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

Kyle Welch†
Harvard Business School

May 2, 2014

Abstract

This study examines how financial reporting practices have shaped private equity's claims to diversification. Despite research showing that private equity lacks unique economic exposure, private equity firms and trade associations continue to promote private equity's diversification as a key investment benefit. I show that returns based on prior methods of valuation understate the economic comovement of private equity with the market, creating a diversification illusion. As private equity valuation methodologies have changed private equity returns reveal increased systematic risk and correlation to equity markets. Moreover private equity firms also encounter higher—not lower—costs when accessing capital under new valuation methods, a finding at odds with public–market research.

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, Josh Lerner, Karthik Ramanna, Edward Riedl, and Charles Wang. I also thank Joshua Anderson, Ian Gow, Rebecca Lester, Shelley Li, Rory McDonald, George Serafeim, Steve Stubben, Haris Tabakovic, Robert Turley, Rajesh Vijayaraghavan, and Thomas Wollmann for their insightful comments. This paper has also benefited from seminar participants at George Washington University, Harvard Business School, NYU's Stern School, University of Rochester's Simon School, and Penn State's Smeal College. I gratefully acknowledge financial support from Harvard Business School. All errors are my own.

†kwelch@hbs.edu, phone:813-505-1137

1 Introduction

Long–term investors, such as endowments and pension funds, who seek to diversify their portfolios have invested over $3 trillion in private equity[1] (Preqin, 2013). Private equity advocates market portfolio diversification as one of the key benefits of private equity investing (Bance, 2004; Nexus, 2013). However research suggests that private equity investments are procyclical (Kaplan and Schoar, 2005; Axelson et al., 2009), follow the same fundamental risk outlined in Modigliani and Miller (1958) (Axelson et al., 2013) and provide economic exposure similar to equity markets (Robinson and Sensoy, 2011; Franzoni et al., 2012). In spite of this evidence the European Private Equity Venture Capital Association (EVCA) claims that private equity's diversification value is still,"Widely debated and needs further investigation" (Bance, 2004). I hypothesize that confusion and conflicting claims from academics and practitioners are due, at least in part, to private equity reporting practices that provide an illusion of diversification.

Private equity's historical best practice in reporting valuations dictated the use of illiquidity discounts in an effort to produce "conservative" estimates of fair value (Partners, 2012). The illiquidity of private equity legitimized the use of extreme discounts in reported valuations, similar to a blockage factor discount.[2] In addition firms often did not write–down assets unless a bankruptcy or down round of equity financing occurred(Miller, 2007; Seery, 2012). High illiquidity discounts and slow response rates to economic changes in investments caused a mismatch in accounting and economic movements. As a result, the comovement of private equity reporting and the stock market inflated the diversification benefits of private equity creating a diversification illusion.

David Swensen, chief investment officer of Yale University's endowment, elaborates on the implications of using financial reporting information for risk assessment of 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.*

[1] I classify private equity as buyout funds investing in mature companies. This does not include venture capital.

[2] A blockage factor discount is used in measuring the value of a security to reflect the impact of selling a large block of the security all at once to an illiquid market.

Consistent with Swensen's comments, the limited research on private equity's diversifying power suggests that it offers economic exposure similar to equity markets. Robinson and Sensoy (2011) note the co–cyclicality of private equity cash flows and public equity markets. One of the few papers directly examining diversification notes that private equity is exposed to the same risk factors as public markets (Franzoni et al., 2012). A private equity "Beta Puzzle" is identified by Axelson et al. (2013) noting that research on private equity firms suggests lower than expected systematic risk (beta) given that leverage is being added up to six fold to private equity portfolio companies. By examining private equity deal level returns Axelson et al. (2013) reveal that private equity indeed follows standard Modigliani and Miller (1958) calculations and that systematic risk (beta) is indeed higher. This paper looks to build on this literature by exploring how perceptions of private equity's systematic risk have shifted with industry valuation practices.

Private equity financial reporting practices changed with the advent of *International Accounting Standard 39—Financial Instruments: Recognition and Measurement* (IAS 39) effective in 2005[3] and *Statement of Financial Accounting Standards No. 157—Fair Value Measurements* (FAS 157) which went into effect in 2008.[4] IAS 39 and FAS 157 changed the estimation of fair value by requiring estimates be representative of an orderly transaction between a willing buyer and a willing seller. This change eliminated the industry specific "best practice" fair value reporting which included illiquidity discounts for private equity and potentially provided new information on private equity diversification.

To explore whether the new accounting standards have modified 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, IAS 39 was implemented before FAS 157, and possibly and could have informed investors in both markets about previously unreported economic comovement. Second, the mandated U.S. adoption of FAS 157 by private firms occurred during the financial crisis, confounding the identification of empirical tests.

Using a modified capital asset pricing model (CAPM), tests show that under IAS 39 the average market beta from reporting increased from 0.22 to 0.91. Moreover, the tests show that the beta

[3]The most relevant standard as of the date of this paper is *IFRS 13 Fair Value Measurement*. Prior to the introduction of IFRS 13, IAS 39 was the standard that shifted best practices for private equity firms. In anticipation of the new international accounting standard, the International Private Equity and Venture Capital Association issued accounting valuation guidelines for private equity firms in December 2004.

[4]FAS No. 157 has also been known as ASC 820 since the FASB updated codification.

increased 0.47 as a direct result of the new definitions of fair value under IAS 39. When the sample excludes the first year of implementation—a period characterized by accumulated unrecognized markups that would seem uncorrelated with public markets—investment alpha for private equity firms adopting fair value disappear. This shift in systematic risk and investment alpha is consistent with the so–called private equity "Beta Puzzle" (Axelson et al., 2013).

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 of 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 rolling correlations after Q4 2005 and the eventual plateau is a result of including redefined fair value estimates in each additional quarter along with quarters under the old standard.

[Insert Figure 1 near here]

In assessing the economic impact of redefining fair value, I use a number of measures of private equity firms' 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; they also raise less capital overall and less capital per investor, and 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 for evaluating portfolio diversification and optimizing private equity investment. Survey data and interviews corroborate these findings. Investors' assumptions about private equity appear to have shifted after implementation of the new standard. The large sample and field data are consistent with institutional investors' use of 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 upward based on new accounting information.

It is important to note that while the new valuation methodology seems to improve reporting, the change was strongly opposed by the private equity industry. Private equity managers face incentives to obfuscate systematic risk (that is, by smoothing returns) so that they are perceived as providing economic diversification. Moreover, institutional investors, such as endowments and pen-

sion funds, likely face difficulties extracting performance from this outsourced relationship (Chen et al., 2013). Institutional investors in private equity also have incentives to obfuscate systematic risk and to choose investments that appear low–risk to demonstrate prudent portfolio management to their institutions' trustees and benefactors. Due to this monitoring issue, trustees and benefactors implement high powered incentives with both private equity firms and institutional portfolio managers following Holmström (1999). As a result private equity firm incentives are closely matched with institutional investors related to this standard with one notable exception, while investors in private equity funds are compensated based on both the realized and unrealized performance of the private equity funds, private equity firm compensation is based on realized returns—not accruals. As a result of strong incentives between private equity firms and institutional investors, the change in valuation methodology could help mitigate agency conflicts 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 Section 9 discusses the contributions of this study and 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 at public firms; 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 horizon 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). As result of greater information asymmetry, private equity compensation incentives are aligned strongly with limited partner investors. 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 in private equity funds face considerable information asymmetry and limited control over how and when their investment commitments are invested(Lerner et al., 2007). Figure 2 illustrates 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 in the course of the funds investment life (up to ten years) invested capital is returned. Since managers enjoy 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).

[Insert Figure 2 near here]

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.

The nature of compensation based on realized returns rather than accruals enables private equity to offer a unique perspective to research. At public firms, for example, earnings management largely deals with accruals and estimates of the future as managers try to increase their stock prices (that is, to beat analysts' estimates) via earnings management. The impact of generally accepted accounting principles (GAAP) regulation might seem less relevant in private equity, but investors still use financial reporting information to make decisions and incentives are still imperfectly aligned.

