Spreading Sunshine in Private Equity: Financial Intermediation and Regulatory Oversight*

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Abstract

This paper studies the impact of regulatory oversight on market transparency and financial intermediation in private equity (PE) markets. I examine an unanticipated reform that substantially expanded the regulatory oversight of PE fund advisers, which reduced information frictions for investors. The enhanced regulatory oversight increases investors' PE market participation and reduces their incentives to bypass PE fund intermediation. When investing directly, investors tend to finance larger, more mature, and less innovative companies, in contrast to investing through PE funds. Overall, these findings highlight the limits of market discipline and demonstrate the positive role of regulatory oversight in improving intermediation in PE markets.

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1 Introduction

There has been a long-standing debate on the benefits of regulation for financial markets, since market forces can potentially discipline conflicts of interest (e.g. Coase, 1960; Stigler, 1971; Posner, 1974; Stiglitz, 1993; Shleifer, 2005; Zingales, 2009). A fundamental source of conflicts in intermediation is that investors are less informed about the investments than the delegated manager who manages them. Such information friction is particularly prevalent in private equity (PE) markets, featured by limited disclosure and a lack of market pricing. The opaqueness of PE funds has gained growing attention from regulators and investors including pension funds, endowments, and insurers, collectively known as limited partners (LPs).[1] On the one hand, PE fund advisers, or general partners (GPs), are mainly incentivized by sophisticated compensation contracts to select, monitor, and exit private companies on behalf of LPs (Figure 1). On the other hand, PE fees collected by GPs are often perceived as outsized, potentially reflecting inherent agency conflicts in this delegation especially when these fees are difficult for investors to assess (Edmans, Gabaix, and Jenter, 2017).[2] Due to information frictions in LP-GP relationships, market discipline may fail to sufficiently align incentives, making intermediation excessively costly for LP investors despite its large benefits for the broader economy (e.g., Leland and Pyle, 1977; Chan, 1983).

This paper studies whether regulatory oversight can complement market discipline to improve incentive alignment and facilitate financial intermediation, an under-explored topic in the PE context. This market offers an ideal setting due to its potential scope for conflicts of interest and a rare exogenous regulatory shift that significantly expanded the oversight of PE funds. Historically, most PE fund advisers in the US faced little regulatory scrutiny,

[1] See, for example, "Private equity's opaque costs mystify the pensions that pay them", *Bloomberg*, March 2022 and "Investment industry welcomes SEC efforts to reform private equity fees", *Financial Times*, February 2022. LPs' efforts to reduce high PE fees have often been considered a contributing factor to the disintermediation of PE markets shown in Figure 1 (Fang, Ivashina, and Lerner, 2015; Braun, Jenkinson, and Schemmerl, 2020; Lerner, Mao, Schoar, and Zhang, 2022).

[2] Bebchuk and Fried (2003, 2004) suggest that managerial compensation can be a part of the principal-agent problem itself and partially set by managers to maximize their rent extraction through various hidden compensation and pay for non-performance (e.g., Yermack, 2006; Harford and Li, 2007; Stefanescu, Wang, Xie, and Yang, 2018). See Edmans, Gabaix, and Jenter (2017) for a survey of the rent extraction view.

since they could avoid SEC registrations under an exemption provided by the Investment Advisers Act of 1940. This exemption applied to advisers with fewer than 15 clients, counting each fund as a single client regardless of the number of investors within a fund (SEC, 2011). However, the Dodd-Frank Act *unexpectedly* eliminated this exemption in 2012, introducing substantially narrower exemptions based primarily on advisers' size and investment strategies rather than on potential agency conflicts (see Section 2.2). These changes reflect regulators' concerns about systemic risks in private funds following the 2008 financial crisis, which originated outside the PE industry. Consequently, many advisers including large GPs were required to register for the first time, becoming subject to examinations, rules, and disclosure.

I motivate my empirical design by presenting new stylized facts about the regulatory oversight of PE funds. First, the Dodd-Frank Act led to a *sharp* and *permanent rise* in registrations, with the share of registered advisers rising from around 25% pre-reform to nearly 50% when the intervention became effective (Figure 2a). Second, the reform contributed to a persistent increase in public disclosure by registered advisers through Form ADV filings (Figure 2b), routinely submitted to the SEC to report detailed information on their operations, disciplinary histories, and other relevant aspects. Third, despite these changes, there are rather limited aggregate changes in PE fund characteristics post-reform based on regulatory filings and fundraising data (Figures 3 and 4), implying that advisers do not systematically adjust their investments to meet the new registration exemptions. Lastly, registered GPs are more likely to receive regulatory actions due to greater scrutiny. Overall, with strong enforcement, the reform has substantially expanded the regulatory oversight within the PE fund sector enhancing market transparency and limiting GPs' opportunistic behaviors.

Since both the timing and exemption of the intervention were largely unanticipated by LPs and GPs, I use it as a quasi-natural shock to assess how regulatory oversight of PE funds affects LPs' PE market participation. To establish the casual relationship, I first document that LP-GP relationships are sticky. Therefore, LPs are arguably more exposed to the regulatory shock if they have more *pre-existing* relationships with GPs that became *newly*

registered due to the Dodd-Frank Act. To identify these GPs in Preqin, I manually match the data with Form ADV by searching the Investment Adviser Public Disclosure database based on GP names. The novel use of Form ADV allows me to accurately track the SEC registration status of each GP over time (see Figure C.2). Using a difference-in-differences (DiD) design that exploits within-LP variation, I compare investment behaviors between LPs with a high versus low share of newly registered GPs in their pre-existing relationships, before and after the shock. Moreover, I show that the cross-sectional variation of LPs' shock exposure cannot be explained by LP institutional types or headquarter states known to influence LP-GP matching (Lerner, Schoar, and Wongsunwai, 2007; Hochberg and Rauh, 2013), mitigating potential concerns of selection into newly registered GPs.

I find that regulatory oversight of PE funds increases investors' market participation and reduces their incentives to bypass intermediation, based on a panel data sample of LP-years covering 1,448 unique LPs in the US across the period 2001-2021. The DiD estimates indicate a 28% increase in the probability of committing capital to PE funds and a 35% decrease in the probability of making direct investments among LPs with high exposure to newly registered GPs. In direct investments, LPs bypass PE funds and directly purchase shares of private companies thus avoiding agency costs in outsourced relationships (see Figure 1). The dollar amount of increased capital commitments outweighs the decreased direct investments, leading to a net increase in capital supply to PE markets. Moreover, there are no differential trends in the years leading up to the reform, but a persistent difference emerges in outcome variables across LPs with different exposure to the regulatory intervention.

GPs' disciplinary histories, as disclosed in Form ADV, provide a direct link between my results and the agency costs of financial intermediation. LPs arguably respond more strongly to regulatory oversight of PE funds when their GPs are more prone to agency conflicts. This idea is supported by a triple-difference analysis of individual LPs' capital commitments at the fund level, which further exploits cross-sectional variation in GPs' mandatory disclosure of misconduct – often related to insufficient or misleading information about fees, asset values,

and similar matters. Notably, the impact of regulatory oversight is concentrated among GPs with prior misconduct, as they tend to have misaligned incentives.

My findings underscore the need for regulatory interventions to mitigate information asymmetries and align incentives between GPs and LPs in PE markets. Financial markets face potential market failures due to information being a public good, creating a free-rider problem – market participants have insufficient incentive to produce or disclose information since they cannot fully capture the benefits (Stiglitz, 1993). In PE markets, this results in limited transparency: GPs may withhold details on investment strategies, portfolio performance, and fees, while LPs may lack the resources or incentives to verify this information. Moreover, PE markets involve specialized and opaque investments in private companies that are exempt from public market disclosure requirements, creating a significant information gap. GPs possess detailed knowledge of portfolio companies, while LPs depend on GPs for information, making it harder for LPs to make informed decisions on contracting, monitoring, and other forms of market discipline. Regulatory interventions, such as mandatory disclosure and periodic examinations, can help bridge this gap by enhancing transparency.

I consider and rule out several alternative mechanisms for my findings. First, the new registration exemptions are tied to GP size and investment strategy, raising concerns that the effects might stem from differences in investment opportunities and market dynamics between small and large GPs, or between GPs managing different types of funds. To address this concern, I re-estimate my baseline regressions, allowing LP outcomes to evolve on flexible time trends based on LPs' exposure to these GPs in their pre-existing relationships, and find similar findings. Moreover, within-GP estimation further mitigates this concern by suggesting that GPs with different sizes or investment strategies do not experience differential dynamics in their fundraising outcomes before and after the intervention. Second, the Dodd-Frank Act introduced another contemporaneous regulatory intervention, the Volcker Rule, which prohibits banks from investing in private equity (Chen and Ewens, 2024). This rule might have increased the supply of PE funds available to non-bank LPs in regions with a

strong bank LP presence. To address this potential confounding factor, I include year-by-LP state fixed effects in my analysis and the results remain robust. Third, the opposite directional changes in capital commitments and direct investments indicate that my findings are unlikely to be driven by unobservable LP characteristics correlated with secular trends in investors' PE allocation.

Lastly, I present evidence that regulatory oversight of PE funds can address potential capital allocation inefficiencies associated with disintermediation. Financing private companies is challenging due to information asymmetry and risk, which impose significant costs on investors. Unlike specialized GPs, LPs often lack the expertise to evaluate private companies and the diversification provided by PE funds which pool capital for PE investments. I show that LPs disproportionately finance more mature and larger companies in their direct investments than their GPs do. Moreover, these companies have less patenting intensity measured by the number of highly cited patent applications scaled by PE deal size. While this investment choice can be privately optimal for LPs, disintermediation might be socially suboptimal because of potential underinvestment in younger and more innovative companies.

Overall, this paper highlights the limits of market discipline of PE funds and suggests that enhanced regulatory oversight can increase capital supply and shape the organizational structure of PE markets. Despite these benefits, it is important to acknowledge that regulatory intervention inevitably introduces ongoing compliance and disclosure costs for PE fund advisers, most of which will be passed on to investors, while potentially distorting fundraising and imposing opportunity costs on the SEC due to its limited resources (Charoenwong, Kwan, and Umar, 2019). Therefore, the paper's findings can inform the active debates about the optimal level of regulation for PE funds, which has important implications for various institutional investors, their beneficiaries, and the broader economy.[3]

[3]Regulation of PE markets has seen increasing presence across countries in recent years. For instance, the European Union introduced the Alternative Investment Fund Managers Directive (AIFMD) in 2011, and the UK retained AIFMD after Brexit to regulate PE funds.

Related Literature. Although financial intermediation offers various advantages such as lower transaction costs and greater risk diversification (e.g., Benston and Smith, 1976; Leland and Pyle, 1977; Chan, 1983), it introduces delegation costs due to incentive problems between intermediaries and investors. When there are many investors, the duplication of monitoring costs and free-riding problems can make financial intermediation excessively costly or even unfeasible. Such incentive problems are first recognized and addressed in the banking literature by Diamond (1984) through diversification and committed debt-like payments to investors. In contrast, PE fund advisers, have limited portfolio diversification, issue equity-like securities to investors, and are mainly incentivized by incomplete compensation contracts (Gompers and Lerner, 1996, 1999; Metrick and Yasuda, 2010; Robinson and Sensoy, 2013). My findings highlight the agency costs inherent in LP-GP relationships due to information friction and justify regulatory interventions in addressing this potential source of market failures, a topic that has received limited exploration. In a related paper, Jiang, Mason, Qian, and Utke (2024) studies the impact of mandatory misconduct disclosure on GPs' fundraising ability. My paper differs by directly examining LPs' PE market participation in response to an arguably exogenous expansion in regulatory oversight of PE funds.

This paper also closely relates to the literature on the regulation of financial intermediaries. Besides the extensive research on bank regulation and supervision (e.g., Laeven and Levine, 2009; Berger and Bouwman, 2013; Buchak, Matvos, Piskorski, and Seru, 2018), a small but growing body of work examines the implications of regulations for non-bank financial intermediaries such as investment advisers, hedge funds, pension funds, and insurance companies (e.g., Charoenwong, Kwan, and Umar, 2019; Garrett, 2024; Dimmock and Gerken, 2016; Andonov, Bauer, and Cremers, 2017; Sen, 2023). While historically facing little regulation, PE markets have been attracting intensified regulatory scrutiny recently due to their rapid growth and opaqueness. As a landmark legislative change, the Dodd-Frank Act significantly expanded the regulatory oversight of PE funds. To my knowledge, this paper is the first to empirically characterize this intervention and estimate its causal effects

on PE markets, adding to the literature on the the economic impacts of PE regulations (Abuzov, Gornall, and Strebulaev, 2024; Chen and Ewens, 2024)[4]. Methodologically, my paper contributes by introducing an arguably exogenous shock to agency frictions faced by GPs, resulting from changes in their SEC registration status, which can be constructed from publicly available Form ADV filings.

At last, my work is complementary to the literature on firm boundaries. Since Coase (1937), existing literature has emphasized that firms are organized to overcome holdup costs in relationship-specific investments (Klein, Crawford, and Alchian, 1978; Williamson, 1979; Grossman and Hart, 1986; Hart and Moore, 1990). Different from the considerable empirical work that supports such capital-allocation perspective (e.g., Lafontaine and Slade, 2007; Frésard, Hoberg, and Phillips, 2020; Bena, Erel, Wang, and Weisbach, 2023), this study shows that institutional investors are less likely to organize PE investment activities within their own firm boundaries when regulatory oversight mitigate agency costs in outsourced relationships. This finding is established within the setting of PE investing, characterized by low asset specificity and weak holdup problems due to its human-capital intensive nature (Ewens and Rhodes-Kropf, 2015). Therefore, my paper provides novel evidence consistent with the under-explored incentive view that firm boundaries respond to agency frictions - when it is difficult to extract outputs from an outsourced relationship, firms tend to organize the relationship within themselves, which improves monitoring and provides a wider range of incentive tools (Holmstrom and Milgrom, 1991, 1994; Holmstrom, 1999). The findings also imply that regulation can indirectly shape the organizational structure of financial markets through incentive alignment.

2 Institutional Details

This section provides a brief introduction to the market discipline of PE funds and conceptually discusses its limits in incentive alignment due to the unique features of PE markets.

[4] Abuzov, Gornall, and Strebulaev (2024) investigates GPs' response towards a disclosure regulation in the venture capital industry. Chen and Ewens (2024) examines the Volcker Rule, which prohibits banks from holding private equity, and its impact on start-up agglomeration.

Then, I present the background information on the Dodd-Frank Act. Lastly, I discuss the deficiencies found in the SEC's examinations of PE funds.

2.1 Market Discipline of PE Funds and Its Limits

While various forms of market discipline, discussed below, act as the first line of defense in mitigating conflicts of interest faced by GPs, these market forces may fail to sufficiently align incentives due to pervasive information frictions in PE markets featured with limited disclosure and market frictions such as market power, illiquidity and a lack of market pricing.

Compensation Contracts. LPs mainly rely on compensation contracts outlined in the Limited Partnership Agreements ("LPAs") at fund inception to incentivize GPs (Gompers and Lerner, 1996, 1999; Metrick and Yasuda, 2010; Robinson and Sensoy, 2013). Key components of the compensation include management fees and carried interest. Management fees are not based on fund performance and provide GPs with fixed annual revenue calculated as 1.5%-2.5% of the fee basis, which often shifts from committed capital to net invested capital calculated as invested capital minus the cost basis of any exited investments. Carried interest, a performance-based component, typically rewards GPs with 20% of profits after LPs achieve a pre-specified hurdle rate of return, often set at 8%.[5] Due to information and search frictions in PE markets, both LPs and GPs have some pricing power (Lerner and Schoar, 2004; Hochberg, Ljungqvist, and Vissing-Jørgensen, 2014). As a result, the level and structure of pay are to some extent decided by GPs potentially to maximize their rent extraction.[6] Empirically, the amount of fixed payments tends to increase during fundraising booms, which favors GPs and could misalign their incentives with LPs' (Robinson and Sensoy, 2013; Lerner and Nanda, 2020). Compounded by GPs' limited disclosure, the intricate nature of PE fee structures makes it challenging for LPs to accurately assess and monitor their fees, creating potential scope for rent extraction and inefficient contracting (Phalippou,

[5]This contract usually includes a catch-up provision allowing GPs to receive 100% of net exit returns until they secure 20% of all annualized profits after they reach the hurdle rate.

[6]In contrast, the shareholder/investor value maximization view in the compensation literature typically assumes that the contract is decided solely by shareholders/investors or their well-incentivized representatives (Edmans, Gabaix, and Jenter, 2017).

2009; Zingales, 2009).[7]

Indirect Pay for Performance. Besides direct compensation paid by existing LPs, GPs are also incentivized through future fundraising tied to their previous performance (Chung, Sensoy, Stern, and Weisbach, 2012). However, unlike public-traded stocks that have market prices, the underlying assets of PE funds usually rely on quarterly interim valuations provided by GPs. These valuations are stale prices by nature and usually do not reflect the most recent information. Therefore, the lack of mark-to-market valuations could lead to insufficient market discipline and inefficient capital allocation across fund managers. Moreover, if inflated to window-dress performance during fundraising, interim fund valuations can potentially mislead investors and exacerbate these problems (Barber and Yasuda, 2017; Chakraborty and Ewens, 2018; Brown, Gredil, and Kaplan, 2019).

Ex-Post Monitoring. While LPs could incentivize GPs through ex-post monitoring, it is often excessively costly due to GPs' limited disclosure and LPs' coordination frictions. Such incentive cost in intermediation is discussed by Diamond (1984). Moreover, LPs can influence GPs by expressing concerns through their advisory committee seats if GPs are making poor investments. However, such action remains weak compared to the influence of the board of directors who can affect corporate decisions through voting. In fact, LPs will lose limited liability if they directly interfere in the day-to-day operations of the fund. Meanwhile, the closed-end design and illiquidity of PE funds restrict LPs' ability to exit current funds, making it difficult for LPs to vote with their feet like investors in public companies or mutual funds.

