustments, 53.1% of adjustments are positive (see Column 2 of Table 2). The percentage of positive valuation adjustments significantly increases from 49.5% in the pre-2007 period to 60% in the post-2008 period, following ASC 820. In additional, in the un-tabulated analyses, we observe that the percentage of positive valuation adjustments increases significantly in the post-2008 period in each of the four fiscal quarters as well as in the sub-sample of quarters without contributions or distributions. These changes in the likelihood of a positive valuation adjustment could be attributable to one of two sources. ASC 820 may have resulted in a change in reporting behavior. Alternatively, the post-period predominately presents a time of rising market prices following the global financial crisis. Therefore, these results could be

attributable to NAVs incorporating concurrent market returns associated with this rise (which we control for in subsequent tests). Columns 3 and 4 (5 and 6) assess the size of positive (negative) valuation adjustments. While positive valuation adjustments tend to be smaller in the post-period (with a statistically significant difference of 0.011 in the median adjustment), Columns 5 and 6 suggest that the size of negative valuation adjustments becomes larger in magnitude (with a statistically significant difference of 0.017 in the mean adjustment).

Panels C and D of Table 2 present similar analyses of the valuation adjustments of both liquidated and non-liquidated funds, by year of fund life. Similar to the results in Panels A and B of Table 2, we observe more non-zero valuation adjustments in the post-2008 period, and that the valuation

Table 2 Valuation adjustments of private equity funds.

Year	*N*	Valuation adjustment ≠ 0	Valuation adjustment > 0	Valuation adjustment (> 0)		Valuation adjustment (< 0)	
		(1)	(2)	(3)	(4)	(5)	(6)
				Mean	Median	Mean	Median
Panel A: Valuation adjustments of liquidated private equity funds by year							
2002	1,061	1,042 (98.2%)	340 (32.6%)	0.077	0.032	−0.103	−0.060
2003	1,158	1,121 (96.8%)	509 (45.4%)	3.929	0.048	−0.068	−0.036
2004	1,362	1,307 (96.0%)	679 (52.0%)	0.135	0.063	−0.069	−0.033
2005	1,374	1,314 (95.6%)	719 (54.7%)	0.145	0.058	−0.071	−0.034
2006	1,351	1,295 (95.9%)	760 (58.7%)	0.143	0.058	−0.073	−0.025
2007	1,313	1,286 (97.9%)	760 (59.1%)	0.389	0.049	−0.147	−0.025
2008	1,198	1,161 (96.9%)	428 (36.9%)	0.454	0.034	−0.124	−0.062
2009	1,124	1,090 (97.0%)	509 (46.7%)	0.135	0.045	−0.114	−0.044
2010	905	885 (97.8%)	546 (61.7%)	0.107	0.053	−0.063	−0.029
2011	703	689 (98.0%)	439 (63.7%)	0.079	0.042	−0.072	−0.034
2012	627	608 (97.0%)	386 (63.5%)	0.072	0.038	−0.092	−0.039
2013	542	533 (98.3%)	358 (67.2%)	0.162	0.041	−0.070	−0.033
2014	470	462 (98.3%)	319 (69.0%)	0.071	0.040	−0.126	−0.040
2015	323	310 (96.0%)	200 (64.5%)	0.081	0.037	−0.086	−0.022
2016	197	177 (89.8%)	95 (53.7%)	0.105	0.038	−0.191	−0.046
2002–2016	13,708	13,280 (96.9%)	7,047 (53.1%)	0.442	0.046	−0.094	−0.038
Panel B: Valuation adjustments of liquidated private equity funds before and after ASC 820							
2002–2006	6,306	6,079 (96.4%)	3,007 (49.5%)	0.775	0.053	−0.078	−0.038
2009–2016	4,891	4,754 (97.2%)	2,852 (60.0%)	0.104	0.042	−0.095	−0.037
2002–2006 vs. 2009–2016	**				***	***	

Table 2 (*Continued*)

	Valuation adjustment ≠ 0		Valuation adjustment > 0		Valuation adjustment (> 0) Mean		Valuation adjustment (> 0) Median		Valuation adjustment (< 0) Mean		Valuation adjustment (< 0) Median	
	2002–2006	2009–2016	2002–2006	2009–2016	2002–2006	2009–2016	2002–2006	2009–2016	2002–2006	2009–2016	2002–2006	2009–2016
Year of fund life	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel C: Valuation adjustments of private equity funds by year of fund life, before and after ASC 820												
0	97.4	97.9	28.5	41.3	0.181	0.202	0.059	0.057	−0.740	−9.770	−0.080	−0.058
1	97.0	97.6	39.4	54.6	2.398	0.136	0.054	0.049	−0.111	−0.303	−0.048	−0.037
2	98.3	97.8	42.9	65.4	0.120	0.084	0.049	0.045	−0.085	−0.067	−0.042	−0.029
3	98.6	97.9	45.2	70.2	0.112	0.075	0.049	0.045	−0.063	−0.075	−0.038	−0.026
4	98.3	98.2	48.7	70.6	0.100	0.069	0.051	0.043	−0.069	−0.051	−0.035	−0.023
5	97.0	98.1	55.0	69.7	1.531	0.079	0.056	0.039	−0.057	−0.052	−0.030	−0.026
6	97.8	98.2	57.6	69.1	0.097	0.078	0.047	0.041	−0.059	−0.056	−0.031	−0.027
7	95.1	97.8	54.3	65.7	0.120	0.122	0.049	0.039	−0.072	−0.058	−0.036	−0.027
8	95.5	97.1	56.7	62.7	0.165	0.088	0.058	0.042	−0.076	−0.062	−0.036	−0.031
9	94.4	96.9	49.7	59.2	0.142	0.116	0.053	0.039	−0.079	−0.065	−0.036	−0.032
10	88.9	96.5	45.9	54.8	0.189	0.086	0.067	0.041	−0.095	−0.070	−0.333	−0.033
Panel D: Valuation adjustments of private equity funds, before and after ASC 820												
All years of fund life	96.9	97.7	49.0	64.3	0.518	0.092	0.052	0.043	−0.100	−0.429	−0.038	−0.030
2002–2006 vs. 2009–2016	***		***		***		***				***	
Number of years significantly different	5 of 11		11 of 11		7 of 11		8 of 11		5 of 11		7 of 11	

