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Information Asymmetries in Private Equity: Reporting Frequency, Endowments, and Governance

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Abstract

Using PitchBook's private equity (PE) database of 4548 PE funds from 42 countries for the 2000 to 2012 period, we find that higher reporting frequency is associated with lower information asymmetry in performance reports from general partners (GPs) to limited partners. We also find that endowments are systematically associated with less reported *un*realized returns as a percentage of total returns generated from GPs. Moreover, endowments receive more performance reports from their PE funds, implying more stringent governance. These findings persist after controlling for various institutional and GP characteristics and are robust to several adjustments for endogeneity concerns. This study also contributes to the finance, accounting, and business ethics literature on financial reporting quality.

Keywords Private equity · Endowments · Financial reporting · Law and governance · Culture

"If I were running a pension fund, I would be very careful about what was being offered to me." - Warren Buffett, May 2019, Bloomberg News (https://www.bloomberg.com/news/articles/2019-05-04/buffett-slams-private-equity-for-inflated-returns-debt-reliance.).

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Introduction

Private equity (PE) funds are sophisticated financial intermediaries investing in relatively high-risk, illiquid securities in private companies on behalf of their investors, or limited partners (LPs). PE fund managers, or general partners (GPs), have the necessary expertise to successfully invest in those portfolio companies but they might be less transparent about their operations and disclosures to maintain their competitiveness. Such opacity vis-à-vis the general public and the less-regulated market status naturally results in two sources of agency problems: between GPs and their portfolio companies/entrepreneurs and between GPs and LPs (Morrell and Clark 2010; Kandel et al. 2011). Extant research in PE, more specifically on the agency problems and information asymmetries that arise in earlier-stage venture capital (VC), has concentrated on the relationship between GPs and portfolio companies/entrepreneurs (Jensen and Meckling 1976; Amit et al. 1998; Higashide and Birley 2002; Fried and Ganor 2006; Morsfield and Tan 2006; De Bettignies and Brander 2007; Yitshaki 2008; Bonnet and Wirtz 2012; Wongsunwai

2013). The GP-LP relationship between PE fund managers and their investors has been relatively understudied and thus is the main focus of this study.

In PE fund management, GP-LP agency problems are exacerbated by the arguably less rigorous regulation of PE funds as compared with other financial intermediaries such as mutual funds and hedge funds (Cumming 2005; Nielsen 2008; Cumming and Walz 2010; Ferran 2011). However, we also know that different types of investors in the PE market seem to enjoy different returns and are thus arguably better at mitigating agency problems and surmounting information asymmetries (Lerner et al. 2007). PE fund managers themselves tend to be quite opaque in regard to their investors. The limited partnership structure upon which funds are built promotes this opacity as PE fund investors risk losing limited partnership liability protection if they seek to involve themselves too much in the operation of the funds. Therefore, unlike PE fund managers who are skilled at negotiating terms of investment to ensure frequent and open interaction between themselves and their investee companies, LPs may not necessarily be incentivized to seek open and frequent interaction between themselves and their investee funds. In short, LPs may not necessarily seek to mitigate information asymmetries. However, prior research has found that open communication and frequent interaction between the investor and the investee to be a crucial element for the success of the investment (Sapienza 1992; Sapienza et al. 1996; Kanniainen and Keuschnigg 2003, 2004; Jääskeläinen et al. 2006; Katz 2009; Cumming and Dai 2010; Hain et al. 2016; Goktan and Muslu 2018). In this paper, we seek to add to the PE literature in determining the effect of open communication and frequent interaction between GPs and LPs, and the ensuing success of reduction in information asymmetries.

With reference to PE fund performance reporting, it has been well established that the main difficulty in determining PE fund success or failure rates over the life of the fund is that their performance measurements are relatively inaccessible to the public (Cumming and Walz 2010; Cumming et al. 2010). While mutual funds are required to make publicly available daily net asset values (NAVs), PE funds are not required, nor are expected to provide numerous reports of their holdings. Reporting frequency is agreed upon between GPs and each LP independently. Moreover, LPs in such funds, who are entitled to at least an annual performance report, are ultimately dependent on measurements of fund performance that are largely subject to PE fund managers' discretion and more significantly, PE fund performance is determined by both realized and *un*realized returns. Unlike mutual fund investors who can verify NAVs with publicly available information, LPs are dependent on relatively subjective valuation methods for

active private investments (Cumming and Dai 2010; Cumming et al. 2013; DaRin and Phalippou 2017). Getmansky et al. (2004) suggested that permissiveness relating to relatively subjective valuations and reporting quality by hedge funds may result from the illiquid assets held by hedge fund managers, and as PE funds hold primarily illiquid assets, we believe this issue to be exacerbated in the PE market. Furthermore, there is no particular reporting standard that GPs must adhere to, just guidelines promoted by the respective national and regional PE associations. Thus, the way GPs report performance to various LPs in different countries around the world may differ significantly across funds. Although many national PE associations have encouraged the creation of more stringent guidelines for the reporting of *un*realized returns, PE funds are not yet regulated as strictly as hedge funds or mutual funds and do not face any mandatory disclosure rules in any country regarding their performance.

In this paper, we seek to add to current research by providing evidence that PE fund reporting frequency is one of the possible explanations for the success of some type of LPs. Following Lerner et al. (2007), we also seek to address the "Limited Partner Performance Puzzle" that endowments' returns from PE funds are nearly 14% greater than the average LPs. Although a recent study by Sensoy et al. (2014) has found that the puzzle is no longer the case because endowments no longer outperform other LPs during the 1996–2006 period, we believe our research is still highly relevant in determining the success of some LPs over others, especially endowments. Sensoy et al.'s (2014) research primarily analyzed performance measurements and they used a different sample period to attribute outperformance of endowments to greater access to top-performing VC partnerships. Our findings on PE fund managers' reporting behaviors may provide further explanatory evidence of the superior performance of certain types of LPs over others, in this case endowments as institutional investors in the PE funds, from a more direct and governance-based point of view. We analyze PE fund reporting behavior of GPs and examine the theory of and empirical evidence on GPs' reporting frequency. Institutional investors rank the quality of international disclosures from PE funds as one of the most important hurdles to be met before they make investment decisions. We therefore aim to obtain a specific picture of how LPs can better govern their investments and mitigate information asymmetries.

We believe that an examination of reporting behavior is particularly relevant considering its absence not only in PE research, but also in research related to other financial intermediaries such as hedge funds and mutual funds. We contribute to the debate in accounting literature about whether more or less frequent financial reporting is necessary and

beneficial to investors while more frequent financial reporting might cause managerial myopia effects (Leuz and Verrecchia 2000; Nallareddy et al. 2017; Ernstberger et al. 2017; Kraft et al. 2018; D'Adduzio et al. 2018). We believe our study could have important implications for future research from financial intermediation managerial performance perspective. By using PE as a unique setting, we contribute to the business ethics literature as well about the ethical issues in the financial reporting quality to explore the possible biases within the performance reports from GPs to LPs (Stewart 1986; Staubus 2005; Frecka 2008; Morrell and Clark 2010; Kusnadi et al. 2016; Elayan et al. 2016). We further believe our study is the first one to use an international PE returns database to observe this type of reporting behavior.

Using comprehensive PE returns data from PitchBook, which comprise 4548 PE funds from 42 countries spanning the 2000–2012 period, we find that higher reporting frequency is associated with lower information asymmetries in the performance reports from GPs to LPs. We also find that endowments are systematically associated with less reported *un*realized returns as a percentage of total returns generated from GPs. Moreover, endowments receive more performance reports from their PE funds, implying more stringent governance. These findings persist after controlling for various institutional and GP characteristics and are robust to several adjustments for endogeneity concerns. Our results provide proof that reporting frequency can serve to mitigate information asymmetries and agency problems, as well as serve to proxy for good corporate governance. We provide additional evidence to support prior studies on PE fund reporting behavior, such as Armstrong et al. (2005), Beuselinck et al. (2008), Cumming and Walz (2010), and Brown et al. (2019). However, we believe our study is innovative because those prior studies did not explore differences in institutional investor types or governance. Moreover, our robust results complement and support a recent study utilizing survey data by DaRin and Phalippou (2017) which suggest active governance effort is important for LPs in PE funds. While they find that the valuation of *un*realized investments is a very important criterion to re-invest in seasoned funds, we have in this paper gone on to document, analyze and quantify such active governance by using reporting frequency. It is interesting to note that in their study, they also find that on average the LPs hold one advisory board seat for every three funds, and that they only attend 80% of the meetings. Put in another way, our results suggest that reporting frequency is especially important to LPs as investment advisory board members have no real operational powers (unlike investment committee members), so they rely more on reports issued by fund managers and if they do not attend meetings, as found by DaRin and Phalippou (2017), and prefer to use their own models to evaluate fund performance, they are especially reliant on reports issued by PE fund managers as benchmarks.

Overall, our analysis and results are consistent with the view that PE fund manager reporting behavior is directly linked to the information asymmetries reflected in PE performance reports. Some institutional investor types are systematically better at mitigating such information asymmetries, for example, endowments receive substantially more reports, and therefore experience substantially higher realized returns and lower *un*realized returns from their PE investments.

The remainder of this paper is organized as follows. Section I discusses the prior literature and develops our hypotheses. Section II presents the data and our summary statistics, while section III covers the regression analyses and robustness checks. Section IV concludes and provides an outlook for future research.

Literature Review and Hypotheses

GPs act as financial intermediaries for LPs to invest in PE investments (Sahlman 1990; Norton 1995). The relationship between GPs and LPs, however, suffers the same principal–agent problems as in any corporation (Jensen and Meckling 1976; Fama 1980). Information asymmetry exists and is especially severe as LPs seek to select the best GP from numerous GPs available, to invest their funds (Burton and Scherschmidt 2004; Cumming et al. 2005). In this sense, two-way agency conflicts might emerge as LPs entrust more experienced GPs with investment decisions, and as GPs influence management of LP funds at the expense of LPs who eventually suffer from moral hazard (Akerlof 1970; Eisenhardt 1989). Although prior literature on agency problems focus on remedial tools such as screening to reduce the information asymmetries between GPs and LPs (Eisenhardt 1989; Norton 1995), we are hard pressed to find the economic mechanisms that include the role of reporting frequency for the reduction of information asymmetries between GPs and LPs in the performance reports and thus is worth investigating.