2.2 Regulatory Oversight of PE Funds and the Dodd-Frank Act

Various features of PE markets discussed above indicate that market discipline may be insufficient, suggesting that policy intervention could play a role. However, most PE fund

[7]Although enhanced transparency benefits all market participants and thus has positive externalities, each investor only partially benefits from greater disclosure and tends to use their bargaining power to extract other concessions from PE funds, resulting in a suboptimal level of disclosure (Zingales, 2009). For example, Begenau and Siriwardane (2024) documents fee dispersion across LPs in the same PE fund due to LP-GP bargaining.

advisers historically received little regulatory oversight in the US because of their exemption from registration with the SEC under the Investment Advisers Act of 1940. The exemption applied to advisers with fewer than 15 clients, considering each fund a single client instead of counting individual investors within the funds under management (SEC, 2011). One rational is that PE funds primarily targeted institutional and accredited investors, who were often considered sophisticated enough to conduct their own due diligence. In 2012, Title IV of the Dodd-Frank Act eliminated this exemption and introduced significantly narrower registration exemptions for advisers solely to private funds with less than $150 million in assets under management (the "private fund adviser exemption") and those that exclusively advise venture capital funds that meet the SEC's regulatory definition (the "venture capital exemption").[8] Consequently, many previously unregistered PE fund advisers, including some large GPs, had to register with the SEC for the *first time* (see Section 4.1).[9]

As an important part of the Dodd-Frank Act's overhaul of financial systems after the 2008 financial crisis, which stemmed outside of the PE sector, these new registration exemptions reflect Congress' concern regarding the potential systemic risks in private funds, especially hedge funds. While the Senate voted to exempt PE fund advisers in 2010, the final enacted version of the Dodd-Frank Act *does not* exclude PE funds from registration and is primarily based on fund managers' size, underlying investments, and use of leverage.[10] For instance, the venture capital exemption is motivated by two major policy rationales. First, venture capital ("VC") funds invest in non-public start-ups, which are not directly connected to the public market and thus pose relatively little systemic risk to the entire financial system

[8]The Dodd-Frank Act amendment was adopted by the SEC on June 22, 2011, with transition provisions that required advisers to be registered by March 30, 2012. Figure C.1b shows that most advisers waited until the compliance deadline to register with the SEC. The reform narrowed the registration exemptions of private funds, which are pooled investment vehicles that are excluded from the definition of investment firm under the Investment Firm Act of 1940 by section 3(c)(1) or 3(c)(7). The term private fund generally includes hedge funds, PE funds, and other funds such as real estate funds and securitized asset funds. Besides the private fund adviser and venture capitation exemptions, certain foreign advisers without a place of business in the US are also exempt from registrations.

[9]Table C.1 provides a list of the top 20 newly registered PE fund advisers in 2012 based on the total gross asset value of their PE funds as reported in their 2012 Form ADV filings.

[10]The SEC's Proposing Release of new registration exemption rules to private funds. Release No. IA-3111; File No. S7-37-10

or retail investors. Second, VC funds use limited leverage, implying that potential losses are mainly borne by LP investors and will not propagate throughout financial markets through the credit channel or other counterparty relationships.[11] Appendix A discusses the venture capital exemption and the heated debate over the regulatory definition of a venture capital fund in more detail as an illustrative example of Congress' trade-offs between systemic risk monitoring and regulatory costs in setting the new registration exemptions.

After becoming registered with the SEC, PE fund advisers will be subject to regulatory oversight including periodic examinations, operational restrictions, as well as mandatory disclosure such as Form ADV filings. These publicly available regulatory filings require registered advisers to disclose information including business practices, ownership, clients, conflicts of interest, and disciplinary information.[12]

2.3 SEC's Examinations of Registered PE Funds

After the Dodd-Frank Act eliminated many PE fund advisers' registration exemptions, the SEC started its first systematic examination of these never-examined advisers to assess risks and operational issues in this market. Soon afterward, the examinations revealed widespread deficiencies, most of which are related to PE fees. In the first announcement of exam observations in mid-2014, the SEC pointed out that:

> "*By far, the most common observation our examiners have made when examining PE firms has to do with the adviser's collection of fees and allocation of expenses. When we have examined how fees and expenses are handled by advisers to PE funds, we have identified what we believe are violations of law or material weaknesses in controls over 50% of the time.*"[13]

The announcement highlighted three major types of misconduct including misallocated

[11] In fact, many VC fund advisers still have to register with the SEC because their funds do not meet the SEC's narrow definition of VC funds based on many characteristics such as the size of non-qualifying investments basket and limits on the use of credit. See Appendix A for more detail.

[12] Besides Form ADV, registered PE fund advisers need to submit Form PF, a type of confidential filings that require detailed information about their private funds' activities and performance. However, LPs and the public do not have access to the details reported in Form PF.

[13] Spreading Sunshine in Private Equity, Andrew J. Bowden, May 2014

expenses, hidden fees, and manipulated valuation of portfolio companies. Conceptually, if these payments were simply another form of compensation aligned with investor value maximization, it is unclear why they would be extracted in such *opaque forms*. Moreover, the SEC noted that the deterioration of PE returns exacerbates these agency problems because fewer GPs can achieve their preferred return through carried interest - creating incentives to shift expenses and collect hidden fees.

Given the typical 10-year lifespan of a PE fund, unforeseen contingencies often arise, making the compensation contracts inherently incomplete. These agreements often feature broad wording, permitting GPs *a wide latitude of flexibility* that might enable them to charge fees and pass along expenses beyond what LPs might reasonably contemplate, further complicating the transparency issues highlighted by the SEC.

The noncompliance also partially results from LPs' limited oversight *after* fund investments despite their extensive due diligence *before* capital commitments, as observed by the SEC. It highlights two main reasons for this observation. First, PE funds typically have a large number of LPs, often making it difficult for individual LPs to coordinate or even identify each other, which creates free-rider problems and coordination failure among LPs when monitoring GPs. Second, investors may not be sufficiently staffed to monitor GPs.[14]

Agency conflicts in PE fees are both widespread and persistent. Since the Dodd-Frank Act became effective, the SEC has been revealing various adviser deficiencies found in its examinations. In its recent alert in 2022, the SEC discovered operational issues such as miscalculating post-commitment period management fees, extending fund lives and recycling realized investment proceeds to charge extra management fees without sufficient disclosure to investors.[15] Overall, the cost to PE fund investors may be far greater than the direct cost of hidden fees. If the managerial contract provides insufficient incentives to exert effort or

[14]For survey evidence, see Da Rin and Phalippou (2017). The 25th (75th) percenitle value of LPs' private equity team size is 1(5) professional(s), with a mean value of 6.4.. The authors examined the team specialization of institutional investors with allocation to private equity, as well as their accounting, legal, investment, and monitoring activities at the fund and portfolio company level.

[15]Observations from Examinations of Private Fund Advisers, Division of the Examinations, January 2022

induces inefficient investment decisions, investor losses could be much greater.

Conscious of the agency conflicts found in PE funds, the SEC recently introduced a sweeping reform on PE fees. Among other things, the proposed rules include quarterly statements on detailed fees, new requirements on fund audits and bookkeeping, as well as a ban from charging certain fees and expenses.[16] While bringing more transparency to fees, most of these changes are *only limited to registered fund advisers*. Moreover, GPs and other interest groups sued the SEC for regulatory overreach, and some of the SEC's oversight rules were stuck down by the US court in 2024.[17]

3 Data and Variables

This section discusses the data sources used for my analyses. Then I discuss my measure of investors' PE direct investments and exposure to the reduction in agency frictions in their outsourced investment adviser relationships as a result of the Dodd-Frank Act.

3.1 Data Sources

Preqin. My main analysis samples consist of the universe of private equity LPs and GPs covered by Preqin. Besides data on PE deals, Preqin provides detailed fund-level information such as the list of LP investors and their committed capital, which allows me to observe LP-GP relationships in PE markets.[18] Importantly, each financial institution listed in Preqin is assigned a unique identifier. This identifier can be used to link fund investors and PE deal participants in Preqin's other datasets. As a result, I can accurately match LP investors with their corresponding fund investments and direct investments in private companies.

Form ADV Filings. Form ADV filings are legally required disclosure made by investment advisers including PE fund advisers. Fund advisers need to indicate their registration status when they submit their filings. Unlike registered advisers, exempt reporting advisers are

[16] See "SEC Enhances the Regulation of Private Fund Advisers", August 2023

[17] See, for example, "US appeals court strikes down SEC private equity, hedge fund oversight rule", Reuters, June 2024.

[18] For LP-GP relationships with missing committed capital, I impute the value with the mean value of other LPs' committed capital at the same fund level.

only required to complete certain sections in the Form ADV. All advisers must keep their forms updated by filing periodic amendments and will face punishments such as revocation of registration and criminal prosecution if there are any false statements or omissions. Moreover, both registered and unregistered advisers need to disclose all their disciplinary events in at least the past ten years and complete the corresponding schedules, Disclosure Reporting Pages ("DRPs"), which include details related to each event such as principal sanctions, initiation date, and status.

Investment Adviser Public Disclosure (IAPD). I manually search Preqin GP names on the IAPD website and create a linking table between Preqin and Form ADV filings. The database contains information about investment adviser firms regulated by the SEC and state securities regulators in the US. Users can search for an investment adviser firm on this site and access the registration or reporting form ("Form ADV") submitted by the adviser, which includes details such as the adviser's name, SEC number, and office addresses.

PatentsView. I complement my analysis with PatentsView, a platform supported by the United States Patent and Trademark Office (USPTO). PatentsView provides comprehensive data such as the assignee name, application year, grant year, and citations of published patent applications filed after 2001. The patent data allows me to assess the level of innovation in private companies funded through LP direct investment versus those funded through fund investment.

SDC Platinum. To investigate whether LPs are adversely selected into worse companies in their direct investments, I augment the Preqin PE exit database with the SDC Platinum to construct outcome variables related to IPOs and acquisitions.

3.2 Measuring LPs' Exposure to the Regulatory Shock

Conceptually, the Dodd-Frank Act has expanded the regulatory oversight of PE markets by eliminating registration exemptions for many unregistered PE fund advisers. Newly registered advisers become subject to examinations, rules, and mandatory disclosure, plausibly facing lower agency conflicts after registration. My measure of LPs' differential exposure

to this regulatory shock is based on the share of GPs that became *newly registered* due to the Dodd-Frank Act within LPs' *pre-existing* LP-GP relationships. Section 5.1.2 presents empirical evidence on the stickiness of LP-GP relationships.

This measure can be constructed based on changes in GPs' registration status indicated in their Form ADV filings. To compile this dataset, I first create a list of unique GP names in LPs' pre-existing relationships covered in Preqin. Then, I manually match the dataset with Form ADV filings by searching GP names in the IAPD web-based database. This approach creates a linking table between Preqin GP identifiers and their SEC numbers in Form ADV. Appendix B.2 provides details of the matching procedure. The novel use of Form ADV filings allows me to track the SEC registration status of each GP over time. Figure C.2 shows that the share of newly registered GP in the matched Preqin dataset closely aligns with the share solely based on Form ADV filings, confirming the accurate identification of GPs' registration status in Preqin. The identification strategy relies on the pre-existing GPs that become newly registered in 2012.

3.3 Summary Statistics

To construct the sample of LPs, I begin by considering all US institutional investors that have at least one LP-GP relationship before 2012, the effective year of the Dodd-Frank Act. Then, I drop 81 PE firms, 68 corporations, and 46 banks because these institutional investors also specialize in making direct investments through independent venture capital, corporate venture capital, and bank-affiliated venture capital firms.[19] This leaves 1,448 unique LPs in the sample. To complement my analysis, I also use a sample of 1,182 unique US GPs invested by my sample LPs and 2,042 PE funds raised by these GPs, including both buyout and venture capital funds.

Table 1 shows the summary statistics of the main variables used in my analysis. In Panel

[19]See Hellmann (2002), Hellmann, Lindsey, and Puri (2008) and Ma (2020) for more information on corporate venture capital and bank-affiliated venture capital. Some established PE firms such as Sequoia Capital, Kleiner Perkins, Accel, and New Enterprise Associates are also LPs that contribute capital to funds managed by other PE firms. These PE firm LPs are dropped in my LP sample. Otherwise, all their PE investments would be implausibly classified as direct investments.

A, a unit of observation is a GP-year spanning from 2001-2021. The variables include a rich set of regulatory actions GPs might receive in a given year. The probability of receiving any regulatory action is around 1.08% each year. Specifically, the probability of censure, disgorgement/restitution, cease and desist, and monetary sanction is approximately 0.46%, 0.45%, 0.65% and 1.03% per year.

For Panel B, a unit of observation is an LP-year during 2001-2021. On average, the probability of LPs committing capital to any PE funds is 34% each year and the probability of making direct investments in private companies is 4%. The average amount of committed capital is $39.41 million per year and $ 1.61 million for direct investments.

In Panel C, a unit of observation is an LP-fund pair for funds invested by the sample LPs during 2001-2021. The mean committed capital is $ 44.04 million. Around 52% of these LP-fund pairs are associated with a GP that became newly registered in 2012 following the Dodd-Frank Act.

In Panel D, the sample consists of financing rounds raised by private companies between 2001 and 2021 in the US, covering both venture capital and buyout deals. This sample is used to evaluate the potential capital allocation implications of disintermediation in PE markets. Approximately 42% of the deals are early-stage, defined as a venture capital deal with a round number below Series C, and the average LP ratio is 1.62% in the sample deals.

4 Stylized Facts of PE Fund Regulatory Oversight

In this section, I motivate the identification design discussed in Section 5.1 by presenting stylized facts about regulatory oversight of PE funds before and after the Dodd-Frank Act. First, I document substantial increases in PE fund advisers' SEC registrations and public disclosure. Second, I investigate whether there is any aggregate change in PE fund characteristics suggesting that advisers strategically undo the impact of the Dodd-Frank Act. Third, I analyze the disciplinary histories of advisers to show that registered advisers tend to receive more regulatory oversight, which indicates that SEC registration reduces agency frictions faced by advisers.

4.1 Expanded Regulatory Oversight

Several patterns from the Form ADV filings suggest that many advisers registered with the SEC due to the Dodd-Frank Act under strong enforcement. Registered advisers are subject to examinations, rules, and mandatory disclosure. Conceptually, such regulatory oversight reduces the information asymmetry faced by fund investors:

Sharp and Permanent Rise in Registrations. The Dodd-Frank Act eliminated the registration exemptions available to many previously unregistered PE fund advisers. As a result, there is an immediate and steep increase in the share of registered advisers in the reform's effective year as shown in Figure 2a.[20] The percentage of registered PE fund advisers increased from 28% in 2011 to 48% in 2012. The large increase in registrations means that the Dodd-Frank Act has bridged a key regulatory gap and brought scrutiny to many PE fund advisers. Figure 2a also suggests that the increase in adviser registrations has been persistent over time in the post-reform period.[21]

Timely Registrations. Figure C.1b reveals a sharp spike in the quarterly number of initial registrations - around 570 PE fund advisers registered with the SEC at the *compliance deadline* of the Dodd-Frank Act in 2012Q1. These registrations in this single calendar quarter account for nearly 30% of the total number of initial SEC registrations in the past two decades and there are no delayed registrations after the compliance deadline. The timely registration indicates strong enforcement of the reform. Although the SEC adopted the amendment in 2011Q2 with transition provisions requiring advisers to be registered by the end of 2012Q1, the fact that almost all non-exempt reporting advisers waited until the compliance deadline to register potentially suggests that they perceive SEC registrations as *costly*. Additionally, the short nine-month transition window between the intervention announcement and its

[20] Unregistered PE fund advisers did not have to submit Form ADV filings until the Dodd-Frank Act became effective in 2012. Therefore, only the number of registered advisers is observable before 2012 and the total number of advisers is unobservable pre-reform and estimated using out-of-sample predictions based on the numbers derived from Form ADV with those obtained from Preqin during 2012-2021.

[21] The post-2012 decline is likely caused by entries of unregistered advisers. In fact, de-registrations are rare based on the Form ADV data. This pattern implies that it is hard for advisers to undo the effects of SEC registrations. Figure C.1a shows the number of registered private equity fund advisers.

effective date suggests that GPs had rather *limited ability to manipulate* their registration status when the intervention was introduced. For instance, a GP that raised a 500 USD MIL buyout fund in 2010 had to register unless the GP liquidates the fund by 2012Q1.

Persistent Increase in Disclosure. Figure 2b presents the actual and predicted number of Form ADV filed by registered PE fund advisers each year.[22] The Dodd-Frank Act has led to a permanent increase in the number of Form ADV filings, which ask advisers to periodically report and amend information on their operation and disciplinary history. Therefore, the reform has improved the transparency of PE markets. From a policy perspective, the finding suggests that disclosure rules targeting GPs are more effective than those aimed at LPs, because GPs tend to limit information sharing with LPs subject to public disclosure requirements (Abuzov, Gornall, and Strebulaev, 2024).

4.2 Limted Aggregate Change in Fund Characteristics

Since registrations can be costly to PE fund advisers due to SEC examinations and mandatory disclosure, one might expect that advisers will have incentives to change their fund characteristics to qualify for registration exemptions. Such concern is largely mitigated by the patterns from Form ADV filings presented in Figure 3. It shows that there is little change in the composition of advisers that rely on different registration exemptions. Moreover, I take further steps by examining the aggregate change in PE fund characteristics based on fundraising data in the Preqin universe.

Due to the private equity adviser exemption discussed in Section 2, advisers can remain unregistered by keeping their assets under management (AUM) below $150 USD MIL. This exemption is the only available option if they manage any buyout funds. If buyout fund advisers were to strategically avoid registrations, they would have to manage very small funds. However, there has been a rather limited increase in the number of small buyout funds following the reform. This observation is evident in the cross-sectional size distributions of

[22]The predicted value is estimated using a model fitted with a quadratic time trend for the 2001-2011 period.

buyout funds raised before and after the Dodd-Frank Act effective year as shown in Figure 4a.

Advisers can also stay unregistered if they meet the venture capital exemption, as discussed in Section 2, by exclusively managing VC funds that meet the SEC's regulatory definition. Figure 4b illustrates the time-series evolution of the percentage of PE funds that fall under the category of VC funds.[23] The lack of immediate and large increase in the share of VC funds suggests that advisers do not abuse venture capital exemption.