One exception to incentive alignment occurs when fundraising begins for a new private equity fund. Private equity managers may manage valuations prior to fundraising to promote follow–on funds (Jenkinson et al., 2013). But fundraising is a repeated activity, and institutional investors seem

to be keenly aware of the potential for this type of earnings management (Seery, 2012). For example, Jenkinson et al. (2013) find that private equity firms sometimes inflate valuations but that investors seem to see through such manipulation. The same work suggests that institutional investors assign significant weight to the realized returns of liquidated funds and tend to discount the new investment portfolios estimated returns. In other words, unrealized returns are viewed with skepticism during fundraising. Jenkinson et al. (2013) also find that the firms with the strongest track records actually underreport their performance to avoid looking like valuation manipulators.

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 (that is, it matches investors' 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 at public firms face incentives to smooth earnings to create an illusion of detachment from market movements. In the same way that smoothing returns creates a diversification illusion for public firms, motivating CEOs to maintain cookie–jar reserves or big baths, private equity firms have an 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" that provide diversification benefits for institutional investors (Franzoni et al., 2012).[5] Figure 3 presents a graph from the European Private Equity Venture Capital Association (EVCA), a trade organization representing "The voice of European private equity." Figure 3 shows the perceived diversification provided by including private equity in a portfolio; the illustration suggests that portfolios without private equity are dramatically inferior. As dramatic as the chart is, Bance (2004) notes that correlation of returns between private equity and public market classes is debated. Empirical academic research suggests 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.

[Insert Figure 3 near here]

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

Private equity firms create value by three methods: (1) interim paydown of debt using firm cash flows, (2) improvements in operational performance and (3) multiple expansion. When a private equity firm adds leverage to a portfolio company, it increases its own expected returns and risk levels but does nothing to enhance diversification. Prior research suggests that operational improvements in portfolio companies are private equity's main means of diversifying its risk exposure from that of 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. Research on private equity's risk–adjusted performance indicates that some of the $3 trillion invested in private equity assets might be misdirected. Lerner et al. (2007) assert that many institutional investors lack sufficient understanding of private equity economics to effectively evaluate such investments, noting that the "progress of the funds' portfolios is very difficult to assess from traditional accounting data" (p.733). This 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.

Our knowledge of the risk–adjusted performance of private equity returns has improved with research from Harris et al. (2012). 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 that private equity firms outperform public markets. Other evidence of relative out performance by private equity can be found in the work of Higson and Stucke (2012) and Ljungqvist et al. (2008). This outperformance however does not factor in illiquidity and commitment risk, the most salient attribute to investors considering private equity assets. 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. In all, the research on risk–adjusted performance of private equity returns has been informed but not concluded (Harris et al., 2012; Sorensen et al., 2012; Higson and Stucke, 2012).

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 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 widely viewed as sophisticated yet appear to make foolish choices when investing in private equity firms.

It is difficult for investors to determine the true comovement of private equity with equity markets and other asset classes. 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.*

[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).

In other words, 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 including the historical best practice for fair value is a conservative approach as it does not overstate performance.[7] The consequence of including discounts under the old method 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 minimally correlated with public–market alternatives, prior accounting practices helped private equity firms market portfolio diversification as a benefit of the asset class, creating a diversification illusion for institutional 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 argues 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 institutional investors tend to suffer from a lower–quality information environment or inferior selection ability when making private equity investment decisions. Two explanations can motivate these choices: (1) investment managers are responding to incentives from their trustees, and/or (2) accounting information has a greater impact in markets that have a lower quality information environment, such as private equity which has few participants, no information intermediaries, and inconsistent benchmarks.

Most investments in private equity by limited partners are not made directly by savers (e.g. pension plan holders), but through a financial intermediary—an investment manager at the endowment or pension—which implies the existence of an agency contract between the savers (the principal) and a portfolio manager (the agent). Endowments and foundation 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. Endowment and foundation managers have more incentive alignment

[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); Cambridge Associates (2009)

with private equity firms for smoothing returns than they do with their constituents. Pre–adoption private equity accounting makes investments seem low–risk not only to the portfolio manager but also to the trustees whom the portfolio manager represents. Thus a pension–fund manager who is already locked in to a ten year private equity investment might have stronger incentive alignment with a private equity fund manager to smooth returns, even if this incentive is out of sync with the interests of pension recipients. The same point applies to college–endowment managers and endowment beneficiaries. Letters to the FASB from both private equity firms and limited partners argue against new fair value accounting standards citing the strong incentive alignment between the two groups, but these 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 investments, managers are not foolish; they are simply responding to incentives.[8]

An alternative explanation is that, as a result of market institutional voids, accounting information matters more in private equity investing because it represents an unusually large fraction of available information. Typically, between 20 and 30 investors each commit $2 to $200 million to a given private equity fund, in the absence of information from intermediaries or analysts. Public markets, by contrast, have information intermediaries and a greater number of peer investors to analyze and digest information. Stocks can be shorted in public markets; in private equity the only option is to abstain from investment. Moreover, unlike public market risk and return benchmarks (such as the S&P 500 or the Russell 2000), the benchmarks for private equity investing assets (e.g., Cambridge Associates Private Equity Index) suffer from the same accounting shortcoming studied here and include funds with varying life cycles. As a result, it is 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), focuses on liquidated investments. Swensen (2009) explains the basic mechanism that causes 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*

[8]Institutional investors could face incentives to invest in these new asset classes in order to maintain prestige among their peers. Private equity and venture capital are new asset classes that hold out the 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 stable returns from a lower–volatility investment.

> *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.*

In the face of so many information voids, investors are at a disadvantage and face limited choices when determining the expected comovement of their private equity portfolio. Asset-allocation models for the purpose of motivating portfolio's mean-variance optimization could be based on (1) assumptions supported by theory but not by empirical return data from portfolio or indices (e.g. Cambridge Associates Private Equity Index), or on (2) accounting data from portfolios or indices in motivating portfolio mean variance optimization. Similar to a methodology noted in Swensen (2009), discussions with practitioners suggest that the best practice for portfolio optimization is to use the available flawed data and to set limits manually on specific asset classes based on management preference. Portfolios are never perfectly optimized; however, with the diversification illusion in play, mean–variance asset–allocation models will always allocate fully 100% of a portfolio to private equity using private equity index returns. In practice, portfolio managers set allocation constraints to limit the amount of private equity the optimizer specifies, typically based on the managers preference.

2.5 Fair Value Accounting

Both IAS 39 and FAS 157 define fair value to exclude the illiquidity estimates that were previously used to justify "best practice" accounting for private equity. Both the IASB and the FASB replaced illiquidity assumptions by 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. Previously, private equity firms typically reported fair values which reported marginal economic movement until there was a "milestone event" (e.g., a liquidity event, including new rounds of financing or an asset sale), with no write–down unless a bankruptcy or down round of equity financing occurred. Prior to the change, this was the best practice for reporting assets at fair value.

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 4–6 percent of financial institutions' balance sheets in the United States and Europe (Fitch Ratings, 2008). 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. By definition, mandated liquidity assumptions should have the greatest impact on the most illiquid assets; 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 level; highly illiquid Level 3 asset reporting is most value–relevant for firms with strong corporate governance. Riedl and Serafeim (2011) find that, under the new standard, the information risk embodied in a financial instruments 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. With the exception of Lawrence et al. (2013)who study closed–end mutual funds whose underlying fair value assets are directly related to performance measures, the fair value reporting literature has focused on firms where only one aspect of 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 research (Barth et al., 1996). However, fair valuations are also 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 the potential for management manipulation and estimation error.

2.5.1 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 perceived as less volatile, but it is a mechanical construct founded on 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.

2.5.2 Managerial manipulation

Agency theory predicts that managers will use unverifiable discretion opportunistically (Jensen and Meckling, 1976). Furthermore, research has shown that fair value reporting can actually help managers postpone or manipulate earnings (Beaver and Venkatachalam, 2003; Ramanna and Watts, 2009; Aboody et al., 2006; Bartov et al., 2007). As Private equity managers are compensated on realized returns—not accruals—short–term reporting incentives to manipulate returns are lower. However, Private equity managers do face strong long–term incentives to manipulate earnings (e.g., earnings smoothing).

2.5.3 Estimation error

Management's perceptions of the future could legitimately entail an estimation 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, the private equity business model focuses on identifying and measuring value.