In the PE market, the determination of relative performance of investments within portfolios is critical for any investor, especially so for institutional investors such as pension funds, banks, insurance companies and endowments. These sophisticated investors essentially manage funds derived from their own clients, therefore, it is their responsibility to identify and invest in the best performing financial intermediaries that manage their portfolio of equities, bonds and the higher-risk alternative investments such as hedge funds and PE funds. Identifying the best performing financial intermediaries, however, is not straightforward. A seminal study of PE fund performance by Kaplan and

Schoar (2005) analyzed data derived from voluntary reporting of fund returns by the PE fund managers to their investors. They reported that the performance of the 746 PE funds in their sample was close to that of the *S&P 500* Index. Jones and Rhodes-Kropf (2003) also use the same data in their research but specifically qualify the self-reported data on NAVs due to the difficulty of accurately valuing privately held and illiquid investments and that different funds may also calculate NAVs in different ways. Subsequently, Gottschalg and Phalippou (2006) suggested that Kaplan and Schoar's (2005) analysis of PE performance may be optimistic as a number of funds analyzed report high values for their *un*exited investments. The funds reported residual values of investments that, if written-off, would negatively affect the actual performance reported. Prior research has therefore established the relatively common practice whereby PE fund managers may report inflated valuations for securities held in private companies that are not yet exited. Even though such overvaluations can lead to reputational costs, international evidence provided by Cumming and Walz (2010) finds systematic biases in managers' reporting of fund performance. Getmansky et al. (2004) also suggest that systematic biases in reporting of fund performance may also occur in the hedge fund industry. They argue that serial correlation in hedge fund returns may likely be the result of illiquid securities within fund portfolios that are contained in the fund as they are not actively traded and for which market prices are not always readily available.

Such intentional overvaluations by GPs are not only determined by the information asymmetries faced by LPs, but also by the expected marginal costs and benefits from those overvaluations. For example, the trade-off between the expected marginal benefit of receiving higher performance and management fees versus the expected marginal cost of reputational loss in the market may encourage GPs to misreport performance. Prior theoretical research along these lines has shown that if investors are patient enough, insiders will disclose their private information more truthfully, and the accounting disclosure environment is generally sufficient to assess the credibility of insider disclosures (Verrecchia 1983; Benabou and Laroque 1992; Healy and Palepu 2001; Stocken 2000; Neus and Walz 2005).

Therefore, the information asymmetry level and the possible misvaluation in the PE performance reports might raise similar concerns about the ethical issues of GPs. Prior literature in business ethics have documented the ethical issues and failures in financial reporting in different ways. In one example, the intentional structuring of lease contracts to avoid disclosing leased asset and liability amounts has been found to have led to the accounting debacle in Enron (Frecka 2008). Research has also found that fraudulent financial reporting, the release of financial statements with errors so material as to require restatement and the biased reporting marred

by defects, all lead to the conflicts between management's interest in reporting its performance in a favorable light and investors' interest in decision-useful financial information (Staubus 2005). Thus, the quality of financial reporting is closely related to the ethics of corporate managers, accountants, and audit committees (Stewart 1986). For example, more diversified audit committees will have higher-quality financial reporting (Kusnadi et al. 2016) and the disclosures of positive changes in firm ethical performance will positively affect firm value (Elayan et al. 2016). Ethical disclosure has meaningful impact to the business and public good.

Although PE funds are not required by law or any specific regulations to routinely report performance to investors, PE fund managers should still adhere to the minimum mandatory reporting requirements of the type of partnership or corporate structure they have chosen to administer their funds. Additional reporting obligations regarding frequency or quality would depend on the terms of the contract between GPs and LPs (and note that each separate investor may potentially agree to different terms). Prior studies in private equity also highlight how reporting quality and reputation matters in the PE industry and how reduction in information asymmetry ultimately improves disclosure quality. By comparing VC-backed IPOs with non-VC-backed ones, Morsfield and Tan (2006) found that earnings management would be less upward in those VC-backed IPOs, and Wongsunwai (2013) further provided evidence that firms backed by high-quality VCs would have less aggressive financial reporting and thus have lower probability linking to manipulation. Katz (2009) also found that the presence of and monitoring by PE sponsors restrains upward earnings management and induces a higher frequency of timely loss recognition. Therefore, financial reporting of PE-backed firms is seen as value-informative (Armstrong et al. 2005; Hand 2005). A recent study by Goktan and Muslu (2018) examines the reporting quality of portfolio companies that are backed by listed and unlisted PE firms. They found that the public reporting model of listed PE firms leads to greater capital market benefits than the private reporting model of unlisted ones. Although those studies are mainly focused on the relationships between GPs and their portfolio companies, their insights about the quality and frequency in financial reporting lead us to work toward understanding the GP-LP relationship by investigating the reporting frequency in the performance reports.

Reporting frequency is also a lively debate subject in the accounting literature given recent consultations by the Securities and Exchange Commission (SEC) in the U.S. that is considering changing reporting frequency from quarterly to biannually. One concern is that more frequent reporting may spur myopia in the financial markets. Although Leuz and Verrecchia (2000) and Fu et al. (2012) confirmed that increased disclosure and transparency is beneficial through improved liquidity and reduced cost of capital, other studies found

competing results. By examining how mandatory quarterly reporting affects managers' business decisions in terms of real activities manipulations, Ernstberger et al. (2017) found higher managerial short-termism resulting from increased reporting frequency requirements. Similar results of increased real earnings management following the adoption of quarterly interim management statements (IMS) have been found by Nallareddy et al. (2017). A recent study by D'Adduzio et al. (2018) added fuel to the debate by providing evidence that higher reporting frequency mitigates investor myopia by providing investors more information on future earnings.

Empirical evidence shows us that PE fund disclosure is increasingly important to investors (Beuselinck et al. 2009; Cumming and Johan 2007, 2013). We believe one of the most efficient ways to reduce information asymmetries between GPs and LPs is to increase the frequency of performance reports. Reporting frequency is viewed as a proxy for managerial expertise, operational efficiency, and good corporate governance. Moreover, fewer time lags between reports may mitigate managerial discretion and can mean fewer opportunities for GPs to continuously misreport *un*realized returns and convincingly overstate performance. While we do not underestimate the difficulty of accurately valuing privately held and illiquid investments, we believe that more frequent reporting may increase accuracy levels, or at least, highlight potential inaccuracies and mitigate information asymmetry levels. More frequent reporting also enables institutional investors to make better informed cash flow decisions, to better benchmark fund performance against their own NAV models (DaRin and Phalippou 2017) and to better manage the relatively higher illiquidity risks associated with PE fund investments. PE fund managers will also find that more frequent reporting allows them to overcome the informational risk hurdles perceived by institutional investors, and to encourage future fund inflows. We therefore hypothesize the following:

H1 Higher reporting frequency is associated with lower information asymmetry in the performance reports from GPs to LPs.

As mentioned earlier, neither reporting frequency (beyond the annual minimum) nor reporting quality are predetermined by laws or regulations, and they are primary obligations resulting from previously agreed upon terms between a PE fund and its investors. In view of international differences across PE funds and investors (Schertler and Tykvova 2006), we seek to test whether the impact of reporting frequency on information asymmetry will persist across countries for different time periods and under different institutional environments. Our focus is on the legal environments. Prior studies suggest that investors are better protected and financial markets are more transparent in countries with stronger legal protections (La Porta et al.

1998, 2006). Cheng and Courtenay (2006) found that better regulations and accounting standards positively affect the quality of voluntary reporting across countries. Huang et al. (2019) in turn suggested that investors may find it less costly to verify information disclosed by firms in countries with better legal standards. With regard to PE disclosure, Cumming and Johan (2013) found that fair valuation clauses in PE fund contracts are more likely to be enforced in countries with stronger and better legal environments and therefore such clauses are more likely to be included by PE fund investors. It must be noted though that better legal environment may not necessarily remove all incentives or potential avenues for GPs to misreport portfolio (company) values and increase the information asymmetry level in their performance reports. Miller and Reisel (2012) suggested that investors in the bond market revert to contractual agreements to overcome weaknesses in country-level protections. As such, additional measures may be taken by LPs, such as contractually requesting more frequent reporting from GPs.

These measures have both costs and benefits to GPs and LPs. Prior research related to firms vis-à-vis their investors found that increased reporting may lead to higher quality of proprietary information and more accurate market valuation of the firm assets (Verrecchia 1983, 1990; Darrough and Stoughton 1990; Hayes and Lundholm 1996; Admati and Pfleiderer 2000). In addition, some recent empirical studies also confirmed such benefits in terms of reducing the firm's cost of capital and improving liquidity in the stock market (Leuz and Verrecchia 2000; Fu et al. 2012). Gigler et al. (2014) also highlighted the benefits of increased financial reporting frequency to serve as more effective discipline tools of market prices and deter negative NPV projects. Mensah and Werner (2008) found that more frequent interim reports could lead to more efficient security pricing. Van Buskirk (2012) found that more frequent disclosure will provide an incentive for increased private information acquisition by sophisticated investors which will lead to reduced information asymmetry and accelerate the rate where information is impounded into market prices. Although Van Buskirk (2012) covers the retail sector only, we believe his findings are highly relevant to our study of PE funds where private information disclosure by GPs are relied heavily upon by LPs to determine the value of their investments and also to mitigate managerial discretion. We expect LPs to seek increased disclosure from GPs due to potential benefits listed above.

There are of course costs to these additional measures. Prior theoretical research has found that increased voluntary disclosure could potentially affect PE fund investment efficiency and might also be costly in terms of additional compliance costs (Stein 1989; Gigler et al. 2014; Roychowdhury et al. 2019). These costs lead us to seek to determine the persistence of voluntary reporting frequency by PE funds across different legal jurisdictions. We therefore refer to Renders

and Gaeremynck (2007) who looked at early (voluntary) IFRS adoption across seven European countries. They argued that the adoption of this accounting standard that is associated with increased disclosure by firms depends on the level of investor protection and the ensuing cost of adoption. In countries with weaker investor protection, firms that have higher private benefits are less likely to adopt IFRS due to the potential loss of these benefits, or higher costs to insiders. They contrasted this with countries that have stronger laws protecting investors that limit private benefits of control, and thus lowering the costs of implementation. Following their study, we believe that GPs will increase disclosure in better legal environments to take advantage of the benefits vis-à-vis their investors listed above, but also because GPs have lower private benefits in these better institutional environments and thus the cost of additional disclosure is lower.

With regard to different types of institutional investors, Lerner et al. (2007) found that endowments perform relatively better in PE investments than other LPs. As one of the most active capital market players, endowments prudently invest their assets with specific long-term perspective attempting to maximize returns while controlling for risks to reserve capital for future generation as well as to meet the current missions. Many prior studies in the literature have been focused on the performances and strategies of endowments trying to shed more lights on the secrets of their successes. In Lerner et al.'s (2008) follow-up paper, they used College Board and NACUBO[1] survey data, and found that the superior investment performance of endowments is attributable to their higher-quality student body, more sophisticated use of alternative investment tools, and larger investment size. By using more updated NACUBO data, Dimmock (2012) also found that those wealthier and highly selective universities will hold much riskier portfolios in their endowments. Brown et al. (2014) also showed that endowments would change payout policies in response to financial market shocks to better mitigate downside risks.