This table explores the valuation adjustments made by private equity funds in the fund-quarters before, after, and spanning implementation of ASC 820. Panel A presents the frequency of fund-quarters that include a non-zero valuation adjustment (Column 1), the frequency of fund-quarters with non-zero valuation adjustments that include positive valuation adjustments (Column 2), and the size of valuation adjustments (*Valuation adjustment*) scaled by lagged NAV (Columns 3 through 6), in the years 2002 through 2016. Panel B presents the same statistics for the periods before and after ASC 820 (2002–2006 and 2009–2016, respectively), as well as tests of the difference between these two periods. Panels C and D present the same statistics by year of fund-life for a sample of non-liquidated and liquidated private equity funds in the periods before and after ASC 820. ***, **, and * denote significance at the 1%, 5% and 10% levels, respectively, based on two-tailed tests. All variables are defined in the Appendix.

adjustments for funds with non-zero valuation adjustments are more likely to be positive in the post-2008 period. We also observe that valuation adjustments, both positive and negative, are smaller in magnitude in the post-2008 period. Overall, these results suggest that private equity funds make more frequent but smaller upward valuation adjustments in the period following

ASC 820 implementation, which suggests that private equity funds provide more timely information to their limited partners in the post-820 period.

4.3 Univariate analysis of private equity fund NAV accuracy

Recall that our focus on liquidated private equity funds allows us to observe all distributions to and contributions from LP investors through to the end of the life of the fund and to assess reported NAVs as predictors of future distributions and contributions. Panel A of Table 3 presents mean and median *NAV Accuracy* in the periods, pre-2007 and post-2008. From 2002–2006 (the pre-period) to 2009–2016 (the post-period) following ASC 820 adoption, we observe a significant increase in overall median accuracy. Of course, accuracy may be affected by factors other than the adoption of ASC 820. We control for these factors in our regression analyses, which follow.

4.4 Regression analyses of NAV accuracy

To examine our first research question, we investigate the accuracy of private equity NAVs as estimates of the perfect-foresight NPV of net distributions through to the end of the life of the fund, in Panel B of Table 3. We include all observations for years 2002–2006 and 2009–2016. The variable *Post* is an indicator variable equal to one for the years 2009–2016, which are the years after the implementation of ASC 820, zero otherwise. If the accuracy of the NAVs of private equity funds relative to future distributions improved following the implementation of ASC 820, we will observe a positive estimate of the coefficient on *Post*. While it is possible that funds in our sample enhanced their use of fair value accounting prior to the post period, or even after 2008, this should work against us funding a significant coefficient on *Post*.

We include numerous controls. Like Kaplan and Schoar (2005) we include the lagged and contemporaneous quarterly returns on the S&P 500 index to control for the effects of market conditions on accuracy. We further control for the lagged and contemporaneous quarterly returns on the Russell 2000 index, which comprises the smallest 2000 stocks of the Russell 3000, with market values of $29 million to $6 billion as of August 2019, and is likely to be more representative of the valuation drivers for the private equity asset class. Like Jenkinson *et al.* (2013), we include a fourth-quarter indicator variable, *Q4*, that equals one if the quarter is the fourth quarter of the fiscal year, zero otherwise. This variable is included to capture the possible effect of the annual audit during the fourth quarter on the accuracy of reported NAV. In order to examine the effects of fund and fund manager characteristics we include the variables: fund size, fund manager experience, a fundraising indicator variable, a venture indicator variable, and the fund's performance quartile. Finally, we include fixed effects for fund age, which is the number of years since the initiation of the fund, to control for changes in accuracy with fund age. As Jenkinson *et al.* (2020) discuss, future cash flows become easier to estimate later in a private equity fund's life, as the fund approaches its terminal years. In a robustness check, we use number of years to liquidation instead of fund age and the results are similar (see Section 5).

Our second research question considers whether ASC 820 implementation differentially affected the accuracy of private equity net asset valuations based on fund and fund manager characteristics. We thus interact the *Post* variable with each of the fund and fund manager characteristic variables.

Table 3 Accuracy of liquidated private equity NAV disclosures.

