Public and Private Firm Ownership in the 21st Century: Financial Performance and Sustainable Considerations.

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by

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Introduction

"The publicly held corporation has outlived its usefulness in many sectors of the economy." [1]
— Michael C. Jensen, (1989)

"Perhaps the single most significant development in securities markets in the new millennium has been the explosive growth of private markets." [2]
— Allison Herren Lee, SEC (2021)

1.1 Introduction

The twentieth century gave corporate finance some of its most influential frameworks for understanding the firm and its environment. Among many others, agency theory, capital structure, information asymmetry, and stakeholder theory have provided the foundations for studying how firms are organized, financed, monitored, and valued. These frameworks share the view that the firm is not a neutral technological unit transforming inputs into outputs. It is also a contractual and organizational structure in which managers, shareholders, creditors, employees, and other stakeholders interact under imperfectly aligned incentives and imperfect information. From this perspective, ownership and control are central to understanding both firm behavior and firm outcomes.

Within the corporate finance literature, Jensen and Meckling (1976) provide the natural starting point for studying ownership and control. Rather than treating the firm as a single decision-maker, they describe it as a nexus of contracts through which individuals contribute resources, delegate authority, and allocate the gains from corporate activity. In this framework, agency costs arise because these individuals may have different objectives and because decision-makers do not always bear the full economic consequences of their choices. In the manager-shareholder relation, this means that managers may choose policies that provide private benefits or reduce their own effort, even when these choices lower firm value. The structure of ownership is therefore fundamental, as it influences the degree of alignment between those who control corporate decisions and those who ultimately bear their financial consequences.

This perspective is particularly relevant for public ownership, the dominant organizational form for large firms during much of the twentieth century (Berle and Means, 1932; Cheffins, 2019). Public markets allow firms to raise capital from a broad base of investors, but this dispersion also weakens the direct link between ownership and control. In Jensen's

[1] Jensen, M.C. (1989), "The Eclipse of the Public Corporation", *Harvard Business Review*, Vol. 67, pp. 61–74.

[2] Lee, A.H. (2021), "Going Dark: The Growth of Private Markets and the Impact on Investors and the Economy", Speech at the SEC, Washington D.C.

free cash flow framework, the cost of this separation is particularly pronounced in publicly held firms, where dispersed ownership weakens monitoring and leaves managers with discretion over excess resources that may be retained and invested without maximizing shareholder value (Jensen, 1986). This concern underlies Jensen's later critique of the publicly held corporation, which he argued had "outlived its usefulness" in many sectors of the economy (Jensen, 1989). In this framework, private ownership, particularly when it combines concentrated claims, active monitoring, and financial discipline, can be interpreted as a governance response to classical manager-shareholder agency conflicts.

This theoretical discussion has become increasingly relevant as corporate ownership has reorganized over the last three decades. Private markets have expanded considerably, and private equity now provides an important source of financing for firms outside public markets (Ewens and Farre-Mensa, 2020). Global private equity assets under management increased sixteen-fold between 2000 and 2024, reaching $10 trillion (Preqin, 2024), a growth that coincides with a 50% decline in the number of publicly listed firms in the United States since its peak in 1996 (Doidge et al., 2017). This shift may be read as moving in the direction anticipated by Jensen (1989), with firms increasingly operating under ownership structures that are more concentrated than public ownership. However, the implications of this shift remain difficult to assess empirically, as private firms are less observable than listed firms and are not subject to the same disclosure requirements (Behr et al., 2013; Asker et al., 2015). Despite their growing importance in the economy, they therefore remain comparatively understudied in corporate finance (Faccio and Xu, 2025). This combination of economic importance and limited observability creates an important gap in our understanding of how ownership affects firm behavior and outcomes in the modern corporate landscape.

Alongside the reorganization of corporate ownership, the modern corporate landscape is also shaped by another major evolution. Environmental and societal challenges have progressively broadened the set of criteria that firms and investors consider relevant, extending corporate evaluation beyond traditional financial performance and shareholder value. Environmental, social, and governance (ESG) considerations have therefore moved closer to the center of corporate strategy and investor decision-making (Crifo et al., 2015; Reber et al., 2022). This evolution echoes stakeholder theory, which views the firm as a set of relationships among multiple constituencies rather than as an organization centered only on shareholders (Freeman, 1984; Donaldson and Preston, 1995). From this perspective, ownership structures may matter not only for the allocation of control and financial claims but also for how firms balance financial objectives with stakeholder-related considerations.

As these considerations have become increasingly important, third-party providers have developed measures intended to capture firms' ESG-related outcomes and practices. However, these measures remain contested. Besides relying on aggregate measures that may obscure specific dimensions of corporate behavior, ESG ratings often differ significantly across providers, reflecting differences in scope, measurement, and weighting choices (Kotsantonis and Serafeim, 2019; Berg et al., 2022). A further limitation is that the availability of such measures remains largely concentrated among publicly listed firms. In the corporate finance literature, the study of ESG considerations has therefore been heavily shaped by data availability, with evidence concentrating largely in public firm settings (Gillan et al., 2021; Grahn, 2025). Given the scale of private markets today, this concentration leaves a growing segment of the modern corporate landscape understudied.

In this context, as the corporate landscape shifts toward less-observable firms and broader non-financial outcomes, traditional data sources have become increasingly limited for studying firms and their environments. At the same time, recent developments in digital technologies have expanded the range of observable information available to corporate finance researchers (Boulland et al., 2026; Briscoe-Tran, 2026). Researchers can now rely on online platforms, firm websites, archived webpages, and other textual sources to capture aspects of corporate behavior that are not directly reflected in standard databases. Combined with advances in natural language processing and machine learning, these alternative data make it possible to construct quantitative measures from previously unstructured information. This creates new opportunities to study ownership, agency conflicts, and stakeholder-related dimensions in both public and private firm settings.

This dissertation builds on these opportunities by bringing together four empirical papers that shed light on the two defining developments of the twenty-first-century corporate landscape. These papers examine how ownership and control influence corporate outcomes, firm behavior, and agency costs at a time when firms are increasingly privately-held and corporate evaluation increasingly extends beyond shareholder value. The dissertation narrative progresses from the workplace conditions of large listed firms to venture capital-backed private firms and, finally, to the investment behavior of private equity funds. Together, these papers show that ownership and control matter not only for financial performance, but also for broader stakeholder outcomes, including sustainability considerations. The remainder of this introduction is organized as follows. Section 1.2 contextualizes the expansion of private markets and the growing importance of ESG considerations in corporate finance. Section 1.3 presents the research questions and contributions of each paper, while Section 1.4 describes the structure of the dissertation.

1.2 Context

The first major development underlying this dissertation is the gradual but persistent retreat from public ownership and the corresponding expansion of private markets. The number of publicly listed firms in the United States has declined by 50% since its peak in 1996, falling from 8,000 to 4,000 companies in 2024.[3] This decrease is the result of delistings consistently outnumbering new listings since 1996. While new listings fell from a peak of 987 in 1996 to fewer than 300 per year in the 2000s, delistings averaged 520 departures against only 283 new entrants annually from 1997 to 2012 (Doidge et al., 2017). These figures reflect a broader phenomenon whereby going public has become a less common corporate milestone since the turn of the century.

One recurring explanation in the policy debate is that regulatory changes increased the relative costs of being public, especially for smaller firms (Doidge et al., 2025). However, the empirical evidence is more nuanced. Doidge et al. (2017) show that the U.S.-centric nature of the decline and the fact that much of the listing gap emerged before the Sarbanes-Oxley Act of 2002 (SOX)[4] make this regulatory explanation incomplete. Furthermore, Gao et al. (2013) argue that the decline in IPO activity instead reflects technological changes that increased the gains from selling to larger organizations able to realize economies of scope and bring products to market faster.

Furthermore, Jensen (1989) anticipated part of this corporate reorganization, arguing that "the publicly held corporation had outlived its usefulness". He suggested that private ownership could be more efficient as it mitigates the free cash flow conflict between managers and investors. This view proved consistent with the subsequent expansion of private capital markets. Ewens and Farre-Mensa (2020) show that the deregulation of private securities markets, especially through the National Securities Markets Improvement Act of 1996, increased the supply of private capital to late-stage startups and altered the going-public versus staying-private trade-off. This deregulation contributed to a new equilibrium in which fewer firms go public and those that do list at older ages. The broader implication, as Doidge et al. (2018) argue, is that what is being eclipsed is not the public corporation itself, but public markets as a funding venue for young firms with mostly intangible capital.

As public markets have become a less common funding venue for many firms, private equity, the largest private market asset class,[5] has emerged as a major funding alternative in the twenty-first century. Global private equity assets under management increased from $615 billion in 2000 to $10 trillion in 2024, representing roughly a sixteen-fold increase since 2000.[6] Within this growing private asset class, the two dominant sub-asset classes are buyout and venture capital. Buyout funds target mature firms and typically

[3]https://www.theglobaleconomy.com/

[4]Enacted in 2002 following the Enron and WorldCom scandals, the Sarbanes-Oxley Act (SOX) introduced stricter compliance and reporting requirements for U.S.-listed firms, including mandatory internal control audits under Section 404.

[5]https://www.spglobal.com/en/research-insights/market-insights/private-markets

[6]https://pro.preqin.com/analysis/dryPowderAUMBreakdown

seek to restructure them through leveraged buyouts, whereas venture capital funds provide equity financing to early-stage, high-growth firms. Together, they constitute the most institutionalized segment of private capital (Sensoy et al., 2014) and shape the financing, governance, and operations of thousands of firms across industries and geographies.[7]

Given their scale and growing role in the economy, understanding private equity funds' behavior alongside their influence on portfolio companies has become a first-order question in corporate finance. Their decisions extend well beyond PE fund investors[8], affecting employees and consumers across industries, with outcomes depending on the regulatory and competitive settings in which portfolio companies operate (Sorensen and Yasuda, 2023). At the same time, as increasing amounts of capital flow into private equity, it becomes increasingly relevant to ask whether these funds can support the shift toward a more sustainable economy[9], one of the defining challenges of the twenty-first century.

Alongside the expansion of private markets, the environmental and societal challenges of this era have become increasingly important on the corporate agenda. From the UN Global Compact[10] and the first GRI guidelines [11] in 2000 to the Sustainable Development Goals[12] and Net Zero commitments[13], successive international frameworks have progressively shaped both the regulatory environment and the corporate landscape. Data from the Governance & Accountability Institute[14] illustrate the pace of this sustainable transformation, with the share of S&P 500 companies disclosing sustainability information rising from 20% in 2011 to 99% in 2024, and the share of Russell 1000 companies increasing from 34% in 2018 to 90% in 2024. On the investment side, the number of signatories to the UN-backed Principles for Responsible Investment (PRI)[15] expanded from 74 at launch in 2006 to over 2,000 in 2018, reaching more than 5,000 by 2023 and representing over half of the world's professionally managed assets.[16]

Given the growing importance of ESG considerations, the corporate finance literature has increasingly documented these sustainability considerations. Chang et al. (2022) show that the number of ESG-related articles published in the top five finance journals[17] in-

[7] In 2024, PitchBook data identified more than 11,500 private equity-backed companies and more than 55,000 VC-backed companies in the United States.

[8] Fund investors are commonly referred to as Limited Partners (LPs), while fund managers are referred to as General Partners (GPs).

[9] https://www.weforum.org/stories/2024/10/private-capital-indispensable-development-climate-financing-divide/

[10] Launched in 2000, the United Nations Global Compact invites firms to align their strategies and operations with ten principles relating to human rights, labour, the environment and anti-corruption.

[11] The Global Reporting Initiative published its first sustainability reporting guidelines in 2000, providing one of the earliest internationally recognized frameworks for sustainability disclosure.

[12] Adopted by all United Nations member states in 2015, the Sustainable Development Goals set out 17 global objectives covering environmental, social and economic development.

[13] Net Zero refers to the objective of reducing greenhouse gas emissions to a level at which any residual emissions are balanced by removals. The concept has become a central reference point in corporate and public climate commitments since the mid-2010s.

[14] https://ga-institute.com/research/reporting_trends

[15] Launched in 2006, the Principles for Responsible Investment provide a voluntary framework through which investors commit to integrating ESG considerations into investment and ownership practices.

[16] https://www.unpri.org/about-PRI/annual-report

[17] The Journal of Finance, Journal of Financial Economics, Review of Financial Studies, Journal of Financial and Quantitative Analysis, and Review of Finance.

creased eight-fold over the 2011–2021 period. Within this growing body of literature, researchers have documented that sustainability commitments serve as credible signals to external stakeholders (Flammer, 2021), influencing the behavior of investors (Hartzmark and Sussman, 2019; Heeb et al., 2023), and are associated with financial performance and firm value (Lins et al., 2017; Derrien et al., 2025). As Edmans (2023) argues, ESG has therefore moved from a niche concern to a central dimension of long-term value creation. Yet, despite ESG having become mainstream, data reliability remains contested as highlighted by Kotsantonis and Serafeim (2019) and supported by Berg et al. (2022), who document significant disagreement across ESG third-party ratings. Consequently, these limitations have led researchers to increasingly rely on alternative data sources and novel methods to study ESG outcomes (Briscoe-Tran, 2026).

1.3 Research Questions and Contributions

This dissertation is structured around four empirical questions, each of which motivates a self-contained paper. Taken together, these questions examine how ownership and control shape firm behavior and financial outcomes in a corporate landscape increasingly marked by private ownership and limited observability. The first paper starts from publicly listed corporations and studies whether workplace stress, as an internal organizational condition, contains information about future firm performance and market valuation. The next two papers move to venture capital-backed private firms and examine whether VC ownership is associated with employee satisfaction and the development of voluntary ESG disclosure. The final paper shifts the analysis from portfolio companies to private equity funds and studies whether deployment incentives near the end of the investment period affect fund performance and deal selection. More specifically, the four research questions are formulated as follows.

Research Question 1: *Does workplace stress influence future operating performance and market valuation of large publicly listed firms?*

Managers exercise discretion over firm decisions whose implications depend on how well their incentives align with value maximization (Jensen and Meckling, 1976). Decisions about work organization and internal pressure are part of this set, affecting employee conditions and thereby firm outcomes. Stakeholder theory complements this view by arguing that firms must consider the interests of stakeholders such as employees, whose treatment may influence long-term value creation (Freeman, 1984). A growing literature confirms that employee-related dimensions are economically meaningful, with employee satisfaction predicting future firm performance and market valuation (Edmans, 2011; Huang et al., 2015; Green et al., 2019). Workplace stress captures the negative side of this employee-related intangible. According to stress theories, stress arises when job demands systematically exceed the resources available to employees (Karasek, 1979; Siegrist, 1996; Bakker and Demerouti, 2007). This imbalance is associated with fatigue, lower job satisfaction, and adverse health outcomes (Bell De Tienne et al., 2012; Dahl, 2011; Ganster and Rosen, 2013), which may translate into lower productivity and weaker future operating performance. Furthermore, if the productivity loss associated with workplace stress is not fully incorporated by financial market participants, it may also be reflected in analyst forecast errors and subsequent stock returns. This paper constructs a quarterly Workplace Stress Index from crowdsourced employee reviews of S&P 100 firms. We identify unrealistic expectations as the primary stressor and show that firm culture and management leadership act as mediating resources. We find that workplace stress negatively predicts future ROA and is associated with more negative analyst forecast errors and lower subsequent risk-adjusted returns. These findings support the view that employee stress constitutes a hidden organizational cost that financial markets do not immediately incorporate.

Research Question 2: *How is employee satisfaction related to venture capital ownership, and do VC influences on employee satisfaction persist after VC exit?*

Stakeholder theory views employees as key stakeholders whose interests and behavior may affect the achievement of firm objectives (Freeman, 1984). This perspective is consistent with evidence that corporate culture and employee satisfaction are economically relevant (Edmans, 2011; Guiso et al., 2015; Lins et al., 2017; Green et al., 2019). The management literature further suggests that employee satisfaction depends on perceived organizational support, psychological empowerment, and employees' sense of identification with the firm (Eisenberger et al., 1986; Rhoades and Eisenberger, 2002; Spreitzer, 1995; Pierce et al., 2001). From this perspective, ownership structure matters not only for financial performance but also for how firms shape the organizational conditions that influence employee experience. Venture capital ownership provides a natural setting to examine these mechanisms because VCs not only provide capital. They also professionalize portfolio companies by improving senior management quality, implementing human resource policies, and introducing monitoring mechanisms (Hellmann and Puri, 2002; Chemmanur et al., 2021; Lerner, 1995). These organizational changes are likely to affect employee satisfaction through the mechanisms documented by the management literature. Whether these organizational changes introduced by VCs translate into higher employee satisfaction, and whether this employee satisfaction persists after VC exit, remain open questions. Using about one million employee reviews, we show that employee satisfaction is significantly higher under VC backing and declines after VC exit. The decline is gradual following partial exits through IPOs and more pronounced when the VC fully exits. Textual analysis reveals that supportive culture, growth environment, and HR practices are the dimensions most strongly associated with VC involvement, while growth-related satisfaction declines most after exit and culture and hiring processes remain the most persistent legacy of VC backing.

Research Question 3: *How is voluntary ESG disclosure associated with venture capital backing, and is this association driven by gradual disclosure development or strategic pre-exit adjustment?*

Stakeholder theory conceives of the firm as a set of relationships with multiple stakeholders whose interests extend beyond those of shareholders alone (Freeman, 1984). From this perspective, ESG-related information is relevant because it enables external stakeholders to assess the non-financial dimensions of firm behavior. Yet ESG disclosure remains largely voluntary, less standardized than financial disclosure, and shaped by firms' communication incentives (Christensen et al., 2021). These incentives may, in turn, depend on ownership structure. Voluntary disclosure theory further suggests that while adverse inferences from non-disclosure may give firms incentives to reveal private information (Grossman and Hart, 1980; Milgrom, 1981), disclosure costs and proprietary concerns can prevent full revelation (Verrecchia, 1983; Dye, 1985). These frictions are particularly salient in private markets, where firms face weaker public reporting requirements (Asker et al., 2015). In this context, VC backing constitutes a natural setting to examine whether ownership influences voluntary ESG disclosure. VCs are active investors who combine financing, monitoring, contractual rights, and board involvement, while also professionalizing young firms' governance and operations (Sahlman, 1990; Lerner, 1995; Gompers, 1995; Hellmann and Puri, 2002; Croce et al., 2013). If VC involvement progressively structures portfolio companies and makes them more externally oriented, ESG disclosure should gradually increase over the financing cycle. Using archived homepage content for over 36,000 U.S. private firms, we find that ESG disclosure increases gradually across VC financing rounds, concentrated in late stages, while VC-backed firms show no pre-transaction disclosure adjustment. By contrast, non-VC-backed firms increase disclosure significantly in the year before IPOs. These findings suggest that ESG disclosure builds progressively under VC backing rather than through strategic pre-transaction signaling.

Research Question 4: *Does the accumulation of dry powder near the end of a private equity fund's investment period distort deal selection and fund performance?*

In the theory of the firm, contracts and managerial incentives are designed to reduce agency conflicts between principals and agents, but may not eliminate agency costs entirely (Jensen and Meckling, 1976). In leveraged buyout funds, LPs commit capital ex ante and delegate investment decisions to GPs, who retain discretion over their deployment during a finite investment period. This discretionary control over committed capital is closely related to the agency costs of free cash flow. When managers control resources not immediately paid out to investors, they may overinvest in negative net present value projects rather than returning capital to providers (Jensen, 1986). Applied to PE funds, Axelson et al. (2009) show that while ex ante fund financing disciplines GPs early in the fund life, accumulated dry powder near the end of the investment period can create pressure to deploy capital in suboptimal deals. The contractual structure of buyout funds may reinforce this pressure. Management fees are typically computed on committed capital during the investment period but often switch to invested or net invested capital afterward (Metrick and Yasuda, 2010), creating incentives for GPs to deploy capital rather than leave it undeployed. Using 431 US buyout funds and 2,379 realized LBO deals, we document two distinct investment patterns among funds with abnormally high dry powder near the end of the investment period. Some remain underinvested, while others accelerate capital deployment, with the latter underperforming comparable funds that remain underinvested. At the deal level, late deals executed under high dry powder pressure exhibit higher entry multiples, lower leverage, and weaker performance. We also find preliminary evidence consistent with management fees contributing to these distortions. These findings suggest that dry powder pressure can create agency costs within private equity funds, leading some GPs to prioritize capital deployment over deal quality.

Overall, the four chapters examine how ownership and control shape financial outcomes, stakeholder-related dimensions, disclosure choices, and agency costs across public and private firm settings. The first two chapters show that employee-related dimensions, workplace stress in listed firms and employee satisfaction in VC-backed companies, contain economically relevant signals about firm performance and organizational conditions. The third chapter turns to another stakeholder-related dimension by examining ESG disclosure in private markets, showing how ownership may shape the development of voluntary non-financial communication. The fourth chapter shifts the analysis to the fund level and shows how contractual incentives can distort capital deployment and deal selection within private equity funds. Together, the chapters show that ownership and control structures affect both financial and non-financial outcomes, while alternative data and textual sources help uncover several dimensions of firm behavior that are difficult to observe in traditional databases. The following section outlines the dissertation's structure and chapter organization.

1.4 Structure of the Dissertation

The remainder of the dissertation is organized as follows. Chapter 2 starts with large publicly listed firms and examines whether workplace stress is related to future operating performance, analyst forecast errors, and stock returns. The chapter uses Glassdoor employee cons reviews from S&P 100 companies and constructs a quarterly Workplace Stress Index by classifying reviews with a BERT model fine-tuned on a GPT-pretrained corpus. It then uses Structural Topic Modeling to identify the workplace dimensions associated with stress and relates the index to accounting and market outcomes.

Building on the evidence that employee-related dimensions are associated with firm value, Chapter 3 moves from publicly listed firms to privately held firms by investigating the relation between venture capital backing and employee satisfaction. The chapter combines Glassdoor employee scores and written reviews with PitchBook and Capital IQ ownership data on private firms and public firms. It first examines how employee satisfaction differs across ownership settings and around VC exits, and then uses Structural Topic Modeling of written reviews to identify the topics associated with VC-backed employees' experiences and their persistence after exit.

Chapter 4 remains in the venture capital setting but shifts the focus from employee outcomes to voluntary ESG disclosure. The chapter combines PitchBook and Capital IQ ownership data with archived homepage content retrieved from the Wayback Machine. It constructs a dictionary-based ESG disclosure measure from firms' websites and validates it against third-party ESG ratings and B Corp certification. It then examines whether ESG disclosure under VC backing develops gradually across financing rounds or instead reflects strategic pre-transaction adjustment around IPOs and acquisitions.

Chapter 5 broadens the private-market focus of the dissertation by shifting the analysis from VC-backed portfolio companies to private equity funds. The chapter combines fund-level and deal-level data from Preqin, S&P Capital IQ, and DealScan to study capital deployment and deal selection in U.S. buyout funds. Using a duration model, it first examines the determinants of capital deployment during the early part of the investment period and documents how some funds accumulate substantial dry powder by vintage year +4. It then studies how these funds deploy their remaining capital near the end of the investment period, comparing the performance and deal characteristics of funds that accelerate deployment with those that remain underinvested.

Chapter 6 concludes the dissertation by summarizing the main findings, discussing their policy and economic implications, and outlining avenues for future research.

Chapter 2

Workplace Stress and Firm Performance: Evidence from Crowdsourced Employee Reviews.

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Abstract. We construct a quarterly measure of workplace stress for each company belonging to the S&P 100 over the period 2013–2022. To do so, we classify over 500,000 crowdsourced employee reviews on a binary stress variable using a BERT model fine-tuned on a ChatGPT-pretrained corpus. We show that future accounting performance is related to our firm workplace stress measure. A portfolio analysis and a Fama-MacBeth cross-sectional analysis both uncover a return premium for firms with low stress levels. Topic modeling on employee reviews reveals that when employees more prevalently express complaints about work pressure, the probability to detect stress in their reviews increases significantly. A one percentage point increase raises the probability that a review is classified as stressed by about two percentage points, corresponding to an approximately five percent increase in the Workplace Stress Index. Consistent with the Job Demands-Resources theory in psychology, we observe mediating effects from long-term resources such as the employees' perceived quality of the firm culture and senior management. Overall, our findings support the view that employee stress coming from an imbalance between demand stressors such as workload and availability of resources constitutes a hidden cost on firm performance and valuation.

Keywords: ESG, workload, workplace stress, BERT, corporate performance, portfolio analysis, Structural Topic Modelling, ChatGPT.

2.1 Introduction

According to the American Institute of Stress, more than 80% of US workers report experiencing daily work-related stress. The Institute identifies the imbalance between job demands and social, psychological and physical resources as the main contributing factor.[1] At a time when a "mental health pandemic is engulfing the world's workplaces" (FT, 14 December 2024)[2] and where burnouts have reached unprecedented levels (American

[1]https://www.stress.org/stress-research/. The World Health Organization (WHO) defines "workplace stress" as "the response people may have when presented with work demands and pressures that are not matched to their knowledge and abilities and which challenge their ability to cope."

[2]https://www.ft.com/content/81eedab5-3dd0-41cb-802b-2390f9aa6f4e

Psychological Association[3]), this paper investigates whether workplace stress is related to firm operating performance and whether this information is incorporated by analysts and investors.

These questions deserve a closer look, as the literature so far has provided mixed guidance on the effect of employee stress on firm value. The principles of scientific management developed by Taylor (1911) consider humans as inputs and ignore human factors in assessing productivity. In this theory, any employee oversatisfaction would arise from underworking or overpayment and would negatively affect firm value. Workplace stress could even be seen as a positive challenge that induces self-regulation and employee creativity (Pfister and Lukka, 2019; Mitchell et al., 2019). However, as highlighted in Bell De Tienne et al. (2012), employees experiencing high moral stress report greater fatigue, lower job satisfaction, and greater intentions to leave their organization. The negative effects of workplace stress on employees' mental and physical health are also well documented in the literature in management and psychology (Altaf and Awan, 2011; Dahl, 2011; Ganster and Rosen, 2013; Greenberg et al., 2015; Goh et al., 2015). According to the American Institute of Stress, workplace stress could cause more than $300 billion in annual losses for US industries (1.1% of US GDP in 2023), driven by absenteeism, reduced productivity, and workplace accidents.[4] In line with these results, Chen et al. (2016), Gubler et al. (2017), and Nyberg et al. (2016) demonstrate that firms implementing superior employee treatment schemes, such as bonus pay, corporate wellness programs, and flexible working conditions, experience an improvement in future employee performance and in corporate innovation. The latter theory receives support from recent advocates for ESG integration in asset allocation which promote the use of environmental, social, or governance criteria to assess firm performance. In particular, social scores are increasingly integrated as material factors in investment decisions (Dyck et al., 2019; Gillan et al., 2021; Bofinger et al., 2022; Ardia et al., 2026).

A first obstacle to studying the relationship between workplace stress and firm performance is data limitations. Studies on workplace stress have traditionally relied on low frequency data retrieved from employee survey data (Bell De Tienne et al., 2012; Baron et al., 2016; Goh et al., 2015) and on stress-related medicine prescriptions (Dahl, 2011; Ganster and Rosen, 2013).[5] To our knowledge, our research is the first to take advantage of large-scale textual data from online employee reviews (from Glassdoor) to construct a quarterly measure of company-specific workplace stress.[6] We combine artificial intelligence (AI) and machine learning (ML) techniques to categorize the stress level of each online review of companies belonging to S&P 100 over the period 2013–2022. These review-level scores are further aggregated into a quarterly index per company. Our Workplace Stress Index

[3]https://www.forbes.com/sites/bryanrobinson/2024/03/27/anxiety-skyrockets-to-no-1-issue-among-american-workers-new-study-shows/

[4]https://www.stress.org/workplace-stress/

[5]Stress-related medicine prescriptions have also been used to quantify employee's mental health (Bach et al., 2021; Kárpáti and Renneboog, 2024)

[6]Yet, related to our approach, Karimli (2023) develops a dictionary to assess workplace harassment in employee reviews and shows that reductions in harassment foster firm innovation.

(WSI) offers empirical evidence that aligns with existing stress theories coming from the literature in psychology (Karasek, 1979; Siegrist, 1996; Bakker and Demerouti, 2007). We show that unrealistic targets given to employees stand out as an important stressor and that the firm culture and the management leadership act as long term resources playing a mediating effect.

Using this index, we first examine how firm stress is related to future accounting performance. We find a negative relationship between the lagged WSI and the next quarter firm return on assets. The effect is especially important when we account for the one-year change in firm workplace stress. We then examine whether this information is incorporated into analyst forecasts and stock prices. We find that analysts tend to overestimate the earnings of high-stress firms and that firms with a low level of stress tend to be underpriced. A value-weighted strategy long in low-stressed firms and short in high-stressed firms delivers a significant four-factor monthly alpha of about 0.15%.

One alternative explanation to our results showing abnormal returns on long-short stress portfolios could be that investors consider that employees working at low-stressed firms enjoy a quiet life and might be less productive, penalizing these firms with a valuation discount. However, this alternative specification would not be consistent with the predictive capacity of our index with regard to future firm accounting, which shows higher operating performance for low-stressed firms.

Prior research has primarily focused on the causes of workplace stress (Dahl, 2011; Bach et al., 2021), its effects on employee health (Ganster and Rosen, 2013; Goh et al., 2015), and its effects on employee productivity (Bell De Tienne et al., 2012; Seppälä and Cameron, 2015). Our results directly contribute to the recent work of Edmans (2011), which demonstrates the intangible value of employee satisfaction. Our work brings additional insight on employee satisfaction: Whereas it shows some significant (but low) correlation with the social pillars of ESG rating agencies, our stress index does not show any significance with regard to the 100 Best Companies to Work For ranking that has been used in previous studies.[7]

In addition, this article contributes to the recent literature on job quality and firm performance. Previous studies have demonstrated the positive relationship between employee satisfaction and firm performance (Edmans, 2011; Huang et al., 2015; Green et al., 2019). Parkes and Langford (2008), Berkery et al. (2017) and Yee et al. (2020) show that flexible working arrangements, improving work-life balance, are associated with lower employee turnover and higher productivity. Our research complements these results by studying workplace stress as a driver of employee satisfaction which has been shown to constitute an intangible asset.

The paper is structured as follows. Section II develops the theoretical framework and derives the hypotheses. Section III presents the data. Section IV details the procedure for constructing the Workplace Stress Index. Section V interprets the WSI in light of estab-

[7] Fortune magazine annually publishes The 100 Best Companies to Work For, a ranking of U.S. companies based on employee satisfaction and workplace benefits. The list features both publicly traded and privately held firms.

lished workplace stress theories. Section VI tests the relationship between the WSI, firm operating performance, and analyst forecast errors. Section VII examines the association between the WSI and stock performance. Section VIII presents the robustness tests. Section IX concludes.

2.2 Theoretical Framework and Hypotheses

2.2.1 Workplace stress, corporate culture, and firm value

Managers are expected to undertake organizational choices that create value for the firm's owners (Jensen and Meckling, 1976). Among these choices, decisions regarding the organization of work, internal pressure, and workplace culture may affect firm value by either enhancing or impairing employee productivity. In this sense, workplace stress can be viewed as an internal organizational condition through which managerial choices about work organization and corporate culture may affect shareholder value. Stakeholder theory reinforces this view by arguing that firms must consider interests beyond those of shareholders, including those of employees, to create long-term value (Freeman, 1984). From this perspective, workplace stress is not only a managerial concern but also a potentially value-relevant organizational condition that may affect firm outcomes.

Prior work suggests that employee-related intangibles are economically meaningful. Edmans (2011) shows that firms with high employee satisfaction subsequently outperform, consistent with the view that employee satisfaction is a valuable intangible asset. Related studies document that employee satisfaction and corporate culture are associated with firm performance and positive market outcomes (Huang et al., 2015; Green et al., 2019; Edmans et al., 2023). This literature suggests that the internal workplace environment can contain value-relevant information. Our focus is on the negative side of this dimension. Rather than studying employee satisfaction or broad workplace quality, we examine whether workplace stress captures an internal organizational cost that is related to subsequent firm outcomes.

2.2.2 Workplace stress and operating performance

The effect of workplace stress on firm performance is theoretically ambiguous. A first view suggests that workplace pressure may improve performance when it takes the form of specific and challenging objectives. The goal-setting literature shows that demanding goals can motivate employees and improve performance (Locke and Latham, 1990). In this perspective, workplace pressure may be interpreted as a challenge that induces self-regulation, effort, and creativity (Pfister and Lukka, 2019; Mitchell et al., 2019).

However, this positive view has important limits. Aggressive goal-setting can also increase risky behavior and destroy firm value (Knight et al., 2001), lead to burnout (Demerouti et al., 2001), or induce unethical behavior (Barsky, 2007). The psychology and management literature also documents that workplace stress is associated with fatigue, lower job satisfaction, turnover intentions, and adverse health outcomes (Bell De Tienne et al., 2012; Altaf and Awan, 2011; Dahl, 2011; Ganster and Rosen, 2013; Greenberg et al., 2015; Goh et al., 2015). These effects may translate into lower productivity, absenteeism, lower innovation, and thus, weaker future operating performance.

The Job Demand-Control, Effort-Reward Imbalance, and Job Demands-Resources frameworks provide a natural interpretation of this mechanism. Workplace stress arises when job demands exceed the resources available to employees to cope with these demands (Karasek, 1979; Siegrist, 1996; Bakker and Demerouti, 2007). Under this view, stress is not simply a form of productive pressure. It reflects an imbalance between workload, expectations, and the organizational resources that allow employees to perform sustainably. If this imbalance affects productivity and organizational functioning, firms with higher workplace stress should subsequently experience weaker operating performance.

Hypothesis H1. Higher workplace stress is associated with lower future operating performance.

2.2.3 Workplace stress and analyst forecasts

If workplace stress affects future operating performance, a follow-up question is whether financial market participants fully incorporate this information. Employee-side information is likely to be only partially captured by broad workplace-quality indicators or social pillar scores. Prior research using Glassdoor data suggests that employee assessments contain information about firm outcomes that is not fully reflected in conventional data sources (Huang et al., 2015; Green et al., 2019). In our setting, workplace stress may therefore contain information about future operating performance that analysts do not fully incorporate into their earnings expectations.

This prediction is consistent with the view that employee-related intangibles can be value-relevant while remaining imperfectly reflected in market expectations. If analysts underestimate the future operating costs associated with workplace stress, firms with higher stress should be more likely to disappoint relative to analyst forecasts. We therefore examine whether workplace stress predicts subsequent analyst forecast errors.

Hypothesis H2. Higher workplace stress is associated with more negative subsequent analyst forecast errors.

2.2.4 Workplace stress and stock returns

The same reasoning also has implications for stock prices. If workplace stress captures a value-relevant internal organizational cost, and if this cost is not fully incorporated into analyst expectations, it may be reflected only gradually in stock prices. This logic is close to the evidence in Edmans (2011), where employee satisfaction predicts future stock returns, and to subsequent studies showing that employee-related measures from Glassdoor contain information about future firm performance (Green et al., 2019; Zhu et al., 2023).

In this paper, the prediction is reversed. If employee satisfaction represents a valuable intangible asset, workplace stress may capture a negative employee-related intangible. Firms with low workplace stress should therefore perform better in the future if investors do not fully price the costs associated with stress. Consequently, low-stress firms should earn higher subsequent risk-adjusted returns than high-stress firms.

Hypothesis H3. Firms with lower workplace stress earn higher subsequent risk-adjusted returns than firms with higher workplace stress.

2.3 Data

2.3.1 S&P 100

We focus on companies that were part of the S&P 100 index between 2013 and 2022. [8] The sample is updated at the beginning of each year to adjust for changes in the composition of the index. We exclude financial firms and companies whose headquarters are not in the U.S., resulting in a total of 96 firms. Descriptive statistics on the sample are presented in Table 2.1.

Financial data are collected from S&P Capital IQ. All financial-related values are winsorized at the 1% level. Companies belonging to the S&P 100 display on average $ 52,351 million sales with a little less than 3% growth. Firms show an average ROA of 7.41% with a large standard deviation (5.60%). Most of the companies in the index are growth stocks. Firm age and industry classification are also inferred from S&P Capital IQ. 14% of the observations concern tech firms. We collect additional data on analyst forecasts from the Institutional Brokers' Estimate System (I/B/E/S) data set. The summary statistics on the forecast errors and dispersion are similar to those reported by Green et al. (2019) and Call et al. (2021).

Finally, we retrieve ESG ratings and social metrics such as social pillar score, human capital score, human capital development score, and labor management score from MSCI, and social score, workforce score, and human rights score from Refinitiv. Table 2.1 shows that one-quarter of the observations present a MSCI social score lower than 3.20 out of 10, while one-quarter exceeds 5.40. The distribution of S scores is more left-skewed than the overall rating. Firms tend to have a better S score under Refinitiv with a distribution very close to the global ESG rating. The table finally reports that over the period, 9.30% of the companies have been awarded the title of Best Companies to Work for by Fortune magazine.[9]

2.3.2 Glassdoor employee reviews

The primary data for building our workplace stress index (WSI) are employee written reviews available on Glassdoor, an employer review website launched in 2008.

To ensure data integrity, Glassdoor proceeds to verification by email and social media, fraud detection algorithms, and manual control by a content management team.[10]

[8] This results in a list of 123 companies over this period.

[9] https://fortune.com/ranking/best-companies/

[10] https://www.glassdoor.com/blog/the-why-behind-glassdoor-review-moderation-process/

Table 2.1: Descriptive Statistics - S&P 100 Companies

	Mean	SD	Q1	Median	Q3	N
Financials						
Sales (in $ million)	52,351.13	46,566.87	19,519.00	35,285.00	69,799.00	3,247
Sales Growth (in %)	2.81	57.18	-0.30	1.07	3.11	3,229
Capex Intensity (in %)	8.74	29.79	2.48	4.38	7.95	3,231
R&D Intensity (in %)	6.13	8.63	0.00	0.00	12.84	3,231
EBITDA Margin (in %)	25.71	13.18	14.58	24.21	35.34	3,193
Net Margin (in %)	12.25	9.39	5.22	11.20	19.09	3,232
ROA (in %)	7.41	5.60	3.00	7.11	11.04	3,216
Market Cap (in $ million)	139,715.70	197,213.80	50,370.45	89,360.42	164,484.60	3,247
Assets (in $ million)	102,347.10	124,819.70	33,551.00	65,891.00	121,622.00	3,247
Book Leverage (in %)	30.96	16.98	18.72	29.11	41.97	3,215
Book Market Ratio	0.31	0.31	0.11	0.24	0.41	3,116
Firm Characteristics						
Firm Age (in years)	75.64	51.02	31.00	71.00	115.00	3,247
Tech company (in %)	14.41	35.13	0.00	0.00	0.00	3,247
Idiosyncratic volatility	0.97	0.37	0.73	0.97	1.17	3,247
Analyst Forecasts						
Forecast Error	0.88	0.34	0.89	0.95	0.99	2,975
Forecast Dispersion	0.07	0.25	0.02	0.03	0.07	2,975
MSCI ESG Scores						
ESG	4.87	1.01	4.30	4.80	5.50	2,993
Social Pillar	4.34	1.57	3.20	4.40	5.40	2,993
Human Capital	4.46	1.90	3.1	4.5	5.8	2,993
Human Capital Development	5.03	2.23	3.5	5.0	6.8	2,081
Health Safety	7.09	2.03	5.6	7.5	8.6	1,694
Labor Management	5.01	2.42	3.3	5.0	6.8	2,941
Refinitiv ESG Scores						
ESG	70.24	14.46	64.62	74.82	83.84	2,646
Social Pillar	73.87	16.57	64.62	74.82	77.27	2,646
Workforce	78.09	18.51	68.75	82.54	93.07	2,646
Human Rights	68.84	23.08	54.08	73.70	89.13	2,413
Best Companies to Work for						
BC Company (in %)	9.30	29.05	0.00	0.00	0.00	3,247

Notes: Table 2.1 presents summary statistics for companies belonging to the S&P 100. We report the mean, standard deviation (SD), and quartiles (Q1, Q2 and Q3) for the sample of quarterly firm-level observations. Financial, firm characteristics and analyst forecast data were collected using S&P Capital IQ and I/B/E/S database, while ESG scores were obtained from MSCI and Refinitiv. Best Companies to Work for data were retrieved from Alex Edmans' website. Financial-related values are winsorized at the 1% level.

The platform implements a "give to get" system, which helps mitigate selection biases in Glassdoor reviews.

Our analysis focuses on reviews submitted between January 2013 and December 2022, since the website started to be well populated from 2013 onwards. Since then, the average number of reviews per firm per quarter has been above 10 reviews as presented in Figure 2.1. Employee reviews and company ratings are anonymously submitted by reviewers who must provide information about their current or former employer to access the platform's ratings, reviews, and salary data.[11]

[11] Green et al. (2019) offer a comprehensive description of the dataset and conduct several external validity

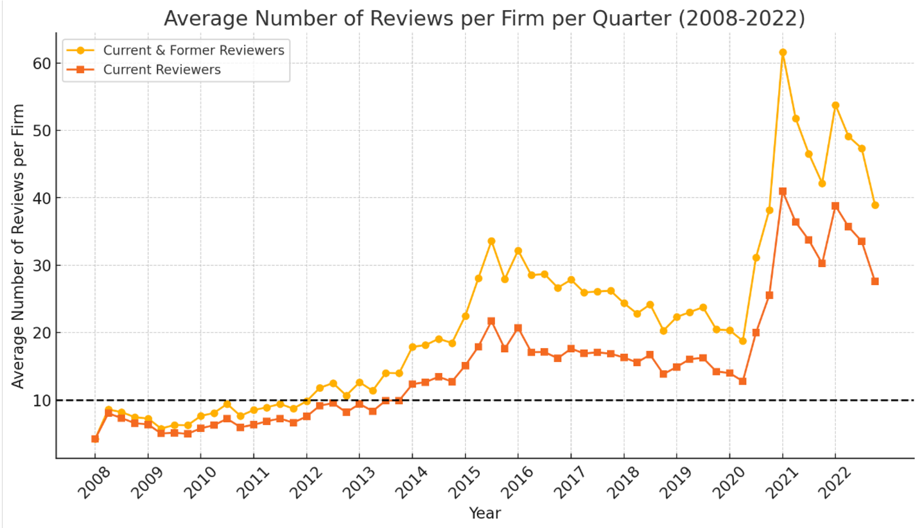

Figure 2.1: Evolution of Number of Glassdoor Reviews.
Notes: The figure displays the average number of Glassdoor reviews per quarter for the S&P 100 companies of our sample.

Most studies using Glassdoor data primarily rely on employee ratings. Only a few have so far leveraged Glassdoor employee written reviews, which offer a direct understanding of employees perception of the company (Symittsi et al., 2021). By analyzing Glassdoor employee reviews, several studies measure the risk of corporate misconduct (Campbell and Shang, 2021), diversity and inclusion (Briscoe-Tran, 2023), overall employee sentiment (Zhu et al., 2023), employee cultural difference (Hertel et al., 2024) and workplace harassment (Karimli, 2023).

The written reviews on Glassdoor are divided into three different sections: "Pros" (positive aspects), "Cons" (negative aspects), and "Advice to Management". We derive our workplace stress measure from the "Cons" section, which is the most informative section regarding employees' negative experiences. [12]

To measure the level of stress within each company of the S&P 100 sample, we rely on a sample of 507,393 current employee reviews with at least 5 words.[13] (and exclude 357,812 former employee reviews). On average, our sample contains 6,040 reviews per company and 12,685 reviews per quarter. The average cons review length in the final sample is 18 words.

2.3.3 *Topics discussed in the employee reviews*

We use a Structural Topic Modeling (Roberts et al., 2016) to provide an overview of the different themes or topics discussed in employee reviews. The STM estimates the distributions of terms $w = 1, ..., N_w$ within each topic $k = 1, ..., N_k$, across the set of employee cons reviews, and the distributions of topics $k = 1, ..., N_k$ within each review $r = 1, ..., N_r$. Both distributions follow a Dirichlet prior, meaning that each element represents a probability

tests.

[12] https://fortune.com/2024/08/06/glassdoor-burnout-reviews-record-high-faith-lost-in-workplace/

[13] 47,683 reviews were eliminated as they do not meet the minimum word threshold

and is bounded within the interval [0,1]. Contrary to the Latent Dirichlet Allocation of Blei et al. (2003)[14], the STM allows topics within a document to be correlated, which means that the presence of one topic in a review may be statistically linked to another. Besides, it allows topic-word distributions to vary across documents, allowing the same topic to be expressed differently depending on context. Finally, STM incorporates document-level covariates, enabling topic prevalence to be influenced by external factors, such as the rating score associated with each review.

Before implementing STM, we need to preprocess the cons reviews: This involves standard text-cleaning procedures, including removing punctuation, converting text to lowercase, removing stop words[15], and stemming words to unify different word forms.[16] Additionally, we apply term-frequency filtering to remove overly common or rare words that contribute little to topic differentiation. Finally, we only keep documents (cons reviews) that contain at least five tokens (words) to ensure sufficient textual content for the STM analysis. Consistent with the literature, we focus on unigrams rather than bigrams or trigrams, as probabilistic topic models like STM are designed to capture word co-occurrence patterns rather than fixed multi-word expressions.

The final dataset for STM consists of 221,819 cons reviews from current employees, with an average length of 32 words per review, compared to 18 words per review in the full sample. We incorporate employee ratings as metadata, allowing the STM to model topic prevalence as a function of the review score, in line with prior studies (Schmiedel et al., 2018; Stamolampros et al., 2020; Sainju et al., 2021).[17] Finally, through a combination of statistical diagnostics and qualitative assessment (see Figure 2.2), we determine the optimal number of topics before running the STM. We rely on the elbow method to select the number of topics. In our cons STM subsample, the optimal number of topics is 20.

Table 2.2 provides the 20 cons topics identified by the STM along with their top ten n-grams based on the FREX score. FREX measures the contribution of an n-gram to a topic by computing the harmonic mean of its rank in terms of exclusivity and frequency (Bischof and Airoldi, 2012).[18] Stamolampros et al. (2020) and Sainju et al. (2021) label their STM topics by consulting experts in human resource management. Following this approach, we ask ChatGPT to generate topic labels while instructing it to respond as an expert in human resource management.[19] To do so, we provide ChatGPT with the list of top n-

[14]LDA is one of the earliest and most used probabilistic topic models. In the financial literature, LDA has been implemented to analyze 10-K filings (Dyer et al., 2017), analyst discussions (Huang, 2018), SEC comment letters (Dechow et al., 2016), corporate disclosure surrounding fraud incidents (Hoberg and Lewis, 2017), and loan classification (Argyle et al., 2020).

[15]Stopwords are commonly occurring words (e.g., 'the', 'and', 'is') that typically carry little semantic meaning on their own and are frequently removed in text preprocessing to improve topic modeling.

[16]Stemming is a text preprocessing technique that reduces words to their root form by removing suffixes (e.g., 'management' becomes 'manag')

[17]In most studies (Schmiedel et al., 2018; Stamolampros et al., 2020; Sainju et al., 2021) applying STM on Glassdoor reviews, researchers use as metadata the score and the employee status (current or former).

[18]Words with a high FREX score appear frequently within a given topic while remaining relatively uncommon across other topics.

[19]We submit the following prompt: *"Forget your previous instruction. Pretend you are an expert in human resource management. Based on a textual analysis of employee-cons reviews from Glassdoor, I would like you to assign a clear and concise label to each topic. Each topic is characterized by: (1) the top n-grams, which represent the most*

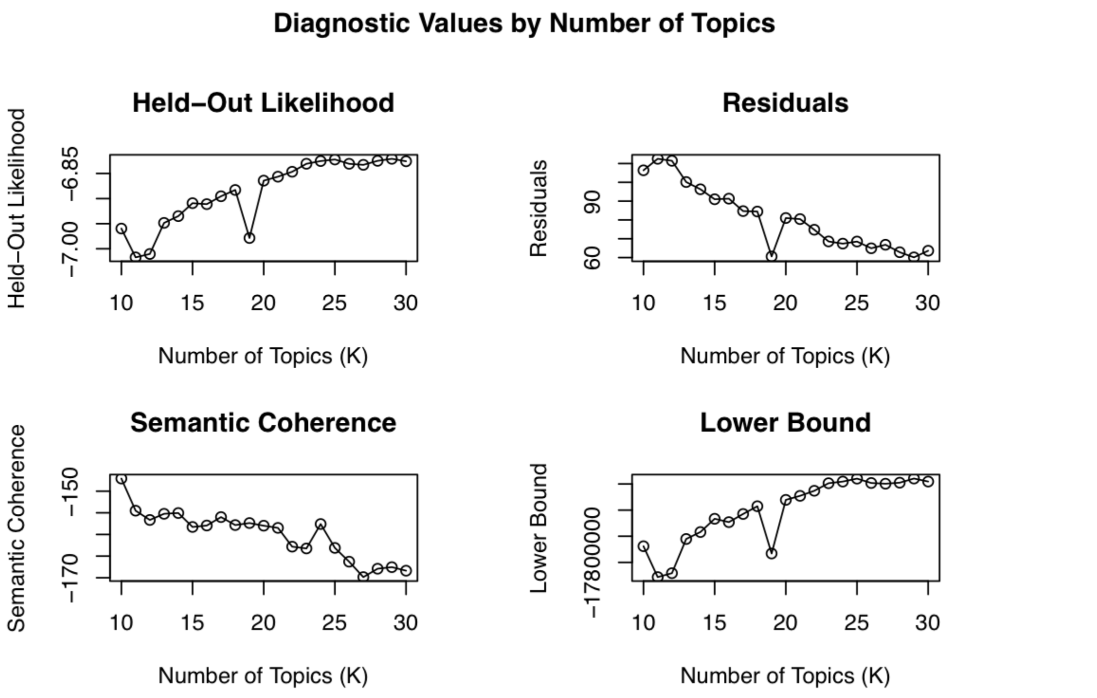

Figure 2.2: Optimal Number of Topics.

Notes: The figures present diagnostic values (held-out likelihood, residuals, semantic coherence, and lower bound) from the STM in order to infer the optimal number of topics through the elbow method.

grams (ranked by FREX score) along with the five most representative documents for each topic.[20]

Several of the topics identified in our analysis closely align with topics retrieved in prior studies applying STM to employee reviews (Sainju et al., 2021; Lambert et al., 2026). Based on the average FREX score of the top 10 n-grams, the three most distinctive topics in our STM model talk about "Unfair Promotions and Job Placement", "Poor Work-Life Balance", and "Long Hours and Limited Mobility".

distinctive words for the topic, and (2) the most representative documents, which are the reviews that best capture the topic. The label should accurately summarize the theme in a maximum of 2 to 3 words. Here are the inputs: (...)."

[20]The most representative documents for a given topic are those with the highest estimated topic allocation, meaning they contain a significant concentration of words associated with that specific topic. Appendix A1 shows the most representative documents (employee cons reviews) provided to GPT for topic labeling.

Table 2.2: STM Topics and N-grams

Panel A: Job Demand							
Bureaucracy & Lack of Innovation		Customer Service Stress & Understaffing		Heavy Workload & Poor Conditions		Mismanagement & Unrealistic Expectations	
N-gram	FREX	N-gram	FREX	N-gram	FREX	N-gram	FREX
product	0.11	custom	0.24	store	0.19	program	0.06
project	0.09	stress	0.13	depend	0.12	target	0.06
deci	0.08	servic	0.08	manag	0.08	push	0.06
engin	0.07	polici	0.07	rate	0.07	complet	0.05
base	0.06	extrem	0.07	workload	0.06	lead	0.05
organ	0.06	employ	0.07	favorit	0.05	experi	0.05
huge	0.04	associ	0.07	heavi	0.05	basic	0.04
bureaucraci	0.04	pai	0.05	pretti	0.04	receiv	0.04
build	0.04	goal	0.05	turnov	0.04	prepar	0.04
creat	0.03	rude	0.04	wage	0.04	major	0.03
Layoffs & Low Morale		Long Hours & Limited Mobility		Outdated Systems & Complex Processes		Unpredictable Schedules & Long Hours	
N-gram	FREX	N-gram	FREX	N-gram	FREX	N-gram	FREX
expect	0.25	time	0.44	process	0.16	hour	0.35
constant	0.16	hard	0.23	perform	0.10	dai	0.22
terribl	0.07	shift	0.13	intern	0.09	schedul	0.12
layoff	0.07	difficult	0.13	learn	0.07	week	0.11
continu	0.05	depart	0.08	busi	0.07	retail	0.05
moral	0.05	take	0.06	pressur	0.05	weekend	0.05
frequent	0.05	demand	0.06	review	0.04	overtim	0.05
middl	0.04	start	0.03	technolog	0.04	call	0.04
manag	0.04	mobil	0.02	system	0.04	vacat	0.03
unrealist	0.04	season	0.02	technic	0.03	night	0.03

Panel B: Job Resources

Employee Disengagement & Cost Cutting		Fast-Paced Environment with Political Challenges		Limited Benefits & Workplace Amenities		Limited Career Advancement Opportunities	
N-gram	FREX	N-gram	FREX	N-gram	FREX	N-gram	FREX
team	0.30	chang	0.16	benefit	0.17	career	0.16
employ	0.17	cultur	0.15	support	0.12	level	0.15
increa	0.09	slow	0.12	leader	0.09	posit	0.14
cost	0.06	environ	0.10	offic	0.08	advanc	0.10
execut	0.05	rai	0.09	horribl	0.06	develop	0.08
reward	0.04	polit	0.09	real	0.06	senior	0.07
oper	0.03	corpor	0.08	stock	0.05	pai	0.06
focu	0.03	fast	0.06	plai	0.04	skill	0.06
bring	0.02	move	0.06	option	0.04	plan	0.05
activ	0.02	industri	0.05	food	0.04	respon	0.05

Limited Career Growth & Salary		Low Compensation & Overwork		Poor Management & Bias		Poor Management & Location Challenges	
N-gram	FREX	N-gram	FREX	N-gram	FREX	N-gram	FREX
salari	0.18	pai	0.17	manag	0.45	employ	0.08
opportun	0.16	cut	0.11	poor	0.13	month	0.08
growth	0.15	compen	0.09	hire	0.11	locat	0.05
limit	0.10	staff	0.08	upper	0.06	treat	0.03
market	0.09	short	0.07	employ	0.06	forc	0.03
structur	0.07	task	0.06	amazon	0.05	respect	0.03
grow	0.07	break	0.06	talent	0.04	live	0.03
term	0.05	bonu	0.06	averag	0.04	worst	0.02
health	0.05	bonus	0.04	diver	0.02	offer	0.02
busi	0.04	staf	0.04	boss	0.02	center	0.02

Poor Leadership & Communication		Poor Training & Unsafe Work Environment		Poor Work-Life Balance		Unfair Promotions & Job Placement	
N-gram	FREX	N-gram	FREX	N-gram	FREX	N-gram	FREX
lack	0.20	train	0.12	balanc	0.24	peopl	0.35
leadership	0.15	care	0.11	life	0.22	job	0.27
lot	0.12	monei	0.05	bad	0.18	promot	0.20
commun	0.10	paid	0.05	sale	0.13	feel	0.11
competit	0.09	worker	0.05	worklif	0.10	role	0.09
issu	0.08	manag	0.04	person	0.09	leav	0.06
meet	0.08	talk	0.04	holidai	0.06	deal	0.04
direct	0.06	suck	0.03	challeng	0.05	easi	0.03
con	0.05	cowork	0.02	account	0.05	happen	0.03
individu	0.04	rule	0.02	flexibl	0.04	tough	0.03

Notes: Table 2.2 presents the twenty topics derived from the Structural Topic Modeling applied to employee cons reviews. Topics are grouped according in Panels A and B to the Job Demands-Resources theory. For each topic, the top 10 n-grams and their FREX score (a measure that quantifies a word's frequency within a given topic while accounting for its exclusivity to that topic) are displayed.

2.4 Workplace Stress Index

We perform a Bidirectional Encoder Representations from Transformers (BERT) to categorize the stress level of each employee Cons review. We use a dichotomous classification: a review is either "Stressed" or "Not stressed". Review stress scores (dummies) are then aggregated at firm-quarter level – by simply counting the reviews coded as "Stressed" and then dividing by the total number of reviews over the period – to construct a firm-specific workplace stress index (WSI). Given the large differences in the number of reviews (for instance, Amazon.com, Inc. received more than 1,000 reviews per quarter from 2017 onwards, whereas a few firms, particularly at the beginning of our sample period, received only 5 to 10 reviews per quarter), we normalize the firm-level average stress score per quarter based on the number of reviews available for each firm in that specific quarter. We apply the Empirical Bayes Shrinkage Estimation approach, which is recommended when the number of observations used to compute an average varies substantially across units (Efron and Morris, 1975; Morris, 1983; Efron, 1996). Efron and Morris (1975) show how unit-level averages based on limited data can be improved by shrinking them toward a global mean. Economic and firm-level applications of such methods are further discussed in Chen (2026) and Walters (2024). The empirical Bayes shrinkage estimation formula we use is: Adjusted $\text{WSI}_{i,q} = \left(\frac{n_{i,q}}{n_{i,q}+k}\right) \times \text{WSI}_{i,q} + \left(\frac{k}{n_{i,q}+k}\right) \times \mu\text{WSI}$, where $n_{i,q}$ is the number of reviews in quarter q of the firm i, k is the interpolation parameter, and μWSI is the overall mean of our Workplace Stress Index (WSI). Following Efron (1996), we calibrate $k = 5$, which ensures that the empirical Bayes shrinkage behaves consistently and improves estimation accuracy in large-sample settings. In our context, this implies a 50% shrinkage toward the global WSI mean when $n_{i,q}$ equals five reviews, making the adjustment both interpretable and conservative for small-sample firm-quarters. In Section 2.8 (robustness section), we test the sensitivity of this k factor calibration.

2.4.1 BERT and coded reviews

Developed by Google in 2018, BERT is an Artificial Intelligence model designed for natural language processing (NLP). Its key advantage lies in its bidirectional architecture, which enables it to understand the context of a word within a sentence by considering both preceding and succeeding words. This approach contrasts with traditional NLP models which process text unidirectionally, either from left to right or right to left. BERT model has been pre-trained on an extensive text corpus, including the entirety of English Wikipedia and BookCorpus: it can therefore capture complex language patterns and contextual nuances effectively (Devlin et al., 2019).

In recent years, financial researchers have increasingly implemented BERT models in their studies, leveraging these advanced NLP techniques to develop novel measures of unobserved corporate characteristics. Using BERT, researchers have constructed metrics to analyze corporate disclosure (Bingler et al., 2022; Kölbel et al., 2024; Cao et al., 2023; Wong et al., 2024), investor sentiment (Jha et al., 2021; Kirtac and Germano, 2024), and ESG performance (Briscoe-Tran, 2023; Giglio et al., 2026; Xie, 2024; Hu et al., 2025). Briscoe-Tran (2023) and Zhu et al. (2023) also employ BERT models on employee reviews to measure the corporate diversity and inclusion and the employee overall sentiment (positive, neutral or negative). Yet, our study is the first to develop a workplace stress index while employing a fine-tuned BERT on employee written reviews.

Before performing the BERT model on our sample of textual reviews, BERT needs to be trained on a sample of annotated corpus that provides examples of reviews where employees express or do not express some sign of stress. We use the ChatGPT interface to annotate 1,000 randomly selected employee reviews from private firms. Fatouros et al. (2023) and Qiu and Jin (2024) demonstrate that ChatGPT outperforms other classification models in sentence-level and sentiment classification tasks. In the prompt, we specify the definition of stress using the WHO definition and include stress symptoms mentioned in Dahl (2011).[21]

We provide ChatGPT with a broad definition of stress and do not target any specific type of stress to avoid influencing the classification. We will then investigate in the empirical analysis, which dimensions of stress drive our results. Out of the 1,000 reviews, ChatGPT classifies 446 reviews as "stressed" and 554 as "not stressed" (See Table A2). These classifications were reviewed manually to ensure their reliability. We run the BERT model on the 1,000 tokenized and cleaned reviews. The fine-tuned model reaches an accuracy score of about 60%, close to the accuracy score of Briscoe-Tran (2023) who also employs fine-tuned BERT on employee reviews. [22] In addition to the accuracy score, the model's precision, recall and F1-score are 0.59, 0.58, and 0.56, respectively. Fine-tuned BERT models typically achieve higher accuracy scores, i.e. between 70% and 90%, on 10K files (Garrido-Mercha et al., 2024), news articles (Nugroho et al., 2021; Chen, 2024), scientific texts (Likhareva et al., 2024). Our lower performance is consistent with the challenge of applying BERT models to unstructured and heterogeneous reviewer-generated content such as Glassdoor reviews. Unlike standardized documents, employee reviews contain informal language, varying lengths, typos, and different structures, which naturally limit the model accuracy. Briscoe-Tran (2023) similarly reports a modest accuracy level (55%-63%) when using fine-tuned BERT on Glassdoor employee reviews to measure the Diversity and Inclusion of companies.

Table 2.3 provides descriptive statistics on our sample of "stressed" versus "not stressed" reviews.

Approximately 30% of the sample reviews are labeled as "stressed reviews". Employees who are categorized as expressing stress in their reviews assign on average significantly lower ratings to the firm than non-stressed employees. The proportion of non-

[21]The prompt submitted reads as follows: *"Forget your previous instruction. Pretend you are a psychologist with a specialization in employee well-being at work. You define the sentiment of stress as a state of worry or mental tension caused by a difficult situation and that the symptoms of stress are described as depression, anxiety, insomnia and tiredness. Based strictly on the information provided in the following employee cons review and without making any assumptions, answer if the employee who wrote the cons review is stressed or not. Please answer with only one word (Yes or No). Here is the review: "(. . .)" "*.

[22]The accuracy score is computed as the ratio of the sum of the true positive and the true negative classifications over the total reviews

Table 2.3: Employee Reviews & Workplace Stress Level.

	All reviews			**Not Stressed reviews**			**Stressed reviews**		
	Mean	SD	N	Mean	SD	N	Mean	SD	N
Glassdoor Rating									
Overall Score	3.81	1.15	507,393	3.98	1.07	364,459	3.37	1.23	142,934
Reviewer Position Charact.									
% Mngt Reviews	19.99	39.99	507,393	19.43	39.57	364,459	21.39	41.00	142,934
% Non-Mngt Reviews	51.66	49.97	507,393	52.67	49.93	364,459	49.10	50.00	142,934
% Other Reviews	28.35	45.07	507,393	27.90	44.85	364,459	29.50	45.61	142,934
Reviewer Tenure Charact.									
% Rookie Reviews	40.69	49.12	507,393	38.99	48.77	364,459	45.03	49.75	142,934
% Experienced Reviews	20.11	40.08	507,393	17.48	37.98	364,459	26.81	44.30	142,934
% Other Reviews	39.20	48.82	507,393	43.53	49.58	364,459	28.16	44.98	142,934

Notes: Table 2.3 presents summary statistics from January 2013 to December 2022 on our sample of employee reviews. We provide the average ratings, job position, and tenure for all reviews and for reviews qualified as "stressed" or "not stressed". "Other Reviews" refers to reviews for which employees did not specify their position and/or tenure.

managers in the not stressed reviews is slightly superior than in the stressed reviews. There is a larger proportion of anonymous and non classified employees in the stressed sample. Stressed employees are often more likely to declare their tenure when reviewing their company on Glassdoor.com.

2.4.2 Firm-specific workplace stress index (WSI)

Each quarter, we classify firms into low and high workplace stress groups within each industry (using the Capital IQ GICS classification) based on their median value of the firm-specific stress index. Panel A of Table 2.4 reports summary statistics for the two groups. In this raw analysis, we observe that high-stress firms have significantly higher sales but lower market capitalization than low-stress firms. High-stress firms tend to be significantly younger. Regarding investment intensity, R&D intensity is lower in high-stress firms, while capital expenditure intensity does not show a significant difference between the two categories of workplace stress. EBITDA margins, net margins, and ROA are significantly lower for high-stress firms, suggesting that workplace stress may correlate with weaker financial performance. We will investigate this relationship further in the following sections. In addition, book leverage is significantly lower for high-stress firms, while the book market ratio is significantly higher.

We find a significant difference in the overall ESG score: high-stress firms display on average lower ratings, in particular regarding the Social (S) score. [23] We interpret this significant correlation as a validity test for our workplace stress measure as in Karimli (2023).[24] This will be further investigated in the next section. Finally, we find that firms where employees experience lower workplace stress are not more likely to be recognized

[23] Environmental (E) and Governance (G) MSCI scores do not show significant differences (untabulated results).

[24] Karimli (2023) shows a positive relationship between the workplace harassment measure and the S score which he also uses as a validity test for his measure.

as a 'Best Company to Work For' (BC). Although the BC ranking is often used as a proxy for workplace quality and employee well-being (Filbeck and Preece, 2003; Edmans, 2011; Dominick et al., 2020; Edmans et al., 2023), this result indicates that firms with high workplace stress are not necessarily excluded from such rankings, suggesting that the ranking may not fully capture internal workplace stress dynamics.

Table 2.4: Workplace Stress Index & Corporate Characteristics.

