

What is the Impact of Managerial Ownership on Firm Performance in Private Equity Portfolio Firms?*

Johan Cassel[†]

January 15, 2020

Abstract

This paper examines the impact of managerial ownership on operational performance for firms backed by private equity. High post-buyout CEO ownership stakes are associated with improved firm profitability. This result is consistent with many explanations, such as the impact of incentives or matching of talented CEOs to firms. To distinguish between these explanations, the paper utilizes that the CEO is often replaced in buyouts. The ownership-performance result is only present for retained CEOs, suggesting that the matching explanation is unlikely to be a main driver. In addition, the result is stronger when absolute changes in ownership are used rather than ownership level. Taken together, these results suggest that changes in incentives from managerial ownership stakes induced by buyouts likely contribute to improved firm performance.

Keywords: Private Equity, Leveraged Buyouts, Incentives.

JEL Classification Numbers: G32, G34

*I thank Ludovic Phalippou, Tim Jenkinson, Thomas Hellman, and Thomas Noe for many helpful comments and constructive suggestions.

[†]Saïd School of Business, University of Oxford, and Oxford-Man Institute; Johan.Cassel@sbs.ox.ac.uk

1 Introduction

Private equity has become a prominent ownership form, with \$3.4 trillion in assets under management globally (Preqin 2019) and sponsoring more than 4000 deals during 2018 in the US alone (Pitchbook 2019). Given its large role in the economy, it is important to understand if and how private equity impacts the performance of its portfolio firms. The current academic literature suggests that private equity generates improvements to portfolio firms' operations, but how this improvement comes about is largely unknown.¹

This paper examines the impact on firm performance from one of the salient features that private equity ownership brings: change in managerial ownership stakes. Starting with [Jensen and Murphy \(1990\)](#), there has been a long debate about whether the equity ownership of CEOs provides sufficient incentives to generate value for shareholders. As previous studies show that managerial ownership increases when listed firms are taken private (e.g. [Kaplan and Stein \(1993\)](#); [Leslie and Oyer \(2009\)](#)), increased alignment of interests may contribute to improved operations. Indeed, [Gompers, Kaplan, and Mukharlyamov \(2016\)](#) document that private equity firms rank improving incentives as the second most important expected source of value creation. Another common feature of buyouts is that the acquiring private equity firm often replaces the CEO (see e.g. [Cornelli and Karakas \(2015\)](#)). Clearly, the interpretation of any observed relationship between managerial ownership and firm performance depends on whether the CEO is retained or replaced.

One contribution of this paper is assembling a representative dataset containing firm performance and managerial ownership of firms acquired in buyouts. Since portfolio firms are privately held after a buyout, this data is generally not available, particularly in the US. To overcome this challenge, this paper follows [Bernstein, Lerner, and Mezzanotti \(2019\)](#) and focuses on UK firms. All firms in the UK are required to submit filings to the national registrar office, Companies House, which makes the filings publicly available. Required filings include annual reports as well as lists denoting the precise ownership of every individual with a stake in the firm. The ownership filings are compiled by hand to construct a dataset on managerial ownership in the period before and after the buyout. Using a random sample of 322 UK firms acquired in a buyout, this paper provides new insights into the impact of managerial ownership on the performance of firms acquired in a buyout.

The main finding of the paper is that the post-buyout CEO ownership share is positively

