Private Equity's Diversification Illusion: Economic Comovement and Fair Value Reporting*

Kyle Welch†

January 14, 2014

Abstract

This study examines how accounting has informed private equity diversification claims and demand for private equity investments. Despite research showing private equity lacks portfolio diversification benefits, those marketing private equity assets continue to emphasize its diversification value, and demand for private equity investments has surged. Exploiting the change in international accounting, I show that returns provided by private equity firms understate the economic comovement between private equity and market returns, creating a diversification illusion. I find that private equity funds that adopted redefined fair value accounting reported returns with increased market beta and correlations. Additionally, I find that abnormal returns to private equity firms disappear after adopting fair value standards. In contrast to findings from public market research showing improved disclosure reduces the cost of capital, private equity firms that implement fair value standards encounter increased costs in accessing capital. This result is consistent with fair value reporting informing diversification benefits, improving resource allocation and mitigating agency concerns.

JEL Classifications: G11, G12, G14, G15, G23, M41, M48

Keywords: private equity; fair value; access to capital; IAS 39; FAS No. 157; FASB; IASB; ASC 820; covariance risk; accounting beta; cost of capital.

*I am grateful to my dissertation committee: Paul Healy, Karthik Ramanna, Edward Riedl, and Charles Wang. I also thank Ian Gow, Josh Lerner, George Serafeim, Steve Stubben, Robert Turley, and seminar participants at Harvard Business School for their insightful comments. I gratefully acknowledge financial support from Harvard Business School. All errors are my own.

†Harvard Business School, kwelch@hbs.edu

1 Introduction

Academic researchers have noted an unusual paradox in private equity investing: while demand for private equity investments has increased steadily since the early 1990s to currently $3 trillion under management (Preqin, 2013), academic research indicates private equity provides inadequate diversification value and risk–adjusted returns.[1] I hypothesize that this paradox is due, at least in part, to financial reporting that provided an illusion of diversification, one of the primary benefits of private equity as argued by industry proponents.

Prior to recent changes in accounting standards, best practice in private equity financial reporting dictated anchoring fair value estimates to historical costs as part of conservative reporting. The illiquidity of private equity assets was used to legitimize the use of extreme discounts in reported valuations to keep asset values close to historical cost. As one valuation firm noted, "these investments were typically held at cost unless there was a 'milestone event,' such as another round of financing or an offer or sale. Often, there was no write–down unless a bankruptcy or down round [of equity financing] occurred."[2] This mismatch between accounting and economics falsely inflated the diversification benefits of private equity by understating correlations between private equity portfolios and the market a diversification illusion.

David Swensen, chief investment officer of Yale University's endowment, elaborated on the implications of using accounting information for risk assessment of illiquid private equity assets (Swensen, 2009):

> *Illiquidity masks the relationship between fundamental drivers of company values and change in market price, causing private equity's diversifying power to appear artificially high... private compan[ies] gain spurious diversifying characteristics based solely on lack of co–movement with the more frequently valued public company.*

Financial reporting by private equity firms changed with new fair value accounting standards: *International Accounting Standard 39—Financial Instruments: Recognition and Measurement* (IAS

[1] Most research notes that limited partner investors lose money or break even on a risk adjusted basis. An extensive literature documents risk–adjusted returns (see: Axelson et al., 2013; Harris et al., 2012; Higson and Stucke, 2012; Kaplan and Schoar, 2005; Phalippou and Gottschalg, 2009; Phalippou and Zollo, 2005; Gottschalg et al., 2003; Axelson et al., 2010; Ljungqvist et al., 2008; Franzoni et al., 2012; Robinson and Sensoy, 2011; Korteweg and Nagel, 2013)

[2] Valuation Research Corporation (2007); Seery (2012); Partners (2012)

39) and *Statement of Financial Accounting Standards No. 157—fair value Measurements* (FAS 157).[3] IAS 39 and FAS 157 provided a clear definition of fair value, a previously undefined term by both standard setting bodies. Under prior accounting, fair value had an imprecise definition which could include a number of assumptions; new fair value standards explicitly defined fair value in a way that assumed an orderly transaction between a willing buyer and a willing seller. The new standards also explicitly restricted using historical cost as a measure of fair value as was the case with private equity accounting practices.

To explore whether the new accounting standards inform private equity diversification claims, this study exploits the adoption of IAS 39 in a difference–in–differences design to examine the impact of fair value accounting on (1) private equity market beta, excess returns and quarterly correlations with equity markets and (2) private equity firms' access to capital. The tests focus on private equity firms reporting under International Accounting Standards for two reasons. First, the United States mandated adoption of FAS 157 for private firms happened during the financial crisis, which confounds the identification of empirical tests. Second, IAS 39 was implemented before FAS 157 and informed investors in both markets of previously unreported economic comovement.

Using a modified CAPM, tests show that under IAS 39 the overall market beta shifted from 0.22 to 0.91. Moreover, the tests show that the beta increased 0.47 as a direct result of the new definitions of fair value under IAS 39. When the first year of implementation is removed from the sample, a period with accumulated unrecognized markups that would seem uncorrelated, excess returns for private equity firms adopting fair value disappear. This shift in systematic risk and investment alpha is consistent with the so–called "Beta Puzzle" in private equity Axelson et al. (2013). The private equity "Beta Puzzle" notes that, according to finance research, buyout funds can increase the leverage up to six fold in portfolio companies without changing systematic risk. By examining private equity deal level returns Axelson et al. (2013) show that that private equity indeed follows standard Modigliani and Miller (1958) calculations showing systematic risk (beta) is indeed higher offering a solution to the "Beta Puzzle." The lower alpha and higher beta findings mirror results from Sorensen et al. (2012) indicating that after fees investors likely break even on private equity investments. The current paper differs in that I explore the impact of redefining fair value on revealing the economic beta and alpha.

[3]FAS No. 157 is also known as ASC 820 after the FASB updated codification. FAS 157 became effective January 1, 2008. The IAS 39 standard became effective January 1, 2005. In conjunction with the new international accounting standard, the International Private Equity and Venture Capital Association issued accounting valuation guidelines for private equity firms in December 2004. The most relevant standard as of the date of this paper is *IFRS 13 Fair Value Measurement.*

An examination of three year correlations shows that market comovement increased across international firms subject to the new standard. Figure 1 shows the impact on European private equity funds implementing IAS 39. Correlations with the MSCI World Index are small and positive prior to implementation of fair value standards. After implementation of IAS 39 in 2006, we observe an increase in accounting correlations. The upward trend in correlation after Q4 2005 and the eventual plateau is a result of including redefined fair value estimates in each additional quarter. Typically, differencing in a chart has a sharp shock within the first few periods of implementation. The nature of calculating rolling correlations, which will include prior quarters under the old standard, causes the graph to look like a trend.[4]

In assessing the economic impact of redefining fair value, I use a number of measures of private equity firm access to capital, including dollars raised per day, dollars raised per investor, and propensity to raise capital. After implementation of IAS 39, private equity firms are less likely to attract new capital and they raise less capital overall and less capital per investor. They also spend more days soliciting capital for lower amounts invested. As a result of redefining fair value, private equity firms implementing the new standards raise roughly 50% less capital than their counterparts.

Overall, this evidence is consistent with the notion that fair value reporting improves the information environment. The new fair value standards provide useful information to institutional investors about industry risk and help optimize private equity investment. These findings are corroborated via survey data and interviews. Investors' assumptions about private equity appear to shift after implementation of the new standard. The large sample and field data is consistent with institutional investors using accounting information to inform correlation assumptions used in asset allocation models. Following the change in fair value accounting, many institutional investors and investment consultants appear to have revised their correlation estimates upwards based on new accounting information.

It is interesting to consider that fair value *improved* reporting given the strong opposition to redefining fair value coming from the private equity industry. Private equity firm managers have incentives to present themselves as low–risk diversifying investments by obfuscating systematic risk (i.e. return smoothing). Moreover, institutional investors such as investment managers at endowments and pensions who rely on accounting information also have incentives to obfuscate systematic risk and choose

[4]To illustrate, in Q1 2006 European private equity firms would report their first quarter of returns using redefined fair values, yet the calculation of the three year correlation would include 11 periods of returns under old reporting standards and only one quarter under new standards. As more returns are reported in following quarters using redefined fair value estimates, correlations shift to their new levels as a result of the standard.

investments that appear low–risk to demonstrate prudent portfolio management to their institutions' trustees and benefactors. Fair value, in this setting, actually helps mitigate agency conflicts and reduces potential agency concerns (attributes not historically associated with fair value standards) not only between private equity firms and institutional investors but also between institutional investors and portfolio benefactors.

The balance of the paper proceeds as follows. Section 2 describes institutional investing in private equity. Section 3 reviews the literature on fair value accounting and implementation of IAS 39 and FAS 157. Section 4 motivates a set of hypotheses on the consequences of the new fair value standard. Section 5 outlines the data and research design, including a discussion of the cost–of–capital proxy measure. Section 6 presents the main empirical results, Section 8 discusses how well the diversification illusion has been resolved by fair value reporting and and Section 9 discusses the contributions of this study as well as its implications for research and practice.

2 Background

Private equity firms' incentives and governance structures differ from those of public firms. Compensation at private equity firms is based on realized returns, not accruals or estimates as with public firms, and as a result, a firm's managers and its investors are compensated simultaneously. Even if managers of public companies are paid entirely with restricted equity, they will exit holdings at different times than their investors, causing a timing and incentive mismatch. Moreover, limited partner investors in private equity funds have little recourse to their capital, which is usually locked up for ten years or more. These unique governance structures do not eliminate principal–agent problems, but they do create a different dynamic within which both the principal and the agent operate. This section outlines the unique attributes of private equity governance and compensation. It then discusses the underlying economic drivers of private equity returns as they relate to financial reporting and portfolio management.

2.1 Private Equity: A Corporate Governance Nirvana?

The governance structure of private equity firms has been called a "corporate governance nirvana" (Cendrowski et al., 2012). Private equity managers are compensated with exceptionally strong alignment of incentives compared to public firms as a result of increased information asymmetry. As one scholar has asserted: "More than any other factor, [private equity firms] resolution of the owner

manager conflict explains how they can motivate the same people, managing the same resources, to perform so much more effectively under private ownership than in the publicly held corporate form" (Jensen, 1997).

For their part, institutional investors face considerable information asymmetry and limited control over how and when their investment commitments are invested in private equity funds (Lerner et al., 2007). Figure 2 provides an example of the typical fund structure of private equity investing. Once capital is committed, private equity managers enjoy discretion over which investments are made, when committed capital is called and when over the course of the fund's investment life (up to ten years), invested capital is returned. Since managers are given more control and investors face higher information asymmetry, private equity governance structures seek high incentive alignment between principals (limited partner investors) and agents (private equity firms).

To achieve this alignment, private equity managers are compensated primarily through carried interest, a percentage of investors' realized returns, not accruals or estimates. Thus, the timing of private equity compensation matches the time horizons of the limited partners (Cendrowski et al., 2012). Both this high incentive alignment and the long term commitment of capital make the impact of accounting standards less clear in the private equity setting.

Because private equity compensation is based on realized returns rather than accruals, this setting offers a unique perspective on existing research in accounting. For example, earnings management at public firms largely deals with accruals and estimates of the future, as public managers try to increase their stock prices (e.g. beat analyst estimates) via earnings management. The impact of generally accepted accounting principles (GAAP) regulation might seem less relevant in private equity, but accounting information is still used by investors to make decisions and incentives are still not perfectly aligned.

One exception to incentive alignment occurs when fundraising for a new private equity fund begins. Private equity managers may manage valuations prior to fundraising to promote follow–on funds (Jenkinson et al., 2013). However, fundraising is a repeated activity, as institutional investors seem to be keenly aware of this potential for a type of earnings management (Seery, 2012). For example, Jenkinson et al. (2013) find that private equity firms sometimes inflate valuations yet investors seen to respond to such manipulation. They also find that the firms with the strongest track records actually underreport their performance to avoid looking like valuation manipulators. The same work suggests that institutional investors assign significant weight to the realized returns of liquidated funds and

tend to discount the current investment portfolio's estimated returns. As a result, unrealized returns are viewed with skepticism during fundraising.

The unique governance structures of private firms offer a new setting in which to explore how well accounting standards mitigate principal/agent issues. Since compensation is based only on realized returns (i.e. match investor time horizon), private equity firms face lower incentives and agency concerns with short term reporting. However private equity firms face the same incentives around the long term reporting and smoothing returns that CEOs at public companies face. Managers in public firms face incentives to smooth earnings to create an illusion that their firm is detached from market movements. In the same way, smoothing returns creates a diversification illusion for public firms motivating CEOs to have cookie jar reserves or big baths, private equity firms have the same incentive to provide an appearance of unique economic returns.