Years	*N*	Mean accuracy	Median accuracy
Panel A: NAV accuracy mean and median values			
2002–2006	6,306	−1.114	−0.383
2009–2016	4,891	−0.561	−0.253
2002–2006 vs. 2009–2016			***

Panel B: NAV accuracy regressions

	Median		Robust	
Dependent variable: *NAV Accuracy*$_{iq}$	(1)	(2)	(3)	(4)
Post	0.073***	0.162***	0.057***	0.139***
	(8.38)	(6.99)	(7.75)	(6.76)
S&P500$_q$	0.195	0.279	0.159	0.083
	(1.15)	(1.29)	(1.28)	(0.52)
S&P500$_q$ × Post		−0.094		0.054
		(−0.29)		(0.20)
S&P500$_{q-1}$	0.248*	0.156	0.154	−0.043
	(1.69)	(0.77)	(1.25)	(−0.26)
S&P500$_{q-1}$ × Post		0.319		0.418
		(1.11)		(1.51)
Russell2000$_q$	−0.187	−0.274	−0.197**	−0.158
	(−1.42)	(−1.78)	(−2.12)	(−1.37)
Russell2000$_q$ ×Post		0.110		−0.008
		(0.44)		(−0.04)
Russell2000$_{q-1}$	−0.151	−0.170	−0.099	−0.046
	(−1.35)	(−1.25)	(−1.06)	(−0.41)
Russell2000$_{q-1}$ × Post		−0.123		−0.178
		(−0.56)		(−0.84)
Q4	0.019*	0.014	0.023***	0.025**
	(1.87)	(0.93)	(2.65)	(2.03)
Q4 × Post		−0.001		−0.013
		(−0.04)		(−0.71)
Fund size	0.029***	0.035***	0.038***	0.045***
	(10.72)	(7.57)	(9.29)	(8.21)
Fund size × Post		−0.011∗		−0.016*
		(−1.83)		(−1.86)
Experience	0.012***	0.020***	0.015***	0.021***
	(7.46)	(6.49)	(7.20)	(6.47)
Experience × Post		−0.012***		−0.010**
		(−3.48)		(−2.21)

Table 3 (*Continued*)

	Median		Robust	
Dependent variable: *NAV Accuracy*$_{iq}$	(1)	(2)	(3)	(4)
Fundraising	0.105***	0.085***	0.086***	0.060***
	(8.56)	(4.19)	(5.57)	(3.25)
Fundraising × Post		0.032		0.082**
		(1.46)		(2.51)
Venture	−0.246***	−0.248***	−0.198***	−0.203***
	(−16.48)	(−14.75)	(−20.47)	(−18.15)
Venture × Post		0.012		0.020
		(0.34)		(0.89)
Quartile	−0.036***	−0.021***	−0.039***	−0.028***
	(−7.87)	(−3.58)	(−12.66)	(−6.85)
Quartile × Post		−0.026***		−0.023***
		(−3.43)		(−3.76)
Fixed effects?	Fund age	Fund age	Fund age	Fund age
Observations	11,199	11,199	11,199	11,199
Number of funds	585	585	585	585
R^2			0.2004	0.2010
Pseudo-R^2	0.1916	0.1923		

This table provides descriptive statistics and regression analyses of the accuracy of liquidated private equity fund NAV disclosures relative to future net distributions discounted back at the internal rate of return ultimately realized by the fund from inception to liquidation (*END_IRR*). Panel A presents mean and median values of accuracy for the periods before and after ASC 820 (2002–2006 and 2009–2016, respectively) as well as tests of the difference between these two periods. In Panel B, the variable *Post* equals zero for the fund-quarters prior to 2007, and one for the fund-quarters after 2008. We estimate variations in the following equation for the years 2002–2016 but excluding 2007 and 2008:

$$\begin{aligned} NAV\ Accuracy_{iq} = {} & \alpha_1 Post + \alpha_2 S\&P500_q + \alpha_3 S\&P500_q \times Post + \alpha_4 S\&P500_{q-1} \\ & + \alpha_5 S\&P500_{q-1} \times Post + \alpha_6 Russell2000_q + \alpha_7 Russell2000_q \times Post + \alpha_8 Russell2000_{q-1} \\ & + \alpha_9 Russell2000_{q-1} \times Post + \alpha_{10} Q4 + \alpha_{11} Q4 \times Post + \alpha_{12} FundSize_i \\ & + \alpha_{13} FundSize_i \times Post + \alpha_{14} Experience_i + \alpha_{15} Experience_i \times Post + \alpha_{16} Fundraising_{iq} \\ & + \alpha_{17} Fundraising_{iq} \times Post + \alpha_{18} Venture_i + \alpha_{19} Venture_i \times Post + \alpha_{20} Quartile_{iq} \\ & + \alpha_{21} Quartile_{iq} \times Post + \sum \text{Fundage} + \epsilon_{iq} \end{aligned}$$

In Panel B, Columns 1 and 2 use median regression and Columns 3 and 4 use robust regression. All 11 fund age fixed effects are included (for years 0 through 10 of fund age) and thus intercepts are suppressed. Coefficients are presented with *t*-statistics in parentheses; standard errors are clustered by fund. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively, based on two-tailed tests. All variables are defined in the Appendix.