Panel A – High and Low Workplace Stress Index							
	High Workplace Stress Firms			Low Workplace Stress Firms			
	Mean	SD	N	Mean	SD	N	T-test (HML)
Workplace Stress Index							
WSI (in %)	40.37	13.66	1,731	29.13	11.80	1,516	11.12***
Financials							
Sales (in $million)	54,816.54	49,531.07	1,731	49,536.06	42,775.61	1,516	6,386***
Sales Growth (in %)	3.93	77.97	1,725	1.53	6.71	1,504	2.40
Capex Intensity (in %)	8.91	34.90	1,726	8.54	22.55	1,505	0.37
R&D Intensity (in %)	5.53	8.20	1,726	6.83	9.06	1,505	-1.29***
EBITDA Margin (in %)	24.56	13.56	1,711	27.05	12.61	1,482	-2.49***
Net Margin (in %)	11.37	9.37	1,727	13.27	9.32	1,505	-1.90***
ROA (in %)	6.98	5.50	1,727	7.91	5.67	1,505	-0.93***
Market Cap (in $million)	127,443.3	152,879.7	1,731	153,728.6	237,221.6	1,516	-26,285.3***
Total Assets (in $million)	99,663.88	119,669.9	1,731	105,410.9	130,423.8	1,516	-5,747.00
Book Leverage (in %)	30.14	16.12	1,731	31.89	17.89	1,516	-1.75***
Book to Market Ratio	0.32	0.33	1,731	0.30	0.29	1,516	0.21*
Firm Characteristics							
Firm Age (in years)	72.53	49.86	1,731	79.19	52.09	1,516	-6.62***
Tech company (in %)	13.52	34.20	1,731	15.44	36.14	1,516	-1.92*
Idiosyncratic volatility	0.96	0.36	1,731	0.98	0.37	1,516	-0.01
Analyst Forecasts							
Forecast Error	0.87	0.37	1,627	0.90	0.30	1,348	-0.03**
Forecast Dispersion	0.09	32.24	1,627	0.06	0.09	1,349	0.03***
MSCI ESG Scores							
ESG	4.82	0.99	1,601	4.94	1.03	1,392	-0.12***
Social Pillar	4.25	1.53	1,601	4.43	1.61	1,392	-0.17***
Human Capital	4.40	1.80	1,601	4.54	1.99	1,392	-0.15**
Human Capital Development	4.81	2.32	1,092	5.27	2.09	989	-0.46***
Health Safety	7.05	1.97	898	7.13	2.09	796	-0.07
Labor Management	5.02	2.40	1,573	4.99	2.45	1,368	0.02
Refinitiv ESG Scores							
ESG	68.68	15.50	1,417	72.03	12.93	1,229	-3.35***
Social Pillar	72.05	17.51	1,417	75.97	15.15	1,229	-3.92***
Workforce	77.32	19.46	1,417	78.98	17.32	1,229	-1.67**
Human Rights	66.20	23.88	1,295	71.90	21.73	1,118	-5.70***
Best Companies To Work for							
BC Company	9.82	29.77	1,731	8.70	28.20	1,516	1.11

We construct a Workplace Stress Index at the company-quarter level. In Table 2.4 - Panel B, we report that our average workplace stress is 35% over the 2013-2022, i.e. on average stress is reported in 35% of the reviews. The table also shows the value of the index conditional to the firm industry or size. We observe only slight differences in the median

Panel B – Workplace Stress Index (in %) and Firm Characteristics							
	Mean	SD	Min.	Q1	Median	Q3	Max.
S&P 100 Firms	35.12	14.00	4.56	23.35	36.14	45.58	75.74
Industry							
Communication Services	34.54	13.44	8.20	23.12	37.44	44.45	62.71
Consumer Discretionary	34.84	13.68	8.70	22.60	36.47	45.32	70.47
Consumer Staples	35.48	14.44	6.95	23.27	37.06	46.44	72.23
Energy	34.93	13.47	8.27	24.16	34.72	44.46	73.17
Health Care	35.74	13.94	8.81	25.07	35.60	45.89	75.23
Industrials	35.57	14.27	4.56	22.97	37.32	46.74	68.69
Information Technology	33.69	14.13	4.78	20.92	34.46	44.22	67.80
Materials	33.57	13.70	11.58	19.97	34.66	44.45	62.15
Utilities	36.87	13.86	12.71	25.61	36.77	46.87	75.74
Size							
Large-cap	36.40	13.76	4.56	25.43	37.69	46.42	75.74
Mega-cap	29.45	13.66	7.20	17.31	27.97	39.98	73.17

Notes: Table 2.4 Panel A sorts firms according to their level of WSI in two sub-groups and reports the same descriptive statistics as in Table 2.1. High-workplace stress firms are defined as those above the median of industry-adjusted quarterly stress levels. The last column reports the t-test of the differences between the High stressed and Low stressed reviews in the variable. Panel B reports descriptive statistics on the WSI (Workplace Stress Index) for the full sample and across sub-groups on industries and size. We follow the Global Industry Classification Standards (GICS) from S&P Capital IQ. Firms are classified as mega-cap if their market capitalization exceeds $200 billion; otherwise, they are classified as large-cap (between $20 billion and $200 billion). * stands for significant at 10%, ** significant at 5%, and *** significant at 1% level.

values across industries but large differences according to the firm size as expected from the previous descriptive statistics.

As an additional validity test, Table A3 shows that WSI lagged by one year is capable of predicting the Refinitiv yearly social, workforce, and human rights scores even when adding year and industry fixed-effects. However, it does not predict MSCI social scores when time and industry fixed-effects are considered. There exist significant differences between the two frameworks as shown by Berg et al. (2022). Refinitiv is data-driven, but MSCI scores rely on a qualitative assessment of the capacity of managers to cope with sustainable risks and opportunities. We interpret these findings as suggesting that our WSI captures social key performance indicators but does not reflect ratings derived from analysts' proprietary assessment.

2.5 Stress Theories and Workplace Stress Index

This section examines whether the Workplace Stress Index is consistent with established theories of workplace stress. The management and psychological literature have conceptualized how stress emerged in the workplace. In the Demand–Control Model (DCM) of Karasek (1979), workplace stress is situated at the interaction between job demands and job control. In this framework, work overload and work pressure are identified as the primary indicators of job demands, while autonomy represents the core dimension of job control. Job demand indicators become stressors when they become out of control. In the Effort–Reward Imbalance (ERI) model, Siegrist (1996) considers stress as the result of an imbalance between the effort required to meet job demands and the rewards received in return. These rewards include not only financial compensation, but also esteem, recognition, and career opportunities. Finally, the Job Demands–Resources (JD–R) model (Bakker and Demerouti, 2007) reconciles and extends previous framework by classifying stress-related risk factors into two broad categories: job demands and job resources. Job demands refer to "those physical, psychological, social, or organizational aspects of the job that require sustained physical and/or psychological (cognitive and emotional) effort and are therefore associated with certain physiological and/or psychological costs." Job demands can vary from classical elements such as work pressure to a demanding client or toxic environment. In contrast, job resources — such as autonomy, feedback, and rewards — play a motivational role and can buffer the negative effects of job demands on stress.

The STM conducted in employee-written reviews provides a way to assess whether these established theoretical frameworks are reflected in our workplace stress indicator. We test whether the prevalence of the various topics that depict employee complaints is related to the stress score indicator of each review. To do so, we run a probit analysis which stands as follows:

$$\Pr(\text{Stress}_r = 1) = \Phi(\alpha + \beta_k \, \mathrm{P}_{k,r} + \delta_q + \lambda_j) \tag{2.1}$$

where Stress_r is a binary variable equal to 1 if review r is classified as stressed, $\mathrm{P}_{k,r}$ is the prevalence of topic k in review r, δ_q denotes quarter fixed-effects, λ_j denotes industry fixed effects, and $\Phi(\cdot)$ is the standard normal cumulative distribution function. Table 2.5 provides the results of the probit.

The table provides the probit coefficients β_k as well as the marginal effects of a variation of 1% of the topic prevalence on the probability for the review to be qualified as stressed. Panel A (Panel B) presents the topics for which there is a positive (negative) relation between the topic prevalence and the stress indicator. A topic related to unrealistic expectations stands out as the main explanatory variable. We observe that if the prevalence of this topic increases by 1%, stress increases by 5 percentage points.

Table 2.5: Topic Prevalence and Review-Level Workplace Stress: Probit Estimates and Marginal Effects

Panel A – Positive Effects			Panel B – Negative Effects		
	Probit Coefficients	Marginal Effects (%)		Probit Coefficients	Marginal Effects (%)
Mismanagement & Unrealistic Expectations	13.21*** (48.27)	4.950*** (48.99)	Long Hours & Limited Mobility	-2.208*** (-35.19)	-0.831*** (-35.48)
Poor Training & Unsafe Work Environment	3.346*** (54.92)	1.251*** (55.95)	Limited Career Growth & Salary	-1.891*** (-36.25)	-0.711*** (-36.57)
Poor Management & Location Challenges	2.464*** (39.14)	0.923*** (39.49)	Poor Work-Life Balance	-1.833*** (-32.19)	-0.690*** (-32.42)
Layoffs & Low Morale	1.628*** (18.28)	0.615*** (18.32)	Fast-Paced Environment with Political Challenges	-1.714*** (-32.36)	-0.645*** (-32.59)
Unfair Promotions & Job Placement	1.569*** (19.03)	0.562*** (19.07)	Poor Leadership & Communication	-1.472*** (-16.57)	-0.556*** (-16.60)
Employee Disengagement & Cost Cutting	1.239*** (14.32)	0.468*** (14.34)	Outdated Systems & Complex Processes	-0.489*** (-9.41)	-0.185*** (-9.42)
Poor Management & Bias	1.262*** (23.12)	0.476*** (23.21)	Low Compensation	-0.425*** (-5.89)	-0.161*** (-5.89)
Limited Benefits & Workplace Amenities	0.709*** (7.32)	0.268*** (7.32)	Limited Career Advancement Opportunities	-0.376*** (-5.70)	-0.142*** (-5.70)
Customers Service Stress & Understaffing	0.411*** (6.92)	0.155*** (6.92)	Unpredictable Schedules & Long Hours	-0.281*** (-6.94)	-0.106*** (-6.94)
Bureaucracy & Lack of Innovation	0.279*** (4.50)	0.106*** (4.50)			
Heavy Workload & Poor Conditions	0.198*** (3.12)	0.074*** (3.12)			

Notes: Table 2.5 reports estimates from the probit analysis displayed in Equation 2.1. Panel A reports topics with positive association with our stress-review variable and Panel B reports topics with negative associations with our stress-review variable. For each topic, we report both, the probit coefficient and the corresponding average marginal effect on the probability that a review is labelled as stressed. Average marginal effects are expressed in percentage %. * stands for significant at 10%, ** significant at 5%, and *** significant at 1% level.

In Table 2.6, we test whether a change in the prevalence of the topic related to unrealistic expectations would lead to a change in WSI, controlling for quarter fixed effects and company fixed effects.

Column (1) shows that when the prevalence of complaints related to target pressure and unrealistic expectations increases by 1%, the level of stress captured by our workplace stress index almost doubles. We then consider in Columns (2) to (4) a set of mitigation variables consistent with the Job Demands-Resources model. That is, the firm overall score, management, and the culture scores are used as proxies for the firm long-term resources that could mitigate the relationship between target pressure and stress. For high level of those mitigation variables, the workload pressure is not translated into a higher level of stress as expected from the Job Demands-Resources theory.

Table 2.6: Complaints about Unrealistic Expectations and Workplace Stress

	Δ WSI					
	(1)	(2)	(3)	(4)	(5)	(6)
Δ Unrealistic Expectations	1.916***	1.910***	1.914***			
	(4.75)	(4.73)	(4.68)			
Δ Unrealistic Expectations x Low Score				2.213***		
				(3.65)		
Δ Unrealistic Expectations x Mid Score				2.337***		
				(2.65)		
Δ Unrealistic Expectations x High Score				1.173		
				(1.60)		
Δ Unrealistic Expectations x Low Cult Score					2.507***	
					(3.66)	
Δ Unrealistic Expectations x Mid Cult Score					1.984***	
					(3.12)	
Δ Unrealistic Expectations x High Cult Score					0.868	
					(1.02)	
Δ Unrealistic Expectations x Low Senior Mgt Score						3.574***
						(4.72)
Δ Unrealistic Expectations x Mid Senior Mgt Score						2.455***
						(3.64)
Δ Unrealistic Expectations x High Senior Mgt Score						-0.0817
						(-0.12)
Quarter-F.E	Yes	Yes	Yes	Yes	Yes	Yes
Industry-F.E	No	Yes	No	No	No	No
Company-F.E	No	No	Yes	Yes	Yes	Yes
Number of Observations	3,109	3,109	3,109	3,109	3,109	3,109
Adjusted R-sq	0.028	0.026	0.003	0.003	0.003	0.007

Notes: Table 2.6 reports how changes in the prevalence of complaints related to unrealistic expectations are related to changes in workplace stress (Δ WSI). Columns (1)-(3) report the baseline specifications, where specification (1) includes quarter fixed effects and specification (2) includes both quarter and industry fixed effects. In Specification (3), industry fixed effects are replaced by company fixed effect. Columns (4)-(6) provide interaction specifications using tercile groups based on firm overall score (4), culture score (5), and senior management score (6). * stands for significant at 10%, ** significant at 5%, and *** significant at 1% level.

2.6 Operating Performance, Earnings Surprise and Workplace Stress

This section examines whether workplace stress has economic consequences for the firm. Building on the theoretical framework developed in Section II, we first test whether higher workplace stress predicts weaker subsequent operating performance. We then examine whether this information is incorporated into analyst forecasts by testing whether workplace stress predicts subsequent forecast errors.

2.6.1 Workplace stress and return on assets

This subsection tests Hypothesis H1 by examining whether firms with higher workplace stress subsequently experience weaker operating performance. Empirically, we test whether the firm-specific workplace stress index (WSI) measured at each quarter q is related to firm operating performance or analyst forecast error. We run a pooled OLS regression on firm ROA at time $q+1$. [25]

We include control variables commonly used in previous research that examined the

[25] Following prior literature (Huang et al., 2015; Green et al., 2019), we measure future corporate performance using the return on assets (ROA) of the following quarter, computed as the ratio of net income to total assets.

impact of corporate culture on corporate performance, such as book leverage, R&D intensity, capex intensity, sales growth, firm age, total assets, book-to-market (Huang et al., 2015; Green et al., 2019). The regression model stands as follows:

$$ROA_{i,q+1} = \alpha + \beta\, WSI_{i,q} + \phi ROA_{i,q} + \gamma Z_{i,q} + \rho Z_{dFE} + \epsilon_{i,q} \tag{2.2}$$

where the dependent variable is the ROA of the firm i in quarter $q+1$. The variable of interest, $WSI_{i,q}$, is the firm's average workplace stress level i in quarter q. The vector $Z_{i,q}$ represents the firm-specific characteristics of the firm i in the quarter q, and includes sales growth (from quarter $q-1$ to q), R&D intensity, capex intensity, book leverage, book-to-market, firm age, firm size and ROA. Z_{dFE} captures the fixed effects for quarter and industry, along with their interaction (crossed fixed-effects).

The results are presented in Table 2.7 - Panel A.

In Columns (1) and (2) of Panel A, we find that workplace stress is negatively associated with next quarter's ROA considering quarter and industry fixed-effects. The coefficient is statistically significant at the 1% level. In Column (3), we add commonly used controls in corporate performance studies (Huang et al., 2015; Green et al., 2019): These controls have only a marginal impact on the magnitude of the coefficient of interest. In Column (4), we control for past corporate performance by incorporating one-quarter lagged ROA. The magnitude of the workplace stress coefficient decreases but remains negative and statistically significant at the 10% level. This means that workplace stress of firm i is significantly associated with the change in future operating performance. In the last specification, we consider $Quarter \times Industry$-fixed effects, which account for time-varying industry-specific shocks that could influence workplace stress and corporate performance. We observe that one standard deviation increase in WSI leads to a decrease of the firm ROA by 0.34%, i.e. about 5% decrease relative to the mean.

Panel B of Table 2.7 examines whether workplace stress remains a significant determinant of future corporate performance when adding the firm social score (from MSCI or Refinitiv) or the average overall rating of the firm from Glassdoor following Huang et al. (2015). To do so, we replace the WSI by one of the just mentioned alternative metrics, then consider these metrics jointly, and then add the WSI. The employee satisfaction score and the Social (S) score of MSCI exhibit a significant and positive association with future ROA when the firm-specific workplace stress index is omitted from the model. However, the loadings on these variables become insignificant when the workplace stress index is added to the specification. Workplace stress remains a statistically significant determinant of future ROA.

Table 2.7: Workplace Stress and Future Operating Performance

Panel A					
	Operating Performance (ROA)$_{q+1}$				
	(1)	(2)	(3)	(4)	(5)
Workplace Stress$_q$	-0.111***	-0.080***	-0.084***	-0.020*	-0.024**
	(-3.62)	(-2.88)	(-3.21)	(-1.85)	(-2.22)
Leverage$_q$			-0.276***	-0.027***	-0.030***
			(-16.26)	(-3.75)	(-4.22)
R&D Intensity$_q$			-0.073***	-0.003	-0.005
			(-3.02)	(-0.33)	(-0.48)
Capex Intensity$_q$			-0.015	-0.009	-0.001
			(-0.70)	(-1.03)	(-0.15)
Sales Growth$_q$			-0.028*	0.017***	0.023**
			(-1.87)	(2.74)	(2.48)
Ln Firm Age$_q$			0.103***	0.012	0.010
			(5.40)	(1.52)	(1.30)
Ln Asset$_q$			-0.046**	-0.004	0.001
			(-2.47)	(-0.48)	(0.18)
Ln Book to Market$_q$			-0.457***	-0.059***	-0.057***
			(-23.12)	(-6.85)	(-6.46)
ROA$_q$				0.905***	0.908***
				(121.18)	(116.41)
Quarter-F.E	Yes	Yes	Yes	Yes	No
Industry-F.E	No	Yes	Yes	Yes	No
Quarter × Industry-F.E	No	No	No	No	Yes
Number of Observations	2,949	2,949	2,949	2,949	2,949
Adjusted R-sq	0.006	0.202	0.387	0.899	0.904

Panel B					
	Operating Performance $(ROA)_{q+1}$				
	(1)	(2)	(3)	(4)	(5)
Glassdoor Score$_q$	0.093***	0.079***	0.066***	0.004	-0.001
	(5.13)	(4.31)	(3.22)	(0.45)	(-0.13)
Social Pillar (MSCI)$_q$		0.137***	0.105***	0.004	0.004
		(7.04)	(4.82)	(0.47)	(0.50)
Social Pillar (Refinitiv)$_q$			0.196***	0.013*	0.013
			(9.59)	(1.66)	(1.54)
Workplace Stress$_q$					-0.021*
					(-1.65)
Leverage$_q$	-0.250***	-0.256***	-0.242***	-0.024***	-0.025***
	(-14.33)	(-14.28)	(-12.27)	(-3.00)	(-3.18)
R&D Intensity$_q$	-0.074***	-0.074***	-0.053*	-0.003	-0.003
	(-2.95)	(-2.93)	(-1.95)	(-0.28)	(-0.31)
Capex Intensity$_q$	-0.013	-0.004	-0.026	-0.002	-0.002
	(-0.57)	(-0.18)	(-0.91)	(-0.16)	(-0.15)
Sales Growth$_q$	-0.105***	-0.079***	-0.049**	0.021***	0.021***
	(-4.46)	(-4.51)	(-2.53)	(2.74)	(2.79)
Ln Firm Age$_q$	0.100***	0.093***	0.068***	0.005	0.004
	(5.26)	(5.00)	(3.32)	(0.58)	(0.46)
Ln Asset$_q$	-0.055***	-0.039**	-0.072***	0.002	0.002
	(-2.87)	(-2.01)	(-3.40)	(0.21)	(0.30)
Ln Book to Market$_q$	-0.432***	-0.415***	-0.384***	-0.049***	-0.051***
	(-20.91)	(-19.82)	(-16.35)	(-5.11)	(-5.27)
ROA$_q$				0.917***	0.917***
				(106.97)	(106.97)
Quarter × Industry-F.E	Yes	Yes	Yes	Yes	Yes
Number of Observations	2,949	2,836	2,398	2,398	2,398
Adjusted R-sq	0.399	0.410	0.415	0.912	0.912

Notes: Table 2.7 presents the results related to Equation 2.2. The variable of interest is the firm workplace stress level at time q, Workplace Stress$_q$. Panel A provides the baseline models. Specifications (1)–(5) introduce different sets of fixed effects: Specification (1) includes quarter-fixed effects only, while specifications (2), (3), and (4) add industry-fixed effects, and specification (5) includes quarter × industry fixed effects. ROA lagged by one period (at time q) is included in specifications (4) and (5). Panel B extends the quarter × industry fixed-effects specification (5) of Panel A by adding, Glassdoor score (specification 1), MSCI social pillar score (specification 2), Refinitiv social pillar score (specification 3), and workplace stress (specification 5). * stands for significant at 10%, ** significant at 5%, and *** significant at 1% level.

2.6.2 *Earnings surprises*

This subsection tests Hypothesis H2 by examining whether workplace stress predicts subsequent analyst forecast errors. Following Green et al. (2019), forecast errors are defined in the I/B/E/S database as "the differences between the actual earnings in quarter Q and the most recent consensus analyst earnings forecast one month prior to the earnings announcement (median value), scaled by the absolute value of the actual earnings". The regression stands as follows:

$$\text{Forecast Error}_{i,q+1} = \lambda_0 + \lambda_1 \text{High WSI}_{i,q} + \lambda_2 Z_{i,q} + \rho Z_{FE} + \varepsilon_{i,q} \tag{2.3}$$

where High WSI takes the value of 1 if the firm's WSI i in quarter q falls in the top quartile of the industry-quarter WSI distribution. Z describes the control variables at the firm-level for the firm i in the quarter q. To implement these control variables, we follow Edmans et al. (2023) by including book-to-market and firm size in specifications (2) to (3), and extend the set of controls in later specifications following Green et al. (2019), adding idiosyncratic volatility, ROA, sales growth, and forecast dispersion. Z_{dFE} accounts for quarter and industry fixed-effects.

We observe a negative association between forecast errors and top quartile WSI firms. This suggests that analysts tend to make more negative errors by overestimating the earnings of firms with a high level of stress. Symmetrically, this also suggests that analysts do not fully anticipate excess earnings when firms show low levels of stress, consistent with Green et al. (2019).

Table 2.8: Workplace Stress and Earnings Surprises

	Forecast Errors$_{q+1}$						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
High WSI$_q$	-0.034**	-0.043**	-0.035**	-0.033*	-0.035**	-0.035**	-0.029*
	(-1.96)	(-2.37)	(-1.97)	(-1.86)	(-2.03)	(-2.04)	(-1.67)
Ln Book to Market$_q$		-0.007	0.034	0.036*	0.092***	0.096***	0.096***
		(-0.34)	(1.56)	(1.66)	(4.28)	(4.43)	(4.41)
Ln Asset$_q$			0.205***	0.177***	0.116***	0.117***	0.112***
			(10.15)	(8.65)	(5.65)	(5.66)	(5.46)
Idiosyncratic volatility$_q$				-0.135***	-0.115***	-0.116***	-0.112***
				(-6.24)	(-5.43)	(-5.45)	(-5.30)
ROA$_q$					0.245***	0.248***	0.252***
					(12.22)	(12.30)	(12.51)
Sales Growth$_q$						0.025	0.022
						(1.42)	(1.25)
Forecast Dispersion$_q$							-0.067***
							(-3.77)
Quarter-F.E	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-F.E	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	2,815	2,815	2,815	2,815	2,815	2,815	2,815
Adjusted R-sq	0.096	0.105	0.137	0.149	0.192	0.193	0.197

Notes: Table 2.8 presents the results related to Equation 2.3 when estimating the relationship between workplace stress and analyst forecast error. In each specification, the dependent variable is the forecast error defined as the actual earnings in quarter q and the consensus analyst earnings forecast(median), scaled by the absolute value of the actual earnings. The variable of interest, High WSI, is a dummy variable equal to one if the firm's workplace stress is above the top quartile of industry-quarter workplace stress. * stands for significant at 10%, ** significant at 5%, and *** significant at 1% level.

2.7 Stock Performance and Workplace Stress

The previous section shows that workplace stress is associated with lower future operating performance and more negative analyst forecast errors. This section tests Hypothesis H3 by examining whether this information is also reflected in subsequent stock returns.

2.7.1 Workplace stress and the cross section of stock returns

We estimate a Fama and MacBeth (1973) cross-sectional regression to examine the relationship between the changes in workplace stress index and firm returns. The regression controls for firm size, book-to-market, and dividend yield (following Edmans, 2011), as well as ROA, sales growth, and idiosyncratic volatility (following Green et al., 2019). We consider three time horizons: a quarter, a year or two years.

In Panel A, we investigate the contemporaneous change between the firm workplace stress index and the return changes over the three horizons. The model reads as follows:

$$R_{i,[q,\,q+\tau]} = \alpha_q + \beta_q\ \Delta\mathrm{WSI}_{i,[q,\,q+\tau]} + \sigma_q Z_{i,q} + \epsilon_{i,q} \tag{2.4}$$

where $\tau \in \{1, 4, 8\}$.

where $R_{i,[q,\,q+\tau]}$ represents the excess return on stock i from quarter q to quarter $q+\tau$. $\Delta\mathrm{WSI}_{i,[q,\,q+\tau]}$ represents the change in workplace stress index for firm i from quarter q to quarter $q+\tau$. The vector $Z_{i,q}$ includes firm-level characteristics such as size, book-to-market ratio, dividend yield, ROA, sales growth and idiosyncratic volatility for firm i.

Each quarter, we estimate the cross-sectional regression in Equation 2.4 and report the time-series average of the coefficients in Table 2.9. Following Edmans (2011) and Green et al. (2019), standard errors are computed using Newey and West (1987) with six lags.

Columns (1) and (2) present insignificant results when the variation in WSI is defined over one quarter. A quarterly change might simply reflect a temporary change in the stress level given some cyclicality of the business. In Columns (3) and (4), we investigate longer time horizon to smooth intra-year cyclicality. We observe that one standard deviation increase in WSI over a year leads to a negative yearly return over 1%. Same conclusion can be inferred from Columns (5) and (6) over two years. Our results hold when adding for firm controls. The analysis reveals that a change in stress over a quarter is not priced in the cross-section of firms, but it does when stress changes over more than a year.

We then investigate the predictability in the cross-section. Panels B and C present respectively the cross-sectional effects of quarterly or yearly change in stress level on future monthly return (up to 4 months) similar to the analysis performed in Green et al. (2019). We show that a quarterly increase in stress might lead to a cross-sectional difference in return over a month but that a change over a year leads to a persistent difference in return to up to 4 months. A variation of the stress level over a two-year horizon does not lead to any predicted cross-sectional differences in return (untabulated results).

Table 2.9: Workplace Stress and Stock Returns: Fama-MacBeth Regressions.

Panel A - Contemporaneous Relationship

	Return $_{[q,q+1]}$		Return $_{[q,q+4]}$		Return $_{[q,q+8]}$	
	(1)	(2)	(3)	(4)	(5)	(6)
Δ WSI$_{[q,q+1]}$	-0.0525	0.171				
	(-0.35)	(0.86)				
Δ WSI$_{[q,q+4]}$			-1.628***	-1.175***		
			(-3.64)	(-3.40)		
Δ WSI$_{[q,q+8]}$					-2.538***	-2.184***
					(-5.26)	(-4.04)
Ln Asset$_q$		-0.381**		-2.339***		-4.701***
		(-2.19)		(-2.86)		(-4.01)
Ln Book to Market$_q$		-0.144		-1.564		-2.660
		(-0.48)		(-1.41)		(-1.57)
Yield$_q$		-0.331		-2.061*		-4.672***
		(-1.45)		(-1.76)		(-2.93)
ROA$_q$		-3.153		-25.70**		-8.394
		(-0.85)		(-2.59)		(-0.36)
Sales Growth$_q$		7.039		-8.242		36.28
		(1.17)		(-0.49)		(0.80)
Idiosyncratic Volatility$_q$		-0.559		1.176		0.758
		(-0.37)		(0.30)		(0.12)
Number of time periods	40	40	36	36	32	32
adjusted R-sq	0.003	0.173	0.013	0.178	0.001	0.175

Panel B - Quarterly WSI Change and Future Monthly Returns

	t+1	t+2	t+3	t+4	t+5
	(1)	(2)	(3)	(4)	(5)
Δ WSI$_{[q-1,q]}$	-0.152**	-0.134	-0.161	-0.192	-0.0667
	(-2.13)	(-1.24)	(-1.14)	(-1.30)	(-0.48)
Ln Asset$_q$	-0.233**	-0.533***	-0.842***	-1.145***	-1.419***
	(-2.56)	(-2.82)	(-3.09)	(-3.30)	(-3.41)
Ln Book to Market$_q$	-0.146	-0.345	-0.563	-0.772	-1.022*
	(-1.11)	(-1.43)	(-1.50)	(-1.56)	(-1.68)
Yield$_q$	-0.212**	-0.421**	-0.618**	-0.829**	-1.044**
	(-2.54)	(-2.21)	(-2.16)	(-2.18)	(-2.21)
ROA$_q$	-1.491	-4.941	-7.802	-10.88	-13.81
	(-1.00)	(-1.51)	(-1.56)	(-1.60)	(-1.63)
Sales Growth$_q$	2.161	4.219	7.133	9.477*	11.87**
	(1.10)	(1.19)	(1.52)	(1.74)	(2.02)
Idiosyncratic Volatility$_q$	-0.435	-0.662	-0.652	-0.623	-0.527
	(-0.83)	(-0.69)	(-0.47)	(-0.36)	(-0.25)
Number of time periods	117	117	117	117	117
adjusted R-sq	0.174	0.189	0.187	0.183	0.179

Panel C - Annual WSI Change and Future Monthly Returns

	t+1	t+2	t+3	t+4	t+5
	(1)	(2)	(3)	(4)	(5)
Δ WSI$_{[q-4,\, q]}$	-0.193*	-0.321**	-0.363*	-0.422**	-0.336
	(-1.82)	(-2.06)	(-1.96)	(-2.00)	(-1.52)
Ln Asset$_q$	-0.247**	-0.519***	-0.809***	-1.090***	-1.369***
	(-2.45)	(-2.64)	(-2.80)	(-2.95)	(-3.08)
Ln Book to Market$_q$	-0.0992	-0.311	-0.534	-0.780	-1.065*
	(-0.68)	(-1.23)	(-1.37)	(-1.52)	(-1.69)
Yield$_q$	-0.177**	-0.361*	-0.543*	-0.765*	-0.983*
	(-2.01)	(-1.80)	(-1.82)	(-1.93)	(-1.98)
ROA$_q$	-0.662	-4.832	-7.713	-11.01	-14.30
	(-0.42)	(-1.32)	(-1.39)	(-1.46)	(-1.53)
Sales Growth$_q$	2.651	2.624	5.275	7.674	10.15
	(1.22)	(0.68)	(1.01)	(1.27)	(1.60)
Idiosyncratic Volatility$_q$	-0.456	-0.586	-0.536	-0.536	-0.481
	(-0.79)	(-0.56)	(-0.36)	(-0.28)	(-0.21)
Number of time periods	108	108	108	108	108
adjusted R-sq	0.172	0.186	0.184	0.182	0.181

Notes: Table 2.9 reports the slope coefficients from the Fama and MacBeth (1973) cross-sectional regressions. Panel A reports the regressions on contemporaneous changes in stock returns (in percentage and in excess of the risk-free rate) on changes in the workplace stress index (WSI) over three horizons, using three return time horizons (one quarter, one year, and two years). Panel B and C report regressions of monthly future excess stock returns (in percentage in excess of the risk-free rate) on lagged changes in WSI, using the most recent quarter-end change in Panel B and the most recent one-year-end change in Panel C. Following Green et al. (2019), our variable of interest is z-scored (i.e. demeaned and divided by their standard deviation). Newey–West adjusted t-statistics are given in parentheses. * stands for significant at 10%, ** significant at 5%, and *** significant at 1% level.

These results complement our earlier findings that higher workplace stress is associated with weaker future corporate performance, highlighting that workplace stress not only affects firm fundamentals but also negatively impacts stock returns.

2.7.2 *Portfolio analysis*

We perform a portfolio analysis to test whether detecting the level of workplace stress could create investment opportunities and lead to overpricing and underpricing of, respectively, high stress and low stress firms. We first perform a portfolio analysis from January 2013 to December 2022. In this analysis, we sort stocks into tercile or quartile portfolios at the end of each month on the basis of their WSI level.[26] We use industry-adjusted workplace stress breakpoints to account for sector-specific effects of workplace stress.

We assess the performance of these portfolios by running a four-factor Carhart (1997) model:

$$R_{p,t} = \alpha_p + \beta_{p,MKT} MKT_t + \beta_{p,HML} HML_t + \beta_{p,SMB} SMB_t + \beta_{p,MOM} MOM_t + \epsilon_{p,t} \quad (2.5)$$

where $R_{p,t}$ represents the excess return of portfolio p in month t in excess of the risk-free

[26] Each stock is assigned to a workplace stress portfolio for one month, and at the end of the month, portfolios are rebalanced according to the workplace stress of the month.

rate; MKT_t, HML_t, SMB_t, and MOM_t represent the returns on the market, value, size and momentum returns, extracted from the Kenneth French database.[27] Following prior studies (Edmans, 2011; Green et al., 2019; Edmans et al., 2023), standard errors are computed using Newey and West (1987) with six lags to account for potential heteroskedasticity and serial correlation.

Table 2.10 presents the results of the portfolio analysis for tercile (Panel A) and quartile portfolios (Panel B). In both panels, we report the average return and the four-factor Carhart (1997) alpha of the portfolios. Low-stress portfolios exhibit the highest average returns. Furthermore, using the Carhart (1997) four-factor model, we find that firms in the lowest workplace stress tercile generate on average a positive and significant alpha of about 0.40% per month (about 5% annually).[28] In the value-weighted portfolio analysis, the high stress portfolio delivers a return close to 0 for both the tercile and the quartile analyses, so that the long-short portfolio (low minus high stress) delivers a significant monthly alpha of about 0.15% (1.8% annually).

Together with the previous result on firm operating performance, the positive and significant alphas generated by the long short portfolio "Low Stress minus High Stress" are consistent with the hypothesis that the market underestimates the cost associated with employee stress.

Table 2.10: Workplace Stress and Portfolio Analysis.

Panel A: Tercile Stress Portfolio with Industry-Adjusted Breakpoints				
	Equally Weighted Portfolios		Value-Weighted Portfolios	
	Average Return	4-Factor Alpha	Average Return	4-Factor Alpha
Low Stress	1.248***	0.399*	0.587***	0.140***
	(4.47)	(1.88)	(4.32)	(2.90)
Mid Stress	0.863***	-0.005	0.291***	0.062
	(3.07)	(0.04)	(3.39)	(1.40)
High Stress	0.952***	0.093	0.070*	-0.038
	(3.39)	(1.00)	(1.72)	(-1.41)
Low-High	0.296	0.307	0.516***	0.178***
	(1.39)	(1.30)	(4.67)	(3.77)
Panel B: Quartile Stress Portfolio with Industry-Adjusted Breakpoints				
	Equally-Weighted Portfolios		Value-Weighted Portfolios	
	Average Return	4-Factor Alpha	Average Return	4-Factor Alpha
Very Low Stress	1.304***	0.431**	0.496***	0.092*
	(4.33)	(2.05)	(3.79)	(1.90)
Low Stress	0.856***	-0.022	0.109***	0.017
	(2.99)	(-0.19)	(3.71)	(0.70)
High Stress	0.994***	0.185	0.267***	0.040
	(4.12)	(1.15)	(3.00)	(0.90)
Very High Stress	0.952***	0.086	0.019	-0.045**
	(3.20)	(0.84)	(0.69)	(-2.04)
Very Low-Very High	0.352*	0.345	0.477***	0.137***
	(1.66)	(1.48)	(4.11)	(3.07)

Notes: Table 2.10 presents the monthly average return (in percent) and the Carhart (1997) four-factor alpha (in percent) of tercile (Panel A) or quartile (Panel B) equally-weighted and value-weighted portfolios sorted on the firm workplace stress index. Breakpoints are industry-adjusted. The full regression analysis is presented in Table A4. * stands for significant at 10%, ** significant at 5%, and *** significant at 1% level.

[27] https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

[28] The magnitudes of our alphas remain in the bounds of plausibility as discussed by Edmans (2011), who collected alpha's magnitude from studies discussing abnormal returns resulting from intangible portfolios.

2.8 Robustness Analyses

In our main analyses, we normalize the firm-level average stress score per quarter. We use the Empirical Bayes Shrinkage Estimation framework (Efron and Morris, 1973; Morris, 1983) to account for the variation in the number of reviews available for each firm in a given quarter. Following Efron (1996), we calibrate the interpolation parameter at $k = 5$ in our baseline Workplace Stress Index (WSI), which implies a 50% shrinkage toward the global mean when a firm-quarter observation is based on five reviews. To assess the robustness of our results, we examine the sensitivity of our findings to alternative values of k. In earlier work, Efron and Morris (1975) derive $k = 3$ as an optimal choice in a related empirical Bayes estimation context, which was later discussed more broadly in Efron (1996), implying a weaker shrinkage than the baseline $k = 5$. We also consider $k = 7$, corresponding to stronger shrinkage toward the global WSI mean. These alternative calibrations allow us to examine whether our results are sensitive to the choice of the interpolation parameter related to the degree of shrinkage.

In addition to varying the interpolation factor k, we test the robustness of our results to alternative normalization procedures accounting for potential heterogeneity in reviewer characteristics. Specifically, we address differences in perceived workplace stress across reviewer types, as job position and tenure may influence employees' workplace stress. Following Ardia et al. (2023), we implement a source-aggregation methodology to construct alternative WSI measures. [29] The normalization is realized using the historical standard deviation of the WSI within each firm and reviewer category, capturing the category-specific variation over time. In a second step, we compute the firm-quarter WSI by aggregating the normalized category-specific scores through a weighted average, where weights reflect the proportion of reviews from each category in that firm-quarter.

Finally, following prior studies using Glassdoor data (Huang et al., 2015; Green et al., 2019) we also examine the robustness of our results when computing the firm-quarter WSI as the average of the workplace stress scores, without any normalization.

Table 2.11 replicates the results of Tables 2.7 and 2.8, under these different configurations. Table 2.12 similarly replicates Tables 2.9 and 2.10.

Table 2.11 shows that the relationship between WSI and firm operating performance or analyst forecast errors hold under the various WSI specifications.

We then replicate the Fama-MacBeth from Table 2.9 and the portfolio analysis of Table 2.10 using the different WSI indexes in Table 2.12. Our results hold and a one-standard deviation increase in workplace stress is associated with about a 1% decrease in abnormal performance.

[29] Ardia et al. (2023) normalize media-specific concern scores to account for systematic differences in coverage and tone across media sources.

Table 2.11: Robustness Analyses: Operating Performance and Workplace Stress.

	1	2	3	4	5	6
	Baseline WSI Normalized	WSI Normalized (with k=3)	WSI Normalized (with k=7)	WSI Empl. Position Normalized	WSI Empl. Tenure Normalized	WSI Not Normalized
Panel A – Reproducing Table 2.7 (Spec. 4)						
ROA_{q+1}	-0.020*	-0.020*	-0.019*	-0.020**	-0.019**	-0.019**
	(-1.85)	(-1.90)	(-1.79)	(-2.04)	(-1.99)	(-2.04)
Panel B – Reproducing Table 2.7 (Spec. 5)						
ROA_{q+1}	-0.024**	-0.024**	-0.025**	-0.024**	-0.023**	-0.022**
	(-2.22)	(-2.23)	(-2.21)	(-2.37)	(-2.36)	(-2.32)
Panel C – Reproducing Table 2.8						
Forecast Errors_{q+1}	-0.029*	-0.029*	-0.032*	-0.031*	-0.027	-0.039**
	(-1.67)	(-1.70)	(-1.87)	(-1.76)	(-1.48)	(-2.25)

Notes: Table 2.11 presents robustness checks on the analyses performed in Section 2.6. Panels A and B replicate Table 2.7, which examines the relationship between the Workplace Stress Index (WSI) and future operating performance, measured by return on assets (ROA). Panel A replicates specification (4) from Table 2.7, using quarter and industry fixed effects, while Panel B replicates specification (5) with quarter × industry fixed effects. Panel C replicates Table 2.8 and shows the relationship between WSI and analysts' forecast errors. Columns (1)–(3) use the normalized WSI variable with varying interpolation k factors. Columns (4) and (5) normalize WSI within reviewer groups defined by job position and tenure, following the source aggregation methodology of Ardia et al. (2023). Column (6) uses the non-normalized WSI. * stands for significant at 10%, ** significant at 5%, and *** significant at 1% level.

Table 2.12: Robustness Analyses: Stock Returns and Workplace Stress.

Panel A – Fama Mac-Beth analysis

	1	2	3	4	5	6
	Baseline WSI Normalized	WSI Normalized with k=3	WSI Normalized with k=7	WSI Empl. Position Normalized	WSI Empl. Tenure Normalized	WSI Not Normalized
Table 2.9 – Panel A						
Returns$_{[q,\,q+1]}$	0.171	0.174	0.167	0.185	0.197	0.176
	(0.86)	(0.89)	(0.83)	(0.95)	(1.09)	(0.93)
Returns$_{[q,\,q+4]}$	-1.175***	-1.164***	-1.188***	-1.217***	-1.175***	-1.141***
	(-3.40)	(-3.49)	(-3.33)	(-4.55)	(-3.91)	(-3.69)
Returns$_{[q,\,q+8]}$	-2.184***	-2.114***	-2.249***	-2.227***	-2.167***	-1.998***
	(-4.04)	(-3.98)	(-4.11)	(-4.22)	(-3.98)	(-3.85)
Table 2.9 – Panel B						
Returns $_{t+1}$	-0.152**	-0.146**	-0.157**	-0.198**	-0.209**	-0.201**
	(-2.13)	(-2.01)	(-2.20)	(-2.36)	(-2.51)	(-2.33)
Returns $_{t+2}$	-0.134	-0.129	-0.136	-0.109	-0.116	-0.120
	(-1.24)	(-1.22)	(-1.24)	(-0.67)	(-0.74)	(-0.76)
Returns $_{t+3}$	-0.161	-0.165	-0.158	-0.052	-0.058	-0.061
	(-1.14)	(-1.17)	(-1.10)	(-0.23)	(-0.26)	(-0.27)
Returns $_{t+4}$	-0.192	-0.203	-0.184	-0.015	-0.020	-0.017
	(-1.30)	(-1.39)	(-1.23)	(-0.06)	(-0.08)	(-0.07)
Returns $_{t+5}$	-0.067	-0.081	-0.055	0.183	0.187	0.186
	(-0.48)	(-0.59)	(-0.39)	(0.81)	(0.86)	(0.87)
Table 2.9 – Panel C						
Returns $_{t+1}$	-0.193*	-0.298*	-0.198*	-0.183**	-0.186**	-0.186**
	(-1.82)	(-1.89)	(-1.90)	(-2.39)	(-2.41)	(-2.42)
Returns $_{t+2}$	-0.321**	-0.333*	-0.335**	-0.293**	-0.305**	-0.309**
	(-2.06)	(-1.77)	(-2.17)	(-2.34)	(-2.45)	(-2.49)
Returns $_{t+3}$	-0.363*	-0.389*	-0.379**	-0.269*	-0.287*	-0.282*
	(-1.96)	(-1.79)	(-2.07)	(-1.71)	(-1.84)	(-1.79)
Returns $_{t+4}$	-0.422**	-0.302	-0.439**	-0.293	-0.317	-0.299
	(-2.00)	(-1.53)	(-2.11)	(-1.45)	(-1.58)	(-1.46)
Returns $_{t+5}$	-0.336	-0.327	-0.354	-0.205	-0.233	-0.197
	(-1.52)	(-1.41)	(-1.64)	(-0.93)	(-1.07)	(-0.88)

Panel B – Portfolio Analysis

	1	2	3	4	5	6
	Baseline WSI Normalized	WSI Normalized (with k=3)	WSI Normalized (with k=7)	WSI Empl. Position Normalized	WSI Empl. Tenure Normalized	WSI Not Normalized
Table 2.10 – Panel A						
Low Stress (EW)	0.399*	0.380*	0.313	0.347**	0.308**	0.287*
	(1.88)	(1.68)	(1.45)	(2.14)	(2.00)	(1.91)
High Stress (EW)	0.092	0.103	0.101	-0.005	0.008	-0.016
	(1.00)	(1.10)	(1.07)	(-0.07)	(0.11)	(-0.20)
Low-High (EW)	0.307	0.277	0.212	0.352*	0.300	0.303
	(1.30)	(1.09)	(0.89)	(1.87)	(1.64)	(1.64)
Low Stress (VW)	0.1400***	0.148***	0.139***	0.109*	0.110*	0.117*
	(2.90)	(3.02)	(2.98)	(1.80)	(1.81)	(1.90)
High Stress (VW)	-0.038	-0.039	-0.029	-0.005	-0.002	-0.006
	(-1.41)	(-1.41)	(-1.07)	(-0.15)	(-0.07)	(-0.19)
Low-High (VW)	0.178***	0.187***	0.168***	0.114**	0.112**	0.123**
	(3.77)	(3.98)	(3.52)	(2.22)	(2.08)	(2.27)
Table 2.10 – Panel B						
Very Low Stress (EW)	0.431**	0.416*	0.327	0.461**	0.423**	0.489**
	(2.05)	(1.87)	(1.48)	(2.36)	(2.26)	(2.56)
Very High Stress (EW)	0.086	0.075	0.089	0.033	0.022	0.032
	(0.84)	(0.71)	(0.83)	(0.43)	(0.27)	(0.39)
Very Low-Very High (EW)	0.345	0.340	0.238	0.427*	0.402*	0.456**
	(1.48)	(1.35)	(1.01)	(1.97)	(1.90)	(2.10)
Very Low Stress (VW)	0.092*	0.081*	0.104**	0.039	0.042	0.044
	(1.90)	(1.80)	(2.15)	(0.65)	(0.74)	(0.75)
Very High Stress (VW)	-0.045**	-0.040*	-0.043*	-0.045	-0.039	-0.051
	(-2.04)	(-1.70)	(-1.88)	(-1.35)	(-1.24)	(-1.55)
Very Low-Very High (VW)	0.137***	0.121***	0.147***	0.084	0.081*	0.095*
	(3.07)	(2.92)	(3.27)	(1.59)	(1.69)	(1.92)

Notes: Table 2.12 presents robustness checks on the analyses in Section 2.7.1. Panel A replicates the Fama and MacBeth (1973) regressions presented in Table 2.9 Panel A, B and C. Panel B reports the Carhart (1997) four-factor alpha (in percent) of tercile (Panel A) and quartile (Panel B) equal-weighted (EW) and value-weighted (VW) portfolios sorted on various Workplace Stress Index (WSI) measures of Table 2.10. Breakpoints are industry-adjusted. The alpha corresponds to the risk-adjusted returns based on the Carhart four-factor model. Columns (1)–(3) use the normalized WSI variable with varying interpolation factors. Columns (4) and (5) normalize WSI within reviewer groups defined by job position and tenure, following the source aggregation methodology of Ardia et al. (2023). Column (6) uses the non-normalized WSI. * stands for significant at 10%, ** significant at 5%, and *** significant at 1% level.

2.9 Conclusion

Using a large dataset on employee crowdsourced reviews, we construct a high-frequency index capturing the level of workplace stress of each firm on the S&P 100 at each quarter. We investigate the source of employee stress using their written reviews and the economic consequences for the firm operating performance and its market valuation.

Our research bridges the gap between the psychological and the economic literature. It provides evidence that target pressure is the major source of workplace stress, consistent with the Job Demand-Control model and the Job Demands-Resources model. Overall, the findings support the view that workplace stress captures a value-relevant employee-side intangible. Higher workplace stress is associated with weaker subsequent operating performance, more negative analyst forecast errors, and lower subsequent risk-adjusted returns. Together, these results suggest that workplace stress is counterproductive for firms and that financial market participants only gradually incorporate this information.

Our research adds to the literature documenting the negative sides of goal-setting. We moreover add to prior research that has primarily focused on general employee satisfaction and firm performance (Edmans, 2011; Green et al., 2019; Edmans et al., 2023; Zhu et al., 2023).

These findings carry several practical implications for managers, boards, investors, and analysts. Managers and boards should not view workplace stress only as an employee well-being issue. It also represents an operational risk signal. The evidence that target pressure is a major source of stress suggests that firms should monitor whether performance objectives create excessive pressure relative to available organizational resources. Stress monitoring thus extends naturally into the domain of operational oversight rather than remaining confined to employee well-being programs.

For ESG analysts and data providers, our results suggest that broad social indicators may overlook economically relevant dimensions of employee experience. Workplace stress, and especially stress related to target pressure, captures a dimension of human capital risk that is not necessarily reflected in aggregate ESG scores or general employee satisfaction measures. This suggests that textual employee data can complement existing social metrics by providing a more granular view of working conditions.

Regarding investors and analysts, employee-generated textual content provides information about future firm performance that appears to be only gradually incorporated into prices. The evidence on analyst forecast errors and portfolio returns suggests that workplace stress can reveal hidden costs not fully captured by aggregated ESG indicators. Investors should therefore consider not only aggregated social ratings and employee satisfaction, but also more specific signals of workplace pressure, when assessing firms' future fundamentals.

Chapter 3

Venture Capitalists and Employee Satisfaction

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Abstract. Using one million employee reviews, we show that ownership is related to employee satisfaction, with VC-backing being the most significant effect. Employee satisfaction is abnormally high in the presence of a VC and decreases when the VC exits. Textual analysis of reviews shows that VC-backed employees enjoy the supportive culture and Human Resources policies, but complain about their compensation and the challenging work environment. When the VC exits, the topics mentioned in the reviews and the satisfaction score become similar to those of similar companies, but some of the initial differences persist. VC presence therefore has some lasting impact.

Keywords: ESG, big data, IPO, crowdsourcing, venture capital, employee well-being, private equity, Structural Topic Modeling, ChatGPT.

"[...] what do other stakeholders – and that's first and foremost employees of private markets-owned companies – think about it? And in fairness, there haven't been a lot of reports or surveys measuring how good private market firms are as owners, not just on the commercial side of things, but in terms of stakeholder impact [...] A very obvious, non-financial KPI will be engagement surveys of employees. How do employees feel one, two, three, four or five years into private markets ownership?" Steffen Meister, Executive Chairman Partners Group, May 2020, Private Equity International.

3.1 Introduction

Studies on venture capitalists (VCs) have focused mainly on their role as financial intermediaries and on their impact on the economy at large (e.g., Gompers and Lerner (2001), Lerner and Nanda (2020)).[1] Yet, several studies highlight that VCs also influence company

[1] Gornall and Strebulaev (2020): "Venture capital-backed companies account for 41% of total US market capitalization and 62% of US public companies' R&D spending. Among public companies founded within the last fifty years, VC-backed companies account for half in number, three quarters by value, and 92% of R&D spending."

operations. Hellmann and Puri (2002) argue that VCs play a role at the top of the organization by replacing founders with outside CEOs, and influence the development further down the organization by (i) introducing stock option plans, (ii) hiring sales and marketing executives, and (iii) formulating human resource policies. More recently, Chemmanur et al. (2021) show that VC-backing is associated with a higher quality senior management team. What is yet to be known is the impact of VC presence on company employees and whether their impact is long-lasting.

In this paper, we collect a large data set that contains the views of employees about their employers. Our data set includes about one million employee scores from 7,500 unique US-based companies between 2012 and 2022 in conjunction with the accompanying written reviews. We merge this dataset with PitchBook and Capital IQ to obtain time-series of company ownership types (public, VC-backed, PE-controlled, other private ownership) and record major transactions (IPO, LBO, corporate acquisitions).[2]

We find that more satisfied employees are higher up in the hierarchy and earning higher salaries. Most recently hired employees are more satisfied, as those working in the Tech industry and for smaller firms. In addition, corporate ownership is related to employee satisfaction. Employees are more satisfied in privately held companies than in public companies. Employee satisfaction plummets after a Primary Buyout (PBO) (consistent with Gornall et al. (2025)).[3] Employee satisfaction also decreases after any M&A but the effect is not significant after controlling for employee and firm characteristics; and Secondary Buyouts do not lead to any significant changes in satisfaction. Interestingly, however, the strongest effect of corporate ownership is for VC-backed companies. Employee satisfaction is significantly higher for VC-backed companies, and after a VC exits, satisfaction drops and becomes closer to that of non-VC-backed employees with similar characteristics.

Obviously, employees are not randomly assigned to VC-backed companies and can leave or join any type of company anytime, making it impossible to prove any causality. Yet, we find that the results hold after controlling for a large set of employee and firm characteristics in a regression setting. In addition, we do not find any pre-trend and employee satisfaction does not increase as the company approaches the exit, which presumably means that satisfaction does not increase as a company becomes more successful. In addition, the decline in the score after exit is stronger when the VC fully exits and when there is a change in CEO at the time of exit.[4] For partial exits (VC-backed IPOs), the decline is gradual. Hence, changes in scores seem closely related to the presence of a VC (and a VC-backed CEO).[5] Taken together, these results are not consistent with hypotheses based on endogeneity.

However, our primary contribution lies in supplementing this conventional empirical

[2]In this paper, we use the labels PE and LBO interchangeably.

[3]The term PBO is not often used but it is important in our context to distinguish between the first time a company is subject to a leveraged buyout, versus when the company is already under PE control and simply changing sponsors.

[4]We also find it is stronger for low-ranked staff and weaker in the Tech sector.

[5]When the exit is an IPO, VCs remain present for several quarters after the IPO date.

evaluation by examining what employees express about their jobs. By analyzing their written reviews, we can deduce whether the unusual satisfaction is due to company growth, cultural factors, or other factors. This serves as the most direct explanatory source because the employees provide the reasons behind the scores we have just analyzed. In a broader sense, employees convey their opinions through narratives that offer greater precision than any numeric metrics (Bybee et al., 2023).

The potential benefits of using written reviews are accompanied by empirical challenges. The complexities inherent in natural language make it difficult to extract and quantify the information embedded within a text. However, recent advances in natural language processing techniques facilitate the extraction of a parsimonious set of topics from large and unstructured textual data (e.g. Bybee et al. (2023)). In this study, we employ a textual dimension reduction technique introduced by Roberts et al. (2016), termed Structural Topic Modeling (STM). STM organizes terms into interpretable narrative themes based on their co-occurrences within the corpus of reviews. It is a more general and advanced technique than the commonly used Latent Dirichlet Allocation (LDA).

Our sample contains half a million written reviews, equally split between those in the field "Cons of working for this company" and those in the field "Pros of working for this company". We extract common topics separately for the two fields. The STM estimates the set of words that makes up each topic, from which we assign a label. The extracted topics correspond to standard employee issues. Pro topics include salary, benefits, career opportunities, and positive work culture. Con topics include several topics directly related to senior management (training, promotions, hiring processes, and politics), and topics related to work-life balance and salaries.

In a multiple regression setting, we observe which topics are significantly associated with VC-backed companies while controlling for a rich set of employee and firm characteristics, as well as business cycles. We focus on two categories: Pros that are mentioned more often and Cons that are mentioned less often.

Three topics stand out as advantages of working for a VC-backed company: "Supportive Culture", "Growth Environment", and "Hiring Processes". Even though the topics for the Cons are determined independently, the three Cons that are least mentioned under VC-backing are also very much Human Resources related: "Promotions", "Training", and "Hiring Processes". These results align well with those of Hellmann and Puri (2002). They show that one of the unique and key changes brought about by VCs is new human resources (HR) processes. Strikingly, four of the six most significantly different Pros mentioned by VC-backed employees are about HR processes.

When the VC exits, all six coefficients go down (toward zero) but only partially. The greatest decline is observed for "Growth Environment". Growth as a positive feature is less prominent once the VC has exited (the coefficient is nearly halved). However, the coefficients of supportive culture and hiring processes decrease only slightly after exit. Similar results are observed for the Cons. The coefficient on promotion policy is mostly reversed, but the other two coefficients (training, and hiring processes) remain abnormally less mentioned as Cons. These findings indicate that satisfaction with the growth environment coincides with the presence of VCs. However, the benefits that VCs bring with respect to work culture and HR processes seem to be long-lasting.

A noteworthy point is that this outcome partly differs for non-managerial employees. For these, following a VC exit, HR topics are discussed just as often as they are in other (similar) companies. This holds true for both the Pros and Cons topics. Hence, the HR benefits brought by VCs seem to have a long-term impact mostly on people with management responsibilities.

In terms of complaints, we find that employees in VC-backed companies complain about work challenges stemming from a fast-growing and changing environment (ambitious sales goals, issues related to technology, and production growth). Similarly, in terms of Pros, they mention pay and benefits (including health benefits), and work-life balance less often.

An analogous analysis for Primary Buyouts (PBOs) reveals that remuneration and work schedules are frequently cited as advantages of private equity backing. Notably, in terms of disadvantages, topics associated with management such as promotions, employee care, hiring processes, and training prominently surface. These observations stand in stark contrast to those pertaining to VC-backed enterprises. In examining the effect of financial sponsors on companies and their stakeholders, it is therefore crucial to differentiate between Venture Capital, Primary Buyout, and Secondary Buyouts, as each type of private equity transaction yields distinct outcomes. Our findings align with the notion that i) VCs predominantly professionalize human resource processes (Hellmann and Puri, 2002), ii) PBOs primarily alter the financial incentives for senior management - which provoke discontent among employees — and iii) Secondary Buyouts tend to change sponsors while maintaining the incentive structure for senior management, thus preserving existing levels of employee satisfaction.

Our article contributes to the literature that highlights the importance of company culture (e.g. Edmans (2011), Guiso et al. (2015); Gorton and Zentefis (2023), Lins et al. (2017)), and senior management (Bertrand and Schoar, 2003; Welch and Yoon, 2023). To our knowledge, our paper is the first to study how satisfied employees in VC-backed companies are, both during and after a VC exit, and to collect direct evidence of their views.

There is an existing literature on how Leveraged Buyouts affect employees, with a general focus on layoffs (e.g. Boucly et al. (2011), Olsson and Tåg (2017), Davis et al. (2014), Davis et al. (2025), Cohn et al. (2021), Fang et al. (2021), Antoni et al. (2019)). There is also a closely related study showing how M&A transactions affect employee health (Bach et al., 2021).

There is a recent but already extensive literature on how companies change when they go public (e.g., Babina et al. (2025)).[6] Our results suggest that it may be pertinent to distin-

[6]Summarizing existing evidence, Bernstein (2022) writes that companies becoming publicly-traded i) focus more on profitability and commercialization, ii) witness a significant change in the composition of their labor force, iii) establish more internal controls and processes, iv) focus more on areas such as finance, accounting, and internal controls, and v) are less innovative.

guish between VC-backed IPOs and non-VC-backed IPOs. This distinction has been made in the literature, but only with respect to governance issues (Hochberg (2012) and Baker and Gompers (2003)), and the quality of the management team (Chemmanur et al., 2021). There is also a larger and extensive literature on VC exit routes. For example, Bayar and Chemmanur (2011) argue that an IPO is the exit that delivers the highest valuation unless the firm has large potential synergies with other firms in their industry. If a firm yields greater benefits of control, it is more likely to be bought by a PE firm.

In an independent contemporaneous article, Gornall et al. (2025) also uses Glassdoor data and reports that employee satisfaction decreases after a leveraged buyout (LBO). They posit that the decline in satisfaction is due to the higher risks faced by employees post-LBO (through several channels, ranging from more high-powered management incentives to higher firm leverage). They also have unique data on the returns realized by some of the LBO funds. They find that these returns are positively correlated with changes in employee satisfaction. However, they do not study VC-backed companies.

The remainder of the paper proceeds as follows. Section II develops the theoretical framework and derives the hypotheses. Section III describes the data, the sample construction, and the main descriptive statistics. Section IV presents the regression analysis on employee satisfaction around ownership changes. Section V turns to the textual analysis of employee reviews and examines the topics associated with VC backing. Section VI concludes.

3.2 Theoretical Framework and Hypotheses

3.2.1 Employee satisfaction and organizational support

Grounded in stakeholder theory, employees are not only providers of labor but also key participants in the organization, whose interests and behavior may affect the achievement of firm objectives (Freeman, 1984). In corporate finance, this view is closely related to the literature showing that corporate culture and employee satisfaction are economically relevant. Edmans (2011) shows that firms with high employee satisfaction subsequently outperform. Related studies show that corporate culture, trust, and employee-related dimensions are associated with firm value and performance (Guiso et al., 2015; Lins et al., 2017; Gorton and Zentefis, 2023; Green et al., 2019).

The management literature provides a useful framework for understanding why employees become satisfied with their employer. A first mechanism is perceived organizational support. Employees value organizations that recognize their contribution and care about their well-being (Eisenberger et al., 1986). This perception is a primary determinant of job satisfaction (Rhoades and Eisenberger, 2002). A second mechanism is psychological empowerment. Employees are more satisfied when they perceive that they have meaning, competence, autonomy, and impact in their work (Spreitzer, 1995). This mechanism is reinforced by high-performance managerial practices (Seibert et al., 2011). A third mechanism is psychological ownership. Employees may develop a sense of belonging and identification with the organization when leadership fosters self-efficacy, responsibility, and involvement (Pierce et al., 2001; Avey et al., 2009).

These mechanisms suggest that employee satisfaction should be higher when employees perceive support from the organization, feel involved in their work, and identify with the firm.

3.2.2 *VC backing and employee satisfaction*

VCs are not passive providers of capital. They influence the development of the firms they finance. Hellmann and Puri (2002) show that VC investors professionalize their portfolio companies' organization through the adoption of human resource policies, stock option plans, the hiring of sales and marketing executives, and the replacement of founders by outside CEOs. Chemmanur et al. (2021) further show that VC backing is associated with a higher quality senior management team.

These organizational changes introduced by VCs are likely to matter for employees through the mechanisms highlighted above. By implementing formal HR policies in their portfolio companies, VCs may signal organizational support to employees as the organization becomes more structured. Their involvement in shaping the firm may also generate a stronger sense of direction and belonging, especially in young firms where organizational routines are still being formed. Improvements in the quality of senior management may further strengthen VC-backed employees' sense of psychological empowerment, since high-performance managerial practices are positively associated with psychological empowerment. Under this mechanism, VC ownership may increase employee satisfaction by shaping the firm's internal organization.

Hypothesis H1. Employee satisfaction is higher in VC-backed firms.

3.2.3 *Employee narratives and the sources of satisfaction*

If VC backing increases employee satisfaction through organizational changes, this should be reflected in what employees write about their employers. Scores indicate whether employees are satisfied, but written reviews provide information about the reasons behind these satisfaction scores. In this sense, employee narratives can help identify whether the higher satisfaction of VC-backed employees is related to culture, growth, HR practices, or other dimensions of the work environment.

The expected mechanisms follow directly from the VC literature. If VCs professionalize firms through human resource policies and managerial changes (Hellmann and Puri, 2002), employees should mention HR-related practices more positively. Similarly, if VC backing improves the quality of senior management (Chemmanur et al., 2021), employees should also express more positive views about leadership and internal organization. Finally, the growth environment may also matter. In the theory of the growth of the firm, firm expansion creates organizational frictions that require managerial capacity and internal coordination (Penrose, 1959). In high-growth firms, employees may therefore value supportive culture and capable management because these features help them cope with the demands of growth.

This reasoning implies that the higher satisfaction of employees in VC-backed firms should not be explained by all dimensions of work equally. It should be more closely related to supportive culture, growth opportunities, and HR or management practices.

Hypothesis H2. Employees in VC-backed firms are more likely to associate their work environment with supportive culture, growth, and HR-related practices.

3.2.4 VC exit and topics persistence

If the higher satisfaction of employees in VC-backed firms is related to VC involvement, it should decline once the VC exits. After the exit, the firm is no longer under the same ownership structure, and the direct influence of the VC on the organization weakens. Employee satisfaction should therefore move toward the level observed in non-VC-backed firms.

At the same time, some specific changes and influences introduced under VC backing may remain embedded in the organization. HR policies, management routines, and cultural practices may persist after exit, even if the growth environment or the direct influence of the VC weakens. This is consistent with the idea that young firms progressively standardize their organization as they develop, making the firm less dependent on specific individuals and easier to transfer to the next owner (Rajan, 2012).

We therefore expect employee satisfaction to decline after VC exit, but not necessarily to fully converge to a standard level. If VC-backed firms have adopted organizational practices that remain in place, some differences in employee reviews, especially those related to culture and HR practices, should persist after exit.

Hypothesis H3. Employee satisfaction decreases after VC exit, but some VC-related differences in employee reviews persist.

3.3 Data and Descriptive Statistics

3.3.1 Glassdoor website

Glassdoor is an employer review website launched in June 2008 and effectively started to receive reviews from 2012 onwards. The reviews in our sample are from 2012 to 2022. Company ratings, reviews, and salary information are entered by employees and displayed anonymously. Most reviews are written by new users who need to submit information about their current or former employer before accessing other people's ratings, reviews, and salary benchmarks (see Green et al. (2019) for more details).

The website verifies that each review is genuine through various fraud detection algorithms, screening by a content management team, checking e-mail addresses and social networking accounts.[7] Green et al. (2019) and Gornall et al. (2025), among others, provide

[7] In 2013, the company stated that it rejects about 20% of entries after screening. Source: http://www.calgaryherald.com/business/Website+lets+workers+rate+their+bosses+anonymously/8221492/story.html.

a comprehensive description of the dataset, along with several external validity tests.