2.2 Private Equity's Unclear Portfolio Value

Private equity assets are frequently promoted as "alternative assets" providing diversification benefits for institutional investors (Franzoni et al., 2012).[5] Figure 3 presents an efficient frontier chart from marketing materials from Nexus Private Equity Partners highlighting the perceived diversification provided by including private equity in a portfolio. Nexus Private Equity Partners' chart suggests that portfolios without private equity are dramatically inferior. But empirical research has suggested that no material diversification exists (Franzoni et al., 2012). Thus, if fair value standards improve the information environment and investors use the resulting accounting information in their evaluations, implementing fair value standards should improve investors' assessments of private equity investments.

Private equity firms generate returns by three methods: (1) interim paydown of debt using firm cash flows, (2) improvements in operational performance and (3) multiple expansion (market timing). When a private equity firm adds leverage to a company, it increases expected returns and risk levels but does nothing to promote enhanced diversification or risk–adjusted returns (Swensen, 2009). Prior research on private equity's risk exposure suggests that operational improvements are the main source of diversifying risk exposure from public markets (Kaplan and Schoar, 2005; Franzoni et al., 2012).

One important question is why institutions continue to invest so much capital in private equity, an asset class characterized by uncertain risk–adjusted returns. Research on private equity's risk–adjusted performance indicates that some of the $3 trillion invested in private equity assets might be misdirected

[5]Diversification is an appealing attribute for institutional investors' portfolios, since assets with unique covariance with public equity markets can generate enhanced returns via rebalancing and portfolio risk reduction (Fama, 1972)

(Preqin, 2013). Lerner et al. (2007) note that many institutional investors lack sufficient understanding of private equity economics to effectively evaluate such investments. Specifically, they argue that the "progress of the funds' portfolios is very difficult to assess from traditional accounting data" (p.733). The problem is compounded by the inherent complexity of developing meaningful economic correlation assumptions to determine appropriate portfolio allocation and appropriate rebalancing of economic exposure to private equity investments.

The risk–adjusted performance of private equity returns is similarly ambiguous (Sorensen et al., 2012; Higson and Stucke, 2012). Franzoni et al. (2012) find that private equity suffers from significant exposure to the same liquidity risk factors as public equity and other alternative asset classes. Consistent with this assertion, Robinson and Sensoy (2011) find that the cash flows of private equity are procyclical with the market, a finding confirmed by Kaplan and Schoar (2005). Finally, Phalippou and Zollo (2005) find that private equity performance covaries positively with both business cycles and stock market cycles and is exposed to tail risk. Most notably, Harris et al. (2012) use data from the Burgiss Group, a back office software management tool for private equity information for large institutional investors, and find that venture capital firms underperform public market alternatives but that private equity firms outperform public markets. Other evidence of relative outperformance by private equity can be found in the work of Higson and Stucke (2012) and Ljungqvist et al. (2008).

2.3 Portfolio Diversification via Private Equity: A Free Lunch?

Understanding how private equity's economic returns move with the public market is critical for investors intent on determining the appropriate magnitude of their private equity investments and rebalancing appropriately. Though economists often warn that there's no such thing as a free lunch, Campbell (2000)notes that finance theory does offer a free lunch: the reduction in risk that is achievable via diversification. Sharpe (1992) also observes that asset allocation across asset classes with different exposures to economic risk is a key driver of portfolio returns, and that understanding the underlying economics of an asset class is critical to asset allocation decisions. Since the emergence of private equity as an asset class in the 1990s, even the most respected institutional investors have had to contend with the challenge of managing a portfolio that contains illiquid assets. This state of affairs led Lerner et al. (2007) to remark that institutional investors are viewed as sophisticated appear to make foolish choices when investing in private equity firms.

A fundamental question of this paper is around how well sophisticated investors can determine

the true comovement of private equity with other assets using accounting information. Consider the three inputs to mean variance optimization analysis of a portfolio: estimating expected returns, estimating expected volatility, and estimating expected portfolio asset correlation. Of these three measures for evaluating the value of portfolio assets, determining expected portfolio covariance is arguably the most complex. [6] To the extent that accounting information contributes to investors' understanding of private equity economics, assumptions about expected variance and correlation may be affected by changes in accounting. Again, Yale's CIO aptly described the possible impact of accounting information on investment allocation decisions (Swensen, 2009).

> *If two otherwise identical companies differ only in the form of organization–one private, the other public–the infrequently and less aggressively valued private company appears much more stable than the frequently valued publicly traded company, particularly in a world where securities markets exhibit excess volatility. Even though both companies react in identical fashion to fundamental drivers of corporate value, the less volatile private entity boasts superior risk characteristics, based solely on mismeasurement of the company's true underlying volatility. Not only does lack of day–to–day valuation information reduce reported risk levels, the private company gains spurious diversifying characteristics based solely on lack of co–movement with the more frequently valued public company.*

According to this argument, the nature of reporting and accounting leads to a diversification illusion for institutional investors. Before fair value was explicitly defined by the new standards, private equity assets were typically not marked up or down over time. In letters to the FASB, private equity managers have argued that holding asset valuations at cost is a conservative approach to private equity accounting to not overstate performance.[7] The consequence of valuing assets at cost is that private equity assets look more attractive to investors seeking equity–market diversification.

All else being equal, the lower the co–movement of an asset within a portfolio, the more important it becomes to the portfolio to allocate to the asset. By making private equity assets seem less correlated with public–market alternatives, prior accounting practices helped private equity firms market portfolio diversification as a benefit from the asset class, creating diversification illusion for institutional

[6] As Swensen points out, "The correlation matrix is the most difficult set of mean–variance optimization variables to specify. Less intuitive than either means of variance, correlations indicate the degree to which asset class returns tend to move with one another" (Swensen, 2009).

[7] See National Association of College and University Business Officers (2009b,a); Private Equity Growth Capital Council (2009, 2010); National Venture Capital Association (2010, 2011) letters to FASB and Cambridge Associates (2009) letter to the AICPA Accounting Standards Executive Committee and the Alternative Investments Task Force.

investors who rely on accounting information to make portfolio allocation and investment decisions (Franzoni et al., 2012).

2.4 Are Institutional Investment Managers Foolish?

Recent research has argued that some institutional investors–typically characterized as informed investors–make foolish choices when investing in private equity funds. In "Smart Institutions, Foolish Choices," for example, Lerner et al. (2007) document that university endowments appear to make informed investment decisions about private equity while other institutional investors suffer from a lower–quality information environment or inferior selection ability. Two explanations can motivate these choices: (1) investment managers are responding to incentives from their trustees, and/or (2) accurate accounting information is more decisive in markets with few participants, no information intermediaries and inconsistent benchmarks.

Portfolio managers have incentives to invest in assets that generate superior returns. However, such incentives could instead have the unintended consequence of encouraging managers to pursue the appearance of being astute investors. If looking like a good investor is important to a manager, private equity's diversification illusion and its lower volatility would be appealing. Private equity accounting enables the investments to seem low risk not only to the portfolio manager, but also to the trustees whom the portfolio manager represents. Thus a pension–fund manager that is already locked in to a 10 year private equity investment might have a stronger incentive alignment with a private equity manager to smooth returns, yet out of sync with pension recipients. The same point applies to college–endowment managers and endowment beneficiaries. In letters to the FASB from both private equity firms and limited partners argued against new fair value accounting standards citing the strong incentive alignment between the two groups, yet letters did not address the potential over alignment of incentives at the expense of retirement or endowment beneficiaries. The reporting practices of private equity could offer an attractive means for a pension or endowment manager to appear to be reducing risk in a portfolio. With such investment managers are not foolish; they are simply responding to incentives.[8]

An alternative explanation is that, as a result of market institutional voids for private equity investing, accounting information matters even more as it represents a larger portion of available

[8]Institutional investors could face incentives to invest in these new asset classes in order to maintain prestige among their institutional investment peers. Private equity and venture capital are new asset classes that hold out promise of producing the most compelling asset–management returns of the last century. Their governance structure might also bias an investor toward the appearance of stabile returns from a lower–volatility investment.

information. In the private equity investment market, between 20 and 30 investors each commit $2 to $200 million to a given private equity fund with no intermediaries or analysts. By contrast, public markets have information intermediaries and a greater number of peer investors to analyze and digest information about the private market. Stocks can be shorted in public markets, where in private equity the only option is to abstain from investment. Moreover unlike public market risk and return benchmarks (e.g. S&P 500 or Russell 2000), the benchmarks for private equity investing assets (e.g. Cambridge Associates) suffer from the same accounting phenomenon studied in this paper and include funds in various life cycles. As a result it becomes difficult to measure how well a manager is performing until the fund is liquidated. This is the primary reason why the finance literature, such as Axelson et al. (2013) focus on liquidated investments. Swensen (2009) explains the basic mechanism causing confusion:

> *The lack of widely accepted benchmarks for the private equity asset class prevents investors from understanding the risk, return, and correlation characteristics of private equity, and hence, the role of private equity in a diversified portfolio. The few private equity indices that exist face the standard problem of how to measure the performance of private assets. The inability to determine a true market price for private assets forces one to use appraisal–based prices that typically lead to artificial smoothing of the returns. Smoothed returns result in lower estimates of volatility, lower correlations with most other asset classes, and artificially high risk and return relationships, all of which can lead to a dramatic over–allocation in a traditional mean–variance optimization setting that attempts to maximize return per unit of risk.*

Facing so many information voids, investors face limited choices when determining the expected comovement of their private equity portfolio with equity markets. Asset allocation models could be based on: (1) assumptions about private equity's correlation that is supported by theory but not by empirical return data from portfolio or indices (e.g. Cambridge Associates), or (2) they can base their assumptions on the accounting data from portfolio or indices in motivating portfolio mean variance optimization. In discussions with practitioners, it seems the best practice with portfolio optimization is to use available flawed data and to set limits to specific asset class levels manually based on management preference Swensen (2009). Portfolios are never perfectly optimized, however, with the diversification illusion in play, mean variance asset allocation models will always fully allocate 100% of the portfolio to private equity. In practice portfolio managers set allocation constraints to

limit the amount of private equity the optimizer uses, typically based on their own preference. With limited options, accounting data is likely to matter a great deal since it represents a preponderance of the available information and could anchor assumptions.

2.5 fair value Accounting

Both IAS 39 and FAS 157 define fair value (previously undefined) to exclude illiquidity estimates that were used to justify "best practice" accounting for private equity. Both the IASB and the FASB replaced illiquidity assumptions with defining fair value as assuming an orderly transaction with a willing buyer. The prior estimates for illiquidity were replaced with a liquidity classification hierarchy (Level 1, Level 2, and Level 3); Level 3 has the lowest liquidity, with valuations based on models, and Level 1 assets have quoted market prices. Under the prior "best practice" accounting for fund fair value, private equity firms reported typically at (or close to) cost unless there was a "milestone event" (e.g., liquidity events, including new rounds of financing or an asset sale) with typically no write–down unless a bankruptcy or down round of equity financing occurred. While this seems closer to historical cost accounting than to fair value accounting, the prior accounting best practice was reported as fair value to investors.

Private equity offers a more direct empirical context in which to test the impact of fair value accounting standards than has previously been possible. Prior research on fair value largely examined firms whose assets were only minimally impacted by the new definition of fair value. For example, Level 3 assets constitute only 46 percent of financial institutions' balance sheets in the United States and Europe (Fitch Ratings, 2008).[9] Thus fair value reporting research has focused primarily on firms whose balance sheets were only modestly impacted by the fair value accounting standard; the literature is devoid of empirical studies in which Level 3 assets represent the majority of balance sheet assets (see Lawrence et al. (2013) for a notable exception). By definition, mandated liquidity assumptions should have the greatest impact on the most illiquid assets, and thus implementing fair value accounting of private equity assets impacts the entire balance sheet.

Research examining the shift to market based fair value measures has produced mixed outcomes. Song et al. (2010) find that the value relevance of fair values decreases with each increment in liquidity levels; highly illiquid Level 3 asset reporting is more value–relevant for firms with strong corporate

[9]In addition, both the IASB and the FASB promulgated a hierarchy of asset classifications based on the inputs used to assess fair value: Level 1 assets have quoted market prices; Level 2 assets use market prices for comparable (but not identical) assets; and Level 3 assets use unobserved (typically internal) inputs.

governance. Riedl and Serafeim (2011) find that, under the new standard, the information risk embodied in a financial instrument's fair values leads to higher cost of capital in illiquid assets. Altamuro and Zhang (2012), find that Level 3 mortgage–servicing rights measurements better reflect the persistence of mortgage–servicing fees than Level 2 mortgage–servicing rights measurements. Lawrence et al. (2013) study closed–end mutual funds where the underlying fair value assets are directly related to performance measures. With the exception of Lawrence et al. (2013), the fair value reporting literature has focused on firms where only one aspect of the firm's balance sheet value is impacted by fair value accounting; the literature is devoid of empirical studies in which Level 3 assets represent the majority of firm assets across the sample. Because such assets require extensive assumptions to determine their fair value, Level 3 assets are likely to be impacted most profoundly by regulation that guides fair value assumptions, like IAS 39 and FAS 157.