Table 3, Panel B presents the results of estimating NAV accuracy regressions. Given the skewness in the dependent variables, we conduct both median regressions (in Columns 1 and 2 of each panel) and robust regressions (in Columns 3 and 4), following Gipper *et al.* (2020) and Leone *et al.* (2019). Standard errors are clustered by fund for all regressions.

Focusing first on the non-interacted accuracy regressions in Columns 1 and 3 in Panel B, we find evidence of an improvement in accuracy in the years 2009–2016 relative to the years 2002–2006. In both the median and robust regressions, the estimate of the coefficient on *Post* is positive and significant (0.073 with a *t*-statistic of 8.38 and 0.057 with a *t*-statistic of 7.75), suggesting that NAV accuracy increased following ASC 820 implementation. Moreover, these results are economically significant, as they suggest a post-ASC 820 accuracy improvement of 6–7% of NAV. (Recall that *NAV Accuracy* is scaled by NAV.) Moreover, accuracy is significantly higher in the fourth quarter suggesting that the annual audit may affect accuracy (the estimate of the coefficient on *Q4* is 0.019 with a *t*-statistic of 1.87, based on the median regression). In addition, NAV accuracy is significantly positively associated with fund size, fund manager experience, and fundraising incentives but lower for venture funds and for low-performance funds (based on *Quartile*).

Turning to the accuracy regressions that include *Post* interaction terms (Columns 2 and 4 in Panel B), we continue to observe a significantly positive estimate of the coefficient on *Post*. At the same time, we observe less of an increase in accuracy for larger funds (the estimate of the coefficient on *Fund Size* × *Post* is −0.011 with a *t*-statistic of −1.83), for more experienced fund managers (the estimate of the coefficient on *Experience* × *Post* is −0.012 with a *t*-statistic of −3.48), and for low-performing (based on quartile) funds (the estimate of the coefficient on *Quartile* × *Post* is −0.026 with a *t*-statistic of −3.43). Results are similar in the robust regression, where we also observe a greater increase in accuracy in the presence of fundraising (the estimate of the coefficient on *Fundraising* × *Post* is 0.082 with a *t*-statistic of 2.51).

4.5 Analyses of NAV signed errors

While our main focus is on the accuracy of private equity fund NAVs, we also assess the signed errors of NAVs, since these are so closely tied to NAV accuracy (i.e., absolute errors). We define $NAV\ Signed\ Error_{iq}$ as the difference between fund *i*'s quarter *q* reported NAV less our calculated NPV for the quarter, scaled by NAV so that the variable is increasing in the optimism of the NAV relative to the perfect foresight NPV. Panel A of Table 4 presents mean and median *NAV Signed Error* in the periods, pre-2007 and post-2008. Mean NAV signed error is negative, consistent with evidence in Jenkinson *et al.* (2020) that private equity NAVs are conservative. From 2002–2006 (the pre-period) to 2009–2016 (the post-period) following ASC 820 adoption, we observe a significant increase in overall median signed error; the increase in mean signed error is not significantly different from zero.

Next, we estimate regressions with *NAV Signed Error* rather than *NAV Accuracy* as the dependent variable. We are interested in the coefficient on *Post* as well as on *Post* interacted with fund- and fund-level characteristics. Panel B of Table 4 presents the results of estimating these regressions. Again, we report the results from median regressions in Columns 1 and 2 and robust regressions in Columns 3 and 4. Focusing first on regressions in which we do not include *Post* interaction terms, we find evidence of an increase in

Table 4 Signed errors of liquidated private equity NAV disclosures.

Panel A: NAV signed error mean and median values

Years	*N*	Mean signed error	Median signed error
2002–2006	6,306	−0.396	0.009
2009–2016	4,891	−0.054	0.025
2002–2006 vs. 2009–2016		**	

Panel B: NAV signed error regressions

	Median		Robust	
Dependent variable: *NAV Signed Error*$_{iq}$	(1)	(2)	(3)	(4)
Post	0.038***	0.161***	0.066***	0.185***
	(4.53)	(6.70)	(5.98)	(6.08)
S&P500$_q$	−0.111	−0.314	−0.083	−0.492**
	(−0.73)	(−1.50)	(−0.45)	(−2.07)
S&P500$_q$ × Post		0.464		0.973**
		(1.46)		(2.46)
S&P500$_{q-1}$	0.094	0.183	0.165	0.136
	(0.60)	(0.82)	(0.90)	(0.57)
S&P500$_{q-1}$ × Post		0.028		0.351
		(0.08)		(0.86)
Russell2000$_q$	−0.073	0.055	−0.113	0.130
	(−0.64)	(0.37)	(−0.82)	(0.76)
Russell2000$_q$ × Post		−0.282		−0.638**
		(−1.22)		(−2.15)
Russell2000$_{q-1}$	−0.065	−0.003	−0.127	−0.018
	(−0.56)	(−0.02)	(−0.92)	(−0.11)
Russell2000$_{q-1}$ × Post		−0.223		−0.404
		(−0.86)		(−1.29)
Q4	0.033***	0.074***	0.036***	0.079***
	(3.65)	(4.34)	(2.87)	(4.38)
Q4 × Post		−0.070***		−0.077***
		(−3.27)		(−2.96)
Fund size	−0.013***	−0.013**	−0.008	−0.008*
	(−3.18)	(−2.17)	(−1.38)	(−1.95)
Fund size × Post		0.005		0.012
		(0.70)		(1.55)
Experience	−0.016***	−0.016***	−0.020***	−0.014***
	(−6.78)	(−5.41)	(−6.17)	(−2.86)
Experience × Post		0.000		−0.011*
		(0.04)		(−1.69)