Although some other studies shared different voices on such outstanding performances no longer existed with evidences that endowments, on average, did not outperform the market index and have negative alphas in their sample (Barber and Wang 2013; Dahiya and Yermack 2019), Barber and Wang (2013) still found that strategic allocations to alternative investments were a source of excess returns for a handful group of elite endowments. Such an outcome coincides with a recent study by Lo et al. (2019) who used U.S. IRS tax filing data to investigate the risk, return and asset allocations of endowments. They concluded that the larger the size of endowments, the more they will invest in riskier and higher-returning assets. Given the fact that over the past two decades, endowments shifted their asset allocation weights more and more towards alternative assets such as hedge funds, private equity, venture capital, private real estate, and illiquid natural resources (Dimmock et al. 2019), this strategic change contributed to the outstanding performance generated from those endowments and has been widely utilized by other institutional investors. Brown et al. (2010) also used asset allocation data from university endowment funds to show that actively managed funds outperform passively managed ones.

Allocation to alternative asset classes such as private equity requires better asset selection skills, longer gestation periods and higher minimum investments, endowments as pioneers and major investors in the PE market reaped high returns. Although we analyze different periods in our sample, we believe endowments will still perform relatively better than other LPs as previous research finds that they are arguably more sophisticated LPs. In Lo et al.'s (2019) study, they also determined that other characteristics including expenses and governance structures might also impact investment outcomes as independent boards were linked to higher returns. Therefore, we expect that for endowments, higher reporting frequency will be the chosen contractual substitute to overcome weaker investor protection and this will jointly affect the information asymmetry level in the performance reports of those PE funds residing in better legal environments. Our second hypothesis is summarized as:

H2 The negative association between reporting frequency and information asymmetry in the performance reports from GPs will be strongest when LPs are endowments and legal environments are better as GPs have lower private benefits of control to relinquish.

Data and Summary Statistics

Our study takes advantage of PitchBook[2]'s comprehensive PE returns database. The PitchBook data not only include voluntarily self-reported fund-level performance multiples,

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[1] NACUBO stands for the National Association of College and University Business Officers which is a membership organization representing more than 1,900 colleges and universities across the U.S.

[2] PitchBook database is a relatively new source to the academic literature and in recent studies by Brown, Harris, Jenkinson, Kaplan and Robinson (2015) and Harris, Jenkinson and Kaplan (2015), they discovered that PitchBook's coverage is pretty similar to other private equity databases, such as Preqin, Cambridge Associates and Burgiss, in North America but varies outside this region. According to PitchBook, the data are mainly obtained from filings, press releases and websites, and collected, verified, and integrated with additional information by their data teams. Their research team also surveys companies, advisers, investors, lawyers, accountants, and lenders to cross-validate collected data and to gather additional information (see https://pitchbook.com/research-process for detailed information about how PitchBook collect data). Recent research on private equity and angel investors are using this database as the main data source (Cumming and Zhang, 2019; Fuchs, Füss, Jenkinson and Morkoetter, 2019).

but also a rich trove of information on related LPs, fund managers, and fund characteristics. Our sample data span 2000 through 2012, with a total of 4548 PE funds from 42 countries. The data comprise 491 LPs, with a wide range of institutional investors, where approximately 70% are pension funds (a combination of public and corporate), nearly 22% are insurance companies, and about 7% are endowments. The remaining 1% cover funds of funds, sovereign wealth funds and other LPs.

Our cross-jurisdictional analysis across investor and PE fund type adds to the existing literature on single country analysis or single LP type. Moreover, to obtain the maximum amount of information on fund performance and reporting behavior, we analyze various fund types as well as various fund styles. This differentiates our study from recent work that has focused primarily on buyouts or venture capital funds (Harris et al. 2014; Robinson and Sensoy 2016).

Table 1 summarizes the main variables in our dataset. We investigate the ex-post examined reporting frequency from each GP to various LPs per year and the RVPI as a percentage of TVPI reported as dependent variables. The explanatory variables include the PE valuation variables DPI, RVPI, the GDP growth rate for each country's economic development, the MSCI returns for each country's stock market conditions, legality index, Hofstede's long-term orientation variable as a cultural dimension, as well as a variety of control variables to capture LP and GP characteristics.

Our first primary variable of interest is reporting frequency, which is calculated as the actual ex-post examined reporting times from a GP to different LPs. Note that it is common for fund managers to exhibit some differences in their reporting behaviors, because reporting frequency and quality depend on each LP's requirements. For example, if a GP has three LPs, it may be providing an annual performance report to LP #1, a quarterly performance report to LP #2, and a monthly performance report to LP #3.[3]

From our data, we can empirically investigate such behavior across PE funds in different countries and over our sample period. This provides us with a unique opportunity to explore all the possible reasons behind. For example, in addition to the different contract terms between GPs and LPs, there may also be other governance or monitoring

reasons. Moreover, the PitchBook database provides detailed information on testing international differences across countries and over time, which can further explain the reasons behind such reporting behavior.

We examine the data in a panel setting across countries and years. Our first step is to present some of the highlighted details from our PitchBook data and provide preliminary means difference test results. We divide our entire sample by LP types (for a total of 491, which includes 9 endowments, 163 pension funds, 296 insurance companies, 10 funds of funds, 2 sovereign funds, and 11 "other" LPs which the data classify simply as "other"). Our sample thus covers a wide range of LPs and provides an interesting opportunity to explore PE fund characteristics across different LP types. The LPs in our sample began investing in the PE sector from 1976; the latest began in 1999. In later sections, we will discuss the relatively superior performances by endowments. But here we just provide additional evidence to support the early-mover advantages documented by Lerner et al. (2007), because, in our sample, endowments were among the first to begin investing in PE.

In panel A of Table 2, we find that, as compared with other LPs, endowments are relatively smaller with fewer total assets under management, but endowments almost always occupy the top two positions in terms of annual commitments, contributions, and distributions to their PE funds, which implies that they are among the most active players in the PE sector. The last column also confirms the activeness in the PE market of endowments with about 183 PE funds invested every year.

Panel B of Table 2 divides our sample by LP types and presents all the sample mean characteristics, including total number of funds invested, average fund size, four main performance measurements, reporting behavior, information asymmetry proxy, and the number of LPs associated with each fund per year. Public pension funds invest in the highest number of PE funds, followed by insurance companies and endowments. In the second column, we summarize average fund sizes, with all types of LPs investing significantly differently from each other where funds of funds are generally the largest, followed by insurance companies and public pension funds. And the last column shows that the number of LPs per PE fund for each year in our sample. It is somewhat puzzling that PE funds invested by insurance companies have an average of about nine LPs investing in them, which implies those funds are relatively popular. But we find that they exhibit rather poor performance over time, so the level of popularity is quite surprising.

The columns 3–8 of Panel B in Table 2 are what we want to discuss more as those involved the main variables of interest of this study. We summarize the four most commonly used performance measurements. Besides the "Other LP Type" category, endowments exhibit the highest IRR, the

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[3] We were initially concerned with the quality of the data as some LPs received more than 12 performance reports a year. Our concerns were however alleviated as we sought clarification from our data provider. We were informed that the valuations of unexited portfolio companies that appear in the fund/LP reports are the valuations reported by the GPs to the LPs. GPs are usually (depending on geography) required to value their holdings at least once a year (some do it much more frequently with varying levels of conservativeness) and this is reflected in the NAV and unrealized gains to the LPs. Such reporting behaviors are thus reflected how GPs report performances to LPs.

highest DPIs, the second lowest RVPIs, and the second highest total TVPIs.[4] We find similar evidence as in Lerner et al. (2007), and we demonstrate that endowments are relatively the best investors in the PE market.[5] On average, they exhibit significantly higher realized returns and significantly lower *un*realized returns than all other LPs. Due to a lack of observations of IRR measurements, we focus on those three valuation multiples in later sections. In the next column, we also summarize the reporting behavior from different LP types in terms of reporting frequency. We find new evidence that may help explain why endowments perform better than other LP types, which may also help address the so-called "Limited Partner Performance Puzzle" raised by Lerner et al. (2007). Endowments enjoy the highest reporting frequencies from their PE funds, an average of about 3 times over the course of a calendar year. This is significantly higher than all other LPs. We believe that higher performance reporting frequency can help reduce information asymmetries between GPs and LPs and serve as a proxy for better governance procedures between them.

We discuss this notion in more detail in later sections, and we provide robust results to confirm our findings. The next column summarizes our second main variable of interest to proxy for the information asymmetries in the performance reports. We created this variable under the notion that within RVPI reported, the residual value is an estimated fair value of the underlying portfolio investments and it is largely subject to PE fund managers' discretions even not manipulations. If such residual value makes up most of the component in the total value reported, then the inaccurate estimates drive the performance of GPs. Given GPs have relatively more information advantage about the portfolio firms invested and their actual performances with strategic exit plans, the higher the RVPI as a percentage of TVPI reported, the more information asymmetries are between GPs and LPs and thus more variability those valuation multiples may experience over time. We note that endowments

have the lowest percentage reported among all other LPs which means the information asymmetries in the performance reports are the lowest between endowments and their GPs. This is also a proxy for good governance between endowments and their GPs and such facts may explain the higher level of monitoring found by endowments, as well as another potential secret of their success.

Panel C of Table 2 presents the preliminary results regarding the implementation of FAS 157 and the associated possible impact will have on our main variables. In September 2006, the Financial Accounting Standards Board (FASB) changed the rules about NAV valuations, part of FAS 157 (ASC 820) requires fair-value reporting of balance sheet assets and all U.S. funds should comply by the end of 2008. In this way, it is important to take this regulation change as a consideration for our tests. Here we mainly present the means difference tests regarding reporting frequency and the RVPI as a percentage of TVPI reported. We constructed a dummy variable of post-2008 which equals one when the FAS 157 should have been implemented after year 2008 and equals zero otherwise. We restrict our subsample in the U.S. context by different LP types to further explore how such a regulation will actually change the reporting behaviors from PE fund managers given this regulation change. If all else equal, such a change should improve the disclosure quality and will have relatively bigger impact for those who have lower reporting frequencies. From our tests, we have found that the reporting frequency is significantly more after the FAS 157 implementation. But for the impact across different LP types, we did find that fund of funds, who seek much lower reporting frequency before the FAS 157 will have significant improvement, but for those LPs who had negotiated better reporting behavior, some of them decreased the reporting frequency, although such decreases are in trivial numbers. For the information asymmetries variable, we also find the similar results as presented for the reporting behavior, for example, insurance company will receive significantly improved-quality performance reports from fund managers. We also run several robustness checks regarding the FAS 157 implementation in the following regression analysis section and confirm that it will improve the disclosure quality from PE fund managers.