¹Examples of studies documenting operational improvements are [Acharya, Gottschalg, Hahn, and Kehoe \(2013\)](#), [Bernstein and Sheen \(2016\)](#), [Boucly, Sraer, and Thesmar \(2011\)](#), [Davis, Haltiwanger, Handley, Jarmin, Lerner, and Miranda \(2014\)](#), [Davis, Haltiwanger, Handley, Lipsius, Lerner, and Miranda \(2019\)](#) [Guo, Hotchkiss, and Song \(2011\)](#), and [Kaplan \(1989\)](#)

correlated with improvements in profitability. The results suggest that firms with a 10% higher ownership stake (one standard deviation) improve their profitability margin by 2.5%-3.0% from the unconditional mean value. The relationship is economically stronger when instead using changes in CEO ownership stakes, where a 10% increase in the ownership translates to 5.4%-6.5% increase in profitability. The documented positive relationship is only present in the subsample of firms where the CEO is retained, while the coefficient is insignificant and switches sign in the subsample of firms where the CEO is replaced. The economic magnitude of the effect when the CEO is retained is twice that of the overall sample. The improvement in profitability appears to primarily be due to reducing costs rather than increasing productivity. Complementing the main analysis is an examination of determinants of CEO ownership. CEO ownership stake is found to be negatively correlated with firm size and profitability, and positively correlated with the pre-buyout ownership share of the CEO, but only when the CEO is retained.

There are multiple potential explanations for the results of the paper. First, it may reflect matching of talented CEOs to firms as in [Gabaix and Landier \(2008\)](#); better CEOs should be able to bargain for a bigger share as well as accept compensation packages that are more dependent on performance. Second, it could be the effect of incentives provided by the ownership stake. Third, it could be a result of efficient bargaining from managers with inside information ([Blanchflower, Oswald, and Sanfey \(1996\)](#)). This study does not claim to fully resolve all endogeneity issues and give a definitive answer, but the results suggest that some explanations are more plausible than other.

First, if the results are due to matching of talented CEO to firms via offering high ownership stakes, we would expect the results to be stronger when the CEO is replaced, as the pool to attract from is larger. Instead, the positive relationship is only observed when the CEO is retained which casts doubt on this explanation. When a CEO is retained, a change in ownership stake implies a change in incentives, with CEO ability held constant. Second, the incentive story would also suggest that that changes in ownership is relevant rather than the level of ownership, consistent with the results of the paper. In contrast, the effective bargaining story would suggest that the relevant metric is the pie that the management team holds. Third, the determinants of CEO ownership is largely consistent with a desire to provide incentives. If profitability can indeed be improved by providing the CEO with a higher ownership stake, we would expect high ownership stakes in firms with a low initial profitability, as any improvement is more valuable. Consistent with this idea, profitability is negatively related to the ownership stake of the CEO. Furthermore, the pre-buyout ownership stake is positively related to the post-buyout stake, but only when

the CEO is retained. This is consistent with an attempt to increase incentives from its initial level. Finally, the arrival of private equity almost invariably induces a shock to the ownership share. To the extent managers have limited say over the post-buyout share, the change in ownership level represents a shock to the incentives. Taken together, these results are supportive of the view that improving managerial incentives plays an important part in value creation by private equity.

It is important to point out some of the caveats to these interpretations. The econometrician cannot observe whether a CEO is offered to stay, nor the decision process of the CEO that is offered to stay. Additionally, firms are not randomly assigned to become buyout targets. While the analysis relies on cross-sectional variation in buyout targets, the reason they get targeted may vary considerably, and therefore so may the optimal compensation package. Finally, distinguishing between the effective bargaining and the incentive story is problematic as they often give similar predictions. For example, imagine a manager of a division in a conglomerate with knowledge of how to improve that division. He may approach a private equity firm with the intention to increase his ownership stake prior to implementing the necessary improvements. Here, the larger stake provides the incentive needed to take action, but presumably the manager's inside information allows him to bargain for a larger stake precisely because of his private information. Absent exogenous shocks to the ownership stake provided to CEOs that stay, this paper cannot claim causality, merely evidence consistent with the idea that incentives are important.