Table 4 (*Continued*)

	Median		Robust	
Dependent variable: *NAV Signed Error*$_{iq}$	(1)	(2)	(3)	(4)
Fundraising	0.052***	0.086***	0.017	0.083***
	(3.78)	(4.86)	(0.74)	(3.04)
Fundraising × Post		−0.113***		−0.179***
		(−4.67)		(−3.70)
Venture	0.429***	0.456***	0.373***	0.424***
	(21.95)	(20.70)	(25.94)	(25.71)
Venture × Post		−0.186***		−0.208***
		(−3.23)		(−6.15)
Quartile	0.093***	0.113***	0.127***	0.140***
	(18.57)	(17.08)	(28.05)	(23.14)
Quartile × Post		−0.037***		−0.024***
		(−4.28)		(−2.68)
Fixed effects?	Fund age	Fund age	Fund age	Fund age
Observations	11,199	11,199	11,199	11,199
Number of funds	585	585	585	585
R^2			0.0409	0.0427
Pseudo-R^2	0.2020	0.2032		

This table provides descriptive statistics and regression analyses of the signed errors of liquidated private equity fund NAV disclosures relative to future net distributions discounted back at the internal rate of return ultimately realized by the fund from inception to liquidation (*END_IRR*). Panel A presents mean and median values of signed errors for the periods before and after ASC 820 (2002–2006 and 2009–2016, respectively), as well as tests of the difference between these two periods. In Panel B, the variable *Post* equals zero for the fund-quarters prior to 2007, and one for the fund-quarters after 2008. We estimate variations in the following equation for the years 2002–2016 but excluding 2007 and 2008:

$$
\begin{aligned}
&NAV\ SignedError_{iq} \\
&= \alpha_1 Post + \alpha_2 S\&P500_q + \alpha_3 S\&P500_q \times Post + \alpha_4 S\&P500_{q-1} + \alpha_5 S\&P500_{q-1} \\
&\quad \times\ Post + \alpha_6 Russell2000_q + \alpha_7 Russell2000_q \times Post + \alpha_8 Russell2000_{q-1} \\
&\quad + \alpha_9 Russell2000_{q-1} \times Post + \alpha_{10} Q4 + \alpha_{11} Q4 \times Post + \alpha_{12} FundSize_i \\
&\quad + \alpha_{13} FundSize_i \times Post + \alpha_{14} Experience_i + \alpha_{15} Experience_i \times Post + \alpha_{16} Fundraising_{iq} \\
&\quad + \alpha_{17} Fundraising_{iq} \times Post + \alpha_{18} Venture_i + \alpha_{19} Venture_i \times Post + \alpha_{20} Quartile_{iq} \\
&\quad + \alpha_{21} Quartile_{iq} \times Post + \sum \text{Fundage} + \epsilon_{iq}
\end{aligned}
$$

In Panel B, Columns 1 and 2 use median regression and Columns 3 and 4 use robust regression. All 11 fund age fixed effects are included (for years 0 through 10 of fund age) and thus intercepts are suppressed. Coefficients are presented with *t*-statistics in parentheses; standard errors are clustered by fund. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively, based on two-tailed tests. All variables are defined in the Appendix.

NAV optimism relative to the NPV in the years 2009–2016 compared to the years 2002–2006. In both the median and robust regressions, the estimate of the coefficient on *Post* is positive and significant (0.038 with a *t*-statistic of 4.53 and 0.066 with a *t*-statistic of 5.98), suggesting that NAV signed errors increased following ASC 820 implementation. Signed errors are significantly higher in the fourth quarter consistent with private equity funds writing up valuations during the annual audit. (The estimate of the coefficient on *Q4* is 0.033 with a *t*-statistic of 3.65, based on the median regression). In addition, NAV signed error is significantly negatively associated with fund size and fund manager experience and significantly higher for funds with fundraising incentives, venture funds, and for poor-performing funds.

Turning to the signed error regressions that include *Post* interaction terms, we continue to observe a significantly positive estimate of the coefficient on *Post*. In both the median and robust regressions in Columns 2 and 4, the estimate of the coefficient on *Post* is positive and significant (0.161 with a *t*-statistic of 6.70 and 0.185 with a *t*-statistic of 6.08), suggesting that NAV signed error increased following ASC 820 implementation. Interestingly, the estimate of the coefficient on *Q4* is significant (0.074 with a *t*-statistic of 4.34, based on the median regression) suggesting higher signed errors in that quarter prior to the implementation of ASC 820, consistent with private equity funds writing up valuations during the annual audit. But, the fourth quarter effect on signed errors is not observed after the implementation of ASC 820; the estimate of the coefficient on *Q4* × *Post* is −0.070 with a *t*-statistic of −3.27, based on the median regression (i.e., the signed error in the fourth quarter after the implementation is $0.074 - 0.070 = 0.004$, which is not significantly different from zero). These results appear consistent with the Table 2 finding that funds make smaller, more frequent positive valuation adjustments post-ASC 820 and thus have a decreased need for upward adjustments at the year-end audit.