We expect employees to provide honest evaluations due to their desire to contribute to the public good (Lerner and Tirole, 2002). Consistent with this argument, many studies use Glassdoor and find that employee ratings are related to a wide range of outcomes. Glassdoor's ratings help predict key accounting-based information such as (i) growth in sales, profitability, and net income; (ii) Tobin's Q, and Return on Assets; (iii) earnings announcement surprises; (iv) corporate scandals; and (v) access to external finance Green et al. (2019); Babenko and Sen (2014); Hales et al. (2018); Huang (2018); Huang et al. (2015); Lee et al. (2021); and Chemmanur et al. (2020). In addition, and similar to the finding of Edmans (2011) who use a different data source for employee satisfaction, Green et al. (2019) find that Glassdoor ratings predict subsequent stock returns. In a recent study, Gadgil and Sockin (2025) find that employee ratings also decrease after corporate scandals.

To sum up, a large body of evidence suggests that crowdsourced employee ratings are a source of important and relevant information, rather than mere noise or a collection of idiosyncratic opinions.

3.3.2 Capital IQ and PitchBook datasets

Using Capital IQ, we generate a list of US-based firms and a set of transactions for which the target is US-based (IPOs, LBOs, and Trade sales, i.e., acquisition by a trade buyer).[8] Capital IQ indicates whether a firm is VC-backed or not, but is not as comprehensive as PitchBook, which we then use as a complement.

We match this data set with Glassdoor based on the firm name.[9] As in Gornall et al. (2025), we exclude reviews from people who (i) are no longer employed at the firm when they write the review, (ii) joined the firm after the transaction, and (iii) are interns. We require at least three reviews before and after the transaction (six reviews for firms without transactions). The window around transactions is three years. Statistics related to this filtering process are shown in Table 3.1.

Table 3.2 shows statistics on changes in ownership. The first set of statistics is for companies that went through a VC exit. The exit route is either IPO (145 firms; 11k reviews), LBO (71 firms; 4k reviews), or Trade sale (92 firms; 4k reviews). The same three exit routes are recorded for companies that have been through an LBO.[10] We observe few IPO exits (16 firms; 1k reviews), many Secondary Buyouts (aka sponsor to sponsor, or PE to PE; 259 firms, 12k reviews), and some trade sales (92 firms; 3.5k reviews).[11] The third set of statistics is for firms that experienced an IPO with no financial sponsor (N=96, 10k reviews), a

[8]To find LBOs, we follow the methodology of Davis et al. (2025). We select M&A transactions with a PE firm as financial sponsor and which have one of the following characteristics: "going private," "leveraged buyout", "management buyout", or "platform." We manually check each transaction to ensure sample integrity. See Davis et al. (2025) for a detailed discussion on how to select LBOs.

[9]We have an exact match for 40% of the companies. For the remaining companies, we match based on the location of the headquarters, the state of incorporation, the year of incorporation, and the website address.

[10]All of these firms are labeled PE Exit.

[11]For trade sales the buyer often does not keep the target company as a separate entity and the reviews posted after the transaction are therefore mixed with those of the acquirer.

primary LBO (i.e., no sell-side financial sponsor; N=333, 18k reviews), or an acquisition with no financial sponsor involved (N=455, 39k reviews).[12] Finally, throughout our time period, many firms have been continuously publicly listed (1,622 firms; 483k reviews) and continuously privately held (4,405 firms; 345k reviews). In total, we have 7,552 companies and about one million reviews.

Table 3.1: Sample Construction – Employee Scores

Panel A: Number of Firms

	Stayed Public	Stayed Private	Change Ownership	Total
Initial sample	2,174	8,997	5,831	17,002
Sample after removing				
Former employees	2,148	8,239	5,315	15,702
Interns	2,096	8,228	5,257	15,581
Missing length of employment	2,025	7,673	4,974	14,672
Those who joined post transaction	2,025	7,673	4,583	14,281
Ratings submitted too early/late	2,025	7,673	4,334	14,032
Minimum number of ratings required	1,622	4,405	1,525	7,552

Panel B: Number of Scores

	Stayed Public	Stayed Private	Change Ownership	Total
Initial sample	1,397,125	1,083,593	812,426	3,293,144
Sample after removing				
Former employees	784,558	575,238	461,529	1,821,325
Interns	769,368	565,351	456,321	1,791,040
Missing length of employment	484,081	352,632	296,193	1,132,906
Those who joined post transaction	484,081	352,632	164,401	1,001,114
Ratings submitted too early/late	484,081	352,632	118,207	954,920
Minimum number of ratings required	483,041	344,772	102,411	930,224

Notes: This table describes the different filters applied to the initial sample of employee scores downloaded from Glassdoor over the period 2012 to 2022. Results are shown separately for the sub-sample of firms that stayed private or public over the whole period, and for those that underwent a change of ownership over this period. The last line corresponds to the final (working) sample.

3.3.3 *Reviewer and firm characteristics*

Employees anonymously assign a one- to five-star score for their employer, and the last three columns of Table 3.2 show the average score before transaction, after transaction, and overall. For firms that stayed private or public throughout, only their overall average score is shown.

Scores are high on average, with a clear cross-sectional dispersion.[13] Ratings are par-

[12] All of these firms are labeled "No PEVC-backed".

[13] Our average score is close but higher than that reported in other studies. This is mostly due to the exclusion of former employees. In addition, ratings in 2017-2020 were higher than in 2012-2015.

Table 3.2: Working Sample and Ownership Changes

	Number of Firms	Number of Reviews	Average Score Overall	Pre	Post
VC Exits					
VC to IPO (VC-sponsored IPO)	145	11,133	4.01	4.06	3.94
VC to PE	71	4,029	3.94	3.92	3.64
VC to Trade Sale	92	3,868	3.80	4.00	3.81
PE Exits					
PE to IPO (PE-sponsored IPO)	16	866	3.09	3.03	3.14
PE to PE (Secondary Buy-Out)	259	12,140	3.28	3.56	3.57
PE to Trade Sale	58	3,526	3.56	3.23	3.39
Other Transactions					
No PEVC to IPO	96	9,650	3.39	3.32	3.46
No PEVC to PE	333	17,717	3.46	3.48	3.43
No PEVC to Trade Sale	455	39,482	3.45	3.43	3.50
No Change of Ownership					
Stayed Public (No PEVC)	1,622	483,041	3.59	n.m.	n.m.
Stayed Private (No PEVC)	4,405	344,772	3.64	n.m.	n.m.
Total	7,552	930,224	3.60	n.m.	n.m.

Notes: This table provides the number of firms, number of reviews or scores and average scores. Panel A shows the results for groups of firms according to their ownership status and shows the average score pre- and post-transactions.

ticularly high for VC-backed firms, regardless of the exit route. After a VC exits, ratings decrease, but they remain above the overall average of 3.6. The decrease is similar when there is an IPO or a trade sale, but it is twice as large when the exit is through an LBO.

As independently documented by Gornall et al. (2025), post-LBO scores are low. However, we note that this result does not hold for Secondary Buyouts (PE to PE). The average post-SBO score is the same as in the overall sample. In addition, we observe that scores increase after an LBO exit, which is the opposite result to what is observed with VC exits.

For transactions with no sell-side financial sponsor, scores are relatively low before the transaction. They increase after an IPO or a trade sale, and decrease following an LBO. Finally, we note that the score is similar for firms that remain privately held and publicly traded.

Table 3.3 provides descriptive statistics on firm characteristics. The median firm has about 1,000 employees and we split the sample into small and large firms around this threshold.[14] In the subsample of firms that have been VC-backed there are twice as many small firms as large firms.

Glassdoor assigns each company, including private firms, to one of 121 industries. We pool these industries into seven categories and then further down into two main categories: Tech (IT Services, and Software) and Non-Tech (consumer, corporate and public

[14]Note that firm size is as of the end year of our sample period and is not available as a time-series.

services, industrial, retail). For the VC-backed sample, there are more Tech firms than Non-Tech firms (185 vs 124), and more than twice as many reviews for Tech firms. In terms of average scores, we observe that scores are much higher for Tech firms than for Non-Tech firms, especially in the VC-backed subsample, where the gap is very large (4.06 vs 3.36).

Table 3.3: Working Sample and Firm Characteristics

	Full Sample			VC-Backed		
	Number of Firms	Number of Reviews	Average Score	Number of Firms	Number of Reviews	Average Score
Firm Size						
Small	3,666	116,532	3.74	202	7,921	4.00
Large	3,886	813,692	3.58	107	11,109	3.92
CEO Change						
Yes	2,025	192,428	3.56	97	2,169	4.01
No	5,527	737,796	3.61	212	16,861	3.95
Industry						
IT Services	353	80,116	3.83	42	3,004	4.04
Software	558	103,165	3.66	143	10,568	3.95
Total – Tech	911	183,281	3.75	185	13,572	4.06
Consumer Servic.	1,242	182,336	3.56	17	444	3.75
Corporate Servic.	2,024	231,028	3.62	39	1,881	3.70
Industrial	2,417	193,270	3.59	35	1,002	3.78
Public Services	492	56,749	3.53	18	1,030	3.77
Retail	466	83,560	3.41	15	1,101	4.09
Total – No Tech	6,641	746,943	3.56	124	5,458	3.36

Notes: This table displays descriptive statistics by firm characteristics (size, age, CEO change, industry classification). Small (large) firms correspond to firms with 1,000 employees or less (more than 1,000 employees). A firm has a CEO change if the announcement date falls within a 12-month-window around the transaction date. CEO change announcement dates are collected from S&P Capital IQ. The 134 Glassdoor industries are reclassified into seven categories (see Appendix B4).

Table 3.4 provides descriptive statistics on reviewer characteristics. Reviewers report when they started working for the company. We label "new hire" people who have been working for less than three years for their employer when they write the review; three years is the median in the VC-backed sample. New hires tend to give higher ratings.

Glassdoor provides the company foundation year, from which we compute the firm's age at the time the review is written. The median firm age in the VC-backed sample is ten years, and we use that threshold to split between young and old firms.

We use textual analysis tools and the guidebook "Work in America" (page 597; see Appendix B.2) to assign each job title to one of the following job categories: (i) Managers, (ii) White Collar (consultants, researchers), (iii) Purple Collars (technical service providers), (iv) Pink Collars (support staff), and (v) Blue Collars (manual labor). The average rating follows what is commonly believed to be the hierarchy of jobs: managers give the highest ratings (3.71), closely followed by white collars (3.69), then come purple collars (3.56), then pink collars, and at the bottom the blue collars (3.40). As with the industry categories, we aggregate further into two main categories by pooling all the non-managers together.

On a separate page of the Glassdoor website, employees can enter their salary along with a job title (to access salary benchmarks). This reporting is separate from the rating process and Karabarbounis and Pinto (2018) show that the wages of Glassdoor reviewers are consistent with external data from the U.S. Census Bureau.

Glassdoor aggregates the salary information, and reports the average salary for a given job title. We assign the average salary to all the people in the firm with that job title. We note that job titles are so granular that we expect information loss to be minimal. For example, the average salary of truck drivers at Kraft Heinz is $41k; and we simply assign this average salary to all truck drivers at Kraft Heinz. However, some reviewers do not enter a job title (16%) or enter a job title that we cannot automatically classify (9%). For these reviewers, we cannot infer their salary. We classify a salary as high if it is higher than the median salary in the same industry. Ratings are higher for higher salaries, especially in the VC-backed sample.

Table 3.4: Working Sample and Reviewer Characteristics

	Full Sample		VC-Backed	
	Number of Reviews	Average Score	Number of Reviews	Average Score
Tenure				
New Hire	432,170	3.65	10,184	4.05
Old Hire	498,054	3.55	8,846	3.83
Firm Age				
Young	44,317	3.59	8,787	4.04
Old	885,907	3.60	10,243	3.87
Job Position				
Manager	182,875	3.71	3,244	4.23
White Collar	243,085	3.69	5,126	4.07
Purple Collar	65,457	3.56	1,283	3.72
Pink Collar	135,747	3.52	1,831	3.76
Blue Collar	69,910	3.40	984	3.30
Total – Non-Manager	514,199	3.59	9,224	3.88
Anonymous	150,478	3.43	5,175	3.98
Not Classified	82,672	3.59	1,387	3.72
Total – Other	233,150	3.54	6,562	3.92
Salary				
Low Salary	410,087	3.51	6,519	3.77
High Salary	366,812	3.71	7,269	4.10
No Salary Information	153,325	3.60	5,242	3.98

Notes: This table shows descriptive statistics by employee status (tenure, job position and salary). New Hire corresponds to employees who were hired maximum 3 years prior to writing the review, otherwise the reviewer is classified as Old Hire. Young firms are less than 10 years-old at the time the review was submitted. Job titles are classified into 6 categories: Management, Mid Management, White Collar, Purple Collar, Pink Collar, Blue Collar (see Appendix B.2). Job positions were matched with the Glassdoor salary databases to attribute a salary to each reviewer.

3.4 Regression Analysis

This section tests Hypotheses H1 and H3 by examining how employee satisfaction differs during VC backing and after VC exit. Our main regression analysis explores the association between ownership structures and employee ratings, and the associated equation reads as follows:

$$S_{r,c,d} = \alpha + \beta_1 Pre\ VC\ Exit_{c,d} + \beta_2 Post\ VC\ Exit_{c,d} + \beta_3 Pre\ PE\ Exit_{c,d} + \beta_4 Post\ PE\ Exit_{c,d}$$
$$\beta_5 Pre\ Other\ Transactions_{c,d} + \beta_6 Post\ Other\ Transactions_{c,d} + \beta_7 Public_{c,d} + \gamma_1 Z_r + \gamma_2 Z_c + \epsilon_{r,c,d} \tag{3.1}$$

The dependent variable is the score $S_{r,c,d}$ given by the reviewer r to the company c on day d.[15] Each explanatory variable is a binary variable. In this equation, the "Pre VC Exit" variable takes the value 1 if company c on day d was VC-backed (otherwise, it is 0). The variable "Post VC Exit" is 1 if the review was posted on a day d, which is after the VC exited the company c it was backing, otherwise it is 0.

Our econometric approach follows the recommendations of Petersen (2009): our panel is estimated by pooled OLS with fixed effects and statistical inference based on standard errors clustered by quarter and company. In Z_r, we control for the characteristics of the reviewer (position, tenure, salary). In Z_c, we control for firm characteristics (size, industry). Fixed effects (captured in α) are either i) $Q(d)$, which is the calendar quarter that day d falls into, ii) $I(c)$, where I(c) is a dummy variable that is 1 if the company c is in the Tech industry, and zero otherwise, or iii) $Q(d) * I(c)$. Having these fixed effects is important because employee ratings are expected to vary over business cycles and different industries may have different cycles.

The coefficients β can be interpreted as the difference between the focal score and that of private firms that did not undergo any ownership changes, keeping some characteristics of the firm and of employees constant and subtracting the average score given in all reviews in the quarter $Q(d)$ or the average score given in all reviews in the industry $I(c)$ in the quarter $Q(d)$ (depending on the fixed effect we use).

Table 3.5 – Panel A shows the results from estimating Equation 3.1 above. Under VC-backing, employees are abnormally satisfied, consistent with Hypothesis H1. In contrast, under PE backing, employees are abnormally dissatisfied, consistent with the results in Gornall et al. (2025). Post-VC-backing, employees are still abnormally satisfied, but much less. The coefficient declines by about 0.30, which is economically large and statistically significant at the 1% level (see Appendix B1).[16] Consistent with Dahl (2011), who shows that there is an increase in the uptake of stress-related medication for employees that ex-

[15] Note that each rating/review is treated as being submitted by a separate reviewer. It is possible that the same person has submitted several reviews, but Glassdoor prevents people from submitting more than one review a year.

[16] In the Appendix, we present the results of a regression model where we change the reference category and we measure the change in score post- versus pre- transaction.

Table 3.5: Score and Corporate Ownership

Panel A: Baseline Specification

	1	2	3	4
Pre VC Exit	0.388***	0.367***	0.331***	0.333***
	(5.07)	(4.77)	(4.67)	(4.78)
Post VC Exit	0.096*	0.115**	0.081	0.083
	(1.71)	(2.06)	(1.53)	(1.55)
Pre PE Exit	-0.095**	-0.100**	-0.116***	-0.117***
	(-2.07)	(-2.20)	(-2.78)	(-2.77)
Post PE Exit	-0.154*	-0.125	-0.134	-0.132
	(-1.86)	(-1.51)	(-1.62)	(-1.60)
Pre Other Transactions	-0.113***	-0.114***	-0.115***	-0.112***
	(-3.50)	(-3.56)	(-3.74)	(-3.67)
Post Other Transactions	-0.216***	-0.187***	-0.184***	-0.184***
	(-6.14)	(-5.32)	(-5.30)	(-5.31)
Public Firm	-0.096***	-0.093***	-0.077***	-0.075***
	(-4.38)	(-4.24)	(-3.52)	(-3.45)
Tech Firm	0.153***	0.155***	0.143***	
	(4.17)	(4.22)	(4.46)	
New Hire		0.088***	0.122***	0.121***
		(10.79)	(14.95)	(14.78)
Manager			0.181***	0.181***
			(8.26)	(8.28)
White Collar			0.109***	0.108***
			(8.27)	(8.32)
Pink & Blue Collar			0.031**	0.031**
			(2.55)	(2.56)
Low Salary			-0.172***	-0.171***
			(-10.91)	(-10.80)
High Salary			-0.010	-0.010
			(-0.63)	(-0.61)
Small Firm			0.153***	0.153***
			(6.92)	(6.92)
Young Firm			-0.026	-0.025
			(-0.81)	(-0.79)
Quarter Fixed Effects	Yes	Yes	Yes	No
Quarter x Industry Fixed Effects	No	No	No	Yes
Number of Observations	930,224	930,224	930,224	930224
Adjusted R-squared	0.033	0.035	0.044	0.044

perience organizational changes, we find a large negative coefficient for scores given after all acquisitions.

In columns (2) and (3), we add controls for employee characteristics (tenure, position and salary). Newly hired employees give higher scores and controlling for this aspect slightly decreases the coefficient representing abnormal satisfaction of employees working for VC-backed firms.[17] Other reviewer characteristics also decrease slightly the coefficient

[17] We have simply split the tenure variable into new and old hire, but if we look at the detail, we see new hires abnormally satisfied (up to year three), but we also see that employees that have been working for more

Panel B: By Exit Route

	1	2	3	4
Pre VC to IPO	0.419***	0.396***	0.402***	0.407***
	(3.57)	(3.36)	(3.71)	(3.80)
Pre VC to PE	0.318***	0.305***	0.253**	0.242**
	(3.12)	(2.97)	(2.38)	(2.51)
Pre VC to Trade Sale	0.373***	0.351***	0.241**	0.247**
	(3.06)	(2.87)	(2.06)	(2.12)
Post VC to IPO	0.156**	0.175**	0.163**	0.165**
	(2.11)	(2.38)	(2.34)	(2.35)
Post VC to PE	-0.092	-0.066	-0.115	-0.115
	(-1.16)	(-0.81)	(-1.51)	(-1.49)
Post VC to Trade Sale	0.118	0.130	0.036	0.035
	(1.02)	(1.12)	(0.31)	(0.29)
Quarter Fixed Effects	Yes	Yes	Yes	No
Industry Fixed Effects	Yes	Yes	Yes	No
New Hire Fixed Effects	No	Yes	Yes	Yes
Quarter x Industry Fixed Effects	No	No	No	Yes
Control for Firm Size	No	Yes	Yes	Yes
Controls for Reviewer Characteristics	No	Yes	Yes	Yes
Controls for Other Transactions	Yes	Yes	Yes	Yes
Number of Observations	930,224	930,224	930,224	930,224
Adjusted R-squared	0.034	0.035	0.044	0.044

Panel C: Cross Effects

	1	2	3	4
Pre VC Exit	0.333***	0.337***	0.332***	0.334***
	(4.78)	(4.80)	(4.78)	(4.79)
Post VC Exit	0.082	0.104*	0.036	-0.067
	(1.55)	(1.91)	(0.57)	(-1.10)
Post VC Exit x CEO Change		-0.325*		
		(-1.96)		
Post VC Exit x Manager			0.237***	
			(3.43)	
Post VC Exit x Non-Manager			-0.009	
			(-0.16)	
Post VC Exit x Tech				0.211**
				(2.32)
Controls for Transaction Type	Yes	Yes	Yes	Yes
Controls for Firm size	Yes	Yes	Yes	Yes
Controls for Reviewer Characteristics	Yes	Yes	Yes	Yes
Control for CEO Change	No	Yes	No	No
Quarter x Industry Fixed Effects	Yes	Yes	Yes	Yes
Number of Observations	930,224	930,224	930,224	930,224
Adjusted R-squared	0.044	0.045	0.044	0.044

Notes: This table displays the results of pooled panel regressions where the dependent variable is the employee Glassdoor score and where the variables of interest are a set of dummy variables capturing if the review falls within three years pre- or post- VC or PE exits or pre- or post- other transactions (Panel A), and a set of dummy variables capturing if the review falls within three years pre- or post-VC exits according to the exit routes (IPO, PE, or Trade Sale) in Panel B. Controls for reviewer characteristics include all the variables shown in Table 3.4. We control for firm size and include fixed effects on the quarter and industry. In Panel C, we examine cross effects with the Post VC Exit variable.

than ten years in the firm are abnormally satisfied (but the effect is much smaller than the new hire effect).

of interest.

We note that employees in publicly traded companies are less satisfied whilst employees working in the tech industry and in small companies are more satisfied. Managers and better paid employees are also more satisfied.

In Panel B, we distinguish between different exit routes (as defined in Table 3.2). The decrease in satisfaction post VC exit holds irrespective of the exit route. However, we observe that when the exit is an IPO, employee satisfaction remains abnormally high. This result may be due to the fact that VCs do not fully exit after an IPO but sell their stakes little by little.[18]

Panel C shows that the decline post VC exit is larger if the VC exit coincides with a change in CEO. We also note that managers, unlike other employees, remain abnormally satisfied post exit. The effect is also different in the Tech industry, where we observe that the abnormal satisfaction remains after the VC exits.

Next, we estimate a model that is similar to the one above but we replace Post VC Exit and Pre VC Exit dummy variables with a series of dummy variables that record the quarter when the score is submitted compared to the transaction date. The specification is as follows:

$$S_{r,c,q} = \alpha_{qi} + \Sigma(\beta_s * VC\ Exit\_Quarter_{c,s}) + \gamma * Z_r + \epsilon_{r,c,q}; s = [-12, -11, .., 11, 12] \quad (3.2)$$

The results are shown in Figure 3.1. The top panel shows the results for all VC exits. We do not observe any pre-trend, and we note a decrease in satisfaction that coincides with the exit. After exit, the score continues to decline, but very slowly. An important takeaway from this figure is that the abnormal satisfaction observed during VC-backing is closely related to VC presence. If abnormal satisfaction was due to employee matching, the results would be different. Employees who like the growth or young-firm environment would be as satisfied right after the VC exits as they were right before. In addition, employees in non-VC companies would also be satisfied with their match; thus, an additional assumption would be required. People who like a growth environment need to be happier people than those who do not.

In addition, the lack of a pre-trend indicates that high satisfaction is not the result of company's success. VC-backed companies experiencing an exit are doing well, and employees are likely to be more satisfied if their company does well. However, if this were the main driver of satisfaction, we would expect the scores to increase as we approach the exit date, as this is the most significant success milestone. Moreover, right after the VC exits, the company is equally successful, but the score decreases.

Interestingly, results differ depending on whether the VC fully exits or only partially exits. The next two panels in Figure 3.1 show that in the case of a partial exit (IPO), the difference in satisfaction before and after the exit is small. There is a slight (not statistically significant) positive pre-trend but a clear monotone decrease in satisfaction over the three years post-exit. Because the stake and influence of the VC slowly decrease over the few

[18] The full regression can be found in Appendix Table B2.

years following the IPO, these results are consistent with the view that the presence of the VC is a key driver of employee satisfaction. In addition, and in contrast, the score plummets at the time of a full exit (with slight anticipation in the prior quarter) and satisfaction remains the same thereafter, again coinciding with VC presence. Overall, this evidence is consistent with Hypothesis H3, according to which employee satisfaction decreases after VC exit.

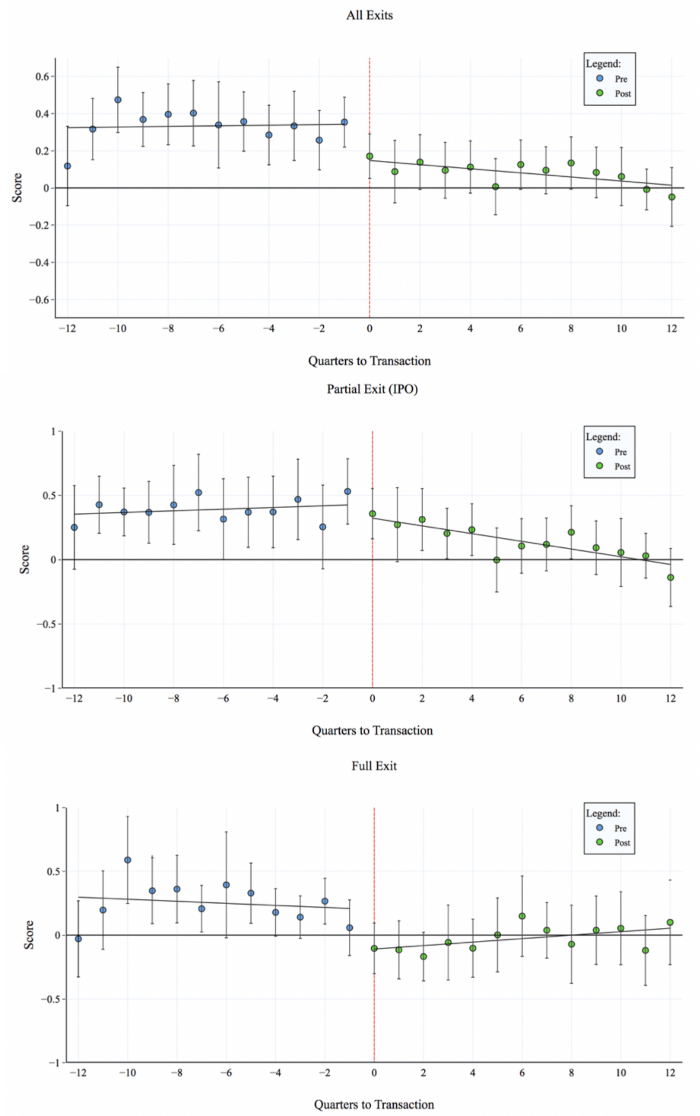

Figure 3.1: Score Given by VC-Backed Employees Around Quarters of VC Exit.

Notes: This figure shows score evolution over quarters relative to VC exits. The top panel displays score for all VC exits. The middle panel shows partial exits (IPO). The bottom panel shows full exits.

3.5 Textual Analysis

This section tests Hypotheses H2 and H3 by examining whether the topics discussed in employee reviews differ under VC backing and whether these differences persist after VC exit.

3.5.1 *Structural topic modeling*

In addition to the scores, employees write reviews that describe the Pros and Cons of working for the company. To analyze the content of these reviews, we opt for an approach called probabilistic topic modeling. Probabilistic topic models represent documents by a probability distribution over a fixed set of topics (topic prevalence) and each topic, in turn, by a probability distribution over a fixed set of words (topic content).[19] That is, for each review, the output is a weight on each topic: in review 1, topic 1 has a weight of 10%, topic 2 has a weight of 5% etc. The sum of the weights is one for each review. In addition, for each topic, the algorithm generates the set of words that are in this topic with a weight for each word. For example, in topic 1, management has a weight of 20%, politics has a weight of 10% etc. The sum of the weights is 1 for each topic.

Formally, the procedure infers (i) the mixture distributions of terms $w = 1, ..., N_w$ describing each topic $k = 1, ..., N_k$, across the set of reviews, and (ii) the mixture distributions of topic $k = 1, ..., N_k$ describing each review $r = 1, ..., N_r$. Both distributions are Dirichlet and hence have [0,1] support.[20]

The most common probabilistic topic model is the Latent Dirichlet Allocation (LDA) introduced by Blei et al. (2003). In Finance and Accounting, LDA has been applied to 10-K disclosures (Dyer et al., 2017), analyst discussions (Huang, 2018), SEC comment letters (Dechow et al., 2016), firm disclosure in the years surrounding fraud (Hoberg and Lewis, 2017), and loan classification (Argyle et al., 2020). In this paper, we implement a novel probabilistic topic model: Structural Topic Modeling (STM; see Roberts et al. (2016)). STM is an LDA, but three assumptions are relaxed: (i) Topics within a document can be dependent on one another (review 1 containing topic 1 may be correlated with review 1 containing topic 2); (ii) the distribution of words within a topic is not fixed (topic 1 in review 1 may use different words to topic 1 in review 2); and (iii) topic weight may be a function of the score given.

3.5.2 *Methodology*

We employ the 'tm' (text mining) and 'stm' (structural topic models) packages available in R for our analysis. We tokenize each review into a collection of single words (unigrams). Stop words (as delineated by the word list from the 'tm' package), words comprising fewer than three letters, numerical values, and punctuation marks are systematically eliminated. All words are stemmed, and all characters are converted to lowercase. Consistent with the existing literature, we focus on unigrams rather than bigrams or trigrams, as the topic modeling algorithm is inherently designed to cluster the individual elements of composite words (e.g., New York City) within the same topic. Furthermore, we retain only the 1,000 most frequently occurring unigrams for each topic as a form of "pruning". Finally, reviews

[19] It is similar to fuzzy clustering (soft clustering), in which each data point belongs to several clusters; and it is in contrast to traditional classification methods, which would assign each review to a single topic.

[20] i) $\Sigma_{w=1}^{N^w} \varphi_{k,w} = 1$, where $\varphi_{k,w}$ is the weight of each term w in topic k. ii) $\Sigma_{k=1}^{N^k} \theta_{r,k} = 1$, where $\theta_{r,k}$ is the weight of each topic k in review r.

must contain a minimum of five unigrams and be written in English.

The main filter is the number of words combined with the removal of stop words. The average review contains 20 words, but half of these are stop words. In the final sample, the average Pros review contains 11 words (Table 3.6 – Panel A). The average Cons review has 15 words (Table 3.6 – Panel B). There are as many Pros reviews as Cons reviews: about 250,000 of each type. In total, we model a corpus of 6.5 million words.

Table 3.6: STM Sample Construction – Employee Reviews

Panel A: Number of Pros Reviews

	Stayed Public	Stayed Private	Changed Ownership	Total	Average N Words
Initial Sample	483,041	344,772	102,411	930,224	20.36
Sample after removing					
Reviews with less than 5 words	478,669	341,809	101,654	922,132	20.51
Special characters	477,090	341,063	101,473	919,626	20.39
Stop words	261,477	209,821	69,887	541,185	11.97
Pruning	249,105	202,077	67,446	518,628	11.43

Panel B: Number of Cons Reviews

	Stayed Public	Stayed Private	Changed Ownership	Total	Average N Words
Initial Sample	483,041	344,772	102,411	930,224	27.43
Sample after removing					
Reviews with less than 5 words	479,611	341,953	101,704	923,268	27.60
Special characters	478,289	341,249	101,491	921,029	27.26
Stop words	261,924	197,777	67,436	527,137	15.44
Pruning	250,721	190,109	65,177	506,007	14.83

Notes: This table shows our working sample of Pros reviews (Panel A) and Cons reviews (Panel B) used for conducting a Structural Topic Modeling (STM). It describes the standard filters applied to the initial sample from Table 3.1 and displays the average number of words per review for each subsample.

In contrast to conventional qualitative methodologies such as surveys and questionnaires, Structural Topic Modeling (STM) does not depend on pre-established and fixed sets of dimensions to measure employee satisfaction. However, an inherent limitation of any clustering method is the need to predetermine the number of clusters, a decision that requires judgment assisted by quantitative metrics. We apply k-means clustering to the input data, experimenting with values of k ranging from 10 to 30, and calculate the sum of squared errors (SSE) within the cluster for each value of k, as illustrated in Figure 3.2. As the number of clusters increases, the SSE decreases, since the distance between any data point and its corresponding cluster center goes down. However, this reduction in SSE is not the same in all steps. The prevalent strategy is to select the value of k where the decrease in SSE within clusters is most pronounced.[21] In our sample, the optimal number of clusters appears to be 15 both for the pro and for the con reviews.[22]

[21] This approach is often referred to as the "elbow method"; see Sainju et al. (2021).

[22] Other metrics used in the literature are "Held-out likelihood" and "Lower bound". We show the plots with these two alternative measures in Panels B and C. These metrics also indicate that the goodness-of-fit improves significantly once we reach 15 topics.

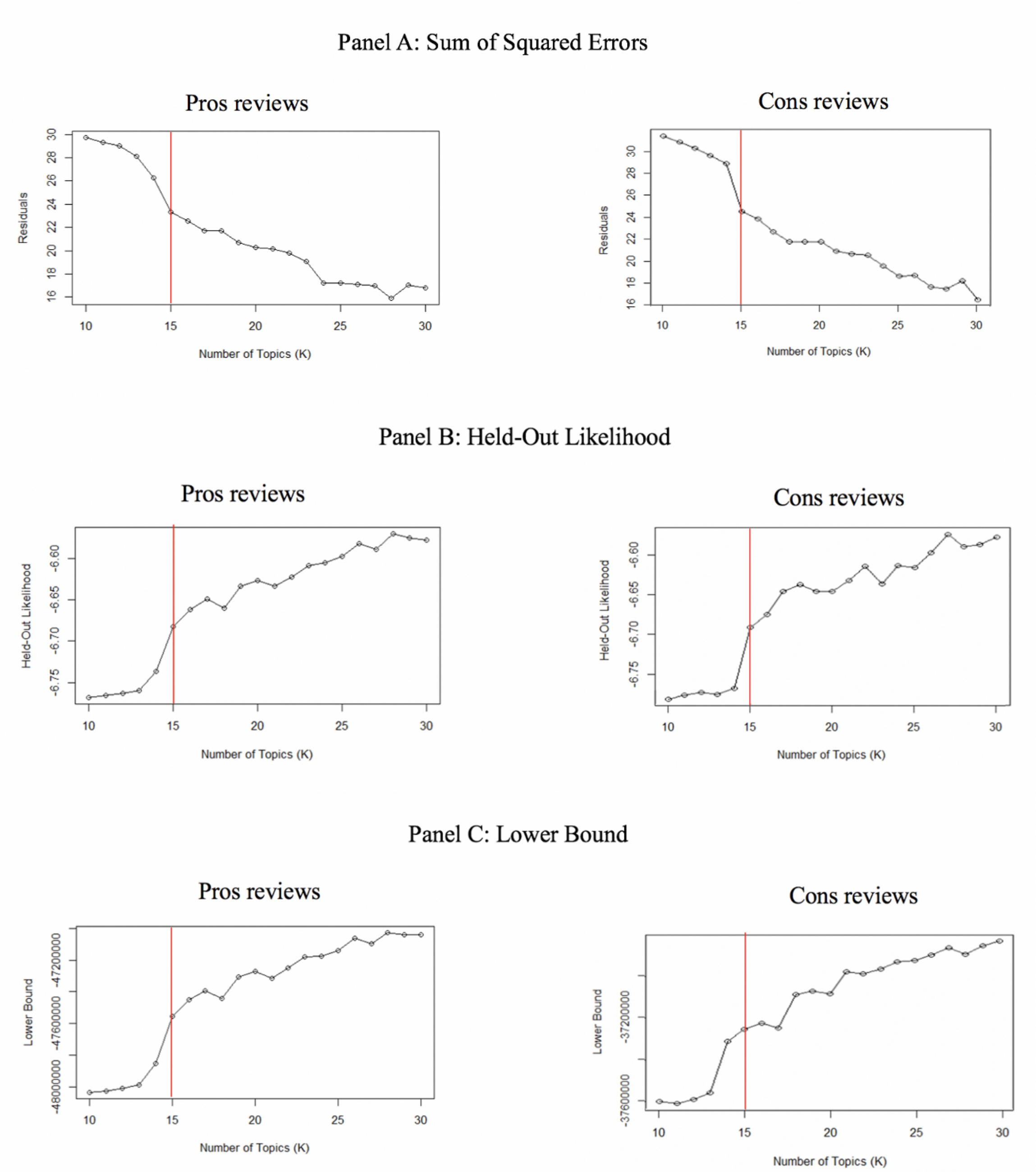

Figure 3.2: Optimal Number of Topics.

Notes: The figures display the Sum of Squared Errors (Panel A), the held-out likelihood (Panel B) and the lower bound (Panel C) for different numbers of topics (K) in the Structural Topic Model (STM) for Pros Reviews and Cons Reviews.

3.5.3 *The topics*

A measure of the contribution of a word to a topic is given by a FREX score (Bischof and Airoldi, 2012). FREX is the harmonic mean of the word's rank in terms of exclusivity and frequency. Thus, words with a high FREX score must be frequently mentioned in the topic but not frequently mentioned in other topics.[23] Table 3.7 provides the list of the 15 topics.

[23]Exclusivity is the conditional probability of seeing the topic given the word. Thus, words with high exclusivity value are those where most of the mass for that word is assigned to the given topic. The frequency score is given by the empirical Cumulative Density Function of the word in its topic.

Panel A shows the topics from the Pros reviews and panel B shows the topics from the Cons reviews. For each topic, the top ten words in terms of FREX are displayed. The topics are ranked by the average FREX score of their top three words, and we label the topics using those top three words.

The extracted topics make intuitive sense. The top two pro topics are nice people (culture, amazing, care), and flexible (working) environment. The third topic is about rewards (bonuses, promotions, performance). Management is often mentioned in this topic because it is about the rewards offered by management. The fourth topic is "benefits", which includes words such as health plan and insurance, but also paid vacation and bonus. The next topic is work-life balance.

Among the con topics, it is notable that about one-third mention the word "management". Three topics have management as their main word. The first is a topic about the hiring processes, which includes words such as departure, lack of process, and stress. The next two management topics are promotions and training, respectively. The topic of politics also contains management as one of the key words.

The best identified con topics describe work challenges. Work busy-ness is the top topic and includes words such as time, busy environment, require, extreme, short, and response. Similarly, there are topics about how difficult the job is (hard, hour, balance, challenging), daily issues, and expectations at work. Overall, the clustering of words appears logical and the topics seem well-identifiable and reasonable.

Table 3.7: Key Words per Topic

Panel A: Pros Topics

Nice People		Flexible Env.		Rewards		Benefits		Work Life Balance	
N-gram	FREX	N-gram	FREX	N-gram	FREX	N-gram	FREX	N-gram	FREX
peopl	0.50	environ	0.32	manag	0.39	benefit	0.51	balanc	0.27
nice	0.18	flexibl	0.29	time	0.27	advanc	0.10	train	0.20
cultur	0.12	friend	0.20	hard	0.11	health	0.10	life	0.19
amaz	0.11	cowork	0.16	promot	0.06	paid	0.09	posit	0.15
care	0.07	schedul	0.16	reward	0.06	insur	0.07	worklif	0.13
awesom	0.07	fast	0.07	perform	0.05	vacat	0.07	offer	0.11
depart	0.06	perk	0.06	fantast	0.04	abil	0.06	program	0.09
valu	0.06	pace	0.05	worker	0.04	bonu	0.05	corpor	0.05
diver	0.06	staff	0.04	bonus	0.04	match	0.05	gener	0.04
secur	0.03	stabl	0.03	activ	0.03	plan	0.05	includ	0.04
Fellow Employees		Pay & Hours		Growth Opp.		Easy Job		Team	
N-gram	FREX	N-gram	FREX	N-gram	FREX	N-gram	FREX	N-gram	FREX
employ	0.41	pai	0.26	opportun	0.33	job	0.29	team	0.39
love	0.11	learn	0.18	growth	0.14	dai	0.18	depend	0.07
industri	0.10	hour	0.17	lot	0.13	easi	0.12	plenti	0.06
famili	0.10	decent	0.10	fun	0.12	person	0.09	packag	0.06
technolog	0.09	discount	0.08	experi	0.12	enjoi	0.06	leav	0.06
innov	0.05	help	0.08	offic	0.11	happi	0.04	polici	0.06
focu	0.05	start	0.07	competit	0.08	understand	0.04	treat	0.06
brand	0.04	atmosph	0.06	profess	0.07	extrem	0.04	share	0.05
financ	0.04	week	0.06	strong	0.07	supervisor	0.03	pro	0.05
stock	0.04	store	0.05	intern	0.05	laid	0.02	vision	0.05
Customer Care		Product		Supportive Culture		Growth Env.		Hiring Processes	
N-gram	FREX	N-gram	FREX	N-gram	FREX	N-gram	FREX	N-gram	FREX
custom	0.19	product	0.17	support	0.10	grow	0.12	hire	0.08
excel	0.16	busi	0.16	cultur	0.10	project	0.09	process	0.07
salari	0.14	locat	0.09	career	0.08	client	0.07	goal	0.06
servic	0.09	sale	0.08	leadership	0.08	smart	0.06	expect	0.05
build	0.08	skill	0.08	care	0.07	improv	0.06	month	0.05
talent	0.07	set	0.04	feel	0.07	knowledg	0.05	execut	0.05
food	0.07	excit	0.03	develop	0.06	chang	0.04	medic	0.04
monei	0.06	exposur	0.03	commun	0.06	resourc	0.04	review	0.03
facil	0.04	freedom	0.03	challeng	0.05	travel	0.04	firm	0.03
lead	0.03	technic	0.03	encourag	0.04	engin	0.04	question	0.02

Panel B: Cons Topics

Busy		Customer Care		Pay & Benefits		Hard job		Hiring Processes	
N-gram	FREX	N-gram	FREX	N-gram	FREX	N-gram	FREX	N-gram	FREX
time	0.43	employ	0.36	pai	0.30	hour	0.29	manag	0.27
busi	0.17	peopl	0.14	benefit	0.14	hard	0.15	lack	0.13
environ	0.11	custom	0.14	opportun	0.13	balanc	0.11	depart	0.10
intern	0.06	care	0.10	salari	0.13	week	0.10	hire	0.09
requir	0.05	servic	0.04	offic	0.11	schedul	0.09	process	0.07
extrem	0.05	terribl	0.04	career	0.10	start	0.08	stress	0.06
short	0.05	real	0.03	advanc	0.10	depend	0.06	organ	0.05
respon	0.04	worker	0.03	poor	0.08	bad	0.06	role	0.05
resourc	0.04	overtim	0.03	compen	0.07	challeng	0.06	polici	0.05
close	0.04	forc	0.03	limit	0.07	worklif	0.05	poor	0.04
Politics		**Daily issues**		**Expectations**		**Changes**		**Promotions**	
N-gram	FREX	N-gram	FREX	N-gram	FREX	N-gram	FREX	N-gram	FREX
job	0.30	dai	0.22	expect	0.19	team	0.16	manag	0.14
perform	0.08	constant	0.11	person	0.11	chang	0.14	promot	0.12
polit	0.08	posit	0.10	project	0.10	base	0.08	peopl	0.10
develop	0.08	difficult	0.09	support	0.09	issu	0.07	leadership	0.09
manag	0.07	feel	0.08	program	0.05	lead	0.06	upper	0.08
level	0.07	famili	0.05	term	0.05	client	0.05	commun	0.07
treat	0.06	review	0.04	vacat	0.04	improv	0.05	senior	0.06
execut	0.04	told	0.04	consist	0.04	account	0.04	increa	0.05
layoff	0.04	matter	0.04	flexibl	0.03	qualiti	0.03	direct	0.04
middl	0.03	neg	0.04	reward	0.03	build	0.03	level	0.04
Sales		**Training**		**Culture**		**Leaving**		**Growth**	
N-gram	FREX	N-gram	FREX	N-gram	FREX	N-gram	FREX	N-gram	FREX
sale	0.16	manag	0.11	cultur	0.12	rai	0.11	growth	0.10
staff	0.11	train	0.10	industri	0.07	leav	0.08	product	0.09
monei	0.08	store	0.09	market	0.07	plan	0.07	life	0.07
meet	0.08	month	0.06	competit	0.06	stai	0.06	slow	0.07
deci	0.07	shift	0.06	cost	0.05	insur	0.05	grow	0.06
goal	0.07	paid	0.05	leader	0.05	health	0.05	technolog	0.05
fast	0.05	associ	0.03	talent	0.04	wage	0.05	learn	0.05
sell	0.05	break	0.03	live	0.04	cut	0.04	locat	0.05
bonus	0.04	supervisor	0.03	travel	0.03	minimum	0.03	corpor	0.04
push	0.03	call	0.03	option	0.03	fire	0.03	limit	0.07

Notes: This table shows our working sample of Pros reviews (Panel A) and Cons reviews (Panel B) used for conducting a Structural Topic Modeling (STM). It describes the standard filters applied to the initial sample from Table 3.1 and displays the average number of words per review for each subsample.

3.5.4 Regression analysis

The previous section shows that employee satisfaction is abnormally high under VC backing and decreases after VC exit, gradually in the case of a partial exit and abruptly in the case of a full exit. These results are consistent with Hypotheses H1 and H3. We now turn to the written reviews to better understand the mechanisms behind these patterns. Specifically, we examine whether the topics mentioned in employee reviews are consistent with the organizational channels predicted in Hypothesis H2 and whether these differences persist after exit, as predicted in Hypothesis H3.

To do so, we analyze how the prevalence of each topic in an employee review changes when a company is VC-backed or was formerly VC-backed. This approach provides a direct way to interpret the previous results, since the employees who assign the scores also explain their reasoning in the written reviews.

We use the same panel regression setting as above, with fixed effects and double clustering. The explanatory variables are the same as those used in specification (4) of Table 3.5 – Panel A. We estimate each equation separately for each of the thirty topics, corresponding to two sets of fifteen topics. The dependent variable is the topic weight in a given review, that is, the prevalence of topic k in review r for company c written on day d.[24] The results are displayed in Table 3.8.

To preserve space and facilitate readability, we do not show the coefficients of the control variables. Each line is the outcome of one panel regression estimation. The two coefficients displayed on each line are those of the dummy variables "Pre VC Exit" and "Post VC Exit" Finally, we sort the topics as a function of their coefficients on "Pre VC Exit" so one can quickly see the most often mentioned topic by employees working in a VC-backed companies (all else equal).

Panel A shows the results for the fifteen pro topics starting with the one most abnormally mentioned in VC-backed companies, given all the characteristics we control for, including time, industry, firm, and employee characteristics. At the bottom are the Pros least mentioned in VC-backed companies. The most abnormally mentioned advantage to work in a VC environment is the supportive culture. The coefficient is highly significant and three times as large as the second most important Pro topic. The next two topics have similar coefficients: Growth Environment and Hiring Processes. These results are consistent with Hypothesis H2, as VC-backed employees are more likely to associate their work environment with supportive culture, growth, and HR-related practices. The next topics have a much smaller coefficient but are still statistically significant (Product, Fellow Employees, Team). The topics listed at the bottom of the Pros list are all related to compensation: Pay and Hours, Benefits, Flexible (working) Environment, WorkLife Balance, Rewards. Hence, people working in a VC environment are not satisfied with their compensation and working hours but enjoy the culture.

[24]We use OLS estimations for simplicity, but we tried alternative methods and found similar results.

Table 3.8: Structural Topic Modeling

Panel A – Pros Reviews

	Pre VC Exit	Post VC Exit	Controls	Adjusted R-squared
Supportive Culture	2.36***	1.63***	Yes	0.070
	(6.95)	(4.40)		
Growth Environment	0.74***	0.42***	Yes	0.048
	(5.90)	(4.22)		
Hiring Processes	0.65***	0.46***	Yes	0.013
	(6.65)	(5.09)		
Product	0.36***	0.39***	Yes	0.021
	(3.88)	(4.30)		
Fellow Employees	0.26**	0.07	Yes	0.022
	(2.50)	(0.85)		
Team	0.12	0.05	Yes	0.005
	(1.11)	(0.48)		
Growth Opportunities	0.12***	0.07	Yes	0.022
	(3.62)	(1.53)		
Nice People	0.06	0.29***	Yes	0.003
	(0.80)	(3.09)		
Customer Care	-0.14**	-0.03	Yes	0.009
	(-2.09)	(-0.43)		
Easy Job	-0.24**	-0.04	Yes	0.044
	(-2.06)	(-0.53)		
Rewards	-0.50***	-0.32***	Yes	0.020
	(-6.17)	(-4.13)		
Work Life Balance	-0.70***	-0.90***	Yes	0.015
	(-7.75)	(-9.06)		
Flexible Environment	-0.72***	-0.43***	Yes	0.028
	(-5.17)	(-3.25)		
Benefits	-1.04***	-0.96***	Yes	0.027
	(-8.60)	(-8.16)		
Pay & Hours	-1.34***	-0.71***	Yes	0.080
	(-5.07)	(-3.96)		

Panel B – Cons Reviews

	Pre VC Exit	Post VC Exit	Controls	Adjusted R-squared
Promotions	-0.86***	-0.16	Yes	0.031
	(-6.53)	(-1.22)		
Training	-0.73***	-0.30**	Yes	0.090
	(-3.08)	(-2.16)		
Hiring Processes	-0.71***	-0.33***	Yes	0.014
	(-5.78)	(-3.96)		
Pay & Benefit	-0.55***	-0.75***	Yes	0.008
	(-6.41)	(-6.51)		
Customer Care	-0.51***	-0.22*	Yes	0.038
	(-2.70)	(-1.80)		
Politics	-0.46***	-0.32***	Yes	0.012
	(-6.83)	(-4.36)		
Leaving	-0.36**	-0.19*	Yes	0.020
	(-2.17)	(-1.77)		
Expectations	0.09	-0.15***	Yes	0.006
	(1.53)	(-2.90)		
Hard Job	0.14	-0.15*	Yes	0.028
	(1.42)	(-1.78)		
Culture	0.21	0.13	Yes	0.044
	(1.63)	(1.46)		
Busy	0.24***	0.09	Yes	0.008
	(3.58)	(1.09)		
Daily Issues	0.40	0.10	Yes	0.028
	(1.06)	(0.94)		
Sales	0.50***	0.44***	Yes	0.004
	(6.02)	(6.14)		
Changes	0.63***	0.78***	Yes	0.043
	(3.72)	(5.66)		
Growth	1.96***	1.03***	Yes	0.055
	(5.62)	(4.15)		

Notes: This table shows, for each of the 15 Pro and 15 Cons topics, the results of pooled regressions on their STM prevalence. Prevalence has been multiplied by 100. Only two explanatory variables are displayed for each regression: Pre VC Exit, and Post VC Exit. Control variables are the same as specification 4 in Table 3.5. Standard Errors are clustered by company and by quarter. There are 518,628 observations in each specification of Panel A and 506,007 observations in each specification of Panel B.

These results are probably not very surprising, as they coincide with casual evidence. However, this may be what is remarkable. Reading these employee reviews provides the most comprehensive record to date about the unique advantages and disadvantages of working under VC-backing. We do not have a natural experiment to test causality. Having a setup where employees would be randomly assigned to companies is quite unrealistic. Having a non-selected sample is equally unrealistic. Our sample is the largest ever studied, and the patterns that emerge are consistent with general belief. Employees who work under a VC enjoy the supportive culture, being with smart people, experiencing high growth, and having superior HR processes. The drawback of this working environment is low pay and difficult working conditions.

Combining these results with those from the previous section, we conclude that being an employee under VC-backing has both Pros and Cons, but the benefits outweigh the costs. Other employees may have chosen not to work for VC-backed companies, and therefore also matched with their preferred company type, but they are not as satisfied.

Another unique aspect that our setup delivers is post-exit analysis. There is relatively little literature on what happens to companies post-VC exit, and certainly little about how employees fare once the VC is gone. The coefficients in the column "Post VC Exit" show a clear reversal. What was abnormally positive when the VC is around is still abnormally positive, but less so post-exit; and vice versa for what was least abnormally negative. This does not show causality, but it does indicate that something unique is happening when the VC is present. Furthermore, and most interestingly, this analysis enables us to observe which of the changes brought in by VCs have long-lasting effects.

When the VC exits, all of the six significantly most mentioned pro topics become less mentioned. The greatest decline is observed for the growth environment. The coefficient on the VC-backed dummy is 0.74, and the one for post VC-backed is 0.42. Hence, there is a decline of -0.32. Growth as a positive feature has a coefficient that is halved after the VC has exited.

In contrast, the coefficients of Supportive Culture and Hiring Processes decrease only slightly after exit. These two features are therefore the largest VC legacies. After exit, the coefficient on Supportive Culture is 1.63. It is still economically large compared to all the other coefficients.[25] For example, it is twice the size of what the growth environment was under VC-backing. Similarly, the benefits of the Hiring Processes decrease, but the decrease is only statistically significant on a 10% level test.

We also note that the Pros that are less mentioned under VC-backing have their coefficients reversed. For example, the topic "Pay and Hours" has a coefficient that is halved post exit. Under VC-backing the coefficient is -1.34, which is economically large and statistically significant. Post exit the coefficient is -0.71. This is still economically large, but shows a clear improvement. That said, the other topics related to compensation (Benefits, Rewards, Flexible Environment, Work-Life Balance) improve only marginally post exit. Hence, the legacy of low pay and benefits also persist after VCs exit.

Similar results are observed for the Cons (Panel B). The coefficient on promotion policy is mostly reversed, but the HR-related topics (Training, and Hiring Processes) remain

[25]The decrease compared to pre-exit (about 0.70) is statistically significant but only at a 5% level test.

abnormally less mentioned as Cons once the VC exits.

We also investigate whether the effects following venture capital involvement diminish gradually or suddenly. Figure 3.3 illustrates the trend of the top three pro topics. References to Culture and Growth drop suddenly at exit and maintain this level thereafter. HR changes show a downward trend before the exit and then stabilize. This is noteworthy because HR changes are highlighted in the literature as crucial alterations brought about by venture capital. Furthermore, Rajan (2012) emphasizes the need for venture capitalists to standardize the company in preparation for transition to the next owner, with HR being a significant aspect. Thus, as the VC-backed company undergoes standardization to align more closely with typical companies, the positive reference of HR decreases, but it remains steady post-exit and stays above that of other firms.

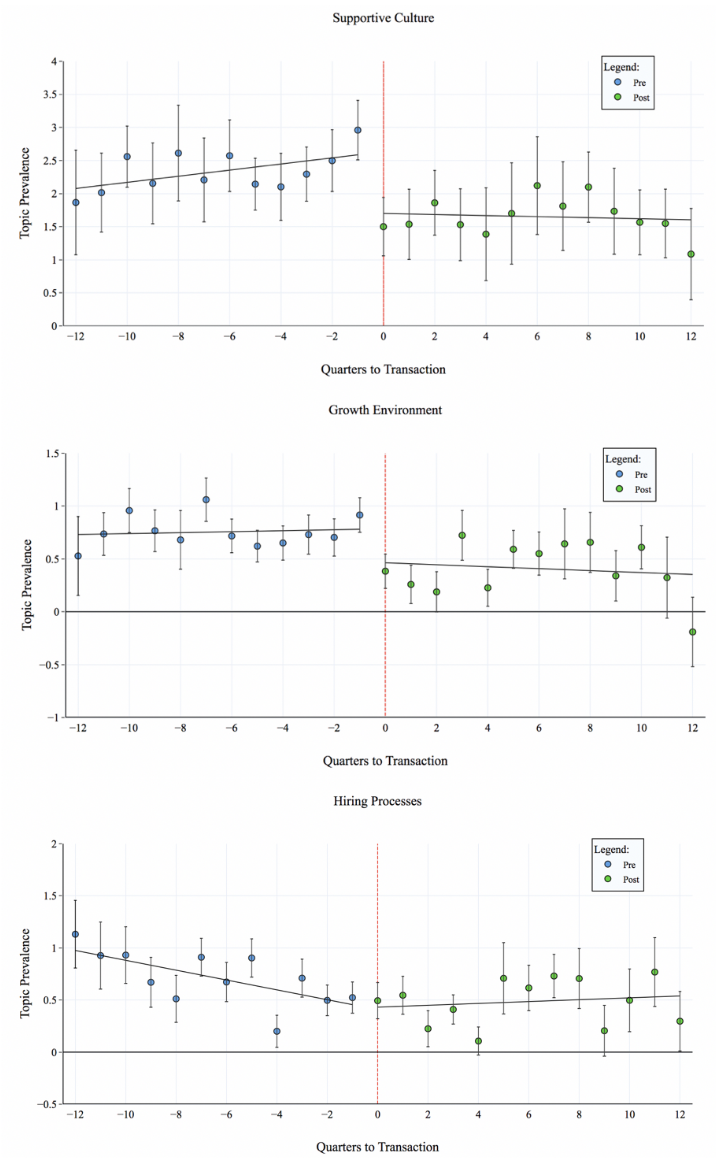

Figure 3.3: Pros Topic Prevalence Around Quarters of VC Exit.

Notes: The figures show the prevalence of Pros topics Supportive Culture (top panel), Growth Environment (middle panel), Hiring Processes (bottom panel) over quarters relative to VC exits for employees working in the VC-backed companies.

We carry the same analysis for PBOs both as a placebo test and to know why employees of PE-backed companies are dissatisfied, unlike those working for VC-backed companies. The results are shown in Table B3. HR processes are also more often mentioned as a pro under PE-backing. Issues related to Pay and Hours are more often mentioned as a benefit of being PE-backed, in contrast to what it is for VC-backed. The results for the cons are consistent. Pay related issues are less mentioned as a cons under PE-backing.

Thus, when studying the impact of financial sponsors on companies and their stakeholders, it seems important to distinguish between Venture Capital, Primary Buyout and Secondary Buyouts. The changes these three types of private equity transactions generate are distinct. A VC mostly professionalizes HR processes. PBOs mostly change the financial incentives of senior management. Secondary (and tertiary,...) buyouts are changes in financial sponsors but the incentive structure of senior management is unchanged.

3.5.5 Managers vs non-managers

Table 3.5 - Panel C shows that VC exit has a different impact on managers (vs non-managers). We therefore show the coefficients of our (topic) regressions separately for the managers and for the non-managers (Table 3.9). In general, the advantages and disadvantages associated with VC-backed ownership, are equally acknowledged by managerial and non-managerial staff. One partial exception is that during the period of venture capital backing, managers report the hiring processes as a primary benefit approximately three times more frequently than non-managers.

Following the exit, the coefficients associated with pro topics remain largely consistent across positions, except for those related to the hiring processes (Panel A). Similarly, in terms of cons, post-exit coefficients linked to HR issues differ for non-managers (Panel B). Managers, after a VC exit, express significantly fewer grievances regarding promotions and training than other workers. In contrast, non-managerial staff have similar levels of complaints about these matters as employees in other types of firms.

Our findings align with a recent analysis by Core et al. (2024), who demonstrate that VCs significantly influence HR processes. They find that they do so through the establishment of more transparent procedures, the addition of support functions, and the introduction of additional hierarchical layers.[26] Furthermore, Rajan (2012) posits that the primary mission of a VC is to assist innovative firms in standardizing operations, thereby enhancing the liquidity of company equity and the replaceability of key human capital. Our findings suggest that such a standardization process may benefit managers more than it benefits other employees.

[26] Also related, Bias et al. (2026) find that before an IPO, a key change is that additional layers of mid-management positions are added.

Table 3.9: Managers vs Non-Managers

Panel A – Pros Reviews

	Pre VC Exit x Manager	Pre VC Exit x Non-Manager	Post VC Exit x Manager	Post VC Exit x Non-Manager
Support Culture	2.839***	2.147***	2.429***	1.601***
	(6.72)	(5.04)	(5.13)	(4.09)
Growth Environment	0.914***	0.624***	0.476***	0.305***
	(5.77)	(3.90)	(3.93)	(2.70)
Hiring Processes	1.417***	0.503***	1.033***	0.205**
	(4.85)	(4.86)	(4.54)	(2.49)
Product	0.272*	0.437***	0.376**	0.446***
	(1.95)	(3.75)	(2.56)	(3.87)
Fellow Employees	0.293**	0.262*	0.053	0.159
	(2.40)	(1.96)	(0.41)	(1.44)
Team	-0.169	0.117	-0.139	0.000
	(-0.98)	(0.88)	(-0.78)	(0.00)
Growth Opportunities	0.191**	0.120***	0.112	0.049
	(2.65)	(2.93)	(1.33)	(0.81)
Nice People	-0.176	0.025	0.031	0.258**
	(-1.31)	(0.29)	(0.25)	(2.40)
Customer Care	-0.363***	-0.064	-0.171**	0.121
	(-3.74)	(-0.86)	(-2.04)	(1.32)
Easy Job	-0.446***	-0.137	-0.043	-0.010
	(-4.33)	(-0.80)	(-0.37)	(-0.09)
Rewards	-0.640***	-0.424***	-0.514***	-0.257***
	(-4.96)	(-4.21)	(-5.63)	(-2.75)
Work Life Balance	-0.764***	-0.674***	-0.993***	-0.871***
	(-5.85)	(-5.44)	(-8.39)	(-6.77)
Flexible Environment	-0.746***	-0.712***	-0.621***	-0.401**
	(-4.68)	(-4.07)	(-4.66)	(-2.45)
Benefits	-1.100***	-0.973***	-1.163***	-0.883***
	(-8.45)	(-6.84)	(-7.92)	(-5.90)
Pay & Hours	-1.521***	-1.251***	-0.866***	-0.719***
	(-6.58)	(-3.27)	(-4.36)	(-3.42)

Panel B – Cons Reviews

	Pre VC Exit x Manager	Pre VC Exit x Non-Manager	Post VC Exit x Manager	Post VC Exit x Non-Manager
Promotions	-1.145***	-0.759***	-0.614***	-0.104
	(-6.05)	(-4.60)	(-2.74)	(-0.67)
Training	-1.014***	-0.580*	-0.707***	-0.226
	(-5.19)	(-1.80)	(-4.16)	(-1.27)
Hiring Processes	-0.577***	-0.784***	-0.437***	-0.311***
	(-4.22)	(-4.51)	(-3.00)	(-2.94)
Pay & Benefits	-0.660***	-0.458***	-0.830***	-0.792***
	(-5.78)	(-4.67)	(-4.74)	(-5.81)
Customer Care	-0.786***	-0.292	-0.426**	-0.0384
	(-5.60)	(-1.05)	(-2.62)	(-0.28)
Politics	-0.699***	-0.368***	-0.478***	-0.275***
	(-10.31)	(-4.04)	(-4.16)	(-3.28)
Leaving	0.165	-0.312	0.100	-0.196*
	(0.81)	(-1.26)	(0.35)	(-1.95)
Expectations	-0.055	0.114	-0.146**	-0.188***
	(-0.63)	(1.41)	(-2.39)	(-2.68)
Hard Job	0.262**	-0.039	0.020	-0.239**
	(2.19)	(-0.35)	(0.15)	(-2.36)
Culture	0.083	0.194	-0.019	0.097
	(0.67)	(1.11)	(-0.17)	(0.81)
Busy	0.420***	0.154*	0.350***	0.042
	(3.73)	(1.77)	(2.73)	(0.47)
Daily Issues	0.087	0.672	-0.034	0.251
	(0.63)	(1.13)	(-0.38)	(1.25)
Sales	0.467***	0.498***	0.354***	0.497***
	(3.66)	(4.99)	(3.71)	(5.07)
Changes	0.789***	0.459*	0.924***	0.832***
	(4.93)	(1.94)	(4.56)	(4.95)
Growth	2.662***	1.500***	1.943***	0.652**
	(8.11)	(3.10)	(4.27)	(2.58)

Notes: This table shows the cross-effects of pre- and post- VC exits and employee position on the Pros (Panel A) and Cons (Panel B) topic prevalence. Prevalence has been multiplied by 100. The cross effects with anonymous and not classified employees are not displayed. Control variables are the same as specification 4 in Table 3.5. Standard Errors are clustered by company and by quarter. There are 518,628 observations in each specification of Panel A and 506,007 observations in each specification of Panel B.

3.5.6 Robustness: Using ChatGPT to summarize employee views

Several studies have established that ChatGPT is the most precise tool for generating automated summaries (Bhaskar et al., 2023; Goyal et al., 2023). Furthermore, recent research has used ChatGPT to condense sets of online reviews analogous to those under consideration here; for instance, McCloskey et al. (2024) utilize ChatGPT to summarize reviews related to small businesses.

We provide a file containing the pro reviews of companies backed by venture capital. From this, we choose the 20 reviews with the highest prevalence scores within each topic.[27] The 20 reviews represent an average corpus of around 500 words. We follow Yang et al. (2023) to effectively frame the prompts to generate quality summaries. We use the prompt: "Please find attached a CSV file. Open the file and read the 20 reviews. After reading the 20 reviews, summarize the advantages in one sentence". Table 3.10 shows the summaries generated by ChatGPT.

The summaries provided are consistent with our previous results even though the two methods are very different. The pro summaries emphasize a culture of continuous innovation and growth, collaboration, support, and significant employee trust. There are also elements about a supportive environment that values employee input and fosters professional development, opportunities for significant impact within the company, and focus on personal and professional growth. Finally, some elements are related to the company's strong leadership, strategic focus, and innovative product development.