This paper speaks directly to the literature on operational improvements provided by private equity. Early studies by [Kaplan \(1989\)](#), [Lichtenberg and Siegel \(1990\)](#), and [Smith \(1990\)](#), showed that management buyouts are associated with improved operations, and that this generates value for the private equity sponsors. More recently, [Guo et al. \(2011\)](#), and [Acharya et al. \(2013\)](#) document the importance of operational improvements for generating value in buyouts. [Boucly et al. \(2011\)](#), using a sample of French firms, suggest one important channel through which private equity can help their portfolio firms: relaxing credit constraints allow firms to grow more rapidly. [Davis et al. \(2014\)](#) and [Davis et al. \(2019\)](#) provide evidence that private equity facilitates reallocation of capital to more productive establishments, generating an overall increase in total factor productivity. This paper contributes to this literature by documenting how changes in managerial ownership induced by buyouts are related to improvements in profitability, which is consistent with the idea that improving managerial incentives are important.

A notable exception to studies finding operational improvements is [Cohn, Mills, and Towery \(2014\)](#). They show that for public-to-private buyouts, improvements in operational

performance is only observed in the subset of firms for which financial data is publicly available. In contrast, utilizing tax data they find little evidence of operating improvements when considering all public-to-private buyouts. Indeed, data limitations is a significant challenge in private equity research in general (e.g. [Jeng and Lerner \(2016\)](#)), and in particular on privately held portfolio firms with limited disclosure requirements.

To overcome this challenge, this paper examines buyouts in the UK where all firms, public and private, have to submit annual accounts. Importantly, all UK-registered firms are required to annually disclose all shareholders and their precise ownership. This ownership data is hand-collected to measure managerial ownership prior to and following a buyout. This is a significant improvement over the existing large-scale study focusing on managerial ownership of private equity targets by [Leslie and Oyer \(2009\)](#).² They utilize a set of public-to-private buyouts to obtain pre-buyout ownership data, while using a different set of firms listing through an IPO to measure post-buyout ownership levels. Since these sets are different, the authors are unable to measure changes induced at the time of the buyout. Additionally, the authors lack firm performance data during the period of private equity ownership. By contrast, this paper measures the change in ownership within a firm as a result of the buyout, allowing an ex-ante measure that is related to firm performance.

This paper also contributes to the literature examining the impact of private equity on corporate governance. The seminal paper by [Kaplan and Strömberg \(2003\)](#) documents that contracts written by venture capitalists generally conform to what optimal contracting theory suggests. The idea that private equity represents agents likely to impose optimal contracts has been further studied to observe differences with other ownership forms. [Cornelli and Karakas \(2015\)](#) examine the role of boards and find that CEO turnover decreases and becomes less contingent on performance when private equity sponsors are more involved. [Edgerton \(2012\)](#) shows that private equity sponsors curb excessive usage of corporate jets, and [Cronqvist and Fahlenbrach \(2013\)](#) provide a detailed overview how the CEO contract is changed for a set of 20 private equity deals. This paper contributes to this stream of papers by linking changes in managerial ownership to firm performance.

The question of how managerial ownership impacts firm performance is an important question in the agency literature. Agency theory suggests that if managers can exert costly effort to increase performance, then we expect better performance when the pay of the man-

²[Cronqvist and Fahlenbrach \(2013\)](#) also examines CEOs of firms acquired in public-to-private buyouts. They obtain detailed information about the contract offered to CEOs in 20 large deals, offering insights into optimal contracting. While this paper lacks that level of detail, it covers more transactions and combines the ownership data with firm performance data.

ager is more tightly linked to exerting that effort.³ Existing studies on managerial ownership in publicly held firms have to overcome multiple issues: compensation packages are the outcome of a matching and bargaining process; managers may influence the process in which compensation is set (Bebchuk, Fried, and Walker (2002)) or time the delivery of news to the awarding of stock options (Yermack (1997) and Aboody and Kasznik (2000)); compensation packages can be renegotiated ex-post (Brenner, Sundaram, and Yermack (2000)); and firms design compensation packages to exploit managerial characteristics such as optimism and overconfidence (Otto (2014) and Humphery-Jenner, Lisic, Nanda, and Silveri (2016)). To the extent that the private equity setting shocks the ownership status, this study provides evidence of the importance of managerial ownership.