So why don't advisers change their fund characteristics to qualify for the new registration exemptions? Advisers face significant costs when attempting to limit their size below the $150 USD regulatory threshold because their compensation increases with the total fund size. In fact, estimates from Metrick and Yasuda (2010) suggest that over $17.5 is allocated as compensation to PE fund advisers for every $100 raised by a PE fund. Furthermore, advisers cannot easily shift towards VC funds either, because their fundraising decisions are affected by various factors such as investment opportunities, supply of capital, and human capital constraints. These frictions are particularly pronounced for VC funds, making it difficult for them to scale up (Metrick and Yasuda, 2010). Collectively, the stylized facts based on regulatory filings and fundraising indicate limited distortion of fundraising incentives faced by GPs post-reform.

4.3 Registration Status and Regulatory Oversight

To quantify the relationship between SEC registration and regulatory oversight, I use Form ADV filings to analyze the difference between registered and unregistered advisers regarding their likelihood of receiving regulatory actions. Specifically, I estimate the following regres-

[23] I use both broad and narrow definitions of VC funds because many PE funds that invest in high-growth start-ups do not necessarily meet the SEC's regulatory definition of a VC fund. I assume funds within the narrow definition are more likely to meet the regulatory definition used for the venture capital exemption. The narrow definition includes funds classified as early stage and venture (general) by Preqin. The broad definition adds funds classified as expansion / late stage, growth, and balanced by Preqin. See Appendix A for a detailed discussion of the SEC's regulatory definition.

sion based on the panel data of advisers constructed from Preqin and Form ADV filings:

$$Disciplinary\ Action_{jt} = \beta \times Registered_{jt} + \boldsymbol{\theta'X} + \boldsymbol{\tau_t} + \boldsymbol{\delta_{state}} + \epsilon_{jt} \tag{1}$$

in which j and t denote a GP and a year. *Disciplinary Action* is a measure of disciplinary actions received by the GP in a year. *Registered* is an indicator variable equal to one if the GP is registered with the SEC in a given year, and zero otherwise. *Registered* varies within a GP, since a GP's registration status can change over time based on exemption qualifications. The regression includes a vector of control variables $\boldsymbol{X}$, which are *Ln(GP Size)*, the natural logarithm of the amount of capital in USD MIL raised by PE funds managed by the adviser in the past 10 years, and *Number of Funds Raised*, the number of PE funds managed by the adviser in the past 10 years, as well as *Buyout*, an indicator variable equal to one if the GP manages buyout funds in the past 10 years, and zero otherwise. These GP characteristics are related to the registration exemptions under the Investment Adviser Act and Dodd-Frank Act (see Section 2.2). $\boldsymbol{\tau_t}$ and $\boldsymbol{\phi_{state}}$ are year and GP state fixed effects. The standard errors are clustered at the GP level to address serial correlations.

Table 2 presents two main findings. First, Across all columns, the coefficient estimates of *Registered* are positive and highly significant suggesting that registered advisers are more likely to receive regulatory actions. From Column (1) to (5), the outcome variables are a set of indicator variables equal to one if the adviser received certain regulatory actions as indicated by the variable name, such as censure, disgorgement, and monetary fine, and zero otherwise in each year. In Column (6), *Ln(1 + Fine Amount)* is the natural logarithm of one plus the amount of fines in USD MIL the adviser receives in one year. For example, Column (1) indicates that registered advisers are 2.9 percentage points more likely to receive regulatory actions in a given year, while the unconditional mean is only around 1.1 percent. Therefore, SEC-registered advisers face stronger regulatory oversight and arguably have less scope for operational deficiencies.[24]

[24]The finding is consistent with Charoenwong, Kwan, and Umar (2019), which documents that client

Second, none of the GP characteristics, including number of funds managed, size, investment strategies, is correlated with regulatory actions - consistent with the idea that the registration exemptions are made mainly based on systemic risks rather than potential agency concerns. However, in untabulated regressions, I find that these characteristics are significantly and positively correlated with registration.

5 LPs' Response to Regulatory Oversight of PE Funds

The previous section presented evidence that the Dodd-Frank Act expanded regulatory oversight of PE funds, subjecting many GPs to examinations, rules, and disclosure requirements. In this section, I leverage this shock as a quasi-natural experiment to examine LPs' response to increased regulatory oversight of GPs. I then discuss alternative explanations and conduct tests to further establish causality.

5.1 Identification Strategy

5.1.1 Research Design

My empirical design exploits quasi-random variation in regulatory oversight of GPs among LPs' pre-existing relationships, introduced by the Dodd-Frank Act. LPs are arguably more exposed to this shock if they have more *pre-existing* relationships with GPs that became *newly registered* following the regulatory intervention.[25] Specifically, I estimate the following difference-in-differences (DiD) regression with LP-year panel data:

$$y_{i,t} = \beta \times \textit{Regulatory Exposure}_i \times Post_t + \boldsymbol{\phi_i} + \boldsymbol{\tau_t} + \epsilon_{i,t} \tag{2}$$

in which i and t index LP and year respectively. The outcome variable y captures the delegated investment activities, measured by capital commitments and direct investments. *Regulatory Exposure* is an indicator variable equal to one if the share of newly registered GPs

complaints over mid-sized investment advisers increased after their regulatory jurisdiction was shifted from the SEC to state securities regulator after the Dodd-Frank Act. My results remain qualitatively similar but only marginally significant after adding GP fixed effects, due to limited variation in the outcome variables.

[25] Similar empirical designs based on pre-existing relationships have been used extensively in the banking literature. See, for example, Chodorow-Reich (2014)

in the LP's pre-existing LP-GP relationships is in the top quintile group, and zero otherwise. *Post* is an indicator variable equal to one in or after 2012, the effective year of the Dodd-Frank Act, and zero otherwise.[26] $\boldsymbol{\phi_i}$ and $\boldsymbol{\tau_t}$ are LP and year fixed effects. Although LPs do not form their relationships with GPs randomly, the inclusion of LP fixed effects absorbs any time-invariant LP characteristics, such as manager selection skills and access to GPs, that might be correlated with LP-GP matching and LPs' delegated investment decisions (e.g., Lerner, Mao, Schoar, and Zhang, 2022). In an alternative specification, I control for LP size measured by the capital committed to PE funds along with the direct investments made by an LP in the past 10 years, similar to Lerner, Schoar, and Wongsunwai (2007). Standard errors are clustered at the LP level to address serial correlations.

Recent literature emphasizes that difference-in-differences estimates may be biased due to staggered or potentially endogenous timing of the treatment (e.g., Goodman-Bacon, 2021; Baker, Larcker, and Wang, 2022). Such an issue is less of a concern in my setting because the regulatory intervention has a single and plausibly exogenous timing. As discussed in detail in Section 2.2, the narrowed registration exemptions of PE fund advisers are one of the many regulatory changes introduced by Congress through the Dodd-Frank Act to monitor systemic risks in different financial markets after the 2008 financial crisis, which originated *outside* the PE industry.

5.1.2 Sticky LP-GP Relationships

One crucial assumption of my measure is that LP-GP relationships are persistent over time. Otherwise, LPs could costlessly switch to registered GPs beyond their pre-existing LP-GP relationships and there would be no reason to expect differential outcomes across LPs after the regulatory intervention. To provide evidence for this persistence, I estimate the following

[26] I choose 2012, the effective year, rather than 2011, the adoption year of Title IV of the Dodd-Frank Act, because most advisers waited until the compliance deadline in March 2012 to register, as shown in Figure C.1b. See Section 2.2 for more institutional details.

regression with all possible GP-LP relationships for varying length n:

$$Invest_{i,j,k+n} = \rho_n \times Invest_{i,j,k} + \boldsymbol{FEs} + \epsilon_{i,j,k+n} \tag{3}$$

in which $Invest_{i,j,k}$ is an indicator variable equal to one if LP i invests in the k-th PE fund raised by GP j, and zero otherwise. The pass-through coefficient ρ_n quantifies the persistence of LP-GP relationships at different "lengths". If existing LP-GP relationships have no predictive power on future LP-GP relationships, then ρ would be zero. If LP-GP relationships are perfectly persistent, ρ would be one.

The baseline specification controls for a GP's average market share by including GP fixed effects. Then, I allow the market share to be time-varying by including GP by year fixed effects. However, it is possible that some GPs may specialize in raising capital from particular types of LP investors, for example, due to LPs' home bias or non-pecuniary objectives. If so, the repeated fund investments could reflect GP specialization rather than true persist relationships. I address this concern by adding fixed effects that control for a GP's market share separately by LP state and type. In the tightest specification, I further control for fund characteristics by including a fund type dummy, based on whether the fund is a venture capital or buyout fund, and fund size dummies, based on the fund's size quintile, as well as fund number dummies.

Table 3 reports the path-through coefficients and provides strong support for persistence in LP-GP relationships. The coefficients across all columns are large in magnitude and highly significant. For example, Panel A Column 1 indicates that LPs have approximately 40 percentage points greater likelihood of reinvesting in the next fund if they invest in the current fund raised by a GP, while the unconditional mean is less than 0.5 percent.[27] While the pass-through coefficient decreases with additional fixed effects and time length, the estimates remain highly significant and large in magnitude. The pattern is consistent with

[27]Figure C.3 shows that over 50% of LPs in a PE fund have invested in an earlier fund managed by the same adviser and the percentage of returning LPs is stable for both unregistered and registered advisers. The high degree of continuity in the investor base has also been documented by Lerner and Schoar (2004).

the general view of limited fund access in the PE fund industry and can result from various costs in establishing new relationships, such as information asymmetry, market power, search and matching frictions (e.g., Lerner, Schoar, and Wongsunwai, 2007; Sensoy, Wang, and Weisbach, 2014; Abuzov, Gornall, and Strebulaev, 2024).

Even with sticky LP-GP relationships, expanded regulatory oversight would likely lead to limited differential outcomes across LPs if they were able to invest *only* in funds managed by registered advisers in their pre-existing relationships. However, this becomes challenging if LPs face rationing in the supply of such funds due to strong investor demand., as evidenced by Figure C.4. Around 60% of registered funds' final size exceeds their target size at fundraising, while only 42% of unregistered funds are oversubscribed. The difference is statistically significant at the 1% level a multivariate regression that accounts for different fund characteristics, such as fund type, sequence number, and vintage year.

5.1.3 Potential Selection into Newly Registered GPs

While LP-GP relationships are sticky, they are not formed randomly. However, my empirical design only exploits pre-existing relationships formed before the regulatory intervention, both the timing and exemptions of which were largely unanticipated by LPs and GPs (see Section 2.2). Therefore, the cross-sectional variation in the share of newly registered GPs in LPs' pre-existing relationships is plausibly orthogonal to the characteristics of each LPs' pre-existing GPs. Moreover, the short nine-month transition window between the announcement and effective date of the intervention implies that GPs have rather limited ability to manipulate their registration status (see Section 4.1).

To provide additional evidence, I estimate a linear probability regression of whether a LP has high exposure to newly registered GPs on dummy variables based on LP types and states. The sample consists of the cross-section of LPs used in my main analysis, with *Regulatory Exposure* being the outcome variable. Figure 5 plots the coefficient estimates and the 95% confidence intervals based on Huber-White standard errors. Although LP types and states have been documented to influence LP-GP matching (Lerner, Schoar, and

Wongsunwai, 2007; Hochberg and Rauh, 2013), these variables have little explanatory power for the variation of whether a LP has high exposure to newly registered GPs. Nearly all coefficient estimates are small in magnitude and statistically insignificant.

5.2 Main Findings

5.2.1 PE Fund Investments

As shown on the left in Figure 1, institutional investors such as pension funds, endowments, and insurance companies usually outsource their PE investments by committing capital to external fund vehicles. As the financial intermediary, the PE fund is managed by advisers who are mainly incentivized through compensation contracts which inevitably distort the advisers' incentives when information frictions exist (see Section 2.1). Regulatory oversight can complement market monitoring and incentive contracts in at least two important ways. First, the regulator acts as the "delegated monitor" that examines fund advisers periodically, reducing opportunistic behaviors. Second, mandatory disclosure improves the contracting environment, enabling investors to write and enforce contracts more effectively to incentivize their fund advisers.

I find that regulatory oversight of intermediaries facilitates financial intermediation across several proxies for fund investments. Table 4 presents the DiD estimates from Equation (2) for capital commitments to PE funds using outcome variables such as *Capital Commitment*, an indicator variable equal to one if the LP commits capital to PE funds in the year, and zero otherwise. In Columns (1)-(6), the coefficient estimates of *Regulatory Exposure* $\times$ *Post* are positive and significant at the 1% level. For example, Columns (1) and (2) suggest that the probability of LPs committing capital to PE funds has risen by 9.6% percentage points (around 28% of the unconditional mean) per year after the Dodd-Frank Act mitigates the agency frictions of newly registered PE fund advisers. The inclusion of LP fixed effects in the even Columns allows me to control for unobservable time-invariant LP characteristics that might be correlated with both their pre-existing relationships with GPs and their committed capital. In Columns (3)-(6), I find consistent results using alternative

measures of capital commitments based on the number of funds invested and the amount of committed capital.

Figure 6a plots the dynamic event-study plot for each year with the *Capital Commitment* as the dependent variable. It allows us to evaluate the parallel trend assumptions without imposing any ex-ante restrictions on when capital commitments should change. Figure 6a shows evidence that there is no significant pre-trend but a persistent increase in the likelihood of capital commitments by LPs with greater exposure to the increase in regulatory oversight of PE funds after the reform.

5.2.2 PE Direct Investments

Instead of holding private equity indirectly through PE funds, investors can directly purchase shares issued by private companies through direct investment, as illustrated on the right of Figure 1. On the one hand, direct investment allows investors to remove agency frictions in their outsourced managerial relationships. On the other hand, direct investment implies that investors have to give up the benefits of financial intermediation such as lower transaction costs and greater diversification (e.g., Benston and Smith, 1976; Leland and Pyle, 1977; Chan, 1983; Diamond, 1984). Therefore, investors trade off the agency costs and benefits of financial intermediation when deciding whether they should bypass PE funds. Since regulatory oversight reduces the agency costs associated with intermediation, it should decrease investors' incentives to bypass intermediation.

The results in Table 5 support this prediction. LP investors are less likely to bypass their GPs when regulatory oversight reduces the agency costs of financial intermediation. As reported in Column (1), in which *Direct Investment* is an indicator variable equal to one if the LP makes direct investments in private companies in the year and zero otherwise, the coefficient estimates of *Regulatory Exposure* $\times$ *Post* is negative and statistically significant, indicating an approximately 1.4 percentage decrease (around 35% of the unconditional mean) in the probability of making direct investments each year in the post-period for investors that face lower agency costs in the financial intermediation of PE investments. The results remain

quantitatively and qualitatively similar when we add LP fixed effects or use alternative measures of LPs' direct investments as shown in Columns (2)-(6) of Table 5.

The identification assumption requires that direct investment activities would have evolved similarly between LPs with high and low shares of newly registered advisers in their pre-existing relationships. It is supported by the pattern in Figure 6b, which indicates a lack of pre-trends but a significant decrease in the event-study estimates following the effective year of the Dodd-Frank Act.

The opposite directional changes in capital commitments and direct investments documented in Sections 5.2.1 and 5.2.2 indicate that my results are unlikely to be driven by unobservable LP characteristics correlated with secular trends in investors' allocation to private equity.

5.2.3 Heterogeneity based on GPs' Disciplinary History

To establish a direct link between regulatory oversight and agency costs, I exploit the disciplinary information reported by GPs in their Form ADV filings. LPs should not indiscriminately react to regulatory oversight of their GPs. Instead, they should be more responsive if these GPs are more susceptible to agency frictions - arguably those with previous disciplinary history. I confirm the prediction with LP capital commitments made at the fund level, by estimating various forms of the following regression:[28]

$$\begin{aligned} Ln(Committed\ Capital)_{i,j,k} = {} & \beta \times Newly\ Registered_j \times Post_t \\ & + \gamma \times Newly\ Registered_j \times Post_t \times Misconduct_j \\ & + \xi \times Misconduct_j \times Post_t + \boldsymbol{\phi_i} + \boldsymbol{\delta_j} + \boldsymbol{\tau_t} + \epsilon_{i,j,k} \end{aligned} \tag{4}$$

in which the subscript i, j, k, and t denote an LP, a GP, a fund, and a fund vintage year. *Newly Registered* is an indicator variable equal to one if a GP became newly registered in the effective year of the Dodd-Frank Act, and zero otherwise. *Misconduct* is an indicator

[28] Table C.2 presents LP-level evidence that LPs are more responsive to regulatory oversight of PE funds if LPs are exposed to GPs prone to agency frictions.

variable equal to one if the GP received investment-related regulatory actions as of the effective year of the Dodd-Frank Act, and zero otherwise. Regulatory misconduct frequently involves insufficient or misleading information regarding fees, asset values, and similar matters. $\boldsymbol{\phi_i}$, $\boldsymbol{\delta_j}$ and $\boldsymbol{\tau_t}$ are LP, GP, and year fixed effects. The inclusion of GP fixed effects controls for GP skills and other time-invariant characteristics. Standard errors are two-way clustered at the LP and GP levels.

The coefficients reported in Table 6 suggest two findings. First, regulatory oversight of GPs increases LPs' fund investments and such increase is mainly concentrated among GPs more prone to agency frictions as indicated by the positive estimates of *Newly Registered* $\times$ *Post* $\times$ *Misconduct* across all columns, which are statistically significant at the 5% level. Column (1) controls for LP's average demand of private equity by including LP fixed effects. Column (2) further allows LP demand to vary across years based on an LP's institutional type and headquarter state, by saturating the vintage year fixed effects with vintage by LP type and vintage by LP state fixed effects. Column (3) includes vintage by LP fixed effects so that the regression compares capital commitments across different funds within an LP-year conditional on GP skills.

Second, the negative coefficient estimates of *Misconduct* $\times$ *Post* indicate that mandatory disclosure of misconduct reduces LPs' capital commitments, which aligns with GPs' reduced fundraising ability after such disclosure documented by Jiang, Mason, Qian, and Utke (2024). However, the interpretation of my empirical design is more nuanced and the coefficient should not be interpreted as a "clean" effect of disclosure. While unregistered advisers are required to disclose disciplinary information in the past ten years only after the Dodd-Frank Act, registered advisers are always subject to this mandatory disclosure even before the reform. Therefore, only the misconduct histories of unregistered advisers and newly registered advisers in 2012 are new information for LPs.

Overall, the findings can reject many potential confounding factors as alternative explanations to my results, unless they can explain why the positive impact of registration on

capital commitments is mainly concentrated among GPs with prior misconduct.