Table 3 presents simple correlations to highlight the relationships across the major variables. The correlations in Table 3 confirm the hypothetical view about the information asymmetries and reporting behavior at the fund level. It is clear that, when reporting frequency is higher, the information asymmetries decrease, and the same negative relationship also applies to endowments and legal environment. However, note that our correlations also highlight some potential collinearity issues across different explanatory variables, which we explore in our multivariate empirical tests in the next section.

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[4] Distributed value to paid-in ratio (DPI) is the ratio of distributions paid out to investors to the original invested capital and residual value to paid-in ratio (RVPI) which is the of remaining portfolio holdings as valued by the PE fund to the original invested capital per year. Total value to paid-in ratio (TVPI) is the sum of the DPI and RVPI of the PE fund which measures the total returns in each year.

[5] We realize that the relatively small number of endowments in our sample may be something of a concern. However, because the total of their observations is more than 6% of our entire sample, we do not believe this poses a serious problem. Note further that, in un-tabulated results, we performed a detailed analysis of the nine endowments, and we are certain our results are not caused by, nor do they suffer from, a bias toward the well-performing endowments in our sample. The top three performing endowments are quite different from the bottom three when sorting by characteristic. The detailed analysis is not included but is available upon request.

Table 1 Variable definitions and summary statistics

Variable name	Definition	Mean	Median	Standard deviation	Minimum	Maximum	Number of observations
Annual DPI multiples	The annualized Distribution to Paid-In (DPI) multiple, which is the average amount of capital that has been distributed back to limited partners as a ratio of total paid-in capital, usually stands as a proxy for realized returns in PE funds	0.510	0.15	1.00	0.00	32.41	60,934
Annual RVPI Multiples	The annualized Remaining Value to Paid-In (RVPI) multiple: which is the remaining value of a limited partner's fund commitment as a ratio of total paid-in capital, usually stands as a proxy for unrealized returns in PE funds	0.740	0.82	0.56	− 1.52	55.03	61,215
Annual TVPI multiples	The annualized Total Value to Paid-in-Capital (TVPI) multiple: which is the sum of the distributions and the remaining value of the limited partner's fund as a ratio of total paid-in capital, usually stands as a proxy for total returns in PE funds	1.251	1.06	1.07	− 1.52	101.00	61,215
Percentage of RVPI in TVPI	The percentage of RVPI in TVPI, or the remaining (residual) value as a component of the total value, as a proxy for information asymmetries between LPs and GPs	0.692	0.85	0.35	0.00	1.00	61,215
Reporting frequency	The ex-post examined reporting times within a year for a specific fund to a specific limited partner. Different PE funds have quite different reporting behavior to their limited partners, even the same fund will report quite differently within a year to their multiple LPs	2.185	2.00	1.34	1.00	12.00	61,215
GDP growth rate	Annual percentage growth rate of GDP at market prices based on constant local currency. Aggregates are based on constant 2010 U.S. dollars. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Source: https://data.worldbank.org/indicator	1.357	1.78	2.12	− 10.89	15.24	61,207
MSCI returns	The country-specific Morgan Stanley Capital International index return over the entire sample period from 2000–2012, a proxy for stock market conditions in each country	0.038	0.11	0.21	− 0.74	1.34	61,170

Table 1 (continued)

Variable name	Definition	Mean	Median	Standard deviation	Minimum	Maximum	Number of observations
Legality index	The weighted average index of the following factors (as per Berkowitz, Pistor and Richard 2003): efficiency of judicial system, rule of law, corruption, risk of expropriation, risk of contract repudiation, and shareholder rights (as per La Porta et al. 1998). Higher values indicate "better" legal systems	20.738	20.88	0.75	9.16	21.92	60,888
Log of fund size	The natural log of fund size, in $M	6.741	6.70	1.40	− 0.16	11.85	57,992
Fund age	The age of a PE fund (in years) which calculated by taking difference of fund reporting year minus the fund vintage year	5.100	4.00	4.67	0.00	36.00	56,997
Total investments per professional at GP	The total investments at GP divided by the professionals there to act as PE firm track record variable. Higher values indicate better PE firm track record	3.070	2.03	4.60	0.00	38.79	52,713
LTO	Hofstede's index of long-term vs. short-term orientation. This dimension associates the connection of the past with the current and future actions/challenges. Every society has to maintain some links with its own past while dealing with the challenges of the present and the future. Societies prioritize these two existential goals differently. Societies who score low on this dimension, for example, prefer to maintain time-honored traditions and norms while viewing societal change with suspicion. Those with a culture which scores high, on the other hand, take a more pragmatic approach: they encourage thrift and efforts in modern education to prepare for the future. In the business context, this dimension is referred to as "(short-term) normative versus (long-term) pragmatic" (PRA). Source: https://geert-hofstede.com/dimensions.html	30.070	25.69	11.47	20.40	100.00	61,171
Endowment dummy	A dummy variable equals to one for a LP type is Endowment	0.067	0.00	0.25	0.00	1.00	61,215
Public pension fund dummy	A dummy variable equals to one for a LP type is Public Pension Fund	0.692	1.00	0.46	0.00	1.00	61,215
Corporate pension dummy	A dummy variable equals to one for a LP type is Corporate Pension	0.003	0.00	0.06	0.00	1.00	61,215
Insurance company dummy	A dummy variable equals to one for a LP type is Insurance Company	0.222	0.00	0.42	0.00	1.00	61,215
Fund of funds dummy	A dummy variable equals to one for a LP type is Fund of Funds	0.010	0.00	0.10	0.00	1.00	61,215
Sovereign wealth fund dummy	A dummy variable equals to one for a LP type is Sovereign Wealth Fund	0.004	0.00	0.06	0.00	1.00	61,215

Table 1 (continued)

Variable name	Definition	Mean	Median	Standard deviation	Minimum	Maximum	Number of observations
Other limited partner type dummy	A dummy variable equals to one for a LP type is Other Limited Partner Type	0.001	0.00	0.04	0.00	1.00	61,215

This table provides definitions of the main variables in the dataset, the data sources, and summary statistics

Regression Analyses

Now that we have laid out some of the unique features and consistent findings from prior studies, we perform our regression analyses using standard OLS methods. We report double clustering model results by controlling individual GP funds, fund types, countries and years effects estimates in Tables 4 and 5. To address the potential endogeneity issues, we detailed our instrumental variable strategy in Table 5. We also perform several interaction and subsample tests as robustness checks before drawing our conclusions. Those reports are in Tables 6, 7, and 8.

What Factors Determine the Reporting Frequency?

In our main regression analyses, we first consider what factors drive the reporting frequency across PE funds to their investors. As there is no mandatory rule similar to the public equity market that listed firms should report quarterly or biannually as requested by the SEC or stock exchanges like NYSE, the reporting rules among GPs and LPs are typically agreed by the limited partnership contracts and LPs are entitled to at least one annual report. Thus, it is important to get the idea of the causality direction and relationship of the reporting frequency and performance measurements. The main regression models in Table 4 use the following specification:

$$\text{ReportFrequency}_{it} = \alpha + \beta_1 \text{DPI}_{it} + \beta_2 \text{RVPI}_{it} + \theta X_{it} + \varepsilon_{it}$$

X_{it} denotes control variables including GDP growth rates, stock market conditions, legal environments, fund and GP characteristics, LP types as well as one Hofstede's cultural dimension of LTO and ε is the error term. Most of the major variables are defined in Table 1. Note that there are many explanatory variables that we could have included but chose to exclude. The primary reasons for our parsimonious specification are as follows. First, the selected variables are plausibly pertinent to PE fund reporting frequency. Second, note that the excluded variables are highly collinear. Hence, any additional control variables for the available sets of countries and years would not be perfectly suitable without potentially introducing spurious results into the regressions. Examples

include some other cultural dimensions measured by Hofstede, as well as other legal and institutional variables. Our selection and reporting of variables were conducted to assess the factors that directly impact information asymmetries and reporting behaviors in PE funds.

Table 4 presents our test results with reporting frequency as a dependent variable and Models (1) and (2) are using full sample while Models (3) and (4) are using subsamples for all PE funds report more than once in a year. Our purpose here is to investigate what factors determine the reporting frequency and whether it is mainly required by different LPs. For those PE funds report more than once in a year, what other factors might drive such behaviors. All models in Table 4 return consistent and statistically significant coefficients on different LP types where only endowments are positively associated with reporting frequency implying that they will require relatively more performance reports from their GPs. The two performance variables of DPI and RVPI do not report significant results which alleviate some concerns regarding the driving force of reporting frequency is more performance related but not set by the limited partnership contracts. Besides these main discoveries we present in Table 4, we also find some other interesting findings: (1) for GPs residing in better developed economies and in better legal environments, LPs tend to require less frequent performance reports; (2) for GPs residing in countries sharing more long-term oriented cultures, their LPs seems to be more patient investors and request relatively less performance reports. In our subsample tests of Models (3) and (4), we expect the impact from our full sample tests will be more prominent and we find consistent results. We also find that more active GPs with more investments on hand will tend to provide more frequent performance reports which intuitively correct.

Will Higher Reporting Frequency Mitigate Information Asymmetries Between GPs and LPs?

In order to test our main hypothesis that higher reporting frequency is associated with lower information asymmetries in the performance reports, we first run a preliminary test following the below specification without introducing other control variables:

Table 2 Mean descriptive statistics by main characteristics

	Number of LPs	Year of establishment of PE investment program	Total assets under management (M$)	Annual commitments per PE fund (M$)	Annual contributions per PE fund (M$)	Annual distributions per PE fund (M$)	Number of funds per LP per year
Panel A: Descriptive statistics—mean characteristics of LPs, by type of LPs							
Endowment	9	1978	13,690.050	87.500	62.832	45.788	183.020
Public pension fund	162	1976	24,270.800	143.684	158.429	79.525	188.533
Corporate pension	1	1988	6824.013	12.693	12.693	1.499	39.737
Insurance company	296	1999	24,146.920	18.936	19.002	1.379	46.727
Fund of funds	10	1981	26,118.930	14.441	18.529	6.989	52.921
Sovereign wealth fund	2	1993	6678.412	19.390	19.542	5.442	81.907
Other LP type	11	1990	6461.832	180.087	179.572	82.262	18.375

	Number of funds	Fund size (M$)	IRR	DPI	RVPI	TVPI	Reporting frequency	Percentage of RVPI in TVPI	Number of LPs per fund
Panel B: Descriptive statistics—mean fund characteristics of LPs, by type of LPs									
Endowment	645	1290.525***	5.945***	0.812***	0.613***	1.426***	3.016***	0.577***	4.058***
Public pension fund	3660	2023.113***	5.114*	0.617***	0.685**	1.245***	2.285***	0.656**	6.155***
Corporate pension	80	921.882*		0.137***	0.872***	1.014***	1.026***	0.885***	5.380***
Insurance company	1266	2412.367***		0.115***	0.911***	1.026***	1.017***	0.906***	9.064***
Fund of funds	255	2534.937***	3.755	0.473***	1.470***	2.257***	1.155***	0.799***	5.102***
Sovereign wealth fund	128	692.466***	3.281	0.516***	0.605	1.119***	1.245***	0.638**	3.789
Other LP type	50	262.333***	21.188***	0.982	0.572	1.506	1.196***	0.506	1.489***