At private equity firms, long–term incentive contracts and investors limited exit opportunities make the short–term agency concerns that prevail at public companies (i.e., short–term earnings targets) less pressing. 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 disclosure directly impacts investors' 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 is likely to be the most important direct effect of the new standard in the private equity setting where there is much less information; yet 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 prompts 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. More complete 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 research studies this phenomenon. However, disclosures and 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 increased the financial reporting co–movement of private equity assets with public markets. One might think that the shift to redefined fair value would mechanically increase the comovment of private equity assets. However, unlike Level 1 and Level 2 assets which both use quoted market prices); in this setting, private equity firm balance sheets are entirely made up of Level 3 assets which use unobserved (typically internal) inputs. Moreover because these assets are based on internal valuation models and not market assumptions they are also more likely to have estimation error. 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 with public equity markets is higher under fair value reporting redefined by IAS 39 than under the prior reporting regime.*

As a result of greater disclosure, despite theory and empirical research in other settings to the contrary, I expect access to capital to decrease and the cost of capital to increase as a result of greater disclosure. A decrease in access to capital implies that investors use accounting information to understand private equity economics, and that it has informed them of the economic comovement 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 is lower under redefined fair value than under the prior reporting regime.*

According to 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, implementation of the new standard could be expected to affect private equity firms access to capital. In particular, if the correlation between accounting returns and market returns increases, I expect access to capital to decrease because private equity will subsequently exhibit greater comovement 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 economic comovement with other investments, increasing the cost of capital. Inasmuch as private equity investors face uncertainty about 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 represent 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. Finally, neither the creation nor the adoption of IAS 39 in 2005 and FAS 157 in 2008 has been linked to

influence from the private equity firms.

Though Watts and Zimmerman (1978) note that accounting regulation is not entirely exogenous, the impact of private equity firms on implementation of the standard is likely to be close to zero. Private equity firms and their investors consistently lobbied against the standard both before and after the 2008 financial crisis, a period at which a number of public firms changed their endorsement of the standard. In fact, responses to the FASB regulation 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 is 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 processes expressed the strongest opposition to the standard. As one said, "It wouldn't be a problem if we didn't 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, or foundation contributors. Given the response of private equity investors, private equity firms and standard setters around adoption, the event of implementing these standards seems largely disconnected to the setting and seems unlikely to have had an endogenous adoption.

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

The main empirical specification in this study is a difference–in–differences approach across funds subject to different standard–setting bodies in order to draw causal inferences about increased co-movement of private equity returns with 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:

$$R-rf = \alpha_1 EUFund + \alpha_2 USFund + \beta_1 RMRF + \beta_2 EUFund \times RMRF + \beta_3 Post + \beta_4 EUFund \times Post + \beta_5 Post \times RMRF + \beta_6 EUFund \times Post \times RMRF + \epsilon \quad (4.1)$$

Where:

R - rf = Quarterly private equity fund return less risk–free rate.

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

$[EU/US]\,Fund$ = Indicator variable equal to 1 if the firm follows US or EU accounting standards and 0 otherwise.

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

The data cover periods prior to and following implementation of IAS 39, from Q1 2000 to Q4 2005 for the pre period, and from Q4 2005 to Q4 2008 for the post–period. The constant is suppressed as indicator variables for each region are included in the regression, specifying the alpha attributable investment managers in the region. 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). H1 predicts the market beta (β_2) attributable to implementing IAS 39 will be positive and higher than the beta of private equity firms in the US. This is due to IAS 39 improving the information around returns. The investment alpha is indicated by α_1. Decreasing α_1 with implementing of IAS 39 would be an additional result consistent with H1.

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 lower bound for the changing assumptions used in practice with portfolio mean variance optimization models. The panel data regression is specified as follows:

$$Corr = \alpha + \beta_1 Post + \beta_2 EUFund + \beta_3 Post \times EUFund + Controls + \epsilon \tag{4.2}$$

Where:

Corr = Three–year rolling correlation of private equity firm's 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.

Equation (4.2), is similar to equation (4.1), but it combines the dataset across the time periods before and after implementation. Using the difference–in–differences approach, I model the economic impact of IAS 39 on private equity firms comparing European Union firms and firms located in the United States. The unit of observation is fund quarters, and standard errors are clustered by fund. This regression specification probably includes serial correlation as I use rolling 3 year correlations. To evaluate the severity of this bias 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 that includes only valuations from the new fair value accounting. Equation (4.2) uses the full time period and a difference–in–differences coefficient to measure the impact of the change on the market beta.

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 (4.3). Equation (4.3) presents the cross–sectional regression using each fundraising as the unit of observation.

$$AccesstoCapital = \alpha + \beta_1 Post + \beta_2 EUFund + \beta_3 Post \times EUFund + Controls + \epsilon \tag{4.3}$$

Where:

Access to Capital =	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 expected return $E(\tilde{R}_j)$, 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, an industry–wide dearth of data necessitates creative solutions to understand how a firm's ex–ante cost of capital changes with 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, nor does the literature offer a standard 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' standard internal hurdle rate of 20 percent for investments does not vary and is not based on investors demand for 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.

I propose using various measures of access to capital—specifically, measures of the duration and yield of fundraising—which I expect to be correlated with the cost of capital. As a firm's cost of

capital increases in this market, it probably becomes more difficult for managers to go to the market to solicit investment capital. Thus managers contending with a high cost of capital should approach 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, treating the amounts raised and the time elapsed before fund closings as benchmarks of fundraising success (Prequin, 2013; PitchBook, 2013).

Time taken to close a private equity fund is frequently cited within the industry as a proxy for demand. Firms that take longer to close new funds are widely agreed to encounter less demand for their investment services and are likely to incur increased costs with obtaining investment capital. As Brav (2009) points out, access to capital exhibits attributes similar to cost of capital from the point of view of managers, and access to capital is used not only for financial policy but also for real investment decisions in private firms.

A potential shortcoming of the proxy is that closure of a fund could be delayed by events uncorrelated to changes in access to capital, such as unexpected time consuming portfolio tasks. Managers do 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 shifts in their portfolio for this concern to bias the findings.

5 Data and Summary Statistics

5.1 Data and Sample Selection

This section discusses the sample selection used to test the hypotheses. My primary data sources are Preqin and Capital IQ, both frequently used in prior private equity research (Lerner et al., 2011; Harris et al., 2012). Index data and Fama/French factors are obtained through from Bloomberg and Wharton Research Data Services (WRDS). Supplemental analysis relies on data from Cambridge Associates and 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 investors (e.g. public pensions) to disclose investments. A possible bias in the Preqin sample is that the cash flow data from Preqin may not be representative of the larger universe of private equity LPs. For example, the set of firms obligated 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 whose financial reporting is of unusually high quality. Preqin could be missing funds with lower quality reporting whose investors are not subject to the Freedom of Information Act. This potential selection bias is likely to bias the data against the key test of the paper. Moreover, this bias is inherent in alternative databases. According to Harris et al. (2012), the Preqin database is consistent with both the Burgess and Cambridge Associates Private Equity Index databases, two leading alternative databases, and represents a reliable measure of private equity performance.

The Preqin database provides quarterly cash flows and net asset valuations, which include capital calls, capital distributions, and end–of–quarter fund fair values. Each of these data points is used to calculate fund quarterly returns, as presented in Equation 5.1.[9]

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

Where:

$r_t =$ Return in quarter (t).

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

$Nav_{t-1} =$ The end–of–prior–quarter (t-1) fund net asset value

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

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

To illustrate, assume that a fund has a net asset value (NAV) of $100 million at the start of Q1. During the quarter $30 million in additional capital is called for new investments and $10 million is returned to investors in cash distributions. If the ending NAV for the quarter is $125 million, the fund would produce a 3.8% return for the quarter ($5 million gain divided by $130 base). Occasionally a fund 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 reports identical fair values 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's winsorized returns.

[Insert Figure 4 near here]

After calculating quarterly returns, my starting point with the Preqin data, presented in Table 1,

[9] Capital calls are requests on the part of private equity firms for previously committed capital to be deployed. Capital distributions return capital to investors.