The next section presents the institutional setting. Section 3 describes the dataset and provides summary statistics. Section 4 presents the empirical approach and the main results of the paper. Section 5 provides some robustness tests while section 6 concludes.

2 Institutional Setting

A private equity fund is a partnership between a group of investors (referred to as Limited Partners, or LPs), and a private equity firm (referred to as the General Partner, or GP). “Private equity” encompasses many different strategies that varies in the the stage of a firms life at which investments are made, and the level of control the GP gets. This paper focuses on firms where the GP acquires a controlling equity stake, commonly referred to as buyout investments. Venture capital investments are therefore not part of the study.

When a fund is raised, LPs commit capital to the fund but do not provide it up front. The GP is provided significant freedom over what to invest in and the timing of those investments, although the fund has a maximum lifetime and a specified investment period. Once an investment is identified and agreed on, the GP “calls” the capital from LPs. When investments are exited, the resulting cash is distributed to LPs and usually cannot be recycled.

The terms of the partnership are defined in the limited partnership agreement which

³Jensen and Meckling (1976), Fama (1980), Fama and Jensen (1983a,b) are examples of this theoretical agency literature. Holmström (1979) and Grossman and Hart (1983) provide models of optimal contracts when effort is unobservable and impacts contractable output with noise. There is some empirical evidence that firm value is positively impacted from increased managerial ownership and when compensation is more sensitive to firm performance (e.g. Abowd (1990), McConnell and Servaes (1990) and Mehran (1995)). However, the evidence is mixed. Agrawal and Knoeber (1996) and Demsetz and Villalonga (2001) do not find evidence of a relationship between managerial ownership and firm performance.

stipulates the length of the investment period, the maximum allowed lifetime of the fund, and the compensation structure to the GP. As documented in [Metrick and Yasuda \(2010\)](#), the most common compensation arrangement for buyout funds includes a 2% management fee and 20% carried interest, allowing the GP to share in the profits if they perform well. In addition to the explicit pay for performance, [Chung, Sensoy, Stern, and Weisbach \(2012\)](#) demonstrates that the implicit gain from improving performance, in the form of future fees from increased success in fundraising, is of a similar magnitude to the explicit part. The structure of the GP's compensation therefore provides strong incentives to focus on taking actions that are value maximizing for their portfolio firms.

As GPs obtain a controlling stake in firms, they can implement changes deemed value increasing. The clear focus on value maximization, coupled with control rights, implies that private equity firms approximate strong principals in agency models. Therefore, it is unsurprising that their actions are viewed to be informative of optimal governance. An early and important example of this is provided by [Kaplan and Strömberg \(2003\)](#). They provide empirical evidence that contracts set up by venture capitalists largely conform to what optimal contracting theory suggests it should be. In a similar vein, [Cronqvist and Fahlenbrach \(2013\)](#) provide a detailed examination of changes in CEO contracts for a set of 20 large firms that are taken private in order to learn about what strong principals change in agent contracts. The most significant change they find is that a significant portion of equity grants performance-vests based on prespecified measures, and that CEOs forfeit unvested equity in the event they are fired.⁴

Proponents of private equity, like [Jensen \(1989\)](#), argue that they provide value for companies by improving incentives for managers through increased leverage, focusing managers on generating cash flow, and by providing high-powered incentives so that align interests of managers with those of investors. Indeed, [Kaplan and Stein \(1993\)](#) and [Cronqvist and Fahlenbrach \(2013\)](#) document that the percentage ownership of CEOs increases following a buyout. At the same time, retained CEOs are shown to "cash-out" and thus reducing their dollar amount invested in the company. To achieve high-powered incentives despite