Standard–setters assert that fair values provide the most relevant information to financial statement users, a position supported by some existing research (Barth et al., 1996). However, fair valuations can also be more subjective, particularly for unique illiquid assets with few comparable firms (categorized as Level 3 assets by both the IASB and the FASB). The fair value debate centers on whether improvements in the relevance of reported information outweigh potential for management manipulation and estimation error.

Improved information environment. For private equity reporting, volatility is precisely the information that should enhance understanding of the underlying asset risk (Barth, 2004; Barth and Clinch, 1998; Muller III, 1999; Aboody et al., 1999; Richard Dietrich et al., 2000; Muller III and Riedl, 2002; Cotter and Richardson, 2002; Kallapur and Kwan, 2004). Cost based reporting is often perceived as less volatile, but it is a mechanical construct as a result of restricting information; the true economics of the asset are not apparent in a measurement that excludes the stream of changes in expected future cash flows that is incorporated in fair value.

Managerial manipulation. Agency theory predicts that unverifiable discretion will be used opportunistically by managers (Jensen and Meckling, 1976). Furthermore, research has shown that fair value reporting can actually aid managers to postpone or manipulate earnings (Beaver and Venkatachalam, 2003; Ramanna and Watts, 2009; Aboody et al., 2006; Bartov et al., 2007). Private equity managers dont face strong short term reporting incentives to manipulate returns, however they do face long term incentives to manipulate earnings (e.g. earnings smoothing).

Estimation error. Management's perceptions of the future could legitimately embody an es-

timation bias that differs from a market valuation. If a valuation deviates too much from the true economics, the inaccurate reporting volatility could mislead investors. Estimation error volatility should be a focus of concern because a high level of volatility error corrodes the information environment (Barth, 2004). For private equity firms we would expect the impact of estimation error to be small. Moreover, a key focus of a private equity business model focuses on identifying and measuring value.

Both long–term incentive contracts with private equity managers and private equity investors' limited exit opportunities make the short term agency concerns present in public companies (i.e. meeting short–term earnings) less pressing at private equity firms. Instead, questions about communicating risk exposure are more pressing for institutional investors who are locked into the investment but anxious to consider portfolio rebalancing and future asset allocations in light of accounting information. Thus, in this setting, the test shifts from short–term incentives for managing fair value estimates to long–term incentives for smoothing earnings to make assets seem less closely correlated with public markets. Lambert et al. (2007)show that the direct effect of disclosure impacts investor's assessed covariance with other firms' cash flows, which is non–diversifiable. To the extent that disclosure reveals increased covariance with other firms' cash flows (the assets correlation/risk exposure common to the market) a firm's cost of capital increases. This direct effect is likely to be most important to the new standard in this setting. If the market is fully informed about private equity economics, new accounting disclosures should not have an economic impact on the market. But if the new definition of fair value induces firms to eliminate the liquidity concerns that help reduce the accounting co–movement discussed in the prior section (Swensen, 2009), private equity managers will not favor new fair value reporting. In that case, fair value reporting will be more costly and will reduce apparent diversification.

3 Hypothesis Development

Theory suggests that managers can increase a firm's value by reducing information asymmetries between insiders and investors. Greater disclosure reduces these asymmetries; theory suggests and empirical research has shown that, once investors are at less of an informational disadvantage, they will be willing to provide capital at a lower cost. A great deal of accounting research studies this phenomenon. However, disclosures and accounting regulations provide investors the most insight when the disclosures do not merely reduce uncertainty about outcomes but also promote understanding of

the underlying economic uncertainty.

I argue that fair value reporting has indeed changed the accounting co–movement of private equity assets with public markets. Theory suggests that, as long as managers are able to report the fair value of assets accurately, the comovement of such assets with equity markets should increase with the shift in accounting standard. Therefore:

Hypothesis 1 *The comovement of private equity to public equity markets is higher under redefined fair value reporting from IAS 39 relative to prior reporting.*

If investors use accounting information to make asset allocation and investment decisions, I expect access to capital to decrease and the cost of capital to increase as a result of greater disclosure. A decrease in the access to capital implies that investors use accounting information to understand private equity economics, and that it has informed them of the economic co–movement of this asset class with public markets. I argue that investors will become more informed about the volatility comovement of the assets and will adjust their discounts. In other words, they will identify previously unrecognized correlated systematic risk in their portfolios and reduce their demand for the asset. Hence the second hypothesis:

Hypothesis 2 *Private equity's access to capital under redefined fair value reporting is lower relative to prior reporting.*

Under semi–efficient market theory, if the market of investors in private equity funds were fully informed of the diversification illusion, changes in accounting standards would have no significant economic consequence for private equity. However, if investors rely heavily on available accounting information to determine correlations with other portfolio asset classes, the implementation of the new standard could be expected to change the access to capital for private equity firms. In particular, if the correlation between accounting returns and market returns increases, then I expect access to capital to decrease since private equity would subsequently exhibit greater co–movement with other portfolio assets. Lambert et al. (2007) provide a model that illustrates the motivation for this hypothesis. In their model, disclosures that reveal the economic comovement of firm cash flows also reveal the economic comovement with other investments causing increased cost for capital. In as much as private equity investors have uncertainty of the timing of cash flows, the Lambert et al. (2007) model for disclosure and capital investment motivates this hypothesis.

4 Research Design

Private equity firms provide a useful laboratory for exploring how private firms more generally are affected by accounting regulation. Though the governance structures of private firms vary widely, the governance, incentives, and investment structure of private equity firms are quite consistent. Moreover, institutional investors mandate that private equity firms adhere to GAAP in order to comply with their own portfolio mandates, whereas other private firms might not face this requirement. Neither in the motivation nor the implementation of IAS 39 in 2005 and FAS 157 in 2008 has been linked to influence from private firms.

Watts and Zimmerman (1978) note that accounting regulation is not entirely exogenous, but the impact of private equity firms on the implementation of the standard is likely to be close to zero. In fact, responses to the FASB regulation supporting more disclosure were unanimously negative: in letters, both private equity firms and institutional investors opposed it. Those letters characterized the regulation as costly, since it generates information that might be useful in a liquid market but of little value to firms "locked into investment" with a private equity fund. In interviews at firms that invest in private equity funds, managers responsible for such firms' internal reporting process expressed the strongest opposition to the standard. As one said, "It wouldnt be a problem if we didnt also have to verify [the private equity firms] valuations." Indeed, it is not just private equity firms that are impacted by the fair value standard; institutional investors must also report their assets to pension recipients, university students/alumni, and foundation contributors. Since most parties were active in lobbying against the standard including institutional investors in private equity, private equity firms are less likely to have an endogenous effect.

The empirical tests in this paper focus on IAS 39 instead of FAS 157 for two reasons. First, the mandated adoption of FAS 157 happened in the middle of the financial crisis. A reasonable argument can be made that a test in the United States is picking up some other paradigm shift in the market and not fair value reporting. As a result the empirical identification of the impact of fair value implementation is muddled by major global events during the period. Second, IAS 39 was implemented before FAS 157. I examine implementation of IAS 39 after 2005 primarily and only use the United States implementation of fair value standards as a suggestive confirmation in untabulated findings.

The main empirical specification in this study is a difference–in–difference approach across funds subject to different standard–setting bodies in order to draw causal inferences about the increased

comovement of private equity returns to equity markets. The first approach however uses a modified capital asset pricing model (CAPM) over the pre and post periods to examine the impact of the new fair value standards. The regression is specified as follows:

$$R - rf = \alpha_1 EUFund + \alpha_2 USFund + \beta_1 mktrf + \beta_2 EUFund \times mkrf + \epsilon \tag{4.1}$$

Where:

R - rf =	Private equity fund quarter return less risk–free rate.
mktrf =	Quarter return on value–weight market portfolio of global common stocks minus the one month U.S. T–bill rate (source Fama/French data library).
[region] Fund =	Indicator variable equal to 1 if the firm follows accounting standards from US (EU) and 0 otherwise.

The data is divided into pre and post periods of implementing IAS 39, from Q1 2000 to Q4 2005 for the pre period and fund returns after Q4 2005 to Q4 2008 for the post period. The constant is suppressed as indicator variables for each region are included in the regression indicating the alpha attributable investment managers in the reign. Standard errors are clustered by fund. The two main coefficients of interest are the EU specific market beta (β_2) and unique EU investment alpha (α_1). The market beta (β_2) attributable to the implementation of IAS 39 which H1 predicts will be higher. α_1 indicates the investment alpha provided by managers that is unique to market movements. If α_1 is decreasing with the implementation of IAS 39 this would be an additional result consistent with H1. Equation (6), which is a similar equation model as equation (5) except it combines the dataset across the time periods before and after implementation. Equation (6) in uses the full time period and difference–in–difference coefficient to measure the impact of the change on the market beta.

The second regression specification determines the shift in correlations associated with implementing IAS 39. While market betas and correlations are similar and should provide similar intuition, correlations provide a benchmark for changing assumptions that are used in practice with portfolio mean variance optimization models. The panel data regression is specified as follows:

$$Corr = \alpha + \beta_1 Post + \beta_2 EUFund + \beta_2 Post \times EUFund + Controls + \epsilon \tag{4.2}$$

Where:

Corr = Three–year rolling correlation of private equity firm returns with the MSCI World Index.

Post = Indicator variable equal to 1 if the observation is drawn from the post–adoption–period earnings distribution and 0 otherwise.

EUFund = Indicator variable equal to 1 if the firm follows IASB accounting standards and 0 otherwise.

Controls = Quarter–Year Fixed Effects, Firm Fixed Effects, Domestic Economic correlation with the MSCI World Index.

I model the economic impact of IAS 39 on private equity firms using the difference–in–differences approach, comparing European Union across all firms globally and then with firms located in the United States. The unit of observation is fund quarters and standard errors are clustered by fund. This regression specification likely includes serial correlation as I use rolling correlation. This is primarily an issue with standard errors and t–statistics. The bias on coefficients is likely down. A separate test is also performed that uses only two periods of correlations, the three year correlation prior to fair value adoption as of the last quarter and the first three year correlation to include only valuations from the new fair value accounting.

In the second group of tests, I examine the impact of the new standard on private equity firms' access to capital following panel data regression of a firm's cash flow correlation as presented in equation (7). Equation (7) presents the cross–sectional regression using each fundraising as the unit of observation.

$$AccesstoCapital = \alpha + \beta_1 Post + \beta_2 EUFund + \beta_2 Post \times EUFund + Controls + \epsilon \tag{4.3}$$

Where:

Access to Capital = The log dollars committed divided by days spent soliciting capital; log dollars committed divided by number of institutional investors; or an indicator variable equal to 1 if the observation was soliciting capital during the period and 0 otherwise.

Post = Indicator variable equal to 1 if the observation is drawn from the post–adoption–period earnings distribution and 0 otherwise.

EUFund = Indicator variable equal to 1 if the firm follows IASB accounting standards and 0 otherwise.

Controls = Fund sequence, first fund indicator, year time trend, Year FE, and private equity investment demand.

Standard asset–pricing models in finance define cost of capital as the expected return $E(\tilde{R}_j)$ of a firm, and the value of the firm's implied covariance with the market $Cov(\tilde{R}_j, \tilde{R}_m)/(\tilde{R}_m)$ which determines the firm's risk class (Fama, 1972). Unfortunately, industry–wide data limitations necessitate

creative solutions to understand how a firm's ex–ante cost of capital changes with the implementation of new accounting standards. Thus researchers are left with few ways to measure how markets determine the future return prospects of a private equity firm.

Currently the literature offers no standard measure of the ex–ante cost of capital for private funds, nor is there any research effort afoot to develop even a proxy measure. Internal hurdle rates, limited partner terms and secondary market transactions have all been considered as candidate measures, but these proxies suffer from determination by industry norms and exhibit little variation over time or between funds. Private equity firms apply a standard internal hurdle rate of 20 percent for investments, which does not vary and is not based on investors demand with capital market information. Given such small and infrequent changes, it is likely that such measures lack variation and fail to reflect investors' ex–ante expected returns accurately.