Table 3.10: ChatGPT Review Summaries

Topics	ChatGPT Summaries
Supportive Culture	The reviews consistently emphasize a highly supportive and collaborative culture, led by visionary leaders who prioritize, creativity transparency, and employee empowerment, along with a strong commitment to values and mission-driven work.
Growth environment	The reviews underscore a culture of continuous innovation and growth, highlighting the company's commitment to safety, access to knowledgeable leadership, encouragement for technical enrichment and a dynamic, supportive environment that values employee input and fosters professional development.
Hiring Processes	The reviews praise the company's inclusive and supportive hiring process, which reflects its strong culture of collaboration, respect, and focus on personal and professional growth, alongside exceptional work-life balance and opportunities for significant impact within the company.
Product	The reviews praise the company for its strong leadership, strategic focus, and innovative product development, emphasizing a collaborative work environment and a competitive edge in market leading products, coupled with excellent social events and significant employee trust.
Fellow employees	The reviews emphasize a strong sense of community and passion within the company, with employees loving the collaborative culture, innovative products, and impactful work that combines personal fulfillment with significant industry contributions

Notes: Summaries of the 20 pro reviews of VC-backed companies (pre-exit) with the highest prevalence of a given topic.

[27] ChatGPT's code shows that it only processes the first 20.

3.6 Conclusion

Studies have highlighted the constraints inherent in both qualitative and quantitative methods for examining organizational phenomena. The emergence of large textual datasets, such as those from Glassdoor, coupled with enhanced computational capabilities, has made text mining an additional analytical approach, albeit with its shortcomings. In this paper, we propose topic modeling as a novel and supplementary research method to explore a significant organizational issue: employee satisfaction under various corporate ownership structures.

We find that the type of corporate ownership is strongly related to employee satisfaction, with VC-backing being the most significant effect. Employee satisfaction is abnormally high in the presence of a VC and decreases when the VC exits. VC-backed employees more frequently associate their work environment with supportive culture, growth, and human resource policies, but they complain more about their compensation and the challenging work environment. When the VC exits, the topics mentioned in the reviews, as well as the satisfaction scores, become closer to those of similar companies, but most of the initial differences persist, indicating that the positive influence of the VC on the company is long-lasting.

These findings carry practical implications for how private market participants think about the organizational effects of VC backing. The evidence suggests that the employee experience associated with VC-backed firms is not only characterized by higher satisfaction, but also by a specific combination of strengths and tensions. Supportive culture, growth environment, and HR practices appear as central dimensions of the positive employee experience under VC backing. These dimensions may constitute organizational assets that matter for retention, integration, and long-term firm development.

At the same time, the results also point to potential pressure points. VC-backed employees report more concerns about the challenging work environment. This suggests that maintaining employee satisfaction in high-growth private firms requires more than preserving culture and HR practices. It also requires managing the pressures that may accompany rapid scaling.

The decline in satisfaction after VC exit also suggests that ownership transitions matter for employees. Scores and review topics move closer to those of comparable firms after exit, but several differences persist. This implies that post-exit owners and investors should pay attention to the organizational features that remain associated with the VC-backed period, rather than evaluating the transaction only through financial or strategic outcomes. In particular, preserving supportive culture and HR practices may help maintain part of the organizational environment developed during the VC-backed period.

More broadly, the results show that employee satisfaction scores are more informative when combined with textual evidence. Scores indicate whether employees are more or less satisfied, while review topics help identify which aspects of the organization are associated with that difference. This is useful for investors and entrepreneurs seeking to understand how ownership structure relates to employee perceptions inside private firms.

Chapter 4

Venture Capital Backing and ESG Disclosure in Private Firms

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Abstract. Given the opacity of private markets, voluntary ESG disclosure constitutes one of the few observable nonfinancial signals available to external stakeholders. This paper examines whether VC backing is associated with voluntary ESG disclosure among private firms and whether the observed pattern reflects gradual disclosure development or strategic pre-transaction adjustments. Using archived homepage content for over 36,000 U.S. private firms from 2013 to 2023, we construct a dictionary-based ESG disclosure measure validated against third-party ESG ratings and B Corp certification. Within VC-backed firms, disclosure increases gradually across financing rounds, reaching approximately 17% above pre-VC levels in late stages. Event-time analyses show stable pre-event disclosure among VC-backed firms, contrasting with significant pre-IPO increases among non-VC-backed firms in the year before going public, while neither group adjusts disclosure before acquisitions. Overall, these results are consistent with progressive disclosure development under VC backing rather than strategic pre-exit adjustment.

Keywords: Venture capital, ESG disclosure, voluntary disclosure, private firms, IPO, mergers & acquisitions, information asymmetry.

4.1 Introduction

Stakeholder theory views the firm as embedded in relationships with multiple stakeholders whose interests extend beyond those of shareholders alone (Freeman, 1984). From this perspective, ESG-related information matters because it enables external stakeholders to assess how firms address non-financial dimensions that may be relevant for corporate value. Yet much of this information remains voluntary and is therefore shaped by firms' reporting and communication choices (Christensen et al., 2021). Voluntary disclosure theory suggests that the possibility of adverse inferences from non-disclosure may give firms incentives to reveal private information to outside audiences (Grossman and Hart, 1980; Milgrom, 1981). However, disclosure is not automatic, as disclosure costs, proprietary concerns, and uncertainty about managers' information sets can prevent full revelation

(Verrecchia, 1983; Dye, 1985). Applied to ESG, this implies that voluntary disclosure may reduce uncertainty about firms' ESG-related practices, while remaining a discretionary communication choice shaped by costs and strategic incentives.

Unlike traditional financial disclosure, ESG reporting is multidimensional, less standardized, and difficult to compare across firms (Christensen et al., 2021). Voluntary ESG disclosure may therefore inform outsiders about underlying practices, but it may also be used selectively or symbolically to shape external perceptions under reputational or legitimacy pressures (Cho and Patten, 2007; Cho et al., 2010). This tension is particularly salient in private markets, where firms are not subject to public reporting requirements (Asker et al., 2015) and reliable firm-level ESG data remain scarce despite growing investor and regulatory demand.[1] Voluntary ESG disclosure therefore provides one of the few observable sources of ESG-related information in this setting, while also potentially serving strategic purposes related to capital access and investor perceptions.

Consequently, if voluntary ESG disclosure is shaped by firm incentives, ownership structures may matter because they affect managerial incentives and monitoring intensity (Jensen and Meckling, 1976). In this context, venture capitalists (VCs) constitute a natural setting for studying the voluntary ESG disclosure of private firms. Widely viewed as value-adding intermediaries, VCs professionalize young firms by strengthening governance (Hellmann and Puri, 2002), enhancing firm productivity (Croce et al., 2013), and implementing monitoring mechanisms aimed at maximizing firm value (Lerner, 1995; Sahlman, 1990). Given that VC involvement broadly reshapes firm operations and governance, it may also influence how portfolio companies disclose ESG-related information to external stakeholders. This paper examines the association between VC backing and private firms' voluntary ESG disclosure, focusing on how disclosure evolves over the VC financing cycle. Specifically, we ask whether the disclosure pattern that emerges under VC backing reflects gradual disclosure development or is concentrated around ownership transactions as firms approach exit.

These questions are particularly relevant given that recent literature has begun to examine how private capital investors are associated with firms' ESG outcomes, albeit with mixed conclusions. Drobetz et al. (2024) show that PE- and VC-backed SMEs exhibit stronger ESG performance, particularly when firms face a higher risk of failure. By contrast, Alakent et al. (2020) find that VC-backed firms display lower ESG performance than non-VC-backed firms prior to IPO, while Cheng et al. (2022) report that ESG performance remains lower during the VC investment period and improves only after VC exit. However, this literature examines ESG outcomes rather than the distinct but related question of voluntary ESG disclosure, reflecting a deliberate communication choice with distinct incentives. Our paper addresses this gap by examining whether and how VC backing shapes this choice among private firms.

Prior studies show that ESG disclosure can reduce information asymmetry, enhance price informativeness, and strengthen firm reputation (Axjonow et al., 2018; Pham and

[1] https://www.ft.com/content/41125a1b-f12e-4f4f-b8e1-c11ca1fce952

Tran, 2020; Grewal et al., 2021; Zhang et al., 2021). At the same time, external pressure and scrutiny may induce more selective disclosure (Marquis et al., 2016; Long et al., 2025). Disclosure incentives also appear to respond to financing conditions, salient risks, and the broader legal-regulatory environment (Dhaliwal et al., 2011; Harjoto and Jo, 2015; Wang and Li, 2016; Huang et al., 2022; Frankel et al., 2025). Taken together, these findings suggest that ESG disclosure is a strategic choice with meaningful implications for how firms are perceived and financed.

Yet most evidence on ESG disclosure comes from public firm settings. Only recently have a few studies begun to investigate disclosure behavior among private firms. Baik et al. (2025) show that public reporting requirements increase private firms' probability of receiving private equity financing, while Boulland et al. (2026) find that website-based disclosure can facilitate private equity transactions. Still, evidence on ESG disclosure among private firms remains limited and mostly focused on the IPO stage, where ESG disclosure has been associated with lower information asymmetry and lower market risk (Fenili and Raimondo, 2021; Reber et al., 2022). Evidence on voluntary ESG disclosure among private firms outside this narrow window remains largely underexplored.

Our empirical setting draws on ownership data and historical website archives to observe voluntary ESG disclosure among U.S. private firms from 2013 to 2023. We combine PitchBook and Capital IQ data to identify 7,303 VC-backed firms and 29,495 non-VC-backed private firms and we recover archived homepage content from the Wayback Machine. Following Abraham et al. (2024), we use a dictionary-based approach to quantify firm-level ESG disclosure from homepage text, the primary channel for external stakeholders (Axjonow et al., 2018). We then validate our ESG disclosure measure by showing that it is positively related to ESG scores from Refinitiv and S&P Capital IQ Pro for listed firms, predicts B Corp certification among private firms, and increases significantly around major ownership transactions, particularly IPOs.

Yet, some caveats apply to our setting. As with other commercial VC databases, PitchBook provides broad but incomplete coverage of VC investments (Kaplan and Lerner, 2016), which may skew our sample toward more established VC-backed firms. Similarly, Wayback Machine archival coverage is uneven across firms, as more prominent domains tend to be crawled more frequently than others (Boulland et al., 2026), which may result in less complete coverage for smaller or younger private firms in our sample. We therefore interpret our results as reflecting associations between VC backing and ESG disclosure rather than causal effects.

Our empirical analysis yields two main findings. First, within VC-backed firms, ESG disclosure increases primarily in later financing stages rather than immediately after VC entry. Compared with their average pre-VC disclosure level, late-stage VC-backed firms exhibit approximately 17% higher disclosure, driven mainly by Environmental and Social components. Relative to other private firms, VC-backed firms start from lower disclosure levels, narrow the gap over successive financing rounds, and surpass non-VC-backed firms only in the latest rounds. The main pattern is therefore not an immediate jump in disclosure at VC entry, but a staged increase as firms move through the financing cycle, which could reflect either gradual disclosure build-up or strategic disclosure ahead of exit.

Second, we analyze disclosure behavior around ownership transactions to distinguish between the two interpretations above. Ownership transactions, and IPOs in particular, serve not as our primary object of study but as a way to make this distinction, as strategic disclosure should produce a run-up before exit, whereas gradual development should yield stable pre-event disclosure. Consistent with the latter, VC-backed firms maintain relatively stable disclosure in the pre-event year, showing no evidence of a disclosure adjustment before ownership transitions. By contrast, non-VC-backed firms exhibit a significant increase in disclosure before IPOs. In the year before going public, they increase disclosure levels by about 39%, and they also exhibit larger disclosure changes and higher disclosure initiation rates. VC-backed firms show no comparable pre-IPO adjustments, while acquisition-related effects are generally insignificant.

Taken together, these findings suggest that ESG disclosure under VC backing builds gradually over the investment cycle rather than increasing opportunistically just before exit. This pattern is in line with the view that VC ownership is associated with progressive firm professionalization, whereas non-VC-backed firms adjust disclosure before public market entry, consistent with more transaction-driven incentives.

This paper provides three contributions. First, we contribute to the venture capital literature by showing that ESG disclosure under VC backing develops progressively over the investment cycle rather than through strategic disclosure adjustments around ownership transitions. While prior studies show that VCs shape governance, monitoring, and firm operations (Hellmann and Puri, 2002; Bottazzi et al., 2008; Chemmanur et al., 2011), our findings suggest that VC involvement is also associated with how private firms develop their ESG disclosure over time. More broadly, our evidence may help interpret the mixed findings in the emerging literature on VC backing and ESG outcomes (Alakent et al., 2020; Cheng et al., 2022; Drobetz et al., 2024) by highlighting the importance of financing-stage heterogeneity.

Second, we contribute to the literature on voluntary ESG disclosure by bringing new evidence from private markets, where firm-level ESG information remains especially limited. While prior studies focus mainly on public firms or on disclosure around IPOs (Fenili and Raimondo, 2021; Reber et al., 2022; Grewal et al., 2021), we show that disclosure behavior differs across ownership contexts, as non-VC-backed firms exhibit substantial pre-IPO disclosure increases, whereas VC-backed firms do not. This contrast suggests that disclosure in private markets may arise either through progressive development or through more transaction-related adjustments, depending on firms' financing environment.

Third, we contribute to the emerging literature on website-based disclosure measurement (Abraham et al., 2024; Boulland et al., 2026) by constructing and validating a firm-level measure of voluntary ESG disclosure from archived website content. This approach offers a scalable way to study disclosure behavior in private markets, where conventional firm-level ESG data remain limited.

The remainder of the paper proceeds as follows. Section II develops the theoretical framework and derives the hypotheses. Section III describes the data and validates the ESG disclosure measure. Section IV examines ESG disclosure within and across VC-backed and non-VC-backed firms. Section V investigates whether disclosure behavior around ownership transactions is consistent with gradual disclosure development or strategic pre-transaction adjustment. Finally, Section VI concludes the paper.

4.2 Theoretical Framework and Hypotheses

4.2.1 Voluntary ESG disclosure in private markets

Voluntary disclosure theory offers a framework for analyzing why firms communicate information to outside parties. When information is verifiable, non-disclosure leads outside parties to draw adverse inferences, generating equilibrium pressure for firms with favorable information to reveal it (Grossman and Hart, 1980; Milgrom, 1981). This unraveling logic applies to ESG disclosure, though ESG communication may also respond to reputational and legitimacy concerns rather than only to underlying ESG practices.

Prior work on sustainability disclosure shows that the relation between underlying sustainability performance and observed disclosure is theoretically ambiguous. Voluntary disclosure arguments predict that better performers disclose more to separate themselves from weaker performers, whereas legitimacy-based arguments suggest that firms may also disclose more when they face pressure to manage external perceptions (Clarkson et al., 2008; Hummel and Schlick, 2016). ESG disclosure therefore cannot be interpreted as a direct mapping from underlying practices to observed communication.

Beyond legitimacy motives, several additional frictions can prevent firms from fully revealing their information. Verrecchia (1983) shows that disclosure costs and proprietary concerns can prevent full revelation, while Dye (1985) shows that incomplete disclosure can arise when outsiders are uncertain about whether managers are informed. These frictions are especially relevant to ESG disclosure because ESG-related information is multidimensional and less standardized, complicating comparisons across firms (Christensen et al., 2021). As a result, disclosure may remain selective, partial, or strategic, even when firms possess ESG-related information internally.

Private markets provide a setting in which these frictions are likely to be particularly salient, as private firms are generally subject to weaker public disclosure requirements and face lower incentives to disclose information publicly (Asker et al., 2015; Minnis and Shroff, 2017). Yet this does not mean that private firms have no reason to communicate information externally. Legitimacy, broadly defined as the perception that a firm's actions are appropriate within a given system of social norms (Suchman, 1995), operates as a resource that conditions access to capital, talent, and commercial relationships (Zimmerman and Zeitz, 2002). Young ventures in particular face a liability of newness and often lack the cognitive and sociopolitical legitimacy needed to attract external support (Aldrich and Fiol, 1994). Voluntary ESG disclosure can thus serve as a legitimacy-building tool for private firms seeking to signal alignment with stakeholder expectations and differentiate themselves from otherwise opaque firms.

4.2.2 VC backing and staged disclosure development

Voluntary ESG disclosure is a discretionary communication choice, and ownership structure may shape this choice by affecting monitoring mechanisms and managerial incentives (Jensen and Meckling, 1976). VC backing is a particularly relevant setting for examining this channel. VCs are active investors who combine financing with monitoring, contractual rights, board involvement, and staged investment. These features allow them to address incentive problems and information asymmetries that are especially relevant in entrepreneurial firms (Sahlman, 1990; Lerner, 1995; Gompers, 1995; Kaplan and Strömberg, 2003). Consequently, beyond their financial intermediary role, VCs are known to professionalize young and innovative firms (Hellmann and Puri, 2002).

Through this professionalization process, VC backing supports firm growth (Davila et al., 2003), improves efficiency and productivity (Chemmanur et al., 2011; Croce et al., 2013), and strengthens internal governance (Hellmann and Puri, 2002). Importantly, these outcomes do not materialize uniformly at VC entry, as VC board involvement itself evolves structurally across the financing cycle (Ewens and Malenko, 2025). Consistent with this gradual implication, Chemmanur et al. (2011) and Davila et al. (2003) show that VC-related outcomes evolve over the financing process, suggesting that the professionalization process is dynamic and responsive to the firm's development stage rather than immediate and uniform from the outset.

Consistent with this staged view, each successive financing round requires VCs to renegotiate contracts and conduct detailed evaluations of the firm's management, products, and competitive environment (Tian, 2011). Early financing rounds therefore occur when portfolio companies are still primarily focused on product development, market validation, and survival, and when their incentives to communicate ESG-related information publicly remain limited. However, as firms move through successive rounds, they may begin to prepare for larger financing events or ownership transitions, periods in which VC board oversight becomes particularly salient (Lerner, 1995). These later-round developments can thus increase the value of disclosing ESG-related information to external audiences.

Under this mechanism, VC backing should not necessarily lead to an immediate increase in ESG disclosure at entry. Early rounds occur when portfolio companies are still developing their product, market position, and organizational structure, so public ESG communication may remain secondary. As the financing cycle progresses, however, repeated investor evaluations, stronger VC oversight, and preparation for larger financing events or ownership transitions increase the relevance of external communication. The prediction is therefore not simply that VC-backed firms disclose more than other private firms on average. Rather, VC-backed firms should increase their voluntary ESG disclosure progressively across successive rounds, with stronger disclosure in later financing stages than immediately after VC entry.

Hypothesis H1. VC backing is associated with a progressive increase in voluntary ESG disclosure over the financing cycle, with stronger disclosure in later financing stages than immediately after VC entry.

4.2.3 Gradual disclosure development versus strategic pre-transaction adjustment

Hypothesis H1 predicts that voluntary ESG disclosure increases progressively over the VC financing cycle. This pattern, however, does not by itself identify the mechanism behind the timing of this increase. A later-stage disclosure premium may reflect gradual disclosure development, but it may also reflect strategic pre-transaction adjustment as firms approach IPOs or acquisitions.

Under the gradual disclosure development interpretation, ESG disclosure increases as VC-backed firms become more visible, more frequently exposed to outside investors, and more likely to communicate firm-level information externally over time. Disclosure evolves as part of the broader trajectory through which portfolio companies become more structured and more externally oriented, rather than as a discrete response to an impending transaction. Under this interpretation, disclosure should not display a sharp increase immediately before an IPO or acquisition.

The second mechanism is strategic pre-transaction adjustment. Around ownership transactions, the benefits of disclosure may increase because prospective investors or acquirers evaluate the firm under heightened uncertainty. This follows from the disclosure frictions discussed above: when disclosure is costly, or when outsiders are uncertain about managers' information sets, full revelation may not occur (Verrecchia, 1983; Dye, 1985). Ownership transactions can therefore create a moment in which reducing uncertainty through voluntary disclosure becomes more valuable.

This logic is especially relevant before IPOs, when firms transition from private financing to public equity markets and face broader investor scrutiny. IPO disclosure can reduce information frictions between issuers and investors, including for ESG-related information (Fenili and Raimondo, 2021; Reber et al., 2022). In the VC setting, prior evidence suggests that VC backing is associated with stronger disclosure controls and procedures among newly public firms, consistent with the idea that VC investors can shape firms' disclosure environment around the transition to public markets (Cumming et al., 2023). More broadly, Dhaliwal et al. (2011) show that firms with a higher cost of equity capital are more likely to initiate voluntary CSR reporting, and that initiating firms with superior CSR performance subsequently experience a reduction in the cost of equity capital.

Acquisitions may create similar incentives, as ESG-related characteristics can matter for merger performance and acquisition premiums (Deng et al., 2013; Gigante et al., 2025). However, this disclosure channel may be less public than in IPOs because disclosure of private-target acquisitions is often limited, unless required (Mason and Stegemoller, 2022).

These arguments imply two distinct pre-transaction disclosure patterns. If ESG disclosure reflects gradual disclosure development, it should increase over the VC financing cycle without displaying a discrete run-up immediately before ownership transactions. By contrast, if ESG disclosure is primarily strategic, it should be concentrated in the pre-transaction period, especially before IPOs, when external scrutiny and valuation concerns are most salient.

Hypothesis H2a. If ESG disclosure reflects gradual disclosure development, VC-backed firms should not exhibit a discrete increase in disclosure immediately before ownership transactions.

Hypothesis H2b. If ESG disclosure is primarily used as a strategic signal around ownership transactions, VC-backed firms should increase ESG disclosure in the period immediately preceding these transactions, particularly before IPOs.

Together, these hypotheses structure the empirical analysis of Sections IV and V around two timing patterns. Hypothesis H1 examines whether VC-backed firms progressively increase their voluntary ESG disclosure over the financing cycle, with stronger disclosure in later financing stages than immediately after VC entry. Hypotheses H2a and H2b distinguish this gradual development pattern from strategic pre-transaction adjustment by testing whether disclosure exhibits a discrete increase before IPOs and acquisitions.

4.3 Data and Descriptive Statistics

4.3.1 Data sources and sample construction

Our U.S. private firm sample combines PitchBook and Capital IQ data over 2014–2024. From PitchBook (accessed via WRDS), we collect U.S. firms that received VC financing during our sample period. The data include the timing of VC investments (investment round and date)[2] and VC exit information (exit date and type). The VC-backed sample thus includes firms with a recorded exit and firms that remain private with VC backing by the end of the sample period. To construct the control sample, we use Capital IQ to collect U.S. private firms over the same period. Within the Capital IQ sample, we separate firms based on whether they experience a major ownership transaction during the sample period, defined as an IPO or a majority-stake acquisition of the private firm.[3] Table 4.1 displays the baseline sample, which consists of 7,473 VC-backed firms (Panel A) and 86,876 private firms (Panel B). To avoid overlap, we exclude from Panel B all firms identified as VC-backed in Panel A.

To measure voluntary ESG disclosure, we rely on historical firm website content retrieved from the Wayback Machine Application Programming Interface (API). This approach is consistent with recent evidence that website archives provide scalable and informative disclosure measures. In particular, Boulland et al. (2026) develop a website-based disclosure measure using historical firm webpages. They demonstrate that their website-disclosure measure is positively correlated with alternative disclosure measures

[2]Because our sample begins in 2014, some firms may already be VC-backed at the start of the sample period, such that the first financing round observed in our data may not be the firm's initial VC investment.

[3]Hereafter, we use ownership transaction as shorthand for major ownership transaction, and acquisition as shorthand for majority-stake acquisition.

Table 4.1: Sample Construction.

Panel A: VC Backed	Number of Firms				
	All	No Ownership Change	Acquisition	IPO	Out of Business
Baseline	7,473	5,161	1,445	539	328
Excluded: No website retrieved	7,411	5,109	1,441	535	326
Excluded: Invalid firm–website	7,390	5,092	1,438	535	325
Excluded: No Wayback snapshots	7,303	5,027	1,427	529	320
Working Sample:					
Firm x Year VC Backed	53,148	35,386	11,348	4,263	2,151

Panel B: No VC Backed	Number of Firms				
	All	No Ownership Change	Acquisition	IPO	Out of Business
Baseline	86,876	23,442	61,083	2,086	265
Excluded: VC-backed firms	84,733	22,792	60,043	1,646	252
Excluded: No website retrieved	63,927	13,071	49,298	1,361	197
Excluded: Invalid firm–website	38,201	13,005	23,749	1,257	190
Excluded: No Wayback snapshots	29,495	10,762	17,629	954	150
Working Sample:					
Firm x Year No VC Backed	236,498	88,797	139,619	6,810	1,272

Notes: Table 4.1 reports the construction of the VC-backed and non-VC-backed private firm samples. Firms are classified into four groups: No Ownership Change (no recorded transaction over the period, with VC-backed firms retaining their VC backing through the end of the sample), Acquisition, IPO, and Out of Business (bankruptcy or write-off). Panel A covers VC-backed firms retrieved from PitchBook (via WRDS) over 2014–2024. Panel B covers non-VC-backed U.S. private firms retrieved from Capital IQ over the same period. Firms identified as VC-backed in Panel A are excluded from Panel B to avoid overlap. In both panels, three sequential filters are then applied. First, firms with missing website identifiers are excluded. Second, a firm–website consistency check removes observations where the retrieved URL is unrelated to the firm name or corresponds to a third-party domain. Third, firms for which no archived snapshot could be retrieved from the Wayback Machine are excluded. The Working Sample rows report the number of firm-year observations generated from annual Wayback Machine snapshots for each firm with at least one usable archive, retaining the most recent snapshot within each calendar year. The firm-year panel is unbalanced, reflecting both incomplete Wayback coverage across firm-years and left-truncation at the founding year for firms founded after 2013.

(e.g., management forecasts and voluntary 8-Ks) and negatively correlated with investor information asymmetry. Similarly, Abraham et al. (2024) build a dictionary-based measure of voluntary ESG disclosure from historical websites for a global sample of private equity firms and show that PE firms' disclosure is associated with investor demand for ESG information. In addition to disclosure measurement, web archives have been used in other areas of finance to construct historical firm-level measures (Axjonow et al., 2018; Fuster et al., 2019; Antill, 2024; Dessaint et al., 2024; Momtaz and Parra, 2025). Consequently, to implement this website-based approach, we require website identifiers from PitchBook and Capital IQ for our sample of private firms.

After removing firms with missing website identifiers, we apply a firm–website consistency check to ensure that the recorded URL corresponds to the sampled company. We identify cases where the website appears unrelated to the firm name (including generic third-party domains) and exclude those observations from the analysis sample. As shown in Table 4.1, this filter has a limited effect across most groups but a larger impact on acquisition observations in Capital IQ.[4]

Using the validated firm website URLs, we query the Wayback Machine, which periodically crawls and archives websites, to construct a firm-year website snapshot dataset. To examine whether website-based disclosure changes in the year preceding an ownership transaction, the annual snapshot window of this study spans 2013—2023, with left truncation at the founding year for firms founded after 2013. For each firm-year with available archives, we retain the most recent snapshot within the calendar year (closest to year-end), following Abraham et al. (2024), thereby providing a standardized annual disclosure timestamp across firms. Appendices C1 and C2 provide interface-based illustrations of the Wayback retrieval process.

Our final working sample includes 7,303 VC-backed firms and 29,495 non-VC-backed private firms with at least one usable annual snapshot. The final rows of both panels of Table 4.1 report the corresponding number of firm-year observations constructed from these annual snapshots, which constitute the baseline dataset for our descriptive and regression analyses.[5] For firms experiencing an ownership transaction (IPO or acquisition), this procedure yields firm-year observations in both pre- and post-event years, conditional on archive availability. We define the event year as the calendar year in which the IPO or acquisition occurs. Firm-years prior to the event year are labeled "pre-event", while the event year[6] and subsequent firm-years are labeled "post-event". Firms that do not experience an IPO or an acquisition during our sample period constitute the "no-event" sample.

4.3.2 Voluntary ESG disclosure measure

We construct a dictionary-based measure of voluntary ESG disclosure from archived firm websites, following the website-based ESG disclosure approach in Abraham et al. (2024). Consistent with Axjonow et al. (2018), we focus on homepage content as homepages serve as the primary communication channel for external stakeholders and are more consistently archived than subpages. For each firm-year snapshot, we preprocess homepage text by converting characters to lowercase, removing punctuation and non-letter characters, tokenizing into words, and filtering out standard English stopwords. We also exclude country names to reduce geographic mentions that may inflate keyword counts without reflecting disclosure content.

We then classify words using predefined ESG dictionaries (E, S, and G). For each firm-year, we compute total word counts and category-specific ESG word counts. We build the dictionaries from two reference glossaries. Specifically, the Cambridge Institute for

[4] In Capital IQ transaction screens, we often observe that the recorded website corresponds to the acquirer after the deal rather than to the original target firm. By contrast, this pattern is much less observed in PitchBook.

[5] The firm-year panel is unbalanced: the number of observations is lower than the number of firms $\times$ 11 (maximum annual snapshots per firm) because Wayback coverage is incomplete across firm-years, and firms founded after 2013 enter only from their founding year onward.

[6] As we retain the most recent Wayback snapshot within each calendar year (typically captured close to year-end), the snapshot for the event may reflect disclosures after the ownership transaction.

Sustainability Leadership sustainability glossary[7] and the UNDP SDG Impact Standards glossary.[8] These sources provide a structured set of ESG-related terms which serve as a starting point for dictionary construction. We refine the initial term list by excluding generic terms that may capture unrelated content rather than ESG disclosure (e.g., "social" in social media contexts, "community" in community forums, "environment" in software development environments) and industry-specific jargon that would mechanically inflate counts without reflecting disclosure intent (e.g., "waste" in waste management industries, "energy" in utilities). The final dictionaries contain 31 Environmental, 20 Social, and 16 Governance terms (reported in Table C1).

Following Abraham et al. (2024), our main measure is the ESG ratio, defined as the total number of ESG words (E+S+G) per 10,000 words of homepage text. This measure provides a standardized disclosure metric for private firms by scaling ESG-related word counts by the total number of words in the homepage text. However, because the distribution is right-skewed and includes many firm-year observations with zero ESG disclosure,[9] we apply a log transformation, which helps address skewness and limits the influence of extreme observations. Our baseline disclosure measure is therefore the natural-log transformed ESG ratio, defined in Equation 4.1.

$$\ln(1 + \text{ESG}) = \ln\left(1 + \frac{\#\text{ESG words}}{\#\text{Total words}} \times 10{,}000\right). \tag{4.1}$$

We next evaluate whether the ESG dictionary captures genuine ESG disclosure rather than mechanical word usage and whether the resulting measure aligns with third-party ESG ratings.

Motivated by Drempetic et al. (2020), who document that ESG disclosure is positively correlated with ESG ratings, we first validate our website-based ESG disclosure measure using out-of-sample U.S. listed firms. As described in Section 4.3.1, we collect annual homepage snapshots from the Wayback Machine for U.S. publicly listed firms and retain the most recent snapshot within the calendar year to compute the disclosure ratio. Using these out-of-sample observations, we examine whether the website-based ESG disclosure is associated with ESG ratings from two independent providers in Table 4.2 (Refinitiv in Panel A and S&P Capital IQ Pro in Panel B). We estimate both aggregate and pillar-level specifications under two fixed-effects structures (industry and year fixed effects, and industry-by-year fixed effects).

The coefficients are consistently positive and statistically significant across both providers and all specifications. In aggregate models (specifications (1) and (2)), a one-standard-deviation increase in website-based ESG disclosure corresponds to a 0.19–0.25 standard-deviation increase in ESG scores. Pillar-level estimates exhibit the same pattern, with stronger associations for Environmental (0.30–0.38) and Social (0.28–0.30) than for Governance (0.08–0.09). This first validation test suggests that our website-based ESG disclosure

[7]https://www.cisl.cam.ac.uk/news-and-resources/sustainability-glossary
[8]https://sdgprivatefinance.undp.org/sites/default/files/resource-documents/2024121
[9]65% of firm-year observations in the pre-event and no-event samples have zero ESG disclosure.

Table 4.2: Website-Based ESG Disclosure and Third-Party ESG Ratings.

Panel A - Refinitiv ESG Score								
	ESG Score		Environmental Score		Social Score		Governance Score	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Ln (1+ESG)	0.254***	0.253***						
	(29.00)	(28.90)						
Ln (1+E)			0.382***	0.383***				
			(43.38)	(43.23)				
Ln (1+S)					0.300***	0.299***		
					(36.57)	(36.35)		
Ln (1+G)							0.082***	0.081***
							(9.26)	(9.14)
Year-F.E	Yes	No	Yes	No	Yes	No	Yes	No
Indus-F.E	Yes	No	Yes	No	Yes	No	Yes	No
YearxIndus-F.E	No	Yes	No	Yes	No	Yes	No	Yes
Number of Obs.	13,386	13,386	13,386	13,386	13,386	13,386	13,386	13,386
Adjusted r-sq	0.108	0.112	0.187	0.190	0.138	0.141	0.052	0.057

Panel B - S&P Capital IQ Pro ESG Score								
	ESG Score		Environmental Score		Social Score		Governance Score	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Ln (1+ESG)	0.194***	0.194***						
	(21.22)	(21.12)						
Ln (1+E)			0.305***	0.304***				
			(31.51)	(31.33)				
Ln (1+S)					0.282***	0.283***		
					(32.72)	(32.81)		
Ln (1+G)							0.092***	0.090***
							(10.22)	(10.03)
Year-F.E	Yes	No	Yes	No	Yes	No	Yes	No
Indus-F.E	Yes	No	Yes	No	Yes	No	Yes	No
YearxIndus-F.E	No	Yes	No	Yes	No	Yes	No	Yes
Number of Obs.	12,180	12,180	12,180	12,180	12,180	12,180	12,180	12,180
Adjusted r-sq	0.121	0.121	0.145	0.146	0.161	0.164	0.111	0.114

Notes: Table 4.2 assesses our website-based ESG disclosure measure with out-of-sample U.S. listed firms by relating disclosure ratios to third-party ESG ratings. Panel A reports results using Refinitiv ratings and Panel B uses S&P Capital IQ Pro ratings. We estimate aggregate and pillar-level specifications for Environmental, Social, and Governance using industry and year fixed effects, and alternatively industry-by-year fixed effects. All reported coefficients are standardized beta coefficients. * stands for significant at 10%, ** significant at 5%, and *** significant at 1% level.

measure aligns with third-party ESG ratings, providing initial support for its relevance.

As a second validation test, we evaluate our ESG disclosure measure in a private-firm setting by examining whether website-based ESG disclosure is associated with the probability of B Corp certification.[10] In Table 4.3, we focus on private firm-year observations that are not yet affected by an ownership transaction event (excluding post-event firm-year observations). Consistent with Gehman et al. (2019), who state that B Corp certification provides a credible label by defining and verifying social and environmental practices, we expect our website-based ESG disclosure measure to be positively associated with the likelihood of B Corp certification.

We estimate Probit models in which the dependent variable equals one if the firm is cer-

[10]B Corp certification is a third-party label awarded by B Lab to firms meeting minimum standards of social and environmental performance, accountability, and transparency.

Table 4.3: Website-Based ESG Disclosure and Likelihood of B Corp Certification.

	Pr (B Corp Certified)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Ln (1+ESG)	4.696***	4.493***						
	(10.63)	(10.70)						
Ln (1+E)			4.471***	4.218***				
			(12.05)	(12.19)				
Ln (1+S)					2.818***	2.732***		
					(7.62)	(7.68)		
Ln (1+G)							1.779***	1.720***
							(4.49)	(4.52)
Year-F.E	Yes	No	Yes	No	Yes	No	Yes	No
Indus-F.E	Yes	No	Yes	No	Yes	No	Yes	No
YearxIndus-F.E	No	Yes	No	Yes	No	Yes	No	Yes
Number of Obs.	173,022	153,935	173,022	153,935	173,022	153,935	173,022	153,935
Pseudo r-sq	0.101	0.099	0.105	0.103	0.087	0.084	0.079	0.076

Notes: Table 4.3 examines the relationship between our website-based ESG disclosure measure and the likelihood of being B Corp certified using the private firm sample. The analysis excludes post-event private firm-year observations and VC-backed firms. As in Table 4.2, specifications include industry and year fixed effects, and alternatively industry-by-year fixed effects. * stands for significant at 10%, ** significant at 5%, and *** significant at 1% level.

tified in year t and use similar fixed-effects specifications as in Table 4.2. Consistent with Table 4.2, coefficients are consistently positive and significant across all specifications, indicating that higher website-based ESG disclosure is associated with a higher likelihood of B Corp certification. The association is strongest for the aggregate ESG measure and the Environmental component, and remains positive for the Social and Governance components. Overall, these results provide additional support for the validity of our website-based ESG disclosure measure in a private-firm setting.

As a final validation test, we examine whether the website-based ESG disclosure by private firms increases following ownership transactions, particularly in the context of IPOs. As discussed by Goergen et al. (2019), listed firms are more likely than non-listed firms to provide non-financial disclosure. Accordingly, if our website-based ESG disclosure measure captures meaningful disclosure behavior, we expect disclosure to increase in the post-transaction period, with the most pronounced increase for IPO events. We estimate event-time regressions of the ESG disclosure ratio on event-time dummies (from $t-3$ to $t+3$, with $t-1$ omitted), controlling for firm age, high-growth status, year fixed effects, and firm fixed effects. Figure 4.1 displays the estimated event-time coefficients and confidence intervals for IPO and acquisition transactions.

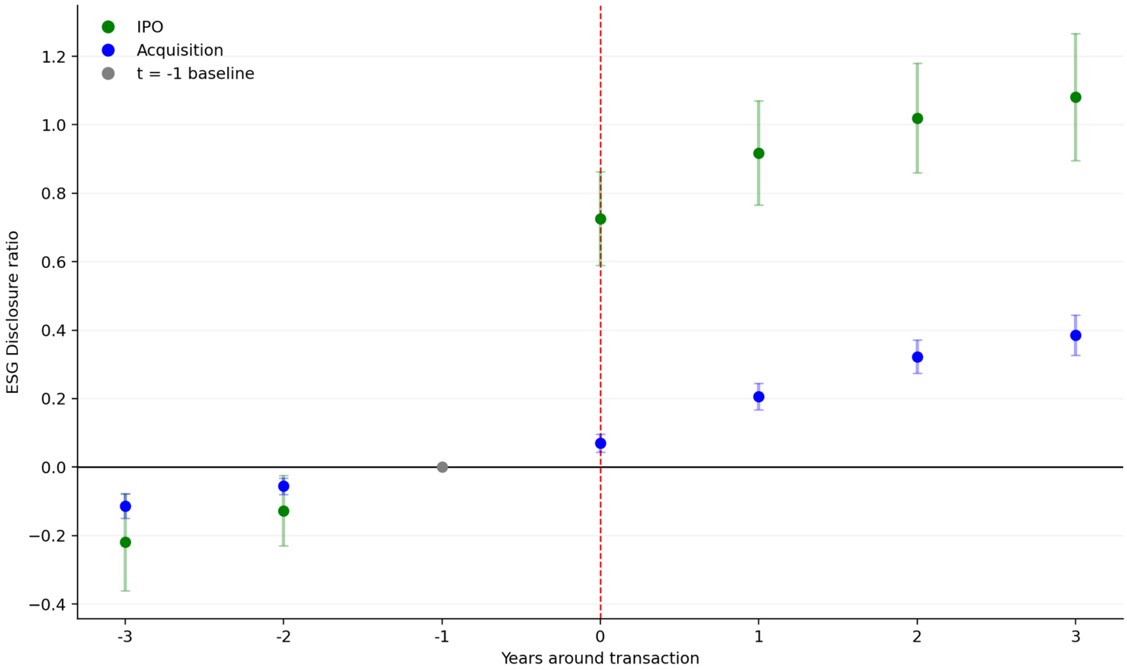

Figure 4.1: ESG Disclosure Around IPOs and Acquisitions.

Notes: Figure 4.1 plots event-time estimates of the ESG disclosure ratio ($\ln(1 + \text{ESG Ratio})$) around major ownership transactions among private firms (VC-backed and non-VC-Backed private firms experiencing an IPO or an acquisition). Points report coefficients for years $t-3$ to $t+3$ relative to $t-1$ (omitted), separately for IPOs and acquisitions, and vertical bars denote confidence intervals. Regressions include firm fixed effects, year fixed effects, and controls for firm age and high-growth status.

Relative to the omitted year $t-1$, the ESG disclosure coefficients are negative in the pre-transaction years, increase sharply in the transaction year $t = 0$, and remain positive in the post-transaction period. This pattern is observed for both IPOs and acquisitions. The post-transaction increase is more pronounced for IPOs than for acquisitions, consistent with stronger disclosure incentives in initial public offerings. These dynamics suggest that the measure captures transaction-related changes in disclosure rather than time-invariant website characteristics.

Taken together, the results of our three validity tests support the interpretation that our dictionary-based metric is a credible proxy for voluntary ESG disclosure and is therefore well-suited to examine the influence of VC backing on private firms' ESG disclosure.

4.3.3 Descriptive statistics

Having validated the ESG disclosure measure, we now document its evolution and descriptive statistics in private firms.

We begin with the evolution of ESG disclosure in private firms that have no VC backing and do not experience any ownership transactions during the sample period. We focus on these no-event private firms to isolate baseline disclosure behavior from periods where disclosure incentives may be mechanically affected by transaction preparation or post-transaction communication policies.

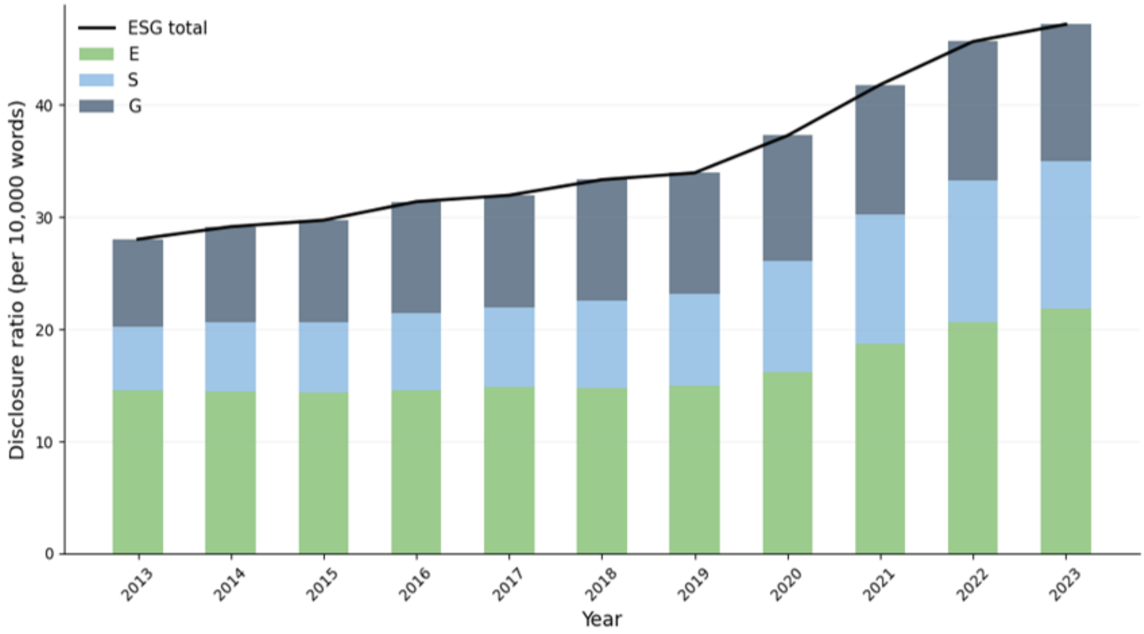

Figure 4.2: ESG Disclosure Evolution (Private Firms).

Notes: Figure 4.2 plots annual averages of the ESG disclosure ratio constructed from archived homepages for the non-VC-backed private firms that do not experience any major ownership change (no event private firm sample) during the observation window. Bars report the pillar-level components (E, S, and G), while the line reports the aggregate ESG ratio.

Figure 4.2 displays the evolution of the website-based ESG disclosure ratio for the no-event private-firm benchmark. The aggregate ESG ratio increases steadily throughout the period, rising from 28.03 in 2013 to 47.20 in 2023, with a visibly steeper slope after 2020. Additionally, the rise is not confined to a single pillar. The environmental ratio remains the largest component in every year, although the acceleration after 2020 coincides with a strong expansion in social disclosure, while governance increases more gradually. Overall, the figure suggests that ESG communication on private-firm websites has become increasingly emphasized over time. This pattern is consistent with the upward trends in website-based ESG disclosure documented for private equity firms in Abraham et al. (2024).

Based on the working sample reported in Table 4.1, Table 4.4 reports descriptive statistics for VC-backed firms (Panel A) and non-VC-backed firms (Panel B). We classify firm-year observations into two groups. The first group pools pre-event and no-event firm-years, while the second group consists of post-event firm-years following ownership transactions.

In the VC-backed sample, mean $\ln(1 + \text{ESG})$ is 1.30 in the full sample, 1.22 in pre-event and no-event observations, and 1.90 in post-event observations. The pillar-level measures exhibit a similar pattern, with higher post-event means for $\ln(1 + E)$, $\ln(1 + S)$, and $\ln(1 + G)$. In the non-VC-backed sample, mean $\ln(1 + \text{ESG})$ is 1.50 overall, 1.42 in pre-event and no-event observations, and 1.69 in post-event observations. ESG disclosure is therefore higher following ownership transactions in both groups. Furthermore, standard deviations exhibit large dispersion in disclosure outcomes across firms.

The table also reports additional firm characteristics. We collect industry classifica-

Table 4.4: Working Sample Summary Statistics.

	Ln (1+ESG)	Ln (1+E)	Ln (1+S)	Ln (1+G)	Firm Age	High Growth
Panel A:						
VC-Backed Firms						
All						
Mean	1.30	0.53	0.47	0.55	6.87	2.40%
Standard Deviation	1.90	1.36	1.26	1.31	5.25	15.30%
Number of Obs.	53,148	53,148	53,148	53,148	53,148	53,148
Pre-event & no-event						
Mean	1.22	0.53	0.44	0.47	6.40	2.64%
Standard Deviation	1.86	1.37	1.22	1.21	4.99	16.04%
Number of Obs.	46,635	46,635	46,635	46,635	46,635	46,635
Post-event						
Mean	1.90	0.58	0.70	1.14	10.24	0.63%
Standard Deviation	2.06	1.35	1.48	1.76	5.78	7.91%
Number of Obs.	6,513	6,513	6,513	6,513	6,513	6,513
Panel B:						
No-VC-Backed Firms						
All						
Mean	1.50	0.70	0.54	0.65	32.38	1.75%
Standard Deviation	2.03	1.57	1.33	1.43	30.02	13.12%
Number of Obs.	236,498	236,498	236,498	236,498	236,498	236,498
Pre-event & no-event						
Mean	1.42	0.68	0.50	0.61	33.04	1.86%
Standard Deviation	2.01	1.56	1.29	1.40	30.83	13.50%
Number of Obs.	167,852	167,852	167,852	167,852	167,852	167,852
Post-event						
Mean	1.69	0.76	0.65	0.76	30.77	1.49%
Standard Deviation	2.07	1.60	1.43	1.50	27.89	12.13%
Number of Obs.	68,646	68,646	68,646	68,646	68,646	68,646

Notes: Table 4.4 displays summary statistics for the main analysis sample. Panel A covers VC-backed firms and Panel B covers non-VC-backed firms. Within each panel, statistics are reported for the full sample and by event timing, pooling pre-event and no-event firm-years and reporting post-event firm-years separately. Events are defined as major ownership transactions (IPOs or acquisitions).

tion,[11] founding year, and a high-growth indicator equal to one if the firm appears in the Inc. 5000 ranking[12] in a given year. We observe that VC-backed firms are younger on average than non-VC-backed firms (mean firm age 6.87 vs. 32.38 years) and exhibit a higher share of high-growth observations.

Since ESG disclosure varies widely across firms, we next examine whether this disclosure heterogeneity is related to industry affiliation by reporting industry-level averages in Table 4.5.

Table 4.5 shows how ESG disclosure varies across industries, reporting industry-level averages using the pre-event and no-event samples. Several patterns emerge. First, ESG

[11] Industry labels are harmonized across databases by mapping Capital IQ sector/industry fields to the PitchBook sector taxonomy through a predefined crosswalk.

[12] https://www.inc.com/inc5000: an annual list of the 5,000 fastest-growing private companies in the U.S.

Table 4.5: ESG Disclosure by Industry.

Panel A: All	Ln (1+ESG)	Ln (1+E)	Ln (1+S)	Ln (1+G)
Business and Products and Services	1.70	1.02	0.49	0.61
Consumer Products and Services	1.03	0.46	0.37	0.41
Energy	2.64	1.96	0.78	1.02
Financial Services	1.31	0.30	0.62	0.73
Healthcare	1.11	0.24	0.53	0.56
Information Technology	1.33	0.52	0.51	0.61
Materials and Resources	2.00	1.62	0.31	0.62
Panel B: VC-Backed Firms	Ln (1+ESG)	Ln (1+E)	Ln (1+S)	Ln (1+G)
Business and Products and Services	1.64	0.91	0.56	0.45
Consumer Products and Services	1.01	0.54	0.40	0.23
Energy	2.83	2.63	0.45	0.24
Financial Services	1.05	0.33	0.43	0.52
Healthcare	0.86	0.23	0.35	0.41
Information Technology	1.32	0.52	0.48	0.57
Materials and Resources	2.97	2.73	0.43	0.35
Panel C: No-VC-Backed Firms	Ln (1+ESG)	Ln (1+E)	Ln (1+S)	Ln (1+G)
Business and Products and Services	1.71	1.03	0.48	0.63
Consumer Products and Services	1.03	0.45	0.37	0.43
Energy	2.62	1.89	0.82	1.10
Financial Services	1.34	0.30	0.64	0.75
Healthcare	1.25	0.24	0.63	0.64
Information Technology	1.34	0.53	0.52	0.63
Materials and Resources	1.94	1.55	0.30	0.64

Notes: Table 4.5 displays industry-level averages of the website-based ESG disclosure measures using the pre-event and no-event firm-year sample. Panel A covers all private firms, Panel B VC-backed firms, and Panel C non-VC-backed firms. The table reports $\ln(1 + \text{ESG})$ and its Environmental, Social, and Governance components by industry.

disclosure differs widely across industries. In Panel A (all firms), $\ln(1 + \text{ESG})$ is highest in Energy and Materials & Resources, and lowest in Consumer Products & Services and Healthcare. Second, the disclosure ranking observed in Panel A is broadly similar in Panel B (VC-backed firms) and Panel C (non-VC-backed firms). This is consistent with public-market evidence that the relevance of ESG topics differs across industries (Khan et al., 2016). Third, Environmental disclosure contributes most to cross-industry dispersion, while Social and Governance vary less across sectors.

We next provide a descriptive analysis of ESG disclosure dynamics within VC-backed firms by examining how disclosure varies across financing rounds, from Pre-VC to round 6+.

Figure 4.3 reports ESG disclosure averages across financing stages, from Pre-VC to Round 6+. The aggregate ESG ratio increases from 16.16 at Pre-VC to 28.04 at Round 6+, indicating higher disclosure at later financing stages. At the pillar level, Environmental and Social disclosure account for most of the increase, while Governance rises more grad-

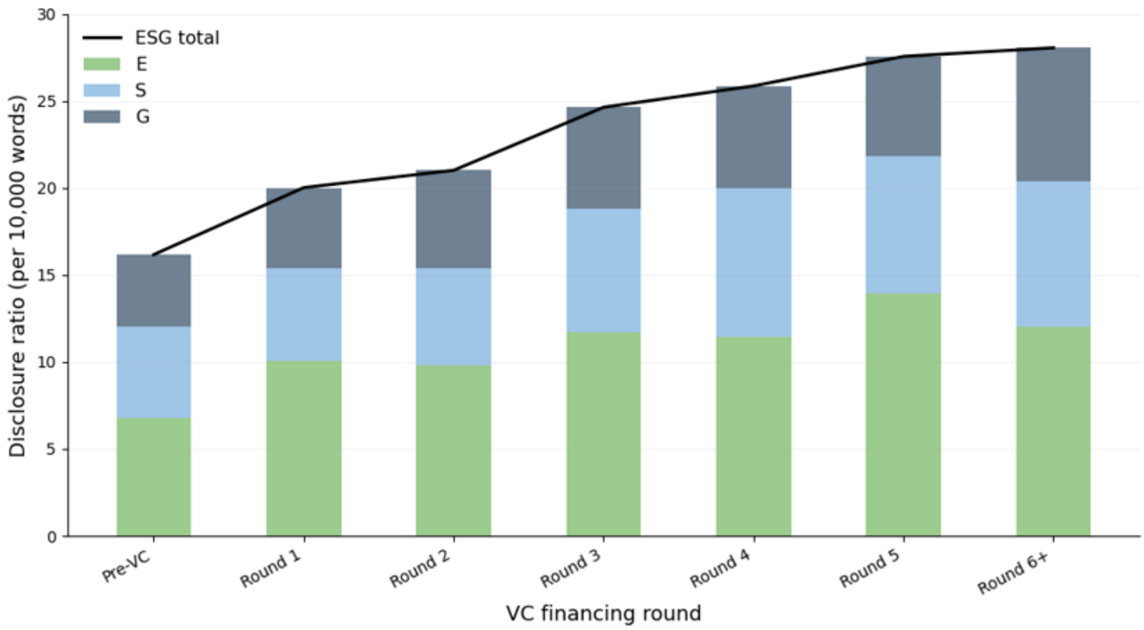

Figure 4.3: ESG Disclosure Across Financing Rounds in VC-Backed Firms.

Notes: Figure 4.3 displays average website-based ESG disclosure ratios across financing stages for VC-backed firms, from the pre-VC stage (before VC entry) to Round 6+. The line plots the aggregate ESG disclosure ratio (per 10,000 words), and the stacked bars decompose the ratio into Environmental, Social, and Governance components.

ually but becomes more pronounced in later rounds. Although the aggregate ESG ratio increases across financing stages, pillar-level patterns are not perfectly monotonic across rounds.

To assess statistical significance, we conduct mean-comparison tests between Pre-VC and each subsequent financing round (Table C2). The aggregate ESG ratio exhibits significant increases across all later rounds, driven primarily by Environmental disclosure, which is significant throughout, and Social and Governance disclosure, which becomes significant from Round 3 onward. ESG disclosure thus becomes more prominent as VC-backed firms mature and progress through financing milestones.

Furthermore, before turning to regression analysis, we investigate firm ESG disclosure levels and changes around ownership transactions. Table 4.6 restricts the sample to pre-event observations only, excluding the event year and all subsequent periods (post-event observations). In this additional descriptive test, we examine whether ESG disclosure dynamics in the year preceding the ownership transaction ($t-1$) are significantly different from those in earlier pre-event years.

For each outcome, we conduct mean-comparison tests separately for IPO and acquisition subsamples, both in the full sample and within VC-backed and non-VC-backed firms. We examine three outcomes. The first outcome is the level of ESG disclosure, measured as $\ln(1 + \text{ESG})$, and the second is the change in disclosure, measured as $\Delta \ln(1 + \text{ESG})$. Following Dhaliwal et al. (2011), the third outcome is an indicator for disclosure initiation, equal to one when a firm reports ESG disclosure for the first time and zero otherwise.

Table 4.6 shows that ESG disclosure levels in year $t-1$ are higher than in earlier pre-event years. This pattern holds in both VC-backed and non-VC-backed subsamples. In contrast, patterns in disclosure changes are more heterogeneous. In the full sample, average changes are larger in year $t-1$ primarily in the IPO subsample, while differences around acquisitions are small and statistically insignificant. This $t-1$ contrast is concentrated among non-VC-backed firms, while differences in disclosure changes in VC-backed firms are not statistically significant. Finally, disclosure initiation is more likely in year $t-1$ for non-VC-backed firms, especially prior to IPOs. For VC-backed firms, initiation rates in year $t-1$ do not differ statistically from earlier pre-event years.

Table 4.6: ESG Disclosure in the Year Before Ownership Transactions.

Panel A:	ESG Disclosure		
	Event year (t-1)	Other pre-event years	T-test
All Private Firms			
IPO	1.38	0.996	0.383***
Acquisition	1.28	1.112	0.168***
VC Backed Firms			
IPO	0.955	0.71	0.25***
Acquisition	1.277	0.968	0.309***
No VC Backed Firms			
IPO	1.699	1.199	0.50***
Acquisition	1.367	1.201	0.165***
Panel B:	Change in ESG Disclosure		
	Event year (t-1)	Other pre-event years	T-test
All Private Firms			
IPO	0.22	0.1	0.12**
Acquisition	0.074	0.075	-0.001
VC Backed Firms			
IPO	0.149	0.094	0.054
Acquisition	0.124	0.131	-0.007
No VC Backed Firms			
IPO	0.272	0.104	0.168***
Acquisition	0.084	0.068	0.016
Panel C	ESG Disclosure Initiation		
	Event year (t-1)	Other pre-event years	T-test
All Private Firms			
IPO	0.1	0.075	0.25**
Acquisition	0.067	0.066	0.001
VC Backed Firms			
IPO	0.097	0.082	0.015
Acquisition	0.099	0.104	-0.005
No VC Backed Firms			
IPO	0.102	0.069	0.033***
Acquisition	0.066	0.062	0.004*

Notes: Table 4.6 shows mean-comparison tests for ESG disclosure outcomes in the year preceding a major ownership transaction (event year $t-1$) versus earlier pre-event years. The sample is restricted to pre-event firm-years only. Panels A–C report, respectively, ESG disclosure levels ($\ln(1+\text{ESG})$), changes in disclosure ($\Delta \ln(1+\text{ESG})$), and an initiation indicator equal to one when a firm reports ESG disclosure for the first time and zero otherwise. Results are shown separately for IPO and acquisition subsamples and by VC status (VC-backed vs non-VC-backed). T-tests are reported in the last column. * stands for significant at 10%, ** significant at 5%, and *** significant at 1% level.

These results suggest that disclosure adjustments in year $t-1$ differ by VC status. Non-VC-backed firms exhibit both larger disclosure changes and higher initiation rates in year $t-1$, particularly prior to IPOs. In contrast, VC-backed firms show higher disclosure levels in year $t-1$ but more modest changes in disclosure.

4.4 VC Backed Firms and ESG Disclosure

This section tests Hypothesis H1 by examining whether voluntary ESG disclosure increases progressively over the VC financing cycle. This prediction builds on prior evidence that VC investors professionalize portfolio companies, strengthen governance and monitoring, and support growth over the financing process (Gompers, 1995; Lerner, 1995; Hellmann and Puri, 2002; Bottazzi et al., 2008). In parallel, disclosure that reduces information asymmetry improves the information environment for ownership transfers and has been linked to a higher likelihood of transactions (Baik et al., 2025; Boulland et al., 2026). Moreover, Fenili and Raimondo (2021) and Reber et al. (2022) find that voluntary ESG disclosure improves the IPO information environment. Taken together, these findings suggest that VCs have incentives to develop voluntary ESG disclosure in their portfolio companies.

To test this prediction, we proceed in three steps. First, within VC-backed firms, we compare disclosure before and after VC entry and estimate how disclosure differs across financing stages. Second, we compare ESG disclosure in VC-backed firms to non-VC-backed firms to assess whether VC-backed firms disclose at higher levels. Third, we assess robustness by replicating the analysis using a binary abnormal-disclosure variable.

4.4.1 Disclosure around VC entry and financing Stages

We begin by testing whether voluntary ESG disclosure differs between pre-VC and VC-backed periods within VC-backed firms, and whether disclosure varies across financing stages. We estimate the following baseline specification:

$$\ln(1+\text{ESG}_{i,t}) = \alpha+\beta\,\text{VC Stage}_{i,t}+\gamma_1\ln(\text{Firm Age}_{i,t})+\gamma_2\text{HighGrowth}_{i,t}+\mu_t+\lambda_s+\varepsilon_{i,t}, \quad (4.2)$$

where i indexes firms and t indexes years. The dependent variable is $\ln(1+\text{ESG}_{i,t})$, as constructed in Section 4.3.2, and VC Stage$_{i,t}$ is measured at the firm-year level and can vary over time within a firm. Depending on the specification, VC Stage$_{i,t}$ is captured by (i) a single indicator VC Backed$_{i,t}$, (ii) two indicators Early VC Backed$_{i,t}$ and Late VC Backed$_{i,t}$,[13] or (iii) round indicators Round $1_{i,t}$ through Round $6+_{i,t}$. In all specifications, the omitted category is the pre-VC period. Furthermore, as the dependent variable is $\ln(1+\text{ESG}_{i,t})$, coefficients on binary VC-stage indicators are interpreted relative to this omitted category and imply multiplicative changes of e^{β} in $(1+\text{ESG}_{i,t})$, i.e., an exact percentage effect of $100\times\left(e^{\beta}-1\right)\%$.

[13]Following Sanati and Spyridopoulos (2026), Early VC Backed$_{i,t}$ corresponds to financing rounds 1–3, and Late VC Backed$_{i,t}$ to financing round 4 onward.

In addition, in Equation 4.2, we control for firm age, measured as $\ln(\text{Firm Age}_{i,t})$, and firm growth, measured by $\text{HighGrowth}_{i,t}$. Firm age is the natural logarithm of the number of years since incorporation and captures firm maturity. $\text{HighGrowth}_{i,t}$ is an indicator equal to one for firm-years in which the firm appears in the Inc. 5000 ranking, capturing periods of rapid expansion. μ_t and λ_s denote year and industry fixed effects. In alternative specifications, we replace $\mu_t + \lambda_s$ with year×industry fixed effects. Standard errors are clustered at the firm level, and we restrict the sample to firm-year observations up to the VC exit (i.e., excluding post-exit observations).

Table 4.7: VC backing and Voluntary ESG Disclosure.

	ln (1 + ESG)					
	(1)	(2)	(3)	(4)	(5)	(6)
VC Backed	0.0313			0.0419		
	(0.84)			(1.13)		
Early VC Backed		0.00775			0.0183	
		(0.21)			(0.49)	
Late VC Backed		0.153***			0.162***	
		(3.76)			(3.98)	
VC Round 1			-0.0342			-0.0228
			(-0.84)			(-0.56)
VC Round 2			0.00660			0.0166
			(0.17)			(0.42)
VC Round 3			0.0702*			0.0800*
			(1.72)			(1.96)
VC Round 4			0.140***			0.150***
			(3.22)			(3.44)
VC Round 5			0.137***			0.146***
			(2.88)			(3.07)
VC Round 6 and +			0.248***			0.255***
			(5.27)			(5.41)
Ln Firm Age	0.180***	0.136***	0.115***	0.176***	0.133***	0.112***
	(13.87)	(9.52)	(7.73)	(13.54)	(9.29)	(7.53)
High Growth	0.222***	0.208***	0.207***	0.216***	0.202***	0.201***
	(4.28)	(4.00)	(3.99)	(4.16)	(3.89)	(3.87)
Year-FE	Yes	Yes	Yes	No	No	No
Industry-FE	Yes	Yes	Yes	No	No	No
YearxIndustry-FE	No	No	No	Yes	Yes	Yes
Number of Obs.	46,635	46,635	46,635	46,635	46,635	46,635
Adjusted R-sq	0.083	0.084	0.084	0.084	0.085	0.086

Notes: Table 4.7 reports OLS estimates from Equation 4.2 where the dependent variable is $\ln(1+\text{ESG}_{i,t})$. The main explanatory variable VC $\text{Stage}_{i,t}$ is alternatively measured as a single VC-backed indicator in specifications (1) and (4), early- and late-stage VC indicators in specifications (2) and (5), or VC financing-round indicators in specifications (3) and (6). Firm-year observations prior to VC entry are omitted and form the reference category. All specifications control for $\ln(\text{Firm Age}_{i,t})$ and $\text{HighGrowth}_{i,t}$. Columns vary the fixed-effects structure and use year and industry fixed effects in specification (1) to (3), and year×industry fixed effects in specification (4) to (6). Standard errors are clustered at the firm level. The sample is restricted to VC-backed firms prior to VC exit. * stands for significant at 10%, ** significant at 5%, and *** significant at 1% level.

Table 4.7 presents the baseline results. The VC-backed coefficients in specifications (1) and (4) are economically small and statistically insignificant across fixed-effects structures, indicating that, on average, ESG disclosure in VC-backed firms does not differ from disclosure before VC entry. However, when the VC-backed variable is split by financing stages, a clear pattern emerges. Early-stage VC-backed firms are not statistically different from pre-VC firms, whereas late-stage VC-backed firms exhibit significantly higher ESG disclosure. Using the unstandardized coefficients, the late-stage estimates (0.153 in specification (2) and 0.162 in specification (5)) imply increases of approximately 16.5% and 17.6%, respectively, relative to the pre-VC period.

The round-based specifications (3) and (6) confirm this pattern. Relative to the pre-VC period, differences are not statistically significant in rounds 1 and 2. From round 3 onward, coefficients become positive and are broadly increasing across later rounds, with the largest estimates in round 6+. Using the unstandardized coefficients, the implied differences are about 7–8% in round 3, 15–16% in rounds 4 and 5, and 28–29% in round 6+, relative to the pre-VC period. These estimates indicate that the association between VC backing and ESG disclosure is concentrated in later VC financing stages rather than immediately after initial VC entry. Additionally, control variables display consistent patterns across specifications. $\ln$(Firm Age) is positive and highly significant, and HighGrowth is also positive and significant, consistent with higher ESG disclosure among more mature firms and firms on stronger growth paths.

Table 4.8 replicates Table 4.7 using pillar-level dependent variables, replacing $\ln(1 + \text{ESG})$ with $\ln(1 + E)$, $\ln(1 + S)$, and $\ln(1 + G)$. Panel A includes year and industry fixed effects, while Panel B replaces them with year$\times$industry fixed effects.