5.3 Alternative Explanations

The absence of pre-trends in the outcome variables and the cross-sectional heterogeneity presented in Section 5.2.3 provide strong support for causality. Moreover, the opposing directional changes in capital commitments and direct investments suggest that my findings are unlikely to be influenced by unobservable LP characteristics that are correlated with broader secular trends in investors' allocation to private equity. However, I take further steps to discuss and address alternative explanations:

Secular Trends across Different GPs. The new registration exemptions are closely linked to the size of GPs and their investment strategies. This connection raises potential concerns that the observed effects of registrations may not simply reflect the regulatory oversight themselves but could instead arise from underlying differences in investment opportunities or market dynamics, for instance, between smaller and larger GPs or between GPs managing buyout funds versus those managing VC funds. To address these concerns, I re-estimate my baseline regressions allowing LP outcomes to evolve along flexible time trends based on the characteristics of GPs in LPs' pre-existing relationships. This approach controls for potential confounding variations due across GPs with different size or investment strategy over time. Table 7 Panel A reports these estimates, which are quantitatively and qualitatively similar to my main findings. Furthermore, evidence from within-GP estimation detailed in Appendix C.1 reveals that GPs with differences in size or investment focus exhibit similar fundraising outcomes before and after the Dodd-Frank Act.[29] Overall, these findings suggest that the observed effects are less likely to be driven by pre-existing differences in GP characteristics and more likely to reflect the direct impact of the exemptions themselves.

Volcker Rule. Another important regulatory intervention introduced by the Dodd-Frank Act is the Volcker Rule, which prohibits banks from investing in private equity.Since GPs tend to raise funds from local LPs, restricting bank LPs could potentially lead to a greater supply

[29]In contrast, Appendix C.1 also shows that GPs that become registered subsequently raise more funds.

of PE funds to non-bank LPs in the same region and affect their PE investment decisions (e.g., Hochberg and Rauh, 2013; Chen and Ewens, 2024). I rule out this explanation by including year-by-LP-state fixed effects, which absorb any time-varying shocks at the LP-state level. The coefficient estimates reported in Table 7 Panel B remain similar quantitatively and qualitatively. Moreover, such a spillover effect is also unlikely to drive my results through pre-existing LP-GP relationships. In untabulated analysis, I find that the high-exposure LPs studied in my difference-in-differences design are less likely to invest with bank LPs or have pre-existing relationships with GPs that raise capital from bank LPs.[30]

Moreover, LP investors consist of vastly different financial institutions such as pension fund managers, endowments, insurance firms, and fund of funds managers, which have systematic differences in terms of balance sheets, investment objectives, and exposure to economic and regulatory shocks. My results are robust to adding LP type by year fixed effects, addressing concerns that different financial institutions might invest differently in PE markets following the financial crisis, for example due to potential confounding regulations that affect them differently.

6 Capital Allocation Implications of Disintermediation

From a social planner's perspective, the organizational structure of PE markets matters if there are capital allocation implications. Given that most LP investors lack expertise in due diligence and post-investment management of private companies, a pertinent question arises: which types of companies do LPs tend to finance directly, and do these companies exhibit lower quality compared to those financed by PE funds? This section delves into the potential implications of disintermediation in PE markets on these aspects.

To investigate the relationship between LP direct investments and a set of company characteristics, I estimate regressions using *LP Ratio (%)*, the percentage of PE investors that are limited partners in a deal, as the dependent variable and the companies' characteristics

[30]Throughout the paper, bank LPs are excluded from my analysis and these LPs have little coverage by Preqin.

as independent variables. One advantage of examining the deal-level share of LP investors is that we can largely isolate companies' demand for private capital, which is positively correlated with the denominator in the share variable. The results are reported in Table 8.

In Column (1), the independent variable *Early Stage* is an indicator variable equal to one if the company is raising capital in a venture capital deal with a round number below Series C, and zero otherwise. Column (1) reveals a strong negative correlation between the maturity of the company and the share of LP investors directly providing capital to it. This result suggests that information asymmetry is an important friction that could potentially affect capital allocation if LPs invest in private companies without the expertise of specialized intermediaries. Such an idea is confirmed by the results in Columns (2) and (3), in which the independent variables are company age in years and number of the funding round that the company is raising. Both variables measure the amount of information available on the company and have positive coefficient estimates at the 1% significance level.

In Column (4), the independent variable *Ln(1 + Capital Raised)* captures the size of a company since companies that have raised more capital are arguably larger. The estimated coefficients are positive and highly significant, supporting the idea that LP investors tend to finance larger companies. These companies are potentially more visible for LPs which have limited deal sourcing compared to their GPs.

Column (5) reports the estimates in which the independent variable is *Number of Highly Cited Patents / Deal Size*, the number of (eventually granted) highly cited patents applied for in the next three years, scaled by the deal size. Highly cited patents are defined as those with the top quintile numbers of citations among patents granted in the same year. A one-standard-deviation increase in this variable would lower the LP ratio by 4%.

Combined together, the results in Table 8 are consistent with the extreme corporate finance challenges in financing private companies, such as information asymmetry and uncertainty as well as low asset tangibility. Moreover, the large minimum investment threshold in PE deals reduces LPs' risk diversification when making direct invesmtents, while GPs

can pool capital from a large number of LPs and spread capital across a diverse range of investments. These frictions imply that younger, more risky, and more innovative firms would be underfunded in a disintermediated PE market compared to a market with financial intermediation. The potential capital allocation inefficiency provides a rationale for the role of policy intervention to facilitate intermediation in PE markets.

7 Conclusion

Financial intermediation plays a vital role in the efficiency of complex economies. However, policy intervention might be necessary when market forces fail to sufficiently align the interests of financial intermediaries with their investors' due to pervasive information frictions.

This paper provides causal evidence that regulatory oversight mitigates agency frictions associated with intermediation and enhances the organizational structure of financial markets. My empirical setting utilizes the Dodd-Frank Act, a landmark change that significantly expanded the regulatory oversight of PE funds by subjecting many fund advisers to examinations, rules, and disclosure. While PE investors can achieve better monitoring and obtain a wider range of incentive tools by organizing PE investment activities within their own organizations, the associated disintermediation in PE markets may shift capital allocation towards more mature, larger, and less innovative companies due to investors' limited ability to overcome asymmetric information and under-diversification when financing private companies directly.

While there are several reasons to regulate PE funds, such as investor protection, market transparency, and market efficiency, new regulations usually impose operational, administrative, and transaction costs on PE fund advisers. Many of these will ultimately be passed on to investors in the form of lower returns. Therefore, this paper can inform the active debate over the costs and benefits of regulation in PE markets, which have played an increasingly important role in nearly every sector of the economy.

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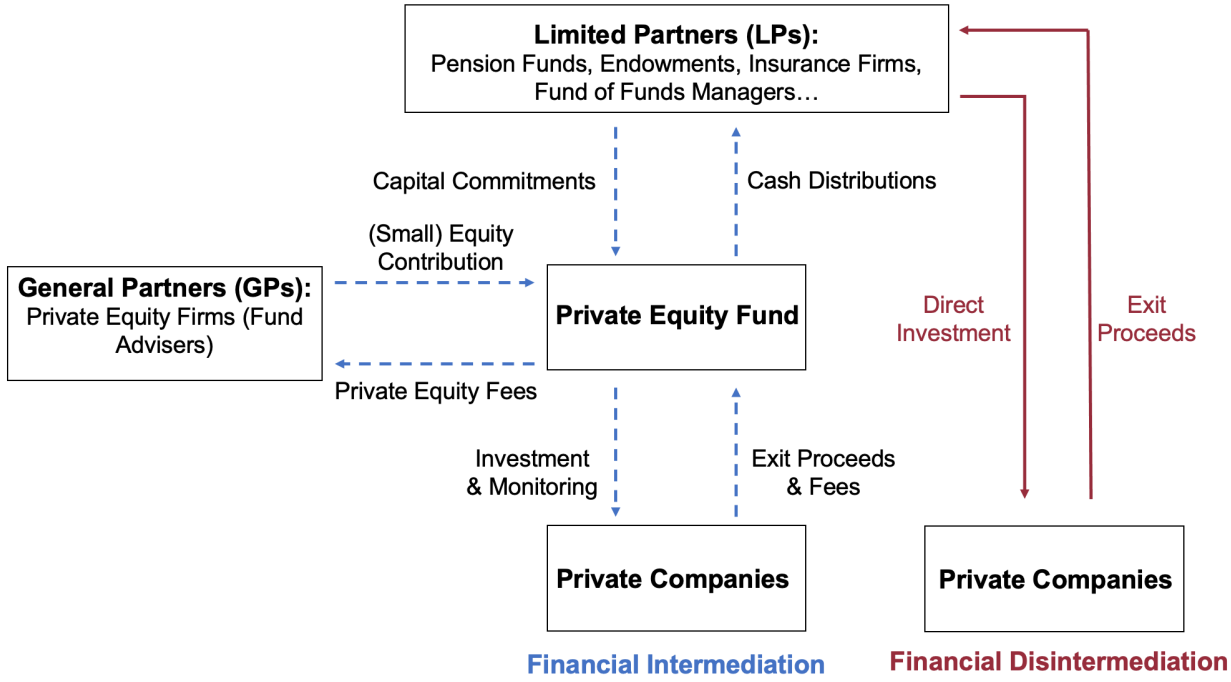
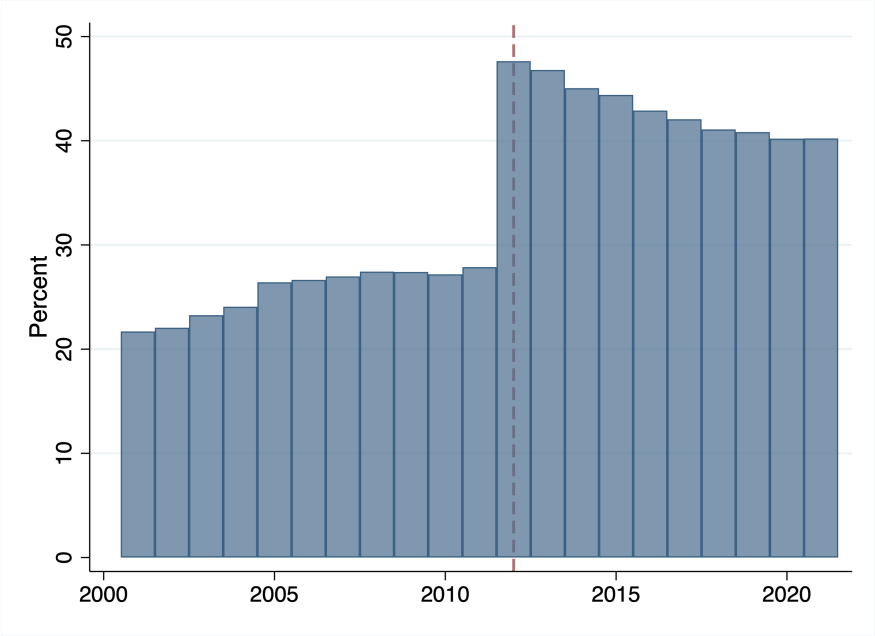
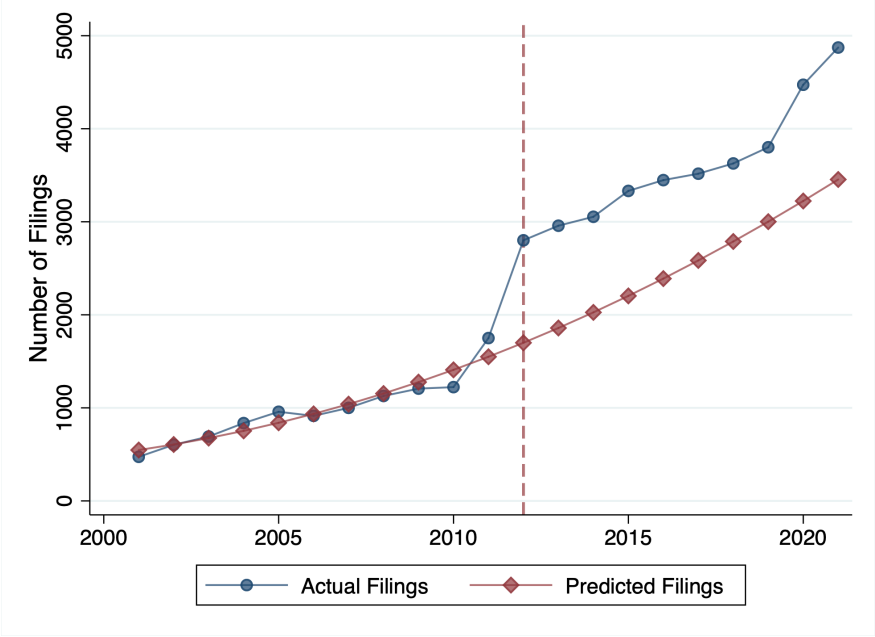


Figure 1: Organizational Structure of the PE Market

This figure illustrates the organizational structures of the PE market. On the one hand, the market is intermediate by PE funds, as shown in the blue dashed arrows on the left (Da Rin, Hellmann, and Puri, 2013). In this setting, PE fund advisers, also referred to as general partners (GPs), select, monitor, and exit private companies on behalf of their limited partner (LP) investors in exchange for various fees discussed in more detail in Section 2.1. On the other hand, these institutional investors can directly purchase private equity issued by companies without the intermediation of PE funds, as shown in the red solid arrows on the right. This process is known as LP direct investing and allows LPs to remove agency costs in outsourced relationships.



(a) Share of Advisers Registered with the SEC



(b) Number of Form ADV Filed by Registered Advisers

Figure 2: Dodd-Frank Act and the Expansion of Regulatory Oversight of PE funds

Figure 2a shows the share of PE fund advisers that are registered with the SEC over time. Registered advisers are subject to the SEC's regulatory scrutiny, rules, and disclosure requirements. The total number of advisers is unobservable before 2012 and estimated using out-of-sample predictions based on a regression that fits the numbers derived from Form ADV with those obtained from Preqin during 2012-2021. Figure C.1 further highlights the number and timing of registrations, indicating GPs' limited ability to manipulate their registration status. Figure 2b displays the actual and predicted number of Form ADV filed by registered PE fund advisers each year. The predicted value is estimated using a model fitted with a quadratic time trend for the 2001-2011 period. In each figure, the red vertical dashed line indicates 2012 when the Dodd-Frank Act became effective and significantly narrowed PE fund advisers' registration exemptions.

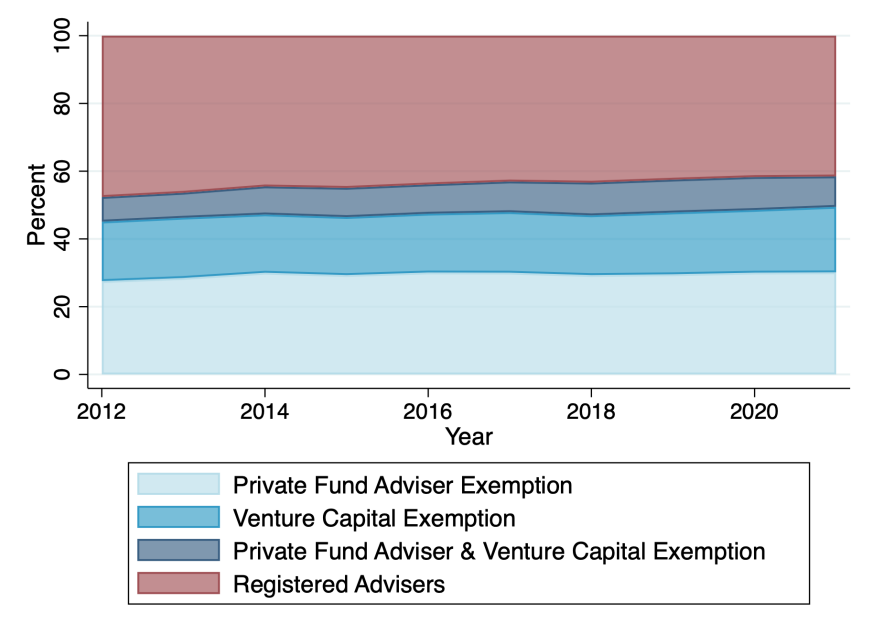
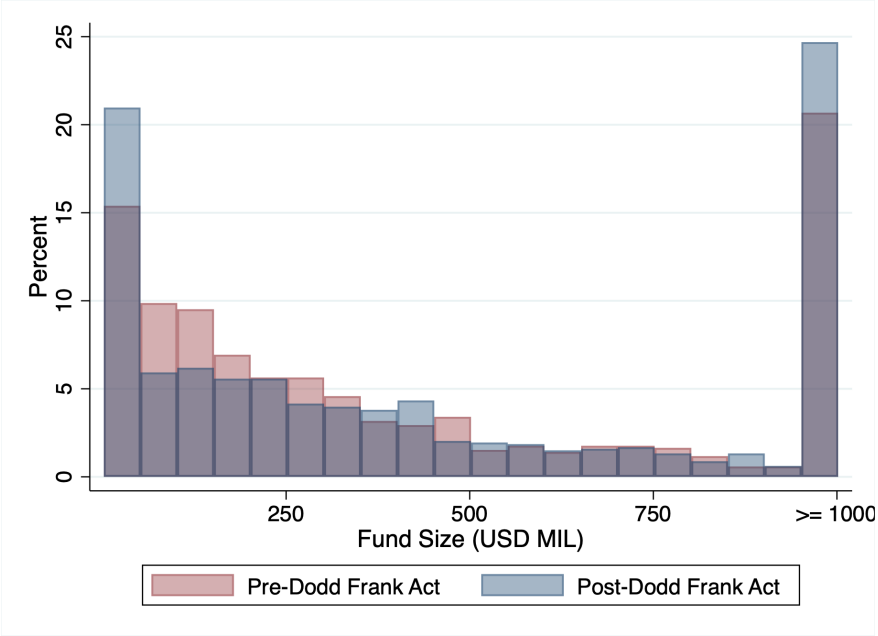
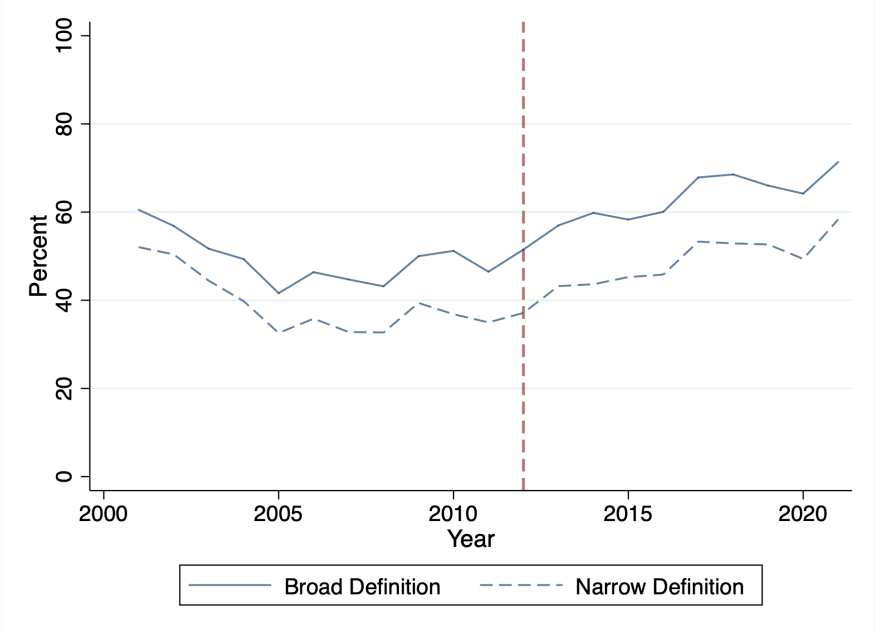


Figure 3: Share of Exempt Reporting Advisers by Qualified Exemption

Figure 3 shows the share of exempt reporting PE funds advisers by qualified exemption in the post-Dodd Frank period from 2012 to 2021. These unregistered advisers are shown in different shades of blue, while registered advisers are indicated in red. The figure indicates a limited aggregate change in PE fund characteristics across advisers post-reform. Advisers qualify for the private fund adviser exemption if solely advising private funds and have assets under management, as defined in rule 203(m)-1, in the US of less than $150 MIL. Advisers qualify for the venture capital exemption if solely advising venture capital funds, as defined in rule 203(1)-1. The detailed regulatory definition is discussed in Appendix A.