Panel A, is the universe of 2,245 funds reporting quarterly cash flow data. This database, according to Preqin, covers about 92% of all capital ever raised by private equity firms. I eliminate 1,535 private equity funds that are not identified as "buyout" funds because such funds (which include venture capital and real estate funds) are less likely to exhibit the diversification illusion. I then drop reporting periods prior to January 2000 as one of my data sources started collecting data at this time. Consistent with prior work (Kaplan and Schoar, 2005), I drop fund quarters with less than $5 million in deployed capital to reduce the influence on results of small funds with potentially extreme growth rates. When a given firm manages European and U.S. funds of the same type, I treat the European and U.S. buyout funds as separate 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 fundraising data from the Capital IQ database, which offers broader coverage than Preqin of private equity fundraising activity including start dates, fund sizes, and fund closings since 1999. Fundraising start dates serve as a key attribute of access to capital in this paper.

Table 1, Panel B presents the sample selection from the Capital IQ data database which includes transactions that closed between January 1980 and December 2012. Information about investments prior to 1999 is back filled, because most private equity databases were not established until the late 1990s. Thus, my starting point is to drop reporting periods in Capital IQ prior to January 2000. As before, I eliminate private- equity funds that are not identified as buyout or turnaround funds. I drop funds whose size or fundraising start and end dates are missing.[10] From the remaining funds, I construct my sample, 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.

[Insert Table 1 near here]

[10]Capital IQ fundraising date information varies: some specifies start and end dates; some merely identifies the year . I drop funds that dont specify at least the month and year. I assume that all dates that specify only a month and year (e.g., June 2003) begin fundraising on the first day of the month (e.g., June 1, 2003) and end fundraising at the end of the month (e.g. June 30, 2003).

5.2 Descriptive Statistics

Table 1, Panel C, presents the number of funds that report returns and fundraising over the sample period. The most notable change in this period is the growth of the private equity industry between 2003 and the end of 2008. In this period, characterized by relatively low–cost debt capital and high growth rates in equity markets, we observe a dramatic increase in the number of funds initiated and incapital under management. The number of funds with deployed capital that report quarterly returns doubles from 155 to 309 in Europe and from 503 to 1,219 in the United States. The number of new funds follows a similar pattern: from a total of 64 in both regions in 2003 to 121 in 2008. Following the financial crisis, Europe and the United States exhibit similar changes in the number of funds reporting and in the number of funds initiated from 2008 to 2009. In 2010 U.S. private-equity firms closed 33 more funds than did European private-equity firms, probably due to uncertainty about Euro–zone government debt and a banking crisis that began in 2009 and intensified in 2010.

Table 2 presents information on returns from Preqin and market data across regional focus for the period 2000–2008. Column (1) presents funds' average quarterly returns by region. EU funds represent a little under 20% of the sample of quarterly returns and have a lower mean than U.S. funds, yet mean reported returns for both groups over the period are relatively similar. After adoption of IAS 39 in 2005, we see the average returns of EU firms exceed those of US firms. One factor contributing to the outperformance of these funds is earlier recognition of gains from as a result of implementing fair value reporting. This finding suggests potential for increased investor demand for EU private equity investments if managers indeed chase returns, in direct opposition to Hypothesis 2. Columns (2) and (3) show mean quarterly excess returns over the period, calculated as the quarterly return minus the market return and the quarterly return minus the risk–free rate respectively. For pre–and post–implementation, 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.

[Insert Table 2 near here]

In Column (4) of Table 2, the post–adoption period average market return is below the risk–free rate. It is important to compare Columns (2), (3) and (4). Since beta measures how an investment comoves with the market and alpha measures additional excess performance, columns (2) through (4) indicate that firms in the sample seem not to have had a market to "ride" for the beta component

of returns. The fact that the market was down during this period and that private equity firms show higher returns superficially suggest that private equity returns have become less economically connected to the market in the post–adoption period. If this overly simplified approach (e.g. without statistical models) were used to attribute private equity alpha, private equity would look like an economically unique asset class with low correlation to equity markets. Thus it will be important to observe what happens to investment alpha when I calculate 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; 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) yet they reflect the nature of the accounting and prior research (Axelson et al., 2013). It is also important to note the 20% jump in correlations in the post–adoption period for firms implementing new definitions of fair value. By contrast, US firm correlations increase by less than 1%.

Table 3 presents information from Capital IQ on private equitys access to capital between 2000 and 2008. Column (1) presents the average total new commitment a fund obtains before closing. Though the average commitment increases over time for both EU and US firms, a dramatic shift is evident in the average amount of capital that US firms are able to secure from investors. The number of funds raising capital in each period (in parentheses below the commitment amount in column 1) does not dramatically shift; however, the amount of money they are able to raise does shift. This summary statistic suggests that observed results are not due solely to fewer funds accessing capital in these markets. Column (2) shows the average time taken to close a fund, which does not materially change between the periods. Column (3) shows the average dollars raised per day, revealing a decline in average EU capital raised. Finally, column (4) shows average dollars committed per investor, or the size of the average bet that an investor is willing to make on a private equity investment manager. The amount increases slightly for EU firms, from $37.0 million per commitment to $52.5 million; US firms average commitment size increases from $56.3 million to $90.2 million.

[Insert Table 3 near here]

Table 4 presents the summary statistics from both Preqin and Capital IQ for the period 2000–2008. Fund sequence indicates an individual fund's position in a series of funds. For example, Bain Capital Fund IV is Bain's fourth investment vehicle with a particular investment strategy. Funds with higher series numbers have a longer track record and are thus more likely to raise capital more easily and to

have stronger industry networks and more experience, boosting performance. A funds vintage year is frequently used to benchmark its performance relative to that of other funds of the same vintage ; 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 whether a given fund is the first in a series. First time funds are likely to encounter intense scrutiny and to have difficulty accessing capital because they lack a liquidated–investment track record to benchmark. This measure is thus important to include in any access–to–capital analysis of private equity firms.

[Insert Table 4 near here]

6 Empirical Results

6.1 Private Equity's Economic Comovement with Public Equity Markets

This section and the next examine the comovement of private equity returns with global capital markets and the corresponding change in access to capital. Table 5 presents results from a modified CAPM model and modified four factor model (Carhart, 1997; Fama and French, 1993) using private equity returns less the risk–free rate as a dependent variable. Each model includes two measures of alpha, corresponding to the reporting standards of a fund, EU funds or US funds. Because both indicator variables cover the sample, the intercept is removed from the regression. Columns (1) and (2) present results from a difference–in–differences design to a single factor market CAPM model. Columns (3), (4) and (5) present results from a e difference–in–differences design to a four factor model. The major difference between similar columns is the dates the regressions are limited to. Column (5) presents the results of implementing both IAS 39 and FAS 157.

[Insert Table 5 near here]

Columns (1) through (5) in Table 5 illustrate the post–adoption impact of IAS 39. The coefficient on RMRF indicates the systematic risk that private equity returns have which appears relatively consistent across each model with a beta between 0.223-0.283. The main experimental variable ($EU_Funds * Post_EU * RMRF$) across each model is a difference–in–differences estimator interacted with RMRF indicating the revealed systematic risk from the new methodology. The experimental

variable is significant and positive indicating fair value reporting revealed increased systematic risk in the market. As a result of new fair value definitions, the EU fund returns have non–diversifiable risk (beta) that is between 0.30 and 0.50 higher. This means that EU funds have a post–adoption beta that is more than twice that of US funds' beta. This is not trivial: a beta twice that of US funds suggests that redefining fair value revealed twice the comovement of private equity returns with equity markets. The magnitude is also significant when we consider that prior to the new standards private equity firms were reporting a beta of 0.223. We know from prior research that this beta is probably low due to the beta puzzle (Axelson et al., 2013) which notes estimates of beta to be lower than expected when using fund level returns. The alpha of EU funds and US funds is also significant and positive, suggesting that private equity investment managers in the EU and the United States provided positive alpha to portfolios.

Column (5) includes an additional modification to the model to examine the impact of implementing fair value standards in the United States. The United States adopted fair value reporting during the 2008-2009 financial crisis and as a result faces a number of confounding alternatives. While I do find positive and significant results, with an increase in beta of 0.205 for US firms, this is presented noting potential concerns about causality. Nevertheless, the results are consistent with H1 that managers modeling valuations under new methodologies present increased comovement and systematic risk.