⁴Private equity are also used to study the impact of boards by [Cornelli and Karakas \(2015\)](#). Their main results are that CEOs are less likely to be fired, and termination is less sensitive to performance. They interpret it as private equity owners having a longer horizon and being more patient. Private equity has also been used by [Edgerton \(2012\)](#) to examine if (some) CEOs in listed firms enjoy excess perks. He focuses on the case of corporate jets, which are costly that cost may be justified if it increases productivity of CEOs. While hard to disentangle these views in any given firm, he shows that jets are kept after being acquired by private equity in firms with modest jet ownership, suggesting a valuable role. However, firms with the biggest fleets experience a clear reduction in jets, suggesting that at least a subset of firms indeed have excessive perks.

lower dollar amounts invested, private equity firms increase leverage. As observed by [Jensen \(1989\)](#), the reduced equity share of firm value implies that any dollar amount represents a higher equity share post-buyout. What has received less attention is that private equity can achieve this on the equity side as well. By creating multiple shares, for example by issuing both preference shares and ordinary shares, the management can be given a large fraction of the residual ownership. Effectively, this makes the position held by management resembling a call option on the firm value.

3 Data

To answer the question of how managerial ownership is related to firm performance, one requires access to performance data as well as information about the managerial ownership itself for the firms while they are privately held.

As private firms lack market valuations, one needs to resort to accounting data to assess firm performance. Accessing accounting information on privately held firms is a challenge in private equity research. Consequently, many studies on private equity portfolio companies are restricted to samples where the researchers have been given access to deals from a particular investor (e.g. [Acharya et al. \(2013\)](#)), or on firms with publicly available data (e.g. [Guo et al. \(2011\)](#)). Accounting data may be publicly available if the firm has publicly traded debt, or if the firm eventually goes public through an IPO and in that process submits past accounts. In both of these scenarios, one does not obtain a comprehensive sample and there is a concern that the resulting sample is not fully representative.⁵

Having information on the precise ownership of managers, and structure of securities issued by the firm, is even more restrictive. Consequently, current studies either rely on subsets of firms that have been or become publicly listed (e.g. [Kaplan and Stein \(1993\)](#), [Leslie and Oyer \(2009\)](#)), or rely on small samples where detailed information can be extracted through filings ([Cronqvist and Fahlenbrach \(2013\)](#)).

To overcome this challenge, this paper follows [Bernstein et al. \(2019\)](#) and focuses on UK firms. All firms in the UK, public and private, are required to submit filings to “Companies House”, the United Kingdom official national registrar office. Companies House makes all

⁵[Guo et al. \(2011\)](#) studies US public-to-private transactions for which accounts are publicly available and find operational improvements post-LBO. In contrast, [Cohn et al. \(2014\)](#) use tax data on all public-to-private deals to show that there is a marked difference in the performance between those for which data is available and those for which it is not, with the latter showing worse performance. In contrast, [Boucly et al. \(2011\)](#) utilize tax data from France to get hold of a more representative sample. However, the portfolio firms in their study are notably smaller than common buyout targets.

accounts publicly available in the form of scanned PDFs. The information available from Companies House is gathered in electronic form by Bureau van Dijk (BvD) in their FAME database.⁶ Companies House also requires annual filings containing a list of all shareholders in the firm with their name and precise ownership documented.

3.1 Sample Selection

This paper follows [Strömberg \(2008\)](#) and uses Capital IQ to identify UK companies that are targets of a buyout. Appendix [A](#) describes the screening process in detail, but essentially it captures buyouts, as defined by Capital IQ, in which a majority ownership stake is sold. This means that venture capital investments, growth investments and other minority stake positions are not included in this study. To be included in the sample, the firms are required to have accounting data available for at least one year prior to and one year following the buyout. In addition, it is required that management ownership data is available following the buyout. The sample in this study contains 322 unique transactions.