Instead I propose various measures of access to capital, based on time and fundraising to solicit new capital, which I expect to be correlated with the cost of capital. As a firm's cost of capital increases in this market, it likely becomes more difficult for managers to go to the market to solicit investment capital. Thus managers contending with a high cost of capital should go to the institutional investment market less frequently and should need more time to find investors willing to commit capital. Consistent with this idea, practitioner periodicals regularly report on private equity firms' fundraising efforts, noting the amounts raised and the time elapsed before fund closings as benchmarks of fundraising success (Prequin, 2013; PitchBook, 2013).

The proxy is not without limitations, but firms that take longer to close new funds are widely agreed to encounter less demand for their investment services and are likely to spend more time and more capital marketing their funds. A firm may fundraise long before the investment commitment is actually needed. Taking a long time to close a fund may indicate that the firm incurs increased costs associated with acquiring investment capital. Consistent with this idea, existing research argues that the timing of fundraising is a strong determinant of fund returns (Kaplan and Schoar, 2005). Furthermore, the time taken to close private equity funds is frequently cited by such observers of the industry as Preqin and PitchBook as an indicator of demand. As Brav (2009) points out, access to capital has attributes similar to cost of capital from the point of view of managers, and it is used not only for financial policy but also for real investment decisions in private firms.

A potential shortcoming is that closure of a fund is could be delayed by a variety of events uncorrelated to changes in the access to capital. An example is unexpected time consuming enhancements to

a portfolio; though conceivable, it is unclear how performance enhancements, on average, would cause investors to take longer to commit capital. Managers have a number of competing responsibilities that could lengthen the time it takes to raise capital; however these distractions would need to be unrelated to positive or negative improvements in their portfolio for this concern to be valid.

5 Data and Summary Statistics

5.1 Data and Sample Selection

In this section, I discuss the sample selection used to test the hypotheses. The primary data sources used include Preqin and Capital IQ, two common data sources used in prior private equity research (Lerner et al., 2011; Harris et al., 2012). Index data and Fama/French factors are obtained through Bloomberg and wrds. Supplemental analysis rely on data from Cambridge Associates as well as hand collected data from institutional investors and actuaries.

Preqin has an extensive database of private equity quarterly cash flows and fund level valuations obtained through the Freedom of Information Act's mandated disclosure for certain institutional investors (e.g. public pensions). A potential bias in the Preqin sample could be that the cash flow data from Preqin is not representative of the larger universe of private equity LPs. For example, the set of firms required under the Freedom of Information Act to disclose cash flow data (the main method used to obtain Preqin data) might, as a group, invest in private equity firms with a higher quality of financial reporting. Preqin could be missing funds with lower quality reporting that do not have investors subject to the Freedom of Information Act. If this bias is indeed present in the sample, it would likely bias against the key test of the paper as the sample firms are more likely to have a higher quality reporting environment. Moreover this bias is inherent in alternative databases. According to Harris et al. (2012), the Preqin database is consistent with both Burgess and Cambridge Associates databases, two leading alternative databases, and represents a reliable measure of private equity performance.

The Preqin database provides quarterly cash flows and valuations which include capital calls, capital distributions and end of quarter fund fair values. Each of these is used in calculating fund quarterly returns as presented in Equation 5.1.[10]

[10]Capital calls include private equity firms requesting previously committed capital from investors to be deployed. Capital distributions include private equity firms returning capital to investors.

$$r_t = \frac{Nav_t + Dist_t - Calls_t - Nav_{t-1}}{Calls_t - Nav_{t-1}} \tag{5.1}$$

Where:

$r_t =$ Indicator variable equal to 1 if the observation is drawn from the post–adoption–period earnings distribution and 0 otherwise.

$Nav_t =$ The end of quarter (t) fund net asset value

$Nav_{t-1} =$ The end of prior quarter's (t-1) fund net asset value.

$Dist_t =$ Distributions from private equity fund to investors.

$Calls_t =$ Capital calls from private equity fund to investors.

To illustrate, assume a fund has a $100MM net asset value (NAV) at the start of Q1. During the quarter $30MM of additional capital was called for new investments and $10MM was returned to investors in cash distributions. If the ending NAV for the quarter was $125MM the fund would reflect a 3.8% return for the quarter. Occasionally funds will have a missing end of quarter net asset value (capital account balance) valuation in a series of reported fair values. When a fund is missing a single period valuation and it has identical fair values reported before and after the missing period, the prior period valuation is assumed to have been reported in the missing period, this impacts a total of 59 fund quarters. Figure 4 presents a histogram of the sample firm winsorized returns.

After calculating fund quarterly returns, my starting point with the Preqin data is presented in Table 1 Panel A and is the universe of Preqin 2,245 funds reporting quarterly fund flow data. This database, according to Preqin, covers about 92% of all capital ever raised by private equity firms. I remove 1,535 private equity funds that are not identified as "buyout" funds as these funds are less likely to exhibit economic comovement with broader markets (e.g. venture capital, real estate). I then restrict the dataset to returns reported between January 2000 and June 2012. Consistent with prior work (Kaplan and Schoar, 2005), I drop fund quarters with less than $5 million in deployed capital to reduce the influence of potentially extreme growth rates of small fund amounts on results. When the same firm manages funds of the same type but with a different geographical focus, I treat the European buyout funds and U.S. buyout funds as unique partnerships. Finally, I exclude funds without vintage year data and without end of quarter valuations and winsorize quarterly returns at the 1% level. From the remaining funds, I construct my sample of private equity fund returns from the set of funds presented in Table 1.

I obtain access to capital data (e.g. fundraising data) from the Capital IQ database. Compared to

Preqin, the Capital IQ database has a broader coverage of private equity fundraising activity including fundraising start dates, fund size and fund closings since 1999. In particular, Capital IQ has the most extensive information on fundraising start dates which is a key attribute of access to capital measures in this paper.

As presented in Table 1 Panel B, my starting point is the universe of transactions in Capital IQ that closed between January 1980 and December 2012. Information about investments prior to the 1999 period is back filled as most private equity databases were not established until the late 1990s. Thus, my starting point is the universe of transactions in Capital IQ that closed between January 2000 and December 2012. I remove private equity funds that are not identified as buyout or turnaround (e.g. venture capital, real estate). I drop all funds that that do not include fund size or don't include both fundraising start and end dates. Capital IQ fundraising date information ranges from specific days of starting and ending fundraising to more general identifying just the year of fundraising. I drop funds that don't include at least the month and year of fundraising start and end dates. If funds don't include an exact fundraising start day, I assume that all dates that specify a year and month but dont include an exact day (e.g. June 2003) begin fundraising on the first day of the month (e.g. June 1, 2003) or end fundraising at the end of the month (e.g. June 30, 2003). From the remaining funds, I construct my sample as presented in Table 1 Panel B. To classify the firms that implement FAS 157 and IAS 39 in both Preqin and Capital IQ, I identify firms that are based in the United States and abroad from their firm office address and fund focus. I drop international firms that are headquartered in the United States.

5.2 Descriptive Statistics

Table 1 Panel C presents sample fund returns and fundraising over the sample period. The most notable change happening in this period is the growth in the private equity industry from 2003 to the end of 2008. Over this time period, private equity firms benefited from relatively low costs of debt capital and high growth rates in equity markets. Durring this time, we observe a dramatic increase in the number of funds raised and capital under management. In both the United States and Europe, the number of funds with deployed capital that report returns doubles from 155 fund quarters to 309 in Europe and from 503 to 1,219 in the U.S. At the same time, the number of new funds raised in each region follows a similar pattern with 64 sample firms raised both in the United States and Europe in my sample; that amount increases to 121 by 2008. In the post financial crisis, both Europe and the

United States exhibit similar changes from in the number of funds reporting and the number of funds raised from 2008 to 2009. In 2010, U.S. private equity firms closed 30 more funds in the sample period than did European Private Equity firms. This is likely due to the uncertainty around the Euro–zone government debt and banking crisis which began in 2009 and intensified during 2010.

Table 2 presents the return information from Preqin and market data across private equity regional focus without any risk adjustment for years after 1999 and before 2009. Column (1) presents average quarter returns of funds by region. EU funds reporting quarterly returns for this period represents a little under 20% of the sample and have a lower mean than U.S. funds, yet mean reported returns for both groups over the period are relatively similar. Post adoption of IAS 39, we see the average return for EU private equity firms outperform reported returns from US private equity firms. One factor contributing to the outperformance of these funds is the earlier recognition of gains from implementing fair value reporting. This average suggests potential for increased investor demand for EU private equity investments if indeed managers chase returns (the opposite direction of H2), not less as analysis show. Columns (2) and (3) show the mean quarterly excess returns over the period calculated as the fund quarter return minus the market return and the fund quarter return minus the risk–free rate, respectively. Over both time periods the mean return for both EU and US private equity outperforms the market average. Column (4) shows the excess return on the market, calculated as the market return minus the risk–free rate.

In Column (4) of Table 2, the post adoption period average market return is below the risk–free rate. It is important to note the contrast of Columns (2) through (4). Since beta measures how an investment comoves with the market and alpha measures the additional excess performance, columns (2) through (4) indicate that in the sample, private equity firms seem not to have had a market to "ride" for the Beta component of returns. Due to the fact that the market was down during this period and that private equity firms show higher returns, if might suggest on the surface that private equity returns have become less economically connected with the market in the post adoption period. If this overly simplified approach was used to attribute private equity alpha (e.g. without statistical models), private equity would look like an economically unique asset class with low correlation to equity markets. It will be important to observe what happens to investment alpha when I determine market beta in later stages of the analysis.

Column (5) presents average 3–year correlations with the MSCI World Index. Before fair value was redefined, EU private equity firm returns indicated a 0.3% correlation with the MSCI World

Index and US firms reported a 16.6% correlation. Both EU and US correlations are surprisingly low given the economic nature of leveraged buyouts (e.g. adding leverage) but reflect the nature of the accounting information prior research (Axelson et al., 2013). It is also important to note the 20% jump in correlations in the post period for firms implementing new definitions of fair value. By contrast, US firm correlations increase by less than 1%.

Table 3 presents buyout fund access to capital information from Capital IQ for years after 1999 and before 2009. Column (1) presents the average new commitments a fund was able to obtain before closing in millions of dollars. While the average commitment to funds increases for both EU and US firms, there is a dramatic shift in the average amount of capital that US firms are able to secure from investors. When taken with the absolute number of funds raised in each period (below commitment amount), it appears that the number of funds raising capital does not shift. However, the amount of money they are able to raise does shift. This summary statistic suggests that observed results are not due to only "quality" firms being able to access capital. Column (2) shows the average time taken to close a fund (in days), which does not materially change between the periods. Column (3) displays the average fund size closed. Column (4) shows the average dollars per day from fundraising, which reflects the decline in average EU private equity capital raised. Finally, column (6) shows the average dollars committed per investor. This measure indicates the average "size of bet" an investor is willing to make on a private equity investment manager. While the amount increases slightly for EU firms from $37.0MM per commitment to $52.5MM, US firms are able to increase their average commitment size from $56.3 to $90.2 over the same period.

Table 4 presents the summary statistics from both the return database (Preqin) and fundraising database (Capital IQ) from 2000 to 2008. Within private equity research, vintage year indicates the year in which a firm began deploying committed capital. Fund sequence indicates the series of investment an individual fund has been raised. For example, Bain Capital fund IV indicates the fund is Bain's fourth investment vehicle within a particular investment strategy. Funds with higher series numbers have a longer track record and are more likely to experience greater ease raising capital and have stronger industry networks and experience to boost performance. Moreover, a private equity fund's vintage year is frequently used to benchmark an individual fund performance to other funds in the year. It has been shown to be strong determinant of fully liquidated fund returns. Table 4 Panel A presents the Preqin data for my sample. The average reported vintage year is 1999 which is expected given that I limit the reporting period, not the vintage year of funds reporting. Table 4 Panel

B also presents a First Fund variable which indicates if a firm is raising the first fund in a series. First time funds are likely to face more scrutiny and difficulty accessing capital as a result of not having a liquidated investment track record to benchmark. As a result, it is an important additional measure to include in any access to capital analysis for private equity firms.

6 Empirical Results

6.1 Private Equity's Economic Comovement with Public Equity Markets

In this and the following section, I examine the comovement of private equity returns with global capital markets and the corresponding change in access to capital. Table 5 presents the results from a modified CAPM model using private equity returns less the risk–free rate as a dependent variable. The table is the result of a difference in difference model that is unpacked to make the impact of fair value standards easier to calibrate. The sample is split to pre and post IAS 39 implementation. Additionally, there are two measures of alpha included in this model corresponding to firms that implement redefined fair value (EU Funds) and those that do not (US Funds). As both indicator variables cover the sample, the intercept is removed from the regression. With this setup we can observe the change in market beta and alpha attributable to the event.