[Insert Table 6 near here]

Table 6 unpacks the results of the difference–in–differences models presented in Table 5 to make the impact of fair value standards easier to calibrate. Results from the pre–implementation of IAS 39 is presented in Column (1); results from the post–implementation of IAS 39 is presented in Columns (2). By comparing the pre and post periods in columns (1) and (2), we can observe the equivalent of a difference–in–differences estimator ($EU_Fund * RMRF$), which shows a large and significant increase as a result of the event. A second important result is evident in Table 6, Column (2). It appears that private equity investment managers' abnormal return disappears for EU funds after implementing the new methodology. This vanishing alpha is consistent across the years following the implementation of new valuation methods; European private equity firms have an alpha indistinguishable from zero. It is important to note that this vanishing is somewhat of a conservative estimate, given the nature of the change in the standard. When adopting the new fair value standards, private equity firms will have accumulated unrecognized value that will be disclosed in the first year after implementing the new

standard. This prior period undisclosed economic value will be disclosed after it was achieved in the post period, potentially leading to an increase in alpha. In the first period after adoption, therefore, private equity firms shifting to a new definition of fair value will have a higher alpha simply due to the accounting change. The combined results of beta doubling in Table 5 and vanishing alpha in Table 6 suggest that excess returns in the pre–adoption period seem to be due more to accounting than to management ability.

While beta is an effective tool to examine market comovement, practitioners who are making asset allocation decisions typically use correlations in mean variance optimization assumptions. Though the results in Table 5 indicate that correlations used by investors had a downward bias, Table 7 provides an estimate of how far off these correlation estimates might be. Table 7 presents the results of regressing the 3–year correlation of private equity accounting returns with the MSCI World Index on design variables. The panel regression results in Table 7 include regression results with and without fund fixed effects. The panel data is used for the period 2000–2008.

[Insert Table 7 near here]

The significant and positive coefficient on the interaction of EU Fund and Post 2005 variables in Table 7 is evidence that accounting correlations track more closely with the broader economy when fair value accounting is employed; in general, accounting correlations are roughly 0.20 higher. As a result of using correlations as a left–hand variable, the model exhibits autocorrelation concerns. Because rolling correlations over time is the dependent variable, it is influenced by pre IAS 39 data. This is likely to work against the main finding, suggesting that the 0.20 change is a conservative estimate. To test the impact of this effect, I use the last and first years of unique data from the standard, periods when all correlations embodied ether pre or post accounting practices. With data only from these two periods, these correlations are regressed on all specifications included in equation (4.2). The experimental variable indicates a 0.57 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.

The implementation of fair value standards resulted in a 0.20 percent increase in 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 2008, the results remain significant. Estimating standard errors using bootstrapping provides results and significance similar to those presented in Table 7. These findings pinpoint the diversification illusion caused by financial reporting. Overall, they are consistent with Hypothesis 1: the comovement of

private equity with public equity markets is higher under fair-value reporting redefined by IAS 39 than under the prior reporting regime.

6.2 The Impact of Fair Value Accounting on Access to Capital

Table 8 reports the cross–sectional regression results of the change in access to capital as a consequence of new fair value definitions. Columns (1), (2), and (3) present the results of regressing the natural log of dollars committed to funds divided by days on the market on my experimental variables. Column (4) presents regressions using the log of dollars committed divided by the number of limited partners. This dependent variable indicates the magnitude of the investment that limited partners are willing to make in new funds or "the size of the 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 launched by the firm in the past.

[Insert Table 8 near here]

The difference–in–differences estimator ($Post_EU * EUFund$) for each regression is negative and significant; moreover, the magnitude of the interaction coefficient is material. The transformed dependent variable in columns (1) to (4) indicates that implementation of fair value reporting caused roughly 50%[11] 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 investors' assessed covariance with other firms' cash flows, which is non–diversifiable. The findings in Table 5 and Table 6 indicating fair value methods increased market beta and reduced alpha combined with the corresponding downward effect on access to capital presented in Table 8 suggests empirical results that depart from the fair value literature. Typically improved disclosure about risk leads to lower costs in accessing capital in public markets. This result is unique to the literature on fair value reporting and seems to confirm the findings of Lambert et al. (2007) on the direct effect of disclosure, revealing how cash flows move with the market.

Size, sequence, year, and first–time fund status are significant determinants of fund inflows and are well specified (coefficients load in the expected direction). EU Funds in general raise less capital than US firms, as noted in Table 8. Funds late in a sequence are likely to raise capital with greater ease, given their track record. As expected, first–time funds have more difficulty accessing capital because they are unproven.

[11]The interpretation of coefficients is as follows: exp(-0.600)=-0.549 and exp(-0.744)=-0.47

In untabulated results, I use a probit regression to capture the likelihood that a firm will go to market to fundraise. Results indicate a negative coefficient on the experimental variable, revealing that 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 firms' access to capital is lower under redefined fair-value reporting than under the prior method of reporting.

7 Additional Tests

7.1 Field Survey and Interviews

For supplementary analysis of the change in correlations, I use three data sources: Bloomberg for public private equity index returns, Cambridge Associates, and survey data from institutional investors. Bloomberg provides S&P Index returns for 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 cited 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 private equity returns since 1986. The benchmarks include private equity funds in Cambridge Associates' client portfolios and private equity funds who participate voluntarily.

I also explore changes in correlations with 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 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). The prior accounting approach has a much lower correlation than do the periods of new fair value reporting. Moreover, index correlations are much closer to public private equity firms, suggesting that economic correlations are higher under prior accounting regimes.

[Insert Table 8 near here]

Finally, I survey 30 institutional investors and consultants about historical mean variance optimization assumptions. Every year, limited partners and investment consultants generate assumptions

about portfolio assets expected return, variance, and correlation. These capital market expectations serve as the motivation for long–term portfolio holdings and rebalancing. From these assumptions, I gain insight into how the shift in accounting standards has impacted institutional investors' view of private equity assets. From both data and these discussions, it is clear that any significant changes in assumptions driven primarily by changes in the analysts making the calculations of at each firm. Moreover, at the firms in question, the average expected correlation of private equity to equity markets in 2004 is 50%, increasing to an average of 80% by 2012. This finding suggests that managers' understanding of private equity diversification is indeed attributable in part to accounting.

8 Resolving Private Equity's Diversification Illusion

To summarize the empirical results, private equity firms' implementation of redefined fair value measures increases the reported economic comovement of private equity assets with public markets. Fair value accounting in this setting improves disclosure in that: (1) it causes fund returns to present systematic risk bridging the beta puzzle identified by Axelson et al. (2013) and (2) it impacts investors' assessed covariance with other firms' cash flows causing greater costs in accessing capital(Lambert et al., 2007). The mandated fair value methodology seems to somewhat address private equity's diversification illusion. However, it is difficult to determine to what degree fair value reporting represents a solution to private equity's diversification illusion. Perfict accounting information is likely to be prohibitively costly. The improvement that this paper identifies is likely a second best solution: accounting information gets closer to reporting the economics of the business, but remains slightly off.

Many analysts have pointed out that private equity groups in both the United States and Europe did relatively modest write–downs in the immediate aftermath of the financial crisis but then did a long series of write–downs in the subsequent quarters, even as public equity markets returned to health. This pattern suggests that 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.

One firm provides anecdotal evidence. 3i Group is the only publicly traded buyout firm for which we can observe both the stock's economic returns and reported returns reflecting the shift in accounting between 2000 and 2012. It is important to note that though the firm's operations are similar to those of firms in the sample, it operates in an entirely different information environment. The information voids that plague private equity reporting do not characterize 3i Group's process; it is a public company,

and its investors benefit from having analysts, thousands of investors, and liquidity to price securities daily. By contrast, non–public private equity investors have access to a sliver of the information that public firm investors enjoy. Private equity reports typically consist of a 5–10 page quarterly audited financial statement with updated accounting information and possibly a telephone conversation with firm management.