The main pattern is consistent across both panels. Early-stage VC coefficients are small and not significant for all three pillars. By contrast, late-stage VC coefficients are positive for all pillars but statistically significant only for Environmental and Social disclosure. Using the unstandardized coefficients, late-stage VC is associated with increases of about 6.2–7.2% in Environmental disclosure and about 8% in Social disclosure, relative to the pre-VC period. These pillar-level results indicate that the late-stage increase in aggregate ESG disclosure documented in Table 4.7 is primarily concentrated in the Environmental and Social components, while Governance effects are not statistically significant relative to pre-VC levels.

Overall, Tables 4.7 and 4.8 show limited differences in ESG disclosure in early VC stages relative to the pre-VC period, while disclosure becomes significantly higher in later VC financing stages.

4.4.2 ESG disclosure in VC-Backed vs. non-VC-Backed private firms

We next examine whether the disclosure pattern documented among VC-backed firms also implies higher disclosure than among private firms without VC backing. We extend the sample beyond VC-backed firms and include non-VC-backed private firms, while maintaining the exclusion of post-transaction firm-year observations and focusing on the combined no-event and pre-event sample. We apply the same baseline framework as in

Table 4.8: VC Backing and Pillar-Level ESG Disclosure.

Panel A						
	Ln (1+E)		Ln (1+S)		Ln (1+G)	
	(1)	(2)	(3)	(4)	(5)	(6)
VC Backed	0.0234		-0.0135		0.00152	
	(0.87)		(-0.54)		(0.06)	
Early VC Backed		0.0164		-0.0312		-0.00509
		(0.61)		(-1.24)		(-0.20)
Late VC Backed		0.0597**		0.0778***		0.0357
		(2.02)		(2.83)		(1.31)
Ln Firm Age	0.0867***	0.0736***	0.0663***	0.0333***	0.0763***	0.0640***
	(9.22)	(7.10)	(7.57)	(3.46)	(8.81)	(6.70)
High Growth	-0.108***	-0.112***	0.153***	0.142***	0.261***	0.257***
	(-2.85)	(-2.96)	(4.37)	(4.06)	(7.51)	(7.39)
Year-FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry-FE	Yes	Yes	Yes	Yes	Yes	Yes
YearxIndustry-FE	No	No	No	No	No	No
Number of Obs.	46,635	46,635	46,635	46,635	46,635	46,635
Adjusted R-sq	0.104	0.104	0.022	0.024	0.026	0.027

Panel B						
	Ln (1+E)		Ln (1+S)		Ln (1+G)	
	(1)	(2)	(3)	(4)	(5)	(6)
VC Backed	0.0334		-0.0121		0.00606	
	(1.24)		(-0.48)		(0.24)	
Early VC Backed		0.0264		-0.0299		-0.000431
		(0.98)		(-1.19)		(-0.02)
Late VC Backed		0.0692**		0.0784***		0.0390
		(2.35)		(2.85)		(1.43)
Ln Firm Age	0.0814***	0.0685***	0.0654***	0.0328***	0.0770***	0.0651***
	(8.65)	(6.62)	(7.44)	(3.40)	(8.85)	(6.81)
High Growth	-0.108***	-0.112***	0.150***	0.139***	0.256***	0.252***
	(-2.87)	(-2.98)	(4.27)	(3.97)	(7.37)	(7.25)
Year-FE	No	No	No	No	No	No
Industry-FE	No	No	No	No	No	No
YearxIndustry-FE	Yes	Yes	Yes	Yes	Yes	Yes
Number of Obs.	46,635	46,635	46,635	46,635	46,635	46,635
Adjusted R-sq	0.109	0.109	0.023	0.024	0.027	0.027

Notes: Table 4.8 replicates Table 4.7 using pillar-level dependent variables: $\ln(1+E_{i,t})$, $\ln(1+S_{i,t})$, and $\ln(1+G_{i,t})$. The VC-stage variables are defined as in Table 4.7, and firm-year observations prior to VC entry form the reference category. Panel A includes year and industry fixed effects, while Panel B uses year$\times$industry fixed effects. Standard errors are clustered at the firm level. The sample is restricted to VC-backed firms prior to VC exit. * stands for significant at 10%, ** significant at 5%, and *** significant at 1% level.

Equation 4.2 to the extended sample and use non-VC-backed private firms as the reference group. The estimated coefficients therefore capture ESG disclosure differences across VC-status indicators relative to non-VC-backed private firms.

Table 4.9 shows that the coefficient on Pre VC Backed is negative and significant in all specifications, implying that firms that will later receive VC funding start from lower ESG disclosure levels than non-VC private firms. Economically, this gap implies that pre-VC-

Table 4.9: VC Financing Stages and ESG Disclosure Relative to Non-VC Private Firms.

	ln (1 + ESG)					
	(1)	(2)	(3)	(4)	(5)	(6)
Pre VC Backed	-0.152***	-0.163***	-0.167***	-0.156***	-0.167***	-0.171***
	(-3.85)	(-4.13)	(-4.23)	(-3.96)	(-4.23)	(-4.33)
VC Backed	-0.0537***			-0.0508***		
	(-4.28)			(-4.02)		
Early VC Backed		-0.116***			-0.112***	
		(-7.92)			(-7.60)	
Late VC Backed		0.0459***			0.0470***	
		(2.64)			(2.69)	
VC Round 1			-0.176***			-0.171***
			(-7.54)			(-7.29)
VC Round 2			-0.126***			-0.122***
			(-6.14)			(-5.93)
VC Round 3			-0.0590***			-0.0552**
			(-2.73)			(-2.55)
VC Round 4			0.0133			0.0165
			(0.52)			(0.65)
VC Round 5			0.0209			0.0218
			(0.66)			(0.69)
VC Round 6 and +			0.105***			0.103***
			(3.69)			(3.65)
Ln Firm Age	0.155***	0.150***	0.148***	0.155***	0.150***	0.148***
	(33.53)	(32.00)	(31.47)	(33.47)	(31.98)	(31.46)
High Growth	0.195***	0.183***	0.181***	0.191***	0.180***	0.177***
	(6.60)	(6.19)	(6.10)	(6.47)	(6.07)	(5.99)
Year-FE	Yes	Yes	Yes	No	No	No
Industry-FE	Yes	Yes	Yes	No	No	No
YearxIndustry-FE	No	No	No	Yes	Yes	Yes
Number of Obs.	214,487	214,487	214,487	214,487	214,487	214,487
Adjusted R-sq	0.057	0.058	0.058	0.058	0.058	0.058

Notes: Table 4.9 displays OLS estimates from Equation 4.2 on an extended sample that includes both VC-backed firms and non-VC-backed private firms. The dependent variable is $\ln(1 + \text{ESG}_{i,t})$. Non-VC-backed private firms constitute the reference group. VC Stage$_{i,t}$ is alternatively measured using indicators for pre-VC, VC-backed status, early versus late VC stages, or VC-round indicators. Columns vary the fixed-effects structure and use year and industry fixed effects in specifications (1) to (3), and year$\times$industry fixed effects in specifications (4) to (6). Standard errors are clustered at the firm level. The sample excludes post-transaction firm-year observations. * stands for significant at 10%, ** significant at 5%, and *** significant at 1% level.

backed firms disclose about 14% to 16% less than non-VC-backed firms.

This negative pre-VC coefficient also alleviates a natural selection concern. If VCs simply targeted firms already inclined toward ESG disclosure, we should expect VC-backed firms to exhibit higher disclosure before VC entry. However, the opposite holds. These firms start below non-VC-backed firms' disclosure levels, suggesting that the increase in disclosure across financing rounds reflects something that develops with VC involvement rather than a pre-existing propensity to disclose.

In specifications (1) and (4), estimates indicate that VC-backed firms still disclose significantly less relative to non-VC-backed private firms, by roughly 5%. However, as in Table 4.7, this pooled VC-backed coefficient masks stage heterogeneity, with a more nuanced pattern emerging when VC-backed observations are separated into early and late

VC stages as shown in specifications (2) and (5). In early VC stages, disclosure remains significantly below that of non-VC-backed firms by about 10.6–11.0%. By contrast, in late VC stages, the sign reverses, with disclosure about 4.7–4.8% significantly higher than in non-VC-backed firms.

The round-based specifications (3) and (6) confirm the same pattern observed in Table 4.7 across the financing cycle. Disclosure is lower than the non-VC-backed benchmark in early rounds (about 16% lower in round 1, 11–12% lower in round 2, and 5–6% lower in round 3), becomes positive but not significant in intermediate rounds (rounds 4–5), and turns positive and significant only by round 6+, reaching about 10.8–11.1% above the benchmark.

Table 4.9 documents a staged disclosure pattern relative to non-VC-backed private firms, with gaps in pre-VC and early VC stages that narrow over the financing cycle and turn positive and significant only by round 6+. Furthermore, control variables remain consistent with Table 4.7, as older firms and high-growth firms exhibit higher ESG disclosure.

4.4.3 Robustness test: Abnormal ESG disclosure measure

As a robustness test, we replicate the baseline analyses of Sections 4.4.1 and 4.4.2 using a binary measure of abnormal ESG disclosure. We first estimate $\ln(1 + \text{ESG})$ as a function of firm controls ($\ln(\text{Firm Age})$ and HighGrowth indicator) and year-by-industry fixed effects, and obtain the residual component. We then define an indicator equal to one when the residual is positive, and zero otherwise. The indicator thus identifies firm-year observations with ESG disclosure above the level predicted by firm characteristics and year-by-industry effects.

We re-estimate the baseline specifications using logit models given the binary dependent variable. The robustness analysis preserves the empirical design as in Equation 4.2. Panel A reproduces the within-VC-backed design, comparing pre-VC and VC-backed periods and examining financing-stage heterogeneity. Panel B reproduces the VC-backed versus non-VC-backed private firm disclosure comparison (Table 4.9). The corresponding logit estimates are reported in Table 4.10 and indicate that the likelihood of above-predicted ESG disclosure increases with VC financing maturity.

In Panel A (within-VC design), the aggregate VC-backed variable is not statistically significant in either fixed-effects structure. However, consistent with Table 4.7, the economically relevant variation comes from VC stage decomposition. Late VC-backed firm observations are associated with a higher likelihood of above-predicted ESG disclosure, while early VC-backed periods are not. The round-based specifications show a similar pattern, with no significant effect in early rounds but a clear increase in disclosure propensity in later rounds (Rounds 4 through 6+). This suggests that abnormal ESG disclosure is concentrated in mature VC financing phases rather than at initial VC involvement.

In Panel B (VC-backed versus non-VC private firms), the pooled VC-backed coefficient in specifications (1) and (4) is not significant, consistent with the heterogeneous VC-phase patterns documented in Table 4.9. When split by stage, the logit estimates show that early-stage VC firms are significantly less likely to exhibit above-predicted disclosure than non-VC firms, while late-stage VC firms are significantly more likely. The round-level specifications confirm this pattern, with Rounds 1 and 2 exhibiting significantly lower likelihood of above-predicted disclosure, Round 3 showing no significant difference, and Rounds 4 through 6+ exhibiting significantly higher likelihood, with the largest point estimate in Round 6+. This confirms that the staged disclosure pattern relative to non-VC private firms documented in Table 4.9 holds when using abnormal disclosure propensity rather than continuous disclosure levels, with effects most pronounced in late financing rounds.

Table 4.10: Abnormal ESG Disclosure and VC Financing Stages.

Panel A						
	Abnormal ESG Disclosure					
	(1)	(2)	(3)	(4)	(5)	(6)
VC Backed	0.0486			0.0547		
	(0.96)			(1.09)		
Early VC Backed		0.0164			0.0227	
		(0.32)			(0.45)	
Late VC Backed		0.194***			0.198***	
		(3.58)			(3.66)	
VC Round 1			-0.0336			-0.0265
			(-0.61)			(-0.48)
VC Round 2			0.0176			0.0238
			(0.33)			(0.44)
VC Round 3			0.0843			0.0891
			(1.54)			(1.63)
VC Round 4			0.173***			0.177***
			(3.01)			(3.09)
VC Round 5			0.183***			0.187***
			(2.96)			(3.01)
VC Round 6 and +			0.306***			0.309***
			(5.00)			(5.04)
Ln Firm Age	0.260***	0.202***	0.176***	0.259***	0.203***	0.177***
	(15.35)	(10.83)	(9.01)	(15.27)	(10.83)	(9.03)
High Growth	0.296***	0.280***	0.280***	0.293***	0.277***	0.276***
	(4.90)	(4.63)	(4.62)	(4.83)	(4.57)	(4.55)
Year-FE	Yes	Yes	Yes	No	No	No
Industry-FE	Yes	Yes	Yes	No	No	No
YearxIndustry-FE	No	No	No	Yes	Yes	Yes
Number of Obs.	46,635	46,635	46,635	46,635	46,635	46,635
Pseudo R-sq	0.061	0.062	0.062	0.062	0.063	0.063

Panel B						
	Abnormal ESG Disclosure					
	(1)	(2)	(3)	(4)	(5)	(6)
Pre VC Backed	-0.177***	-0.192***	-0.197***	-0.182***	-0.197***	-0.202***
	(-3.62)	(-3.93)	(-4.04)	(-3.72)	(-4.03)	(-4.13)
VC Backed	-0.00984			-0.0168		
	(-0.69)			(-1.16)		
Early VC Backed		-0.0984***			-0.103***	
		(-5.81)			(-6.03)	
Late VC Backed		0.118***			0.108***	
		(6.16)			(5.60)	
VC Round 1			-0.178***			-0.181***
			(-6.39)			(-6.48)
VC Round 2			-0.110***			-0.114***
			(-4.58)			(-4.75)
VC Round 3			-0.0318			-0.0374
			(-1.29)			(-1.52)
VC Round 4			0.0687**			0.0608**
			(2.44)			(2.15)
VC Round 5			0.0941***			0.0840**
			(2.72)			(2.42)
VC Round 6 and +			0.193***			0.181***
			(6.31)			(5.90)
Ln Firm Age	0.196***	0.188***	0.186***	0.195***	0.187***	0.184***
	(36.27)	(34.50)	(33.91)	(35.94)	(34.24)	(33.66)
High Growth	0.289***	0.273***	0.270***	0.287***	0.272***	0.269***
	(8.98)	(8.48)	(8.37)	(8.90)	(8.42)	(8.32)
Year-FE	Yes	Yes	Yes	No	No	No
Industry-FE	Yes	Yes	Yes	No	No	No
YearxIndustry-FE	No	No	No	Yes	Yes	Yes
N	214,487	214,487	214,487	214,487	214,487	214,487
Pseudo R-sq	0.036	0.036	0.037	0.036	0.036	0.037

Notes: Table 4.10 reports logit estimates using a binary measure of abnormal ESG disclosure. The dependent variable equals one if a firm-year's ESG disclosure exceeds its predicted level based on $\ln(\text{Firm Age}_{i,t})$, $\text{HighGrowth}_{i,t}$, and year×industry fixed effects, and zero otherwise. Panel A replicates Table 4.7 and Panel B replicates Table 4.9. Columns vary the fixed-effects structure and use year and industry fixed effects in specifications (1) to (3), and year×industry fixed effects in specifications (4) to (6). Standard errors are clustered at the firm level. The sample excludes post-transaction firm-year observations. * stands for significant at 10%, ** significant at 5%, and *** significant at 1% level.

This section documents that VC backing is associated with higher ESG disclosure primarily in late financing stages. The staged pattern emerges consistently across specifications and robustness tests. Disclosure increases from Round 3 onward within VC-backed firms and turns positive relative to non-VC private firms only in late rounds. The concentration of disclosure effects in mature financing phases is consistent with two mechanisms. First, disclosure can develop gradually through VC professionalization over the investment cycle (Hellmann and Puri, 2002; Bottazzi et al., 2008). Second, disclosure may respond strategically to external scrutiny (Marquis et al., 2016; Frankel et al., 2025), as firms approach ownership transactions. We investigate these mechanisms in the following section.

4.5 ESG Disclosure Around Ownership Transactions

This section tests Hypotheses H2a and H2b by examining whether ESG disclosure patterns around ownership transactions are consistent with gradual disclosure development or strategic pre-transaction adjustment.

Prior research argues that firms strategically adjust voluntary ESG disclosure in response to external scrutiny and market pressures. Marquis et al. (2016) and Long et al. (2025) argue that external pressure and scrutiny are associated with more selective ESG disclosure. Frankel et al. (2025) further document that ESG disclosure responds to market pressures and regulatory risks. Additionally, Dhaliwal et al. (2011) find that firms with higher costs of equity are more likely to initiate standalone CSR reporting, and that initiators are more likely to raise equity capital. Building on this evidence, we examine whether ESG disclosure in private firms changes as they approach major ownership transactions, when informational frictions and scrutiny may be heightened.

To assess this mechanism and distinguish gradual disclosure build-up discussed in Section 4.4 from strategic pre-transaction disclosure adjustments, we proceed in two steps. First, we estimate separate event-time regressions for IPO and acquisition samples, comparing VC-backed and non-VC-backed firms, to examine the ESG disclosure patterns around ownership transactions. Second, we test whether disclosure in the year preceding IPOs and acquisitions differs across private firm types, using several disclosure outcomes that capture disclosure levels, changes, and initiation.

4.5.1 Event-time ESG disclosure around ownership transactions

We begin with event-time analyses around IPOs and acquisitions, estimated separately. Within each sample, we compare VC-backed and non-VC-backed firms by relative year τ, with $\tau = -1$ (the year before the transaction) as the reference period.

$$Y_{i,t} = \sum_{\tau=-3,\tau\neq-1}^{3} \left(\beta_\tau^{NonVC} D_{i,t}^{NonVC,\tau} + \beta_\tau^{VC} D_{i,t}^{VC,\tau}\right) + \gamma' X_{i,t} + \alpha_i + \mu_t + \varepsilon_{i,t} \tag{4.3}$$

where i indexes firms and t indexes years. The dependent variable $Y_{i,t}$ is either $\ln(1 + \text{ESG})$ (Figure 4.4) or the abnormal ESG disclosure indicator as used in Section 4.4.3 (Figure 4.5). Event time is indexed by τ, which is measured in years relative to the transaction year. $D_{i,t}^{NonVC,\tau}$ and $D_{i,t}^{VC,\tau}$ are event-time dummy variables, where $D_{i,t}^{NonVC,\tau} = 1$ if firm i is non-VC-backed and observed in relative year τ, and 0 otherwise. $D_{i,t}^{VC,\tau}$ is defined analogously for VC-backed firms. The regression includes $\tau \in \{-3, -2, 0, 1, 2, 3\}$, with $\tau = -1$ omitted as the reference period. $X_{i,t}$ is a vector of firm-year controls, including Firm Age, the High Growth indicator, and indicators for Early VC and Late VC financing stages. The VC-stage controls allow us to test whether event-time disclosure patterns near ownership transactions capture variation beyond the gradual disclosure progression documented across VC financing stages. α_i denotes firm fixed effects, μ_t denotes year fixed effects, and $\varepsilon_{i,t}$ is the error term. Standard errors are clustered at the firm level.

In the IPO sample (Figure 4.4– Panel A), VC-backed firms exhibit disclosure levels that are not statistically different from the $\tau = -1$ baseline in pre-event years ($\tau = -3$ and $\tau = -2$), consistent with relatively stable disclosure leading up to the IPO event. By contrast, non-VC-backed firms show significantly lower disclosure in pre-event years relative to $\tau = -1$, indicating a sharper increase in disclosure in the year immediately before the IPO. At $\tau = 0$, both groups exhibit significantly higher disclosure relative to $\tau = -1$, with VC-backed firms showing larger increases relative to their baseline.[14] Post-IPO, disclosure levels remain persistently higher than in the pre-IPO baseline year for both groups, with VC-backed firms exhibiting larger post-IPO increases. This pattern is consistent with evidence that VC-backed IPO firms engage in broader disclosure activities (e.g., early guidance) post-IPO (Allee et al., 2021).

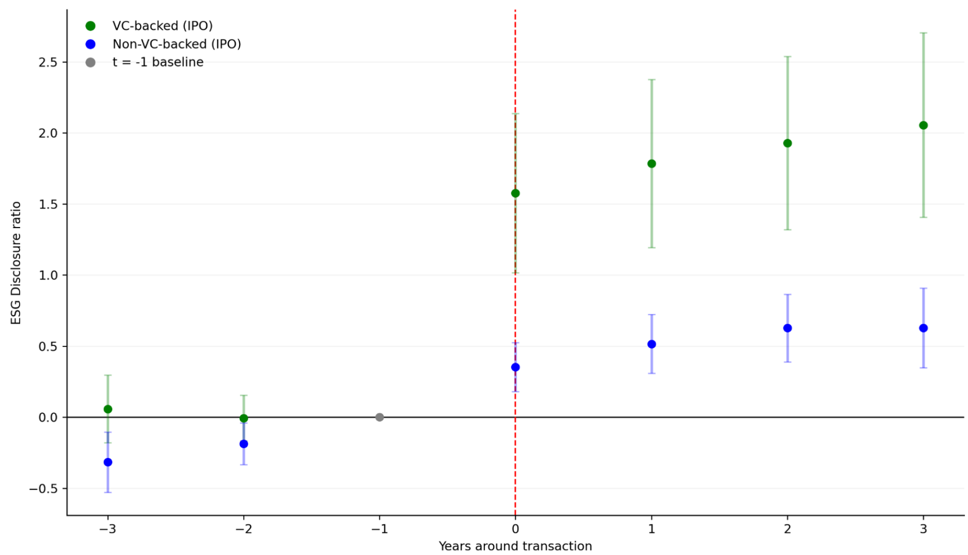

Figure 4.4: Panel A. Event-Time ESG Disclosure Around IPOs.

Notes: Figure 4.4 – Panel A plots event-time estimates of $\ln(1+\text{ESG Ratio}_{i,t})$ for VC-backed and non-VC-backed firms over $\tau \in \{-3, -2, -1, 0, 1, 2, 3\}$, where $\tau = 0$ is the transaction year and $\tau = -1$ is the omitted reference year. Points report coefficient estimates and vertical bars denote 95% confidence intervals.

[14] Annual snapshots are retrieved at year-end, meaning that $\tau = 0$ captures disclosure in the IPO year itself.

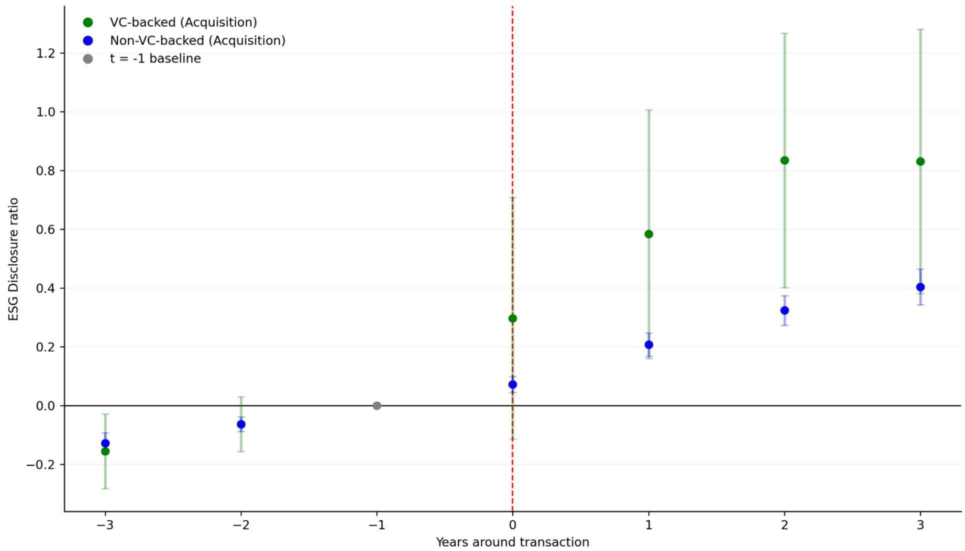

Figure 4.4: Panel B. Event-Time ESG Disclosure Around Acquisitions.

Notes: Panel B plots event-time estimates of $\ln(1 + \text{ESG Ratio}_{i,t})$ for VC-backed and non-VC-backed firms over $\tau \in \{-3, -2, -1, 0, 1, 2, 3\}$, where $\tau = 0$ is the transaction year and $\tau = -1$ is the omitted reference year. Points report coefficient estimates and vertical bars denote 95% confidence intervals.

The acquisition sample (Figure 4.4– Panel B) displays similar broad patterns. VC-backed firms do not exhibit significant pre-event deviations from $\tau = -1$ (except at $\tau = -3$), while non-VC-backed firms display significantly lower disclosure before $\tau = -1$. At $\tau = 0$ and in subsequent years, both groups display higher disclosure relative to their pre-event baselines.

Figure 4.5 examines the same event-time framework using the abnormal ESG disclosure indicator, which identifies firm-year observations with ESG disclosure above the level predicted by firm characteristics and year-by-industry effects. Results are consistent with Figure 4.4. VC-backed firms display no significant pre-event deviations from $\tau = -1$ in most pre-event periods, while non-VC-backed firms exhibit significantly lower propensity for abnormal disclosure before $\tau = -1$. At $\tau = 0$ and in subsequent years, both groups exhibit significantly higher propensity for abnormal disclosure relative to their baselines.

Taken together, these patterns are more consistent with gradual disclosure development among VC-backed firms than with abrupt pre-exit adjustments. In contrast, non-VC-backed firms exhibit a more pronounced increase in the year preceding the ownership transaction, consistent with strategic disclosure adjustments as the event approaches. Appendix C3 reports the underlying event-time coefficient estimates for Figures 4.4 and 4.5.

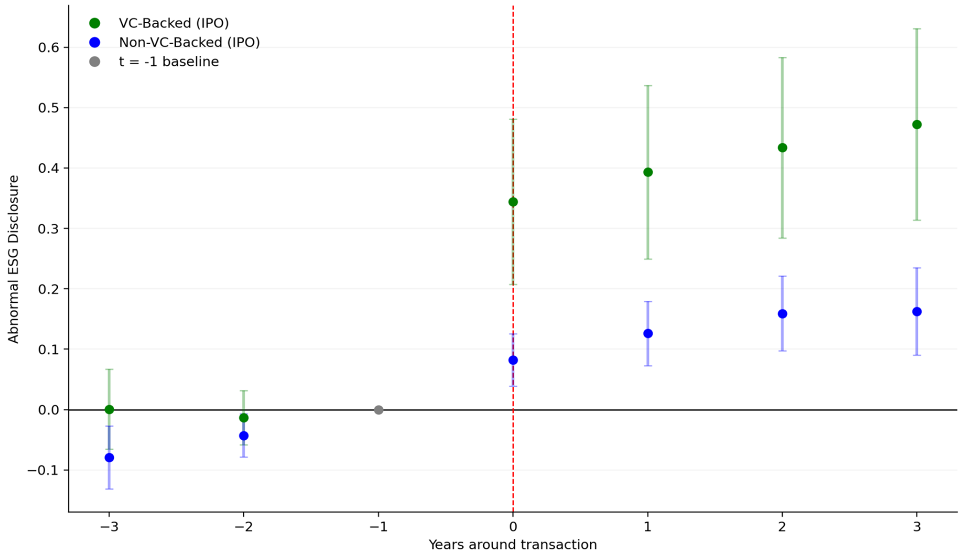

Figure 4.5: Panel A. Event-Time Abnormal ESG Disclosure Around IPOs.

Notes: Panel A plots event-time estimates of Abnormal ESG $\text{Ratio}_{i,t}$ for VC-backed and non-VC-backed firms over $\tau \in \{-3, -2, -1, 0, 1, 2, 3\}$, where $\tau = 0$ is the transaction year and $\tau = -1$ is the omitted reference year. Points report coefficient estimates and vertical bars denote 95% confidence intervals.

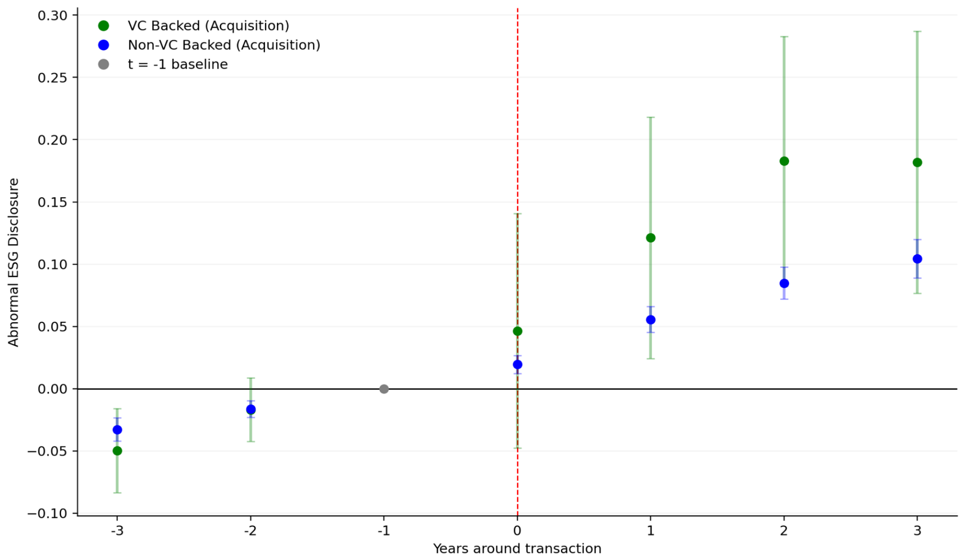

Figure 4.5: Panel B. Event-Time Abnormal ESG Disclosure Around Acquisitions.

Notes: Panel B plots event-time estimates of Abnormal ESG $\text{Ratio}_{i,t}$ for VC-backed and non-VC-backed firms over $\tau \in \{-3, -2, -1, 0, 1, 2, 3\}$, where $\tau = 0$ is the transaction year and $\tau = -1$ is the omitted reference year. Points report coefficient estimates and vertical bars denote 95% confidence intervals.

4.5.2 *Disclosure in the year preceding ownership transactions*

We next test whether disclosure in the year preceding IPOs and acquisitions differs across firm types. We estimate the following baseline specification:

$$Y_{i,t} = \beta_1 \, \text{IPOLead}_{i,t} + \beta_2 \, \text{AcqLead}_{i,t} + \gamma' X_{i,t} + \mu_t + \lambda_s + \varepsilon_{i,t}, \quad (4.4)$$

where i indexes firms and t indexes years. $Y_{i,t}$ represents four alternative disclosure outcomes: (i) ESG disclosure level $\ln(1 + \text{ESG}_{i,t})$, (ii) abnormal ESG disclosure indicator, (iii) change in ESG disclosure $\Delta \ln(1 + \text{ESG}_{i,t})$, and (iv) ESG disclosure initiation indicator. For continuous outcomes (i) and (iii), we estimate Equation 4.4 by OLS, whereas for binary outcomes (ii) and (iv), we estimate logit models. $\text{IPOLead}_{i,t}$ equals one if firm i is observed in the year immediately preceding an IPO, and zero otherwise; $\text{AcqLead}_{i,t}$ is defined analogously for acquisitions. $X_{i,t}$ includes firm-level controls ($\ln(\text{Firm Age}_{i,t})$ and $\text{HighGrowth}_{i,t}$), μ_t denotes year fixed effects, and λ_s denotes industry fixed effects. In alternative specifications, we replace $\mu_t + \lambda_s$ with year$\times$industry fixed effects. Beyond this baseline specification, we include VC-status indicators (Pre-VC, VC-backed, or Early/Late VC). In specifications based on VC-backed or Early/Late VC indicators, we further interact these indicators with $\text{IPOLead}_{i,t}$ and $\text{AcqLead}_{i,t}$ to test whether pre-transaction disclosure behavior differs between VC-backed and non-VC-backed firms.[15] Standard errors are clustered at the firm level, and the sample is restricted to the combined no-event and pre-event sample.

Table 4.11 reports results for ESG disclosure levels, with specifications (1) and (4) providing baseline estimates without VC-status controls. The IPOLead coefficient is positive but not significant, while the AcqLead coefficient is negative and significant, suggesting lower disclosure in the year before acquisitions. However, after adding VC status in specifications (2) and (5), the IPOLead coefficient becomes positive and highly significant, indicating higher disclosure in the year preceding an IPO for non-VC-backed firms relative to other firm-years. Using the unstandardized coefficients, the estimates (0.329 in specification (2) and 0.336 in specification (5)) imply increases of approximately 39% and 40%, respectively. By contrast, the interaction term IPOLead $\times$ VC Backed is negative and highly significant, implying that VC-backed firms do not exhibit the same pre-IPO increase. The combined effect for VC-backed firms is approximately -18% to -19%. Overall, these estimates suggest that disclosure behavior in the run-up to IPOs differs across VC-backed and non-VC-backed firms.

Furthermore, the decomposition of VC-backed firms by stage in specifications (3) and (6) reveals that early and late VC-backed firms exhibit negative and highly significant interactions. The Early VC interaction is stronger in magnitude than the Late VC interaction, but both remain highly significant. Combined with the baseline IPOLead effect, Early VC-backed firms show a net effect of approximately -37% to -38%, while Late VC-backed firms show a net effect of approximately -10% to -11%, both indicating lower disclosure in the year before IPOs relative to other firm-years. This suggests that the absence of pre-IPO disclosure increases holds across both VC financing stages, unlike the increase observed for non-VC-backed firms.

For acquisitions, the main effect remains negative across specifications, contrasting with the positive IPO effect. The coefficients indicate lower disclosure in the year before the acquisition (approximately 10% lower). Moreover, VC interactions are not statistically significant, suggesting that both VC-backed and non-VC-backed firms display similar pre-

[15] We do not interact Pre-VC with the lead indicators because pre-VC observations do not occur in the year immediately preceding ownership transactions in our sample construction.

Table 4.11: ESG Disclosure Before IPOs and Acquisitions.

	Ln (1+ESG)					
	(1)	(2)	(3)	(4)	(5)	(6)
IPOLead	0.0950	0.329***	0.317***	0.0967	0.336***	0.324***
	(1.61)	(4.18)	(4.11)	(1.63)	(4.27)	(4.20)
AcqLead	-0.0890***	-0.103***	-0.105***	-0.0891***	-0.102***	-0.105***
	(-5.40)	(-5.89)	(-6.04)	(-5.40)	(-5.88)	(-6.02)
Pre VC Backed		-0.159***	-0.175***		-0.163***	-0.180***
		(-4.03)	(-4.45)		(-4.13)	(-4.55)
VC Backed		-0.0594***			-0.0564***	
		(-4.62)			(-4.36)	
Early VC Backed			-0.121***			-0.116***
			(-8.09)			(-7.77)
Late VC Backed			0.0387**			0.0399**
			(2.17)			(2.22)
IPOLead x VC backed		-0.527***			-0.542***	
		(-4.43)			(-4.56)	
AcqLead x VC Backed		0.0331			0.0347	
		(0.58)			(0.61)	
IPOLead x Early VC backed			-0.687***			-0.700***
			(-4.61)			(-4.70)
IPOLead x Late VC backed			-0.419***			-0.436***
			(-2.74)			(-2.85)
AcqLead x Early VC Backed			0.00600			0.00709
			(0.08)			(0.09)
AcqLead x Late VC Backed			0.0708			0.0741
			(0.84)			(0.87)
Ln Firm Age	0.166***	0.154***	0.149***	0.166***	0.154***	0.149***
	(40.78)	(33.23)	(31.68)	(40.63)	(33.17)	(31.67)
High Growth	0.200***	0.199***	0.187***	0.196***	0.195***	0.183***
	(6.75)	(6.71)	(6.31)	(6.62)	(6.58)	(6.19)
Year-FE	Yes	Yes	Yes	No	No	No
Industry-FE	Yes	Yes	Yes	No	No	No
YearxIndustry-FE	No	No	No	Yes	Yes	Yes
Number of Obs.	214,487	214,487	214,487	214,487	214,487	214,487
Adjusted R-sq	0.057	0.057	0.058	0.058	0.058	0.058

Notes: Table 4.11 reports OLS estimates from Equation 4.4 where the dependent variable is $\ln(1 + \text{ESG}_{i,t})$. IPOLead$_{i,t}$ and AcqLead$_{i,t}$ indicate firm-years in the calendar year immediately preceding an IPO or an acquisition, respectively. Specifications add VC-status controls (Pre-VC and VC-backed) or decompose VC-backed observations into early- and late-stage indicators, and include interactions between VC-status indicators and the lead-year dummies. Columns (1)–(3) include year and industry fixed effects, while Columns (4)–(6) replace them with year$\times$industry fixed effects. Standard errors are clustered at the firm level. The sample is restricted to pre-exit observations. * stands for significant at 10%, ** significant at 5%, and *** significant at 1% level.

acquisition disclosure patterns, with neither group exhibiting disclosure increases.

Table 4.12 examines the same specifications using the abnormal ESG disclosure indicator. Results are consistent with Table 4.11. Non-VC-backed firms exhibit significantly higher propensity for abnormal disclosure in the year before IPOs across all specifications. When VC status is introduced in specifications (2) and (5), the IPOLead coefficient remains positive and highly significant for non-VC-backed firms, while the interaction term IPOLead $\times$ VC Backed is negative and significant, indicating that VC-backed firms do not exhibit this pre-IPO increase in abnormal disclosure propensity. Decomposing by VC stage in specifications (3) and (6), both Early and Late VC interactions are negative and significant, with the Early VC effect being stronger. For acquisitions, the main effect is negative and significant, indicating lower propensity for abnormal disclosure in year $t-1$, while VC interactions are not statistically significant. This is consistent with the results of Table 4.11, which show that firms do not increase disclosure before acquisitions, regardless of VC status.

Table 4.12: Abnormal ESG Disclosure Before IPOs and Acquisitions.

	Abnormal ESG Disclosure					
	(1)	(2)	(3)	(4)	(5)	(6)
IPOLead	0.119*	0.339***	0.332***	0.116*	0.338***	0.330***
	(1.82)	(4.00)	(3.99)	(1.77)	(3.99)	(3.97)
AcqLead	-0.0885***	-0.0976***	-0.101***	-0.0866***	-0.0963***	-0.0995***
	(-4.81)	(-5.01)	(-5.18)	(-4.70)	(-4.94)	(-5.11)
Pre VC Backed		-0.184***	-0.205***		-0.189***	-0.210***
		(-3.76)	(-4.19)		(-3.86)	(-4.28)
VC Backed		-0.0159			-0.0225	
		(-1.08)			(-1.52)	
Early VC Backed			-0.104***			-0.108***
			(-5.99)			(-6.19)
Late VC Backed			0.111***			0.101***
			(5.64)			(5.11)
IPOLead x VC backed		-0.537***			-0.541***	
		(-3.95)			(-3.98)	
AcqLead x VC Backed		0.0551			0.0499	
		(0.87)			(0.79)	
IPOLead x Early VC backed			-0.802***			-0.808***
			(-4.24)			(-4.27)
IPOLead x Late VC backed			-0.418**			-0.418**
			(-2.48)			(-2.48)
AcqLead x Early VC Backed			0.0502			0.0410
			(0.59)			(0.48)
AcqLead x Late VC Backed			0.0642			0.0643
			(0.70)			(0.70)
Ln Firm Age	0.166***	0.154***	0.149***	0.166***	0.154***	0.149***
	(40.78)	(33.23)	(31.68)	(40.63)	(33.17)	(31.67)
High Growth	0.200***	0.199***	0.187***	0.196***	0.195***	0.183***
	(6.75)	(6.71)	(6.31)	(6.62)	(6.58)	(6.19)
Year-FE	Yes	Yes	Yes	No	No	No
Industry-FE	Yes	Yes	Yes	No	No	No
YearxIndustry-FE	No	No	No	Yes	Yes	Yes
Number of Obs.	214,487	214,487	214,487	214,487	214,487	214,487
Pseudo R-sq	0.036	0.036	0.0367	0.036	0.037	0.037

Notes: Table 4.12 reports logit estimates from Equation 4.4 where the dependent variable is abnormal ESG disclosure. $\text{IPOLead}_{i,t}$ and $\text{AcqLead}_{i,t}$ indicate firm-years in the calendar year immediately preceding an IPO or an acquisition, respectively. Specifications add VC-status controls (Pre-VC and VC-backed) or decompose VC-backed observations into early- and late-stage indicators, and include interactions between VC-status indicators and the lead-year dummies. Columns (1)–(3) include year and industry fixed effects, while Columns (4)–(6) replace them with year$\times$industry fixed effects. Standard errors are clustered at the firm level. The sample is restricted to pre-exit observations. * stands for significant at 10%, ** significant at 5%, and *** significant at 1% level.

Tables 4.11 and 4.12 together indicate that non-VC-backed firms increase both their disclosure levels and their propensity for abnormal disclosure in the year before IPOs, consistent with strategic disclosure adjustments as the IPO approaches. By contrast, VC-backed firms do not exhibit these pre-IPO disclosure adjustments across VC financing stages. Before acquisitions, firms exhibit lower disclosure levels rather than increases, with both VC-backed and non-VC-backed firms behaving similarly. This suggests that strategic disclosure adjustments are specific to the IPO context and are primarily driven by non-VC-backed firms.

Table 4.13 shifts focus to the magnitude of disclosure adjustments by examining year-over-year changes in ESG disclosure. Baseline specifications (1) and (4) show that private firms exhibit year-over-year disclosure increases before IPOs (coefficients of 0.100 and 0.102), whereas acquisition-related changes are not statistically significant. This initial pattern supports the view that disclosure adjustments may concentrate around IPOs rather than acquisitions.

Table 4.13: ESG Disclosure Changes Before IPOs and Acquisitions.

	ESG Disclosure Change					
	(1)	(2)	(3)	(4)	(5)	(6)
IPOLead	0.100**	0.165***	0.165***	0.102**	0.167***	0.167***
	(2.37)	(2.95)	(2.97)	(2.41)	(2.98)	(3.00)
AcqLead	-0.0121	-0.00304	-0.00332	-0.0125	-0.00329	-0.00356
	(-1.06)	(-0.25)	(-0.27)	(-1.09)	(-0.27)	(-0.29)
Pre VC Backed		0.0559	0.0530		0.0558	0.0530
		(1.63)	(1.55)		(1.63)	(1.55)
VC Backed		0.0477***			0.0491***	
		(4.99)			(5.12)	
Early VC Backed			0.0371***			0.0392***
			(3.31)			(3.49)
Late VC Backed			0.0628***			0.0633***
			(4.87)			(4.89)
IPOLead x VC backed		-0.158*			-0.158*	
		(-1.85)			(-1.85)	
AcqLead x VC Backed		-0.0202			-0.0199	
		(-0.51)			(-0.50)	
IPOLead x Early VC backed			-0.210*			-0.208*
			(-1.95)			(-1.93)
IPOLead x Late VC backed			-0.120			-0.123
			(-1.11)			(-1.15)
AcqLead x Early VC Backed			-0.0631			-0.0636
			(-1.20)			(-1.21)
AcqLead x Late VC Backed			0.0304			0.0321
			(0.52)			(0.55)
Ln Firm Age	-0.0168***	-0.00794**	-0.00898**	-0.0171***	-0.00798**	-0.00896**
	(-5.18)	(-2.16)	(-2.42)	(-5.27)	(-2.17)	(-2.42)
High Growth	0.0687***	0.0681***	0.0659***	0.0684***	0.0677***	0.0656***
	(3.15)	(3.12)	(3.02)	(3.14)	(3.10)	(3.01)
Year-FE	Yes	Yes	Yes	No	No	No
Industry-FE	Yes	Yes	Yes	No	No	No
YearxIndustry-FE	No	No	No	Yes	Yes	Yes
Number of Obs.	181,933	181,933	181,933	181,933	181,933	181,933
Adjusted R-sq	0.001	0.001	0.001	0.001	0.001	0.002

Notes: Table 4.13 reports OLS estimates from Equation 4.4 where the dependent variable is $\Delta \ln(1 + \text{ESG}_{i,t})$. $\text{IPOLead}_{i,t}$ and $\text{AcqLead}_{i,t}$ indicate firm-years in the calendar year immediately preceding an IPO or an acquisition, respectively. Specifications add VC-status controls (Pre-VC and VC-backed) or decompose VC-backed observations into early- and late-stage indicators, and include interactions between VC-status indicators and the lead-year dummies. Columns (1)–(3) include year and industry fixed effects, while Columns (4)–(6) replace them with year×industry fixed effects. Standard errors are clustered at the firm level. The sample is restricted to pre-exit observations. * stands for significant at 10%, ** significant at 5%, and *** significant at 1% level.

Adding VC status controls in specifications (2) and (5) reveals that the positive IPO effect is driven by non-VC-backed firms, with coefficients rising to 0.165 and 0.167. These estimates indicate that non-VC-backed firms exhibit significantly larger disclosure changes in the year before IPOs. The interaction IPOLead $\times$ VC Backed is negative (-0.158) and significant at the 10% level with a net effect approaching zero. This suggests limited change in disclosure magnitude for VC-backed firms in the year before IPOs.

Specifications (3) and (6) decompose VC-backed firms by financing stages, yielding nuanced results. Early VC firms show negative interactions of -0.210 and -0.208, both significant at the 10% level, implying smaller disclosure changes relative to non-VC-backed firms in the year before IPOs. For Late VC firms, the interaction coefficients are not statistically significant (-0.120 and -0.123). However, untabulated results show that Late VC-backed firms do not exhibit significant disclosure changes in year $t-1$ relative to other years. This implies that both Early and Late VC-backed firms show no evidence of meaningful pre-IPO disclosure adjustments.

The AcqLead coefficient and the interaction coefficients AcqLead $\times$ VC status remain insignificant across all specifications, reinforcing that disclosure change patterns before acquisitions differ fundamentally from those before IPOs.

Finally, Table 4.14 examines ESG disclosure initiation, defined as the transition from zero to positive ESG disclosure. This measure allows us to assess whether firms begin disclosing ESG information in year $t-1$ before ownership transactions.

Results confirm the patterns documented in Table 4.13. Baseline specifications (1) and (4) show that firms are more likely to initiate disclosure before IPOs (coefficients of 0.235 and 0.232), while acquisition-related initiation is not statistically significant. Adding VC status controls in specifications (2) and (5), the IPOLead coefficient increases to 0.415 and 0.411, indicating that non-VC-backed firms are significantly more likely to initiate ESG disclosure before IPOs. The interaction IPOLead $\times$ VC Backed is negative and significant at the 10% level, indicating that the Pre-IPO increase in disclosure initiation is significantly weaker for VC-backed firms.

Decomposing by VC stage in specifications (3) and (6) reveals that Early VC interactions are negative and significant at the 5% level, while Late VC interactions are not statistically significant. However, as in Table 4.13, untabulated results show that Late VC firms do not exhibit a significant increase in ESG disclosure initiation in year $t-1$. Both Early and Late VC-backed firms thus show no evidence of strategic disclosure initiation before IPOs. Furthermore, consistent with Table 4.13, acquisition-related initiation effects remain insignificant across all specifications.

Results across Tables 4.11 through 4.14 provide consistent evidence that non-VC-backed firms adjust ESG disclosure in the year before IPOs across multiple dimensions. Non-VC-backed firms exhibit higher disclosure levels, higher propensity for abnormal disclosure, larger disclosure changes, and higher rates of disclosure initiation in year $t-1$ before IPO. By contrast, VC-backed firms do not undertake these pre-IPO adjustments. VC-backed firms maintain relatively stable disclosure in year $t-1$, with no significant increases in levels, changes, or initiation rates, regardless of financing stages. Before acquisitions, neither VC-backed nor non-VC-backed firms exhibit increases in disclosure, confirming that strategic disclosure adjustments are specific to IPO settings.

These results, combined with the event-study evidence in Figures 4.4 and 4.5, suggest

Table 4.14: ESG Disclosure Initiation Before IPOs and Acquisitions.

	ESG Disclosure Initiation					
	(1)	(2)	(3)	(4)	(5)	(6)
IPOLead	0.235**	0.415***	0.411***	0.232**	0.411***	0.408***
	(2.17)	(2.92)	(2.92)	(2.14)	(2.89)	(2.89)
AcqLead	-0.0825**	-0.0144	-0.0156	-0.0829**	-0.0151	-0.0162
	(-2.39)	(-0.38)	(-0.42)	(-2.40)	(-0.40)	(-0.43)
Pre VC Backed		0.176*	0.166*		0.172*	0.163*
		(1.87)	(1.77)		(1.83)	(1.73)
VC Backed		0.343***			0.345***	
		(13.10)			(13.12)	
Early VC Backed			0.313***			0.316***
			(10.27)			(10.34)
Late VC Backed			0.383***			0.384***
			(11.50)			(11.48)
IPOLead x VC backed		-0.426*			-0.425*	
		(-1.95)			(-1.95)	
AcqLead x VC Backed		-0.0539			-0.0522	
		(-0.52)			(-0.50)	
IPOLead x Early VC backed			-0.603**			-0.601**
			(-2.03)			(-2.02)
IPOLead x Late VC backed			-0.316			-0.317
			(-1.21)			(-1.22)
AcqLead x Early VC Backed			-0.0804			-0.0790
			(-0.58)			(-0.57)
AcqLead x Late VC Backed			-0.0272			-0.0258
			(-0.19)			(-0.18)
Ln Firm Age	-0.126***	-0.0560***	-0.0599***	-0.127***	-0.0568***	-0.0605***
	(-13.25)	(-5.04)	(-5.32)	(-13.33)	(-5.10)	(-5.37)
High Growth	0.387***	0.376***	0.369***	0.387***	0.377***	0.370***
	(7.23)	(7.02)	(6.88)	(7.24)	(7.02)	(6.89)
Year-FE	Yes	Yes	Yes	No	No	No
Industry-FE	Yes	Yes	Yes	No	No	No
YearxIndustry-FE	No	No	No	Yes	Yes	Yes
Number of Obs.	181,933	181,933	181,933	181,933	181,933	181,933
Pseudo R-sq	0.010	0.012	0.012	0.011	0.013	0.013

Notes: Table 4.14 reports logit estimates from Equation 4.4 where the dependent variable is ESG Disclosure Initiation. $\text{IPOLead}_{i,t}$ and $\text{AcqLead}_{i,t}$ indicate firm-years in the calendar year immediately preceding an IPO or an acquisition, respectively. Specifications add VC-status controls (Pre-VC and VC-backed) or decompose VC-backed observations into early- and late-stage indicators, and include interactions between VC-status indicators and the lead-year dummies. Columns (1)–(3) include year and industry fixed effects, while Columns (4)–(6) replace them with year×industry fixed effects. Standard errors are clustered at the firm level. The sample is restricted to pre-exit observations. * stands for significant at 10%, ** significant at 5%, and *** significant at 1% level.

that the disclosure increases documented in Section 4.4 for VC-backed firms reflect a gradual build-up over the financing cycle rather than strategic disclosure adjustments before exit. Non-VC-backed firms, by contrast, exhibit a pattern of pre-IPO disclosure increases consistent with disclosure serving as a signal to reduce information asymmetry in anticipation of public market entry.

4.6 Conclusion

We investigate how VC backing is associated with voluntary ESG disclosure among U.S. private firms. Our analysis combines PitchBook and Capital IQ data with historical website archives from the Wayback Machine to develop a website-based ESG disclosure measure for more than 36,000 private firms over 2013–2023. We validate this measure using external ESG scores, B Corp certification, and transaction-related disclosure patterns.

Our results show that VC-backed firms exhibit higher ESG disclosure than in the pre-VC period, with the effects concentrated in late financing stages. Disclosure in late rounds exceeds pre-VC levels by approximately 16–18%, driven by Environmental and Social components. Compared to non-VC-backed private firms, VC-backed firms begin with lower disclosure, close the gap over successive rounds, and overtake non-VC firms in the latest rounds.

Examining disclosure around ownership transactions reveals that VC-backed and non-VC-backed firms follow different pre-IPO disclosure patterns. Event studies first show that non-VC-backed firms display significantly lower disclosure in years $t-3$ and $t-2$ relative to $t-1$, consistent with an increase in disclosure in the year before IPOs, whereas VC-backed firms show no pre-event deviations. Additional tests confirm that non-VC-backed firms exhibit higher disclosure levels, larger year-over-year changes, and more frequent disclosure initiation before IPOs, while VC-backed firms do not. These patterns are IPO-specific, as neither group exhibits disclosure adjustments before acquisitions.

Therefore, these findings point to different disclosure trajectories. VC-backed firms develop disclosure capacity over the financing cycle, consistent with professionalization unfolding across VC financing rounds. Non-VC-backed firms, by contrast, increase disclosure in the year before IPOs, when disclosure incentives related to information asymmetry become more salient. Taken together, these patterns are consistent with documented responses to different organizational structures and market pressures.

These findings carry several practical implications for private market participants. For venture capital investors, the absence of a pre-exit disclosure run-up among VC-backed firms is informative. It suggests that ESG disclosure may be more credible when built progressively across financing rounds, rather than concentrated immediately before exit. Funds able to document stable disclosure trajectories across portfolio companies may therefore be better positioned during investor due diligence. The disclosure trajectory of portfolio companies thus mirrors the broader organizational professionalization that VC involvement produces, rather than reflecting exit-driven incentives.

For investors evaluating private firms ahead of IPOs, the pre-IPO disclosure increase observed among non-VC-backed firms should be interpreted with caution. The paper cannot determine whether this pattern reflects strategic signaling or heightened market pressures as the IPO approaches. It shows, however, that this pattern differs from the gradual disclosure development observed among VC-backed firms. Investors should therefore consider not only the level of ESG disclosure, but also its timing and trajectory.

Nonetheless, a limitation of our analysis is that it focuses on website-based disclosure and identifies systematic associations rather than causal effects of VC backing. Future research could extend this framework by examining alternative disclosure channels, richer measures of ESG communication quality, and settings that allow stronger causal identification. An additional avenue would be to study whether investors perceive gradual and transaction-driven ESG disclosure differently, and whether such differences are reflected in post-IPO pricing.

Chapter 5

Dry Powder Pressure and Private Equity Investment Choices

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Abstract. Private equity funds might accumulate unspent capital, or "dry powder", toward the end of a fund's investment period. This study investigates the deal selection of 431 US PE funds between 1986 and 2019 in relation with this buildup of dry powder. Our analysis reveals two types of reactions: some funds remain underinvested, while some funds accelerate capital deployment during the investment period. Funds in the latter category tend to select worse performing deals, use less leverage, and higher entry multiples than the former type of funds. These results are robust to the addition of controls on the characteristics of fund sponsors or the prevailing market conditions. Our empirical results finally suggest that the fund general partner's interest in maximizing the proceeds of management fees could affect fund capital deployment and deal selection.

Keywords: Dry powder, pressure to buy, management fees, PE contract, distortions, performance.

5.1 Introduction

Assets under management in private equity (PE) funds grew more than threefold during the last decade to reach $9.4 trillion by the end of March 2024. In a typical PE fund, general partners (GPs) seek ex-ante commitments from limited partners (LPs) and call the capital later when acquiring stakes in companies during the investment period. Consequently, part of the committed capital remains unused and serves as a buffer for future investments. In 2022, approximately $2.5 trillion have been raised but not yet invested.[1] This "dry powder" represents more than 25% of the committed capital in 2022 (and reaches a peak of over 50% in 2002). Moreover, the average delay put committed capital at work has increased over time and reaches up to three years, shortening the investment duration (Gourier et al., 2024). This paper examines whether slow capital deployment and the accumulation of unused capital at the end of the investment period create investment distortions and whether

[1]Source: Preqin Pro (2023)

it could negatively affect deal and fund performance, and as a consequence, PE investors' welfare.

We start by studying the capital deployment over the investment phase of 431 US buyout funds with vintage years ranging from 1985 to 2013 and liquidated as of 2022. Our analysis provides evidence of different investment patterns. The average fund in our sample deploys gradually more than 70% of its capital during the first four years. Consistent with Axelson et al. (2013), Robinson and Sensoy (2016), Ljungqvist et al. (2020), the capital deployment of the average fund in our sample is related to variables such as fund competition for deal flows, credit spread, and market opportunities. Given the recent evidence of Hüther (2023) on the significance of the GP fundraising activities in explaining capital deployment, we also consider how fundraising interacts with previous findings on capital deployment; we show that fundraising activities usually take place in good market conditions (low book-to-market multiples, low credit spread) and subsume the significance of variables related to market conditions in explaining fund capital deployment. Reputation however pointed out in Barber and Yasuda (2017) and Hüther (2023) barely affects our empirical model. From our first empirical analysis, we support previous evidence that the accumulation of dry powder is partly endogenous to market conditions and fund-specific. This makes the study of the effects of dry powder on fund investment decisions a non-trivial research question.

Zooming on funds that accumulate unused capital two years before the end of the investment period, we observe that two-thirds of them suddenly manage to deploy capital to reach a similar level to other funds at the end of the investment period. A probit model shows that market conditions only partially explain the propensity of funds to suddenly deploy their remaining capital. The consequences of this rush in capital deployment are ex-ante unknown. On the one hand, investors will benefit from a better proportion of capital at work, as investors bear opportunity costs on unused capital. On the other hand, if the fund is not able to offer investment opportunities that offer the risk-adjusted market rate, capital should be "returned" to investors according to finance theory. Using a propensity score model and a pooled OLS with fixed effects, we show that funds that suddenly deploy the remaining capital underperform (using traditional fund performance metrics such as multiples) other funds which face similar dry powder situation but stay underinvested.

To further understand the economic channel supporting these fund-level results, we collect information on 2,379 realized LBO deals whose investment years range from 1986 to 2019 (i.e. which fall within the investment phases of the 431 funds) using both Preqin and S&P Capital IQ. We work with different subsamples of deals varying according to data availability. We could retrieve leverage information for 639 deals (additional information was retrieved from DealScan accessible via the Refinitiv Loan Connector platform) and EBITDA entry multiples for 622 deals. We examine the features of deal performed by funds at the very end of the investment period (i.e. late deals) executed by funds with abnormally high level of dry powder (above median). While doing so, we control for market conditions, the fund opportunity set and its reputation. Using IRR and cash on cash return, we show that those deals underperform not only early deals but also late deals performed with normal levels of dry powder. We also analyse the difference in deal characteristics between funds which have the same level of dry powder very close (2 years from) to the end of investment period and show that deals undertaken by funds which suddenly deploy capital have a higher entry multiple, lower leverage, IRR, and cash on cash return.

Axelson et al. (2009) provide a theoretical framework for understanding our results. They show that ex ante equity financing motivates the fund sponsor – or general partner (GP) – in the early life of the fund to not invest in bad deals, as this would dilute overall fund performance. However, the authors acknowledge that GPs might be tempted to over-invest close to the end of the investment period in the event of large 'untapped' capital. Our analysis is consistent with these findings. We document that in case of large untapped capital at the end of the investment period, some GPs overinvest in lower-quality deals rather than reducing the capital commitment of the investors.

One possible explanation for the decision to deploy or not the remaining capital can be found in the fee structure. GPs are compensated for their services (deal generation, selection, structuring, value adding, exit) with a fixed component (management fee) and a performance-based component (carried interest). In the vast majority of leveraged buyout contracts, management fees are computed as a fraction of the committed capital during the investment period. However, the computation basis then switches to the net invested capital (which is invested capital excluding exited investments) during the divestment period. This situation occurs 84% of the time in buyout funds compared to only 42.6% for venture capital (VC) funds, according to the statistics provided by Metrick and Yasuda (2010). The level of dry powder of the fund thus has a direct impact on both components of the GP compensation and results in the following trade-off, especially for leveraged buyout funds: Having a high level of dry powder close to the end of the investment period means that GPs will lose part of their management fees after the switch, but maintain the valuable option to invest later if better opportunities arrive, which would result in a higher carried interest. This situation is typical of leveraged buyout (LBO) contracts. Buyout fund managers can become pressured because their contract imposes them a limited period to deploy their capital (generally of 5 years) or because the basis for fee computation changes from the investment to the harvesting phase. We find preliminary evidence consistent with the hypothesis that management fees play a role in the deal selection and fund capital deployment.

We interpret this situation as a potential source of misalignment between the GP and the LPs given that our results show large differences in deal performance between these two groups. This result is grounded in the agency costs related to free cash flow. As stated by Jensen (1986), corporate managers, as agents, might favor company growth to increase their compensation and power to the detriment of the equity holders, who are the principals. In a situation of excess internal funds and limited profitable investment opportunities, corporate managers can waste those internal funds to finance negative net present value projects instead of distributing the free cash flow to equity holders. This principal-agent framework also applies to PE funds for which LPs provide the capital and delegate the investment decisions to the GP. The GP's compensation structure in the form of both management and performance fees should align their incentives with the interests of LPs. However, in some circumstances, such as the accumulation of unspent fund commitments, a personal objective of GPs to maximize fee collection might enter into conflict with LP profit maximization. Accumulating a large amount of unspent fund commitments close to the end of the investment period might indeed force the GP to invest in inferior deals to collect higher management fees. We therefore reach a similar type of situation observed for corporate managers in companies with excess internal funds.

Some caveats apply to our work. Our study suffers from the usual limit in private equity data that use GP-sourced datasets such as Preqin as their main source. However, other databases sourced directly from investors – or limited partners (LPs) – could also bias the results as these investors have large bargaining power. In GP-sourced data like ours, one could hypothesize that funds would not report bad late deals to Preqin or that funds with high dry powder would not report. As a consequence, this situation is more likely to lead to an underestimation – rather than overestimation – of the true impact we try to measure. Moreover, the examination of the effects of dry powder on deal distortions and performance suffers from endogeneity issues. Dry powder is correlated with fund characteristics that, in turn, are correlated with deal and fund performance. An example is GP quality. High-quality GPs may have a better deal flow and face a lower level of dry powder at the end of the investment period. Furthermore, deals of high-quality GPs may be associated with better performance. In this situation, we would observe a negative correlation between high dry powder and performance, but this effect would be driven by an unobserved GP quality. To account for unobserved GP quality, we rerun our main deal-level regressions with GP-fixed effects as a robustness test. Our results are also robust to the time-varying characteristics of GPs such as the reputation of the GP or its fundraising activity. Given that the propensity to deploy dry powder can be related to fund characteristics and that fund characteristics can be associated with deal characteristics, we test the robustness of our main results using an instrumental variable to estimate the exogenous part of dry powder. Our results stay robust.

We contribute to the recent literature analyzing potential fund buying pressure related to fundraising (Hüther, 2023) or fee structure (Song, 2023), as well as documenting higher activity in secondary buyouts in times of buying pressure (Arcot et al., 2015; Degeorge et al., 2016). Hüther (2023) determines that, closer to fundraising, funds with low reputation (measured as past performance and difficulty in fundraising) deploy their dry powder faster than other funds and make bad deals. Our paper takes another stance as it zooms on funds that accumulated dry powder for diverse reasons. In our analysis, the majority of these funds tend to overinvest regardless of whether the GP is currently (or will be) in fundraising. While fundraising is an important variable to determine whether the funds are more likely to accumulate dry powder (also confirmed in our empirical set up), fundraising is not any more significant when explaining fund capital deployment of funds who had accumulated dry powder. In addition, Arcot et al. (2015) show that funds with buying pressure are more likely to execute SBOs. Degeorge et al. (2016) show that SBO deals bought late with excess cash under-perform while PBOs do not. We demonstrate a more general effect, and our results suggest that these findings go outside the SBO markets. However, we could not relate this phenomenon to the characteristics of GP.

Our research also contributes to the literature on PE performance by analyzing whether the GP maximizes the value for LPs. Most of the papers conclude to outperformance when they compare PE raw returns to public market returns (Chung et al., 2012; Harris et al., 2014; Robinson and Sensoy, 2016). However, several methodological issues remain to be solved, such as how to measure risk in PE or what is the appropriate benchmark for performance (Phalippou and Gottschalg, 2009; Brown et al., 2019; Phalippou, 2020). Our paper does not focus on these methodological issues, but highlights how GP overinvestment could impact fund performance.

The literature studying the direct effects of dry powder is scarce. Yet, we observe a growing interest in the academic literature in studying how private equity funds deploy capital. Recently, Jelic et al. (2021) examine the potential earnings management of PE funds and show that they are more likely to misbehave if the GP faces funding pressure. They provide evidence that dry powder mitigates incentives for earnings management. Similar findings on reported returns and net asset value can be found in Barber and Yasuda (2017) and Brown et al. (2019). Several studies examine profit sharing agreements between GP and LPs, mobilizing the agency theory to understand potential effects of fees (Robinson and Sensoy, 2013; Song, 2023). Robinson and Sensoy (2013) reveal that funds tend to delay exit when the basis for fee computation switches to invested capital and exit early around waterfalls to secure their carry.[2]

This paper proceeds as follows. Section II develops the theoretical framework and derives the hypotheses. Section III describes the fund-level and deal-level data. Section IV presents the main empirical fund-level analyses. Section V presents our results on the deal dataset. Section VI provides robustness tests. Finally, Section VII concludes the paper.

5.2 Theoretical Framework and Hypotheses

5.2.1 Dry powder, agency costs, and capital deployment

In the theory of the firm, contracts and managerial incentives are designed to reduce agency conflicts between principals and agents (Jensen and Meckling, 1976). These mechanisms, however, may not eliminate agency costs entirely. In leveraged buyout funds, LPs commit capital ex ante and delegate investment decisions to the GP, who has discretion over the deployment of this capital during a finite investment period. This discretionary control over committed capital makes the setting closely related to the agency costs of

[2]Robinson and Sensoy (2013) do not find inefficiency in the GP-LP contract, but demonstrate that, under certain circumstances, GPs can exploit some contractual features such as exit decisions to magnify their fee collection.

free cash flow. In the free cash flow framework, Jensen (1986) argues that when managers control resources that are not immediately paid out to investors, they may overinvest these resources in negative net present value projects rather than returning them to capital providers.