Column (1) in Table 5 presents the beta and alpha prior to implementing new definitions of fair value. The market beta (mkrf) in the pre period is significant and positive suggesting market comovement of private equity prior to adopting fair value standards. We know from prior research that this beta is likely low due to the "beta puzzle" (Axelson et al., 2013). The alpha from EU Fund and US Fund is also significant and positive suggesting that private equity investment managers in the EU and US provide diversifying alpha and unique exposure to portfolios prior new fair value definitions, a narrative that shifts when we observe the implementation of new standards.

Columns (2) and (3) in Table 5 illustrate the impact of the post adoption period of IAS 39. In column (2), the main experimental variable (EU Funds*mkrf) is significant and positive. By comparing the pre and post period in columns (1) and (2), I observe the equivalent of a difference in difference estimator (EU Fund*mkrf), which shows a large and significant increase as a result of the event. As a result of new fair value definitions, the EU fund returns have non–diversifiable risk (beta) that is 0.47 higher. This means EU Funds have a post adoption beta of 0.916 (0.446+0.470) compared to US funds with a beta of 0.446. This is not trivial as it is twice that of US funds suggesting that redefining fair

value revealed twice the comovement of private equity returns with equity markets. The magnitude is also significant when considering that prior to the new standards private equity firms were reporting a beta of 0.223.

A second important result is observed in column 3 of Table 5, which uses a longer period than column 2. When adopting the new fair value standards, private equity firms will have accumulated unrecognized value that will be disclosed in the first year of implementing the new standard. This is economic value that was created in prior periods but went undisclosed as a result of industry "best practices" of keeping valuations low. The result is that in the first period of adoption, private equity firms shifting to new definitions of fair value will have a higher alpha simply due to the accounting change. Column 3 removes the first period of the accounting change and reports an interesting result for the reported alpha of EU Fund. As fair value standards are adopted it appears that private equity investment managers provide less return that is unique to the market. Moreover in column 3 of Table 5, when the first year of adopting fair value standards is excluded from the post period sample–alpha from private equity firms in Europe is indistinguishable from zero. Excess returns from management reporting in the pre period seem potentially due more to accounting than management ability.

While beta's are an effective tool to asses market comovement, when practitioners are determining asset allocations correlations are typicaly used in mean variance optimizer assumptions for determing asset allocations. While results in Table 5 indicates correlations used by investors had a downward bias, Table 6 provides a conservative base line estimate of how far off these correlation estimates might be. Table 6 presents the regression results from regressing the 3–year correlation of private equity accounting returns with the MSCI World Index on design variables. My design variables indicate firms for which fair value accounting standards were adopted (EU Fund) and if the reporting period is after the adoption (Post 2005). The panel regression results in Table 6 include regression results with and without fund fixed effects. The panel data is used for years after 1999 and before 2009.

The significant and positive coefficient on the interaction of EU Fund and Post 2005 in Table 6 is evidence of accounting correlations tracking more closely with the broader economy from fair value accounting. In general, accounting correlations are at least 20% higher as a result of the standard. As a result of using correlations as a left hand variable, the model exhibits auto correlation concerns. Because rolling correlations over time is the dependent variable, it is influenced by prior dates of measurement. This is likely to work against the main finding, suggesting the 20% change is a conservative

estimate. To test the impact of this effect, I select only the last periods where all valuations included prior accounting practices and the first period after the new standard where there are at least three years of fair values under new standards. With only data from these two dates, these correlations are regressed on all specifications included in equation (1). I find that the experimental variable indicates a 57% jump in accounting correlations which is significant at the 1% level (untabulated). The fund size control variable loads and is significant in the expected direction.

On average, the implementation of fair value standards had a 20% percent increase on accounting correlations with broader equity markets. This shift in correlations is robust to various specifications of the model. When dates are restricted to exclude the implementation of fair value standards after year 2008, results remain significant. Changing specifications on standard errors provides similar results and significance as presented in Table 6. These findings identify private equity's diversification illusion caused by financial reporting. Overall, these findings are consistent with the argument for the hypothesis 1: the comovement of private equity to public equity markets is higher under redefined fair value reporting from IAS 39 relative to prior reporting.

6.2 Fair Value Accounting Impact on Access to Capital

In the prior section, I provide evidence of the impact of fair value reporting on the reported private equity comovement with public markets. Table 7 reports the cross–sectional regression results of the change in access to capital for private equity firms as a consequence of new fair value definitions. Columns (1), (2) and (3) present results from regressing the natural log of dollars committed to funds divided by days on the market on my experimental variables. Column (4) presents the regressions using the log of dollars committed to funds divided by the number of limited partners in a fund. This dependent variable indicates the investment size limited partners are willing to make in new funds or "size of bet." Column (3) indicates the ability of funds without a prior fund track record ("first time fund") to raise new capital. Fund sequence is included as a control indicating the number of similar funds that have been raised by the firm in the past.

The difference in difference estimator (Post 2005*EUFund) for each regression is positive and significant at the 1% level. Moreover, the magnitude of the interaction coefficient is material. As the dependent variable is transformed using the natural log, the interpretation of the coefficients in columns 1–4 indicates that in the post period, the implementation of fair value reporting caused roughly 50% less capital to be raised by private equity firms across each measure of access to capital. This result is

consistent with the direct effect of disclosure noted in Lambert et al. (2007), that disclosure impacts investor's assessed covariance with other firms' cash flows, which is non–diversifiable. The finding that fair value increases market beta and potentially removes alpha from reported returns and the corresponding downward effect on access to capital suggests unique empirical results to the fair value literature. Typically better disclosure leads to lower costs of capital in public markets and the likely lower cost of accessing capital. This result is unique to the literature of fair value reporting and seems to confirm findings from Lambert et al. (2007) on the direct effect of disclosure, revealing how cash flows move with the market.

Size, sequence, year and first fund status are significant determinants of fund inflows and are well specified (coefficients load in the expected direction). EU Funds in general, raise lower amounts of capital compared to US firms as noted in Table 7. Additionally, funds that are in a higher sequence are more likely to raise capital with greater ease, given their track record in the investment strategy. As we would expect, I also find funds that are the first fund in a series to have a more difficult time accessing capital as investors face more uncertainty about the unproven fund.

In untabulated results, I use a probit regression to observe the likelihood of a firm to go to market to fundraise. Results indicate a negative coefficient on the experimental variable revealing firms implementing the new accounting standard are 60% less likely to solicit capital in the post adoption period. In each regression, results are consistent with hypothesis 2: Private equity's access to capital under redefined fair value reporting is lower relative to prior reporting.

7 Additional Tests

7.1 Field Survey and Interviews

For supplementary analysis on the change in correlations, I use three data sources including Bloomberg for public private equity index returns, Cambridge Associates, and survey data from institutional investors. Bloomberg provides S&P Index returns on 19 public private equity firms, which serve as a proxy for economic correlations. For my sample of private equity quarterly index returns, I obtain data from Cambridge Associates benchmarking database. This database is frequently noted in industry publications and is used by private equity industry associations and institutional investors to assess industry performance (Harris et al., 2012). The Cambridge Associates database also provides information on industry wide returns for private equity since 1986. The benchmarks include managers

in Cambridge Associates client portfolios as well as managers who choose to participate.

To further examine findings I explore changes in industry benchmarks over time. Under a simple approach, correlation is calculated using Cambridge Associates quarterly private equity benchmark returns to a public equity market index. I then compare the correlation of the same benchmark in the periods before and after the shift to fair value accounting and observe an average period correlation increase of 21.4%. I then calculate the correlation of 16 public private equity firms with the S&P 500 representing the economic correlation (available after 2007). I observe the prior accounting approach having a much lower correlation than periods of new fair value reporting. Moreover index correlations are observed to be much closer to public private equity firms, suggesting economic correlations are higher than in prior accounting regimes.

Finally I surveyed 30 institutional investors and consultants on historical mean variance optimization assumptions. Every year, limited partners and investment consultants generate assumptions on portfolio assets' expected return, variance and correlation. These capital market expectations serve as the motivation for long term portfolio holdings and rebalancing. From these reported institutional investor assumptions, I gain insight into how the shift in accounting standards has impacted institutional investors' view of private equity assets. Specifically, I examine whether fair value reporting has indeed changed the expected co–movement of assets with public markets. From discussions with market participants who provided the information, it is clear that any significant changes in assumptions and sources are primarily driven by changes in analysts making calculations at each firm. Moreover, of the firms included, the average expected correlation of private equity to equity markets in 2004 is 50% and steadily increases to an average of 80% by 2012. This suggests that indeed managers' understanding of private equity diversification is due in part to private equity accounting.

8 Resolving the Private Equity "Diversification Illusion"

To summarize the empirical results up to this point, private equity firms implementing redefined fair value measures has improved the economic comovement of private equity assets with public markets. Redefining fair value also seems to identify and address, the private equity "diversification illusion." Fair value accounting in this setting improves disclosure as it impacts investors' assessed covariance with other firms' cash flows (Lambert et al., 2007). However, it is difficult to calibrate how much of a solution fair value reporting is to private equity's "diversification illusion." In particular, many analysts have pointed out that in both the United States and Europe, private equity groups did

relatively modest write–downs in the immediate aftermath of the financial crisis, but then did a whole series of write–downs in the subsequent quarters, even as public equity markets returned to health. This pattern is suggestive of one where, despite the best efforts of financial regulators, private equity groups continue to engage in the smoothing of returns, leading to depressed correlations and incorrect investment decisions. While the results of this study indicate that fair value reduces these effects, the question remains, how much of the "diversification Illusion" was resolved by redefining fair value? Perfect comovement with accounting information is likely prohibitively costly and not the optimum for financial reporting. The improvement this paper identifies is likely a second best solution, where accounting information gets closer to reporting the economics of the business, but is slightly off.

One firm over the time period of my sample can provide anecdotal evidence to this question of how well fair value reporting reduced the "diversification Illusion." Although not entirely comparable, one firm (3i Group) from 2000 to 2012 was the only publicly–traded buyout firm from which we can observe both economic returns from the stock and reported returns from the shift in accounting. It is important to note that while the operations of the firm are similar to those in the sample, the firm operates in an entirely different information environment compared to the sample firms in this paper. The information voids that plague private equity reporting are not part of 3i Group's process as it is a public company. 3i Group's investors benefited from having analysts, thousands of investors and liquidity to price securities daily. By contrast non–public private equity investors receive a sliver of the information environment public firm investor enjoy. Private equity's information environment will include a 5–10 page quarterly audited financial statement with updated accounting information and possibly a call with private equity firm management.

Figure 5 and Figure 6 illustrates the difference between accounting and economic correlations using 3i Group. Figure 5 presents the quarterly indexed returns for 3i Group's fund accounting return, stock return and the MSCI World Index return. At first glance, Figure 5 the volatile stock return with a sharp spike and decline around Q2 2000 might be perceived to have the lowest correlation between accounting (which seems to stay close to the market index) and stock returns. However, because correlation is concerned with the comovement (direction) of returns in a period, in fact the Q2 2000 stock spike and decline is quite correlated with equity markets in Figure 6 at about 80%. In contrast, the accounting return which seems to track closely with the index actually moves in opposite directions within several quarters causing the accounting return correlation in Figure 6 to dip down to negative 80%. If we assume the publicly traded stock return is a proxy for the true economic movements,

there is a persistent, significant difference between accounting and economic correlations in Figure 6. The portion of Figure 6 with up to negative 80% correlation represents a period where 3i Group's stock and equity markets posted gains and losses in returns while accounting correlations maintained conservative reporting, not moving in sync with markets.

In 2006, 3i Group implemented IAS 39 which caused accounting returns during the financial crisis to co–move more with public markets. While the difference between stock and accounting correlations of 3i Group in Figure 6 after 2006 is still significant, the difference between 3i Group's accounting correlations during the 2000—2002 market swings is dramatically different during the end of 2008 and first half of the 2009 financial crisis with positive correlations. This provides some anecdotal evidence supporting fair value improving the comovement of private equity returns.

As global financial regulators have caused private equity groups to implement fair value reporting it seems to be helping with private equity's diversification illusion. While fair value will not eliminate problems with private equity firms continuing to engage in return smoothing, fair value reporting seems to provide a reasonable solution to bring accounting returns more in line with the economics of investment.

9 Conclusion

My empirical results are consistent with the main hypothesis of this paper that financial reporting has created a diversification illusion for private equity assets, and fair value helps mitigate this illusion. First, I found firms implementing fair value standards reporting 2x the market beta as a result of the standard. In addition, excess return alpha disappears. Not only do assets move more closely to the market than previously reported but managers also benefited from transferring beta returns to alpha returns. Additionally, I find correlations dramatically increased after fair value adoption. Then, I compared the difference in access to capital to firms adopting new fair value standards. I find that firms implementing fair value standards exhibited a lower propensity to raise capital, raised less capital overall, raised less capital for each day they were in the market and raised less capital per investor.