(a) Buyout Fund Size Distribution



(b) Time Series Evolution of Venture Capital Fundraising

Figure 4: Aggregate Fundraising Characteristics Before and After the Dodd-Frank Act

Figure 4a shows the cross-sectional size distribution of buyout funds raised before and after the effective year of the Dodd-Frank Act. Figure 4b illustrates the time-series evolution of the percentage of PE funds classified as venture capital (VC) funds. Both figures indicate limited aggregate changes in PE fund characteristics across advisers around the reform. These characteristics are determinants of the new registration exemptions under the Dodd-Frank Act. The solid line uses a broad definition including funds classified as early stage, expansion / late stage, venture (general), growth, and balanced funds by Preqin. The dashed line uses a narrow definition including funds classified as early stage and venture (general) funds by Preqin. The red vertical dashed line indicates the base year 2011, the year before the Dodd-Frank Act significantly narrowed PE fund advisers' registration exemptions.

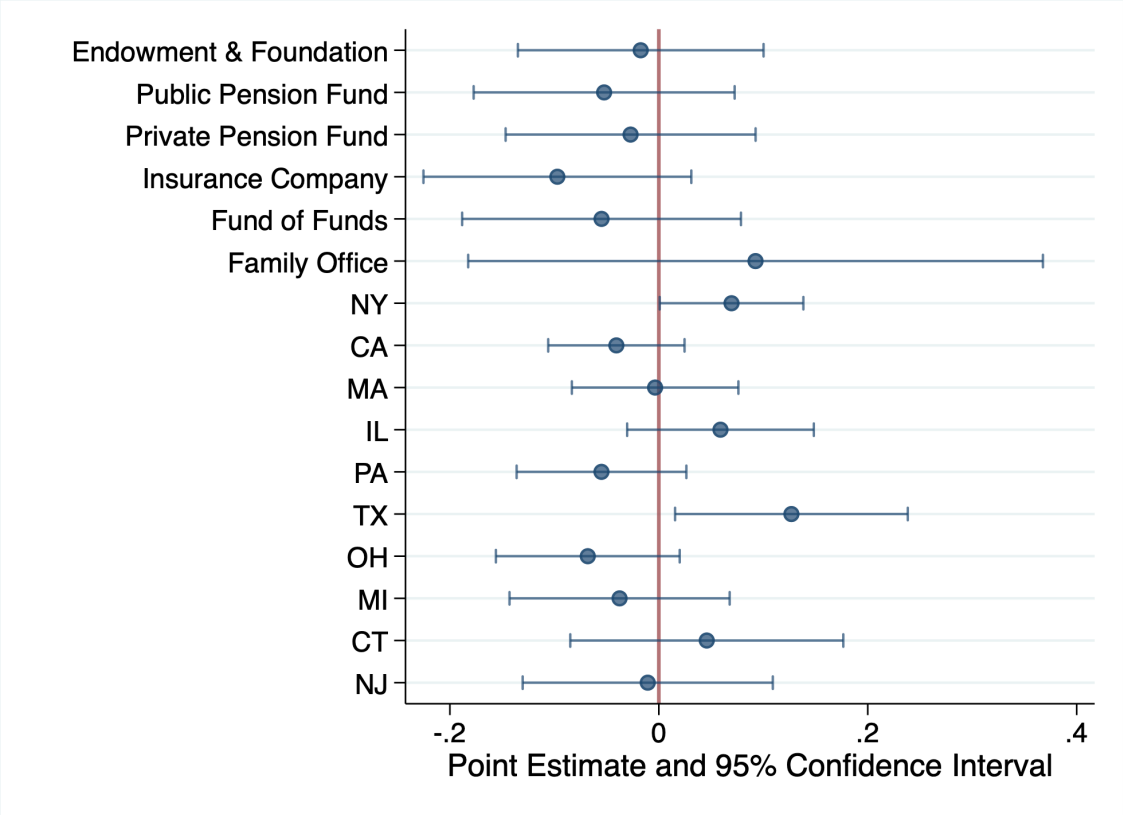
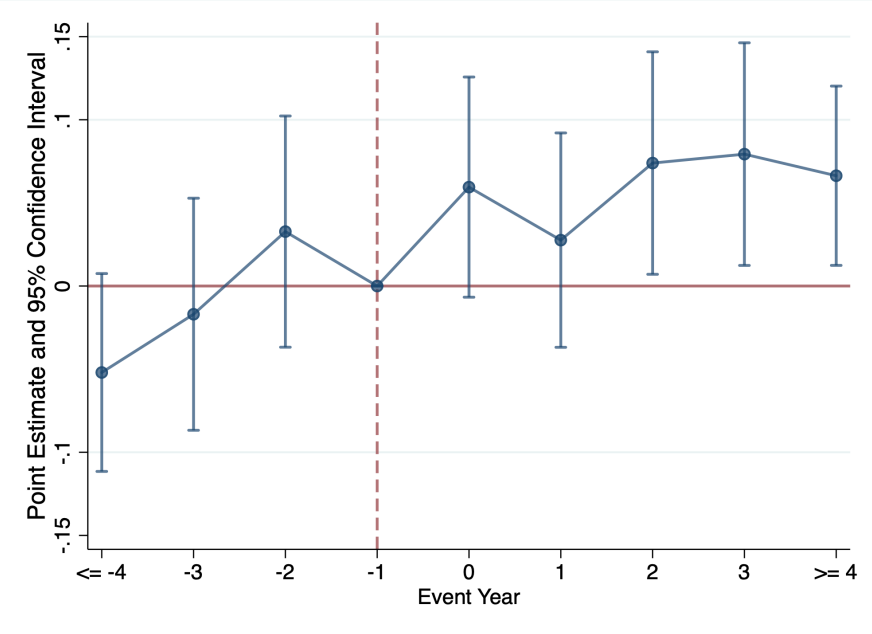
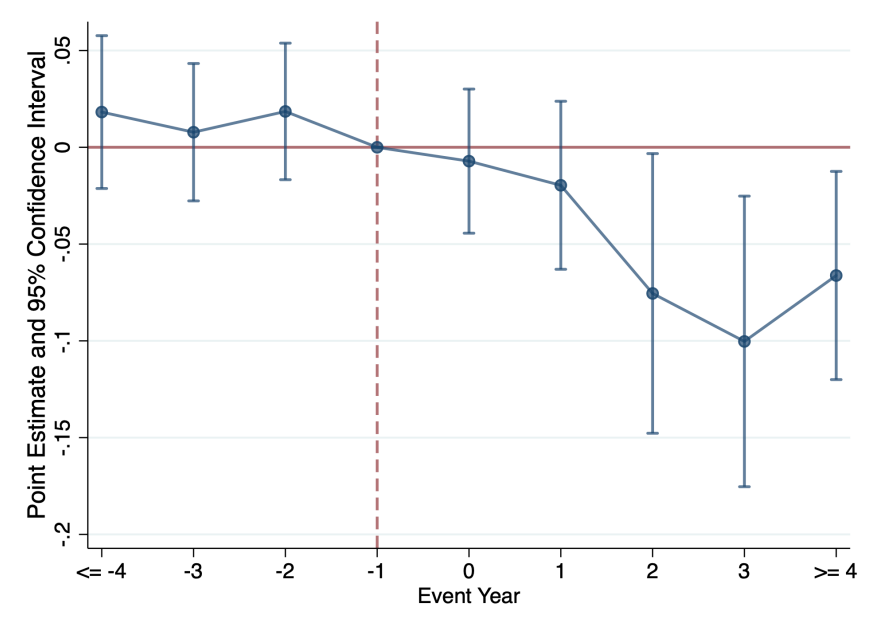


Figure 5: Linear Probability Estimates Explaining Exposure to Newly Registered GPs

This figure plots the linear probability coefficients and the associated two-tailed 95% confidence intervals from a cross-sectional regression of whether a LP has high exposure to newly registered GPs on dummy variables based on LP institutional types and headquarter states known to influence LP-GP matching as documented by Lerner, Schoar, and Wongsunwai (2007) and Hochberg and Rauh (2013). Huber-White standard errors are used. The outcome variable, *Regulatory Exposure*, is an indicator variable equal to one if the share of newly registered GPs in the LP's pre-existing LP-GP relationships is in the top quintile group, and zero otherwise. The omitted group for LP types includes institutions such as government agencies, investment trusts, and wealth managers. The omitted group for LP states includes the rest of the US states other than the top 10 LP states (NY, CA, MA, IL, PA, TX, OH, MI, CT, NJ). The estimates suggest that these LP characteristics have little explanatory power of whether a LP has high exposure to newly registered GPs, supporting quasi-random variation of LPs' exposure to the regulatory shock.



(a) Capital Commitment



(b) Number of Direct Investments

Figure 6: Dynamic Effects of Regulatory Oversight on LP Investors' Delegated Investment

This figure plots the annual event-study coefficient estimates and associated two-tailed 95% confidence intervals of the difference between LPs with high (treatment group) and low exposure (control group) to newly registered GPs in their pre-existing LP-GP relationships. The coefficient in 2011 (t = -1) is normalized to zero. The red vertical dashed line indicates the base year of 2011, the year before the Dodd-Frank Act brought PE fund advisers under the SEC's regulatory oversight. The outcome variables are indicated in subcaptions. The regressions control for LP size and include year and LP fixed effects. Standard errors are clustered at the LP level.

Table 1: Summary Statistics

This table reports the summary statistics of the main variables in my analysis. For Panel A, the sample consists of 1,182 unique US private equity (PE) fund advisers, also known as general partners (GPs), during the period 2001-2021. A unit of observation is a GP-year. The value of indicator variables *Regulatory Action*, *Censure*, *Disgorgement/Restitution*, *Cease and Desist*, and *Monetary Sanction* is scaled by 100. For Panel B, the sample consists of 1,448 unique US limited partner (LP) investors located during the period 2001-2021. A unit of observation is an LP-year. For Panel C, the sample consists of LP-fund pairs for 2,042 unique PE funds invested by the sample LPs during 2001-2021. These funds are either venture capital or buyout funds. A unit of observation is an LP-fund pair. For Panel D, the sample consists of US PE deals raised by 68,471 unique companies during 2001-2021. A unit of observation is a PE deal, which can be either a venture capital or a buyout transaction. Detailed variable definitions are provided in Appendix B.

	Mean	Std.	p10	p25	p50	p75	p90	N
Panel A: GP-Year Level								
Registered	0.32	0.47	0.00	0.00	0.00	1.00	1.00	15,490
Regulatory Action	1.08	10.33	0.00	0.00	0.00	0.00	0.00	15,490
Censure	0.46	6.75	0.00	0.00	0.00	0.00	0.00	15,490
Disgorgement/Restitution	0.45	6.66	0.00	0.00	0.00	0.00	0.00	15,490
Cease and Desist	0.65	8.01	0.00	0.00	0.00	0.00	0.00	15,490
Monetary Sanction	1.03	10.11	0.00	0.00	0.00	0.00	0.00	15,490
Fine Amount ($ MIL)	1.49	65.35	0.00	0.00	0.00	0.00	0.00	15,490
GP Size	1441.24	4429.29	53.30	131.00	353.00	1050.00	2671.50	15,490
Number of Funds Raised	2.49	2.30	1.00	1.00	2.00	3.00	4.00	15,490
Buyout	0.44	0.50	0.00	0.00	0.00	1.00	1.00	15,490
Panel B: LP-Year Level								
Regulatory Exposure	0.18	0.38	0.00	0.00	0.00	0.00	1.00	28,308
Post	0.51	0.50	0.00	0.00	1.00	1.00	1.00	28,308
Capital Commitment	0.34	0.47	0.00	0.00	0.00	1.00	1.00	28,308
Number of Funds	1.07	2.34	0.00	0.00	0.00	1.00	3.00	28,308
Commitment Amount ($ MIL)	39.41	111.86	0.00	0.00	0.00	16.67	114.72	28,308
Direct Investment	0.04	0.19	0.00	0.00	0.00	0.00	0.00	28,308
Number of Direct Investments	0.11	0.91	0.00	0.00	0.00	0.00	0.00	28,308
Direct Investment Amount ($ MIL)	1.61	53.91	0.00	0.00	0.00	0.00	0.00	28,308
LP Size ($ MIL)	365.49	828.42	0.00	11.20	72.59	296.12	940.41	28,308
Panel C: LP-Fund Level								
Committed Capital ($ MIL)	44.04	44.93	6.03	13.14	27.50	57.86	100.00	25,413
Newly Registered	0.52	0.50	0.00	0.00	1.00	1.00	1.00	25,413
Post	0.41	0.49	0.00	0.00	0.00	1.00	1.00	25,413
Misconduct	0.06	0.24	0.00	0.00	0.00	0.00	0.00	25,413
Panel D: Private Equity Deal Level								
LP Ratio (%)	1.62	7.36	0.00	0.00	0.00	0.00	0.00	125,206
Early Stage	0.42	0.49	0.00	0.00	0.00	1.00	1.00	125,206
Company Age	11.33	17.08	1.00	2.00	5.00	12.00	31.00	108,917
Round Number	2.15	1.72	1.00	1.00	1.00	3.00	5.00	125,206
Capital Raised ($ MIL)	67.19	195.41	1.05	3.37	12.42	42.10	126.49	81,177
Number of Highly Cited Patents / Deal Size	0.07	0.32	0.00	0.00	0.00	0.00	0.05	73,725

Table 2: SEC Registration and Regulatory Oversight of PE Fund Advisers

This table shows the relationship between PE fund advisers' SEC registration status and regulatory actions received by advisers for their misconduct, based on estimates from Equation (1). The sample consists of PE fund advisers, also known as general partners (GPs), located in the US during the period 2001-2021. A unit of observation is a GP-year. *Registered* is an indicator variable equal to one if the GP is registered with the SEC in a given year, and zero otherwise. The outcome variables are a set of variables based on regulatory actions disclosed by the advisers in their Form ADV filings. For example, *Regulatory Action* is an indicator variable equal to one if the GP receives regulatory disciplinary actions in the year, and zero otherwise. *Cease and Desist* is an indicator variable equal to one if the GP receives a cease and desist order in the year, and zero otherwise. *Ln(1 + Fine Amount)* is the natural logarithm of the fine amount in USD MIL. The regressions control for GP characteristics related to the registration exemptions under the Investment Adviser Act and Dodd-Frank Act (see Section 2.2). *Ln(GP Size)* is the natural logarithm of the amount of capital in USD MIL raised by PE funds managed by the adviser in the past 10 years. *Number of Funds Raised* is the number of PE funds raised by the GP in the past 10 years. *Buyout* an indicator variable equal to one if the GP manages buyout funds, and zero otherwise. Detailed variable definitions are provided in Appendix B. Standard errors are clustered at the GP level and reported in brackets. ***, ** and * indicate 1%, 5% and 10% significance level.

	Regulatory Action	Censure	Disgorgement/ Restitution	Cease and Desist	Monetary Sanction	Ln(1 + Fine Amount)
	(1)	(2)	(3)	(4)	(5)	(6)
Registered	0.029***	0.014**	0.014***	0.019***	0.028***	0.058***
	[0.008]	[0.006]	[0.005]	[0.006]	[0.008]	[0.022]
Number of Funds Raised	0.001	0.000	0.001	0.001	0.001	0.001
	[0.001]	[0.000]	[0.000]	[0.001]	[0.001]	[0.002]
Ln(GP Size)	0.002	0.001	0.001	0.001	0.002	0.008
	[0.002]	[0.002]	[0.001]	[0.001]	[0.002]	[0.005]
Buyout	-0.007*	-0.003	-0.002	-0.005*	-0.007*	-0.019
	[0.004]	[0.003]	[0.002]	[0.003]	[0.004]	[0.013]
GP State FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
Observations	15,480	15,480	15,480	15,480	15,480	15,480
Adjusted R^2	0.035	0.019	0.021	0.024	0.035	0.021

Table 3: Sticky LP-GP Relationships

This table shows the pass-through estimates from Equation (3) suggesting that LP-GP relationships are sticky in the private equity market. The sample includes all possible LP-GP relationships, both realized or unrealized, for funds raised from 2001-2021. $Invest_k$ is an indicator variable equal to one if an LP invests in the k-th PE fund raised by a GP, and zero otherwise. Each panel reports the path-through estimates for different n with the outcome variable indicated in the panel caption. For example, Panel A shows the incremental probability that an LP will invest in the next PE fund raised by the GP if the LP has invested in its current fund. Column (1) controls for a GP's average market share by including GP fixed effects. Column (2) allows the market share to be time-varying by including GP by year fixed effects. Column (3) adds GP by LP state and GP by LP type fixed effects to account for potential GP specialization by LP state or LP type. Column (4) further controls for fund characteristics by including a fund type dummy, based on whether the fund is a venture capital or buyout fund, and fund size dummies, based on the fund's size quintile, as well as fund number dummies. Standard errors are two-way clustered, at the LP and GP levels, and reported in brackets. ***, ** and * indicate 1%, 5% and 10% significance level.