Now, we consider the results of analyses of differences in signed errors across fund characteristics. We find that the post-820 increase in *NAV Signed Error* is moderated: in the presence of fundraising incentives (the estimate of the coefficient on *Fundraising* × *Post* is −0.113 with a *t*-statistic of −4.67), for venture funds (the estimate of the coefficient on *Venture* × *Post* is −0.186 with a *t*-statistic of −3.23), and for low-performing (based on quartile) funds (the estimate of the coefficient on *Quartile* × *Post* is −0.037 with a *t*-statistic of −4.28). Results are similar in the robust regression, where we further observe less increase in signed error for experienced fund managers (the estimate of the coefficient on *Experience* × *Post* is −0.011 with a *t*-statistic of −1.69).

5 Robustness Checks

A challenge in testing for the effects of ASC 820 is that the change in accounting standard happened almost concurrently with the global financial crisis. In this section we describe the un-tabulated controls and sensitivity tests we have implemented to help understand the robustness of our main findings in Table 4.

Our main results exclude the years 2007 and 2008, when the credit crisis took effect. When we exclude the years 2007 and 2008, as well as 2009, from our sample, results are similar to those in Table 3 with one exception: in Column 4 of Panel B, the coefficient on *Experience* × *Post* is no longer statistically significant. When we include observations from 2007 in the pre-period and from 2008 in the post-period, we find that our main results in Table 3 are similar with one

exception: in Column 2 of Panel A the coefficient on *Fund Size* × *Post* is no longer statistically significant.

Our main analyses show that there was an increase in the accuracy of NAVs following ASC 820. In these analyses, we compared a pre-820 period, 2002–2006, with a post-820 period, 2009–2016, excluding the two years, 2007 and 2008, which were the years of the adoption of ASC 820 and the global financial crisis. In addition to excluding the years of the crisis, we also include controls to attempt to address the possible effects of changes in market conditions. However, there is a possibility that the crisis itself had lingering effects beyond 2008. To address this concern, we recognize the fact that 2000 and 2001 were years when there were major disruptions to the market in the form of the collapse of the internet bubble. This similar disruption provides a "control" set of observations for which we examine changes in accuracy before (i.e., 1996 through 1999) and after (i.e., 2002 through mid-2004) the internet bubble effect. This "control" sample is compared with an ASC 820 "treatment" sample pre- (mid-2004 to 2006) and post- (2009–2014) ASC 820 and the global financial crisis. Our un-tabulated results are consistent with our earlier evidence of an increase in NAV accuracy following ASC 820.[23]

Our net present value (*NPV*) calculations are based on using the *END_IRR* for each fund, that is, the internal rate of return on the fund from inception to liquidation, in order to discount future net distributions to limited partners as of a given quarter.[24] This could be problematic in extreme cases, such as for the funds with negative *END_IRR*. For robustness, we assess the sensitivity of our tests by using a variety of discount rates to calculate NPVs, the choice of which is guided by the observed distribution of *END_IRR* for our sample of liquidated funds. As shown in Panel C of Table 1, *END_IRR* has a mean (median) of 12.0 (8.7) percent and a 25th percentile (75th percentile) of −0.8 (18.7) percent. We thus re-calculate NPVs for all fund-quarters using discount rates of 0, 9, and 19%, as well as the 11% rate assumed in Jenkinson *et al.* (2020). In these analyses, we find similar results in Table 4, although two of the estimates of the coefficients on the interaction terms (in particular, those on *Fund Size* × *Post* and *Experience* × *Post*) become statistically insignificant.

Our main results use the S&P 500 to represent broader market returns, as in Kaplan and Schoar (2005), and the Russell 2000 index to represent small-cap market returns. When we also control for Cambridge Private Equity index returns (in both the current and lagged quarters), results are similar with the following exception: in the median interacted regression for the signed error analysis (Column 2 of Panel B in Table 4), the coefficient on *Quartile* × *Post* is no longer statistically different from zero. All inferences based on the robust regressions are unchanged when we add this additional index.

In our main tests, we attempt to control for differences in fund age by including fund-age fixed effects. We attempt several other robustness checks and obtained similar results. First, we interact each fund-age fixed effect with *Post*. In the accuracy tests, we continue to find evidence of an increase in accuracy in the post-ASC 820 period across most years of fund age. In the signed error tests using robust regressions, we continue to find evidence of an increase in signed error in the post-ASC 820 period across most years of fund age. Second, while our main tests include fund-age fixed effects, based on the age of the fund since inception, we repeated the analyses reported in Table 3 including a time-to-liquidation fixed effect, based on the time remaining in the life of the fund (obviously an *ex post* analysis),

as well as including both fund-age and time-to-liquidation fixed effects. In these analyses, we obtained similar results with the following exceptions: in Panel A of Table 3, the coefficients on *Fund Size* × *Post* are no longer statistically significant, and in Column 1 of Panel B in Table 3, the coefficient on *Post* is no longer statistically significant.