My analysis and results make several contributions. First, my results provide insight into the private equity "diversification illusion." Prior to fair value standards, the prior accounting "best practice" of fair value estimates provided a diversification illusion to limited partner investors by not updating asset values causing returns to look more diversified than the underlying economics. After implementing the new standard, correlations increased and private equity firms' propensity and ability

to attract new capital commitments decreased. The presumed diversification benefits of private equity for institutional investors effectively diminished with the implementation of fair value. For the private equity literature more broadly, my study also contributes the development of a set of measures for access to capital for private equity firms, measures previously unexplored by the literature.

Second, the results inform fair value research related to FAS 157. Prior research on fair value accounting has primarily examined firms in which only a small portion of firm balance sheets were impacted by the standard. In the private equity setting, the entire balance sheet of a firm is impacted by the standard and the majority of the assets are highly illiquid Level 3 assets, which require more significant mandated assumptions by new fair value standards. Results are largely consistent with the notion that fair value standards improve the reporting environment.

Third, my analysis and results have normative implications for the impact of public accounting standards on private firms. Specifically, this study serves as a laboratory in which to examine how public accounting standards impact private firms. For private equity firms, where incentive alignment might seem to justify providing an exception to fair value GAAP, it is not clear that such an exemption is warranted. The results highlight an important topic facing the IASB and FASB: providing private firms potential exemptions from public GAAP. Despite scant research on the topic, the FASB formed the Private Company Council (PCC) in 2012 to explore GAAP exemptions for private firms. While there were a number of private firms influencing the FASB, the move was motivated in part by private equity firms' objections to implementing FAS 157.[11] While results from this paper could also indicate information problems with private equity investing, the lobbying for private GAAP after implementing a more accurate reporting methodology suggests agency concerns are more plausible. Accounting standard setting bodies should carefully consider private firm exemptions from public GAAP. Even in a setting like private equity in which there appears to be strong incentive alignment, opportunities still exist to inform investors with accounting. Moreover, given that institutional investment managers face additional incentives to report diversification deriving from holding illiquid assets, accounting can help inform trustees and benefactors of those portfolios as to the true diversification benefits that exist.

Finally, practitioners that are unaware of the diversification illusion will be more aware of the problems of using private equity reported returns in creating correlation assumptions for allocating capital and rebalancing their portfolios. While fair value accounting seems to improve the information

[11] One of the nine PCC board members is a private equity manager. None of the letters from private equity firms to the FASB supported the FAS No. 157 fair value standard.

environment, private equity investments still benefit from the attributes noted by Swensen in the introduction. Overall results indicate several important considerations for academics, practitioners, and regulators.

References

Aboody, D., M. E. Barth, and R. Kasznik (1999). Revaluations of fixed assets and future firm performance: Evidence from the uk. *Journal of Accounting and Economics 26*(1), 149–178.

Aboody, D., M. E. Barth, and R. Kasznik (2006). Do firms understate stock option-based compensation expense disclosed under sfas 123? *Review of Accounting Studies 11*(4), 429–461.

Altamuro, J. and H. Zhang (2012). The financial reporting of fair value based on managerial inputs versus market inputs: evidence from mortgage servicing rights. *Review of Accounting Studies*, 1–26.

Axelson, U., T. Jenkinson, P. Strömberg, and M. S. Weisbach (2010). Borrow cheap, buy high? the determinants of leverage and pricing in buyouts. Technical report, National Bureau of Economic Research.

Axelson, U., M. Sorensen, and P. Stromberg (May, 2013). The alpha and beta of buyout deals. *Unpublished working paper*.

Barth, M. (2004). *Market discipline across countries and industries*, Chapter Fair Values and Financial Statement Volatility. Cambridge, MA: MIT Press.

Barth, M. E., W. H. Beaver, and W. R. Landsman (1996). Value-relevance of banks' fair value disclosures under sfas no. 107. *Accounting Review*, 513–537.

Barth, M. E. and G. Clinch (1998). Revalued financial, tangible, and intangible assets: Associations with share prices and non-market-based value estimates. *Journal of Accounting Research 36*, 199–233.

Bartov, E., P. Mohanram, and D. Nissim (2007). Managerial discretion and the economic determinants of the disclosed volatility parameter for valuing esos. *Review of Accounting studies 12*(1), 155–179.

Beaver, W. and M. Venkatachalam (2003). Differential pricing of components of bank loan fair values. *Journal of Accounting, Auditing & Finance 18*(1), 41–68.

Brav, O. (2009). Access to capital, capital structure, and the funding of the firm. *The Journal of Finance 64*(1), 263–308.

Cambridge Associates (2009, February). letter to the aicpa accounting standards executive committee and the alternative investments task force.

Campbell, J. Y. (2000). Diversification: A bigger free lunch. *Canadaian Investment Review 13*, 14–15.

Cendrowski, H., L. W. Petro, J. P. Martin, and A. A. Wadecki (2012, 5). *Private Equity: History, Governance, and Operations (Wiley Finance)* (2 ed.). Wiley.

Cotter, J. and S. Richardson (2002). Reliability of asset revaluations: The impact of appraiser independence. *Review of Accounting Studies 7*(4), 435–457.

Fama, E. (1972). *The theory of finance*. New York: Holt, Rinehart and Winston.

Fitch Ratings (2008, January). Challenges of moving toward market based valuations: Analytical implications of sfas 157 and 159.

Franzoni, F., E. Nowak, and L. Phalippou (2012). Private equity performance and liquidity risk. *The Journal of Finance 67*(6), 2341–2373.

Gottschalg, O., L. Phalippou, and M. Zollo (2003). *Performance of private equity funds: Another puzzle?* Citeseer.

Harris, R. S., T. Jenkinson, and S. N. Kaplan (2012). Private equity performance: What do we know? Technical report, National Bureau of Economic Research.

Higson, C. and R. Stucke (2012). The performance of private equity. *Available at SSRN*.

Jenkinson, T., M. Sousa, and R. Stucke (2013). How fair are the valuations of private equity funds? *Unpublished working paper*.

Jensen, M. (1997). Eclipse of the public corporation. *Harvard Business Review (Sept.-Oct. 1989), revised*.

Jensen, M. C. and W. H. Meckling (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of financial economics 3*(4), 305–360.

Kallapur, S. and S. Y. Kwan (2004). The value relevance and reliability of brand assets recognized by uk firms. *The Accounting Review 79*(1), 151–172.

Kaplan, S. N. and A. Schoar (2005). Private equity performance: Returns, persistence, and capital flows. *The Journal of Finance 60*(4), 1791–1823.

Korteweg, A. and S. Nagel (2013). Risk-adjusting the returns to venture capital. Technical report, National Bureau of Economic Research.

Lambert, R., C. Leuz, and R. E. Verrecchia (2007). Accounting information, disclosure, and the cost of capital. *Journal of Accounting Research 45*(2), 385–420.

Lawrence, A., S. Siriviriyakul, and R. G. Sloan (2013). Who's the fairest of them all? evidence from closed end funds.

Lerner, J., A. Schoar, and W. Wongsunwai (2007). Smart institutions, foolish choices: The limited partner performance puzzle. *The Journal of Finance 62*(2), 731–764.

Lerner, J., M. Sorensen, and P. Strömberg (2011). Private equity and long-run investment: The case of innovation. *The Journal of Finance 66*(2), 445–477.

Ljungqvist, A., M. Richardson, and D. Wolfenzon (2008). The investment behavior of buyout funds: Theory and evidence. Technical report, National Bureau of Economic Research.

Modigliani, F. and M. H. Miller (1958). The cost of capital, corporation finance and the theory of investment. *The American economic review 48*(3), 261–297.

Muller III, K. A. (1999). An examination of the voluntary recognition of acquired brand names in the united kingdom. *Journal of Accounting and Economics 26*(1), 179–191.

Muller III, K. A. and E. J. Riedl (2002). External monitoring of property appraisal estimates and information asymmetry. *Journal of Accounting Research 40*(3), 865–881.

National Association of College and University Business Officers (2009a, July). Letter to the financial accounting standards board.

National Association of College and University Business Officers (2009b, October). National association of college and university business officers letter to the financial accounting standards board.

National Venture Capital Association (2010, January). Letter to the financial accounting standards board.

National Venture Capital Association (2011, February). Letter to the financial accounting standards board.

Nexus Private Equity Partners (2013). What is private equity?

Partners, A. (2012, March). Fair value accounting & private equity: The challenges and steps firms can take to measure fair value.

Phalippou, L. and O. Gottschalg (2009). The performance of private equity funds. *Review of Financial Studies 22*(4), 1747–1776.

Phalippou, L. and M. Zollo (2005). What drives private equity fund performance. *Unpublished working paper*.

PitchBook (2013, Q3). 3q 2013 Deal Multiples and Trends Report.

Preqin (2013, December). 2013 preqin global private equity report.

Prequin (2013, October). Preqin quarterly update: Private equity, q3 2013.

Private Equity Growth Capital Council (2009, October). Letter to the financial accounting standards board.

Private Equity Growth Capital Council (2010, September). Letter to the financial accounting standards board.

Ramanna, K. and R. L. Watts (2009). *Evidence from goodwill non-impairments on the effects of using unverifiable estimates in financial reporting*. Harvard Business School.

Richard Dietrich, J., M. S. Harris, and K. A. Muller III (2000). The reliability of investment property fair value estimates. *Journal of Accounting and Economics 30*(2), 125–158.

Riedl, E. J. and G. Serafeim (2011). Information risk and fair values: an examination of equity betas. *Journal of accounting research 49*(4), 1083–1122.

Robinson, D. T. and B. A. Sensoy (2011). Cyclicality, performance measurement, and cash flow liquidity in private equity. Technical report, National Bureau of Economic Research.

Seery, M. (2012, October). Regulatory concerns in private equity fund valuation.

Sharpe, W. F. (1992). Asset allocation: Management style and performance measurement. *The Journal of Portfolio Management 18*(2), 7–19.

Song, C. J., W. B. Thomas, and H. Yi (2010). Value relevance of fas no. 157 fair value hierarchy information and the impact of corporate governance mechanisms. *The Accounting Review 85*(4), 1375–1410.

Sorensen, M., N. Wang, and J. Yang (2012). Valuing private equity. *Available at SSRN 2041715*.

Swensen, D. F. (2009). *Pioneering portfolio management : an unconventional approach to institutional investment*, pp. 222. New York: Free Press.

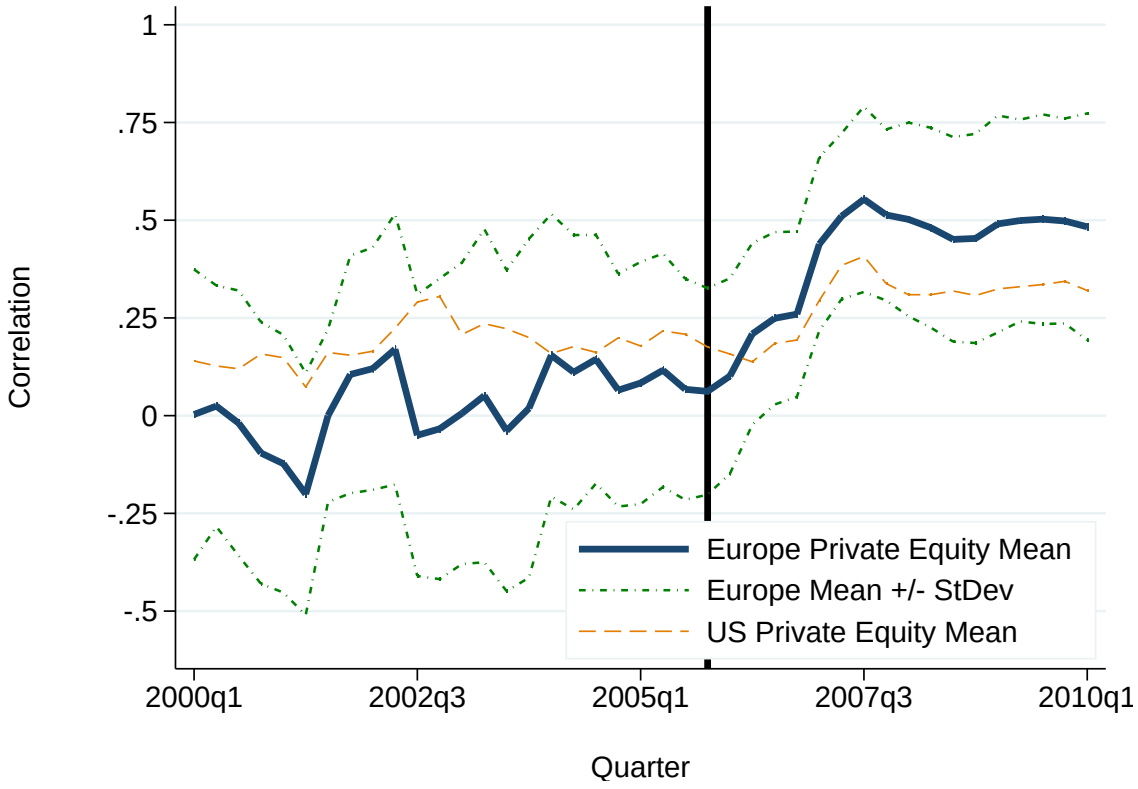
Valuation Research Corporation (2007, December). Portfolio valuations satisfy requirements of sfas 157, private equity guidelines.