	Reporting frequency			Percentage of RVPI in TVPI		
	Pre FAS 157	Post FAS 157	Difference	Pre FAS 157	Post FAS 157	Difference
Panel C: Descriptive statistics—mean characteristics of reporting frequencies and percentage of RVPI in TVPI, by FAS 157 implementation in US						
All LPs	2.158	2.301	0.142***	0.697	0.686	− 0.012***
Endowment	2.827	3.122	0.295***	0.576	0.578	0.002
Public pension fund	2.630	2.490	− 0.140***	0.638	0.624	− 0.013***
Corporate pension	1.037	1.025	− 0.012	0.846	0.907	0.061**
Insurance company	1.021	1.016	− 0.006**	0.950	0.887	− 0.062***
Fund of funds	1.005	1.527	0.522***	0.850	0.726	− 0.123***

This table provides the main mean descriptive statistics across different main characteristics by LP types and PE funds. The table also provides the two-sample means test results between major characteristics groups in our data. The means test is a two-sample t-test with equal variance

*, **, ***Significant at the 10%, 5% and 1% levels, respectively

$$\frac{\text{RVPI}}{\text{TVPI}}_{it} = \alpha + \beta_1 \text{Report Frequency}_{it}$$
$$+ \beta_2 \text{Endowments Dummy}_{it}$$
$$+ \beta_3 \text{Legality Index}_{it} + \varepsilon_{it}$$

We use double clustering OLS models by controlling fund types, individual funds, countries, and years fixed effects but without other facets of control variables. In this way, we can get a better picture what factors will affect the information asymmetry levels presented in the performance reports. Model (1) in Table 5 indicates that higher reporting frequency will reduce information asymmetries significantly

Table 3 Correlations

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]
Annual TVPI multiples	1.00										
Percentage of RVPI in TVPI	− 0.34*	1.00									
Reporting frequency	0.03*	− 0.18*	1.00								
GDP growth rate	0.05*	− 0.05*	0.02*	1.00							
MSCI returns	− 0.01*	− 0.03*	− 0.03*	0.03*	1.00						
Legality index	0.02*	− 0.03*	0.00	− 0.17*	-0.05*	1.00					
Log of fund size	− 0.07*	0.20*	− 0.02*	− 0.06*	0.01*	0.02*	1.00				
Fund age	0.30*	− 0.81*	0.18*	0.05*	0.01*	0.03*	− 0.30*	1.00			
Total investments per professional at GP	0.02*	− 0.06*	0.04*	0.01	0.01*	0.06*	− 0.07*	0.08*	1.00		
LTO	0.01*	0.03*	− 0.03*	0.11*	0.01*	− 0.29*	0.07*	− 0.03*	− 0.18*	1.00	
Endowment dummy	0.04*	− 0.09*	0.17*	0.04*	0.01	0.01*	− 0.11*	0.11*	0.04*	− 0.04*	1.00

This table provides correlations among the main regression variables in the dataset

*Significant at least the 5% level of significance

Table 4 Regression models for the determinants of report frequency

	Model (1)		Model (2)		Model (3)		Model (4)	
	Report frequency (full)		Report frequency (full)		Report frequency (> 1)		Report frequency (> 1)	
	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic
GDP growth	− 0.0567	− 2.77***	− 0.0534	− 2.63***	− 0.0792	− 1.44	− 0.0776	− 1.44
MSCI returns	− 0.2861	− 1.10	− 0.2730	− 1.08	− 0.8875	− 1.58	− 0.8782	− 1.59
Legality index	− 0.0794	− 0.93	− 0.0718	− 4.77***	− 0.1244	− 1.53	− 0.0681	− 3.19***
LTO			− 0.0035	− 2.74***			− 0.0044	− 3.52***
LN of fund size	− 0.0068	− 0.21	− 0.0076	− 0.25	− 0.0682	− 1.46	− 0.0671	− 1.49
Total investments per professional	0.0049	1.33	0.0053	1.49	0.0085	1.97**	0.0088	2.01**
Fund age	0.0022	0.13	0.0019	0.11	− 0.0288	− 1.13	− 0.0287	− 1.14
DPI	− 0.0330	− 1.40	− 0.0342	− 1.44	0.0347	0.93	0.0354	0.95
RVPI	− 0.0164	− 0.43	− 0.0155	− 0.40	− 0.0493	− 0.48	− 0.0474	− 0.46
Endowments	0.5260	3.07***	0.5836	3.07***	0.2995	3.75***	0.3048	3.75***
Corporate pension	− 1.5729	− 8.75***	− 1.5230	− 8.86***	− 1.1435	− 3.79***	− 1.1429	− 3.78***
Fund of funds	− 1.3290	− 8.46***	− 1.3060	− 8.38***	− 1.1184	− 3.60***	− 1.1074	− 3.53***
Insurance company	− 1.5843	− 9.71***	− 1.5529	− 9.71***	− 1.4125	− 7.26***	− 1.4102	− 7.17***
Sovereign wealth funds	− 1.4387	− 6.27***	− 1.3811	− 6.20***	− 1.5600	− 4.89***	− 1.5385	− 4.93***
Other LP type	− 1.4816	− 6.25***	− 1.4552	− 4.80***	− 1.0526	− 2.41**	− 1.4499	− 5.14***
Fund types	Yes		Yes		Yes		Yes	
GP fund effects	Yes		Yes		Yes		Yes	
Country effects	Yes		No		Yes		No	
Year effects	Yes		Yes		Yes		Yes	
Number of observations	49,966		49,966		26,896		26,896	
R^2	0.2626		0.2606		0.0952		0.0934	

This table presents the double clustering model results by controlling individual GP funds, fund types, countries and years effects estimates of the determinants of report frequency. All variables are as defined in Table 1

*, **, ***Significant at the 10%, 5% and 1% levels, respectively

with a pronounced economic effect: a one standard deviation increase in reporting frequency will reduce the information asymmetries in performance reports by 14.7% relative to the mean value of all country-years. In addition, better legal environments and endowments will also be associated with significantly lower information asymmetries. Combined the results from Table 4, we can find that when GPs report more frequently, their performance reports will suffer less information asymmetries. Moreover, as endowments will require more performance reports, they tend to enjoy less information asymmetries and such results could help us confirm that reporting frequency is a good proxy for high-quality governance and monitoring efforts by endowments to request more frequent reporting in their contract terms. Better legal environments will also be an important factor which we cannot ignore.

However, our setting will also raise a natural question about endogeneity issues. Such an issue might arise from the selection criteria of endowments that are driving the demand for higher reporting frequency and thus reduce the

information asymmetries in the performance reports. It is also possible that some omitted variables could simultaneously drive endowments' choices and information asymmetries. In addition, when adding new control variables into the model specification, it will also raise the chance for interacting or mitigating factors from some of the variables as well as the possibility of collinearity issues. Therefore, we designed a two-stage regression model with an instrumental variable to further address this potential issue.

For the instrumental variable (IV), we first tracked the voluntary switches of reporting frequency within each funding commitment contract by each GP and created a dummy variable which highlights those unchanged ones where coded as one and otherwise zero. The idea is to identify those PE fund managers who will voluntarily switch their reporting frequency as a treatment group to compare those who do not switch. If it is a good instrument then it should be correlated with the endowments' selection criteria but uncorrelated with our information asymmetry variable (Angrist and Krueger 2001), because if they do not switch,

Table 5 Regression models for reporting frequency impact on information asymmetries in PE

	Model (1)		Model (2)—1st Stage		Model (3)—2nd Stage		Model (4)—2nd Stage	
	IA—% of RVPI		Endowments		IA—% of RVPI		IA—% of RVPI	
	Coefficient	t-statistic	Coefficient	z-score	Coefficient	z-score	Coefficient	z-score
Endowments	− 0.0423	− 5.22***			− 0.6241	− 41.99***	0.0254	1.57
Report frequency	− 0.0760	− 4.14***	0.2109	30.36***	− 0.0178	− 7.14***	− 0.0092	− 6.06***
Legality index	− 0.0038	− 1.66*	0.0722	4.53***	− 0.0015	− 0.18	0.0027	0.64
GDP growth			0.0274	5.41***			− 0.0008	− 1.05
MSCI returns			0.0744	1.46			0.0271	5.70***
LN of fund size			− 0.1225	− 16.07***			− 0.0084	− 2.61***
Total investments per professional			0.0049	2.31**			0.0010	1.13
Fund age			0.0219	10.33***			− 0.0630	− 57.63***
IV-no frequency change dummy			0.1075	5.33***				
Fund types	Yes		No		No		No	
GP fund effects	Yes		Yes		Yes		Yes	
Country effects	Yes		No		No		No	
Year effects	Yes		No		No		No	
Number of observations	60,884		39,832		39,832		39,832	
R^2/Pseudo R^2	0.0643		0.0793					
Wald X^2					1812.34 (df = 3)		3847.01 (df = 8)	

This table first presents the double clustering model results by controlling individual funds, fund types, countries and years effects estimates of the impact of report frequency on the information asymmetries variable. The following models present the two-stage regression model with the 1st stage presenting the selection criteria by endowments on different facets of characteristics with instrumental variable and the 2nd stage model present the impact of report frequency on the information asymmetries variable as Model (1). All other variables are as defined in Table 1

*, **, ***Significant at the 10%, 5% and 1% levels, respectively

the information content in their reports might be less likely to change. Our following models in Table 5 use the below specification:

1st Stage：$\mathrm{Pr}\,(\mathrm{Endowments\ Dummy} = 1)$
$$= \alpha + \beta_1 \mathrm{Report\ Frequency}_{it} + \beta_2 IV_{it} + \theta X_{it} + \varepsilon_{it}$$

2nd Stage：$\dfrac{\mathrm{RVPI}}{\mathrm{TVPI}}_{it} = \alpha + \beta_1 \mathrm{Report\ Frequency}_{it}$
$$+ \beta_2 \mathrm{Endowments\ Dummy}_{it} + \theta X_{it} + \varepsilon_{it}$$

Our 1st stage model (Model (2)) confirms our proposition and reveals the selection criteria by endowments as compared with other LPs which might shed some more light on their superior performance in the PE market. They tend to invest more in relatively smaller-sized mature PE funds with more active managers and report more frequently, and those funds are more likely to reside in countries with better economic development and legal environments. More

specifically, the instrumental variable returns significant positive coefficients indicating that those PE funds invested by endowments are less likely to switch their reporting frequency within each funding commitment contract.