Axelson et al. (2009) provide a private-equity-specific framework for this argument. In their model, ex ante fund financing can discipline GPs early in the fund life because investing in bad deals dilutes overall fund performance. However, once capital has been committed, GPs retain discretion over its deployment. When a fund approaches the end of the investment period with large untapped capital and too few attractive projects, this discretion can create pressure to put capital to work, leading GPs to invest in lower-quality deals rather than leave capital undeployed. In this case, the problem is not dry powder itself, but the possibility that accumulated dry powder creates suboptimal capital deployment incentives near the end of the investment period.

The contractual structure of buyout funds can reinforce this pressure. Management fees are typically computed on committed capital during the investment period, but often switch to invested or net invested capital during the divestment period (Metrick and Yasuda, 2010). A GP approaching the end of the investment period with substantial dry powder may therefore face a trade-off between preserving the option to wait for better deals and avoiding a reduction in future fee income. This fee-based incentive provides one reason why the pressure to put capital to work may persist even when remaining investment opportunities are less attractive.

Consequently, if late-period capital deployment reflects distorted incentives rather than attractive investment opportunities, funds that rapidly deploy accumulated dry powder should underperform comparable funds that remain underinvested.

Hypothesis H1. Funds that rapidly deploy accumulated dry powder near the end of the investment period underperform comparable funds that remain underinvested.

5.2.2 Dry powder pressure and deal selection

If late-period deployment reflects investment pressure, the consequences should be visible not only at the fund level but also in the characteristics of the deals selected. A GP facing pressure to put capital to work may accept lower-quality investment opportunities, pay higher entry prices, or deviate from the usual financing structure of leveraged buyouts. These distortions should be particularly relevant for deals executed late in the investment period by funds that still hold high levels of dry powder.

This prediction is consistent with prior work on buying pressure in private equity. Arcot et al. (2015) show that funds under pressure are more likely to execute SBOs and that pressured buyers pay higher multiples, use less leverage, and syndicate less. In the same vein, Degeorge et al. (2016) show that SBOs bought late with excess cash underperform, while SBOs made without such pressure perform similarly to other buyouts. More recently, Hüther (2023) documents that funds under fundraising pressure deploy dry powder faster and undertake suboptimal deals. These studies suggest that deployment pressure can affect deal selection and performance.

In our setting, dry powder pressure should therefore be reflected in deal-level distortions. Late deals executed by high-dry-powder funds should underperform other deals and exhibit characteristics consistent with weaker investment discipline. In particular, if GPs deploy capital despite a less attractive opportunity set, these deals should be associated with higher entry multiples, lower leverage, and lower realized performance.

Hypothesis H2. Late deals executed by funds with high dry powder exhibit investment distortions, reflected in higher entry multiples, lower leverage, and lower deal performance.

5.2.3 Management fees as an incentive channel

The fee-based mechanism discussed above also implies cross-sectional variation in the severity of deal distortions. If the pressure to deploy dry powder is partly driven by the risk of losing management fee income after the investment period, the distortions documented in late deals should be stronger when management-fee incentives are more salient. This prediction follows from the contractual structure of buyout funds, where the compensation basis often changes after the investment period and can therefore make uninvested commitments less valuable for the GP (Metrick and Yasuda, 2010).

Prior work shows that contractual features can affect GP behavior. Robinson and Sensoy (2013) document that GPs exploit certain contractual features, such as exit timing, in ways that can increase fee collection. Related evidence also links PE investment behavior to fee incentives and buying pressure (Song, 2023).

If management fees contribute to dry powder pressure, the deal-level distortions predicted in Hypothesis H2 should be stronger when management-fee incentives are more salient. Under this mechanism, late deals executed by high-dry-powder funds should display weaker investment discipline when the GP has stronger incentives to preserve fee income.

Hypothesis H3. The deal-level distortions associated with late-period dry powder pressure are stronger when GPs face stronger management-fee incentives.

5.3 Data and Descriptive Statistics

Our database is the result of a merge of three datasets: Preqin, S&P Capital IQ and DealScan from Refinitiv-LSEG.

Sourcing from the Preqin database, we gathered 1,231 US LBO funds with vintage years ranging from 1985 to 2013, all of which were liquidated in 2022. Our sample drops to 431 funds when requiring availability of dry powder information of these funds. We define dry powder as a variable that varies over time, measuring the fraction of uninvested capital over the total committed capital of a fund.[3] Therefore, it represents the percentage of

[3] Dry powder is computed as one minus the ratio of the total amount of the transactions (invested capital) to the committed capital.

committed capital that has not yet been invested. We construct the dry powder variable using the Private Capital Cash Flow Module from Preqin.

Despite an important dropout rate (i.e. 65%), our sample size is comparable to previous international studies that also use Preqin: Brown et al. (2015) report 836 funds from 1984 to 2010 in North America, while Hüther (2023) reports 851 North American funds with vintage years between 1996 and 2010. Our sample focuses on the US market, which constitutes approximately 88% of the Preqin North American sample.

Then, we matched the sample of LBO funds with their corresponding US deals, merging information from Preqin and S&P Capital IQ. We were able to retrieve a total of 6,376 fully realized deals. We focus on their US deals to minimize the effects of accounting rules on reporting deal characteristics (such as EBITDA).[4] Finally, we complete information on leverage on these deals using Refinitiv Loan Connector, which includes access to DealScan, a source of historical information on global loans. However, requiring some minimum information to conduct our deal-level analysis – such as the entry price, entry multiple, cash return, deal size and duration, leverage – our largest sample drops to 2,379 deals, with an investment year between 1986 and 2019. Data available on private deals are scarce. For comparison, the recent paper of Hüther (2023) works with a sample of 1,187 fully realized deals. Braun et al. (2017) report a sample of 3,121 fully realized deals in North America from 1974 to 2010, of which Preqin reports that US deals represent 92%.

5.3.1 Fund-level data

Table 5.1 – Panel A displays summary statistics on the 431 funds sponsoring LBO deals. Definitions of fund variables are presented in Table D1.

The average fund size (measured by the committed capital) is approximately \$2 billion.[5] The average total value over paid-in capital (TVPI) at the end of the fund life, which sets distributions in relation to the invested capital, is 1.75. This value is comparable to those reported in previous studies (Harris et al., 2014).[6] The average Kaplan-Schoar Public Market Equivalent (KS-PME) at the end of the fund life is 1.38.[7] The average management fee is 1.81%, with a standard deviation of 37 basis points and a large positive skewness, and the average carried interest amounts to 19.92%.[8]

The mean value of dry powder as a percentage of the committed capital three years after the vintage year is 26%, with a standard deviation of 17%. This means that on average about 75% of the investments in our sample are made within the first three years after the

[4] We could also retrieve 306 international deals for these US funds. These deals share similar characteristics to the US deals. All our empirical results are valid when these observations are added. Results are available upon request.

[5] Similar to other studies (Robinson and Sensoy, 2016; Brown et al., 2019; Jenkinson et al., 2021), we observe a large standard deviation for this variable in our sample.

[6] Harris et al. (2014) display an average TVPI of 1.72 for buyout funds.

[7] KS-PME is the ratio of the present value of calls over the present value of distributions plus the residual net asset value (NAV). In contrast to TVPI, KS-PME accounts for the time value of money using the S&P500 as the minimum remuneration. The discount rate comes from the public market index return; we use the S&P500.

[8] Our data on carried interest lack variation; 92% of the funds report a carry of 20%.

Table 5.1: LBO funds: Summary Statistics.

Panel A: LBO Funds	Mean	Sd	25th Perc.	Median	75th Perc.	N
Fund Characteristics						
Fund Size (in $million)	2,039.6	2,999.3	418.4	900	2,300	431
TVPI	1.748	0.625	1.365	1.665	2.088	431
KS-PME	1.381	0.734	0.88	1.306	1.763	431
Management Fees (in %)	1.812	0.373	2	2	2	159
Carried Interest (in %)	19.924	2.946	20	20	20	195
Dry Powder Information						
DP Y3	0.260	0.173	0.124	0.257	0.386	431
DP Y4	0.148	0.127	0.033	0.127	0.228	431
DP Y5	0.088	0.095	0.000	0.065	0.133	431
DP Y6	0.059	0.078	0.000	0.029	0.097	431
DP Change (Y4-Y6)	0.088	0.10	0.008	0.059	0.146	431
GP Information						
Low Reputation	0.413	0.493	0	0	1	431
Fundraising Y4-Y6	0.548	0.498	0	1	1	431
Past TVPI	1.709	0.658	1.213	1.629	2.102	239
Past KS-PME	1.373	0.817	0.858	1.398	2.015	239

Panel B: High vs. Low Dry Powder Y4 LBO Funds	High Dry Powder Y4			Low Dry Powder Y4			T-Test
	Mean	Sd	N	Mean	Sd	N	High-Low
Fund Characteristics							
Fund Size (in $million)	1,901.6	3,081.9	149	2,518.4	3,060.5	147	-616.8*
TVPI	1.551	0.504	149	1.936	0.614	147	-0.385***
KS-PME	1.104	0.648	149	1.595	0.724	96	-0.492***
Management Fees (in %)	1.872	0.368	57	1.750	0.367	46	0.123*
Carried Interest (in %)	19.14	3.83	67	20.43	2.04	70	-1.291**
DP Information							
DP Y3	0.415	0.133	149	0.115	0.111	147	0.300***
DP Y4	0.287	0.097	149	0.024	0.031	147	0.263***
DP Y5	0.167	0.102	149	0.016	0.029	147	0.154***
DP Y6	0.110	0.099	149	0.013	0.027	147	0.097***
DP Change (Y4-Y6)	0.177	0.111	149	0.012	0.025	147	0.166***
GP Information							
Low Reputation	0.456	0.500	149	0.347	0.478	147	0.109*
Fundraising Y4-Y6	0.510	0.502	149	0.571	0.497	147	-0.061
Past TVPI	1.592	0.580	67	1.857	0.756	96	-0.266**
Past KS-PME	1.281	0.79	67	1.453	0.838	96	-0.172*

Notes: Panel A displays summary statistics on 431 US LBO funds with vintage years ranging from 1985 to 2013, all liquidated in 2022 (source: Preqin). Panel B split funds into terciles according to their level of dry powder at vintage year +4 (Y4). "High Dry Powder Y4" and "Low Dry Powder Y4" refer to the groups of funds in the third and first tercile respectively, among funds of similar vintage year (i.e. that falls into a 5-year period; because the group reference changes over time, the funds can not be split evenly across the three categories). * stands for significant at 10%, ** significant at 5%, and *** significant at 1% level. Definitions of fund variables are presented in Appendix – Table D1.

vintage year. This is consistent with market practice and the earlier findings. Ljungqvist and Richardson (2003) observed that 50% of the funds invested 70% of their committed capital in the first three years. Similarly, Giot et al. (2014) and Metrick and Yasuda (2010) report the same level of dry powder, with 74% and 75% in the third year of the fund, respectively. The mean dry powder (as a % of committed capital) drops to 15% one year later, i.e. four years after the vintage year. Between Y4 and Y6, dry powder decreases by approximately 9%, but there is substantial variation between funds and some funds still display a large level of dry powder at the end of vintage year + 6 (about 15% for the top tercile dry powder funds).

We finally investigate the characteristics of the sponsors. We build a "GP low reputation" variable by following Barber and Yasuda (2017) who define less reputed GPs as small, young and lacking strong performance track record.[9] Our sample includes approximately 41% of funds run by low-reputed PE firms. Second, we build a fundraising dummy equal to 1 if the PE firm is in the fundraising phase for a follow-up fund when the tested fund is close to the end of the investment phase (i.e., from vintage years + 4 to + 6). More than 50% of the funds have a follow-up fund in fundraising in that period.

Table 5.1 – Panel B displays descriptive statistics on LBO funds sorted according to their respective levels of dry powder in vintage year + 4. "High-dry powder Y4" and "Low-dry powder Y4" refer to the groups of funds in the third and first terciles of dry powder among funds of similar vintage years.[10] Compared to the other group, LBO funds with high levels of dry powder display significantly lower TVPI and KS-PME. Finally, LBO funds with top tercile dry powder tend to be less frequently in a fundraising phase, to exhibit a lower size, to be managed by less reputed GPs, and by GPs with lower past performance.

As in other papers relying on data mostly reported by PE funds, we acknowledge that our sample could suffer from a selection bias. We perform a probit analysis (following Cressy et al. (2007)) to investigate the propensity to report dry powder information. The results of the probit analysis are shown in Table 5.2. We control for fund and GP characteristics using variables already displayed in Table 5.1. We also include a dummy variable that indicates whether the GP reported dry powder information for the previous fund in the same series. The latter variable is further split into two dummies: the first (second) variable is equal to 1 if the GP already displayed high dry powder (i.e. at or above median) (resp. low, below median) dry powder at vintage year + 4 for the previous fund.

The probit analysis reveals that larger funds and funds for which the GP already displayed dry powder information for their previous fund tend to more frequently disclose

[9]Following Barber and Yasuda (2017) this means "small" (less than $1B of accumulated committed capital before the tested fund), "young" (less than 3 funds launched before the tested fund) and "lacking of a strong performance record" (we use Preqin dummy indicating whether a fund is a top quartile among a peer group made of fund of similar vintage years and geographical focus.

To qualify for this last condition, the GP should not have any top quartile funds in the same fund series (the same investment strategy) at the time of the inception of the fund). This represents a triple condition. If one of the three conditions fails, the fund is not classified as "Low Reputation".

[10]We aggregate funds in cohorts based on their vintage years, using a five-year period, starting in 1985 such as 1985-1989. For instance, funds with a vintage year from 1985 to 1989 or funds with a vintage year from 1990 to 1994 are grouped.

dry powder information to Preqin. We do not observe any difference in the propensity to report information between GPs with high and low dry powder in their previous fund (see Column (2)).[11] Furthermore, funds for which the GP already reported performance metrics for previous funds – within similar series – tend to report more frequently dry powder information; however, we do not find differences across the performance quartiles (the reference category in the regression are past funds for which we do not have performance metrics). Funds for which the GP is currently in fundraising activity tend to report their dry powder information more frequently. However, GPs with a better reputation are less likely to report dry powder information.

Table 5.2: Dry Powder Disclosure: Probit Analysis.

	$\mathbb{P}$(DP Disclosure)	
	(1)	(2)
Past Fund DP Inform.	0.400***	
	(0.108)	
Past Fund Low DP (Y4)		0.393***
		(0.130)
Past Fund High DP (Y4)		0.411***
		(0.151)
Q4 Past Perf.	0.569***	0.570***
	(0.128)	(0.128)
Q3 Past Perf.	0.427***	0.426***
	(0.122)	(0.122)
Q2 Past Perf.	0.568***	0.567***
	(0.130)	(0.130)
Q1 Past Perf.	0.650***	0.650***
	(0.171)	(0.171)
Ln Fund Size	0.341***	0.341***
	(0.0389)	(0.0390)
GP Low Reputation	0.475***	0.475***
	(0.103)	(0.103)
Fundraising Y4-Y6	0.141*	0.142*
	(0.0824)	(0.0826)
Number of Observations	1,231	1,231
Pseudo R^2	0.1345	0.1345

Notes: This table displays the results of a probit regression where the dependent variable is whether the private equity fund discloses dry powder (DP) information. The analysis is performed on 1,231 US LBO funds with vintage years ranging from 1969 to 2013, all liquidated in 2022 (source: Preqin). Among those funds, 431 report dry powder information. "Past Fund Low DP" ("Past Fund High DP") variable is defined as equal to one if the dry powder in vintage year + 4 (Y4) of the previous family fund is below or equal (resp. above) the sample median dry powder of funds following the same strategy and having the same vintage year. * stands for significant at 10%, ** significant at 5%, and *** significant at 1% level. Definitions of fund variables are presented in Appendix – Table D1.

Although the probit analysis does not suggest any self-selection in dry powder reporting related to fund performance, we cannot rule out the fact that since our data are mostly sourced from GPs they might be biased towards what is best for funds to report. However, should our thesis hold, our results would most probably be underestimated: Funds with large investment distortions related to their dry powder would be reluctant to reveal the dry powder. This suggests that the real effect would be even larger. Some papers have access to less biased data, but the sample is generally small. For example, Hüther (2023) uses a sample of 121 funds, while Song (2023) does not have access to deal information.

[11] We perform an incremental analysis (untabulated), and we do not find any significant difference.

Furthermore, the direction of bias for other databases sourced from LPs with a large bargaining power is unclear.

5.3.2 *Deal-level data*

Table 5.3 displays descriptive statistics on the LBO deals. The definitions of the deal variables are presented in the Table D2.

Table 5.3: LBO Deals: Summary Statistics.

	Panel A: All Deals				
	Mean	Sd	25th perc	75th perc	N
Deal Characteristics					
Deal Size (in $million)	821.018	1,1315.5	100	900	2,379
Deal Club	1.688	1.195	1	2	2,379
Investment Duration	4.884	2.403	2	7	1,797
Target Revenues (in $million)	1,019.4	1,411.6	180	1,200	986
Cash Return	2.129	2.276	0.498	2.615	966
IRR (in %)	9.932	32.653	-2.493	26.276	966
Leverage	0.597	0.209	0.445	0.738	639
EBITDA Margin	0.164	0.097	0.083	0.234	622
EV/EBITDA Multiple	10.305	4.979	7.143	12.96	622
Fund Characteristics					
Fund Size (in $million)	3,811.1	4,818.5	750	4,700	2,379
Fundraising	0.287	0.452	0	1	2,379
GP Low Reputation	0.348	0.476	0	1	2,379
Carried Interest (in %)	20.3	2.480	20	20	1,133
Management fees (in %)	1.79	0.336	1.5	2	978

	Panel B: Late Deals						
	High Dry Powder			Low Dry Powder			T-test
	Mean	Sd	N	Mean	Sd	N	High-Low
Deal Characteristics							
Deal Size (in $million)	519.1	808.8	192	914.1	1,338.6	185	-394.9**
Deal Club	1.526	1.193	192	1.789	1.172	185	-0.263**
Investment Duration	4.831	2.259	159	4.320	2.203	159	0.510*
Target Revenues (in $million)	780.93	1,154.56	85	906.30	1,209.19	89	-125.37
Cash Return	1.870	2.178	82	2.178	2.246	87	-0.308
IRR (in %)	6.87	26.70	82	13.13	35.77	87	-6.27
Leverage	0.538	0.196	55	0.619	0.203	55	-0.081**
EBITDA Margin	0.181	0.097	49	0.183	0.124	51	0.06
EV/EBITDA Multiple	11.277	4.615	49	10.392	5.416	51	0.463
Fund Characteristics							
Fund Size (in $million)	2,890.8	3,780.9	192	4,927.5	5,107.4	185	-2,036.668***
Fundraising	0.365	0.483	192	0.432	0.497	185	-0.068**
GP Low Reputation	0.370	0.484	192	0.276	0.448	185	0.094*
Carried Interest (in %)	20.947	3.175	75	20.414	2.021	87	0.532
Management fees (in %)	1.845	0.247	55	1.730	0.289	63	0.115*

Notes: This table displays summary statistics on a sample of deals performed between 1986 and 2019 by 431 US funds. Panel A displays descriptive statistics of all LBO deals and Panel B only considers deals completed at and after vintage year + 4 according to the level of dry powder of their funds. All deal variables are winsorized at the 1% level, except deal club. * stands for significant at 10%, ** significant at 5%, and *** significant at 1% level. Definitions of deal variables are presented in Appendix – Table D2.

Panel A presents statistics for the full sample of US deals performed by the 431 LBO funds. All variables are winsorized at the 1% level, except for the variable deal club for which a symmetric winsorization is not feasible. Our LBO deals have an average duration of five years and an average total enterprise value of $821 million. The cash return (multiple) is slightly greater than 2, the EV / EBITDA entry multiple is approximately 10.3, with a debt-to-enterprise value (leverage) close to 60%. We convert the cash return into an IRR measure using the duration of the deal. The average IRR is 10% close to the value reported in Barber and Yasuda (2017) and Robinson and Sensoy (2016). The standard deviation is large (almost 33%); it is not rare to see PE funds reporting large extreme IRRs.[12] The summary statistics are similar to other studies (Axelson et al., 2013; Arcot et al., 2015; Robinson and Sensoy, 2016; Hotchkiss et al., 2021).[13]

Panel B focuses on late LBOs (performed at or after vintage year + 4) and compares deal characteristics (e.g., the entry EV/EBITDA multiples, leverage, size, and cash return) for late deals executed by funds classified in the top and lowest tercile of dry powder one quarter before the deal is executed. In this raw analysis without controls, the differences in leverage, deal size, and syndication are significant. Funds sponsoring late deals and accumulating dry powder (in percentage of the committed capital) close to the end of the investment period differ in terms of size and fundraising phase: These funds tend to be smaller and less frequently in a fundraising phase.[14] Following Chung et al. (2012) and Hüther (2023), we expect funds open to fundraising to have reduced levels of dry powder.

5.4 Fund Capital Deployment and Performance

This section tests Hypothesis H1 by examining whether funds that rapidly deploy accumulated dry powder near the end of the investment period underperform comparable funds that remain underinvested. We first reconcile the previous literature on the process that leads to the accumulation of dry powder. We then analyze the investment behavior of funds that did accumulate dry powder over the investment period. In particular, we examine their capital deployment decisions during the rest of the investment phase and their related performance.

5.4.1 Fund capital deployment up to vintage year +4

To understand how private equity funds deploy their capital over the investment period, we employ a duration model and model the time the private equity funds take to deploy their committed capital during the first part of the investment period (from the vintage

[12] For instance, one example in our sample is the deal on the company Horizon Line which was acquired by Carlyle Group on December 5, 2002, for a price of $300 million. Eighteen months later, on May 23, 2004, Carlyle Group sold Horizon Line for a price of $650 million, which constitutes a cash return of 2.16 and an IRR of 67%. Robinson and Sensoy (2016) also report a standard deviation of 28% for the IRR.

[13] Arcot et al. (2015) display an average total enterprise value of $886 million and an average sales multiple of 1.36. Hotchkiss et al. (2021) report average target revenues of $1,678 million and an average EBITDA margin of 15%. Barber and Yasuda (2017) display an average IRR of 11.1% and Robinson and Sensoy (2016) of 12%. Finally, Axelson et al. (2013) has an average EV / EBITDA of 8.2.

[14] PE firms usually raise capital for a new fund every three to five years (Chung et al., 2012). Some funds have a clause requiring that 70% of their committed capital must be invested before launching a new fund (Financial Times, June 18, 2019, "Private equity groups prepare to raise mega funds.")

year to vintage year +4). Following Hüther (2023) and Ljungqvist et al. (2020), we use a Weibull distribution to account for the fact that the hazard to be fully invested increases with time. As in Ljungqvist et al. (2020), we consider the threshold of 70% which corresponds to the usual contractual minimum required to raise follow-up funds. Our model therefore combines in one model all the explanatory variables documented by the literature so far.

We start by considering the same model as in Ljungqvist et al. (2020), including variables that capture the characteristics of the funds and market conditions. This includes (i) a proxy for investment opportunities measured by the annual value-weighted book to market calculated from all listed US available in Compustat, (ii) two proxies for capturing competition for deal flows (measuring the total cash to deploy by all US buyout funds sharing the same vintage year and expressed in logarithm and in dollars adjusted for 2010 purchasing power, or measuring the concentration of uninvested capital though the Herfindahl index, the more concentrated, the less competition), (iii) and finally a proxy capturing the cost of capital using the annual credit spread between corporate BAA bonds and 3-month treasury bills (high credit spread periods are defined as periods where the credit spread is above the median value) such as in Hüther (2023). We add a dummy variable on fund reputation similar to Barber and Yasuda (2017) and on fundraising similar to (Hüther, 2023) to capture whether the fund is currently in fundraising or preparing a fundraising (considering a lag of 1 year).[15] We include vintage-year fixed effects (grouped by period of 5 years, starting at 1985 to 1989) to distinguish time effects from specific market conditions in the private markets. In other words, this allows us to analyze the capital deployment within cohorts of funds facing the same economic conditions.

Table 5.4 presents the results.

Column 1 replicates Ljungqvist et al. (2020) for a threshold of 70%. We observe that capital deployment slows down when market opportunities become scarce (in case the book-to-market index becomes higher than its median value over the period) or in times of higher competition among buyout funds (proxied by high quantity of capital to be deployed or low market concentration of the uninvested capital across many private equity funds). Tighter credit conditions will also delay capital deployment, as also demonstrated theoretically in Axelson et al. (2009). Columns 3 and 4 add successively two variables: the fund low reputation and the fundraising activity of the fund. While the competition for deal flow continues to impact capital deployment when adding fund reputation or fundraising activity, the proxy for market opportunities gets insignificant due to its correlation with fundraising activity. Starting a fundraising phase accelerates capital deployment and fundraising tends to occur in good market conditions described by low book-to-market ratio. Funds of larger size also tend to deploy capital faster. This analysis reconciles the previous literature on the main economic variables that influence capital deployment. This explains why some funds tend to accumulate capital at the end of the investment period. As discussed in (Robinson and Sensoy, 2016), the accumulation of dry powder is

[15]Contrary to Hüther (2023), we also consider if the fund is currently in fundraising.

Table 5.4: Duration Model: Time to Drawdown 70% of Capital.

	Time to Drawdown 70% of Committed Capital				
	(1)	(2)	(3)	(4)	(5)
Economic Variables					
High Value-Weighted Mean BM Ratio	0.291***	0.291***	0.293***	0.140	0.145
	(2.62)	(2.60)	(2.61)	(1.28)	(1.32)
High Credit Spread	0.235**	0.234**	0.232**	0.136	0.121
	(2.03)	(2.02)	(2.01)	(1.31)	(1.16)
Competition for Deal Flow					
Ln Real Funds Size, same vintage year	0.216***	0.209***	0.205***	0.0660	0.0589
	(3.07)	(2.98)	(2.91)	(0.99)	(0.88)
DP Industry Concentration	-0.366**	-0.350**	-0.353**	-0.309**	-0.329**
	(-2.32)	(-2.26)	(-2.28)	(-2.23)	(-2.41)
Fund Characteristics					
Ln Real Fund Size	-0.0734***	-0.0621**	-0.0551*	-0.0625**	-0.0486*
	(-2.79)	(-2.12)	(-1.77)	(-2.22)	(-1.68)
Past Q3 (TVPI)		0.198*	0.199*	0.134	0.102
		(1.85)	(1.86)	(1.37)	(1.08)
Past Q2 (TVPI)		0.195*	0.195*	0.0246	0.0117
		(1.88)	(1.87)	(0.26)	(0.12)
Past Q1 (TVPI)		0.275**	0.271**	0.0649	0.0500
		(2.14)	(2.10)	(0.57)	(0.44)
First Fund		0.227**	0.213**	0.113	0.0984
		(2.38)	(2.21)	(1.28)	(1.12)
Low Reputation			0.0459	-0.00194	0.00404
			(0.64)	(-0.03)	(0.06)
Fundraising				-1.017***	-1.027***
				(-11.79)	(-11.94)
Management Fees (%) Information					0.144**
					(2.03)
Management Fees Switch Information					-0.122*
					(-1.86)
Carried Interest (%) Information					0.0274
					(0.42)
Vintage Year Period-F.E	Yes	Yes	Yes	Yes	Yes
p	1.112	1.114	1.114	1.222	1.224
L Ratio Test	45.96	61.24	61.28	238.58	248.45
P-Value	0.000	0.000	0.000	0.000	0.000
Number of Funds	431	431	431	431	431
Number of Funds x Year	1320	1320	1320	1320	1320
Number Failure	383	383	383	383	383

Notes: The table presents the results of a duration model where the error is assumed to follow a Weibull distribution. It reports the variables associated with the time a fund takes to drawdown 70% of its committed capital during the first part of the investment period (which we consider up to year 4). The economic variables are defined in Appendix Table D3 and the fund variables in Appendix Table D1. We use vintage years fixed-effects where vintage years are grouped by period of 5 years.* stands for significant at 10%, ** significant at 5%, and *** significant at 1% level.

therefore endogenous.

To rephrase the results from this analysis, the accumulation of DP might be due to unfavorable conditions such as lack of opportunities or increased competition and, on the contrary, would significantly decrease in anticipation of fundraising. Analyzing the impact of dry powder on fund performance is therefore challenging as accumulated dry powder is endogenous to fund's ability to deploy capital due to market conditions. In Table D4, we examine the interactions among these variables of interest. We observe that the low reputation variable becomes positively significant when interacted with the proxy for deal flow competition (Ln Real Funds Size, same vintage year). This suggests that when competition for deal flow is high, low reputation funds take significantly longer time to deploy capital. Although fundraising activities correlate with good market conditions, we also observe that if a fundraising for a follow-up fund occurs in less favorable market conditions characterized by a high book-to-market, the fund will still be able to deploy faster the capital.

An additional variable that has not yet been examined in the literature is whether GPs are transparent regarding the fee structure (management fee, carry, switch option). In Table 5.4 Column (5), we add variables that proxy for the transparency of the fund on the fee structure. More transparency reduces the information asymmetry between the GP and the LPs. We identify a dual phenomenon. First, greater transparency regarding the management fee tends to delay investment during the investment phase, as it reduces information asymmetry between the GP and the LPs and the GP holds a valuable delay option (Axelson et al., 2009) : They may postpone capital deployment to seize the best opportunities.

Second, transparency regarding the switch is associated with faster capital deployment. Since any investment made immediately before the switch might be perceived as a rushed investment, GPs may anticipate this situation by accelerating capital deployment earlier. These findings are consistent with both agency theory and reputation theory (Barber and Yasuda, 2017).

5.4.2 Accelerating the capital deployment or returning the capital to LPs?

To better understand the consequences of accumulating dry powder, we sort funds in terciles according to their dry powder level in vintage year + 4 and study how they deploy their capital over the remaining two years which constitute the end of the investment period (from vintage years + 4 to + 6).

Figure 5.1 illustrates the capital deployment of funds for different levels of dry powder at the end of the investing period.

Looking at the first part of the graph, we observe that one-third of the funds quickly deploy their capital over the first four years and present only 3% of unspent cash at vintage year +4. The second tercile keeps on average 13% of dry powder at vintage year +4, whereas the low tercile group of funds has the lowest capital deployment and reaches a level of dry powder close to 30%. The second part of the graph, separated by the dotted line, illustrates the capital deployment conditional to the accumulation of dry powder at vintage year +4. We observe that funds which deployed their capital faster during the first four years finally manage to deploy almost 100% of their capital at the end of the investment period. In contrast, funds that accumulate about 30% of dry powder in vintage year + 4 exhibit very different behaviors. Some managed to deploy a little bit less than 10 percentage point of additional dry powder over the remaining two years, while others deploy over 20%. We observe similar differences in fund capital deployment among the group of

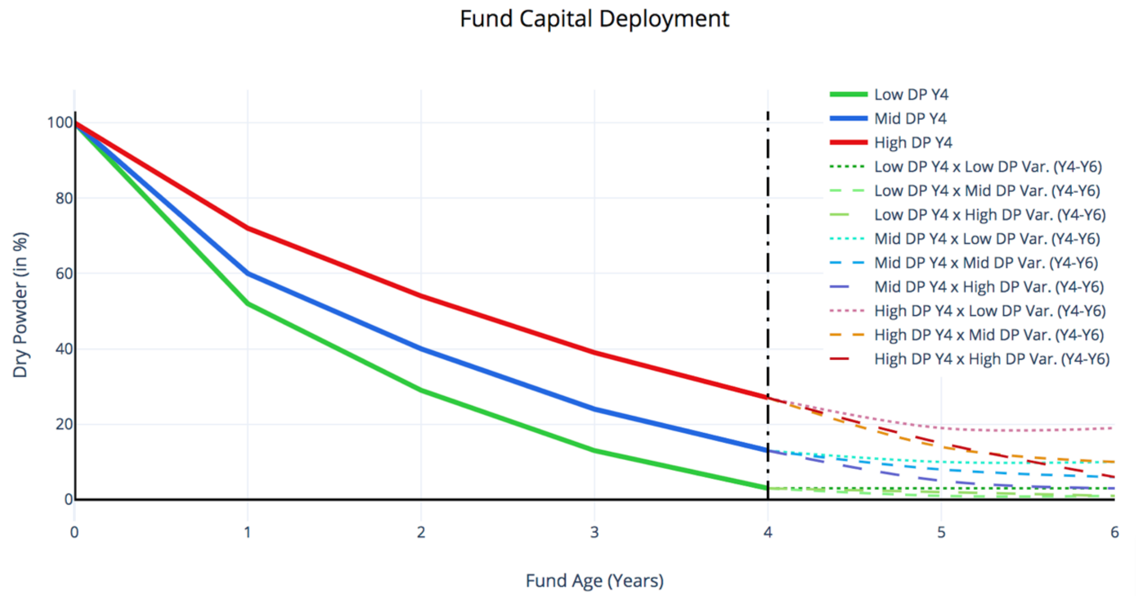

Figure 5.1: Fund Capital Deployment.

Notes: The figure displays the fund capital deployment for different levels of dry powder at the end of the investing period. Conditionally to the cross-sectional level of dry powder achieved in vintage year + 4, we sort funds in terciles according to their capital deployment over the years vintage years + 4 to + 6.

funds that present a medium level of dry powder in vintage year + 4. While the difference in capital deployment between the top tercile (resp. mid tercile) and the low tercile funds ranked on their dry powder level is 24 percentage point (resp. 10 percentage point) in vintage year +4, funds that suddenly deploy a large amount of dry powder over two years in the top or mid tercile groups reach very similar investment rate then. The difference in dry powder between funds that suddenly deploy a large amount of dry powder over two years in the top or mid tercile groups and the funds in the low tercile dry powder is reduced to only 5 and 2 percentage point.

A potential explanation for this situation could be conditional on time (i.e. funds that deploy suddenly quickly experience attractive market conditions in terms of market opportunities, credit spread, or deal competition) or self-selection (the GP opts for large capital deployment). To test the first possibility, we check whether the same variables that explain the capital deployment during the first four years can explain why some funds managed to quickly deploy their remaining capital. We use a probit analysis where the dependent variable is the probability to be a fast-deploying fund over the period ranging from vintage years + 4 and + 6 (referred to as high DP var) among the funds that reach high and mid levels of dry powder at vintage year +4. Results can be found in Table D5. None of the previous variables display significance in explaining the differences in capital deployment. This suggests that the decision to deploy is specific to each fund and leads toward self-selection of the GP.

As the decision to deploy is independent from market conditions or market opportunities, we could question whether the decision to deploy or not taken by the GP is a good or a bad decision for their limited partners. The ex ante answer is ambiguous. On the one hand, limited partners will benefit from having their capital at work given the opportunity cost of dry powder. On the other hand, corporate finance theories state that capital needs to be returned to shareholders if the return from the reinvestment is lower than the market rate for the same risk.

We investigate the relative fund performance between these two groups in the next section.

5.4.3 *Fund performance*

We first investigate the relationship between fund performance and capital deployment. We control for fund past performance, fundraising activity, reputation, and fund size as well as potential selection bias using a two-stage Heckman procedure. The first stage corresponds to the probit discussed in Table 5.2.

Table 5.5 presents the results for three levels of capital deployment between vintage years +4 and +6, as shown in Figure 5.2. Panel A measures fund performance through the TVPI, Panel B uses the KS-PME.

Table 5.5: Fund Performance.

	Panel A: TVPI				Panel B: KS-PME			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
High DP Y4 x Low DP Var (Y4Y6)	-0.236**	-0.193*	-0.135	-0.138	-0.192	-0.171	-0.103	-0.104
	(0.107)	(0.107)	(0.106)	(0.106)	(0.117)	(0.117)	(0.116)	(0.116)
High DP Y4 x Mid DP Var (Y4Y6)	-0.301***	-0.271***	-0.281***	-0.277***	-0.519***	-0.496***	-0.505***	-0.504***
	(0.0911)	(0.0915)	(0.0901)	(0.0901)	(0.0996)	(0.0999)	(0.0981)	(0.0983)
High DP Y4 x High DP Var (Y4Y6)	-0.374***	-0.351***	-0.350***	-0.348***	-0.605***	-0.605***	-0.605***	-0.604***
	(0.0875)	(0.0868)	(0.0854)	(0.0854)	(0.0956)	(0.0948)	(0.0931)	(0.0932)
Q4 Past Perf.		0.319***	0.277***	0.318***		0.191**	0.126	0.135
		(0.0975)	(0.104)	(0.110)		(0.0834)	(0.0939)	(0.102)
Q3 Past Perf.		0.120	0.133	0.168*		0.160*	0.116	0.127
		(0.0808)	(0.0920)	(0.0969)		(0.0921)	(0.102)	(0.111)
Q2 Past Perf.		0.0536	0.0186	0.0678		-0.179	-0.182	-0.174
		(0.0871)	(0.0933)	(0.103)		(0.124)	(0.124)	(0.129)
Q1 Past Perf.		-0.0618	-0.0339	-0.00903		0.0272	0.00986	0.0145
		(0.106)	(0.109)	(0.111)		(0.129)	(0.132)	(0.134)
Ln Fund Size			0.0122	0.0484			0.0476	0.0558
			(0.0306)	(0.0442)			(0.0335)	(0.0479)
GP Low Reputation			0.0398	0.0449			0.0549	0.0559
			(0.0745)	(0.0746)			(0.0815)	(0.0817)
Fundraising Y4-Y6			0.239***	0.256***			0.267***	0.271***
			(0.0583)	(0.0601)			(0.0629)	(0.0655)
IMR				0.179				0.0409
				(0.157)				(0.171)
Vintage Year-F.E	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	431	431	431	431	431	431	431	431
Adjusted R^2	0.123	0.143	0.173	0.173	0.242	0.257	0.287	0.285

Notes: This table presents how dry powder utilization at the end of the investment period is associated with the fund performance. The main variable of interest, High DP Y4, is split in three level according to the variation of dry powder between vintage year + 4 and + 6. Low DP Variation Y4-Y6 represents funds that have invested from 0% to 10% (included) of dry powder over the period Y4 to Y6. Mid DP Variation Y4-Y6 represents funds that have invested more than 10% and less or equal to 20% (included). High DP Variation Y4-Y6 represents funds that have invested more than 20% of dry powder. The reference category to interpret these results are funds that have display a low level dry powder at vintage year + 4. Dependent variables are the realized TVPI (Total Value to Paid-In capital) (Panel A), and the realized KS-PME (Kaplan Schoar PME) (Panel B). IMR refers to the inverse Mills ratio capturing the non-selection hazard of disclosing information. * stands for significant at 10%, ** significant at 5%, and *** significant at 1% level.

Panel A shows the effects, within each group, of capital deployment at the end of the investment period on fund performance. We observe an almost linear effect, with increased negative impact on performance for large capital deployment at the end of the investment period. The effects are strong and significant across all specifications and barely change with the addition of control variables. Table D6 in the Appendix repeats the same analysis but tests the incremental effects with regard to the category of fund that decides to stay underinvested (see Figure 5.2). Funds that decide to use a large part of their remaining capital have significantly lower performance (when measured in terms of KS-PME) compared to funds that slow down the use of their excess cash.

We then test whether the funds with top tercile level of dry powder that rapidly deploy their remaining capital and funds that slow down their capital deployment were evolving on parallel trends with regard to their since-inception performance measure.

We implement a propensity score matching based on the vintage year, the fund industry focus (diversified or specialized), GP track record (measured by the previous fund performance), the GP experience (sequence of the fund in the same strategy), and the GP reputation (based on cumulative fundraising). We estimate the average treatment effect (ATT) on the fund performance of the treatment (i.e., large capital deployment after Y4). Results are displayed in Table D7. The evolution of the ATT over the whole life of the fund is displayed in Figure 5.2, the details on the coefficients are available in Table D7.

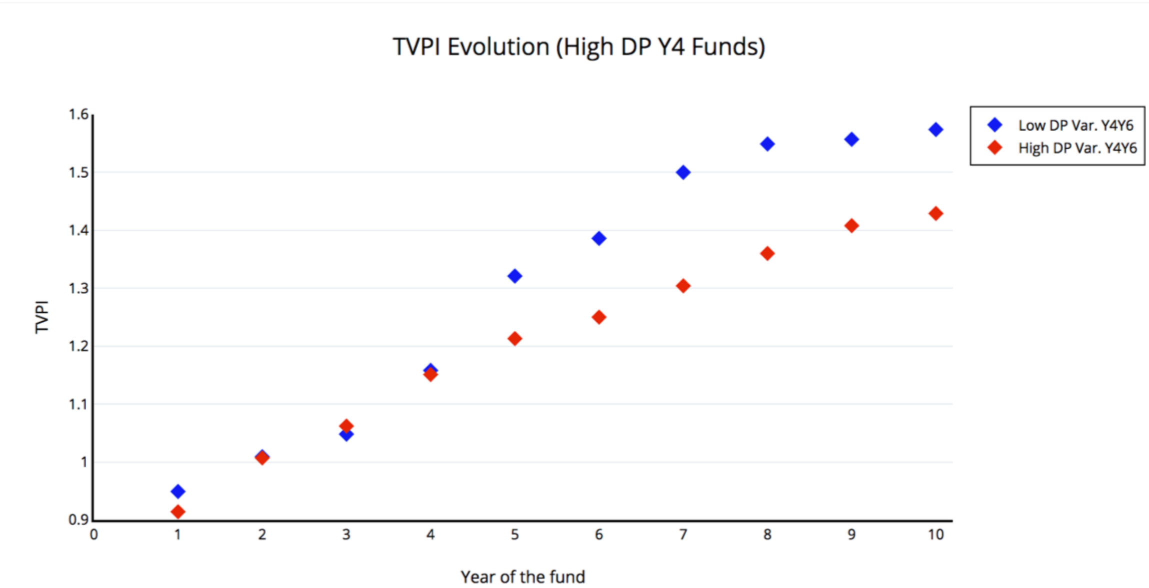

Figure 5.2: Panel A. Dry Powder Variation (Y4-Y6) and "Since-Inception" TVPI.

Notes: The figure displays the evolution of the TVPI of the treated group (High DP variation between vintage year +4 and +6) and the control group (Low DP variation between vintage year +4 and +6) of funds with a high level of dry powder at the vintage year +4.

We do not observe any significant differences in performance between the treated group (funds with top level of dry powder at Y4 and fast capital deployment) and the control (funds with top level of dry powder at Y4 and slow capital deployment). This is consistent with the two groups of funds facing the same investment opportunity sets. TVPI and KS-PME only start diverging significantly at vintage year + 5 onwards. This suggests that funds that deploy suddenly their remaining capital dilute their previous performance by investing in low quality deals. The difference is significant using the KS-PME but re-

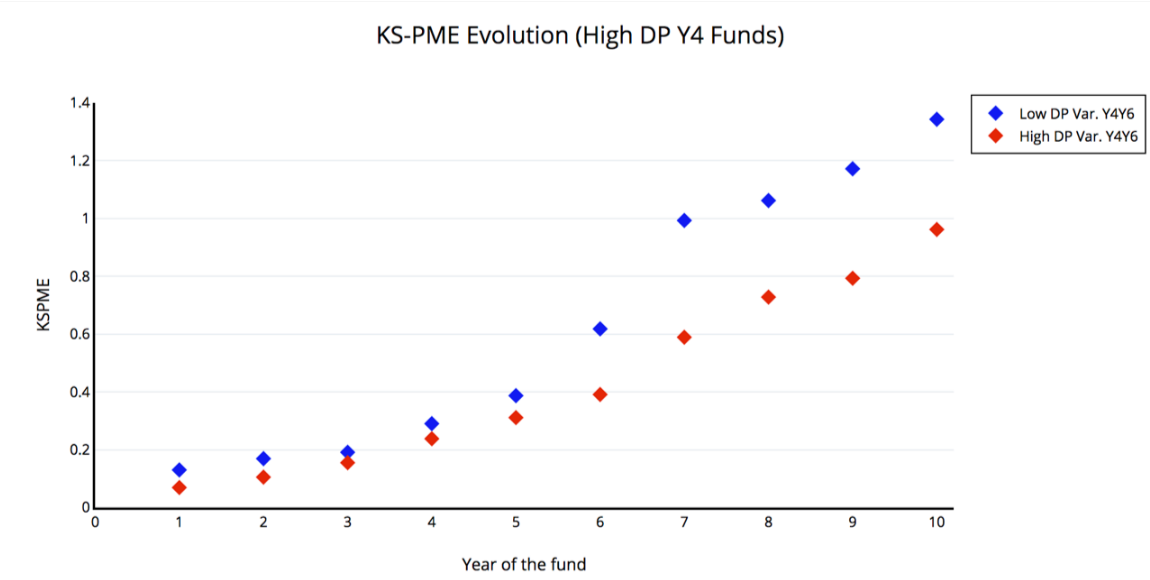

Figure 5.2: Panel B. Dry Powder Variation (Y4-Y6) and "Since-Inception" KSPME.

Notes: The figure displays the evolution of the KSPME between the treated group (High DP variation between vintage year +4 and +6) and the control group (Low DP variation between vintage year +4 and +6) of funds with a high level of dry powder at the vintage year +4.

mains insignificant for TVPI. This can be explained by the opportunity cost of not returning the capital which is accounted for in KS-PME but not TVPI.

These results suggest that large capital deployment at the end of the investment period might lead to a misalignment of interests between GP and LPs, as GP tend to privilege capital deployment over maximizing returns. We further investigate this hypothesis in the next section at deal-level.

5.5 Deal Analysis

This section tests Hypothesis H2 by examining whether late deals executed by funds with high dry powder exhibit investment distortions. We examine the characteristics of the deals that GPs execute close to the end of the investment period, that is, four years after the vintage year and later (hereafter called "late deals") when they accumulate an abnormal level of dry powder. We proceed to two comparisons. First, we examine whether those deals differ significantly from deals executed with normal to low level of dry powder. We compare early to late deals. Second, we compare the terms of the deals executed by funds with abnormal levels of dry powder that either decide to remain underinvested (by deploying less than 10%) or that adopt a more aggressive approach (by deploying more than 20% of dry powder over the remaining two years of the investment phase). These funds correspond to groups 1 and 3 of the previous section.

In both analyses, our multivariate analysis considers the following terms or conditions as dependent variables on the LBO deal d carried out at time q, i.e. the distance in quarters with respect to the vintage year: leverage of the deal, the natural logarithm of deal size, the entry EV/EBITDA multiple, the deal club, and finally its cash return and estimated

IRR. Our testing variable is of three types: (i) the level of dry powder one quarter before the deal is executed, (ii) a dummy variable indicating whether the level of dry powder is abnormally high with regard to the fund peers (abnormal level exceeds the top tercile of funds within the same range of vintage years considered over a 5-year period), and (iii) the deployment rate of the dry powder at the end of the investment period.

Many other factors may affect these deal characteristics. First, following Chung et al. (2012), Arcot et al. (2015), Degeorge et al. (2016), and Barber and Yasuda (2017), we control the size of the fund and of the deal. Then, funds might be active in different industries and deal characteristics differ across industries. To account for these factors, we add industry-fixed effects. In addition, the characteristics of the deals vary over time because they depend on market conditions. We address this issue by adding fixed effects on the investment year as well as a series of economic variables explaining fund capital deployment as illustrated in Section 5.4.2 (e.g., market concentration, credit conditions, market opportunities). In addition, we account for the reputation of the GP following Barber and Yasuda (2017), and whether the GP is in a fundraising phase following Hüther (2023).

The model is given by Equation 5.1.

$$Deal\ terms_{d,q} = \beta DP_{d,q-1} + \delta LD_{d,q} + \omega DP_{d,q-1} \times LD_{d,q} + \gamma_1 Z_d + \gamma_2 Z_{d,f} + \gamma_3 Z_{d,m} + \gamma_4 Z_{dFE} + \epsilon_d \tag{5.1}$$

where $DP_{d,q-1}$ is the level of dry powder or a related measure described above one quarter before the deal is executed, $LD_{d,q}$ is an indicator for late deals equal to 1 if q is greater than or equal to 16 (or four years from the vintage year), Z_d represents controls for other deal characteristics (natural logarithm of deal size), $Z_{d,f}$ represents fund sponsor control variables (fund size, GP low reputation dummy [16], and GP fundraising dummy[17]), $Z_{d,m}$ represents the market control variables (value-weighted mean of the book-to-market ratio of US firms, the concentration of the dry powder in the LBO market (using the Herfindahl index), the value of the credit spread), and Z_{dFE} represents the deal-fixed effects (industry and investment year). Following Arcot et al. (2015), standard errors are clustered by investment year. From the descriptive statistics presented in Section 5.3, we observe that the level of the testing variable, that is, dry powder, is related to the characteristics of the GP and the fund, which influence the terms of the deal themselves. This problem of endogeneity will be addressed in Section 5.6 using an instrumental variable.

5.5.1 *Accumulation of dry powder and deal selection*

This sub-section examines the deal terms selected by funds with an abnormal level of dry powder. In the appendix, we also consider the level of dry powder expressed in percentage of the committed capital.

Table 5.6 presents the results of the regression for the deal leverage (Column 1), the

[16]Dummy variable which takes the value of 1 if the GP is small, young and lack strong performance track record

[17]GP fundraising dummy takes value 1 if the deal is executed during a fundraising period of a follow-up fund, zero otherwise. See Table D1 for the definition of the fundraising period.

entry EBITDA multiple (Column 2), the deal cash return (Column 3), and its estimated IRR (Column 4).[18] The results on deal size, deal syndication and deal duration are presented in the appendix at Table D12.

Table 5.6: Deal Analysis: Abnormal Dry Powder.

	Leverage	EBITDA Mult.	Cash Return	IRR
Abnormal DP	0.00927	-0.901**	0.213	0.0201
	(0.0190)	(0.406)	(0.170)	(0.0207)
Late Deal	0.0119	0.00781	0.270*	0.0483*
	(0.0272)	(0.666)	(0.155)	(0.0274)
Abnormal DP × Late Deal	-0.0821**	1.902**	-0.743**	-0.128***
	(0.0304)	(0.797)	(0.329)	(0.0437)
Ln Deal Size	-0.0493***	1.241***	-0.886***	-0.107***
	(0.00994)	(0.123)	(0.0773)	(0.00906)
Ln Fund Size	0.00627	-0.696***	0.229**	-0.000193
	(0.0108)	(0.133)	(0.0874)	(0.00989)
GP Low Reputation	-0.00518	-0.338	-0.200	-0.0574**
	(0.0322)	(0.420)	(0.131)	(0.0240)
Fundraising	-0.00862	-0.313	-0.0955	-0.0199
	(0.0159)	(0.397)	(0.126)	(0.0222)
Market BM Ratio	-0.00375	-2.389***	-0.0965***	-0.0170***
	(0.00457)	(0.202)	(0.0274)	(0.00431)
DP Industry Concentration	-0.00159	0.587	0.678*	0.0473
	(0.0443)	(0.852)	(0.365)	(0.0449)
Credit Spread	0.00571	-0.0782	-0.108	-0.0138
	(0.0248)	(0.411)	(0.0836)	(0.0146)
Year-F.E	Yes	Yes	Yes	Yes
Industry-F.E	Yes	Yes	Yes	Yes
Number of Observations	639	622	966	966
Adjusted R^2	0.153	0.301	0.278	0.222

Notes: This table displays the results related to Equation 5.1 when leverage, EBITDA multiple, cash return and IRR are the dependent variables. The abnormal dry powder (DP) is a dummy variable equal to one if the dry powder one quarter before the deal is above or equal to the top tercile dry powder of the peer funds. "Late Deal" is a dummy variable taking the value of one if the deal investment year is superior or equal to vintage year + 4. Standard errors are clustered according to investment year and are reported in parentheses. Tables D8 to D11 in Appendix provides more details on the effects of the control variables and filters. * stands for significant at 10%, ** significant at 5%, and *** significant at 1% level.

Across the different regressions, we observe no significant differences in characteristics between early and late deals, as shown by the mostly insignificant late deal variable. The abnormal level of dry powder is not significantly related to the characteristics of the deal, except for the entry multiple. A lower entry multiple (see Table D9) associated with abnormal dry powder could be explained by the fund better positioning (that is the financial slack) to seize good deals or to negotiate deal terms.

Our interest lies in how dry powder at the end of the investment year and deal characteristics correlate in Table D8. We are mainly interested in the coefficient ω of Equation 5.1. Deals performed toward the end of the investment period by funds with abnormal dry powder are associated with lower leverage than early deals also executed in times where the funds display abnormal dry powder. The coefficient remains negative and significant in all specifications; the coefficients barely change when more controls or fixed effects are

[18]Tables D8 to D11 in Appendix provide more details on the effects of the control variables and filters

added. Late deals executed by funds with dry powder above the top tercile of their peer group at the end of the investment period tend to present close to 10 pp less leverage (in proportion to the enterprise value). These findings are consistent with Arcot et al. (2015), who demonstrate that SBO deals made by funds under buyout pressure (measured by a set of criteria, including the level of dry powder) are less leveraged to avoid a loss in fee collection. Similarly to them, we interpret this situation as evidence supporting the agency view that excess cash at the end of the investment period can pressure funds to deploy capital.

In Column 2, we examine the relationship between the abnormal level of dry powder, late deals, and the deal entry EV/EBITDA multiple. We observe a positive and significant (at the 5 percent level) association between the entry multiple and the fact of presenting abnormal dry powder at the end of the investment period. With regard to early deals executed with the "normal" level of dry powder, late deals executed with abnormal DP are more expensive: The difference of multiple is economically large of magnitude 1x EBITDA (i.e. from column (2), 1.902 + (-0.901) + 0.00781).

In the Appendix, we consider the link between dry powder and deal size, deal syndication, and deal duration (Table D12) respectively. Dry powder does not appear to significantly affect deal size, while traditional control variables such as fund size are associated with deal size. Less reputed funds or funds in fundraising tend to execute smaller deals (which is consistent with Hüther (2023) and is explained by the pressure to deploy capital). Tighter credit conditions also lead to smaller deals. We do not observe any association between dry powder and deal syndication decision, but deal syndication is related to control variables. It makes sense to observe less syndication for deals executed by large funds but more syndication for larger deals. Market conditions are also associated with the propensity to syndicate deals. We also test the impact of dry powder on the duration of late deals, but do not find any significant relationship.

The results displayed in Columns (1) and (2) indicate that an abnormal level of dry powder close to the end of the investment period is associated with different deal characteristics: higher entry multiple, lower leverage. Both results are consistent with the thesis developed by Arcot et al. (2015) and Degeorge et al. (2016) analyzing the specific case of SBOs: Funds under buying pressure will prefer to pay higher price and decrease leverage to deploy more equity capital. Our results generalize these findings to all types of deal, whether they are SBOs or PBOs. To investigate whether these deviations in deal characteristics might be considered as deal distortions, Columns (3) and (4) examine whether this situation of abnormal dry powder materializes in lower deal performance, which could be seen as a misalignment in deal selection between the GP and LPs. As the lower leverage documented in Column (1) could mechanically reduce the return of the deal from the point of view of shareholders, we work with performance measures based on the value of the company. First, we examine the cash return of the deal in Column (3). Late deals executed by funds with an abnormal level of dry powder are associated with a lower cash return than early deals. These results are robust to deal size and other controls, including variables such as lack of investment opportunities (book-to-market ratio). The economic magnitude is large. We observe a decline in the cash return multiple of 0.7 for funds corresponding to a 10 pp drop in IRR (Column (4)).

The results when using the absolute level of dry powder instead of an abnormal level with respect to peers are displayed in Table 5.7. Our results hold.

Table 5.7: Deal Analysis: Level of Dry Powder and Deal Terms

	Leverage	EBITDA Mult.	Cash Return	IRR
DP	0.0434	-0.930	0.562**	0.0604
	(0.0337)	(1.045)	(0.273)	(0.0395)
Late Deal	0.0632**	-0.805	0.816***	0.120**
	(0.0266)	(0.777)	(0.214)	(0.0440)
DP × Late Deal	-0.278***	5.600**	-2.048***	-0.342***
	(0.0502)	(2.057)	(0.577)	(0.0883)
Ln Deal Size	-0.0484***	1.254***	-0.885***	-0.108***
	(0.00990)	(0.125)	(0.0782)	(0.00917)
Ln Fund Size	0.00658	-0.708***	0.224**	-0.000212
	(0.0106)	(0.147)	(0.0858)	(0.0102)
GP Low Reputation	-0.00398	-0.291	-0.183	-0.0566**
	(0.0325)	(0.420)	(0.125)	(0.0241)
Fundraising	-0.00660	-0.368	-0.0631	-0.0158
	(0.0160)	(0.374)	(0.116)	(0.0202)
Market BM Ratio	-0.00390	-2.256***	-0.0947***	-0.0175***
	(0.00451)	(0.173)	(0.0272)	(0.00385)
DP Industry Concentration	-0.00375	0.531	0.653*	0.0463
	(0.0449)	(0.888)	(0.361)	(0.0449)
Credit Spread	0.00492	-0.124	-0.104	-0.0109
	(0.0247)	(0.449)	(0.0816)	(0.0152)
Year-F.E	Yes	Yes	Yes	Yes
Industry-F.E	Yes	Yes	Yes	Yes
Number of Observations	639	622	966	966
Adjusted R^2	0.157	0.302	0.281	0.227

Notes: This table displays the results related to Equation 5.1 when the dry powder is expressed in level. "Late Deal" is a dummy variable taking the value of one if the deal investment year is superior or equal to vintage year + 4. Coefficients are unstandardized and represents the change in the deal characteristics for one unit change in dry powder (expressed in percentage of the fund committed capital). Standard errors are clustered according to investment year and are reported in parentheses. * stands for significant at 10%, ** significant at 5%, and *** significant at 1% level.

5.5.2 Capital deployment decisions and deal selection

The previous subsection reconciles our empirical results with the previous literature. Consistent with Axelson et al. (2009), we show that abnormal dry powder or financial slack at the beginning of the investment period allows for greater flexibility to investment funds to select good deals, while abnormal dry powder at the end of the period might push investment funds to deploy their capital in lower quality deals than what they would select at the beginning of the period. This situation does not especially indicate an agency cost between GP and LPs as it is quite expected that GP privilege first high quality deals. The question that remains unanswered in the literature is whether GP should return undeployed cash to their LPs when the investment period is about to close and the GP did not find any good opportunities so far. We show in the previous section that some funds decide to stay underinvested and return the cash to LPs while others deploy fast the remaining capital. Fund-level analyses show that the latter group of funds exhibit lower performance than the former group, especially in times where the opportunity cost (i.e., remuneration) from the capital markets is high. To investigate further the economic channel supporting these results, we compare the deal terms between these two groups of funds.[19]

We reproduce the same multivariate regression as in the previous subsection but considering different levels (0 up to (included) 10%, 10% to 20% and above 20%) deployment of dry powder over the period Y4 and Y6 as the testing variable. Should we have a direct link between excess cash deployment and distortions, controlling for credit conditions, we should find a significant coefficient on the triple interaction Abnormal DP x Late Deal X High DP Var Y4-Y6.

Results are displayed in Table 5.8.

Table 5.8: Deal Analysis: Capital Deployment Decisions and Deal Selection.

	Panel A			
	Leverage	EBITDA Mult.	Cash Return	IRR
Abnormal DP	0.00881	-0.893**	0.234*	0.0196
	(0.0190)	(0.413)	(0.137)	(0.0208)
Late Deal	0.0110	0.0128	0.318*	0.0485*
	(0.0273)	(0.671)	(0.165)	(0.0270)
Abnormal DP × Late Deal× Low DP Var Y4-Y6	-0.0454	1.776	0.0714	0.00218
	(0.0879)	(1.133)	(0.528)	(0.0769)
Abnormal DP × Late Deal× Mid DP Var Y4-Y6	0.00336	1.364	-0.637*	-0.147***
	(0.0625)	(1.422)	(0.347)	(0.0435)
Abnormal DP × Late Deal× High DP Var Y4-Y6	-0.126***	2.138**	-1.077***	-0.158***
	(0.0427)	(0.998)	(0.361)	(0.0452)
Ln Deal Size	-0.0481***	1.240***	-0.887***	-0.107***
	(0.00985)	(0.124)	(0.0768)	(0.00882)
Ln Fund Size	0.00706	-0.692***	0.222**	-0.000340
	(0.0108)	(0.138)	(0.0883)	(0.00990)
GP Low Reputation	-0.00231	-0.334	-0.190	-0.0566**
	(0.0315)	(0.422)	(0.132)	(0.0240)
Fundraising	-0.0107	-0.271	-0.119	-0.0242
	(0.0157)	(0.440)	(0.127)	(0.0224)
Market BM Ratio	-0.00361	-2.387***	-0.0885***	-0.0169***
	(0.00464)	(0.201)	(0.0276)	(0.00427)
DP Industry Concentration	0.000571	0.578	0.658*	0.0462
	(0.0450)	(0.859)	(0.360)	(0.0450)
Credit Spread	0.00596	-0.0875	-0.126	-0.0149
	(0.0245)	(0.416)	(0.0831)	(0.0146)
Year-F.E	Yes	Yes	Yes	Yes
Industry-F.E	Yes	Yes	Yes	Yes
Number of Observations	639	622	966	966
Adjusted R^2	0.156	0.299	0.280	0.224

[19]The previous section shows that the decision to deploy capital by GP between vintage years +4 and +6 is almost exogenous to market conditions such as market opportunities, competition or on any activity of fundraising

	Panel B			
	Leverage	EBITDA Mult.	Cash Return	IRR
Abnormal DP	0.00874	-0.894**	0.236*	0.0199
	(0.0190)	(0.412)	(0.137)	(0.0207)
Late Deal	0.0108	0.0207	0.313*	0.0473*
	(0.0272)	(0.677)	(0.165)	(0.0272)
Abnormal DP × Late Deal	-0.0145	1.626	-0.262	-0.0679
	(0.0442)	(1.077)	(0.378)	(0.0543)
Abnormal DP × Late Deal× High DP Var Y4-Y6	-0.112*	0.512	-0.819*	-0.0910*
	(0.0614)	(1.319)	(0.453)	(0.0473)
Ln Deal Size	-0.0484***	1.242***	-0.889***	-0.108***
	(0.00986)	(0.123)	(0.0772)	(0.00898)
Ln Fund Size	0.00720	-0.696***	0.223**	-0.000113
	(0.0106)	(0.134)	(0.0883)	(0.00992)
GP Low Reputation	-0.00315	-0.340	-0.195	-0.0575**
	(0.0315)	(0.421)	(0.131)	(0.0241)
Fundraising	-0.0105	-0.290	-0.106	-0.0214
	(0.0158)	(0.431)	(0.125)	(0.0221)
Market BM Ratio	-0.00347	-2.388***	-0.0894***	-0.0171***
	(0.00455)	(0.201)	(0.0275)	(0.00424)
DP Industry Concentration	0.0000339	0.589	0.661*	0.0468
	(0.0445)	(0.859)	(0.359)	(0.0447)
Credit Spread	0.00538	-0.0873	-0.120	-0.0137
	(0.0247)	(0.416)	(0.0817)	(0.0144)
Year-F.E	Yes	Yes	Yes	Yes
Industry-F.E	Yes	Yes	Yes	Yes
Number of Observations	639	622	966	966
Adjusted R^2	0.157	0.300	0.280	0.223

Notes: This table displays the results related to Equation 5.1 for the main deal terms (leverage, EV/EBITDA multiple, cash return and IRR) when considering three levels of deployment of dry powder over the period Y4 and Y6: Low (Mid) DP Var stands for a deployment of dry powder inferior to 10% (20%) and High DP var to deployment above 20%. Panel A presents the results when the coefficient of interest is split into the three categories, Panel B considers the incremental effects with regard to the reference category of deploying less than 20% (Low and Mid DP Var funds).* stands for significant at 10%, ** significant at 5%, and *** significant at 1% level.

Panel A presents the analysis splitting the effects of abnormal level of dry powder into three categories as if we were doing three separate regressions. Each column corresponds to one deal term, respectively: leverage, entry multiple, cash return and IRR. For all these deal characteristics, we have a significant coefficient for the high dry powder variation and deal terms (negative link with leverage and performance measures, positive link on entry multiple) on each deal characteristic. Only the largest capital deployment is related with a decrease in leverage, in performance, and an increase in entry multiple. Panel B tests the effects incrementally to the other deployment rates. The reference category is the sample of funds that spend between 0% and 10% of committed capital between vintage years + 4 and + 6. Using both performance measures, we observe, among funds with large untapped capital in Y4, a significantly lower performance for funds spending 20% or more dry powder between vintage years + 4 and + 6.

5.5.3 *Management fee structure*

Our results are consistent with the thesis that GPs tend to overinvest at the end of the investment period of the fund should they have a large amount of cash to deploy. We show that when deploying large amounts of capital, they tend to maximize equity over debt by underlevering deals, paying an entry premium on the entry multiple with negative consequences on the deal performance. Funds that decide not to deploy their excess cash at the very end of the investment period do not suffer from these distortions and present better performance.

One possible explanation is that GPs who tend to deploy capital quickly and make rushed investments are those seeking to secure their management fees on invested capital. This subsection therefore tests Hypothesis H3 by examining whether the deal-level distortions associated with dry powder pressure are stronger when management-fee incentives are more salient. If this thesis were true, the evidence described in this paper would be even stronger for funds with high management fees or for funds which switch the basis for fee computation. We test this possibility in Table 5.9.

Table 5.9: Deal Analysis: Fees.