6 Conclusion

This study evaluates the effect of ASC 820 on valuations reported by US private equity funds and, in particular, the effect of how fair value is implemented by private equity funds before and after ASC 820. This setting involves highly illiquid underlying investments that are inherently difficult to value, as well as perfect-foresight observation of all cash flows over the lifetime of funds, which negates the need for terminal value estimates. Given that reported NAVs of private equity funds are typically incorporated into the financial statements of the investors in the funds, this change to the most important accounting standard for the $3.4 trillion private equity industry potentially affects a large cross-section of the capital markets, including pension funds, mutual funds, and endowments, as well as their beneficiaries.

We show that, following ASC 820 adoption, private equity fund NAVs predict *ex post* future net distributions to fund investors more accurately (i.e., closer to the NPV of realized *ex post* future cash flows) following ASC 820 implementation. The improvement in accuracy is even stronger for smaller funds, less experienced fund managers, and high-performing funds. Moreover, the improvement in NAV accuracy following ASC 820 appears to stem from more frequent upward adjustments to private equity fund NAVs following ASC 820 adoption. Our results suggest that enhanced fair value reporting requirements may have improved the information environment for private equity investors and their stakeholders. While we cannot rule out the possibility that our results may be due to changes in estimation of NAVs associated with the occurrence of the financial crisis, we believe that documenting the change in accuracy of NAVs that was coincident with, by far, the most significant change in accounting to have occurred in this multi-trillion dollar industry is important to our understanding of the impact of ASC 820 on the private equity industry.

Our study thus departs from fair value literature that requires market prices to evaluate the underlying relevance and/or reliability of fair value estimates (as discussed by Sloan, 1999), and allows us to shed light on the financial reporting of an opaque segment of the financial markets. While we address a benefit to private equity LP investors of additional fair value guidance under ASC 820, we do not attempt to address the potential increase in costs to private equity GPs due to the new valuation guidelines.

Appendix: Variable definitions.

Variable	Definition
$Contributions_{iq}$	The dollar value of contributions (aka calls) received by fund i during quarter q, scaled to be representative of a $10 million commitment to the fund, according to Preqin
$Distributions_{iq}$	The dollar value of distributions paid by fund i during quarter q, scaled to be representative of a $10 million commitment to the fund, according to Preqin, multiplied by -1

Appendix: (*Continued*)

Variable	Definition
END_IRR_i	The internal rate of return realized by a liquidated fund over its entire life
Experience	The number of prior private equity funds run by the fund manager
$Fees_q$	The fees charged to the private equity fund by the general partner
$Fund\ Size_{iq}$	The total commitments to a private equity fund, measured in millions of dollars, according to Preqin, where commitments are the specified sum of capital a limited partner has agreed to contribute to a private equity fund. This variable is divided by 1,000 before inclusion in the regressions
Fundraising	Indicator variable that equals one if the fund manager's next private equity fund makes its first cash call within the next year, and equals zero otherwise
NAV_{iq}	Net asset value reported by fund i at the end of the quarter q, according to Preqin
$NAV\ Accuracy_{iq}$	NAV_{iq}–NPV_{iq}, scaled by NAV_{iq} and multiplied by -1 so that this variable is increasing in accuracy
$NAV\ Signed\ Error_{iq}$	NAV_{iq}–NPV_{iq}, scaled by NAV_{iq}
NPV_{iq}	Future quarterly net distributions (distributions less contributions) to limited partners from quarter $q+1$ to fund liquidation, discounted at the internal rate of return ultimately realized by the fund (END_IRR_i)
Post	Indicator variable that equals 1 for the years following 2008 and zero for the years preceding 2007
Q4	Indicator variable that equals 1 during the fourth calendar quarter and equals zero otherwise
Quartile	A measure of private equity fund performance, set by Preqin to compare funds with other funds in their benchmark grouping, where the benchmark is created based on funds' vintage, investment strategy, and geographic focus and includes only funds that have reported data within the past two years
$Russell2000_q$	Indicator variable that equals 1 for a fund with below median fund size, and equals zero otherwise
$S\&P500_q$	The CRSP quarterly return on the S&P500 index (SPRTRN), compounded monthly during quarter q
$Valuation\ adjustment_{iq}$	The change in NAV from quarter $q-1$ to quarter q, that is not explained by contributions and distributions during the quarter
Venture	Indicator variable that equals 1 for a venture fund and equals zero otherwise

Endnotes

[1] The ASU 2009-12 amendment to ASC 820 allows reporting entities to use the NAV provided to them to estimate the fair value of investments within the scope of ASU 2009-12. These investments, often referred to as alternative investments, include venture capital, private equity, and hedge funds.

[2] Jenkinson *et al.* (2020) provide evidence of fair value accounting being used prior to ASC 820.

[3] http://www.fasb.org/summary/stsum157.shtml

[4] For example, a private equity fund might need to provide a valuation estimate of an investment in SpaceX or UFC (Ultimate Fighting Championship), where forecasting the future cash flows and the risk associated with these cash flows is extremely difficult. Under ASC 820, the

fair value hierarchy includes three levels. Level 1 valuations are based on observable, independent market data, Level 2 on observable prices from similar markets, and Level 3 on unobservable data such as a pricing model or a proprietary financial forecast.