For the earlier deals in the sample, the pre-deal years fall outside the coverage provided by Fame. These early annual reports have been downloaded directly from Companies House and manually input for the period not covered by Fame. The requirement on what has to be in annual reports varies with the size of the firm. In particular, firms classified as "small" submit abridged accounts that contains limited information, excluding profit and loss information. The requirements to be classified as a small company has changed over time, and any firm-year in which a company qualified for a small classification is dropped from the sample.⁷

The firms characteristics of the sample at the last annual report prior to the buyout is summarized in Panel [A](#) of Table [1](#). The average (median) firm has revenues of £115.0 (£57.2) million, an EBITDA margin of 16.3% (14.4%), assets in place worth £109.6 (£48.6) million, and have 1353 (450) employees. Panel [B](#) provides the growth numbers in the last year prior

⁶Information in FAME is available for a given registered firm for up to the 20 most recent annual reports. Note that this restriction is an improvement from earlier when FAME only provided 10 years of data. The 10 year requirement is still present in ORBIS, another commonly used BvD database. The UK setting, and BvD databases, have been utilized to gain insights from privately held firms by [Brav \(2009\)](#) and [Michaely and Roberts \(2012\)](#). [Bernstein et al. \(2019\)](#) use it to study how firms backed by private equity fared during the financial crisis.

⁷To be classified as a small company, a firm needs to be smaller in at least two out of three qualifying measures: turnover, total assets, and number of employees. The limit on number of employees has been stable at 50 over time. The following requirements and time periods are relevant for the sample in this paper, with numbers for turnover (total assets): prior to 2004-01-10, £2.8m (£1.4m); prior to 2008-04-06, £5.6m (£2.8m); prior to 2015-04-06, £6.5m (£3.26m); since 2015-04-06, £10.2m (5.1m).

to the buyout. The average (median) firm grows revenue by 17.8% (12.0%), assets expand by 17.6% (6.8%), the number of employees increases by 12.2% (7.2%), and the EBITDA margin increased by 0.6 (0.7) percentage points.

To correctly capture the period under private equity ownership, the exit date needs to be identified in addition to the entry date. To capture the exit, Capital IQ and Zephyr are used to identify exits that involves a sale of ownership stake such as IPO, trade sale, sale to the management team, or secondary buyouts. If Capital IQ and Zephyr miss some of these transactions they are detected by reading annual reports when a change in ownership is identified. If the private equity firm is listed as the ultimate owner at the most recently available annual report (as of June 2019), it is recorded as still being the owner.

Identifying outcomes where firms end up in administration or control passes to creditors are usually tricky to spot, but the UK setting provides an ideal setting to capture even these cases. When a firm enters administration processes it provides filings to Companies House on the process, and the appointed administrator provides progress reports.⁸

The outlined process does not pick up all cases. Capital IQ and Zephyr miss some sales, and not all cases where equity holders lose control go through formal processes requiring filings. If, for example, a debt-for-equity swap takes place leading to creditors seizing control, they may opt to continue running the business and therefore no liquidation filings are made.⁹ The outcome of these deals are picked up through observing changes in the controlling owner, and going through the annual reports in the years prior to the change in ownership. Following this process, there are only 2 cases of 322 for which the outcome is not known. This contrasts to the 11% unknown exits in [Strömberg \(2008\)](#).

Panel C of Table 1 documents the type of buyout both for the full sample and for four sub-periods based on the year the transaction took place. Secondary buyouts are the most common buyout, comprising 38% of transactions. It is also clear that secondary buyouts have become increasingly common in the UK over time. The other types of acquisition are buying

⁸The progress reports usually contains background information of the events leading up to the firm being placed in administration. The progress reports also contains information about the outcome to creditors and shareholders from the administration process. In the event a firm is liquidated through other processes than administration, filings again have to be submitted. Hence, if creditors seize control and opts to liquidate the firm's assets later, this process would be picked up. It is worth noting that in the process of assembling this dataset, several cases have been identified where a firm enters administration, (part of) the business is acquired from the administrators, but the sale is erroneously listed in Capital IQ as a sale by the original private equity owner. When an administration process is initiated, the previous owners lose control over the firm but may receive a payout when the creditors have received their pay. In the sample used here however, there is not a single administration process in which all creditors received full payment.