In our 2nd stage regression models, we use the instrumented results from our 1st stage model and still find both reporting frequency and endowments return significant negative results which confirm our H1 (Model (3)) and minimize the possible endogeneity concerns. When we add more control variables in the 2nd stage model as presented in Model (4), we still find that reporting frequency is a good indicator to reduce the information asymmetries with sizable economic significance: a one standard deviation increase in reporting frequency will reduce the information asymmetries in the performance reports by 3.4% (Model (3)) and 1.8% (Model (4)), respectively. We also find that larger-sized PE funds are associated with less information asymmetries and fund age is another critical factor to consider as younger

Table 6 Interaction models for reporting frequency impact on information asymmetries in PE

	Model (1)		Model (1)		Model (3)		Model (4)	
	IA—% of RVPI		IA—% of RVPI		IA—% of RVPI (report frequency > 1)		IA—% of RVPI (report frequency > 1)	
	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic
Report frequency	− 0.0481	− 2.13**	− 0.0331	− 0.88	− 0.0263	− 0.97	− 0.0450	− 1.25
Endowments	− 0.7373	− 2.28**	− 0.5783	− 2.01**	− 1.2472	− 2.51**	− 0.9203	− 2.64***
Legality index	− 0.0125	− 2.60***	− 0.0015	− 0.36	− 0.0090	− 1.51	− 0.0029	− 0.47
Report frequency * endowments	0.2795	3.33***	0.1684	2.19**	0.4446	2.93***	0.2603	2.27**
Report frequency * legality index	0.0020	1.97**	0.0013	0.74	0.0006	0.47	0.0015	0.94
Endowments * legality index	0.0340	2.07**	0.0263	1.78*	0.0557	2.14**	0.0400	2.14**
Report frequency * endowments * legality index	− 0.0125	− 3.23***	− 0.0072	− 2.04**	− 0.0197	− 2.68***	− 0.0109	− 2.00**
GDP growth	− 0.0016	− 0.52	− 0.0011	− 0.36	− 0.0004	− 0.09	0.0002	0.04
MSCI returns	0.0348	1.76*	0.0375	1.97**	0.0230	0.91	0.0243	0.96
LTO			0.0000	0.11			− 0.0003	− 0.60
LN of fund size	0.0054	1.58	0.0047	1.37	0.0104	2.05**	0.0092	1.86*
Total investments per professional	− 0.0008	− 1.09	− 0.0007	− 1.03	− 0.0009	− 1.04	− 0.0009	− 1.03
Fund age	− 0.0622	− 57.28***	− 0.0624	− 57.14***	− 0.0635	− 48.36***	− 0.0637	− 48.40***
Fund types	Yes		Yes		Yes		Yes	
GP fund effects	Yes		Yes		Yes		Yes	
Country effects	Yes		No		Yes		No	
Year effects	Yes		Yes		Yes		Yes	
Number of observations	51,128		51,128		27,827		27,827	
R^2	0.5225		0.5215		0.4724		0.4713	

This table first presents the double clustering interaction model results by controlling individual funds, fund types, countries and years effects estimates of the impact of report frequency on the information asymmetries variable with all control variables included. All other variables are as defined in Table 1

*, **, ***Significant at the 10%, 5% and 1% levels, respectively

funds are just established, and their information asymmetries levels tend to be the highest and will reduce when portfolios are continuously divested.

Can Reporting Frequency, Legal Environment and Endowments Jointly Mitigate Information Asymmetries Between GPs and LPs?

After using instrumental variable tests to alleviate potential concerns about endogeneity and selection biases in our models, we continue to perform several additional tests to further support our propositions. As discussed in the previous subsections, as we introduce more control variables in the model, there could be some interacting and mitigating effect from those variables of each other that reduce the model explanatory power. In our following tests of Table 6, we use a triple interaction model to specifically focus on the mitigating effect from endowments with reporting frequency and legal environments on the level of information asymmetries in the performance reports. Our model specification is as follows:

$$
\begin{aligned}
\underline{\text{RVPI}}\text{TVPI}_{it} = {} & \alpha + \beta_1 \text{ Report Frequency}_{it} \\
& + \beta_2 \text{ Endowments Dummy}_{it} \\
& + \beta_3 \text{ Legality Index}_{it} \\
& + \beta_4 \text{ Report Frequency}_{it} \\
& * \text{ Endowments Dummy}_{it} \\
& + \beta_5 \text{ Legality Index}_{it} \\
& * \text{ Endowments Dummy}_{it} \\
& + \beta_6 \text{ Report Frequency}_{it} * \text{ Legality Index}_{it} \\
& + \beta_7 \text{ Report Frequency}_{it} \\
& * \text{ Endowments Dummy}_{it} \\
& * \text{ Legality Index}_{it} + \theta X_{it} + \varepsilon_{it}
\end{aligned}
$$

Such model specification can help us understand the mitigating effects jointly affect our information asymmetry variable and we will focus on the sign of β_7 and expect the sign to be significantly negative.

Our models in Table 6 confirm this proposition as well as our H2, that when endowments invest in PE funds residing

Table 7 Regression models for reporting frequency impact on information asymmetries in PE—subsamples by fund age

	Model (1)		Model (2)	
	Fund age below median		Fund age above median	
	IA—% of RVPI		IA—% of RVPI	
	Coefficient	t-statistic	Coefficient	t-statistic
Report frequency	− 0.0377	− 3.50***	− 0.1346	− 1.90*
Endowments	− 0.3910	− 1.59	− 2.4126	− 2.86***
Legality index	− 0.0081	− 2.98***	− 0.0394	− 2.60***
Report frequency * endowments	0.2352	2.56**	0.4123	1.58
Report frequency * legality index	0.0019	3.47***	0.0060	1.85*
Endowments * legality index	0.0159	1.51	0.1150	2.79***
Report frequency * endowments * legality index	− 0.0097	− 4.13***	− 0.0193	− 1.48
GDP growth	− 0.0024	− 1.25	0.0060	1.31
MSCI returns	0.0074	0.69	0.0754	1.64
LN of fund size	0.0049	1.72*	0.0047	0.70
Total investments per professional	0.0000	− 0.02	− 0.0014	− 1.38
Fund age	− 0.0374	− 10.72***	− 0.0520	− 15.67***
Fund types	Yes		Yes	
GP fund effects	Yes		Yes	
Country effects	Yes		Yes	
Year effects	Yes		Yes	
Number of observations	30,206		20,922	
R^2	0.0475		0.4588	

This table first presents the double clustering interaction model results by controlling individual funds, fund types, countries and years effects estimates of the impact of report frequency on the information asymmetries variable with all control variables included. All other variables are as defined in Table 1

*, **, ***Significant at the 10%, 5% and 1% levels, respectively

Table 8 DiD regression models for FAS157 impact on information asymmetries in PE

| | Model (1) | | Model (2) | |
| | IA—% of RVPI | | IA—% of RVPI | |
	Coefficient	t-statistic	Coefficient	t-statistic
FAS 157 dummy	0.1299	8.14***	0.0556	2.23**
Voluntary increase vs. decrease report frequency dummy	0.2972	7.74***	0.2891	7.92***
Voluntary increase vs. decrease report frequency dummy * FAS 157 dummy	− 0.2600	− 6.27***	− 0.2411	− 5.73***
Controls	No		Yes	
LP types	Yes		Yes	
Fund types	Yes		Yes	
GP fund effects	Yes		Yes	
Year effects	Yes		Yes	
Number of observations	17,540		15,124	
R^2	0.0676		0.1459	

This table first presents the double clustering DiD model results by controlling individual funds, fund types, countries and years effects estimates of the impact of report frequency on the information asymmetries variable with all control variables included. All other variables are as defined in Table 1

*, **, ***Significant at the 10%, 5% and 1% levels, respectively

in better legal environments and request more performance reports, the information asymmetry level in those reports will be significantly lower. By analyzing both the full sample, and those subsamples excluding PE funds only reporting once a year, we find consistently robust results. And by controlling the fund age effect in every model specification which could capture not only the maturity of the fund but also their vintage year and investment timing effect, we provide relatively robust results to support our proposition.

However, another concern that might be raised is that younger-aged funds usually have much more *un*realized or *un*exited investments as compared with more mature funds that approach the end of their limited partnership term. In this regard, the information asymmetry level is naturally high during the earlier life of the fund and will be consistently reduced over the life of funds. We thus consider whether the mitigating effect would be different for mature funds and younger funds. We further divide our sample by the median fund age of four and perform our robustness checks. In our Table 7, we use the same model specification as we used in Table 6 and we find the mitigating effects on information asymmetries are more pronounced for funds aged below four or who are much younger in our sample and we cannot find such mitigating effects for the other group. By controlling the effect from fund age, we still find that when endowments invest in PE funds residing in better legal environments and request more performance reports, the information asymmetries level in those reports will be significantly lower, especially for those much younger funds. This result also echoes our view that reporting frequency could be a good governance tool to address the potential agency problems between GPs and LPs. Endowments is a good example for other LPs to learn from.

To further clarify these explanations, Fig. 1a–d present the information asymmetries variable, reporting frequency, and performance measurements trends over the 10-year fund life period. Compared with the two other major LP types, public pension funds and insurance companies, endowments consistently perform the best over fund life across those four main characteristics.

Figure 1a shows that endowments and public pension funds tend to receive performance reports with consistently lower information asymmetries over the years while insurance companies do not present such a trend. In Fig. 1b, we note that, over the life of a fund, endowments' reporting frequencies are consistently the highest, followed by public pension funds and insurance companies. The better governance role between endowments and their PE fund managers is therefore obvious.

In Fig. 1c, d, which present the trends on the two main performance measurements, we observe that, in terms of the realized returns of DPI multiples, over the fund life,

endowments and public pension funds increase their investment efficiency in PE, with endowments regaining a relatively better position. In terms of *un*realized returns of RVPI multiples, we find that, over the fund life, the public pension funds and endowments all exit their PE investments efficiently with a declining slope. Insurance companies perform much worse in PE investments than the other two LP types.

Will FAS 157 have any Impact on the Reporting Frequency and Information Asymmetries?