	Panel A			
	Leverage	EBITDA Mult.	Cash Return	IRR
Abnormal DP	0.0119	-1.637**	-0.217	0.0159
	(0.0366)	(0.686)	(0.332)	(0.0469)
Late Deal	0.0125	0.101	0.462	0.0643
	(0.0380)	(1.291)	(0.301)	(0.0477)
Abnormal DP × Late Deal × High MF	-0.167**	4.830**	-1.001	-0.240***
	(0.0605)	(2.207)	(0.768)	(0.0759)
Abnormal DP × Late Deal × Low MF	-0.0499	1.468	0.425	0.0286
	(0.0564)	(1.769)	(0.794)	(0.121)
Ln Deal Size	-0.0375*	1.484***	-0.849***	-0.124***
	(0.0209)	(0.176)	(0.152)	(0.0171)
Ln Fund Size	-0.00467	-0.488*	0.182	0.0228
	(0.0182)	(0.249)	(0.129)	(0.0201)
GP Low Reputation	0.0343	-0.447	-0.210	-0.0196
	(0.0348)	(0.752)	(0.345)	(0.0515)
Fundraising	-0.0218	-0.793	0.272	0.0489
	(0.0456)	(1.076)	(0.291)	(0.0375)
Market BM Ratio	0.0190**	-0.707***	-0.633***	-0.0640***
	(0.00836)	(0.189)	(0.116)	(0.0140)
DP Industry Concentration	-0.0732	-0.199	0.991	0.121
	(0.0523)	(1.129)	(0.640)	(0.0865)
Credit Spread	0.0315	0.0654	-0.121	-0.0454**
	(0.0329)	(0.596)	(0.264)	(0.0212)
Year-F.E	Yes	Yes	Yes	Yes
Industry-F.E	Yes	Yes	Yes	Yes
Number of Observations	261	239	338	338
Adjusted R^2	0.093	0.351	0.263	0.272

	Panel B			
	Leverage	EBITDA Mult.	Cash Return	IRR
Abnormal DP	0.0223	-1.018	-0.262	-0.0348
	(0.0546)	(1.259)	(0.331)	(0.0481)
Late Deal	-0.00804	0.0490	0.664**	0.0131
	(0.0533)	(1.714)	(0.310)	(0.0523)
Abnormal DP × Late Deal × Switch	-0.147*	5.134**	-1.494**	-0.162*
	(0.0709)	(2.206)	(0.572)	(0.0936)
Abnormal DP × Late Deal × No Switch	-0.117	3.813	-0.455	-0.0347
	(0.0940)	(3.023)	(1.234)	(0.176)
Ln Deal Size	-0.0525***	1.057***	-1.020***	-0.147***
	(0.0175)	(0.302)	(0.127)	(0.0137)
Ln Fund Size	0.00633	-0.732**	0.129	0.0172
	(0.0135)	(0.347)	(0.137)	(0.0208)
GP Low Reputation	-0.0228	-2.023	-0.0229	-0.0269
	(0.0439)	(1.602)	(0.413)	(0.0612)
Fundraising	0.0193	-0.308	0.284	0.0182
	(0.0406)	(1.315)	(0.313)	(0.0548)
Market BM Ratio	0.131***	0.748	-0.803***	-0.0857***
	(0.0217)	(0.609)	(0.163)	(0.0231)
DP Industry Concentration	-0.0173	0.393	0.644	0.0725
	(0.0658)	(1.354)	(0.615)	(0.0877)
Credit Spread	0.00611	-1.128	-0.268**	-0.0535**
	(0.0319)	(0.694)	(0.111)	(0.0233)
Year-F.E	Yes	Yes	Yes	Yes
Industry-F.E	Yes	Yes	Yes	Yes
Number of Observations	180	167	238	238
Adjusted R^2	0.153	0.351	0.441	0.345

Notes: This table displays the results related to Equation 5.1 when the variable of Abnormal DP x Late deal is split according to the level of management fees of the fund (Panel A) or the fee computation basis (Panel B). * stands for significant at 10%, ** significant at 5%, and *** significant at 1% level.

In Panel A, we distinguish between funds with high and low management fees: high management fees are defined as 2% or above - up to 3.75% with a mean of 2.02%, whereas low management fees are defined as below 2% - it ranges from 0.5% and 1.88% with a mean of 1.45% -. The table supports the fact that leverage or entry multiple distortions do not hold in funds charging low management fees. High dry powder close to the end of the investment phase only bears on the deal cash return for funds with high levels of management fees.

Another key variable explaining the buying pressure associated with dry powder near the end of the investment period is the basis for the management fee calculation. By switching from committed capital to invested capital, most LBO fund managers are under buying pressure close to the end of the investment period to protect their management fee collection.

Panel B reveals that the magnitude of the effects of dry powder on late deal characteristics are larger for the subsample of funds that switch the basis for fee computation from committed to invested capital than for the full sample used in the main tables.

Our deal-level analyses show that the management fee structure interacts with our results: As expected, funds with low management fees or that do not switch the basis for fee display weaker results on the relationship between dry powder and performance of late deals. Given our previous results documenting a significant negative effect on the total fund performance, should it be related to a mechanical drop in performance for all LBO funds that accumulate dry powder, we should not observe any significant difference between funds with different management fee structures. This constitutes only preliminary evidence given the lack of data on fee structure in PE. However, the number of observations is limited: only about 20 to 30 late-stage deals are executed with high dry powder.

To address this limitation, we finally examine GP transparency in both management fees and the switch option, as these two characteristics directly influence the incentives to deploy capital.

Table 5.10 reproduces Table D5 in Appendix considering the transparency of the fee structure.

When there is transparency in the fee structure, information asymmetry between GP and LPs is reduced. More transparency on the switch of the basis for fee computation is associated with a slower capital deployment for funds with high and mid dry powder at vintage year 4. These funds are less likely to suddenly rush investments by deploying capital in lower-quality deals.

5.6 Robustness Tests

Our results show the existence of a “GP overinvestment” phenomenon where, under the pressure of excess dry powder, GPs deploy large quantity of dry powder at the end of the investment period leading to a drop in performance.

5.6.1 Alternative specifications

We first test the robustness of our deal analyses for alternative fixed-effects and different samples.

Tables 5.11 to 5.14 present the results for the deal leverage, entry multiple and performance measures. Panel A uses abnormal level of dry powder as the variable of interest. Panel B uses capital deployment levels.

Column (1) of each table reproduces the main results obtained in Section 5.5.2 for comparison purpose. Column (2) adds GP-fixed effects which control for cross-sectional variation in their skills regarding deal selection (that would jointly affect the level of dry powder and deal quality). Column (3) works on a subsample of PBO deals. We show that our main results on deal leverage, entry multiple and performance also hold for this subsample: This

Table 5.10: Probability of Fast-Deploying Fund over the Period Ranging from Vintage Years + 4 and + 6 and Fees Disclosure.

Pr High DP VARY4-Y6 =1 (High & Mid DP Y4 Funds)				
	(1)	(2)	(3)	(4)
Market Conditions				
High Value-Weighted Mean Book Market Ratio	0.201	0.194	0.168	0.208
	(1.07)	(1.02)	(0.87)	(1.07)
High Spread	-0.0671	-0.0682	-0.0498	-0.0556
	(-0.37)	(-0.38)	(-0.27)	(-0.30)
Competition for Deal Flow				
Ln Real Funds Size, same vintage year	-0.193	-0.157	-0.166	-0.181
	(-1.63)	(-1.30)	(-1.38)	(-1.49)
Herfindahl Industry Concentration Index	0.195	0.298	0.276	0.284
	(0.54)	(0.81)	(0.75)	(0.77)
Fund Characteristics				
Ln Real Fund Size	-0.0289	-0.0611	-0.0377	-0.0329
	(-0.37)	(-0.75)	(-0.46)	(-0.40)
Past Q3 (TVPI)	0.220	0.210	0.162	0.135
	(0.64)	(0.61)	(0.47)	(0.39)
Past Q2 (TVPI)	0.208	0.175	0.104	0.0730
	(0.59)	(0.49)	(0.29)	(0.20)
Past Q1 (TVPI)	0.536	0.525	0.538	0.491
	(1.41)	(1.38)	(1.41)	(1.28)
First Fund	0.0510	0.0223	-0.00955	-0.0550
	(0.16)	(0.07)	(-0.03)	(-0.16)
Low Reputation	-0.176	-0.219	-0.248	-0.225
	(-0.92)	(-1.14)	(-1.28)	(-1.16)
Fundraising	0.238	0.264*	0.276*	0.283*
	(1.52)	(1.68)	(1.74)	(1.78)
Low Interm. TVPI (Tercile)	0.276	0.247	0.252	0.289
	(1.46)	(1.30)	(1.33)	(1.49)
Mid Interm. TVPI (Tercile)	0.225	0.252	0.263	0.281
	(1.20)	(1.33)	(1.38)	(1.47)
Management Fees (%) Information		-0.353**	-0.183	-0.306
		(-2.17)	(-1.00)	(-1.47)
Management Fees Switch Information			-0.420**	-0.457**
			(-2.02)	(-2.17)
Carried Interest (%) Information				0.249
				(1.27)
Number of Observations	289	289	289	289
Pseudo R^2	0.032	0.044	0.055	0.059

Notes: This table replicates Table D5 while considering funds' fees disclosure in the probit analysis that analyzes the probability of being a fast-deploying fund over the period ranging from vintage years + 4 and + 6 among funds that reach high and mid levels of dry powder at vintage year +4. * stands for significant at 10%, ** significant at 5%, and *** significant at 1% level.

generalizes the results of Arcot et al. (2015) and Degeorge et al. (2016).[20]

[20] We replicate the analysis over the same sample period as in Degeorge et al. (2016) (1986-2007) and confirm their previous results (untabulated) : the effects mostly concentrate among SBO deals over their specific sample period.

Finally, Column (4) uses time x industry fixed-effects instead of considering them independently. Results hold.

Table 5.11: Robustness test: Deal selection – Leverage.

	Panel A			
Abnormal DP	0.00927	0.0102	0.0372	0.0176
	(0.0190)	(0.0229)	(0.0231)	(0.0270)
Late Deals	0.0119	0.00892	-0.0137	0.00151
	(0.0272)	(0.0277)	(0.0347)	(0.0327)
Abnormal DP x Late Deals	-0.0821**	-0.0954**	-0.100**	-0.0882**
	(0.0304)	(0.0418)	(0.0385)	(0.0384)
Ln Deal Size	-0.0493***	-0.0419***	-0.0454***	-0.0508***
	(0.00994)	(0.0132)	(0.0106)	(0.0116)
Ln Fund Size	0.00627	0.000823	0.00840	0.00576
	(0.0108)	(0.0167)	(0.0111)	(0.00969)
GP Low Reputation	-0.00518	0.0161	0.0108	-0.000146
	(0.0322)	(0.0346)	(0.0347)	(0.0313)
Fundraising	-0.00862	0.00375	-0.00212	-0.00319
	(0.0159)	(0.0202)	(0.0208)	(0.0189)
Market BM Ratio	-0.00375	-0.00647	-0.000852	-0.122***
	(0.00457)	(0.0102)	(0.00571)	(0.0306)
DP Industry Concentration	-0.00159	0.0390	-0.0203	-0.0465
	(0.0443)	(0.0909)	(0.0471)	(0.0305)
Credit Spread	0.00571	0.0149	0.00513	-0.0150
	(0.0248)	(0.0158)	(0.0355)	(0.0315)
Year-F.E	Yes	Yes	Yes	No
Industry-F.E	Yes	Yes	Yes	No
GP F-E	No	Yes	No	No
PBO Only	No	No	Yes	No
Time x Industry F-E	No	No	No	Yes
Number of Observations	639	639	498	639
Adjusted R^2	0.153	0.224	0.195	0.258

	Panel B			
Abnormal DP	0.00881	0.00964	0.0373	0.0173
	(0.0190)	(0.0226)	(0.0229)	(0.0271)
Late Deals	0.0110	0.00918	-0.0139	0.00102
	(0.0273)	(0.0279)	(0.0349)	(0.0321)
Abnormal DP × Late Deal × Low DP Var Y4-Y6	-0.0454	-0.142	-0.161**	-0.113
	(0.0879)	(0.113)	(0.0678)	(0.107)
Abnormal DP × Late Deal × Mid DP Var Y4-Y6	0.00336	-0.0192	0.0169	-0.0188
	(0.0625)	(0.0686)	(0.0679)	(0.0848)
Abnormal DP × Late Deal × High DP Var Y4-Y6	-0.126***	-0.116**	-0.138***	-0.112**
	(0.0427)	(0.0517)	(0.0439)	(0.0414)
Ln Deal Size	-0.0481***	-0.0412***	-0.0430***	-0.0498***
	(0.00985)	(0.0131)	(0.0104)	(0.0118)
Ln Fund Size	0.00706	0.000337	0.00827	0.00599
	(0.0108)	(0.0163)	(0.0110)	(0.00979)
GP Low Reputation	-0.00231	0.0167	0.0156	0.00241
	(0.0315)	(0.0340)	(0.0339)	(0.0311)
Fundraising	-0.0107	0.00277	-0.00623	-0.00536
	(0.0157)	(0.0209)	(0.0216)	(0.0192)
Market BM Ratio	-0.00361	-0.00590	-0.000901	-0.125***
	(0.00464)	(0.0108)	(0.00570)	(0.0298)
DP Industry Concentration	0.000571	0.0377	-0.0158	-0.0432
	(0.0450)	(0.0923)	(0.0471)	(0.0314)
Credit Spread	0.00596	0.0149	0.00613	-0.0132
	(0.0245)	(0.0167)	(0.0351)	(0.0313)
Year-F.E	Yes	Yes	Yes	No
Industry-F.E	Yes	Yes	Yes	No
GP F-E	No	Yes	No	No
PBO Only	No	No	Yes	No
Time x Industry F-E	No	No	No	Yes
Number of Observations	639	639	498	639
Adjusted R^2	0.156	0.223	0.202	0.258

Notes: This table - Panel A replicates Table D8 considering other fixed-effects or in the PBO subsample. Panel B repeats the same analysis considering capital deployment between Y4 and Y6 instead of the abnormal dry powder level. * stands for significant at 10%, ** significant at 5%, and *** significant at 1% level.

Table 5.12: Robustness test: Deal selection – EBITDA Multiple.

	Panel A			
Abnormal DP	-0.901**	-0.895*	-0.869*	-0.898*
	(0.406)	(0.451)	(0.460)	(0.481)
Late Deals	0.00781	-0.839	-0.461	-0.199
	(0.666)	(0.769)	(0.752)	(0.596)
Abnormal DP x Late Deals	1.902**	2.033**	2.237**	2.079**
	(0.797)	(0.811)	(0.920)	(0.959)
Ln Deal Size	1.241***	1.215***	1.200***	1.256***
	(0.123)	(0.143)	(0.127)	(0.158)
Ln Fund Size	-0.696***	-0.182	-0.723***	-0.672***
	(0.133)	(0.532)	(0.129)	(0.163)
GP Low Reputation	-0.338	0.460	-0.197	-0.445
	(0.420)	(1.102)	(0.492)	(0.489)
Fundraising	-0.313	0.0558	-0.226	-0.553
	(0.397)	(0.586)	(0.442)	(0.493)
Market BM Ratio	-2.389***	-2.393***	-2.411***	0.899***
	(0.202)	(0.761)	(0.220)	(0.118)
DP Industry Concentration	0.587	1.969*	0.201	0.244
	(0.852)	(0.973)	(1.300)	(1.079)
Credit Spread	-0.0782	-0.318	-0.132	0.0307
	(0.411)	(0.549)	(0.414)	(0.587)
Year-F.E	Yes	Yes	Yes	No
Industry-F.E	Yes	Yes	Yes	No
GP F-E	No	Yes	No	No
PBO Only	No	No	Yes	No
Time x Industry F-E	Yes	Yes	Yes	Yes
Number of Observations	622	622	518	622
Adjusted R^2	0.301	0.389	0.307	0.400

	Panel B			
Abnormal DP	-0.893**	-0.905*	-0.864*	-0.887*
	(0.413)	(0.465)	(0.463)	(0.490)
Late Deals	0.0128	-0.859	-0.468	-0.131
	(0.671)	(0.766)	(0.778)	(0.628)
Abnormal DP × Late Deal × Low DP Var Y4-Y6	1.776	2.304*	2.298	1.014
	(1.133)	(1.201)	(1.514)	(1.105)
Abnormal DP × Late Deal × Mid DP Var Y4-Y6	1.364	1.935	1.475	1.997
	(1.422)	(2.255)	(1.520)	(1.659)
Abnormal DP × Late Deal × High DP Var Y4-Y6	2.138**	1.909*	2.458**	2.612*
	(0.998)	(0.970)	(1.056)	(1.347)
Ln Deal Size	1.240***	1.211***	1.198***	1.274***
	(0.124)	(0.140)	(0.130)	(0.155)
Ln Fund Size	-0.692***	-0.167	-0.711***	-0.696***
	(0.138)	(0.536)	(0.136)	(0.171)
GP Low Reputation	-0.334	0.476	-0.180	-0.464
	(0.422)	(1.103)	(0.496)	(0.500)
Fundraising	-0.271	0.0628	-0.165	-0.536
	(0.440)	(0.656)	(0.490)	(0.579)
Market BM Ratio	-2.387***	-2.389***	-2.407***	0.901***
	(0.201)	(0.773)	(0.218)	(0.121)
DP Industry Concentration	0.578	1.954*	0.180	0.289
	(0.859)	(1.038)	(1.307)	(1.072)
Credit Spread	-0.0875	-0.314	-0.144	-0.0326
	(0.416)	(0.545)	(0.420)	(0.600)
Year-F.E	Yes	Yes	Yes	No
Industry-F.E	Yes	Yes	Yes	No
GP F-E	No	Yes	No	No
PBO Only	No	No	Yes	No
Time x Industry F-E	No	No	No	Yes
Number of Observations	622	622	518	622
Adjusted R^2	0.299	0.386	0.304	0.399

Notes: Panel A replicates Table D9 considering other fixed-effects and the PBO subsample. Panel B repeats the same analysis considering capital deployment between Y4 and Y6 instead of the abnormal dry powder level. * stands for significant at 10%, ** significant at 5%, and *** significant at 1% level.

Table 5.13: Robustness test: Deal selection – Cash Return.

	Panel A			
Abnormal DP	0.238*	0.146	0.139	0.379**
	(0.137)	(0.152)	(0.155)	(0.184)
Late Deals	0.321*	0.376	0.381*	0.303
	(0.165)	(0.232)	(0.186)	(0.219)
Abnormal DP x Late Deals	-0.805**	-0.755**	-0.745**	-0.822**
	(0.315)	(0.358)	(0.327)	(0.381)
Ln Deal Size	-0.883***	-0.925***	-0.873***	-0.928***
	(0.0770)	(0.0857)	(0.0928)	(0.0970)
Ln Fund Size	0.222**	0.150	0.229**	0.261**
	(0.0886)	(0.141)	(0.0901)	(0.0982)
GP Low Reputation	-0.194	-0.443	-0.205	-0.128
	(0.131)	(0.276)	(0.141)	(0.188)
Fundraising	-0.0923	-0.366**	-0.156	-0.0285
	(0.124)	(0.154)	(0.119)	(0.144)
Market BM Ratio	-0.0881***	-0.0927	-0.0861***	-1.419***
	(0.0275)	(0.0614)	(0.0296)	(0.234)
DP Industry Concentration	0.665*	0.596	0.619	0.728
	(0.361)	(0.504)	(0.403)	(0.442)
Credit Spread	-0.122	-0.0965	-0.0917	-0.0451
	(0.0825)	(0.102)	(0.0833)	(0.130)
Year-F.E	Yes	Yes	Yes	No
Industry-F.E	Yes	Yes	Yes	No
GP F-E	No	Yes	No	No
PBO Only	No	No	Yes	No
Time x Industry F-E	Yes	Yes	Yes	Yes
Number of Observations	966	966	773	966
Adjusted R^2	0.278	0.321	0.266	0.362

	Panel B			
Abnormal DP	0.234*	0.135	0.137	0.373*
	(0.137)	(0.153)	(0.155)	(0.185)
Late Deals	0.318*	0.370	0.380*	0.310
	(0.165)	(0.233)	(0.186)	(0.218)
Abnormal DP × Late Deal × Low DP Var Y4-Y6	0.0714	-0.110	0.274	0.0320
	(0.528)	(0.673)	(0.556)	(0.612)
Abnormal DP × Late Deal × Mid DP Var Y4-Y6	-0.637*	-0.669	-0.786*	-0.473
	(0.347)	(0.536)	(0.461)	(0.347)
Abnormal DP × Late Deal × High DP Var Y4-Y6	-1.077***	-0.941**	-1.059**	-1.155**
	(0.361)	(0.430)	(0.395)	(0.430)
Ln Deal Size	-0.887***	-0.927***	-0.876***	-0.933***
	(0.0768)	(0.0853)	(0.0931)	(0.0974)
Ln Fund Size	0.222**	0.147	0.224**	0.258**
	(0.0883)	(0.138)	(0.0898)	(0.0974)
GP Low Reputation	-0.190	-0.442	-0.205	-0.131
	(0.132)	(0.282)	(0.139)	(0.188)
Fundraising	-0.119	-0.397**	-0.190	-0.0544
	(0.127)	(0.164)	(0.119)	(0.142)
Market BM Ratio	-0.0885***	-0.0802	-0.0855***	-1.429***
	(0.0276)	(0.0613)	(0.0295)	(0.236)
DP Industry Concentration	0.658*	0.643	0.607	0.700
	(0.360)	(0.509)	(0.403)	(0.426)
Credit Spread	-0.126	-0.0981	-0.103	-0.0370
	(0.0831)	(0.104)	(0.0845)	(0.130)
Year-F.E	Yes	Yes	Yes	No
Industry-F.E	Yes	Yes	Yes	No
GP F-E	No	Yes	No	No
PBO Only	No	No	Yes	No
Time x Industry F-E	No	No	No	Yes
Number of Observations	966	966	773	966
Adjusted R^2	0.280	0.320	0.269	0.364

Notes: Panel A replicates Table D10 considering other fixed-effects and the PBO subsample. Panel B repeats the same analysis considering capital deployment between Y4 and Y6 instead of the abnormal dry powder level. * stands for significant at 10%, ** significant at 5%, and *** significant at 1% level.

Table 5.14: Robustness test: Deal selection – IRR.

	Panel A			
Abnormal DP	0.0201	0.0227	0.00532	0.0371
	(0.0207)	(0.0276)	(0.0213)	(0.0259)
Late Deals	0.0483*	0.0381	0.0395	0.0540**
	(0.0274)	(0.0390)	(0.0265)	(0.0262)
Abnormal DP x Late Deals	-0.128***	-0.134*	-0.108**	-0.136**
	(0.0437)	(0.0723)	(0.0429)	(0.0539)
Ln Deal Size	-0.107***	-0.113***	-0.103***	-0.112***
	(0.00906)	(0.00972)	(0.00916)	(0.00982)
Ln Fund Size	-0.000193	-0.0248	-0.000687	0.00939
	(0.00989)	(0.0237)	(0.0109)	(0.00888)
GP Low Reputation	-0.0574**	-0.0110	-0.0506*	-0.0475*
	(0.0240)	(0.0439)	(0.0256)	(0.0249)
Fundraising	-0.0199	-0.0465	-0.0333	-0.0288
	(0.0222)	(0.0279)	(0.0218)	(0.0216)
Market BM Ratio	-0.0170***	-0.0187**	-0.0183***	0.138***
	(0.00431)	(0.00866)	(0.00457)	(0.0179)
DP Industry Concentration	0.0473	-0.0402	0.0858	0.0902*
	(0.0449)	(0.0621)	(0.0541)	(0.0505)
Credit Spread	-0.0138	-0.0144	-0.0138	-0.00317
	(0.0146)	(0.0215)	(0.0130)	(0.0204)
Year-F.E	Yes	Yes	Yes	No
Industry-F.E	Yes	Yes	Yes	No
GP F-E	No	Yes	No	No
PBO Only	No	No	Yes	No
Time x Industry F-E	Yes	Yes	Yes	Yes
Number of Observations	966	966	773	966
Adjusted R^2	0.222	0.257	0.239	0.288

	Panel B			
Abnormal DP	0.0196	0.0210	0.00484	0.0362
	(0.0208)	(0.0276)	(0.0213)	(0.0263)
Late Deals	0.0485*	0.0377	0.0396	0.0554**
	(0.0270)	(0.0379)	(0.0261)	(0.0256)
Abnormal DP × Late Deal × Low DP Var Y4-Y6	0.00218	-0.0152	0.0591	-0.0127
	(0.0769)	(0.125)	(0.0782)	(0.0864)
Abnormal DP × Late Deal × Mid DP Var Y4-Y6	-0.147***	-0.160**	-0.134**	-0.137**
	(0.0435)	(0.0672)	(0.0526)	(0.0546)
Abnormal DP × Late Deal × High DP Var Y4-Y6	-0.158***	-0.158**	-0.155***	-0.172***
	(0.0452)	(0.0745)	(0.0429)	(0.0562)
Ln Deal Size	-0.107***	-0.113***	-0.104***	-0.112***
	(0.00882)	(0.00964)	(0.00900)	(0.00949)
Ln Fund Size	-0.000340	-0.0262	-0.00155	0.00896
	(0.00990)	(0.0236)	(0.0109)	(0.00888)
GP Low Reputation	-0.0566**	-0.0105	-0.0505*	-0.0476*
	(0.0240)	(0.0438)	(0.0257)	(0.0249)
Fundraising	-0.0242	-0.0527*	-0.0390*	-0.0324
	(0.0224)	(0.0274)	(0.0220)	(0.0219)
Market BM Ratio	-0.0169***	-0.0162*	-0.0181***	0.138***
	(0.00427)	(0.00881)	(0.00453)	(0.0182)
DP Industry Concentration	0.0462	-0.0336	0.0838	0.0868*
	(0.0450)	(0.0617)	(0.0544)	(0.0497)
Credit Spread	-0.0149	-0.0150	-0.0157	-0.00294
	(0.0146)	(0.0220)	(0.0128)	(0.0205)
Year-F.E	Yes	Yes	Yes	No
Industry-F.E	Yes	Yes	Yes	No
GP F-E	No	Yes	No	No
PBO Only	No	No	Yes	No
Time x Industry F-E	No	No	No	Yes
Number of Observations	966	966	773	966
Adjusted R^2	0.224	0.257	0.244	0.289

Notes: Panel A replicates Table D10 considering other fixed-effects and the PBO subsample. Panel B repeats the same analysis considering capital deployment between Y4 and Y6 instead of the abnormal dry powder level. * stands for significant at 10%, ** significant at 5%, and *** significant at 1% level.

5.6.2 *Omitted variables*

Our results might also be consistent with an omitted variable story where limited investment opportunities drive both deal quality/returns and fund dry powder. Limited opportunities early on during the investment phase would lead to dry powder, and those limited investment opportunities might persist and lead to worse returns. However, our results show that among the groups of funds that accumulate dry powder, we observe very different reactions when deploying this capital; these investment patterns are neither related to market conditions nor to fund characteristics. Only large capital deployment is associated with investment distortions and a drop in performance. We interpret this as a consequence of the GP decision.

One classical econometric method to address an omitted variable problem or an endogenous variable is the use of instrumental variables. In our setting, it is difficult to find an instrument that meets the exclusion and relevance rules. Potential external instruments that determine the level of dry powder, such as market conditions, directly affect investment opportunities as well as deal flow and performance. We therefore construct a synthetic instrument following Lewbel (2012). The method consists in constructing a heteroskedasticity-based regressor for the endogenous dry powder estimate. The use of such constructed instruments is recent but has increased in the corporate finance literature. It has been used in a context where an external IV could not be found (Mavis et al., 2020; Chen et al., 2023) or as a robustness test (Peng et al., 2023).

When executing the internal IV setting, we follow the advice of Baum and Lewbel (2019) and verify the instrument exogeneity using the J-test developed by Sargan (1958). We replicate our main table of results (see Tables D8 - D11) using the synthetic IV in Table 5.15. Table D13 displays the first-stage regression.

The table supports our main findings because our variable of interest remains significant and similar to the coefficient in Tables D8 - D11. Furthermore, we perform the J-test of Sargan (1958) and did not reject the null hypothesis of overidentification between the instruments and error terms.[21]

[21] This is true for all our specifications except the specification where Ln Deal Size is the dependent variable. For this regression, the results of the IV should be interpreted with caution.

Table 5.15: Deal analysis: Deal terms – Lewbel IV.

	Leverage	EBITDA Mult.	Cash Return	IRR
Abnormal DP′	0.00927	-0.870**	0.238	0.0201
	(0.0191)	(0.378)	(0.151)	(0.0224)
Late Deal	0.0119	0.0249	0.321	0.0483
	(0.0228)	(0.669)	(0.199)	(0.0297)
Abnormal DP′ × Late Deal	-0.0821**	1.878**	-0.805***	-0.128***
	(0.0378)	(0.849)	(0.306)	(0.0455)
Ln Deal Size	-0.0493***	1.249***	-0.883***	-0.107***
	(0.00735)	(0.142)	(0.0499)	(0.00743)
Ln Fund Size	0.00627	-0.681***	0.222***	-0.000193
	(0.00860)	(0.190)	(0.0674)	(0.0100)
GP Low Reputation	-0.00518	-0.310	-0.194	-0.0574**
	(0.0206)	(0.426)	(0.152)	(0.0227)
Fundraising	-0.00862	-0.270	-0.0923	-0.0199
	(0.0176)	(0.393)	(0.144)	(0.0214)
Market BM Ratio	-0.0793	-0.257	0.497	0.0638
	(0.0549)	(0.596)	(0.328)	(0.0489)
DP Industry Concentration	-0.00159	0.586	0.665**	0.0473
	(0.0436)	(0.912)	(0.315)	(0.0470)
Credit Spread	0.00571	-0.0397	-0.122	-0.0138
	(0.0177)	(0.380)	(0.125)	(0.0187)
Year-F.E	Yes	Yes	Yes	Yes
Industry-F.E	Yes	Yes	Yes	Yes
Number of Observations	639	622	966	966
Centered R^2	0.214	0.346	0.31	0.258

Notes: This table replicates the results of Tables D8 - D11 in an IV setting following Lewbel (2012). The variable Abnormal DP′ represents instrumented Abnormal DP variable. The first-stage regressions are displayed in Table D13. Owing to command limitations in the software, we did not cluster the standard errors. Standard errors are reported in parentheses. * stands for significant at 10%, ** significant at 5%, and *** significant at 1% level.

5.7 Concluding Remarks

Capital deployment by private equity funds is endogenous to economic conditions. Our results, however, suggest that at the end of the authorized investment phase, buying pressure could influence the GP decision to deploy capital: Some GPs will decide to deploy rapidly the remaining capital, some will slow down the capital deployment. We show that funds that opt for fast capital deployment undertake deals with lower leverage and with a higher entry price. We show that these deals tend to underperform early deals, but also, and more importantly, underperform deals undertaken by funds that slow down the capital deployment. This situation suggests that while LBO contracts between GPs and LPs might be efficient ex ante, the accumulation of cash (dry powder) might create investment distortions or inferior deal selection close to the end of the investment period. This potentially creates an ex post misalignment of the interests of the different parties in the selection of deals.

Our theoretical stance is that the inefficiencies mostly emanate from the tendency of the GP to overinvest the committed capital. We demonstrate that this leads to lower performance.

Testing the impact of dry powder on the investment decisions of LBO funds is not a straightforward exercise, because we face a challenge that is common in corporate finance: We lack exogeneity in the test variable, i.e., dry powder. The accumulation of dry powder might be the result of the fund lacking skills in deal selection, the latter being jointly determined with the deal and fund performance. Still, our results do not seem to be consistent with this alternative hypothesis given that our results hold in instrumental variables, when adding GP fixed-effects capturing unobserved GP characteristics and when investigating the cross-sections of funds, it only holds for funds that deploy a large amount of dry powder and not for others, although they present the same level of capital to deploy.

These findings carry practical implications for LPs and private equity fund governance. For LPs, high dry powder near the end of the investment period should not be interpreted only as unused investment capacity. It may also reveal a fund-level tendency to face deployment pressure when large amounts of capital remain undeployed. This is particularly relevant for LP due diligence and fund selection. LPs should therefore pay attention to whether a GP has historically accelerated capital deployment late in the investment period, especially when such late deals are associated with higher entry prices, lower leverage, and weaker performance.

The results also have implications for fund contracting. Practitioners often emphasize carried interest as the main mechanism aligning GP and LP incentives. Our evidence suggests that management fees may also matter in specific circumstances. When market conditions or slow early deployment lead to large dry powder accumulation, the fee structure may affect the GP's incentive to deploy capital rather than remain underinvested or return capital to LPs. This makes management fees relevant to the governance of capital deployment, not only to the economics of fund compensation.

More broadly, the results suggest that greater transparency on fund fee structures would help LPs assess deployment incentives in this opaque industry. This is particularly relevant because the management-fee channel remains difficult to test with existing commercial data. Future research should therefore examine more granular fee data to better understand when fee structures mitigate or exacerbate GP-LP misalignment.

Chapter 6

Conclusion

"The shift toward private markets in recent decades has brought us back to a familiar crossroads, one at which we must evaluate the opacity of large and important segments of the economy" [1]
— Allison Herren Lee, SEC (2021)

"[...] technological advances could also help bring greater transparency and potentially broader access to parts of the private markets [...]" [2]
— Larry Fink, BlackRock (2026)

Since the turn of the century, the corporate landscape has been reshaped by the expansion of private markets and the growing importance of sustainability considerations in corporate finance. In this context, the preceding chapters examine how ownership and control shape financial and sustainability-related outcomes across several empirical settings. The dissertation begins with workplace stress in large publicly listed firms, then turns to employee satisfaction and voluntary ESG disclosure in venture capital-backed private firms, before shifting to capital deployment incentives in private equity buyout funds. The chapters contribute to the literature by documenting corporate dimensions that are not fully reflected in conventional data sources, either because the relevant firms operate outside public disclosure requirements or because sustainability-related dimensions are not captured by standard ESG score metrics. As economic activity increasingly takes place outside public markets, these limitations become more consequential. By leveraging alternative sources of information, this dissertation helps expand the study of financial performance and sustainability-related outcomes across public and private ownership structures.

6.1 Summary of the Main Findings

The second chapter examines whether workplace stress, an important social dimension of employee well-being, is associated with accounting performance and priced by investors. To overcome the limitation that workplace stress is not directly observable in conventional data, the chapter combines large-scale employee reviews with machine learning methods to construct a quarterly measure of firm-specific workplace stress for S&P 100 companies. Complementing this measure with topic modeling analysis, the chapter identifies pressure stemming from unrealistic targets as an important source of workplace stress, while firm culture and managerial leadership appear to mitigate its effects. Regarding financial performance, workplace stress exhibits a negative relationship with future accounting

[1] Lee, A.H. (2021), "Going Dark: The Growth of Private Markets and the Impact on Investors and the Economy", Speech at the SEC, Washington D.C.

[2] Fink, L. (2026), "Larry Fink's 2026 Annual Chairman's Letter to Investors", BlackRock.

performance, which analysts fail to account for, leading them to overestimate the earnings of firms with high levels of workplace stress. At the market level, increases in workplace stress measured over a one-year horizon predict lower future returns, and a value-weighted long-short portfolio that is long in low-stress firms and short in high-stress firms generates a significant four-factor monthly alpha. These findings show that workplace stress represents a hidden organizational cost to firm performance that the market delays in pricing.

The third chapter extends the analysis of employee well-being to private firms by examining employee satisfaction under venture capital ownership. Combining employee reviews with ownership data for thousands of U.S. companies, the chapter studies how employees perceive VC backing and how these perceptions evolve around VC exit. The findings show that employees in VC-backed firms report significantly higher satisfaction than employees in other firms, but that this satisfaction premium declines after VC exit. The magnitude of the decline depends on the type of exit. It is more gradual following an IPO, when the VC exits only partially, and more abrupt following a full exit through a trade sale or a sale to private equity funds. Textual analysis of employee pros reviews identifies supportive culture, hiring processes, and the growth environment as the dimensions most strongly associated with VC backing. Following VC exit, all three topics remain more frequently praised than in other firms, but the growth environment declines the most, while supportive culture and hiring processes remain more persistent. These findings suggest that VC backing is associated with organizational practices that affect employee satisfaction, some of which continue to shape employee perceptions after VC investors exit.

The fourth chapter remains within the venture capital setting but turns to how VC-backed firms communicate about sustainability. In opaque private firms, voluntary ESG disclosure constitutes one of the few observable sources of ESG-related information. The chapter therefore uses archived homepage content from the Wayback Machine to construct a dictionary-based measure of ESG disclosure and study how disclosure evolves across VC financing rounds and around ownership transactions. The findings show that, in the early stages of VC financing, VC-backed firms disclose less ESG-related information than other private firms. This gap narrows as firms progress through successive financing rounds, and late-stage VC-backed firms ultimately surpass their non-VC-backed counterparts. This pattern is more consistent with progressive disclosure development than with strategic pre-exit signaling. Event-time analysis around ownership transactions reinforces this interpretation. VC-backed firms do not increase ESG disclosure in the year preceding an IPO or acquisition, whereas non-VC-backed firms increase disclosure significantly before going public. These findings suggest that ESG disclosure under VC backing develops progressively over the financing cycle rather than through a short-term adjustment immediately before exit.

The fifth chapter broadens the analysis from venture capital-backed firms to U.S. private equity buyout funds. It examines whether the accumulation of dry powder near the end of the investment period distorts deal selection and fund performance through agency costs arising from the contractual structure of buyout funds. The chapter first documents that capital deployment during the early years of the investment period reflects market conditions and fundraising activity, consistent with prior literature. Near the end of the investment period, funds with abnormal levels of dry powder face a trade-off between remaining underinvested and accelerating capital deployment, which can lead to suboptimal investment decisions. Funds that accelerate deployment underperform those that remain underinvested on both TVPI and KS-PME. At the deal level, their late-period investments exhibit higher entry multiples, lower leverage, and weaker cash-on-cash returns and IRRs. The chapter also provides preliminary evidence that management fee structures contribute to these distortions, especially when fees are high or when the fee base switches from committed to invested capital after the investment period. These findings suggest that dry powder pressure can affect both deal selection and fund performance when GPs face incentives to deploy remaining capital near the end of the investment period.

Taken together, these findings show that ownership and control shape corporate outcomes in ways that extend beyond the formal principal-agent relationship between managers and owners, consistent with the broader perspective of stakeholder theory. By studying both public and private ownership settings and moving beyond conventional data, this dissertation documents employee well-being, disclosure dynamics, and capital deployment behavior in settings where these dimensions are often difficult to observe. Overall, the dissertation identifies several channels through which ownership and control relate to firm outcomes in the 21st-century corporate landscape, providing the basis for the economic and policy implications discussed in the next section.

6.2 Economic and Policy Implications

The findings of this dissertation have several economic and policy implications. They suggest that financial performance and sustainability-related outcomes cannot be fully assessed through conventional data sources, formal governance structures, or aggregate ESG scores alone. Value-relevant information is also embedded in workplace conditions, employee narratives, disclosure policies, and the incentives created within specific ownership and control structures. These implications are relevant for corporate managers, investors, venture capitalists, limited partners, regulators, and data providers.

At the firm level, the evidence on workplace stress has direct implications for corporate managers and boards. Employee well-being should not be treated only as a human resource issue. Workplace stress is negatively associated with future accounting performance and appears to contain information that analysts and investors do not immediately incorporate. Managers and boards should therefore view stress as an organizational risk with potential financial consequences. The finding that unrealistic expectations are an important source of stress also has a direct managerial implication. Internal performance targets should be assessed together with the resources, support, culture, and leadership available to employees. High pressure may become value-reducing when firms impose demanding objectives without providing the organizational conditions needed to meet them.

Beyond the firm level, the evidence on workplace stress also carries implications for investors, analysts, and other market participants, as employee-based information can help identify risks that are not fully captured by conventional data or standard ESG scores. Analysts appear to overestimate the earnings of high-stress firms, while increases in workplace stress predict lower subsequent returns. For investors, this suggests that employee narratives may provide useful information about future operating performance and market valuation.

The findings on IPO-related ESG disclosure provide a further implication for investors. Non-VC-backed firms increase ESG disclosure significantly before going public, while VC-backed firms do not show a comparable pre-IPO adjustment. Investors should therefore distinguish between disclosure levels and disclosure trajectories. ESG disclosure that increases gradually over time may convey a different signal from disclosure that rises shortly before a transaction. In the IPO context, where information asymmetry is high, investors should interpret late ESG disclosure increases with caution and consider the ownership history of the issuing firm.

Beyond public markets, the findings also carry implications for venture capital investors, entrepreneurs, VC-backed firms, and post-VC exit owners. VC backing is associated with organizational dimensions that employees value, especially supportive culture, hiring processes, and the growth environment. These dimensions help explain the higher satisfaction reported by employees in VC-backed firms. The role of venture capital should therefore not be viewed only through financing, monitoring, governance, or exit outcomes. VC investors may also shape organizational conditions that matter for employee satisfaction and that can become part of the firm's organizational capital. For entrepreneurs and VC-backed firms, this means that supportive culture, effective hiring processes, and growth opportunities should be perceived as important elements of organizational development, not as secondary workplace features.

The evidence after VC exit further suggests that ownership transitions require attention. Employee satisfaction declines after VC exit, but the decline is not uniform across organizational dimensions. Growth-related satisfaction declines more strongly, whereas supportive culture and hiring processes remain more persistent. For post-exit owners, this suggests that ownership transitions should not be managed only through financial or strategic considerations. Preserving the organizational practices that employees value may help maintain part of the organizational legacy associated with VC backing. At the same time, managing the pressures associated with scaling and ownership change is therefore important for sustaining employee satisfaction.

The findings on ESG disclosure provide additional implications for venture capital investors and VC-backed firms. ESG disclosure in VC-backed firms appears to develop progressively across financing rounds rather than through a short-term adjustment before exit. This suggests that sustainability-related communication is more credible when it is built over time as part of the firm's professionalization process. VC investors may therefore encourage portfolio companies to build ESG disclosure gradually, while VC-backed firms may benefit from developing disclosure practices before they face transaction-related pressure. Furthermore, such disclosure trajectories may also become relevant for VC funds in interactions with LPs and other investors. While they do not prove the quality of underlying ESG practices, they help distinguish gradual disclosure development from transaction-driven communication.

Shifting from portfolio companies to fund-level dynamics, the evidence on dry powder pressure carries implications for limited partners in buyout funds. It suggests that undeployed capital near the end of the investment period requires careful interpretation. High dry powder may reflect unused capacity, but it may also create pressure to deploy capital quickly. LPs should therefore evaluate how GPs have behaved historically when approaching the end of the investment period with substantial undeployed capital. Funds that accelerate deployment under these conditions underperform those that remain under-invested, and their late deals are associated with higher entry multiples, lower leverage, and weaker returns.

The findings also have implications for fund contracting. Management fees are often treated as less central than carried interest in discussions of GP-LP alignment. The evidence suggests that they can nevertheless affect capital deployment incentives, especially when fees are high or when the fee base switches from committed to invested capital. LPs should therefore examine fee structures as part of their assessment of fund governance. Greater transparency on fee terms would also help LPs and researchers better understand when contractual arrangements may contribute to inefficient deployment incentives.

For regulators, ESG data providers, and researchers, the dissertation highlights the importance of improving measurement in private markets and sustainability-related domains. Standard ESG ratings are often concentrated among public firms and may miss important employee-related dimensions. Broad social scores may not capture workplace stress, while private firms are often absent from conventional ESG datasets. Alternative sources such as employee reviews and archived websites can therefore complement traditional data sources. They make it possible to study employee well-being and voluntary ESG disclosure in settings where standard measures are incomplete.

The broader policy implication is not that alternative data should replace conventional databases. Rather, the findings show that alternative data can reveal dimensions that conventional sources fail to capture, while also emphasizing the need for better transparency. As private markets continue to expand, regulators and data providers face the challenge of improving the observability of firms and funds that play an increasingly important role in the economy.

Overall, the implications of the dissertation point to a common conclusion. Ownership and control affect performance and sustainability-related outcomes through organizational, informational, and incentive channels that are not always visible in conventional data. Recognizing these channels matters for managers, investors, private-market participants, and regulators concerned with transparency in an expanding private-market economy.

6.3 Directions for Future Research

Beyond their practical implications, the findings of this dissertation also raise questions that the present work could not fully address. Several directions for future research emerge from the empirical designs, data constraints, and results documented across the four chapters.

The Workplace Stress Index developed in Chapter 2 could be extended in several directions. A natural first step would be to apply it to a broader set of firms, moving from S&P 100 to S&P 500 companies, as in Green et al. (2019), to test whether the documented associations between workplace stress and firm performance hold beyond the largest listed corporations. The classification of stressed reviews also leaves room for improvement. The fine-tuned BERT model achieves moderate accuracy, consistent with the difficulty of classifying heterogeneous user-generated content (Briscoe-Tran, 2023), and future work could combine LLM-generated labels with human annotations to improve reliability (Wang et al., 2024). More generally, employee reviews could be used to construct richer measures of workplace conditions, including pressure, support, empowerment, culture, hiring quality, and growth opportunities. This would help researchers move beyond aggregate employee scores and better understand the organizational mechanisms linking employee experience to firm outcomes.

Chapters 3 and 4 share several natural extensions. Chapter 4 already exploits the round-level structure of financing data to document how ESG disclosure evolves across financing rounds. A similar approach could be applied in Chapter 3 to track how employee satisfaction and workplace topic prevalence evolve as VC-backed firms progress through the financing cycle. Future work could also compare portfolio companies backed by PRI-signatory and non-signatory VC funds (Abraham et al., 2024) to examine whether fund-level ESG commitments shape both disclosure trajectories and employee satisfaction. Beyond documenting these dynamics, both measures could be used to predict the type of VC exit using a multinomial logit approach (Giot and Schwienbacher, 2007; Cumming et al., 2017). Employee satisfaction may be particularly informative in this regard, consistent with evidence that Glassdoor reviews contain early signals of financial distress (Dunham et al., 2023).

Specific to Chapter 4, future research could also study whether pre-IPO ESG disclosure affects underpricing (Fenili and Raimondo, 2021) and post-IPO risk (Reber et al., 2022). In the same IPO setting, a related question is whether such disclosure reflects genuine ESG commitment or instead potential greenwashing. Once these firms go public and become covered by third-party ESG providers, it would be possible to assess whether their prior disclosure behavior is consistent with their subsequent ratings, or whether high pre-IPO ESG disclosure mainly serves a signaling purpose. Additionally, a related avenue concerns the extent to which pre-IPO ESG disclosure influences the speed at which ESG coverage emerges post-listing.

Chapter 5 points to two main extensions. First, the management fee channel identified in the dry powder analysis remains preliminary due to data constraints. More granular fee data, obtained from institutional investors (Hüther, 2023) or fundraising prospectuses (Degeorge et al., 2016), would allow for a more rigorous examination of how specific fee structures shape deployment incentives and GP-LP alignment. Second, extending the dry powder analysis to venture capital funds would be valuable, though the VC setting differs fundamentally from buyouts. High dry powder in VC funds may reflect the need to reserve capital for follow-on investments rather than pressure to undertake new deals (Hogrebe and Lutz, 2024), requiring a different empirical design.

6.4 Concluding Remarks

Most of these findings would not have been possible without the use of alternative data and novel empirical methods. Employee reviews, machine learning classification, structural topic modeling, and archived website content make it possible to observe dimensions of firm behavior that would otherwise remain difficult to measure. In this sense, the dissertation also illustrates how new sources of information can expand the scope of corporate finance research, especially when traditional databases provide only a partial view of firms, funds, and sustainability-related outcomes.

More broadly, the results point to a growing gap between the economic importance of private markets and sustainability-related considerations and our ability to study them using conventional tools. As highlighted by Allison Herren Lee, the expansion of private markets raises fundamental challenges related to opacity. At the same time, echoing Larry Fink's view, technological advances offer a path toward greater transparency in these settings. The findings collected in this dissertation contribute to this broader effort by providing new evidence on firms and funds operating outside traditional disclosure frameworks, as well as on organizational and sustainability-related dimensions that remain beyond the reach of standard datasets. Collectively, they suggest that improving our ability to measure these dimensions is not only useful, but necessary to better understand how firms operate in the 21st century.

Appendices

Appendix A

Appendix to Chapter 2: Supplementary Material

Table A1: Most Representative Documents Used for GPT Topic Labeling.

Panel A: Job demand topics (1/2)
Bureaucracy & Lack of Innovation
(1) findelement and findelements also installing free tools like eclipse, chrome driver, testNG, github, maven, Jenkins, configuration meven project, set up automation design.
(2) Not focused on software products. Software is supplementary to product focus.
(3) This is not the place to be for Software Engineers. Lockheed is a Systems Engineering organization with very little software engineering expertise. Software is considered a tool like Matlab... so leadership has no appreciation for good design. Most of the people writing software are educated in other disciplines (ex. Electrical, Mechanical, Aeronautical Engineering). That would be fine except for the fact that 1000's of lines of unmaintainable code are written every year.
(4) Major portion of the company is still in waterfall model. Slow progress on projects due to bureaucracy. Review model hinders innovation.
(5) Procter and Gamble has very slow decision making, and it is not always clear who can make a decision. They are very risk averse.
Customer Service Stress & Understaffing
(1) Costomer happiness is reallly important for starbucks. Sometimes customers are very rude and inconsiderate. You can be yelled at and it can be very stressful and busy.
(2) Corporate policy of understaffng pharmacies while demanding customer satisfaction. It's impossible to provide great customer service when the customer is yelling at you because you do not have enough help to complete their prescription on time. Pay schedule does not keep us from losing Pharmacy Technicians to hospitals.
(3) Customer Service Surveys scoring could be upgraded to 1-5 instead of 1-10. Sometimes customer mean a 10 but customer error may put 1 or a 0 which causes a detractor survey.
(4) Upset customers that would be angry at the customer service associate.
(5) customers backlash, customer complaints, customer dissatisfaction.
Heavy Workload & Poor Conditions
(1) Mentally and physically draining. Managers asking why it took you the amount of minutes to use the restroom, even though restrooms are about a half a mile away from your station.
(2) Layoffs!! Depending on which store you work in management can be mean to you if your not their yes person No air conditioning for cashiers outside at register area in extreme heat
(3) Store managers and district managers carry a large work load. Not to say itâs not worth it.
(4) Can be very cold in some stores. Minimum wage is ok depending on experience.
(5) Everything...the hard work..carrying boxes more than 50 pounds...in a single cage you can find boxes weight 1 pound to 60 pounds..the stress..the pressure..everything
Mismanagement & Unrealistic Expectations
(1) "You don't get your accounts and targets until mid quarter. Fun fact: we still don't have our targets for this quarter (one month into this quarter). Your targets might change completely mid-quarter with no warning, rendering all work you put down useless. Organization is unstructured and chaotic, and no one really knows what's going on. 125% cap on targets, and if new PPI's goes through it could be impossible for some reps to reach 125%, it's all about having the right product and the right field reps."
(2) BA Management is not professional. When there are issues, instead of addressing the problem, they add additional work/worksheet/template to be filled out. Mgmt is sloppy, and unwilling to go to bat for direct reports or even be consistent in maintaining the BA CoE guidelines on a project. Mgmt mandates unrealistic deadline that result in EXTREME amounts of overttime consistently.
(3) Once you get sick or develop a condition that will not allow you to do the job your currently in, they will not place nor help find a more suitable job for you to do within the company. They will recommend you find another job. They will then start hindering about every little thing. They will hound you about unnecessary things to force you to quit.
(4) Huge corporation, ask advice from HR is definitely a trip to an outer layer of hell. They bought small companies that did employee health and are trying to digest the meal which means strict policies that may make sense one place but certainly not another.
(5) "Commissions not being paid on time because ""Someone left the business."" Compensation plans not being delivered until a quarter of the way through the fiscal year. Sales targets are increased by 10-20% over last year with less ability to meet them. Senior management never has answers for direct questions and is not genuine or forthcoming with what's really happening from top down decision making. Same Senior Management has been promoted for the team's performance, but creates negative culture putting extreme pressure on FLMs that is then transferred to FLM to CSM relationships.

Panel B: Job demand topics (2/2)
Layoffs & Low Morale
(1) Constant changes Constant changes Constant changes Constant changes Constant changes Constant changes Constant changes Constant changes Constant changes Constant changes Constant changes Constant changes Constant changes
(2) Layoffs layoffs layoffs, then more layoffs. They are never ending, and while everyone left takes on more work to cover for those laid off, revenue continues to decline (down ¿40% over the past 4+ years), the executive office continues to reward themselves with raises. It's disgusting and demoralizing, and has many of those still left looking elsewhere for work.
(3) Unreasonable expectations slow GPS Managers who know nothing about managing people a general manager who is never around and unapproachable Set up for failure and expects high turnover
(4) BK, since he has taken over this once GPTW is not so great; he has caused low moral due to layoffs and it will continue with future reductions.
(5) Layoffs layoffs layoffs layoffs layoffs
Long Hours & Limited Mobility
(1) Shift timings. Shift timings. Shift timings. Shift timings. Shift timings.
(2) "PTO time isn't the greatest. I had carry-over sick time and I have to use vacation time first before I can use my sick time. It also takes a long time to earn time so you can't take a vacation until the end of the year. Hard work, a lot of time on your feet on concrete floors."
(3) "Not a lot of upward mobility. You must be mobile in order to move up in the company. Too much lateral movement/""promotions""."
(4) Glass ceilings, hard upward mobility
(5) No hikes. Less pay. You might get into comfortable zone, hard to come out. Promotion takes lot of time even if u work hard.
Outdated Systems & Complex Processes
(1) One of the biggest cons for me is the lack of verbal communication for the management. They lack direction and motivation.
(2) Lack of direction within senior leadership. Lack of communication. Salary is not competitive.
(3) Somewhat rigid in how things are done, lack of creativity (no reinventing the wheel here), lots of task-oriented work which gets monotonous, excessive meetings, understaffed...
(4) Disorganized and lack of structure, conflicting priorities, high-level communication overload and specific tactical communication lacking. Too many meetings, reports, emails.
(5) Lack of Clarity in Roles & Responsibilities Lack of clarity in strategic direction Lack of Technology Support
Unpredictable Schedules & Long Hours
(1) Not a consistent schedule. Working up to 9 days in a row before you get 1 day off to work another 6 or 7 days in a row to get another day off. Split days off. You have to request time off 30 days in advannce.
(2) "Mandatory overtime of 10 hours a week 10 hours workshift with rotating brakes a 15 and a 20 minute so you may get a break 2 hours after starting or 4 hours for first break and 6 hours to 9 hours for the second one You can't change your job tell after a year"
(3) They have a corporate issued schedule, your weeks run from Saturday through Friday. The rotation is usually starts with your first week having Wednesday Thursday off, your second week is a Monday Tuesday off, your third week is a Saturday Sunday off, and your last week is a Sunday Friday off. This isn't a problem in itself, you can tell which holidays you'll work or get off months in advanced. This becomes a problem when you close for three days (2pm to 11pm) then you have two days off, open for three days (7am to 4pm) and then go back to closing.
(4) you have to work atleast 11 hours a day. MANDATORY OVERTIME WITH LITTLE TO NO BREAK DURING DAYS. 20 min break on 12 hour days
(5) Scheduling is retail, i.e. nights, weekends, split days off, different schedule every week.

Panel C: Job Resources topics (1/3)
Employee Disengagement & Cost-Cutting
(1) With increased focus on cost savings and global standardisation, employee benefits that led to long term tenures have been stripped.
(2) *Tenured employees should be rewarded monetarily after every 5 year milestone.
(3) Company is downward spiral followIng Immelt's disastrous reign. Global Research has shed some of its best talent in 2017 with massive layoffs led by a tyrannical CTO. Attrition is huge.
(4) Focus only on generating revenue and no consideration for the employees Lack of employee engagement
(5) The GBU has destroyed our company culture and shipped our entire team overseas. We do not even have straws and lids for cups. It was too costly for the company to cover.
Fast-Paced Environment with Political Challenges
(1) old school company, politics are everything, politics, politics, politics, politics, politics, politics, politics
(2) "Slow to change and adapt to market Old school company culture Rely on traditional methods"
(3) We are evolving rapidly so change is inevitable. If you aren't comfortable with change, then CVS may not be the best fit.
(4) Very fast moving and you need to be comfortable with working in quickly changing and adapting work environment.
(5) Fast paced work environment. Fast paced work environment
Limited Benefits & Workplace Amenities
(1) Parking can be a struggle, no parking for contractors. Contractors must park at an off-site parking and take the shuttle to Tmo campus.
(2) inside competition. they don't have many benefits such as stock awards and many health benefits. They also don't offer parking in the Sao Paulo office.
(3) Cafeteria food is not great and not cheap, not expecting free food but at least a bit cheaper than going outside. No transport shuttle for the home to office commute like most other companies have.
(4) Satellite offices may have less benefits, cafeteria food is not the best
(5) No food reimbursement working from home, even though food was one of the great benefits while working at the office
Limited Career Advancement Opportunities
(1) Not a lot of chances to move up from entry level, although the pay for entry level was good there wasnt much of a chance to build upon that pay.
(2) No career progression No secondment opportunity No career development
(3) Not a meritocratic system, although they brand themselves to be. No career development and advancement. Management portrays that they are interested to develop you, but they are not actually doing it.
(4) It is diffcult to make a career, you can stay in the same position for many years. There is no career plan
(5) No room for advancement as much as they preach that to be the case, no action plan or career advancement plans go into action.

Panel D: Job resources topics (2/3)
Limited Career Growth & Salary
(1) Monotonous work Monotonous work Monotonous work Monotonous work Monotonous work Monotonous work Monotonous work Monotonous work Monotonous work Monotonous work Monotonous work Monotonous work
(2) Uninteresting Work Laid Back Attitude Lots of processes Less Youngsters No Salary Hikes
(3) Flat organizational structure tends to restrict vertical growth
(4) Limited growth opportunity Limited growth opportunity
(5) Limited opportunity for carrer growth, no too much increment in salary
Low Compensation & Overwork
(1) Lower compensation than other large tech companies. The signing bonuses and overall stock compensation I'm other companies is a lot better than at Microsoft.
(2) Salesforce does not include signing bonuses once you are the Lead pay-band or above, it's pretty much signing bonuses if you're not eligible for RSU, or just RSUs if you are. RSUs vest over 4 years
(3) No bonuses, over-worked, nickel and dime pharmacist pay every year...it is barely worth it anymore.
(4) Short meal break, multi tasking, no overlaping, short personnal
(5) Bonuses, RSU, Bonuses, RSU, Bonuses, RSU,
Poor Management & Bias
(1) They hire white men to be racist and misogynistic towards their minority female employees. You know, gotta keep them pickaninnys in line. Cant have minority black or Hispanic employees, especially women being promoted. If you ain't white you ain't right is the Comcast behavior.
(2) Poor management. Poor management. Poor management.
(3) "Hectic and irregular schedules Pompous and condescending managers Managers will sit around in the office and not do their jobs Manager have double standards about certain employees, female managers will favour female employees, while male managers tend to be indifferent and more fair Female General Managers will favour female managers and will not take into account anything that any employees, male or female says against them (I am a female employee and have seen female managers treat my male co-workers very poorly)"
(4) Poor management. Too many chiefs not enough Indians. Everyone wants to be the boss.
(5) Managers had favorites and it was very obvious. It often led to biased employee treatment
Poor Management & Location Challenges
(1) wrost Management Phycho directiors No ethics No values No respect all worst Managemet on earth had arriaved in Pepsico Hyd
(2) The offices are located in sandyford which is quite far from the city centre, the commute from the city centre takes around 30 minutes using the free exective bus transfers.
(3) Location is far from downtown Chicago. Long commute if you live in the city.
(4) Working in Mountain View. Living nearby is undesirable, but living someplace desirable means a 90+ minute commute.
(5) It is too centralised to the San Francisco office, it is quite frequent you need to wait that someone in San Francisco goes online to get the info you need. The desks in the Dublin office are a bit small and you get only one ethernet port. Technically, the company does not use virtualization as many other companies.

Panel E: Job resources topics (3/3)
Poor Leadership & Communication
(1) One of the biggest cons for me is the lack of verbal communication for the management. They lack direction and motivation.
(2) Lack of direction within senior leadership. Lack of communication. Salary is not competitive.
(3) Somewhat rigid in how things are done, lack of creativity(no reinventing the wheel here), lots of task-oriented work which gets monotonous, excessive meetings, understaffed...
(4) Disorganized and lack of structure, conflicting priorities, high-level communication overload and specific tactical communication lacking. Too many meetings, reports, emails.
(5) Lack of Clarity in Roles & Responsibilities Lack of clarity in strategic direction Lack of Technology Support
Poor Training & Unsafe Work Environment
(1) Not enough training, thrown out to the wolves without the proper training. lie about job responsibilities, contradictory training. they tell you one thing in training and then another when youre out on the floor.
(2) Management has no idea what they're doing most of the time Management demeans workers and refuses to listen to workers People who shouldn't be managers are If you're good at your job, most of the time you will not progress in the company Suck ups are everywhere May make you work swinging shifts Schedule is not stable There is never enough coverage in the departments High school mentality
(3) bullying managers, no proper PPE for workers, with more than 6 to 7 forklifts operating on the floor staff is not encouraged to wear safety boots. forklift drivers are not trained by accredited trainers, threat of suspension and dissmissals for minor mistakes, no training provided.
(4) not very careful about workers not very careful about workers not very careful about workers
(5) This is by far the worst company i have worked maintenance for, Their maintenance program is a complete joke. We don't have the proper tools to do our job, we don't have the proper hazmat to do the proper inspections, and no one is held responsible. Corners are cut and eventually someone is going to get hurt. Their engineering team is extremely under-experience and it shows. Millions of dollars thrown away everyday on equipment that has to be decommissioned and on top of all that, NO ONE IS SAFE FROM LAYOFFS! AVOID THIS PLACE NO MATTER HOW MUCH MONEY THEY THROW AT YOU
Poor Work-Life Balance
(1) Work life balance a challenge Work life balance a challenge Work life balance a challenge Work life balance a challenge Work life balance a challenge
(2) "no work life balance no work life balance no work life balance no work life balance no work life balance"
(3) worklife balance, worklife balance, worklife balance,
(4) The Family/work life could be balanced. A lot of work that needs to be done and a lot of priorities are set. You have to be pretty balance to maintain a good worklife balance.
(5) bad work-life balance, bad work-life balance
Unfair Promotions & Job Placement
(1) Inconsistent, promoting people that can't/won't do their job, not promoting people that have been doing the job for years
(2) Unfair promotions: people deserve a promotion are not getting it, while people donât deserve get the promotion
(3) Having to bid on jobs for a promotion now along with 100's of other people applying for the job. It's almost easier to find a higher paying job outside of the company than wait for an internal promotion.
(4) People that have worked here can sometimes hold back progress. They should do a better job of placing people in the jobs that they belong in instead of just leaving them where they are.
(5) There is something called "imposter syndrome" where you think that you don't belong at Google because it's "GOOGLE"... but if you've made it through the interview process you belong there, and so it just takes some time adjustin gto that.

Table A2: ChatGPT Employee Reviews Classification: Stressed vs Not Stressed.

Employee Cons Review	Stressed (Yes/No)
They will work you to the bone and then still demand more will lay off people and then expect other people to do the work of three people	Yes
There aren't as many networking opportunities outside of work but I know the company is working on that	No
Sometimes take longer than average to get answers from leadership	No
Very strict work life and im not a fan of their outlook on employees	Yes
Out of touch management who complains about factors that they have control over	No
There are no cons to working here compared to what is available in the current job market	No
Pretty quick turnover different managers style throughout teams not standardized	Yes
Retail can have long hours but not a can price of success	
It takes a long time to complete the training process and become a proficient insurance agent also it takes a long time to me to build your client base.	No
No training program for new hires so veterans are left with the task of showing new people around and explaining how to do their job way to many meeting	No
Very physical and extremely fast paced work they have very high expectations	Yes
Sometimes stressful environment like any sales job anyone not constantly selling will be let go regardless of time with the company	Yes
Very conservative in approaching emerging markets or disruptive technologies with respect to staffing and investment pay at or below average	No
The salaries and benefits are little behind the norm for certain position	No
Long hours unreasonable workloads very little transparency from upper management	Yes
What was once the worst benefit package in the industry is now getting worse	No
At times, it gets stressful to meet the sales goal	Yes
I am not super thrilled with my department but they are so great about letting you move around	No

Notes: Table A2 shows examples of classification performed by ChatGPT interface (the prompt is discussed in Section 2.4.1.

Table A3: Workplace Stress Index and Refinitiv/MSCI Social Scores.

Panel A – WSI and Future Refinitiv Social Score						
	Social Pillar$_y$		Workforce$_y$		Human Right$_y$	
	(1)	(2)	(3)	(4)	(5)	(6)
WSI$_{y-1}$	-0.305***	-0.364***	-0.202***	-0.169**	-0.258***	-0.295***
	(-7.95)	(-4.77)	(-5.13)	(-2.20)	(-6.37)	(-3.63)
Year-F.E	No	Yes	No	Yes	No	Yes
Industry-F.E	No	Yes	No	Yes	No	Yes
Number of obs.	617	617	617	617	573	573
Adjusted R-sq	0.092	0.270	0.039	0.253	0.065	0.248

Panel B – WSI and Future MSCI Social Score						
	Social Pillar$_y$		Human Capital$_y$		Labor Management$_y$	
	(1)	(2)	(3)	(4)	(5)	(6)
WSI$_{y-1}$	-0.207***	-0.0963	-0.109***	-0.035	-0.091**	-0.015
	(-5.58)	(-1.60)	(-2.89)	(-0.44)	(-2.39)	(-0.22)
Year-F.E	No	Yes	No	Yes	No	Yes
Industry-F.E	No	Yes	No	Yes	No	Yes
Number of obs.	695	695	695	695	683	683
Adjusted R-sq	0.042	0.356	0.011	0.137	0.007	0.383

Notes: Table A3 – Panels A and B test the predictability of the firm-specific Workplace Stress Index with regard to social (sub-)scores from Refinitiv and MSCI database, respectively. y stands for year. * stands for significant at 10%, ** significant at 5%, and *** significant at 1% level.