Figure 5 and Figure 6 illustrate the difference between accounting and economic correlations using 3i Group as an example. Figure 5 presents the quarterly indexed returns for 3i Group's fund accounting return, stock return, and MSCI World return. At first glance, the volatile stock return in Figure 5, which exhibits a sharp spike and decline around Q2 2000, appears to exhibit the lowest correlation with market returns. By contrast accounting returns seem to be more closely correlated with the market index. However, because correlation entails the comovement (direction) of returns in a given period, the Q2 2000 stock spike and decline is actually 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 in several quarters, causing the accounting return correlation in Figure 6 to dip down to negative 60%. If we assume that the publicly traded stock return is a proxy for true economic movement, there is a persistent, significant difference between accounting and economic correlations in Figure 6. The portion of Figure 6 that shows a negative correlation up to 80% represents a period when 3i Group's stock and equity markets both posted gains and losses in returns while accounting correlations maintained "conservative" reporting, not moving in sync with markets.

[Insert Figure 7 & Figure 6 near here]

In 2006, 3i Group implemented IAS 39, which caused accounting returns during the financial crisis to comove more with public markets. While the difference between the stock and accounting correlations of 3i Group in Figure 6 after 2006 is still significant, the difference between its accounting correlations during the 2000–2002 market swings and at the end of 2008 and during the first half of the 2009 financial crisis is dramatic. This anecdotal evidence supports the thesis that fair value improves the reported comovement of private equity returns.

Global financial regulators' insistence that private equity groups implement fair value reporting seems to be helping phase out private equity's diversification illusion. Fair value will not eliminate private equity firms' practice of return smoothing, but fair value reporting seems to be bringing 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 that fair value helps to mitigate this illusion. First, I found firms that implemented fair value standards to be reporting twice the market beta as a result of the standard. Excess return alpha also disappears. Not only do assets move more in sync with the market than previously reported, but managers also benefit from transferring beta returns to alpha returns. Additionally, I find correlations dramatically increased after fair value adoption. When I examine access to capital, those firms adopting redefined fair value standards exhibit a lower propensity to raise capital, raise less capital overall, raise less capital each day they are in the market, and raise less capital per investor.

My analysis and results make several contributions. First, my results provide insight into the private equity diversification illusion. Prior to the advent of fair value standards, best practice 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 implementation of 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 shrank with implementation of fair value. For the private equity literature more broadly, my study also contributes a set of measures of access to capital previously unexplored by the literature.

Second, the results inform fair value research on FAS 157. Prior research on fair value accounting has primarily examined firms only a small portion of whose balance sheets were impacted by the standard. In the private equity setting, a firm's entire balance sheet is impacted by the standard; also, the majority of assets are highly illiquid Level 3 assets, which require more significant mandated assumptions by new fair value standards. My 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 an exception to fair value GAAP, it is not clear that such an exemption is warranted. The results address 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. Though a number of private firms influenced the FASB, the move was motivated in part by private equity firms' objections to implementing FAS 157.[12] While incentive alignment is probably high between pension fund managers and private equity managers as noted in the lobbying for private GAAP, it is not clear that pension fund retirees incentives are fully aligned with a pension fund manager's incentive to smooth returns through private equity investments. Accounting standard setting bodies should weigh private firm exemptions from public GAAP with care. Even in a setting like private equity, in which there appears to be strong incentive alignment, opportunities still exist to inform investors via accounting. Moreover, given that institutional investment managers face additional incentives to report diversification derived from holding illiquid assets, accounting can help inform trustees and beneficiaries of those portfolios about the true extent of diversification.

Finally, practitioners unaware of the diversification illusion will be more aware of the shortcomings of using private equity's reported returns to create correlation assumptions for allocating capital and rebalancing their portfolios. Though fair value accounting seems to improve the information environment, private equity investments still exhibit smoothing effects by management caused by the diversification illusion. Overall results indicate several important considerations for academics, practitioners, and regulators involving the evaluation of private equity as an asset class and attributes of fair value reporting.

[12]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.

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

Axelson, U., P. Strmberg, and M. S. Weisbach (2009). Why are buyouts levered? the financial structure of private equity funds. *The Journal of Finance 64*(4), pp. 1549–1582.

Bance, A. (2004). Why and how to invest in private equity. *European Private Equity Venture Capital Association Relations Committee Paper, March*.

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.

Carhart, M. M. (1997). On persistence in mutual fund performance. *The Journal of finance 52*(1), 57–82.

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.

Chen, J., H. Hong, W. Jiang, and J. D. Kubik (2013). Outsourcing mutual fund management: firm boundaries, incentives, and performance. *The Journal of Finance 68*(2), 523–558.

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.

Fama, E. F. and K. R. French (1993). Common risk factors in the returns on stocks and bonds. *Journal of financial economics 33*(1), 3–56.

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.

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*.

Holmström, B. (1999). Managerial incentive problems: A dynamic perspective. *The Review of Economic Studies 66*(1), 169–182.

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.

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.

Miller, T. (2007, December). Portfolio valuations satisfy requirements of sfas 157, private equity guidelines.

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 (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 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*.

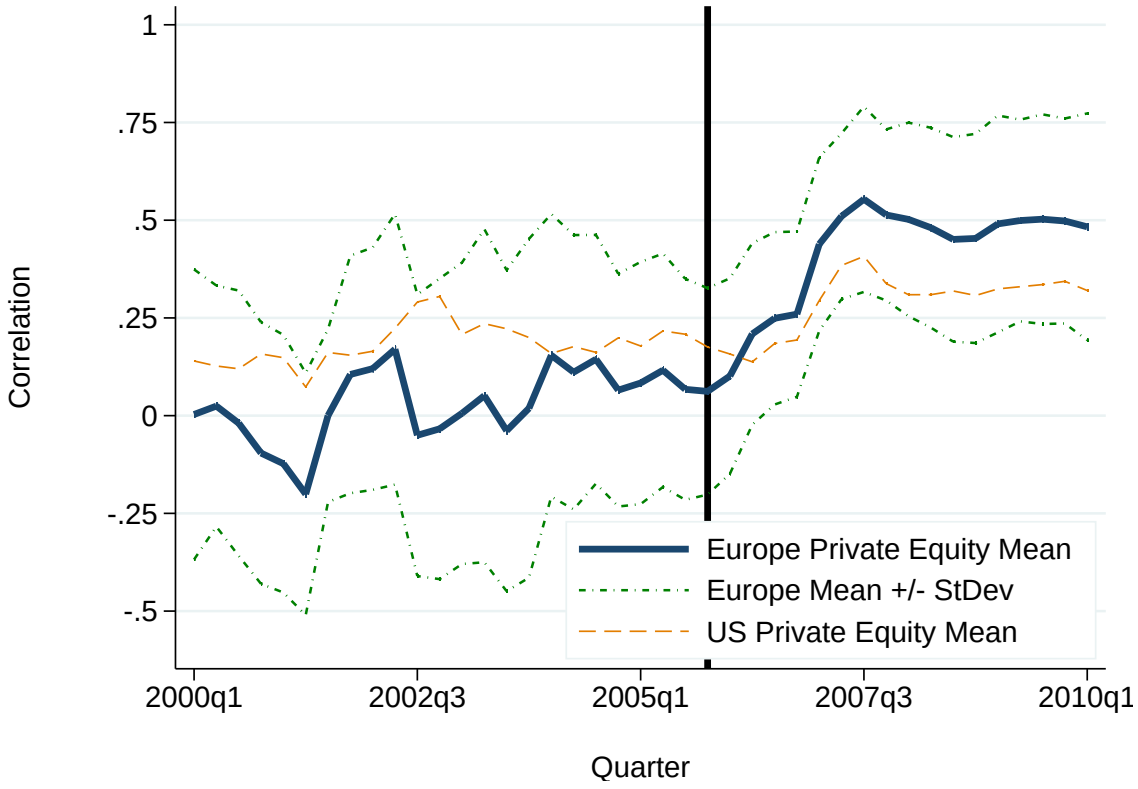
Swensen, D. F. (2009). *Pioneering portfolio management : an unconventional approach to institutional investment*, pp. 222. New York: Free Press.