	(1)	(2)	(3)	(4)
Panel A: Invest$_{k+1}$				
Invest$_k$	0.405***	0.405***	0.393***	0.392***
	[0.013]	[0.013]	[0.013]	[0.013]
Observations	6,507,889	6,507,889	6,501,467	5,985,357
Adjusted R^2	0.190	0.193	0.196	0.198
Panel B: Invest$_{k+2}$				
Invest$_k$	0.287***	0.287***	0.274***	0.272***
	[0.016]	[0.016]	[0.016]	[0.015]
Observations	4,070,636	4,070,636	4,066,895	3,792,964
Adjusted R^2	0.108	0.112	0.121	0.121
Panel C: Invest$_{k+3}$				
Invest$_k$	0.233***	0.233***	0.223***	0.220***
	[0.021]	[0.021]	[0.022]	[0.019]
Observations	2,697,002	2,697,002	2,694,597	2,527,197
Adjusted R^2	0.082	0.086	0.099	0.098
GP FE	✓			
GP × Year FE		✓	✓	✓
GP × LP State FE			✓	✓
GP × LP Type FE			✓	✓
Fund Type FE				✓
Fund Size FE				✓
Fund Number FE				✓

Table 4: Regulatory Oversight of PE Funds and Investors' Fund Investments

This table investigates how regulatory oversight of fund advisers affects LP investors' outsourced PE investment measured by their capital commitments to PE funds. The sample consists of LP investors located in the US during the period 2001-2021. A unit of observation is an LP-year. *Capital Commitment* is an indicator variable equal to one if the LP commits capital to any PE funds in the year, and zero otherwise. *Number of Funds* is the number of PE funds the LP committed capital to in one year. *Ln(1 + Committed Capital)* is the natural logarithm of one plus the amount of capital in USD MIL committed to PE funds in one year. *Regulatory Exposure* is an indicator variable equal to one if the share of newly registered GPs in the LP's pre-existing LP-GP relationships is in the top quintile group, and zero otherwise. *Post* is an indicator variable equal to one if the year is or after 2012, the effective year of the Dodd-Frank Act, and zero otherwise. *Ln(LP Size)* is the natural logarithm of the capital committed to PE funds along with the direct investments made by an LP in the past 10 years. Detailed variable definitions are provided in Appendix B. Standard errors are clustered at the LP level and reported in brackets. ***, ** and * indicate 1%, 5% and 10% significance level.

	Capital Commitment		Number of Funds		Ln(1 + Committed Capital)	
	(1)	(2)	(3)	(4)	(5)	(6)
Regulatory Exposure × Post	0.096***	0.096***	0.328***	0.290***	0.317***	0.307***
	[0.018]	[0.018]	[0.072]	[0.070]	[0.077]	[0.076]
Ln(LP Size)		0.000		0.079***		0.020**
		[0.002]		[0.010]		[0.010]
LP FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
Observations	28,308	28,308	28,308	28,308	28,308	28,308
Adjusted R^2	0.350	0.350	0.572	0.574	0.469	0.469

Table 5: Regulatory Oversight of PE Funds and Investors' Direct Investments

This table investigates how regulatory oversight of fund advisers affects LP investors' incentives to bypass financial intermediation through direct investing. The sample consists of LP investors located in the US during the period 2001-2021. A unit of observation is an LP-year. *Direct Investment* is an indicator variable equal to one if the LP makes direct investments in private companies in the year, and zero otherwise. *Number of Direct Investments* is the number of direct investments in private companies made by the LP in one year. *Ln(1 + Direct Investment Amount)* is the natural logarithm of one plus the amount of direct investments in USD MIL made by the LP in one year. *Regulatory Exposure* is an indicator variable equal to one if the share of newly registered GPs in the LP's pre-existing LP-GP relationships is in the top quintile group, and zero otherwise. *Post* is an indicator variable equal to one if the year is or after 2012, the effective year of the Dodd-Frank Act, and zero otherwise. *Ln(LP Size)* is the natural logarithm of the capital committed to PE funds along with the direct investments made by an LP in the past 10 years. Detailed variable definitions are provided in Appendix B. Standard errors are clustered at the LP level and reported in brackets. ***, ** and * indicate 1%, 5% and 10% significance level.

	Direct Investment		Number of Direct Investments		Ln(1 + Direct Investment Amount)	
	(1)	(2)	(3)	(4)	(5)	(6)
Regulatory Exposure × Post	-0.013*	-0.014*	-0.068***	-0.075***	-0.034**	-0.037***
	[0.007]	[0.007]	[0.026]	[0.027]	[0.014]	[0.014]
Ln(LP Size)		0.003***		0.014***		0.006***
		[0.001]		[0.004]		[0.002]
LP FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
Observations	28,308	28,308	28,308	28,308	28,308	28,308
Adjusted R^2	0.395	0.395	0.510	0.511	0.427	0.427

Table 6: Heterogeneity - Capital Commitments at the Fund Level

This table investigates the relationship between regulatory oversight of PE fund advisers and capital commitment made by LP investors at the fund level. The sample includes fund-level capital commitments made by LPs during the period 2001-2021. *Ln(Committed Capital)* is the natural logarithm of the amount of capital in USD MIL committed to PE funds in one year. *Newly Registered* is an indicator variable equal to one if a GP became newly registered in the effective year of the Dodd-Frank Act, and zero otherwise. *Post* is an indicator variable equal to one if the year is or after 2012, the effective year of the Dodd-Frank Act, and zero otherwise. *Misconduct* is an indicator variable equal to one if the GP received investment-related regulatory actions as of the effective year of the Dodd-Frank Act, and zero otherwise. Regulatory misconduct frequently involves insufficient or misleading information regarding fees, asset values, and similar matters. While unregistered advisers are required to disclose disciplinary information in the past ten years only after the Dodd-Frank Act, registered advisers are always subject to this mandatory disclosure even before the reform. Therefore, only the misconduct histories of unregistered advisers and newly registered advisers in 2012 are new information for LPs. *Newly Registered* × *Misconduct*, *Misconduct*, and *Post* are absorbed by the fixed effects. Detailed variable definitions are provided in Appendix B. Standard errors are two-way clustered, at the LP and GP levels, and reported in brackets. ***, ** and * indicate 1%, 5% and 10% significance level.

	Ln(Committed Capital)		
	(1)	(2)	(3)
Newly Registered × Post	-0.026	-0.033	-0.004
	[0.054]	[0.050]	[0.049]
Newly Registered × Post × Misconduct	0.290**	0.331**	0.345**
	[0.138]	[0.133]	[0.164]
Misconduct × Post	-0.158**	-0.238***	-0.273***
	[0.075]	[0.052]	[0.074]
GP FE	✓	✓	✓
LP FE	✓	✓	
Vintage Year FE	✓		
Vintage Year × LP Type FE		✓	
Vintage Year × LP State FE		✓	
Vintage Year × LP FE			✓
Observations	10,853	10,748	10,019
Adjusted R^2	0.738	0.754	0.776

Table 7: Heterogeneous Time Trends

This table rules out alternative explanations based on different GP or LP dynamics by adding flexible trends across LPs. The sample consists of LP investors located in the US during the period 2001-2021. A unit of observation is an LP-year. Panel A controls for heterogeneous trends across LPs based on the GP characteristics in LPs' pre-existing relationships. Panel B controls for heterogeneous trends based on LP characteristics. Results remain quantitatively and qualitatively similar when all trends are included in regressions. *Large GP Share* ranks LPs into quintile groups based on the share of large GPs in their pre-existing relationships. Large GPs are those that in the top quintile group based on the total amount of PE funds raised in the past ten years before 2011, the year before the Dodd-Frank Act becomes effective. *Buyout GP Share* ranks LPs into quintile groups based on the share of buyout GPs in their pre-existing relationships. Buyout GPs are those that raised buyout funds in the past ten years as of 2011. These GP characteristics are correlated with registration udner the Dodd-Frank Act (see Section 2.2). *LP Type* are dummy variables based on the institutional types of LPs, such as public pension funds, private pension funds, endowments, and insurance companies. *LP State* are dummy variables based on the headquarter state of the LP. Detailed in Appendix C, Table C.3 presents GP-level evidence that GPs with different sizes or investment strategies do not face different dynamics in investment opportunities after the Dodd-Frank Act. Detailed variable definitions are provided in Appendix B. Standard errors are clustered at the LP level and reported in brackets. ***, ** and * indicate 1%, 5% and 10% significance level.

	Capital Commitment	Number of Funds	Ln(1 + Committed Capital)	Direct Investment	Number of Direct Investments	Ln(1 + Direct Investment Amount)
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: GP Characteristics						
Regulatory Exposure × Post	0.068***	0.148**	0.225***	-0.012	-0.057**	-0.031**
	[0.019]	[0.069]	[0.078]	[0.008]	[0.023]	[0.013]
Ln(LP Size)	0.001	0.082***	0.023**	0.003***	0.014***	0.006***
	[0.002]	[0.010]	[0.010]	[0.001]	[0.004]	[0.002]
LP FE	✓	✓	✓	✓	✓	✓
Year × Large GP Share FE	✓	✓	✓	✓	✓	✓
Year × Buyout GP Share FE	✓	✓	✓	✓	✓	✓
Observations	27,830	27,830	27,830	27,830	27,830	27,830
Adjusted R^2	0.355	0.590	0.478	0.398	0.511	0.430
Panel B: LP Characteristics						
Regulatory Exposure × Post	0.101***	0.333***	0.358***	-0.015**	-0.068**	-0.037**
	[0.018]	[0.071]	[0.074]	[0.008]	[0.027]	[0.015]
Ln(LP Size)	-0.003	0.065***	0.007	0.003***	0.017***	0.007***
	[0.002]	[0.010]	[0.010]	[0.001]	[0.005]	[0.002]
LP FE	✓	✓	✓	✓	✓	✓
Year × LP Type FE	✓	✓	✓	✓	✓	✓
Year × LP State FE	✓	✓	✓	✓	✓	✓
Observations	28,246	28,246	28,246	28,246	28,246	28,246
Adjusted R^2	0.372	0.595	0.493	0.396	0.516	0.429

Table 8: Relationships Between Company Characteristics and Direct Investments

This table reports results that investigate the link between a set of company characteristics and investors' direct investment in private equity. The sample consists of US PE deals during the period 2001-2021. A unit of observation is a PE deal. *LP Ratio (%)* is the percentage of PE investors that are limited partners in a deal. *Early Stage* is an indicator variable equal to one if the deal is a venture capital deal with a round number below Series C, and zero otherwise. *Company Age* is the age of the company in years. *Round Number* is the number of the funding round. *Ln(Capital Raised)* is the natural logarithm of the total amount of capital in USD MIL that the company has raised. *Number of Highly Cited Patents / Deal Size* is the number of (eventually granted) highly cited patents applied for in the next three years, scaled by the deal size. Highly cited patents are defined as those with the top quintile numbers of citations among patents granted in the same year. Deal type FE is a dummy variable based on whether the PE deal is a buyout or venture capital deal. Detailed variable definitions are provided in Appendix B. Huber-White standard errors are reported in brackets. ***, ** and * indicate 1%, 5% and 10% significance level.

	LP Ratio (%)				
	(1)	(2)	(3)	(4)	(5)
Early Stage	-1.537***				
	[0.071]				
Company Age		0.014***			
		[0.002]			
Round Number			0.396***		
			[0.021]		
Ln(Capital Raised)				0.585***	
				[0.022]	
Number of Highly Cited Patents / Deal Size					-0.210**
					[0.095]
Deal Year FE	✓	✓	✓	✓	✓
Deal Type FE	✓	✓	✓	✓	✓
Company State FE	✓	✓	✓	✓	✓
Company Industry FE	✓	✓	✓	✓	✓
Observations	125,206	108,917	125,206	81,177	73,725
Adjusted R^2	0.015	0.008	0.016	0.021	0.006

Online Appendix for

"Spreading Sunshine in Private Equity: Financial Intermediation and Regulatory Oversight"

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City University of Hong Kong

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A Appendix: Venture Capital Exemption

In this Appendix, I provide more details on the venture capital exemption enacted as part of Title IV of the Dodd-Frank Act as an illustrative example of Congress' policy rationale in setting the new registration exemptions.[1] It highlights that the new registration exemptions are mainly set to monitor systemic risk in the wake of the 2008 financial crisis, which developed outside of the PE sector, as well as the complex trade-offs in introducing regulation into the PE market. First, I discuss the policy rationale for the venture capital exemption. Then, I present the SEC's regulatory definition of "venture capital funds" and heated debates in the VC community on the scope of such definition.

A.1 Policy Rationale

The heart of the Dodd-Frank Act is to overhaul the US financial regulatory market, after the 2008 financial crisis, to evaluate systemic risk, increase market transparency and protect consumers. While the Senate voted to exempt all PE fund advisers from registration with the SEC, the final version of the Dodd-Frank Act only exempts advisers that meet the private fund adviser or venture capital exemptions. The fundamental policy rationale to distinguish VC funds from other private funds reflects Congress' concerns regarding the potential for systemic risk based on the underlying investments and use of leverage among different private funds.

First, unlike many other private funds, VC funds invest in non-public start-ups, which are not directly connected to the public market and thus pose little systemic risk to the financial market or retail investors. Due to the nature of underlying assets, VC funds have much smaller aggregate size compared to the public equity market and other private funds such as hedge funds as pointed out by the SEC.

Second, VC funds do not rely on extensive leverage to make investments. As a result, the equity nature of fund interests implies that potential losses are only borne by LP investors

[1] This part is largely based on the SEC's Proposing Release of new registration exemption rules to private funds. Release No. IA-3111; File No. S7-37-10

and will not propagate throughout financial markets through the credit channel or other counterparty relationships.

Taking into consideration the intent of Congress, the SEC is "sensitive" to the benefits and costs of the rule imposed by venture capital exemption. With more restrictive exemption criteria, the increased regulatory oversight of private fund advisers would reduce systemic risk and increase market transparency, which in turn benefits investors through more efficient capital allocation. Potential costs include on-going compliance costs, which might be prohibitive to small advisers, potential change in the fund structure and operation for advisers that seek to meet the criteria of venture fund exemption, and reduced flexibility to accommodate unknown or uncontemplated future practices in venture capital investing.

A.2 Debates on the Definition of Venture Capital Funds

In light of Congress' intended scope of venture capital exemption, the SEC's new rule 203(1)-1 defines a venture capital fund as:

> "[a] private fund that (i) holds no more than 20 percent of the fund's capital commitments in non-qualifying investments [...]; (ii) does not borrow or otherwise incur leverage, other than limited short-term borrowing [...]; (iii) does not offer its investors redemption or other similar liquidity rights except in extraordinary circumstances; (iv) represents itself as pursuing a venture capital strategy to its investors and prospective investors; and (v) is not registered under the Investment Company Act and has not elected to be treated as a business development company."

in which a qualifying investment is defined as:

> "(i) any equity security[2] issued by a qualifying portfolio company[3] that is

[2]An equity security is defined by reference to the Securities Exchange Act of 1934 and includes common stock, preferred stock as well as warrants and other securities convertible into common stock in addition to limited partnership interests.

[3]Under rule 203(1)-1, a qualifying portfolio company is defined as "any company that: (i) is not a reporting or foreign traded company and does not have a control relationship with a reporting or foreign traded company; (ii) does not incur leverage in connection with the investment by the private fund and distribute the proceeds of any such borrowing to the private fund in exchange for the private fund investment;

> directly acquired by the private fund from the company ("directly acquired equity"); (ii) any equity security issued by a qualifying portfolio company in exchange for directly acquired equity issued by the same qualifying portfolio company; and (iii) any equity security issued by a company of which a qualifying portfolio company is a majority-owned subsidiary, or a predecessor, and that is acquired by the fund in exchange for directly acquired equity."

However, the SEC pointed out the difficulty in defining a VC fund in a way that balances Congress' intended scope of exemption and various views of the VC community. The SEC received over 70 comment letters in response to the proposed definition from industry groups such as VC fund advisers, their law firms, and the National Venture Capital Association (NVCA).[4] For example, much of the debate centers around the size of non-qualifying investments basket among different industry groups, the SEC and Congress. Some commenters expressed support for a larger basket size emphasizing the need for greater flexibility in taking advantage of investment opportunities such as non-convertible bridge loans of portfolio companies,[5] interests in other pooled investment funds,[6] and publicly offered securities.[7] Although the SEC considered adopting a 40% basket for non-qualifying investments by analogy to the Investment Advisers Act definition of business development companies, the final 20% basket was established by Congress.

With respect to financial leverage, a VC fund under rule 203(1)-1 must not incur debt

and (iii) is not itself a fund (*i.e.*, is an operating company)."

[4]The SEC's Proposing Release spends almost 70 pages to define a venture capital fund and discuss concerns raised by commenters. The details are beyond the scope of this paper.

[5]*See, e.g.*, Comment Letter of CounselWorks LLC (Jan. 24, 2011); ESP Letter; Comment Letter of McGuireWoods LLP (Jan. 24, 2011) ("McGuireWoods Letter"); NVCA Letter; Oak Investment Letter. See also BioVentures Letter (supported venture capital fund investments in non-convertible debt without a time limit); Cook Children's Letter; Leland Fikes Letter (each of which expressed general support). One commenter indicated that the proposed condition limiting investments in portfolio companies to equity securities was too narrow. See Pine Brook Letter. For recent work on venture debt, see Ibrahim (2010); Hochberg, Serrano, and Ziedonis (2018); Davis, Morse, and Wang (2020).

[6]*See, e.g.*, Cook Children's Letter; Leland Fikes Letter; PEI Funds Letter; Comment Letter of SVB Financial Group (Jan. 24, 2011) ("SVB Letter").