In Table 2 Panel C, we have shown that after the FAS 157 implementation in the U.S., the overall reporting frequency increased, and the information asymmetry level decreased. However, we still find such changes suffered some variability across different LPs. We thus designed a new difference-in-differences (DiD) test to find out whether FAS 157 will have any impact on the information asymmetry level given the changes in those PE funds on reporting behaviors. Our model specification is presented below:

$$\frac{\text{RVPI}}{\text{TVPI}}_{\text{it}} = \alpha + \beta_1 \text{ FAS157 Dummy}_{\text{it}}$$
$$+ \beta_2 \text{ Frequency Change Dummy}_{\text{it}}$$
$$+ \beta_3 \text{ FAS157 Dummy}_{\text{it}}$$
$$* \text{ Frequency Change Dummy}_{\text{it}}$$
$$+ \theta X_{\text{it}} + \varepsilon_{\text{it}}$$

Similar to the framework of Agrawal (2013), the coefficient β_3 is a DiD estimate of the effect of FAS 157 implementation on the dependent variable. Following our instrumental variable creation, the Frequency Change Dummy is coded as one when any fund voluntarily switches to increase the reporting frequency and equals zero when any fund voluntarily switches to decrease the reporting frequency. Please note that within each funding commitment contract, funds barely switch their reporting frequency, therefore any changes could be attributed to exogenous event like regulation change and are subject to some more attention. We thus expect to find significantly negative coefficient on β_3 which helps us to understand the impact from FAS 157 implementation on information asymmetries in the performance reports from GPs to LPs.

Our results in Table 8 confirm our proposition that for those funds voluntarily switching to report more after the FAS 157 implementation, the information asymmetry level will be lower. This is not surprising and intuitively makes sense: if a fund manager is willing to switch and increase his performance reporting frequency as a result of the regulation change like FAS 157 to encourage more market-based fair valuations on illiquid assets remaining in their portfolio, those LPs would receive relatively more accurate
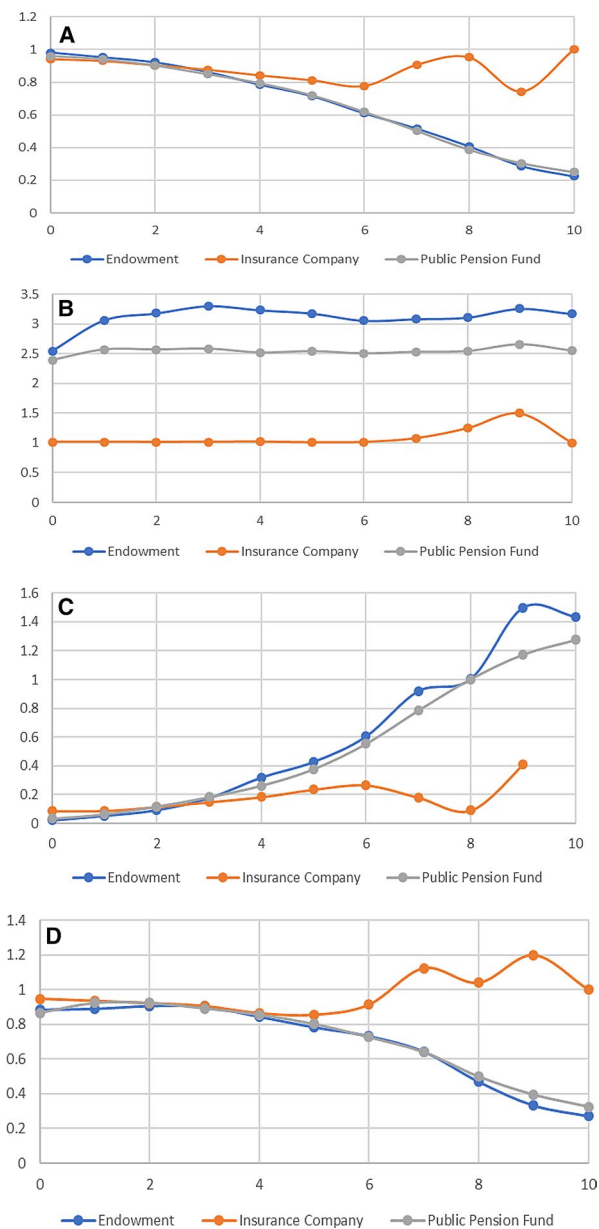
Fig. 1 **a** RVPI as % of TVPI over fund life. **b** Reporting frequency over fund life. **c** DPI over fund life. **d** RVPI over fund life

valuation and the performance multiples from those reports thus reduce the information asymmetries between those two parties. Our results might also contribute to the debate about FAS 157 as a controversial rule in the PE market. But we have to admit that our FAS 157 dummy variable construction could be coincide with the recent global financial crisis period which might reduce some explanatory power of our models. Since we only compare those funds with positive or negative changes in their reporting frequency and teasing out those unchanged ones, it will alleviate some concerns, but we would still accept it as a limitation for our study.

Conclusions

Using comprehensive PE returns data from PitchBook, which comprise 4548 PE funds from 42 countries spanning the 2000 to 2012 period, we find that higher reporting frequency is associated with lower information asymmetries in the performance reports from PE fund managers to institutional investors. We also find that endowments are systematically associated with less reported *un*realized returns as a percentage of total returns generated from PE funds. Moreover, endowments receive more performance reports from their PE funds, implying more stringent governance even when investing in countries with strong legal environments. These findings persist after controlling for various institutional and GP characteristics and are robust to several adjustments for endogeneity concerns. We believe our analysis of financial reporting behaviors from an arguably less-regulated set of financial intermediaries (as compared to mutual fund and even hedge fund managers) is an interesting contribution to the finance, accounting and business ethics literature on financial reporting and disclosure quality.

However, our study is not without limitations. Perhaps the most notable one is that the PitchBook dataset and our empirical tests do not enable a perfect assessment of causality as we do not have a natural experiment that affords a clearly exogenous test. This database also has some potential shortcomings such as backfill bias that those poorly performing funds might simply not report at all and the pension funds pressure can also create a bias against non-disclosure. Having all those obstacles overcome would facilitate future research on this topic.

Overall, we believe our findings are useful for policymakers and for market monitors. Although the PE market is not subject to mandatory disclosure regulation yet, the contract terms are nevertheless subject to corporate laws. Reporting frequency can act as a good governance and monitoring effort from LPs by implementing higher frequency terms into their contracts. We believe that, by requiring or recommending stronger standards, the efficiency of capital investments will increase because possible performance overstatement and information asymmetry will be reduced, and the negative impact on reputation will be reduced as well.

Compliance with Ethical Standards

References

Admati, A., & Pfleiderer, P. (2000). Forcing firms to talk: Financial disclosure regulation and externalities. *The Review of Financial Studies, 13*(3), 479–519.

Agrawal, A. (2013). The impact of investor protection law on corporate policy and performance: Evidence from the blue-sky laws. *Journal of Financial Economics, 107*(2), 417–435.

Akerlof, G. (1970). The market for lemons: Quality uncertainty and the market mechanism. *Quarterly Journal of Economics, 84*, 488–500.

Amit, R., Brander, J., & Zott, C. (1998). Why do venture capital firms exist? Theory and Canadian evidence. *Journal of Business Venturing, 13*(6), 441–466.

Angrist, J., & Krueger, A. (2001). Instrumental variables and the search for identification: From supply and demand to natural experiments. *Journal of Economic Perspectives, 15*(4), 69–85.

Armstrong, C., Davila, T., & Foster, G. (2005). Venture-backed private equity valuation and financial statement information. *Review of Accounting Studies, 11*, 119–135.

Barber, B., & Wang, G. (2013). Do (some) university endowments earn alpha? *Financial Analyst Journal, 69*(5), 26–44.

Benabou, R., & Laroque, G. (1992). Using privileged information to manipulate markets: Insiders, gurus and credibility. *Quarterly Journal of Economics, 107*(3), 921–958.

Berkowitz, D., Pistor, K., & Richard, J. (2003). Economic development, legality, and the transplant effect. *European Economic Review, 47*, 165–195.

Beuselinck, C., Deloof, M., & Manigart, S. (2008). Private equity investments and disclosure policy. *European Accounting Review, 17*(4), 607–639.

Beuselinck, C., Deloof, M., & Manigart, S. (2009). Private equity involvement and earnings quality. *Journal of Business Finance and Accounting, 36*, 587–615.

Bonnet, C., & Wirtz, P. (2012). Raising capital for rapid growth in young technology ventures: When business angels and venture capitalists coinvest. *Venture Capital, 14*(2–3), 91–110.

Brown, G., Gredil, O., & Kaplan, S. (2019). Do private equity funds manipulate reported returns? *Journal of Financial Economics, 132*(2), 267–297.

Brown, G., Harris, R., Jenkinson, T., Kaplan, S., & Robinson, D. (2015). What do different commercial data sets tell us about private equity performance? Working paper.

Brown, J., Dimmock, S., Kang, J., & Weisbenner, S. (2014). How university endowments respond to financial market shocks: Evidence and implications. *American Economic Review, 104*(3), 931–962.

Brown, K., Garlappi, C., & Tiu, C. (2010). Asset allocation and portfolio performance: Evidence from university endowment funds. *Journal of Financial Markets, 13*(2), 268–294.

Burton, J., & Scherschmidt, R. (2004). First-time venture fundraising: Challenges and best practices. *Journal of Private Equity, 8*, 9–21.

Cheng, E., & Courtenay, S. (2006). Board composition, regulatory regime, and voluntary disclosure. *The International Journal of Accounting, 41*, 262–289.

Cumming, D., & Zhang, M. (2019). Angel Investors around the World. *Journal of International Business Studies, 50*(5), 692–719.

Cumming, D. (2005). Agency costs, institutions, learning and taxation in venture capital contracting. *Journal of Business Venturing, 20*, 573–622.

Cumming, D., & Dai, N. (2010). Hedge fund regulation and misreported returns. *European Financial Management, 16*(5), 829–857.

Cumming, D., & Johan, S. (2007). Regulatory harmonization and the development of private equity markets. *Journal of Banking and Finance, 31*, 3218–3250.

Cumming, D., & Johan, S. (2013). *Venture capital and private equity contracting: An international perspective* (2nd ed.). Waltham: Elsevier Science Academic Press.

Cumming, D., & Walz, U. (2010). Private equity returns and disclosure around the world. *Journal of International Business Studies, 41*, 727–754.

Cumming, D., Dai, N., & Johan, S. (2013). *Hedge fund governance, regulation and performance around the world*. Oxford: Oxford University Press.

Cumming, D., Fleming, G., & Suchard, J. (2005). Venture capitalist value-added activities, fundraising and drawdowns. *Journal of Banking and Finance, 29*, 295–331.

Cumming, D., Schmidt, D., & Walz, U. (2010). Legality and venture capital governance around the world. *Journal of Business Venturing, 25*(1), 54–72.

D'Adduzio, J., Koo, D., Ramalingegowda, S., & Yu, Y. (2018). Financial reporting frequency and investor myopia. Working paper.

Dahiya, S., & Yermack, D., 2020. Investment returns and distribution policies of non-profit endowment funds. SSRN. Retrieved from https://ssrn.com/abstract=3291117.

DaRin, M., & Phalippou, L. (2017). The importance of size in private equity: Evidence from a survey of limited partners. *Journal of Financial Intermediation, 31*, 64–76.