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: Three–Year Correlation of European Private Equity Returns 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

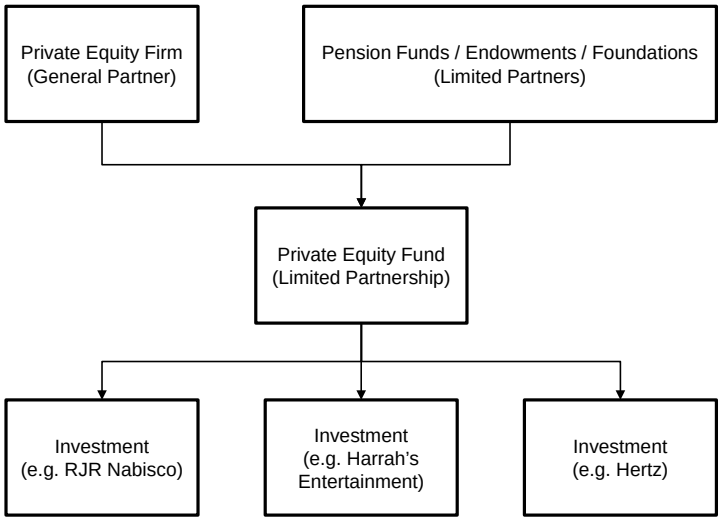
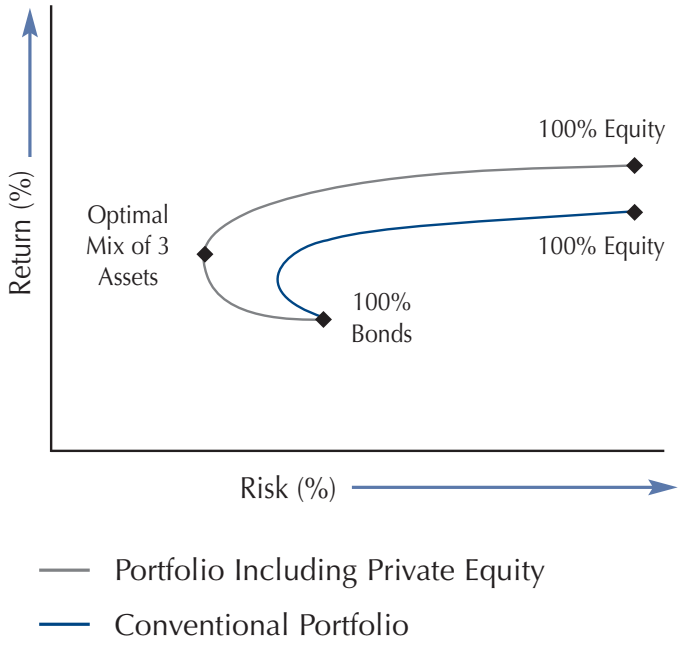


Figure 3: European Private Equity Venture Capital Association's Illustration of Risk–Return Trade–off



The European Private Equity Venture Capital Association's (EVCA) graph from marketing document entitled, "Why and How to Invest in Private Equity." The graph is similar to those used by private equity managers in marketing documents illustrating private equity's diversification benefits by shifting the efficient frontier (Nexus, 2013).

Figure 4: Private Equity Quarterly Returns

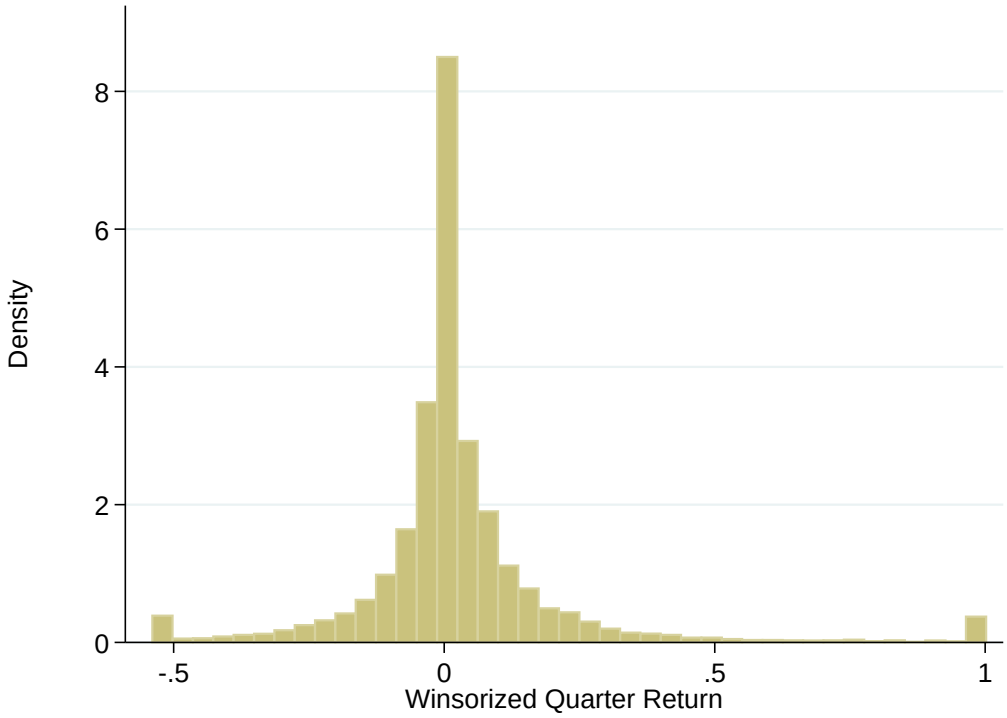


Table 1: Sample Selection and Frequency Statistics

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 Quarterly Returns and Correlation

	(1)	(2)	(3)	(4)	(5)
	R	R-Rm	R-Rf	Rm-Rf	3-Year Correlation MSCI World Index
US & EU Funds 2000-2005	2.9%	1.2%	2.2%	1.0%	14.0%
	(3,994)	(3,994)	(3,994)	(3,994)	(1,516)
EU Funds 2000-2005	3.9%	1.8%	3.3%	1.5%	0.3%
	(768)	(768)	(768)	(768)	(245)
US Funds 2000-2005	2.6%	1.1%	2.0%	0.9%	16.6%
	(3,226)	(3,226)	(3,226)	(3,226)	(1,271)
US & EU Funds 2006-2008	1.9%	4.2%	1.1%	-3.1%	18.0%
	(4,041)	(4,041)	(4,041)	(4,041)	(1,522)
EU Funds 2006-2008	2.4%	4.8%	1.5%	-3.3%	21.1%
	(808)	(808)	(808)	(808)	(296)
US Funds 2006-2008	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 returns, excess returns and correlations for buyout funds from 2000 to 2008. Column (1) presents average quarterly returns of funds by region. Column (2) and (3) show the mean quarterly excess returns over the period calculated as the fund quarterly return minus the market return and the fund quarterly 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)
US & EU Funds 2000-2005	755.9	420.6	7.0	50.3
	(384)	(393)	(384)	(330)
EU Funds 2000-2005	482.2	396.8	5.9	37.0
	(116)	(125)	(116)	(102)
US Funds 2000-2005	874.3	431.7	7.4	56.3
	(268)	(268)	(268)	(228)
US & EU Funds 2006-2008	1,171.1	413.3	12.1	80.0
	(394)	(404)	(394)	(300)
EU Funds 2006-2008	624.2	398.3	3.0	52.5
	(110)	(118)	(110)	(81)
US Funds 2006-2008	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: Descriptive Statistics on Private Equity Returns and Fundraising, 2000–2008

Panel A: 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	2.48	2003	2006	2007	-0.51
Fund Vintage	1999	4.56	1997	1999	2003	-0.43

Panel B: Fundraising (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	2.23	2004	2006	2007	-0.68
Close Year	2006	2.41	2005	2007	2008	-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 Capital Asset Pricing Model