Table A4: Workplace Stress and Portfolio Analysis.

Panel A: Monthly Industry Tercile Break Point									
	Equally-Weighted Portfolios					Value-Weighted Portfolios			
	Low	Mid	High	Low-High		Low	Mid	High	Low-High
Alpha	0.399*	-0.00529	0.0925	0.307	Alpha	0.140***	0.0615	-0.0377	0.178***
	(1.88)	(-0.04)	(1.00)	(1.30)		(2.90)	(1.40)	(-1.41)	(3.77)
MKT	0.859***	0.886***	0.887***	-0.0284	MKT	0.453***	0.230***	0.106***	0.346***
	(12.73)	(24.42)	(28.29)	(-0.63)		(26.82)	(30.25)	(10.35)	(28.05)
SMB	-0.0127	-0.172***	-0.163***	0.150*	SMB	-0.118***	-0.0777***	-0.0167	-0.101***
	(-0.16)	(-2.98)	(-5.38)	(1.86)		(-4.22)	(-5.48)	(-1.60)	(-3.77)
HML	0.0568	0.185***	0.0470	0.00979	HML	-0.0419**	-0.00509	0.00717	-0.0491***
	(0.76)	(3.66)	(0.93)	(0.16)		(-2.27)	(-0.42)	(0.74)	(-4.10)
MOM	0.0539	0.0192	-0.0293	0.0832	MOM	-0.00251	0.00338	0.0141	-0.0166
	(0.61)	(0.45)	(-0.89)	(1.00)		(-0.15)	(0.28)	(1.60)	(-0.89)
N	120	120	120	120	N	120	120	120	120

Panel B: Monthly-Industry Quartile Break Point											
	Equally-Weighted Portfolios						Value-Weighted Portfolios				
	Q1	Q2	Q3	Q4	Q1-Q4		Q1	Q2	Q3	Q4	Q1-Q4
Alpha	0.431**	-0.0223	0.185	0.0860	0.345	Alpha	0.0920*	0.0167	0.0403	-0.0446**	0.137***
	(2.05)	(-0.19)	(1.15)	(0.84)	(1.48)		(1.90)	(0.70)	(0.90)	(-2.04)	(3.07)
MKT	0.879***	0.892***	0.836***	0.897***	-0.0185	MKT	0.409***	0.0934***	0.226***	0.0622***	0.347***
	(13.15)	(24.80)	(15.26)	(26.75)	(-0.38)		(28.95)	(15.08)	(25.71)	(9.86)	(28.60)
SMB	0.0160	-0.200***	-0.138**	-0.154***	0.170**	SMB	-0.0935***	-0.0299***	-0.0748***	-0.0112*	-0.0823***
	(0.19)	(-3.76)	(-2.35)	(-4.35)	(2.13)		(-3.47)	(-2.76)	(-6.35)	(-1.71)	(-3.01)
HML	0.0478	0.157***	0.122**	0.0484	-0.000643	HML	-0.0319	0.00106	-0.0164	0.00970	-0.0416***
	(0.61)	(3.69)	(2.00)	(0.83)	(-0.01)		(-1.65)	(0.14)	(-1.38)	(1.36)	(-2.99)
MOM	0.0735	0.0244	-0.0150	-0.0364	0.110	MOM	0.0000181	0.000380	0.00684	0.00795	-0.00794
	(0.76)	(0.54)	(-0.25)	(-1.01)	(1.14)		(0.00)	(0.04)	(0.67)	(1.28)	(-0.47)
N	120	120	120	120	120	N	120	120	120	120	120

Notes: Table A4 presents the details on portfolio analysis, by providing coefficient estimates for all four risk factors (MKT, SMB, HML, and MOM) from Table 2.10. Panel A presents the results using tercile-based sorting, where stocks are classified into three portfolios based on their industry-adjusted workplace stress levels. Panel B presents the results using quartile-based sorting, where stocks are classified into four portfolios based on their industry-adjusted workplace stress levels. * stands for significant at 10%, ** significant at 5%, and *** significant at 1% level.

Appendix B

Appendix to Chapter 3: Supplementary Material

B.1 Example of VC-related employee reviews

Panel A - Pros Reviews (Before VC Exit)
With 18 years mature history behind it and backed by solid venture capital, the company, product and customer base continues to witness sizable growth! The best part about working at Intacct is it's product culture and exposure to cloud technologies and financials domain. With our quarterly release cycle and Innovate with Confidence culture, we love shipping the code fast! The company management remains humble and believes in industry leading customer satisfaction practices.
Capable and accomplished senior management team. Venture capital backing gives the company needed resources to achieve aggressive long term goals.
Jumio has a fun culture that drives to succeed for its customers. The culture is also very collegial and everyone is very willing to go out of their way to help each other out... Having Andreessen Horowitz, CitiVentures, and Eduardo Saverin (Facebook Cofounder) as lead VC backers has been a great resource to drive sales and Biz Dev engagements. Beyond the money, they help bring credibility and a great network.
Company provides resources to assist you in succeeding Good leadership team Strong financial backing from VC to provide monetary resources and grow technology and services Focus on technology and market research.
Established Brand. Long Term Management. referenceable accounts in every major industry. Excellent Sales with field pros in every major region and state in the U.S. and Internationally. recent infusion of cash from VC takeover adding confidence in the future of the People/Organization/Brand. Leading the Scalable and Cloud based Agile/Open Source ALM Platform. Small enough to react to clients needs. large enough to satisfy Enterprise product integration and support. generous commission plans for sales. A top notch independent recruiter to work with whom has 15 years in Enterprise ALM career consulting experience.
(...)The company really put in the effort in a humble, low-key, respectful and compassionate way to support his family as well as memorialize him. A very sad incident yet provides an authentic insight into the company culture. Ann Winblad's VC firm was in the company's seed round (as well as subsequent rounds) and Ms. Winblad has been on the board ever since. Ms. Winblad is a true pioneer and trail blazer in the VC and tech industry, and she is and has always been a great positive influence on the company.

Panel B - Cons Reviews (After VC Exit)
Looking back, going IPO and changing some of the top management at that time was a big mistake. From an engineering company focused on a core product A10 morphed into a bean-counter managed mad rush to release as many products and features as possible. Nothing is fully baked. The company has lost its commitment to quality. Everything is rushed out the door, tomorrow be damned. You can smell the fear of the stock exchange punishing the company for not making the numbers. The new management brought sales-centric orientation and the associated cliquishness and favoritism not seen before. Other groups exist to serve Sales and should not rise above their station.
Everything changed post acquisition - used to love Medallia but they stopped being transparent, did a massive layoff and lack communication.
Disorganized, fast-pace, and changes due to acquisition. Management lacks experience and titles are given out. They invests more money in paying new employees that have not done anything for the company as opposed to spending money retaining employees. Therefore, employee turnover is high.
1. Every company has pros, cons and with the acquisition, management changes, it takes time to absorb changes and reflect the same on the ground. 2. There are internal issues within local leadership which need to be resolved for better efficiency and culture improvement. 3. Favoritism needs to be avoided and all employees need to be treated equally. 4. Engineering managers and leaders need to be guided and trained including people operations. They need to spend more time in office and should be employee friendly, improve cross-team functioning and involvement rather than being self-centric. They should be empowered and resolve things at their level rather than they keep cribbing about things.
Recent acquisition is already causing a bit of a brain drain... Not many folks seem to have a positive opinion of the senior management team. Company seemed to have a problem turning success into real profits.
- Executives are not aligned at all. - No company vision since being acquired. - Private Equity advisors are running the show. - Comp plans not communicated until well into the 1st quarter of the year (still waiting) - Zero marketing support for sales people. - Commission plans change constantly. No plan for AE's to actually achieve quotas. - Incoherent product marketing. - Your manager (sales) is definitely interviewing elsewhere. - Accounts on your list get moved all the time due to turnover.

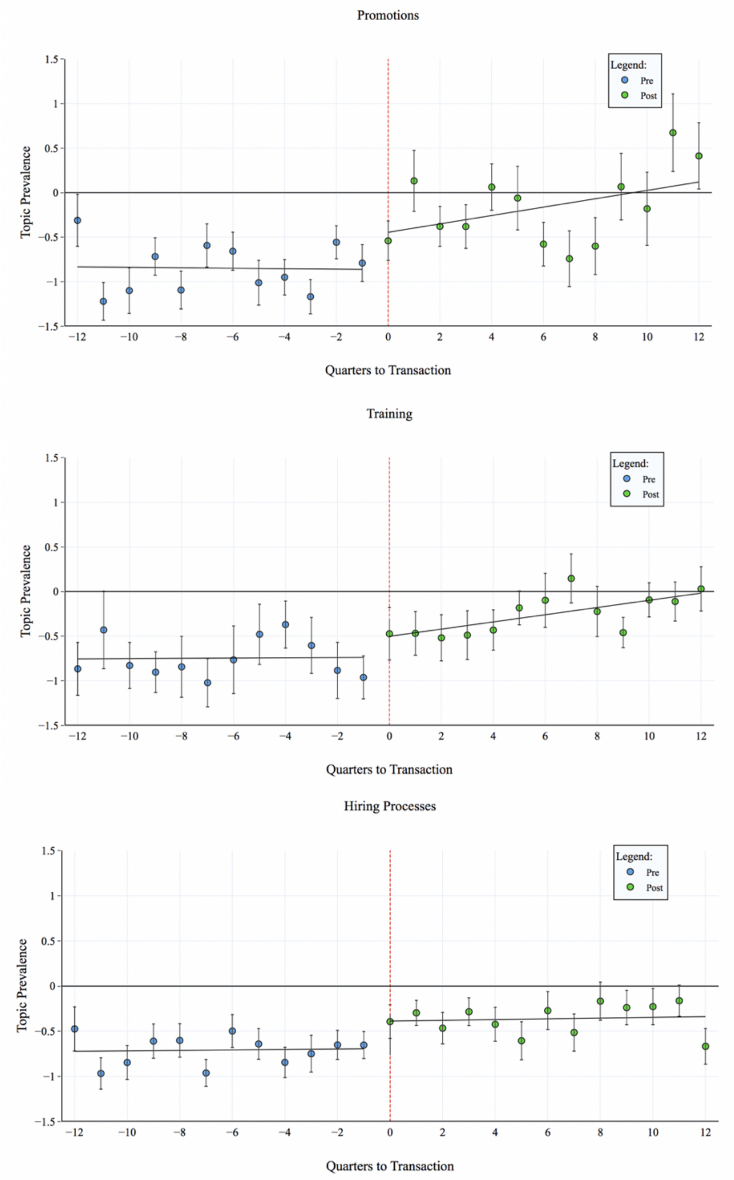

Figure B1: Cons Topic Prevalence Around Quarters of VC Exit.

Notes: The figures show the prevalence of the cons topics Promotion (top panel), Training (middle panel), and Hiring Processes (bottom panel) over quarters relative to VC exits for employees working in the VC-backed companies.

Table B1: Score and Corporate Ownership I: Incremental Approach

Panel A: Baseline Specification

	1	2	3	4
VC-backed	0.388***	0.367***	0.331***	0.333***
	(5.07)	(4.77)	(4.67)	(4.78)
Post VC Exit	-0.292***	-0.251***	-0.250***	-0.250***
	(-4.78)	(-4.09)	(-4.27)	(-4.26)
PE-backed	-0.095**	-0.100**	-0.116***	-0.117***
	(-2.07)	(-2.20)	(-2.78)	(-2.77)
Post PE Exit	-0.059	-0.025	-0.018	-0.015
	(-0.73)	(-0.31)	(-0.23)	(-0.18)
Other Transactions	-0.113***	-0.114***	-0.115***	-0.112***
	(-3.50)	(-3.56)	(-3.74)	(-3.67)
Post Other Transactions	-0.103***	-0.073**	-0.070**	-0.072**
	(-3.66)	(-2.62)	(-2.51)	(-2.56)
Public Firm	-0.096***	-0.093***	-0.077***	-0.075***
	(-4.38)	(-4.24)	(-3.52)	(-3.45)
Tech Firm	0.153***	0.155***	0.143***	
	(4.17)	(4.22)	(4.46)	
New Hire		0.088***	0.122***	0.121***
		(10.79)	(14.95)	(14.78)
Manager			0.181***	0.181***
			(8.26)	(8.28)
White Collar			0.109***	0.108***
			(8.27)	(8.32)
Pink & Blue Collar			0.031**	0.031**
			(2.55)	(2.56)
Low Salary			-0.172***	-0.171***
			(-10.91)	(-10.80)
High Salary			-0.010	-0.010
			(-0.63)	(-0.61)
Small Firm			0.153***	0.153***
			(6.92)	(6.92)
Young Firm			-0.026	-0.025
			(-0.81)	(-0.79)
Quarter Fixed Effects	Yes	Yes	Yes	No
Quarter x Industry Fixed Effects	No	No	No	Yes
Number of Observations	930,224	930,224	930,224	930,224
Adjusted R-squared	0.033	0.035	0.044	0.044

Panel B: By Exit Route

	1	2	3	4
VC-backed (IPO Target)	0.419***	0.396***	0.402***	0.407***
	(3.57)	(3.36)	(3.71)	(3.80)
VC-backed (PE Target)	0.318***	0.305***	0.253**	0.242**
	(3.12)	(2.97)	(2.38)	(2.51)
VC-backed (Trade Sale Target)	0.373***	0.351***	0.241**	0.247**
	(3.06)	(2.87)	(2.06)	(2.12)
Post VC to IPO	-0.264***	-0.221**	-0.239***	-0.242***
	(-3.09)	(-2.60)	(-2.97)	(-2.98)
Post VC to PE	-0.410***	-0.371***	-0.368***	-0.356***
	(-3.69)	(-3.27)	(-3.24)	(-3.37)
Post VC to Trade Sale	-0.255**	-0.221*	-0.205*	-0.212*
	(-2.11)	(-1.81)	(-1.69)	(-1.74)
Quarter Fixed Effects	Yes	Yes	Yes	No
Industry Fixed Effects	Yes	Yes	Yes	No
New Hire Fixed Effects	No	Yes	Yes	Yes
Quarter x Industry Fixed Effects	No	No	No	Yes
Control for Firm Size	No	Yes	Yes	Yes
Controls for Reviewer Characteristics	No	Yes	Yes	Yes
Controls for Other Transactions	Yes	Yes	Yes	Yes
Number of Observations	930,224	930,224	930,224	930,224
Adjusted R-squared	0.034	0.035	0.044	0.044

Notes: This table replicates Table 3.5 – Panels A and B where the Post coefficients measure the incremental employee satisfaction with regard to the satisfaction level prior to the change of ownership. VC-backed, PE-backed and Other Transactions represent respectively the average satisfaction level of the group of firms that have experienced a change ownership over the total period.

Table B2: Score and Corporate Ownership II: Details on Table 3.5 - Panel B.

By exit route

	1	2	3	4
Pre VC to IPO	0.419***	0.396***	0.402***	0.407***
	(3.57)	(3.36)	(3.71)	(3.80)
Pre VC to PE	0.318***	0.305***	0.253**	0.242**
	(3.12)	(2.97)	(2.38)	(2.51)
Pre VC to Trade Sale	0.373***	0.351***	0.241**	0.247**
	(3.06)	(2.87)	(2.06)	(2.12)
VC to IPO	0.156**	0.175**	0.163**	0.165**
	(2.11)	(2.38)	(2.34)	(2.35)
VC to PE	-0.092	-0.066	-0.115	-0.115
	(-1.16)	(-0.81)	(-1.51)	(-1.49)
VC to Trade Sale	0.118	0.130	0.036	0.035
	(1.02)	(1.12)	(0.31)	(0.29)
Pre PE to IPO	-0.399***	-0.399***	-0.374**	-0.371**
	(-2.68)	(-2.72)	(-2.49)	(-2.48)
Pre PE to PE	0.000	-0.006	-0.032	-0.032
	(0.01)	(-0.12)	(-0.71)	(-0.71)
Pre PE to Trade Sale	-0.308***	-0.312***	-0.308***	-0.317***
	(-4.08)	(-4.18)	(-4.58)	(-4.53)
PE to IPO	-0.468***	-0.439***	-0.406***	-0.406***
	(-3.49)	(-3.31)	(-2.97)	(-2.96)
PE to PE	-0.102	-0.072	-0.092	-0.090
	(-1.00)	(-0.71)	(-0.90)	(-0.89)
PE to Trade Sale	-0.274***	-0.252***	-0.229***	-0.225***
	(-3.62)	(-3.36)	(-3.20)	(-3.21)
Pre No PEVC to IPO	-0.148**	-0.154**	-0.117*	-0.115
	(-2.06)	(-2.15)	(-1.70)	(-1.67)
Pre No PEVC to PE	-0.079*	-0.083*	-0.095**	-0.092**
	(-1.70)	(-1.79)	(-2.21)	(-2.14)
Pre No PEVC to Trade Sale	-0.121***	-0.121***	-0.122***	-0.120***
	(-2.77)	(-2.77)	(-2.93)	(-2.89)
Post No PEVC to IPO	-0.134*	-0.108	-0.076	-0.079
	(-1.79)	(-1.45)	(-1.02)	(-1.08)
Post No PEVC to PE	-0.283***	-0.255***	-0.270***	-0.267***
	(-6.15)	(-5.48)	(-6.21)	(-6.13)
Post No PEVC to Trade Sale	-0.209***	-0.181***	-0.178***	-0.177***
	(-4.24)	(-3.65)	(-3.59)	(-3.59)
Quarter Fixed Effects	Yes	Yes	Yes	No
Industry Fixed Effects	Yes	Yes	Yes	No
New Hire Fixed Effects	No	Yes	Yes	Yes
Quarter x Industry Fixed Effects	No	No	No	Yes
Control for Firm Size	No	Yes	Yes	Yes
Controls for Reviewer Characteristics	No	Yes	Yes	Yes
Number of Observations	930,224	930,224	930,224	930,224
Adjusted R-squared	0.034	0.035	0.044	0.044

Notes: This table provides the estimates of all the coefficients of Table 3.5 - Panel B.

Table B3: Structural Topic Modelling – PBO

Panel A – Pros Reviews

	Pre PBO Exit	Post PBO Exit	Controls	Adjusted R-squared
Easy Job	0.220**	0.238***	Yes	0.044
	(2.40)	(3.00)		
Hiring Processes	0.158**	0.166**	Yes	0.013
	(2.27)	(2.38)		
Pay & Hours	0.163	0.711***	Yes	0.08
	(0.70)	(2.75)		
Flexible Environment	0.136	0.132	Yes	0.028
	(1.01)	(1.08)		
Product	0.103	0.212**	Yes	0.021
	(1.00)	(2.35)		
Rewards	0.101	0.125	Yes	0.02
	(1.28)	(1.59)		
Fellow Employees	0.083	-0.029	Yes	0.022
	(0.62)	(-0.25)		
Customer Care	0.080	0.116*	Yes	0.009
	(1.22)	(1.92)		
Growth Opportunities	0.037	0.033	Yes	0.022
	(0.79)	(0.79)		
Nice People	0.018	0.040	Yes	0.003
	(0.27)	(0.66)		
Supportive Culture	-0.030	-0.445	Yes	0.07
	(-0.11)	(-1.39)		
Growth Environment	-0.042	-0.171	Yes	0.048
	(-0.35)	(-1.35)		
Team	-0.155**	-0.200**	Yes	0.005
	(-2.08)	(-2.33)		
Work Life Balance	-0.333***	-0.474***	Yes	0.015
	(-5.10)	(-5.68)		
Benefits	-0.538***	-0.454***	Yes	0.027
	(-6.03)	(-4.53)		

Panel B – Cons Reviews

	Pre PBO exit	Post PBO Exit	Controls	Adjusted R-squared
Hiring Processes	-0.379***	-0.206**	Yes	0.014
	(-5.06)	(-2.32)		
Pay & Benefits	-0.257***	-0.343***	Yes	0.008
	(-2.74)	(-2.84)		
Promotions	-0.207	0.306*	Yes	0.031
	(-1.47)	(1.87)		
Politics	-0.177***	-0.0710	Yes	0.012
	(-2.66)	(-0.98)		
Culture	-0.176*	-0.168	Yes	0.044
	(-1.71)	(-1.41)		
Growth	-0.170	-0.715***	Yes	0.055
	(-0.92)	(-4.89)		
Busy	-0.0447	-0.257***	Yes	0.008
	(-0.75)	(-4.61)		
Hard Job	-0.0434	-0.316***	Yes	0.028
	(-0.38)	(-3.09)		
Expectations	-0.0286	-0.199***	Yes	0.006
	(-0.57)	(-3.81)		
Daily Issues	-0.00235	-0.0573	Yes	0.028
	(-0.04)	(-1.01)		
Changes	-0.00600	-0.0349	Yes	0.043
	(-0.06)	(-0.29)		
Sales	0.144	0.200**	Yes	0.004
	(1.66)	(2.04)		
Leaving	0.231**	0.264**	Yes	0.02
	(2.64)	(2.66)		
Customer Care	0.367***	0.705***	Yes	0.028
	(2.91)	(4.67)		
Training	0.749**	0.892***	Yes	0.09
	(2.34)	(2.72)		

Notes: This table shows for Pros (Panel A) and Cons (Panel B) topics the results of pooled regressions on their STM prevalence. Prevalence has been multiplied by 100. Variables of interest are dummies representing the situation pre- and post- Primary Buyout (PBO) exits (relative to the sample of private firms without any change of ownership). Controls for the average level related to the transactions are included. Other controls are similar to Table 3.5. Errors are clustered by company and by quarter.

B.2 Details on position classification

Employees report their position in the company in an open field, which provides guided suggestions as you type, which helps uniformization and avoid typos. We go through the 500 most frequent unique entries and classify them manually using a specialized guidebook.[1] Based on this, we use the following rules to categorize all employees as follows:

- Manager: Each job title containing the words "director" or "vice president" (e.g. senior director, associate director, vice president, senior vice president) unless the words assistant or sales are also present, plus all the job titles containing the words manager or leader (account manager, project manager, store manager, team leader, store leader).
- White Collars: Each job title containing the words consultant, executive, assistant-manager, analyst.
- Purple Collar: Each job title containing the words engineer or software.
- Pink Collar: Each job title containing the words sales or administrative or assistant. Teachers and marketing are also included here.
- Blue Collar: Each job title containing the words technician or driver. Cashier and servers are also included here.

[1] 'Work in America', page 597, ISBN.9781576076767.

B.3 Industries

Table B4: Industry Classification.

Industry category	Glassdoor industry
Consumer Services	Casual Restaurants, Health Beauty & Fitness, Sports & Recreation, Hotels Motels & Resorts, Fast-Food & Quick-Service Restaurants, Photography, News Outlet, Upscale Restaurants, TV Broadcast & Cable Networks, Video Games, Music Production & Distribution, Banks & Credit Unions, Gambling, Express Delivery Services, Audiovisual, Auctions & Galleries, Bus Transportation Services, Car Rental, Catering & Food Service Contractors, Charter Air Travel, Floral Nurseries, Funeral Services, Gas Stations, Radio, Food & Beverage Stores, Home Centers & Hardware Stores, Laundry & Dry Cleaning, Motion Picture Production & Distribution, Movie Theaters, Parking Lots & Garages, Passenger Rail, Performing Arts, Ticket Sales, Toy & Hobby Stores, Veterinary Services
Corporate Services	Accounting, Advertising & Marketing, Airlines, Architectural & Engineering Services, Brokerage Services, Building & Personnel Services Centers & Copy Shops Commercial Equipment Rental, Consulting, Convenience Stores & Truck Stops, Farm Support Services, Financial Analytics & Research, Financial Transaction Processing, Insurance Agencies & Brokerage, Insurance Carriers, Investment Banking, & Asset Management, Legal, Lending, Metals Brokers, Moving Services, Oil & Gas Services, Publishing, Real Estate, Research & Development, Security Services, Self-Storage Services, Shipping, Staffing & Outsourcing, Stock Exchanges Stock Exchanges, Travel Agencies, Truck Rental & Leasing, Venture Capital & Private Equity, Wholesale
Industrial	Biotech & Pharmaceuticals, Consumer Products Manufacturing, Food & Beverage Manufacturing, Logistics & Supply Chain, Health Care Products Manufacturing, Electrical & Electronic Manufacturing, Construction, Transportation Management, Industrial Manufacturing, Aerospace & Defense, Trucking, Energy, General Repair & Maintenance, Utilities, Commercial Printing, Miscellaneous Manufacturing, Chemical Manufacturing, Transportation Equipment Manufacturing, Auto Repair & Maintenance, Food Production, Telecommunications Manufacturing, Animal Production, Asphalt Products Manufacturing, Commercial Equipment Repair & Maintenance, Commercial Fishing, Metal & Mineral Manufacturing, Mining, Oil & Gas Exploration & Production, Timber Operations, Wood Product Manufacturing
IT Services	IT Services, Internet, Telecommunications Services, Cable Internet & Telephone Providers
Public Services	Health Care Services & Hospitals, Colleges & Universities, Preschool & Child Care, K-12 Education, Social Assistance, Education Training Services, Federal Agencies, Grantmaking Foundations, Health Fundraising Organizations, Membership Organizations, State & Regional Agencies, Rail
Retail	Office Supply Stores, Pet & Pet Supplies Stores, Department Clothing & Shoe Stores, Other Retail Stores, Media & Entertainment Retail Stores, Grocery Stores & Supermarkets, Consumer Electronics & Appliances Stores, Sporting Goods Stores, Vehicle Dealers, Home Furniture & Housewares Stores, Drug & Health Stores, Gift Novelty & Souvenir Stores, Automotive Parts & Accessories Stores, Consumer Product Rental, Beauty & Personal Accessories Stores, General Merchandise & Superstores,
Software	Computer Hardware & Software, Enterprise Software & Network Solutions

Notes: 134 industries were retrieved from Glassdoor which we allocated to 7 industries: Consumer Services, Corporate Services, Industrial, IT Services, Public Services, Retail, and Software. Industries are missing for certain companies (about 108 companies). We used the industry classification from Capital IQ to classify these.

Appendix C

Appendix to Chapter 4: Supplementary Material

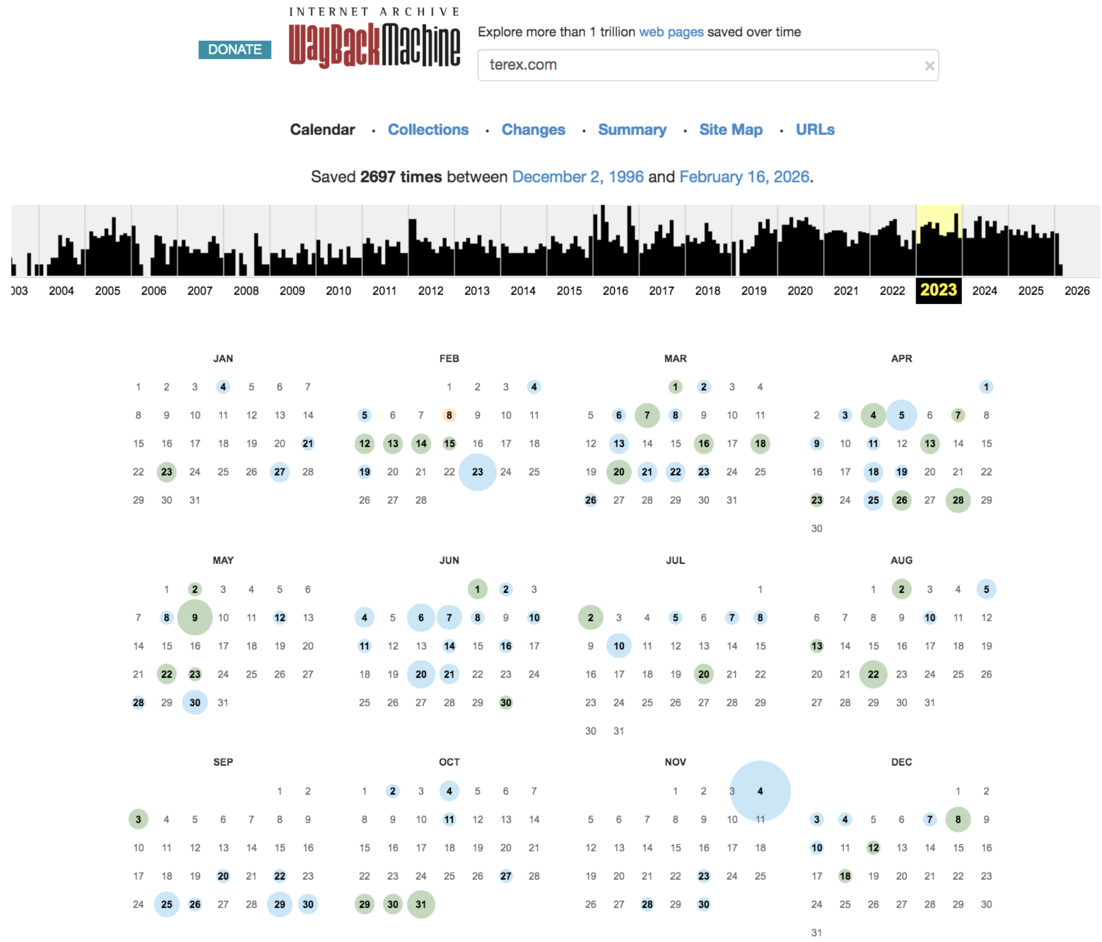

Figure C1: Wayback Machine Calendar View and Snapshot Selection.

Notes: This figure shows the Internet Archive Wayback Machine "calendar view" for a given firm URL. The timeline at the top summarizes the intensity of archived captures over time, while the calendar highlights the specific capture dates available within a selected year (bubble size reflecting capture volume/availability).

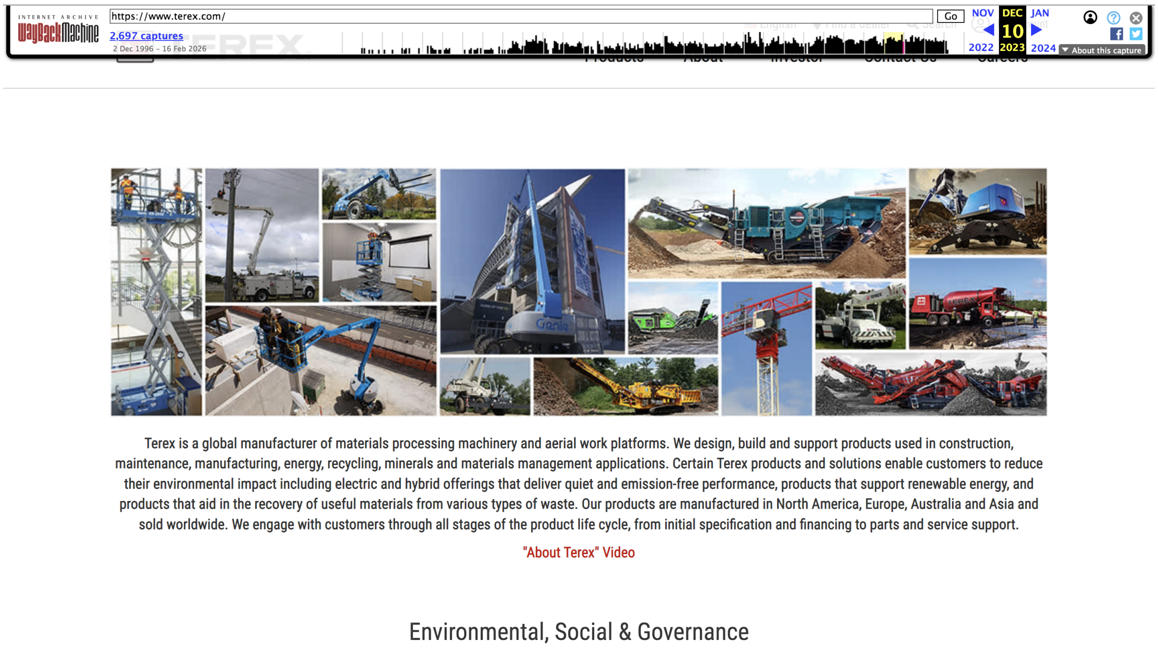

Figure C2: Archived Page Snapshot Retrieved from the Wayback Machine.

Notes: This figure displays an example of a historical webpage snapshot retrieved via the Internet Archive Wayback Machine for a firm URL and date selected from the archive calendar, illustrating the archived page content used in our data collection process.

Table C1: ESG Dictionary

Panel A. Environmental (E) terms			
afforestation	biodiversity	biodiverse	carbon
climate	cleantech	coal	decarbonisation
decarbonization	decarbonize	decarbonized	decarbonizing
deforestation	ecosystem	effluent	emissions
environmental	environmentally	ghg	greenhouse
landfill	netzero	offset	pollution
recycle	recycling	reforest	renewable
renewables	sustainability	warming	

Panel B. Social (S) terms			
antislavery	citizenship	communities	diversity
gender	inclusion	inclusiveness	inclusivity
indigenous	minority	nondiscrimination	nondiscriminatory
philanthropy	slavery	socially	stakeholder
volunteering	wellbeing	workforce	workplace

Panel C. Governance (G) terms			
accountability	anticorruption	antibribery	avoidance
bribery	conduct	corruption	ethics
governance	integrity	misconduct	oversight
responsibility	stewardship	transparency	

Notes: Table C1 reports the ESG word dictionaries used for website-based disclosure measurement. Terms are grouped into Environmental (E), Social (S), and Governance (G) categories and are drawn from the CISL sustainability glossary and the UNDP SDG Impact Standards glossary. We remove overly generic and sector-specific terms to reduce non-disclosure matches. The final dictionary includes 31 E terms, 20 S terms, and 16 G terms.

Table C2: ESG Disclosure Across Financing Rounds in VC-Backed Firms.

	Ln(1+ESG)	Ln(1+E)	Ln(1+S)	Ln(1+G)
Pre VC	16.16	6.74	5.28	4.14
Round 1	20.01	10.03	5.35	4.63
T-test (Round 1 - Pre VC)	*3.85****	*3.29****	*-0.07*	*0.49*
Round 2	21.00	9.82	5.53	5.66
T-test (Round 2 - Pre VC)	*4.84****	*3.08****	*0.25*	*1.52****
Round 3	24.63	11.70	7.10	5.82
T-test (Round 3 - Pre VC)	*8.47****	*4.96****	*1.82***	*1.68****
Round 4	25.85	11.41	8.55	5.89
T-test (Round 4 - Pre VC)	*9.69****	*4.67****	*3.27****	*1.75****
Round 5	27.55	13.97	7.87	5.71
T-test (Round 5 - Pre VC)	*11.39****	*7.22****	*2.59****	*1.58****
Round 6	28.04	12.02	8.37	7.65
T-test (Round 6 - Pre VC)	*11.88****	*5.28****	*3.09****	*3.51****

Notes: Table C2 reports average website-based ESG disclosure measures across financing stages for VC-backed firms, from the pre-VC stage to Round 6. The table reports the aggregate disclosure measure and its Environmental, Social, and Governance components. For each round, we report a mean-comparison test relative to the pre-VC stage. * stands for significant at 10%, ** significant at 5%, and *** significant at 1% level.

Table C3: Event-Time Regression Estimates Around IPOs/Acquisitions.

	Panel A		Panel B	
	Ln (1 + ESG)		Abnormal ESG	
	IPO	ACQ	IPO	ACQ
Year -3 × VC Backed	0.0575	-0.155**	0.000695	-0.0498***
	(0.47)	(-2.40)	(0.02)	(-2.90)
Year -2 × VC Backed	-0.00563	-0.0632	-0.0134	-0.0170
	(-0.07)	(-1.33)	(-0.59)	(-1.30)
Year 0 × VC Backed	1.576***	0.297	0.344***	0.0464
	(5.52)	(1.41)	(4.95)	(0.97)
Year +1 × VC Backed	1.784***	0.583***	0.393***	0.121**
	(5.92)	(2.70)	(5.38)	(2.45)
Year +2 × VC Backed	1.929***	0.834***	0.434***	0.183***
	(6.21)	(3.78)	(5.70)	(3.57)
Year + 3 × VC Backed	2.055***	0.831***	0.472***	0.182***
	(6.21)	(3.62)	(5.84)	(3.39)
Year -3 × No VC Backed	-0.316***	-0.128***	-0.0793***	-0.0328***
	(-2.91)	(-6.98)	(-2.99)	(-6.86)
Year -2 × No VC Backed	-0.187**	-0.0633***	-0.0427**	-0.0163***
	(-2.52)	(-5.00)	(-2.32)	(-4.87)
Year 0 × No VC Backed	0.353***	0.0725***	0.0822***	0.0194***
	(4.00)	(5.22)	(3.73)	(5.33)
Year +1 × No VC Backed	0.516***	0.208***	0.126***	0.0556***
	(4.90)	(10.24)	(4.66)	(10.57)
Year +2 × No VC Backed	0.627***	0.324***	0.159***	0.0849***
	(5.15)	(12.66)	(5.04)	(12.96)
Year + 3 × No VC Backed	0.628***	0.404***	0.163***	0.104***
	(4.39)	(12.98)	(4.41)	(13.13)
Ln Firm Age	0.280	0.132**	0.0549	0.0345**
	(1.55)	(2.40)	(1.31)	(2.50)
High Growth	-0.159	-0.0503	-0.0529	-0.00897
	(-0.86)	(-0.94)	(-1.04)	(-0.64)
Early VC	0.0819	0.0899	0.00336	0.000787
	(0.31)	(0.44)	(0.05)	(0.02)
Late VC	0.802***	0.217	0.150**	0.0281
	(2.73)	(1.00)	(2.06)	(0.55)
Year-F.E	Yes	Yes	Yes	Yes
Firm-F.E	Yes	Yes	Yes	Yes
Number of Obs.	7,110	89,331	7,110	89,331
Adjusted R-sq	0.583	0.628	0.515	0.571

Notes: Table C3 reports coefficient estimates from Equation 4.3 underlying Figures 4.4 and 4.5. Columns (1) and (2) use $\ln(1+\text{ESG}_{i,t})$ as the dependent variable, while columns (3) and (4) use the abnormal ESG disclosure indicator. The omitted reference year is $\tau = -1$. All specifications include firm and year fixed effects and cluster standard errors at the firm level.

Appendix D

Appendix to Chapter 5: Supplementary Material

Table D1: Fund Sponsor Variables: Definitions.

Variable	Definition
Carried Interest	Performance-based component (in %) of the profit-sharing agreement between GP and LPs.
Dry Powder Y4 (resp. Y5)	One minus the ratio of the invested capital to the total committed capital of the fund. It represents the level of dry powder at the fourth (resp. fifth) year of the life of the fund (vintage year of the fund + 4, resp. +5).
Dry Powder Change (Y4 to Y6)	Difference in dry powder between vintage year of the fund + 4 and vintage year of the fund + 6.
Fund Size	Total committed capital of the fund (in $million).
Fundraising period	Period of time elapsing from the fundraising launching date to the closing date. When the fundraising launching date is not provided by Preqin, we assume a fundraising length of 18 months and a closing the quarter before the first capital call. Alternative length of 12 or 24 months are considered for robustness.
Fundraising	Dummy variable taking the value of 1 if the fund is in fundraising or preparing a fundraising (considering a lag of 1 year).
Fundraising Y4-Y6	Dummy variable taking the value of 1 if the vintage year + 4, +5 or +6 of the tested fund falls within the fundraising period of the follow up fund.
GP Age	Age of the fund's GP at the time of the vintage year of the fund, using GP establishment year data from Preqin which we complete using information taken from Pitchbook if missing on Preqin.
GP Low Reputation	Following Barber and Yasuda (2017) we define low reputation GPs as small (Less than $1B of cumulated committed capital before the tested fund), Young (Fewer than 3 funds launched before the tested fund) and lacking of a strong past records (No top quartile funds as of the inception of the tested funds). This represents a triple condition.
IMR	Inverse Mills ratio capturing the nonselection hazard for data availability.
KS-PME	Kaplan Schoar PME index which incorporates the performance contribution of a public market index by compounding each fund cash flow (capital calls and distributions) based on index performance. The index we used is the S&P500. Index performance is measured between the date of the cash flow and the valuation date.
Management Fees	Fixed component (in %) of the profit-sharing agreement that the GP received for their services (deal generation, selection, structuring, value adding, exiting).
Past Performance	TVPI or KS-PME of the previous fund launched by the PE firm in the same strategy (LBO, VC, or growth).
TVPI	Total Value Paid In Capital which is the sum of the cash flows distributed and the residual value, divided by the invested capital; computed at the end of the fund life.

Table D2: Deal Variables: Definitions.

Variable	Definition
Cash Return	Ratio of the exit value of the portfolio company to the entry price.
Deal Club	Number of LBO buyer funds that are involved in the purchase of a target company.
Deal Size	Enterprise value of the target company (in $million), that is, the size of the transaction including leverage.
Dry Powder (DP)	Dry powder one quarter before the execution of the deal. It is computed as one minus the ratio of the invested capital to the total committed capital of the fund.
EBITDA Margin	EBITDA of the target company divided by the revenues of the target company.
EV/EBITDA Multiple	Ratio of the entry price over the latest available annual EBITDA for the target firm at the time of the LBO.
Fundraising	Dummy variable taking the value of 1 if the deal is executed within the fundraising period of the follow up fund.
GP Low Reputation	Following Barber and Yasuda (2017) we define low reputation GPs as small (Less than $1B of cumulated committed capital before the tested fund), Young (Fewer than 3 funds launched before the tested fund) and lacking of a strong past records (No top quartile funds as of the inception of the tested funds). This represents a triple condition.
Internal Rate of Return	Deal return obtained by a conversion of the cash return as follows: (cash return)$^{(1/D)} - 1$.
Investment Duration	Number of years between the investment year and the investment exit.
Late Deal	Dummy variable taking the value of one if the investment year of the deal is superior or equal to vintage year + 4.
Leverage	Ratio of the total net debt to the enterprise value of the target company.
Target revenues	Latest available annual revenues for the target firm at the time of the LBO (in $million).

Table D3: Economic Variables: Definitions.

Variable	Definition
Credit Spread	Following Hüther (2023), the credit spread corresponds to the spread between the Moody's BAA bond index over the 3 Month Treasury-Bill. Data are obtained from the FRED database.
DP Industry Concentration	Herfindhal index measuring the annual concentration of uninvested capital in each fund industry.
DP Industry Concentration	Following Ljungqvist et al. (2020), Herfindahl index of the concentration of uninvested capital held by buyout funds. The index is computed by determining the proportion of uninvested capital each fund holds in a given year relative to the total uninvested capital in its category (industry-specialist or generalist) in this same year.
High Credit Spread	The High Credit Spread variable is a dummy variable that equals one for a particular year if the annual credit spread is above the median value of our sample over the total time horizon.
High Value-Weighted Mean BM Ratio	The High Value-Weighted is equal to one if the Value-Weighted Mean BM Ratio of a given year is above the median value of the sample of our time period.
Ln Real Funds Size, same vintage year	The total cash to deploy by all US buyout funds sharing the same vintage year and expressed in natural logarithm and in dollars adjusted for 2010 purchasing power.
Value-Weighted Mean BM Ratio	Following Ljungqvist et al. (2020), the annual value-weighted book to market is calculated as a capitalisation-weighted average of the book-to -market ratio from all listed US available in Compustat.

Table D4: Duration Model: Time to Drawdown 70% of Capital (Interactions)

	Time to Drawdown 70% of Committed Capital		
	(1)	(2)	(3)
Fundraising x Low Reputation	0.0507		
	(0.26)		
Fundraising x First Fund	-0.547***		
	(-3.50)		
Ln Real Funds Size, same vintage year x Fundraising		-0.104	
		(-0.80)	
Herfindahl Industry Concentration Index x Fundraising		-0.0575	
		(-0.14)	
Ln Real Funds Size, same vintage year x Low Reputation		0.244***	
		(3.02)	
Herfindahl Industry Concentration Index x Low Reputation		0.315	
		(1.09)	
Ln Real Funds Size, same vintage year x First Fund		-0.0123	
		(-1.26)	
Herfindahl Industry Concentration Index x First Fund		0.329	
		(1.00)	
High Value-Weighted Mean Book Market Ratio x Fundraising			-0.472**
			(-2.40)
High Spread x Fundraising			0.0888
			(0.43)
High Value-Weighted Mean Book Market Ratio x Low Reputation			-0.170
			(-0.97)
High Spread x Low Reputation			-0.320
			(-1.63)
High Value-Weighted Mean Book Market Ratio x First Fund			-0.0451
			(-0.22)
High Spread x First Fund			0.0478
			(0.21)
Vintage Year F-E (Grouped every 5 Years)	Yes	Yes	Yes
p	0.217	0.242	0.220
L Ratio Test	261.99	450.75	312.99
P-Value	0.000	0.000	0.000
Number of Funds	431	431	431
Number of Funds x Year	1320	1320	1320
Number Failure	383	383	383

Notes: Table D4 presents the results of the duration model as in Table 5.4 where interactions among variables of interest are examined. Control variables are the same as in column (4) of Table 5.4 (not displayed). * stands for significant at 10%, ** significant at 5%, and *** significant at 1% level.

Table D5: Determinants of Fast-Deployment over the Period Ranging from Vintage Years + 4 to + 6.

Pr High DP VARY4-Y6 =1 (High & Mid DP Y4 Funds)			
	(1)	(2)	(3)
Market Conditions			
High Value-Weighted Mean Book Market Ratio	0.203	0.205	0.201
	(1.08)	(1.09)	(1.07)
High Spread	-0.0888	-0.0817	-0.0671
	(-0.49)	(-0.45)	(-0.37)
Competition for Deal Flow			
Ln Real Funds Size, same vintage year	-0.179	-0.181	-0.193
	(-1.51)	(-1.53)	(-1.63)
Herfindahl Industry Concentration Index	0.165	0.174	0.195
	(0.45)	(0.48)	(0.54)
Fund Characteristics			
Ln Real Fund Size	-0.0393	-0.0355	-0.0289
	(-0.50)	(-0.45)	(-0.37)
Past Q3 (TVPI)	0.218	0.226	0.220
	(0.64)	(0.66)	(0.64)
Past Q2 (TVPI)	0.237	0.232	0.208
	(0.67)	(0.66)	(0.59)
Past Q1 (TVPI)	0.523	0.535	0.536
	(1.38)	(1.41)	(1.41)
First Fund	0.0759	0.0720	0.0510
	(0.23)	(0.22)	(0.16)
Low Reputation	-0.205	-0.189	-0.176
	(-1.08)	(-0.99)	(-0.92)
Fundraising	0.215	0.222	0.238
	(1.38)	(1.43)	(1.52)
Low Interm. TVPI (median)		0.100	
		(0.66)	
Low Interm. TVPI (Tercile)			0.276
			(1.46)
Mid Interm. TVPI (Tercile)			0.225
			(1.20)
Number of Observations	289	289	289
Pseudo R^2	0.026	0.027	0.032

Notes: This table displays a probit analysis where the dependent variable is a dummy variable indicating whether the fund is fast-deploying the dry powder over the period ranging from vintage years + 4 to + 6 among the subsample of funds that reach high and mid levels of dry powder at vintage year +4. We use the same control variables as in Table 5.4. * stands for significant at 10%, ** significant at 5%, and *** significant at 1% level.

Table D6: Fund Performance.

	Panel A: TVPI				Panel B: KS-PME			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
High DP Y4	-0.236**	-0.193*	-0.135	-0.138	-0.192	-0.171	-0.103	-0.104
	(0.107)	(0.107)	(0.106)	(0.106)	(0.117)	(0.117)	(0.116)	(0.116)
High DP Y4 x Mid DP Var (Y4Y6)	-0.0655	-0.0788	-0.146	-0.138	-0.327**	-0.325**	-0.402***	-0.400***
	(0.133)	(0.132)	(0.131)	(0.131)	(0.146)	(0.144)	(0.143)	(0.143)
High DP Y4 x High DP Var (Y4Y6)	-0.139	-0.158	-0.215*	-0.210	-0.413***	-0.435***	-0.501***	-0.501***
	(0.130)	(0.129)	(0.128)	(0.128)	(0.142)	(0.141)	(0.139)	(0.140)
Q4 Past Perf.		0.319***	0.277***	0.318***		0.191**	0.126	0.135
		(0.0975)	(0.104)	(0.110)		(0.0834)	(0.0939)	(0.102)
Q3 Past Perf.		0.120	0.133	0.168*		0.160*	0.116	0.127
		(0.0808)	(0.0920)	(0.0969)		(0.0921)	(0.102)	(0.111)
Q2 Past Perf.		0.0536	0.0186	0.0678		-0.179	-0.182	-0.174
		(0.0871)	(0.0933)	(0.103)		(0.124)	(0.124)	(0.129)
Q1 Past Perf.		-0.0618	-0.0339	-0.00903		0.0272	0.00986	0.0145
		(0.106)	(0.109)	(0.111)		(0.129)	(0.132)	(0.134)
Ln Fund Size			0.0122	0.0484			0.0476	0.0558
			(0.0306)	(0.0442)			(0.0335)	(0.0479)
GP Low Reputation			0.0398	0.0449			0.0549	0.0559
			(0.0745)	(0.0746)			(0.0815)	(0.0817)
Fundraising Y4-Y6			0.239***	0.256***			0.267***	0.271***
			(0.0583)	(0.0601)			(0.0629)	(0.0655)
IMR				0.179				0.0409
				(0.157)				(0.171)
Vintage Year-F.E	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	431	431	431	431	431	431	431	431
Adjusted R^2	0.123	0.143	0.173	0.173	0.242	0.257	0.287	0.285

Notes: This table replicates the analysis of Table 5.5 but tests the incremental effects with regard to the category of fund with low DP variation between Y4 and Y6. Dependent variables are the realized TVPI (Total Value to Paid-In capital) (Panel A), and the realized KS-PME (Kaplan Schoar PME) (Panel B). IMR refers to the inverse Mills ratio capturing the non-selection hazard of disclosing information. * stands for significant at 10%, ** significant at 5%, and *** significant at 1% level.

Table D7: Propensity Score Matching Analyses of Capital Deployment.

	Panel A: TVPI			Panel B: KSPME		
	High DP Var	Low DP Var	ATT	High DP Var	Low DP Var	ATT
Year 1	0.914	0.949	-0.035	0.069	0.130	-0.061
Year 2	1.007	1.009	-0.002	0.105	0.169	-0.064
Year 3	1.062	1.048	0.014	0.155	0.191	-0.036
Year 4	1.151	1.158	-0.007	0.238	0.290	-0.052
Year 5	1.213	1.321	-0.108	0.311	0.387	-0.076
Year 6	1.250	1.386	-0.136	0.391	0.618	-0.227*
Year 7	1.304	1.500	-0.196	0.589	0.993	-0.404**
Year 8	1.360	1.549	-0.189	0.728	1.062	-0.334*
Year 9	1.408	1.557	-0.149	0.793	1.172	-0.379**
Year 10	1.429	1.574	-0.145	0.962	1.343	-0.381*

Notes: Table D7 presents the average treatment effect (ATT) on the fund performance (Panel A: TVPI and Panel B: KS-PME) of the treatment (i.e., large capital deployment after Y4) of funds displaying high level of dry powder (top tercile level) in vintage year+4.* stands for significant at 10%, ** significant at 5%, and *** significant at 1% level.

Table D8: Deal analysis: Leverage.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Abnormal DP	0.0248	0.0189	0.0110	0.0106	0.00912	0.00912	0.00905	0.00927
	(0.0223)	(0.0189)	(0.0184)	(0.0188)	(0.0192)	(0.0192)	(0.0193)	(0.0190)
Late Deal	0.0123	0.0116	0.0102	0.00992	0.0117	0.0117	0.0116	0.0119
	(0.0299)	(0.0285)	(0.0276)	(0.0278)	(0.0272)	(0.0272)	(0.0272)	(0.0272)
Abnormal DP × Late Deal	-0.0975**	-0.0926***	-0.0820**	-0.0815**	-0.0812**	-0.0812**	-0.0812**	-0.0821**
	(0.0384)	(0.0312)	(0.0314)	(0.0318)	(0.0315)	(0.0315)	(0.0315)	(0.0304)
Ln Deal Size	-0.0449***	-0.0515***	-0.0496***	-0.0497***	-0.0496***	-0.0496***	-0.0496***	-0.0493***
	(0.00963)	(0.00978)	(0.00937)	(0.00917)	(0.00932)	(0.00932)	(0.00934)	(0.00994)
Ln Fund Size	0.000887	0.00750	0.00747	0.00656	0.00609	0.00609	0.00603	0.00627
	(0.00916)	(0.00799)	(0.00850)	(0.0107)	(0.0110)	(0.0110)	(0.0112)	(0.0108)
GP Low Reputation				-0.00595	-0.00607	-0.00607	-0.00609	-0.00518
				(0.0337)	(0.0341)	(0.0341)	(0.0341)	(0.0322)
Fundraising					-0.00826	-0.00826	-0.00830	-0.00862
					(0.0150)	(0.0150)	(0.0153)	(0.0159)
Market BM Ratio						-0.00326	-0.00320	-0.00375
						(0.00361)	(0.00381)	(0.00457)
DP Industry Concentration							-0.00215	-0.00159
							(0.0446)	(0.0443)
Credit Spread								0.00571
								(0.0248)
Year-F.E	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-F.E	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	639	639	639	639	639	639	639	639
Adjusted R^2	0.074	0.136	0.158	0.157	0.156	0.156	0.154	0.153

Notes: This table displays the results related to Equation 5.1 when leverage is the dependent variable. The abnormal dry powder (DP) is a dummy variable equal to one if the dry powder one quarter before the deal is above or equal to the top tercile dry powder of the peer funds. "Late Deal" is a dummy variable taking the value of one if the deal investment year is superior or equal to vintage year + 4. Standard errors are clustered according to investment year and are reported in parentheses. * stands for significant at 10%, ** significant at 5%, and *** significant at 1% level.

Table D9: Deal analysis: EBITDA Multiple.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Abnormal DP	-0.969**	-0.893**	-0.847**	-0.865**	-0.902**	-0.902**	-0.900**	-0.901**
	(0.416)	(0.424)	(0.392)	(0.392)	(0.403)	(0.403)	(0.404)	(0.406)
Late Deal	-1.132	-0.207	0.0117	-0.00007	0.0123	0.0123	0.0172	0.00781
	(1.057)	(0.751)	(0.637)	(0.647)	(0.655)	(0.655)	(0.660)	(0.666)
Abnormal DP × Late Deal	2.715***	1.965**	1.779**	1.815**	1.882**	1.882**	1.887**	1.902**
	(0.885)	(0.860)	(0.698)	(0.723)	(0.776)	(0.776)	(0.781)	(0.797)
Ln Deal Size	1.445***	1.330***	1.247***	1.241***	1.247***	1.247***	1.243***	1.241***
	(0.164)	(0.123)	(0.127)	(0.123)	(0.124)	(0.124)	(0.124)	(0.123)
Ln Fund Size	-0.475**	-0.908***	-0.651***	-0.706***	-0.719***	-0.719***	-0.697***	-0.696***
	(0.228)	(0.169)	(0.176)	(0.137)	(0.135)	(0.135)	(0.133)	(0.133)
GP Low Reputation				-0.363	-0.350	-0.350	-0.327	-0.338
				(0.436)	(0.434)	(0.434)	(0.426)	(0.420)
Fundraising					-0.319	-0.319	-0.317	-0.313
					(0.396)	(0.396)	(0.399)	(0.397)
Market BM Ratio						-2.348***	-2.376***	-2.389***
						(0.193)	(0.209)	(0.202)
DP Industry Concentration							0.585	0.587
							(0.856)	(0.852)
Credit Spread								-0.0782
								(0.411)
Year-F.E	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-F.E	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	622	622	622	622	622	622	622	622
Adjusted R^2	0.153	0.243	0.304	0.304	0.303	0.303	0.302	0.301

Notes: This table displays the results related to Equation 5.1 when EV/EBITDA multiple is the dependent variable. The abnormal dry powder (DP) is a dummy variable equal to one if the dry powder one quarter before the deal is above or equal to the top tercile dry powder of the peer funds. "Late Deal" is a dummy variable taking the value of one if the deal investment year is superior or equal to vintage year + 4. Standard errors are clustered according to investment year and are reported in parentheses. * stands for significant at 10%, ** significant at 5%, and *** significant at 1% level.

Table D10: Deal analysis: Cash Returns.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Abnormal DP	0.164	0.182	0.238	0.235	0.224	0.224	0.212	0.213
	(0.144)	(0.150)	(0.158)	(0.161)	(0.167)	(0.167)	(0.170)	(0.170)
Late Deal	0.182	0.258*	0.250	0.261	0.268*	0.268*	0.269*	0.270*
	(0.128)	(0.151)	(0.151)	(0.155)	(0.155)	(0.155)	(0.156)	(0.155)
Abnormal DP $\times$ Late Deal	-0.683**	-0.739**	-0.786**	-0.793**	-0.780**	-0.780**	-0.745**	-0.743**
	(0.297)	(0.307)	(0.319)	(0.320)	(0.325)	(0.325)	(0.326)	(0.329)
Ln Deal Size	-0.872***	-0.873***	-0.873***	-0.882***	-0.881***	-0.881***	-0.883***	-0.886***
	(0.0719)	(0.0783)	(0.0780)	(0.0766)	(0.0765)	(0.0765)	(0.0764)	(0.0773)
Ln Fund Size	0.274***	0.257***	0.246***	0.215**	0.211**	0.211**	0.230**	0.229**
	(0.0761)	(0.0809)	(0.0776)	(0.0879)	(0.0877)	(0.0877)	(0.0884)	(0.0874)
GP Low Reputation				-0.201	-0.203	-0.203	-0.196	-0.200
				(0.134)	(0.132)	(0.132)	(0.132)	(0.131)
Fundraising					-0.0746	-0.0746	-0.0933	-0.0955
					(0.123)	(0.123)	(0.126)	(0.126)
Market BM Ratio						-0.0655***	-0.0970***	-0.0965***
						(0.0174)	(0.0276)	(0.0274)
DP Industry Concentration							0.678*	0.678*
							(0.364)	(0.365)
Credit Spread								-0.108
								(0.0836)
Year-F.E	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-F.E	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	966	966	966	966	966	966	966	966
Adjusted R^2	0.264	0.269	0.276	0.276	0.276	0.276	0.278	0.278

Notes: This table displays the results related to Equation 5.1 when the cash return is the dependent variable. The abnormal dry powder (DP) is a dummy variable equal to one if the dry powder one quarter before the deal is above or equal to the top tercile dry powder of the peer funds. “Late Deal” is a dummy variable taking the value of one if the deal investment year is superior or equal to vintage year + 4. Standard errors are clustered according to investment year and are reported in parentheses. * stands for significant at 10%, ** significant at 5%, and *** significant at 1% level.

Table D11: Deal analysis: Internal Rate of Return.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Abnormal DP	0.0254	0.0179	0.0234	0.0229	0.0204	0.0204	0.0195	0.0201
	(0.0190)	(0.0195)	(0.0182)	(0.0184)	(0.0201)	(0.0201)	(0.0206)	(0.0207)
Late Deal	0.0582**	0.0459*	0.0438	0.0460	0.0478*	0.0478*	0.0476*	0.0483*
	(0.0226)	(0.0235)	(0.0274)	(0.0275)	(0.0272)	(0.0272)	(0.0275)	(0.0274)
Abnormal DP $\times$ Late Deal	-0.119**	-0.122**	-0.133***	-0.133***	-0.130***	-0.130***	-0.127***	-0.128***
	(0.0452)	(0.0447)	(0.0437)	(0.0428)	(0.0434)	(0.0434)	(0.0439)	(0.0437)
Ln Deal Size	-0.101***	-0.103***	-0.104***	-0.107***	-0.107***	-0.107***	-0.107***	-0.107***
	(0.00883)	(0.00884)	(0.00887)	(0.00894)	(0.00892)	(0.00892)	(0.00887)	(0.00906)
Ln Fund Size	0.0151	0.00949	0.00826	-0.000479	-0.00132	-0.00132	-0.0000153	-0.000193
	(0.00969)	(0.00901)	(0.00899)	(0.00971)	(0.00998)	(0.00998)	(0.00999)	(0.00989)
GP Low Reputation				-0.0567**	-0.0574**	-0.0574**	-0.0569**	-0.0574**
				(0.0245)	(0.0244)	(0.0244)	(0.0243)	(0.0240)
Fundraising					-0.0184	-0.0184	-0.0197	-0.0199
					(0.0216)	(0.0216)	(0.0223)	(0.0222)
Market BM Ratio						-0.0148***	-0.0170***	-0.0170***
						(0.00324)	(0.00432)	(0.00431)
DP Industry Concentration							0.0473	0.0473
							(0.0449)	(0.0449)
Credit Spread								-0.0138
								(0.0146)
Year-F.E	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-F.E	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	966	966	966	966	966	966	966	966
Adjusted R^2	0.192	0.207	0.218	0.223	0.222	0.222	0.222	0.222

Notes: This table displays the results related to Equation 5.1 when the IRR is the dependent variable. The abnormal dry powder (DP) is a dummy variable equal to one if the dry powder one quarter before the deal is above or equal to the top tercile dry powder of the peer funds. “Late Deal” is a dummy variable taking the value of one if the deal investment year is superior or equal to vintage year + 4. Standard errors are clustered according to investment year and are reported in parentheses. * stands for significant at 10%, ** significant at 5%, and *** significant at 1% level.

Table D12: Deal analysis: Deal Size, Club and Duration.

	Ln Deal Size	Deal Club	Duration
Abnormal DP	-0.0787	-0.0334	0.326*
	(0.0776)	(0.0507)	(0.168)
Late Deal	-0.0212	0.0623	-0.180*
	(0.0715)	(0.0560)	(0.0931)
Abnormal DP $\times$ Late Deal	0.0402	-0.127	-0.0293
	(0.0919)	(0.114)	(0.216)
Ln Deal Size		0.254***	0.0815
		(0.0373)	(0.0549)
Ln Fund Size	0.622***	-0.0894***	-0.0721
	(0.0278)	(0.0287)	(0.0445)
GP Low Reputation	-0.401***	0.00577	-0.148
	(0.0787)	(0.0556)	(0.0915)
Fundraising	0.131**	-0.114**	0.164*
	(0.0624)	(0.0483)	(0.0893)
Value-Weighted Mean BM Ratio	0.0288***	-0.0344***	0.0757***
	(0.00517)	(0.00470)	(0.00894)
DP Industry Concentration	0.209	0.205*	-0.0785
	(0.140)	(0.103)	(0.254)
Credit Spread	-0.166**	-0.0611*	-0.0672
	(0.0813)	(0.0341)	(0.0734)
Year-F.E	Yes	Yes	Yes
Industry-F.E	Yes	Yes	Yes
Number of Observations	2379	2379	1797
Adjusted R^2	0.339	0.152	0.134

Notes: This table presents the relationship between dry powder and other deal characteristics such as the size (Ln Deal Size), the number of LBO buyer funds (Deal Club) and the investment duration (Duration). Standard errors are clustered according to investment year and are reported in parentheses. * stands for significant at 10%, ** significant at 5%, and *** significant at 1% level.

Table D13: Deal analysis: Lewbel IV / First-stage regression.

	Leverage	EBITDA Mult.	Cash Return	IRR
Lewbel(Late Deals)	0.0205	0.189***	0.0754*	0.0754*
	(0.0456)	(0.0529)	(0.0391)	(0.0391)
Lewbel(Ln Deal Size)	-0.0197	-0.0347**	-0.0192	-0.0192
	(0.0174)	(0.0169)	(0.0123)	(0.0123)
Lewbel(Ln Fund Size)	0.0221	0.0183	0.0120	0.0120
	(0.0204)	(0.0227)	(0.0166)	(0.0166)
Lewbel(GP Low Reputation)	-0.0717	-0.0341	-0.0138	-0.0138
	(0.0487)	(0.0510)	(0.0378)	(0.0378)
Lewbel(Fundraising)	-0.196***	-0.100**	-0.118***	-0.118***
	(0.0411)	(0.0468)	(0.0353)	(0.0353)
Lewbel(Value-Weighted Mean BM Ratio)	0.0916	0.0121	-0.0201	-0.0201
	(0.130)	(0.0714)	(0.0813)	(0.0813)
Lewbel(DP Industry Concentration)	-0.220**	-0.0390	0.0215	0.0215
	(0.103)	(0.109)	(0.0780)	(0.0780)
Lewbel(Credit Spread)	0.000188	0.0396	0.0288	0.0288
	(0.0419)	(0.0454)	(0.0311)	(0.0311)
Year-F.E	Yes	Yes	Yes	Yes
Industry-F.E	Yes	Yes	Yes	Yes
Number of Observations	639	622	966	966
Centered R^2	0.148	0.0689	0.0644	0.0644

Notes: This table provides the first stage regression of the Lewbel (2012) IV method. The dependent variable is the Abnormal DP one quarter before the execution of the deal. Standard errors are reported in parentheses. * stands for significant at 10%, ** significant at 5%, and *** significant at 1% level.

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