Darrough, M., & Stoughton, N. (1990). Financial disclosure policy in an entry game. *Journal of Accounting and Economics, 12*(1–3), 219–243.

De Bettignies, J., & Brander, J. (2007). Financing entrepreneurship: Bank finance versus venture capital. *Journal of Business Venturing, 22*(6), 808–832.

Dimmock, S. (2012). Background risk and university endowment funds. *Review of Economics and Statistics, 94*(3), 789–799.

Dimmock, S., Wang, N., & Yang, J. (2019). The endowment model and modern portfolio theory. SSRN. Retrieved from https://ssrn.com/abstract=3330919.

Eisenhardt, K. (1989). Agency theory: An assessment and review. *Academy of Management Review, 14*, 57–74.

Elayan, F., Li, J., & Liu, Z. (2016). Changes in the covalence ethical quote, financial performance and financial reporting quality. *Journal of Business Ethics, 134*(3), 369–395.

Ernstberger, J., Link, B., Stich, M., & Vogler, O. (2017). The real effects of mandatory quarterly reporting. *The Accounting Review, 92*(5), 33–60.

Fama, E. (1980). Agency problems and the theory of the firm. *Journal of Political Economy, 88*, 288–307.

Ferran, E. (2011). After the crisis: The regulation of hedge funds and private equity in the EU. *European Business Organization Law Review, 12*(3), 379–414.

Frecka, T. (2008). Ethical issues in financial reporting: Is intentional structuring of lease contracts to avoid capitalization unethical? *Journal of Business Ethics, 80*(1), 45–59.

Fried, J., & Ganor, M. (2006). Agency costs of venture capital control in startups. *New York University Law Review, 81*, 967–1025.

Fu, R., Kraft, A., & Zhang, H. (2012). Financial reporting frequency, information asymmetry, and the cost of equity. *Journal of Accounting and Economics, 54*(2–3), 132–149.

Fuchs, F., Füss, R., Jenkinson, T., & Morkoetter, S. (2019). Winning a deal in private equity: Do educational ties matter? Working paper.

Getmansky, M., Lo, A., & Makarov, I. (2004). An econometric model of serial correlation and illiquidity in hedge fund returns. *Journal of Financial Economics, 74*, 529–609.

Gigler, F., Kanodia, C., Sapra, H., & Venugopalan, R. (2014). How frequent financial reporting can cause managerial short-termism: An analysis of the costs and benefits of increasing reporting frequency. *Journal of Accounting Research, 52*(2), 357–387.

Goktan, M., & Muslu, V. (2018). Benefits of public reporting: Evidence from IPOs backed by listed private equity firms. *Journal of Corporate Finance, 50*, 669–668.

Gottschalg, O., & Phalippou, L. (2006). The performance of private equity funds. In Paris, H. (Ed.), *Les Cahiers de Recherche*, 852.

Hain, D., Johan, S., & Wang, D. (2016). Determinants of cross-border venture capital investments in emerging and developed economies: The effects of relational and institutional trust. *Journal of Business Ethics, 138*(4), 743–764.

Hand, J. (2005). The value of relevance of financial statements within and across private and public equity markets. *The Accounting Review, 80*, 613–648.

Harris, R., Jenkinson, T., & Kaplan, S. (2014). Private equity performance: What do we know? *Journal of Finance, 69*(5), 1851–1882.

Harris, R., Jenkinson, T., & Kaplan, S. (2016). How do private equity investments perform compared to public equity? *Journal of Investment Management, 14*(3), 14–37.

Hayes, R., & Lundholm, R. (1996). Segment reporting to the capital market in the presence of a competitor. *Journal of Accounting Research, 34*(2), 261–279.

Healy, P., & Palepu, K. (2001). Information asymmetry, corporate disclosure, and the capital markets: A review of the empirical disclosure literature. *Journal of Accounting and Economics, 31*, 405–440.

Higashide, H., & Birley, S. (2002). The consequences of conflict between the venture capitalist and the entrepreneurial team in the United Kingdom from the perspective of the venture capitalist. *Journal of Business Venturing, 17*(1), 59–81.

Huang, W., Li, J., & Zhang, Q. (2019). Information asymmetry, legal environment, and family firm governance: Evidence from IPO underpricing in China. *Pacific-Basin Finance Journal, 51*, 155–170.

Hughes, P., & Sankar, M. (2006). The quality of discretionary disclosure under litigation risk. *Journal of Accounting, Auditing & Finance, 21*(1), 55–81.

Jääskeläinen, M., Maula, M., & Seppä, T. (2006). Allocation of attention to portfolio companies and the performance of venture capital firms. *Entrepreneurship Theory and Practice, 30*(2), 185–206.

Jensen, M., & Meckling, W. (1976). Theory of firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics, 3*, 305–360.

Jones, C., & Rhodes-Kropf, M. (2003). The price of diversifiable risk in venture capital and private equity. Working paper, Columbia University.

Kandel, E., Leshchinskii, D., & Yuklea, H. (2011). VC funds: Aging brings myopia. *Journal of Financial and Quantitative Analysis, 46*(2), 431–457.

Kanniainen, V., & Keuschnigg, C. (2003). The optimal portfolio of start-up firms in venture capital finance. *Journal of Corporate Finance, 9*(5), 521–534.

Kanniainen, V., & Keuschnigg, C. (2004). Start-up investment with scarce venture capital support. *Journal of Banking and Finance, 28*(8), 1935–1959.

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

Katz, S. (2009). Earnings quality and ownership structure: The role of private equity sponsors. *The Accounting Review, 84*(3), 623–658.

Kraft, A., Vashishtha, R., & Venkatachalam, M. (2018). Frequent financial reporting and managerial myopia. *The Accounting Review, 93*(2), 249–275.

Kusnadi, Y., Leong, K., Suwardy, T., & Wang, J. (2016). Audit committees and financial reporting quality in Singapore. *Journal of Business Ethics, 139*(1), 197–214.

La Porta, R., Lopes-de-Silanes, F., Shleifer, A., & Vishny, R. (1998). Law and finance. *Journal of Political Economy, 106*, 1113–1155.

La Porta, R., Lopes-de-Silanes, F., Shleifer, A., & Vishny, R. (2006). What works in securities laws? *Journal of Finance, 61*, 1–32.

Lerner, J., Schoar, A., & Wang, J. (2008). Secrets of the academy: The drivers of university endowment success. *Journal of Economic Perspectives, 22*(3), 207–222.

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

Leuz, C., & Verrecchia, R. (2000). The economic consequences of increased disclosure. *Journal of Accounting Research, 38*, 91–124.

Lo, A., Matveyev, E., & Zeume, S. (2019). The risk, reward, and asset allocation of nonprofit endowment funds. SSRN. Retrieved from, https://ssrn.com/abstract=3560240

Mensah, Y., & Werner, R. (2008). The capital market implications of the frequency of interim financial reporting: An international analysis. *Review of Quantitative Finance and Accounting, 31*(1), 71–104.

Miller, D., & Reisel, N. (2012). Do country-level investor protections affect security-level contract design? Evidence from foreign bond covenants. *The Review of Financial Studies, 25*(2), 408–438.

Morrell, K., & Clark, I. (2010). Private equity and the public good. *Journal of Business Ethics, 96*(2), 249–263.

Morsfield, S., & Tan, C. (2006). Do venture capitalists influence the decision to manage earnings in initial public offerings? *The Accounting Review, 81*(5), 1119–1150.

Nallareddy, S., Pozen, R., & Rajgopal, S. (2017). Consequences of mandatory quarterly reporting: The U.K. experience. Working paper.

Neus, W., & Walz, U. (2005). Exit timing of venture capitalists in the course of an initial public offering. *Journal of Financial Intermediation, 14*, 253–277.

Nielsen, K. (2008). Institutional investors and private equity. *Review of Finance, 12*(1), 185–219.

Norton, E. (1995). Venture capital as an alternative means to allocate capital: An agency theoretic view. *Entrepreneurship Theory and Practice, 20*, 19–29.

Penno, M. (1997). Information quality and voluntary disclosure. *The Accounting Review, 72*(2), 275–284.

Renders, A., & Gaeremynck, A. (2007). The impact of legal and voluntary investor protection on the early adoption of IFRS. *De Economist, 155*(24), 49–72.

Robinson, D., & Sensoy, B. (2016). Cyclicality, performance measurement, and cash flow liquidity in private equity. *Journal of Financial Economics, 122*(3), 521–543.

Roychowdhury, S., Shroff, N., & Verdi, R. (2019). The effects of financial reporting and disclosure on corporate investment: A review. *Journal of Accounting and Economics, 68*(2), 179–194.

Sahlman, W. (1990). The structure and governance of venture-capital organizations. *Journal of Financial Economics, 27*, 473–521.

Sapienza, H., Manigart, S., & Vermeir, W. (1996). Venture capitalist governance and value added in four countries. *Journal of Business Venturing, 11*(6), 439–469.

Sapienza, H. (1992). When do venture capitalists add value? *Journal of Business Venturing, 7*(1), 9–27.

Schertler, A., & Tykvová, T. (2006). Rivals or partners? Evidence from Europe's international private equity deals. Working paper.

Sensoy, B., Wang, Y., & Weisbach, M. (2014). Limited partner performance and the maturing of the private equity industry. *Journal of Financial Economics, 112*, 320–343.

Skinner, D. (1994). Why firms voluntarily disclose bad news. *Journal of Accounting Research, 32*(1), 38–60.

Staubus, G. (2005). Ethics failures in corporate financial reporting. *Journal of Business Ethics, 57*(1), 5–15.

Stein, J. (1989). Efficient capital markets, inefficient firms: A model of myopic corporate behavior. *The Quarterly Journal of Economics, 104*(4), 655–669.

Stewart, I. (1986). Ethics and financial reporting in the United States. *Journal of Business Ethics, 5*(5), 401–408.

Stocken, P. (2000). Credibility of voluntary disclosure. *RAND Journal of Economics, 31*, 359–374.

Van Buskirk, A. (2012). Disclosure frequency and information asymmetry. *Review of Quantitative Finance and Accounting, 38*(4), 411–440.

Verrecchia, R. (1983). Discretionary disclosure. *Journal of Accounting and Economics, 5*, 179–194.

Verrecchia, R. (1990). Information quality and discretionary disclosure. *Journal of Accounting and Economics, 12*(4), 365–380.

Wongsunwai, W. (2013). The effect of external monitoring on accrual-based and real earnings management: Evidence from venture-backed initial public offerings. *Contemporary Accounting Research, 30*(1), 296–324.

Yitshaki, R. (2008). Venture capitalist-entrepreneur conflicts: An exploratory study of determinants and possible resolutions. *International Journal of Conflict Management, 19*(3), 262–292.