Watts, R. L. and J. L. Zimmerman (1978). Towards a positive theory of the determination of accounting standards. *Accounting review*, 112–134.

Appendix A Variable Definitions

Dependent Variables	Definition
r	Return for a quarter calculated by summing end of quarter net asset value (NAV) plus distributions less capital called less prior period NAV. The resulting amount is divided by the sum of capital called and prior period NAV. Winsorized at 1%
Corr	The 3-year rolling quarterly correlation of returns with the MSCI World Index
ln(Commit)	Total dollars committed to invest with a private equity fund
ln(Time)	Time taken to close fundraising in days.
ln (Commit / Time)	Natural log of dollars committed to a fund divided by the number of days spent fundraising.
ln (Commit /# LP's)	Natural log of dollars committed to a fund divided by the number of Limited Partner investors in the fund.
Control Variables	
rf	Risk-free rate of return
mkrf	Market return less the risk-free rate of return.
EU PE Firm	Indicator variable equal to one if the private equity firm is located in Europe following IFRS standards.
Post 2005	Indicator variable equal to one if the fundraising time is after the deadline to implement IAS 39, December 2005 for international accounting standards.
3 Year Return	The quarterly rolling 3 year return across funds of a fund manager
Fund Sequence	Then number of similar investment funds the manager has brought to market
First Fund	Indicator variable equal to one if this is the first fund type invested by private equity firm
Fund Size	The current period net asset value of a fund
Commit>$5MM	Indicates regressions exclude funds smaller than $5MM USD
Fund Vintage	The year a private equity fund begins investing
Launch Year	The year a private equity fund begins fundraising
Close Year	The year a private equity fund closes fund
VIX Index	Measure of the implied volatility of S&P 500 index options. The VIX index is quoted in percentage points and translates to the expected movement in the S&P 500 index over the upcoming 30-day period, which is then annualized.
Quarter Year FE	Indicator variable equal to 1 if reporting in specific firm year quarter.

Figure 1: Private Equity 3 Year Correlation with MSCI World Index



3 Year Correlation of European private equity firms' returns with the MSCI World Index before and after adoption of fair value accounting. The figure shows centered correlations of European private equity fund returns with the MSCI World Index over three years. The solid lines display the centered mean and upper/ lower standard deviation of quarterly three–year rolling correlations. The vertical line demarcates the mandated adoption of fair value accounting by European private equity firms beginning in 2006. The upward trend in correlation after Q4 2005 and eventual plateau is a result of including redefined fair value estimates in each additional quarter. To illustrate, in Q1 2006 European private equity firms would report their first quarter of returns using redefined fair values, yet the calculation of the three year correlation would include 11 periods of returns under old reporting standards and only one quarter under new standards. As more returns are reported in following quarters using redefined fair value estimates, correlations shift to their new levels as a result of the standard.

Figure 2: Typical Structure of Private Equity Fund

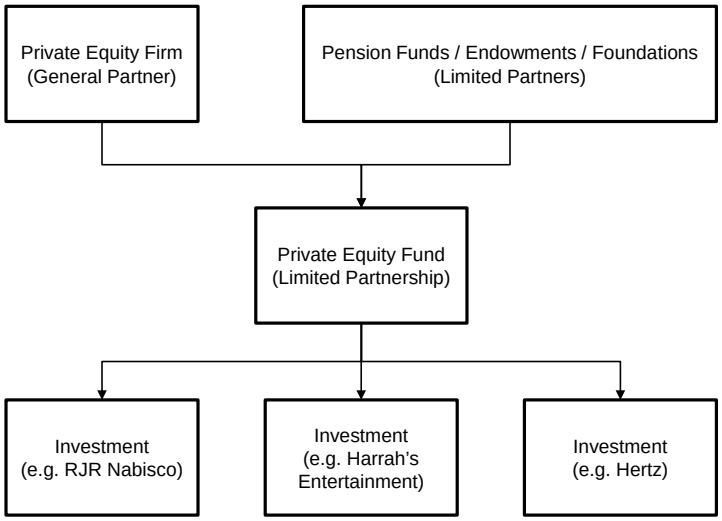
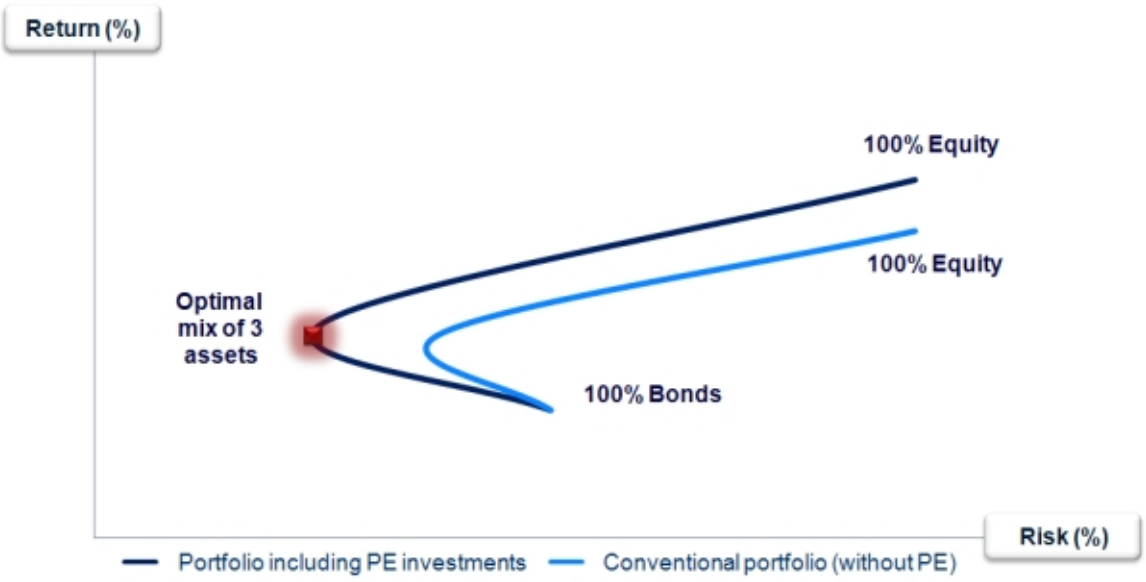


Figure 3: Nexus Private Equity Partners Marketing Chart



Slide from Nexus Private Equity Partners marketing materials (Nexus Private Equity Partners, 2013) illustrating portfolio diversification with private equity by shifting efficient frontier

Figure 4: Private Equity Quarterly Returns

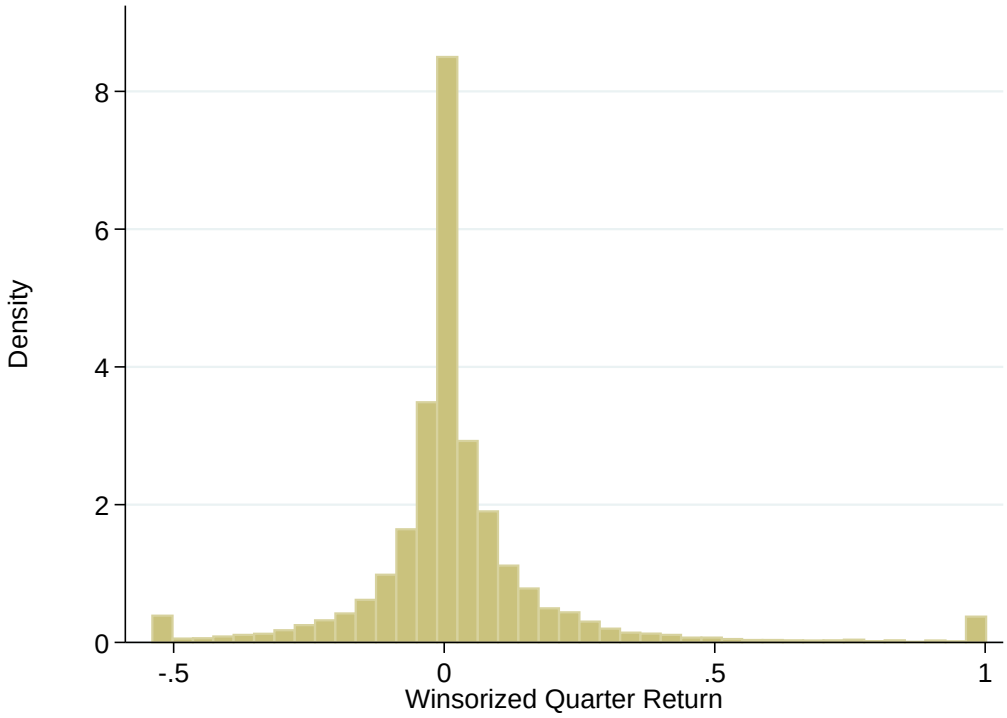


Table 1: Sample Selection and Frequency Statistics

Panel A: Private Equity Cash Flow Fund Selection	Funds	Firms
All Preqin Funds	2,245	1,022
Less: Non Buyout/Turnaround Private Equity Funds	1,535	651
Less: Funds closing before the year 2000	48	23
Less: Institutions not located within the US or Europe	46	25
Private Equity funds in the US	472	243
Private Equity funds in Europe	144	80
Total	616	323

Panel B: Private Equity Fundraising Selection	Funds	Firms
All Private Equity Firms in Capital IQ database	28,929	6,670
Less: Fims not identfied as buyout or turnaround	15,197	3,907
Less: Fims missing fundraising start date	8,715	1,292
Less: Fims missing fundraising end date	3,708	668
Less: Firms Fundrasing before the year 2000	142	36
Less: Firms missing fund size	45	13
Less: Institutions not located within the US or Europe	110	80
Private Equity funds in the US	711	491
Private Equity funds in Europe	301	183
Total	1,012	674

Panel C: Annual Distribution

	Preqin Fund Quarters			**Capital IQ Fundrasing Closings**		
Year	**Europe**	**US**	**Total**	**Europe**	**US**	**Total**
2000	74	385	459	14	28	42
2001	98	456	554	5	17	22
2002	119	465	584	14	28	42
2003	155	503	658	20	44	64
2004	148	646	794	30	66	96
2005	174	771	945	39	81	120
2006	223	926	1,149	33	94	127
2007	276	1,088	1,364	43	101	144
2008	309	1,219	1,528	36	85	121
2009	354	1,318	1,672	12	50	62
2010	370	1,328	1,698	22	55	77
2011	401	1,427	1,828	17	49	66
2012	408	1,364	1,772	5	24	29
Total	**3,109**	**11,896**	**15,005**	**290**	**722**	**1,012**

Table 2: Excess Quarter Returns and Correlation

	(1)	(2)	(3)	(4)	(5)
	R	R-Rm	R-Rf	Rm-Rf	3-Year Correlation MSCI World Index
All Pre 2006	2.9%	1.2%	2.2%	1.0%	14.0%
	(3,994)	(3,994)	(3,994)	(3,994)	(1,516)
EU Funds Pre 2006	3.9%	1.8%	3.3%	1.5%	0.3%
	(768)	(768)	(768)	(768)	(245)
US Funds Pre 2006	2.6%	1.1%	2.0%	0.9%	16.6%
	(3,226)	(3,226)	(3,226)	(3,226)	(1,271)
All Post 2005	1.9%	4.2%	1.1%	-3.1%	18.0%
	(4,041)	(4,041)	(4,041)	(4,041)	(1,522)
EU Funds Post 2005	2.4%	4.8%	1.5%	-3.3%	21.1%
	(808)	(808)	(808)	(808)	(296)
US Funds Post 2005	1.8%	4.0%	1.0%	-3.1%	17.3%
	(3,233)	(3,233)	(3,233)	(3,233)	(1,226)
Average All	2.4%	2.7%	1.6%	-1.1%	16.0%
	(8,035)	(8,035)	(8,035)	(8,035)	(3,038)

The table includes absolute returns, excess returns and correlations for buyout funds from 2000 to 2008. Column (1) presents average quarter returns of funds by region. Column (2) and (3) show the mean quarterly excess returns over the period calculated as the fund quarter return minus the market return and the fund quarter return minus the risk–free rate, respectively. Column (4) shows the excess return on the market, calculated as the market return minus the risk–free rate. Column (5) presents average 3–year correlation with the MSCI World Index. The number of fund observations are in parentheses below each mean.