[5] General partners often raise a new fund before the previous fund is liquidated; therefore, fund-level interim NAV estimates (and IRR disclosures) may also affect limited partners' new investment decisions.

[6] The secondary market for private equity limited partnership interests only comprises about 2–7% of the total supply of US and European fund interests for the time period 2001–2013 (Capital Dynamics, 2014).

[7] Preqin's Private Equity Cash Flow Download provides fund-level information at the limited partner level, but not about the portfolio companies in which the private equity fund invests.

[8] Private equity NAVs are conservative, on average (Jenkinson *et al.*, 2013, 2020).

[9] In un-tabulated analyses, we also use the burst of the internet bubble as another exogenous event that may have affected the accuracy of NAVs, as a "control" sample against which to compare our "treatment," sample, which is the sample of observations around the adoption of ASC 820. Our results and conclusions are substantially the same with this experimental design.

[10] General partner compensation often follows the industry standard of 2/20 (2% management fee on all invested capital and 20% profit share, or "carried interest," of the total return, typically after a hurdle rate is reached). Gompers and Lerner (1999) discuss compensation in the private equity industry.

[11] While we can observe financial statements for the subset of public private equity general partners (e.g., KKR), they are generally unavailable for private funds, which make up the vast majority of the industry. A portfolio summary from InterWest is available at http://www.interwest.com/sites/default/files/PEI-Investor-Relations-Manual-LP-Reporting-Chapter.pdf; this is included in Private Equity International's (2005) Investor Relations Manual as an example of how private equity funds should report their performance to their limited partners (Holmes and Hupp, 2011). Having said that, we would argue that the published reports of a public, private equity GP, either pre- or post-820, would not reflect the same type of reporting as received by LPs in a specific private equity fund. Goktan and Muslu (2018) examine the reporting of private firms owned by publicly-traded private equity firms.

[12] See Lattman (2012), Morgenson (2014), and Maremont and Spector (2014), as well as SEC speeches by Bowden (2014), Wyatt (2015), and Deresney (2016).

[13] In an opaque setting without mandatory disclosure and limited regulation, such as in private equity, financial reporting may become even more important. In a similar private setting, Cassar and Gerakos (2010) find that hedge funds voluntarily invest in internal controls over financial reporting to reduce agency costs. Moreover, hedge fund investors are willing to pay higher fees for internal controls in settings where managers have more discretion in reporting or manipulating performance. Even in private lending relationships between banks and small companies, financial reporting plays a role in a monitoring capacity (Minnis and Sutherland, 2016).

[14] Hochberg *et al.* (2014) describe a winner's curse, in which existing LP investors have an informational advantage over prospective LP investors when the GP seeks fundraising for its next fund.

[15] These findings contrast with earlier empirical work by Petroni and Wahlen (1995) who do not find the pricing of investment securities such as corporate bonds to be value relevant. Later, Carroll *et al.* (2003) conclude that Petroni and Wahlen's (1995) findings are most likely due to correlated omitted variables.

[16] See, for example, Mendelson (2009) and Sigalow (2011).

[17] ASC 820 allowed early adoption in 2007 and required adoption in 2008. To the extent that private equity funds delayed adoption of ASC 820, this would work against our finding a significant difference following 2008.

[18] Harris *et al.* (2014) obtain similar performance results using the Burgiss, Cambridge Associates, and Preqin data sets; they conclude that these three private equity data sources are unbiased.

[19] Requiring a non-zero NAV results in exclusion from our sample of the final fund-quarter where there is both a final liquidation and the final distribution of the fund.

[20] We do not include non-liquidated funds in the sample. While excluding such funds comes at the cost of a smaller sample size, including them would result in assessing the accuracy of the NAV reported by the fund relative to the net present value of future cash flows as well as the final NAV, also reported by the fund.

[21] We use all cash inflows and outflows during the fund's life (whether that precedes 2002 or extends to 2019) in order to both observe the *ex post* internal rate of return on the fund and to calculate NPV as of a given fund-quarter.

[22] In un-tabulated results, we obtain similar inferences in our main NAV accuracy tests when we instead scale by the absolute value of *NPV* or by total contributions over the life of fund.

[23] Results available from the authors upon request.

[24] The internal rate of return implied by these sequences of cash flows, the sign of which changes over time (i.e., in some years there are net cash inflows and in others there are net cash outflows) may not be unique. In order to check the sensitivity of our results to this issue, we calculate the IRR using starting points ("seeds") in the iterative procedure implicit in the IRR ranging from 1% to 20%. For 24.5% of the observations in our sample, we find estimates of the implied IRR that differ by more than 1%, depending upon the seed. Including or excluding these observations from our analyses has little effect on our empirical results, with the following exceptions: the coefficient on *Fundraising* × *Post* in the robust accuracy regression is no longer significant, and the coefficient on *Quartile* × *Post* in the signed error regressions is no longer significantly negative. We note that, for 41 of the 586 funds in our final sample, we are unable to solve for an internal rate of return and thus use an assumed IRR of 11% (as in Jenkinson *et al.*, 2020) for these funds throughout our analyses.

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