[7]*See, e.g.*, ATV Letter; BIO Letter (noted that investments by venture capital funds in "PIPEs" (i.e., "private investments in public equity") are "common"). For recent work on PIPE investments in VC, see Iliev and Lowry (2020)

including guarantees of portfolio company debt in excess of 15% of the fund's capital contributions and uncalled committed capital. Many commenters sought to broaden the leverage criterion by excluding the 15% leverage limitation on capital call lines of credit[8] or borrowing by a VC fund in order to meet fee and expense obligations[9] or expanding the limit,[10] etc. However, the SEC believes that a relative lack of leverage is one of the major reasons for Congress to exempt VC fund advisers and an alternative approach to fund leverage will not address Congress' concerns about potential systemic risks created by financial leverage.

Moreover, some commenters favored the California definition of "venture capital operating company",[11] which generally requires a fund to have at least 50% of its portfolio investments in operating companies that provide it with "sufficient" management rights. But such a definition was considered too broad to be consistent with Congress' intended scope of exemption because it potentially includes many other types of PE funds.

The SEC also considered defining a qualifying VC fund as one that invests in small companies, as proposed by several commenters.[12] However, the SEC eventually gave up this alternative due to a lack of consensus on the definition of "small companies" and worries of potential negative impacts of applying a single standardized metric. For example, various definitions were proposed based on reference to the Small Business Investment Act, size of public float or EBITDA, which may be too simple to take into account the complex heterogeneity across industries and regions. As a result, the SEC believed that applying a simple metric would inadvertently restrict venture capital supply to otherwise promising young small companies.

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[8] Cook Children's Letter; Leland Fikes Letter; SVB Letter.

[9] Dechert General Letter

[10] *See* Charles River Letter (argued that a qualifying fund should be able to borrow, without limit on duration, up to 20% of capital commitments with the consent of its investors).

[11] Comment Letter of Lowenstein Sandler PC (Jan. 4, 2011) ("Lowenstein Letter"); Comment Letter of Keith Bishop (Jan. 17, 2011).

[12] *See, e.g.*, Comment Letter of National Association of Small Business Investment Companies and Small Business Investor Alliance (Jan. 24, 2011) ("NASBIC/SBIA Letter"); Quaker BioVentures Letter (Jan. 24, 2011); Comment Letter of Venrock (Jan. 23, 2011)

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B Variable Definitions and Construction

B.1 Variable Definitions

Variable Name	Definition
Panel A: GP-Year Level	
Regulatory Action	An indicator variable equal to one if the GP receives regulatory disciplinary actions in the year, and zero otherwise
Censure	An indicator variable equal to one if the GP is sentenced to censure in the year, and zero otherwise
Disgorgement/Restitution	An indicator variable equal to one if the GP is sentenced to disgorgement or restitution in the year, and zero otherwise
Cease and Desist	An indicator variable equal to one if the GP receives a cease and desist order in the year, and zero otherwise
Monetary Sanction	An indicator variable equal to one if the GP receives monetary sanction in the year, and zero otherwise
Ln(1 + Fine Amount)	Natural logarithm of the fine amount in USD MIL
Registered	An indicator variable equal to one if the GP is registered with the SEC in a given year, and zero otherwise
Ln(GP Size)	Natural logarithm of the amount of capital in USD MIL raised by PE funds managed by the adviser in the past 10 years
Number of Funds Raised	Number of PE funds raised by the GP in the past 10 years
Buyout	An indicator variable equal to one if the GP manages buyout funds, and zero otherwise
Fundraising	An indicator variable equal to one if the GP raises a PE fund in the year, and zero otherwise
Number of Funds Raised	Number of PE funds raised by the GP in a given year
Ln(1 + Raised Capital	Natural logarithm of one plus the total amount of PE funds raised in USD MIL in a given year
Size Group	A variable ranging from 1 to 5 that ranks a GP in quintile groups based the total amount of PE funds raised in the past ten years as of 2011, the year before the Dodd-Frank Act becomes effective. A value of 5 indicate the group of the largest size.
Buyout Manager	An indicator variable equal to one if the GP manages any buyout funds in the past 10 years as of 2011
Post	An indicator variable equal to one if the year is or after 2012, the effective year of the Dodd-Frank Act which brings PE fund advisers under the SEC's scrutiny, and zero otherwise
Panel B: LP-Year Level	
Capital Commitment	An indicator variable equal to one if the LP commits capital to any PE funds in the year, and zero otherwise
Number of Funds	Number of PE funds the LP committed capital to in one year
Ln(1 + Committed Capital)	Natural logarithm of one plus the amount of capital in USD MIL committed to PE funds in one year

Direct Investment	An indicator variable equal to one if the LP makes direct investments in private companies in the year, and zero otherwise
Number of Direct Investments	Number of direct investments in private companies made by the LP in one year
Ln(1 + Direct Investment Amount)	Natural logarithm of one plus the amount of direct investments in USD MIL made by the LP in one year
Direct Investment	An indicator variable equal to one if the LP makes direct investments in private companies in the year, and zero otherwise
Regulatory Exposure	An indicator variable equal to one if the share of newly registered GPs in the LP's pre-existing LP-GP relationships is in the top quintile group, and zero otherwise
Post	An indicator variable equal to one if the year is or after 2012, the effective year of the Dodd-Frank Act which brings PE fund advisers under the SEC's scrutiny, and zero otherwise
Ln(LP Size)	Natural logarithm of the capital committed to PE funds along with the direct investments made by an LP in the past 10 years
Misconduct Exposure	An indicator variable equal to one if there is any GP with investment-related regulatory misconduct as of the effective year of the Dodd-Frank Act in the LP's pre-existing LP-GP relationships, and zero otherwise.
Panel C: LP-Fund Level	
Ln(Committed Capital)	Natural logarithm of the amount of capital in USD MIL committed to PE funds in one year
Newly Registered	An indicator variable equal to one if a GP became newly registered in the effective year of the Dodd-Frank Act, and zero otherwise
Post	An indicator variable equal to one if the year is or after 2012, the effective year of the Dodd-Frank Act, and zero otherwise
Misconduct	An indicator variable equal to one if the GP received investment-related regulatory actions as of the effective year of the Dodd-Frank Act, and zero otherwise
Panel D: Private Equity Deal Level	
LP Ratio (%)	Percentage of PE investors that are limited partners in a deal
Early Stage	An indicator variable equal to one if the deal is a venture capital deal with a round number below Series C, and zero otherwise
Company Age	Age of the company in years
Round Number	Number of the funding round
Ln(Capital Raised)	Natural logarithm of one plus the total amount of capital in USD MIL that the company has raised
Ln(Capital Raised)	Natural logarithm of the total amount of capital in USD MIL that the company has raised
Number of Highly Cited Patents / Deal Size	Number of (eventually granted) highly cited patents applied for in the next three years, scaled by the deal size. Highly cited patents are defined as those with the top quintile numbers of citations among patents granted in the same year
IPO	An indicator variable equal to one if the company goes public by the end of 2021, and zero otherwise

Successful Exit	An indicator variable equal to one if the company goes public or is acquired with a valuation two times or greater than invested capital, and zero otherwise
Years to Exit	Number of years from first PE financing to exit and is missing if there is no exit
Ln(Exit Value)	Natural logarithm of the exit valuation for companies that go public or are acquired
Direct Investment	An indicator variable equal to one if the PE deal is directly invested by LP investors, and zero otherwise

B.2 Matching Preqin and Form ADV Filings

I manually match the GP names from Preqin with the investment adviser names in Form ADV filings by searching the Investment Adviser Public Disclosure (IAPD) database from `https://adviserinfo.sec.gov`. The IAPD is sponsored by the SEC and allows users to search for the Form ADV filings of investment advisers regardless of their registration status with the SEC.

I search each name of my sample GPs in the IAPD, which returns potential matches with similar adviser names. Then I manually identify and validate the matches by cross-checking the addresses reported in the advisers' Form ADV filings and those shown on their official websites or PitchBook. This process allows me to create a linking table between the GPs' identifiers in Preqin and their SEC numbers in the Form ADV filings for data merging.

While each GP has a unique identifier in Preqin, it's important to note that a single GP may have multiple SEC numbers due to factors like operating through multiple subsidiaries or undergoing changes in registration status. For example, Bain Capital has multiple subsidiaries such as Bain Capital Private Equity, LP (SEC Number 801-69069) and Bain Capital Ventures, LP (SEC Number 801-69071). Another example is Sequoia Capital Operations, LLC which changed its SEC number from 802-75992 to 801-122957.[13] This change occurred as Sequoia Capital restructured itself around an open-ended fund and began holding assets like cryptocurrencies, leading it to no longer qualify for the venture capital exemption under Title IV of the Dodd-Frank Act.[14]

[13] The SEC Number starts with "801" for registered advisers and with "802" for exempt reporting advisers.
[14] See "The Sequoia Capital Fund: Patient Capital for Building Enduring Companies", October 26, 2021.

C Additional Figures and Tables

C.1 A Lack of Differential Trends across GPs

Since the new registration exemptions under the Dodd-Frank Act are tied to GP size and investment strategy, one potential concern is that the effects documented in my main tables are confounded by differential trends in investment opportunities and market dynamics between small and large GPs or between GPs that manage buyout funds or only VC funds. Table 7 Panel A addresses this concern by allowing LP outcomes to evolve on flexible time trends across LPs with different exposure to these GPs. To further rule out this confounding factor, I directly test whether these GPs face differential fundraising outcomes by estimating the following regression:

$$Fundraising_{jt} = \beta \times GP\ Characteristics_j \times Post_t + \boldsymbol{\delta_j} + \boldsymbol{\tau_t} + \epsilon_{jt} \tag{5}$$

in which j and i denote a GP and a year, respectively. *Size Group* is a variable ranging from 1 to 5 that ranks a GP in quintile groups based the total amount of PE funds raised in the past ten years as of 2011, the year before the Dodd-Frank Act becomes effective. A value of 5 indicate the group of the largest size. *Buyout Manager* is an indicator variable equal to one if the GP manages any buyout funds in the past 10 years as of 2011. *Post* is an indicator variable equal to one if the year is or after 2012, the effective year of the Dodd-Frank Act which brings PE fund advisers under the SEC's scrutiny, and zero otherwise. $\boldsymbol{\delta_j}$ and $\boldsymbol{\tau_t}$ are GP and year fixed effects. Appendix B.1 provides detailed variable definitions. Standard errors are clustered at the GP level.

If the effects of registration documented in Table 6 is driven by the secular trends across GPs, then β should be statistically positive. This explanation is unsupported by the β coefficient estimates shown in Table C.3. The coefficients are not meaningfully different from zero in terms of magnitude and also mostly statistically insignificant.

To highlight the effect of registration, Table C.3 also reports OLS estimates of fundrais-

ing outcomes on *Registered*, an indicator variable equal to one if the GP is registered with the SEC in a given year, and zero otherwise, which has within-GP variation due to change in a GP's registration status - mainly in 2012 (Figures C.1 and C.2). In contrast to the coefficient estimates of *Size Group* × *Post* and *Buyout Manager* × *Post*, *Registered* are positive with economically large magnitude at the 1% significance level. The finding provides further evidence that the effects documented in my main tables are indeed driven by registration instead of seculary trends across GPs with different size or investment strategy.

One might wonder why exempt GPs do not choose to register if registration enhances fundraising. First, operating as an exempt reporting adviser provides greater flexibility in operations and investment strategies, whereas SEC registration imposes restrictions on areas such as fees, expenses, marketing, and custody rules. Second, SEC registration requires the disclosure of sensitive information, including detailed business practices and financial data, which some PE fund advisers may prefer to avoid to protect proprietary information and maintain confidentiality (Abuzov, Gornall, and Strebulaev, 2024). Third, the costs of SEC registration—such as legal, compliance, and administrative expenses—can be substantial, particularly for smaller or mid-sized advisers.

C.2 Firm Boundaries - Restrict to a Subsample of LPs

Some LPs such as asset management firms, family offices, funds of funds, sometimes have blurred boundaries with PE firms. Moreover, the subsidiaries of PE firms sometimes also commit capital to other PE funds as LPs.[15] As a robustness check, I re-estimate Equation (2) using the subsample of LPs that are public pensions, insurance companies, endowments and foundations, whose main operations are well-defined and, more importantly, distinct from PE investing. Comparing the results reported in Table C.4 with the baseline estimates, we can conclude that the results stay largely unchanged. The robust check further highlights

[15] An example is Adams Street Partners, classified as a PE fund of fund manager by Preqin, which has over 50 years of investing with PE fund managers and directly investing in growth stage technology and healthcare companies. As an employee-owned firm, Adams Street Partners also has a corporate pension fund called Adams Street RSP LP which also invests in private equity.

the interaction between firm boundaries and agency frictions in outsourced relationships as emphasized by Holmstrom and Milgrom (1991, 1994) and Holmstrom (1999)

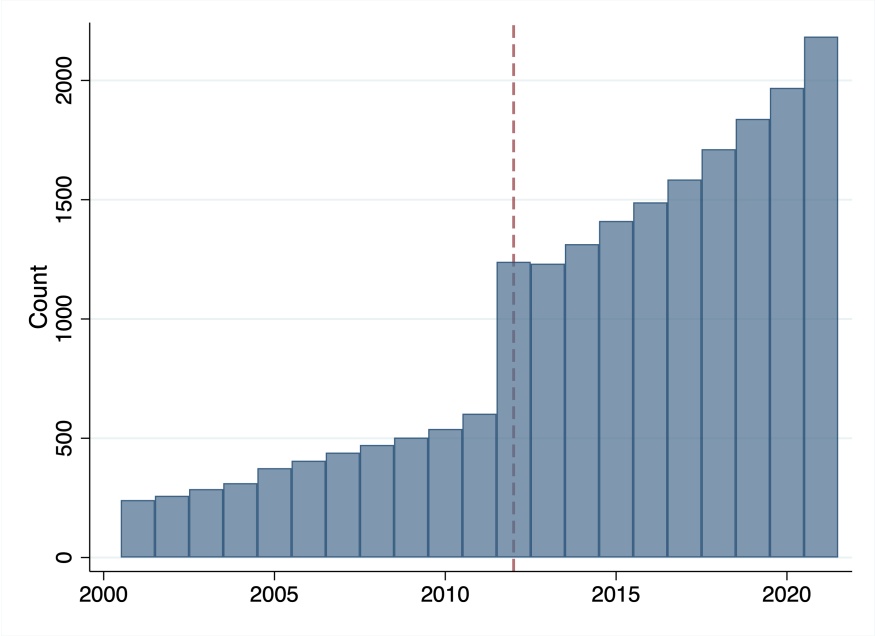
C.3 Adverse Selection in Direct Investments

While LPs tend to invest in mature and large companies, such deals are presumably the most subject to adverse selection – the very best deals will be oversubscribed and syndicated to investors within the GP networks rather than invested by LP investors which tend to have weaker deal origination. As a result, those companies that LPs have a greater chance to directly invest in might have lower quality. Similar adverse selection in co-investments has been studied by Fang, Ivashina, and Lerner (2015) and Braun, Jenkinson, and Schemmerl (2020), who examine whether PE fund advisers offer worse co-investment opportunities to their LP investors and find inconclusive results.

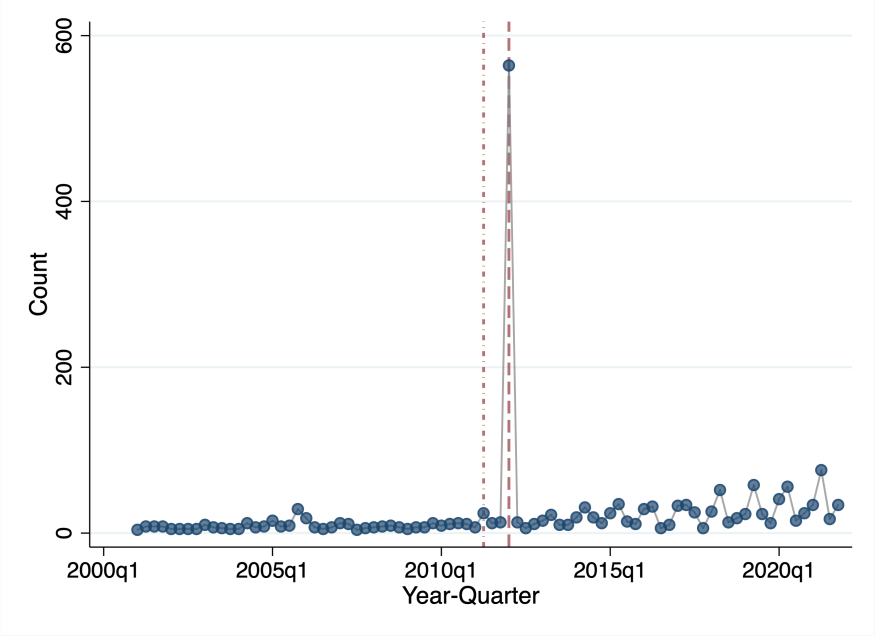
This paper does not find evidence of adverse selection in LP investors' direct investments based on the exit outcomes of the propensity-score-matched sample of PE deals in the US. According to results reported in Table 8, deals participated by LPs are very different from those invested by GPs. To create a proper benchmark, I construct a control group by matching each LP's direct investment with another deal with similar observable deal characteristics but no LP investors. Table C.5 Panel A reports the OLS estimates of exit outcomes, in which the variable of interest *Direct Investment* is an indicator variable equal to one if the deal is directly invested by LP investors and zero otherwise. The coefficient estimates are highly insignificant across all columns - providing little support for adverse selection into companies with worse exit outcomes measured either by the probability of having a successful exit through IPO or acquisitions, time to exit, and exit valuation. Panel B shows balanced covariates after the propensity score matching - the standardized differences of observable characteristics between LP-invested companies and those without LPs' direct investments are almost reduced to zero and the variance ratios become closer to one after the matching.

One caveat is that a lack of differences in company exit outcomes does not necessarily

suggest LPs can earn similar net returns in their direct investments compared to their fund investments. To properly measure LP's return in company exits, we will need to observe the ownership stake at the IPO or M&A, which is unobservable in my data. Using proprietary data of deal-level cash flow provided by some large institutions, Fang, Ivashina, and Lerner (2015) show that LPs' direct investments tend to outperform their fund benchmark, especially when LPs can more easily overcome information frictions in direct investing.