Table 3: Private Equity Fundraising Access to Capital

	(1) Commit ($MM)	(2) Time to Close (Days)	(3) Commit / Time to Close ($MM/Days)	(4) Size of Bet ($MM/#LP's)
All Pre 2006	755.9	420.6	7.0	50.3
	(384)	(393)	(384)	(330)
EU Funds Pre 2006	482.2	396.8	5.9	37.0
	(116)	(125)	(116)	(102)
US Funds Pre 2006	874.3	431.7	7.4	56.3
	(268)	(268)	(268)	(228)
All Post 2005	1,171.1	413.3	12.1	80.0
	(394)	(404)	(394)	(300)
EU Funds Post 2005	624.2	398.3	3.0	52.5
	(110)	(118)	(110)	(81)
US Funds Post 2005	1,382.9	419.5	15.6	90.2
	(284)	(286)	(284)	(219)
Average All	966.2	416.9	9.6	64.5
	(778)	(797)	(778)	(630)

The table includes the fundraising data for individual buyout funds from 2000 to 2008. Column (1)presents the average new commitments to individual funds in millions of dollars. Column (2) and (3) show the average time taken to close a fund (in days) and the average dollars per day from fundraising, respectively. Column (4) shows the average dollars per day from fundraising. Column (6) shows the average dollars committed per investor. The number of fund observations are in parentheses below each mean.

Table 4: Return and Fundraising Descriptive Statistics

Panel A: Private Equity Quarterly Valuation and Cash Flows (Preqin Fund Quarter)						
	Mean	**Std Dev**	**Q1**	**Median**	**Q3**	**Skew**
Dependent Variables						
Fund Return	0.02	0.22	-0.04	0.00	0.05	1.84
3-Year Correlation	0.16	0.35	-0.11	0.17	0.43	-0.11
Control Variables						
rf (Risk-free rate)	0.01	0.00	0.00	0.01	0.01	0.18
mkrf (Market less rf)	-0.01	0.09	-0.05	0.01	0.05	-0.60
EU PE Firm	0.20	0.40	0.00	0.00	0.00	1.53
Post 2005	0.50	0.50	0.00	1.00	1.00	-0.01
Fund Size ($MM)	1306.21	2018.91	300.00	550.00	1500.00	4.47
Fund Sequence	2.85	2.16	2.00	3.00	4.00	0.62
Year	2005.01	2.48	2003.00	2006.00	2007.00	-0.51
Fund Vintage	1999.47	4.56	1997.00	1999.00	2003.00	-0.43

Panel B: Private Equity Fundrasing (Capital IQ Fund Level)						
	Mean	**Std Dev**	**Q1**	**Median**	**Q3**	**Skew**
Dependent Variables						
Commitment ($MM)	966.54	2144.12	143.87	325.23	787.00	5.53
Time to Close (Days)	416.90	310.33	190.00	366.00	564.00	1.63
Commitment / Time to Close	9.56	66.11	0.35	1.05	3.75	17.26
Size of Bet ($MM/#LP's)	64.47	101.36	15.38	30.23	69.19	4.00
Control Variables						
EU PE Firm	0.30	0.46	0.00	0.00	1.00	0.85
Post 2005	0.51	0.50	0.00	1.00	1.00	-0.03
Fund Sequence	2.55	2.05	1.00	2.00	3.00	1.71
First Fund	0.42	0.49	0.00	0.00	1.00	0.31
Launch Year	2005.19	2.23	2004.00	2006.00	2007.00	-0.68
Close Year	2006.24	2.41	2005.00	2007.00	2008.00	-0.52

The table presents the summary statistics from both the return (Preqin) and fundraising (Capital IQ) databases for years after 1999 and before 2009. Variable definitions are included in Appendix A.

Table 5: Modified CAPM

	Europe vs. US		
	Pre IAS 39 2000-2005	Post IAS 39 2006-2008	Post IAS 39 2007-2011
	(1)	(2)	(3)
EU Fund *(Alpha)*	0.030***	0.045***	0.008
	(0.007)	(0.008)	(0.004)
US Fund *(Alpha)*	0.018***	0.023***	0.016***
	(0.003)	(0.004)	(0.002)
mktrf *(Beta)*	0.223***	0.446***	0.202***
	(0.044)	(0.038)	(0.019)
EU Fund*mkrf *(IAS 39 Beta)*	-0.03	0.470***	0.277***
	(0.107)	(0.092)	(0.052)
N	3,994	4,041	9,862
adj. R^2	0.02	0.06	0.05

Standard errors in parentheses; ***, **, and * indicate significance at the 0.001, 0.01, and 0.05 levels, respectively.

$$R - rf = \alpha_1 EUFund + \alpha_2 USFund + \beta_1 mktrf + \beta_2 EUFund \times mkrf + \epsilon$$

Where:

R - rf = Private equity fund quarter return less risk–free rate.

mktrf = Quarter return on value–weight market portfolio of global common stocks minus the one month U.S. T–bill rate (source Fama/French data library).

regionFund = Indicator variable equal to 1 if the firm follows accounting standards from US (EU) or 0 otherwise.

The constant is suppressed as indicator variables for each fund reign category is included indicating the alpha attributable investment managers. Standard errors are clustered by fund. Columns 1–3 use Europe, United States funds while columns 4–6 display results for only Europe and United States. Columns 1 and 4 are from the first quarter of 2000 through the fourth quarter of 2005. Columns 2 and 5 are from the first quarter of 2006 through the fourth quarter of 2008. Columns 3 and 6 are the same as 3 and 5 after removing the first year of implementation. All variable definitions included in AppendixA.

Table 6: Shifting Correlation

	Europe vs. US	
	3-Year Correlation	3-Year Correlation
Post 2005 * EU Fund	0.190*	0.194***
	(0.082)	(0.074)
Post 2005	0.034	.179***
	(0.105)	(0.047)
EU Fund		-.174*
		(0.051)
Fund Sequence		0.006
		(0.010)
Fund Vintage		-0.003
		(0.005)
Fund Size		0.000***
		(0.000)
Fund FE	Yes	
Quarter Year FE	Yes	Yes
Quarter Time Trend	Yes	Yes
N	3,038	3,038
R^2	0.09	0.11

Standard errors in parentheses; ***, **, and * indicate significance at the 0.001, 0.01, and 0.05 levels, respectively.

$$Corr = \alpha + \beta_1 Post + \beta_2 EUFund + \beta_2 Post \times EUFund + Controls + \epsilon$$

Where:

Corr = Three–year rolling correlation of private equity firm returns with the MSCI World Index.

Post = Indicator variable equal to 1 if the observation is drawn from the post–adoption–period earnings distribution and 0 otherwise.

EUFund = Indicator variable equal to 1 if the firm follows IASB accounting standards and 0 otherwise.

Controls = Quarter–Year Fixed Effects, Firm Fixed Effects, Domestic Economic correlation with the MSCI World Index.

The table presents the panel regression with standard errors from 1 to 3 year rolling private equity fund quarter correlations with the MSCI world index. The panel data is used for years after 1999 and before 2009. All variable definitions included in Appendix A.

Table 7: Access to Capital

	Predicted Sign	Europe vs. US			
				First Time Fund	Size of Bet
		(1)	(2)	(3)	(4)
Post 2005* EU Fund	-	-0.600**	-0.677**	-0.744*	-0.620**
		(0.23)	*(0.26)*	*(0.38)*	*(0.20)*
EU Fund	-	-0.21**	-0.19**	-0.24**	-0.19***
		(0.18)	*(0.19)*	*(0.26)*	*(0.14)*
Fund Sequence	+	0.287***	0.323***		0.133***
		(0.03)	*(0.04)*		*(0.03)*
First Fund	-	-0.278*	-0.23**		-0.363**
		(0.14)	*(0.16)*		*(0.12)*
VIX Index		Yes	Yes	Yes	Yes
Year FE		Yes	Yes	Yes	Yes
Commit>$5MM		Yes	Yes	Yes	Yes
Close Year<2009			Yes	Yes	Yes
N		1,012	778	324	630
R2		0.21	0.20	0.03	0.20

Standard errors in parentheses; ***, **, and * indicate significance at the 0.001, 0.01, and 0.05 levels, respectively.

$$AccesstoCapital = \alpha + \beta_1 Post + \beta_2 EUFund + \beta_2 Post \times EUFund + Controls + \epsilon$$

Where:

Access to Capital = The log dollars committed divided by days spent soliciting capital; log dollars committed divided by number of institutional investors; or an indicator variable equal to 1 if the observation was soliciting capital during the period and 0 otherwise.

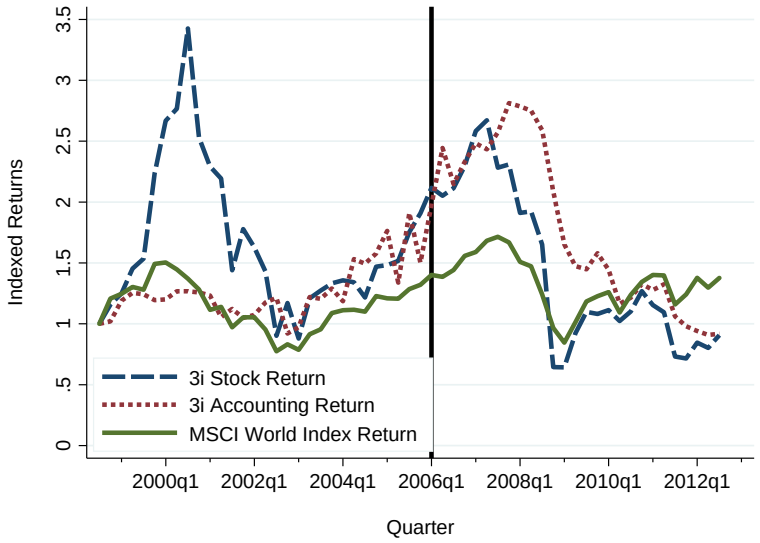
Post = Indicator variable equal to 1 if the observation is drawn from the post–adoption–period earnings distribution and 0 otherwise.

EUFund = Indicator variable equal to 1 if the firm follows IASB accounting standards and 0 otherwise.

Controls = Fund sequence, first fund indicator, year time trend, Year FE, and private equity investment demand.

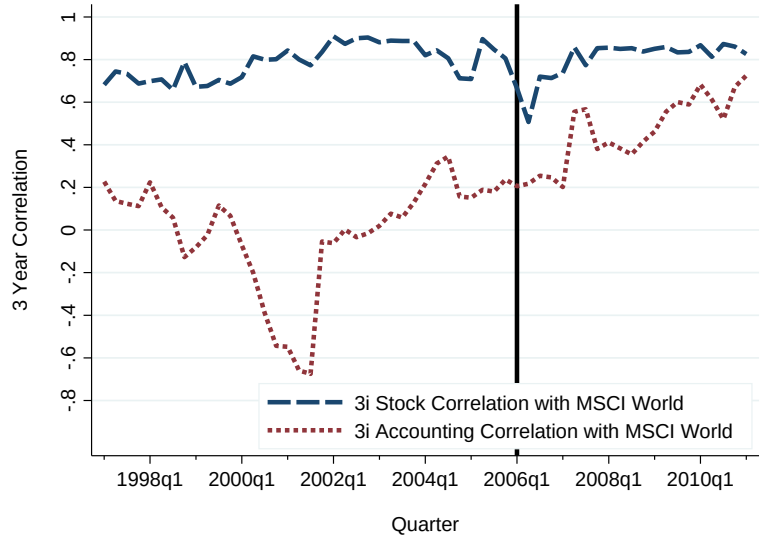
The table presents the cross–sectional regression of access to capital for private equity funds. All variable definitions included in Appendix A.

Figure 5: Indexed Returns for 3i Group's Equity Market Return, 3i Group's Fund Accounting Return and MSCI World Index Return



3i Group's stock returns, accounting returns and the MSCI World Index return indexed at 1 in Q1 1999. The vertical line in 2006 identifies the start of the mandated adoption of fair value accounting for European Private equity firms.

Figure 6: 3i Group's Stock Market Return Correlation vs. Fund Accounting Return Correlation with MSCI World Index



3i Group's stock and accounting three year correlations with the MSCI World Index (centered). The 2006 vertical line identifies the start of the mandated adoption of fair value accounting for European Private equity firms. The significant negative swings in 3i Group's accounting correlation reflect the smoothing caused by historical fair value accounting best practices in private equity. The lack of a similar negative swing in accounting correlations during the financial crisis suggests new fair value accounting definitions better reflect systematic risk.