⁹The process followed by [Bernstein et al. \(2019\)](#) might miss these cases, as the firm would remain in operation

already private companies (27% of transactions), acquiring divisions (19%), taking public companies private (13%), while distressed buyouts, defined as acquiring from administration processes, accounts for 1% of the transactions.

Panel D of Table 1 similarly documents the outcome of transactions in the sample, where again the sub-periods refer to the year in which the transaction took place rather than the year of the exit. The most common exit is selling to a financial sponsor, usually other private equity firms, corresponding to 35% of the deals. Selling the portfolio company to another firm is the second most common exit with 28% of the deals ending up with such a sale. In 18% of the deals, the private equity firm loses control either by the firm being placed in one of the liquidation forms or via creditors seizing control but continuing running the business. This is the second most common form of exit for transactions taking place in 2005-2009, representing 29% of these deals. 11% of the transactions in this sample are still owned, representing a majority of the most recent deals. 7% are listed through an IPO, while the outcome is not known for 2 deals, representing less than 1%.

The composition of type of buyouts and exits are largely consistent with [Strömberg \(2008\)](#), but with a higher proportion of secondary buyouts at entry, and selling to financial sponsors at exit. Both of these have grown in importance over time and thus partly reflect the more recent sample. The 19% of deals in which control passes to creditors is high compared to the 6% number in [Strömberg \(2008\)](#). However, 11% of the exits in his study are not known, with 22% of deals in 2006-2007 being unknown. Presumably, deals without a successful sale have a higher propensity to be part of the unknown set, particularly if the creditors seize control but continue running the business. In addition, the timing of his study means that the impact of the financial crisis is not part of the exit numbers. For most of the firms in this sample that ended up in administration or lost control to creditors following the financial crisis, the change in ownership took place in 2009-2011 following attempts to restructure the debt.¹⁰

3.1.1 Managerial Ownership Data

One unique part of this dataset is the inclusion of managerial ownership information, both prior to and just after the buyout. This is enabled by the UK setting as firms required to

¹⁰In the event a financial restructuring took place that concluded with the private equity firm retaining a majority stake, it will not be a part of the 19% figure. While this paper does not formally study the restructuring process, anecdotally there are multiple cases in which the private equity owner injects equity to maintain its majority stake. This is consistent with the evidence in [Bernstein et al. \(2019\)](#) that a private equity owner can help firms get through difficult times.

annually provide a filing called "Annual Returns" (or more recently, "Confirmation Statements"). The filing discloses the directors of the firm, the outstanding number and types of shares issued by the firm, and the precise ownership of each of these types of shares for every individual shareholder in the company. For private companies the exact ownership of all individuals are available publicly, while a comparable list is not available for publicly listed firms.

These filings are manually collected and compiled by name to measure the fraction of ownership belonging to the CEO, non-CEO directors, other employees, and the private equity firms themselves. This information is collected at two points: in the last annual return filed prior to the acquisition; and in the first filing following the acquisition. This allows measuring changes in ownership shares as well and allows the researcher to capture adjustments to the composition of equity instruments. In buyouts, different classes of shares are often constructed and distributed with various voting rights even if they rank *pari passu* for cash flow rights. It is also common to utilize classes with different cash flow priority rights, such as preference shares. In the UK in particular, the usage of shareholder loans is a common practice. Shareholder loans do not appear in this annual return, and are instead part of liabilities in the balance sheet. In most respect they act as preference shares however, and the information about shareholder loans is collected through reading the annual report.