	Europe vs. US				
	CAPM 2000-2008	CAPM 2000-2012	4 Factor Model 2000-2008	4 Factor Model 2000-2012	4 Factor Model 2000-2012
	(1)	(2)	(3)	(4)	(5)
SMB			-0.12	-0.03	-0.05
			(0.084)	(0.063)	(0.064)
HML			-0.04	-0.07	0.00
			(0.075)	(0.042)	(0.045)
MOM			0.088*	0.151***	0.122***
			(0.041)	(0.020)	(0.020)
RMRF *(Beta)*	0.223***	0.223***	0.260***	0.266***	0.283***
	(0.044)	(0.044)	(0.052)	(0.043)	(0.044)
EU Fund *(Alpha)*	0.030***	0.030***	0.032***	0.030***	0.028***
	(0.007)	(0.007)	(0.008)	(0.007)	(0.007)
US Fund *(Alpha)*	0.018***	0.018***	0.019***	0.018***	0.016***
	(0.003)	(0.003)	(0.006)	(0.004)	(0.004)
Post EU	0.01	0.00	0.00	0.00	0.00
	(0.005)	(0.004)	(0.006)	(0.005)	(0.005)
EU Fund*RMRF	-0.03	-0.03	-0.03	-0.02	-0.03
	(0.107)	(0.106)	(0.106)	(0.107)	(0.106)
EU Fund*Post EU	0.01	-0.02	0.191**	-0.01	0.163**
	(0.011)	(0.009)	(0.067)	(0.047)	(0.060)
Post EU*RMRF	0.222***	-0.02	0.01	-0.01	0.01
	(0.059)	(0.046)	(0.011)	(0.008)	(0.011)
EU Fund*Post EU*	0.503***	0.316**	0.501***	0.307**	0.501***
RMRF (IAS 39 Beta)	(0.143)	(0.112)	(0.143)	(0.112)	(0.143)
Post US					-0.029**
					(0.01)
US Fund*Post US					-0.504***
					(0.09)
Post US*RMRF					0.032**
					(0.01)
US Fund*Post US*					0.205*
RMRF (FAS157 Beta)					(0.099)
N	8,035	15,005	8,035	15,005	15,005
adj. R^2	0.04	0.03	0.04	0.04	0.04

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

The constant is suppressed as indicator variables for each fund region category is included indicating the alpha attributable investment managers. Standard errors are clustered by fund. Columns 1–2 display results from a CAPM model while Columns 3–4 display the results from a 4 factor model. Columns 1 and 3 are from the first quarter of 2000 through the fourth quarter of 2008. Columns 1 and 3 are from the first quarter of 2000 through the fourth quarter of 2012. All variable definitions included in AppendixA.

Table 6: Disappearing Alpha

	Europe vs. US	
	Pre IAS 39	Post IAS 39
	2000-2005	2006-2012
	(1)	(2)
EU Fund *(Alpha)*	0.037***	0.007
	(0.008)	(0.004)
US Fund *(Alpha)*	0.024***	0.015***
	(0.006)	(0.002)
SMB	-0.296**	(0.089)
	(0.106)	(0.079)
HML	-(0.153)	-(0.064)
	(0.080)	(0.046)
MOM	0.187***	0.147***
	(0.046)	(0.024)
RMRF *(Beta)*	0.282***	0.247***
	(0.053)	(0.020)
EU Fund*mkrf *(IAS 39 Beta)*	-0.02	0.278***
	(0.106)	(0.052)
N	3,994	4,041
adj. R^2	0.02	0.06

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

The constant is suppressed as indicator variables for each fund region category is included indicating the alpha attributable investment managers. Standard errors are clustered by fund. Columns 1–2 display results from a modified 4 factor model illustrating European private equity disappearing alpha. All variable definitions included in AppendixA.

Table 7: 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 3 year rolling private equity fund quarterly 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 8: 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
R^2		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 = 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.

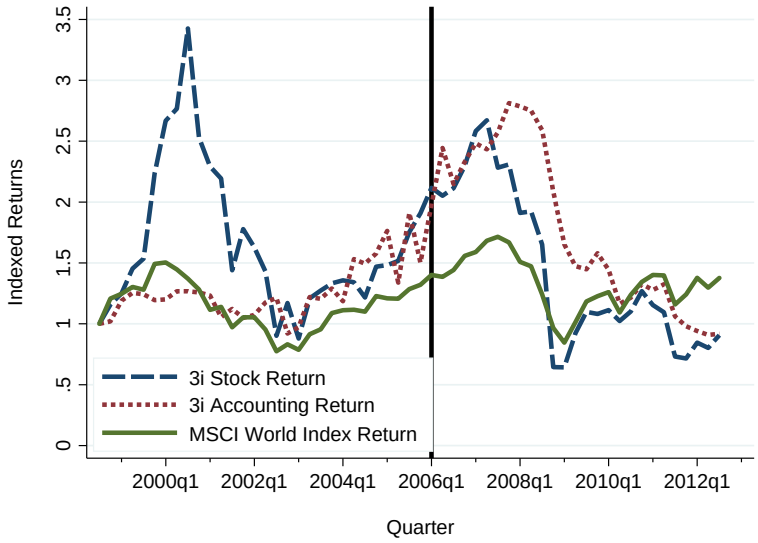
Post = Indicator variable equal to 1 if the observation is drawn from the post–adoption–period earnings distribution and 0 otherwise.

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.

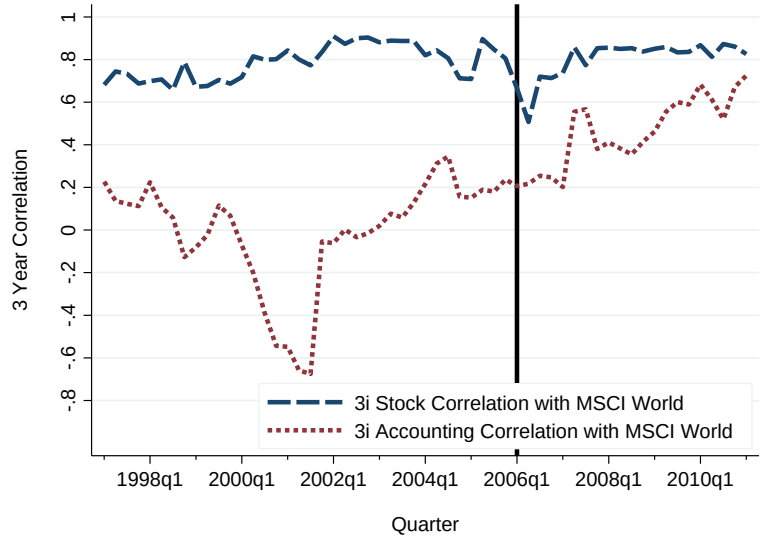
The table presents the regression of access to capital for private equity funds. All variable definitions included in Appendix A.

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



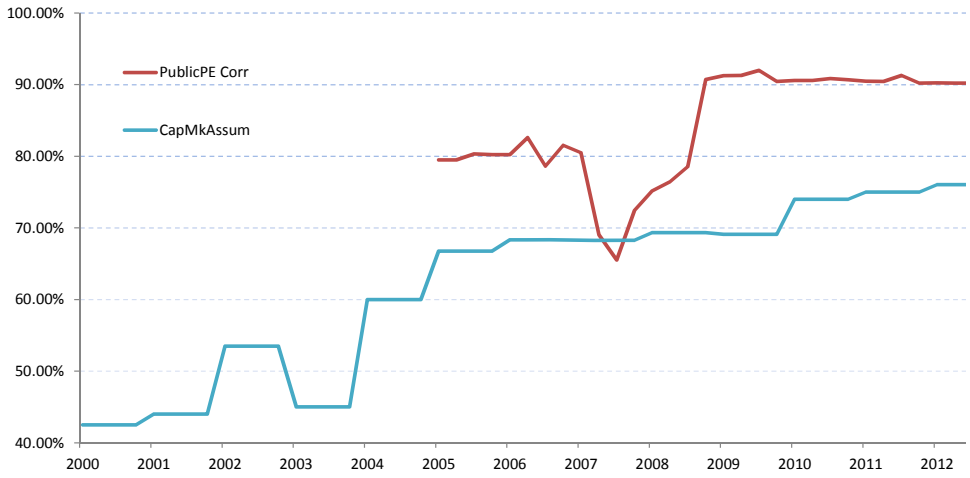
3i Group's stock returns, accounting returns and the MSCI World Index return indexed at 1 in Q1 1999. The vertical line in 2006 identifies the start of the mandated adoption of fair value accounting for European Private equity firms.

Figure 6: 3i Group's Stock 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.

Figure 7: Mean–Variance Optimization Historical Assumptions



The above chart presents the historical private equity to public equity correlation assumptions from 17 actuaries used in mean–variance optimization models. The five year correlation of the S&P 500 and S&P Listed Private Equity Index is also presented.