(a) Number of Registered Advisers



(b) Quarterly Number of Initial Registrations

Figure C.1: Private Equity Fund Adviser SEC Registrations - Number and Timing

Figure C.1a shows the number of PE fund advisers that are registered with the SEC from 2001-2021. The red vertical dashed line indicates 2012 when the Dodd-Frank Act became effective and significantly narrowed PE fund advisers' registration exemptions. Figure C.1b highlights the registration timing by showing the quarterly number of initial registration filings submitted by PE fund advisers. While the Dodd-Frank Act was adopted by the SEC in 2011Q2 (red dash-dotted line), the compliance deadline was 2012Q1 due to the transition provisions that required advisers to be registered by the end of 2012Q1 (red dashed line). The short nine-month transition window between the announcement and effective date of the intervention implies that GPs have rather limited ability to manipulate their registration status.

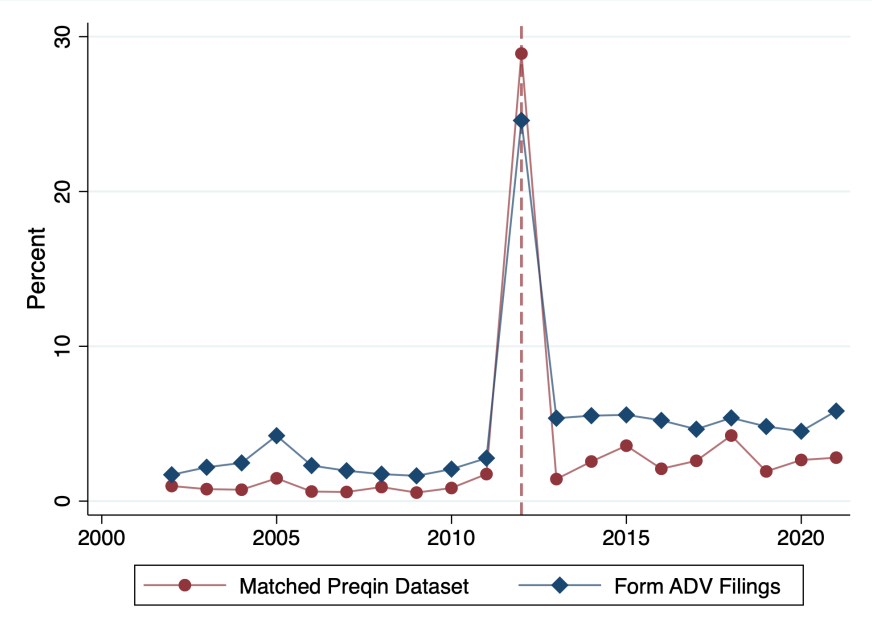


Figure C.2: Data Validation - Share of Newly Registered Advisers

This figure compares the share of newly registered PE fund advisers as a percentage of all advisers in the manually matched Preqin dataset with the share soly based on Form ADV filings. To identify these GPs in Preqin, I manually match Preqin with Form ADV filings by searching the Investment Adviser Public Disclosure database based on GP names. Appendix B.2 provides details about the matching procedure. The share in the matched Preqin database closely aligns with the share solely based on Form ADV filings, validating the matching quality. The sample GP in the matched Preqin database consists of GPs with observed LP relationships. The main identification strategy in this paper relies on the GPs that become newly registered in 2012, indicated by the vertical red dashed line, when the Dodd-Frank Act becomes effective to PE fund advisers.

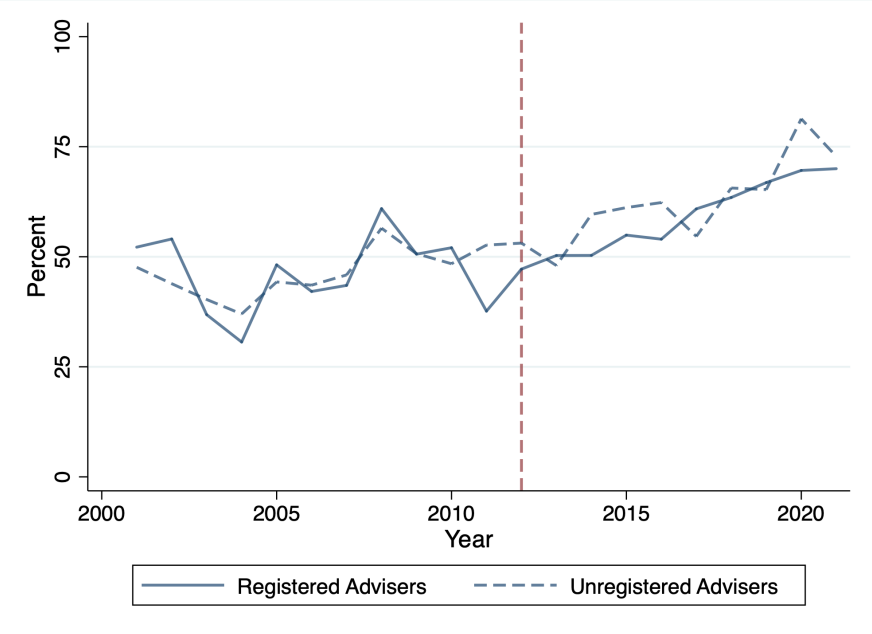


Figure C.3: Percent of Returning LPs

This figure shows the average percentage of returning LPs in PE funds managed by registered and unregistered advisers. Returning LPs are defined as LPs that have previous investments in funds managed by the adviser. The red vertical dashed line indicates the base 2012 when the Dodd-Frank Act became effective for PE fund advisers and significantly narrowed their registration exemptions from the SEC.

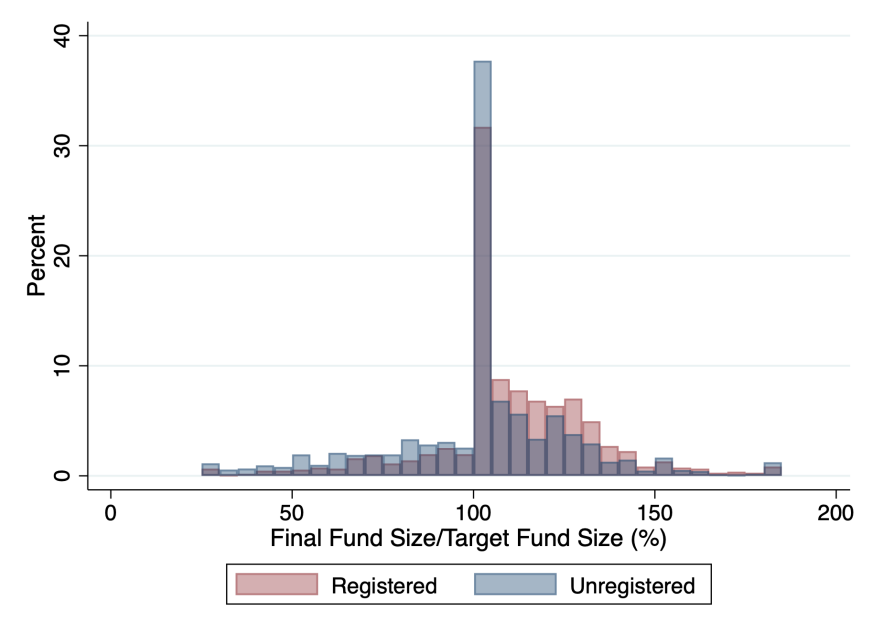


Figure C.4: Subscription Ratio of Private Equity Funds

This figure shows the subscription ratio of funds raised by registered and unregistered advisers. The subscription ratio is defined as the ratio of the final fund size to the target fund size. Around 60% of funds managed by registered advisers are oversubscribed, but only 42% of funds managed by unregistered advisers are oversubscribed. The difference in subscription ratio between registered and unregistered GPs is statistically significant at the 1% level in a multivariate regression that accounts for different fund characteristics, such as fund type, sequence number, and vintage year.

Table C.1: Top Private Equity Fund Advisers Initially Registered in 2012

This table provides the top PE fund advisers initially registered with the SEC in 2012 after the Dodd-Frank Act became effective for PE funds. The ranking is based on the total gross asset value of PE funds reported by the advisers in their Form ADV filings in 2012.

	Adviser Name	Gross Asset Value (USD MIL)
1	Warburg Pincus LLC	33,177
2	Hellman & Friedman LLC	20,685
3	Leonard Green & Partners, LP	15,385
4	First Reserve Management, LP	14,294
5	Madison Dearborn Partners, LLC	13,878
6	Clayton, Dubilier & Rice, LLC	13,725
7	Silver Lake Technology Management, LLC	13110
8	TA Associates Management, LP	10,631
9	Centerbridge Partners, LP	8,859
10	American Securities LLC	8,857
11	WCAS Management Corporation	8,392
12	H.I.G. Capital, LLC	8,300
13	THL Managers VI, LLC	8,276
14	Stone Point Capital LLC	8,273
15	Kelso & Company, LP	8,245
16	Sun Capital Advisors, Inc.	8,172
17	Arclight Capital Partners, LLC	7,954
18	Golden Gate Private Equity Inc.	7,274
19	Tiger Global Management, LLC	7,211
20	Onex Partners Manager LP	7,209

Table C.2: Heterogeneity based on Private Equity Fund Advisers' Disciplinary History

This table investigates the cross-sectional difference in the impact of regulatory oversight on investors' PE investment decisions, based on LP investors' exposure to PE fund advisers with disciplinary history. The sample consists of LP investors located in the US during the period 2001-2021. A unit of observation is an LP-year. *Capital Commitment* is an indicator variable equal to one if the LP commits capital to any PE funds in the year, and zero otherwise. *Number of Funds* is the number of PE funds the LP committed capital to in one year. *Ln(1 + Committed Capital)* is the natural logarithm of one plus the amount of capital in USD MIL committed to PE funds in one year. *Regulatory Exposure* is an indicator variable equal to one if the share of newly registered GPs in the LP's pre-existing LP-GP relationships is in the top quintile group, and zero otherwise. Regulatory misconduct frequently involves insufficient or misleading information regarding fees, asset values, and similar matters. *Post* is an indicator variable equal to one if the year is or after 2012, the effective year of the Dodd-Frank Act, and zero otherwise. *Misconduct Exposure* is an indicator variable equal to one if there is any GP with investment-related regulatory misconduct as of the effective year of the Dodd-Frank Act in the LP's pre-existing LP-GP relationships, and zero otherwise. *Ln(LP Size)* is the natural logarithm of the capital committed to PE funds along with the direct investments made by an LP in the past 10 years. Detailed variable definitions are provided in Appendix B. Standard errors are clustered at the LP level and reported in brackets. ***, ** and * indicate 1%, 5% and 10% significance level.

	Capital Commitment	Number of Funds	Ln(1 + Committed Capital)	Direct Investment	Number of Direct Investments	Ln(1 + Direct Investment Amount)
	(1)	(2)	(3)	(4)	(5)	(6)
Regulatory Exposure × Post	0.074***	0.059	0.148*	-0.013	-0.060*	-0.032*
	[0.020]	[0.062]	[0.080]	[0.009]	[0.033]	[0.017]
Regulatory Exposure × Post × Misconduct Exposure	0.049	0.596***	0.407**	0.004	-0.024	-0.001
	[0.045]	[0.187]	[0.196]	[0.014]	[0.052]	[0.025]
Misconduct Exposure × Post	-0.055***	-0.470***	-0.332***	0.009	0.049	0.022
	[0.017]	[0.103]	[0.080]	[0.008]	[0.046]	[0.020]
Controls	✓	✓	✓	✓	✓	✓
LP FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
Observations	28,308	28,308	28,308	28,308	28,308	28,308
Adjusted R^2	0.351	0.576	0.470	0.395	0.511	0.427

Table C.3: No Differential Trends across GPs with Different Size and Investment Strategy

This table shows within-GP regression estimates that rule out secular trends across GPs as an explanation for the LPs' PE market participation. The finding is consistent with Table 7 Panel A. *Size Group* is a variable ranging from 1 to 5 that ranks a GP in quintile groups based the total amount of PE funds raised in the past ten years as of 2011, the year before the Dodd-Frank Act becomes effective. A value of 5 indicate the group of the largest size. *Buyout Manager* is an indicator variable equal to one if the GP manages any buyout funds in the past 10 years as of 2011. *Post* is an indicator variable equal to one if the year is or after 2012, the effective year of the Dodd-Frank Act which brings PE fund advisers under the SEC's scrutiny, and zero otherwise. *Registered* is an indicator variable equal to one if the GP is registered with the SEC in a given year, and zero otherwise. Change in registration status leads to within-GP variation in *Registered*. *Fundraising* is an indicator variable equal to one if the GP raises a PE fund in the year, and zero otherwise. *Number of Funds Raised* is the number of PE funds raised by the GP in a given year. *Ln(1 + Raised Capital* is the natural logarithm of one plus the total amount of PE funds raised in USD MIL in a given year. Detailed variable definitions are provided in Appendix B. Standard errors are clustered at the GP level and reported in brackets. ***, ** and * indicate 1%, 5% and 10% significance level.

	Fundraising			Number of Funds Raised			Ln(1 + Raised Amount)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Size Group × Post	0.001			0.020**			-0.005		
	[0.005]			[0.009]			[0.028]		
Buyout Manager × Post		0.003			-0.025			0.055	
		[0.013]			[0.023]			[0.075]	
Registered			0.035***			0.059***			0.254***
			[0.011]			[0.020]			[0.065]
GP FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Observations	14,927	14,927	14,927	14,927	14,927	14,927	14,927	14,927	14,927
Adjusted R^2	0.062	0.062	0.062	0.160	0.159	0.160	0.095	0.095	0.096

Table C.4: Restrict to Public Pensions, Insurers, Endowments and Foundations

This table provides robustness checks by using the subsample of LP investors that are public pension fund managers, insurance companies, endowments and foundations. The sample consists of LP investors located in the US during the period 2001-2021. A unit of observation is an LP-year. *Capital Commitment* is an indicator variable equal to one if the LP commits capital to any PE funds in the year, and zero otherwise. *Number of Funds* is the number of PE funds the LP committed capital to in one year. *Ln(1 + Committed Capital)* is the natural logarithm of one plus the amount of capital in USD MIL committed to PE funds in one year. *Direct Investment* is an indicator variable equal to one if the LP makes direct investments in private companies in the year, and zero otherwise. *Number of Direct Investments* is the number of direct investments in private companies made by the LP in one year. *Ln(1 + Direct Investment Amount)* is the natural logarithm of one plus the amount of direct investments in USD MIL made by the LP in one year. *Regulatory Exposure* is an indicator variable equal to one if the share of newly registered GPs in the LP's pre-existing LP-GP relationships is in the top quintile group, and zero otherwise. *Post* is an indicator variable equal to one if the year is or after 2012, the effective year of the Dodd-Frank Act, and zero otherwise. *Ln(LP Size)* is the natural logarithm of the capital committed to PE funds along with the direct investments made by an LP in the past 10 years. Detailed variable definitions are provided in Appendix B. Standard errors are clustered at the LP level and reported in brackets. ***, ** and * indicate 1%, 5% and 10% significance level.

	Capital Commitment	Number of Funds	Ln(1 + Committed Capital)	Direct Investment	Number of Direct Investments	Ln(1 + Direct Investment Amount)
	(1)	(2)	(3)	(4)	(5)	(6)
Regulatory Exposure × Post	0.086***	0.199**	0.261***	-0.008	-0.024*	-0.008
	[0.020]	[0.083]	[0.081]	[0.005]	[0.013]	[0.008]
Ln(LP Size)	-0.002	0.072***	0.008	-0.000	-0.001	-0.001
	[0.003]	[0.012]	[0.012]	[0.001]	[0.001]	[0.001]
LP FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
Observations	17,443	17,443	17,443	17,443	17,443	17,443
Adjusted R^2	0.357	0.635	0.511	0.199	0.150	0.137

Table C.5: Direct Investments and Adverse Selection

This table investigates whether investors face adverse selection of investment opportunities when making direct investments in private equity markets. The sample is constructed by finding the nearest neighbor match for each company invested directly by LPs using a propensity score matching procedure based on PE deals during the period 2001-2021. Each LP direct investment is matched with a deal invested by GPs. The propensity score is estimated using the following deal characteristics: *Early*, *Company Age*, *Round Number*, *Capital Raised*, *Deal Size*, *Number of Investors*, as well as deal year, deal type, company state, and company industry indicators. These characteristics are used as control variables in the regressions. Panel A reports the OLS estimates on the exit outcomes. Panel B shows the covariate balance summary of key variables between companies directly invested by LP investors and those without LP investors. *IPO* is an indicator variable equal to one if the company goes public by the end of 2021, and zero otherwise. *Successful Exit* is an indicator variable equal to one if the company goes public or is acquired with a valuation two times or greater than invested capital, and zero otherwise. *Years to Exit* is the number of years from first PE financing to exit and is missing if there is no exit. *Ln(Exit Value)* is the natural logarithm of the exit valuation for companies that go public or are acquired. *Direct Investment* is an indicator variable equal to one if the PE deal is directly invested by LP investors, and zero otherwise. Detailed variable definitions are provided in Appendix B. Huber-White standard errors are reported in brackets. ***, ** and * indicate 1%, 5% and 10% significance level.

Panel A: Company Exit Outcomes

	IPO	Successful Exit	Years to Exit	Ln(Exit Value)
	(1)	(2)	(3)	(4)
Direct Investment	0.003	-0.000	0.020	-0.038
	[0.006]	[0.008]	[0.112]	[0.063]
Controls	✓	✓	✓	✓
Deal Year FE	✓	✓	✓	✓
Deal Type FE	✓	✓	✓	✓
Company State FE	✓	✓	✓	✓
Company Industry FE	✓	✓	✓	✓
Observations	9,301	9,301	2,281	2,113
Adjusted R^2	0.168	0.161	0.307	0.330

Panel B: Covariate Balance Summary

	Standardized Differences		Variance Ratios	
	Raw	Matched	Raw	Matched
Early Stage	-0.422	0.036	1.039	0.983
Company Age	0.070	0.001	0.675	0.658
Round Number	0.493	0.044	1.547	1.003
Capital Raised	0.329	0.015	2.064	0.910
Deal Size	0.225	-0.020	1.763	0.730
Number of Investors	0.857	0.064	1.777	0.848