There are cases when the ownership share of all employees is not available. When the company is publicly listed prior to the buyout, only the ownership of the CEO and other directors is available, and it is collected through annual reports. Outstanding options are included in the ownership share by estimating measuring the delta, assuming that the Black-Scholes option pricing formula holds. When a private equity firm acquires a division of a larger conglomerate, the management team's interest, if any, is normally in shares of the ultimate parent firm. The pre-ownership measures for these directors therefore represents ownership in the ultimate parent firm.¹¹

Table 2 summarizes the CEO common equity ownership in the sample. Panel A displays the post-buyout ownership stake held by the CEO, and Panel B summarizes CEO ownership before the buyout takes place. The first row in each panel displays the overall sample numbers, while the remaining five rows provides a break down by type of buyout. The

¹¹It is not uncommon that at least one of the directors in the targeted subsidiary is also a director at the ultimate parent. Commonly, the acquired division represents a small fraction of the larger firm, and parent directors do not join the acquired division. It is likely that these directors' main focus is not on the (relatively) small division but rather on the larger firm. Therefore, any ownership by directors having a directorship in the ultimate parent is excluded from the management team ownership share for these divisions, when the revenue of the division represents less than 20% of the parent company.

average (median) CEO ownership stake is 14.0% (10.5%) after the buyout, compared to 22.2% (9.5%) before the buyout.

In contrast to earlier studies by [Kaplan and Stein \(1993\)](#), [Leslie and Oyer \(2009\)](#), and [Cronqvist and Fahlenbrach \(2013\)](#), average CEO ownership is lower after the buyout compared to the pre-period. This difference can be reconciled with the type of buyouts included in these studies. In the earlier studies, only public-to-private buyouts are considered, while this paper includes all types of buyout. Indeed, average CEO ownership increases from 10.1% to 16.1% in the subset of public-to-private buyouts. The main driver of the high pre-buyout ownership stems from private-to-private buyouts, where the average (median) CEO ownership is 47.2% (50.0%). The reason for the high ownership numbers is that a big fraction of the private-to-private buyouts target firms owned by the founder, or are family firms in which the CEO owns large stakes.

The average post-buyout ownership is highest in private-to-private buyouts (17.8%), followed by public-to-private buyouts (16.1%), secondary buyouts (12.7%), distressed buyouts (11.8%), and divisional buyouts (9.9%). The pattern is similar in the pre-buyout ownership numbers, the only ranking difference is that secondary buyouts switch place with public-to-private buyouts.

3.1.2 Data Issues

While the UK setting theoretically provides an ideal setting for studying firms under private equity ownership, there are several complications that arise in the data collection. This section describes how the paper deals with the following issues: the consolidating (reporting) entity shifts over time; the relevant time period over which economic activity is generated in a given fiscal year is not always provided by the FAME database; the FAME database often fail to properly incorporate impairment charges to goodwill, an important component given that the goodwill can be very large following a buyout.

Although all private firms have to file their accounts with Companies House, wholly owned subsidiaries are allowed to submit unconsolidated accounts; it is sufficient that one (parent) firm in a group structure submits consolidated accounts. Unconsolidated accounts may be misleading as they: do not net out intra-group transactions; do not incorporate the full costs that the group experience; occasionally misrepresents turnover; and frequently lack relevant financial information altogether. The consolidating entity is virtually always changed following a buyout, normally to a shell company set up to facilitate the acquisition. Occasionally the consolidating entity is shifted multiple times during the private equity

ownership, even when the ultimate controlling party remains the same. Presumably this practice is intended to obfuscate and reduce transparency. Ultimately, what this means is that simply identifying the acquired firm's ID is not sufficient to get a comparable measure of how a firm's performance change over time.

When a wholly owned subsidiary submits unconsolidated accounts, it is disclosed in the notes which firm is consolidating the group's accounts.¹² As part of the data collection, annual reports of the (original) portfolio companies are scanned each year to identify the consolidating firm. The end result is a time-series of the relevant reporting firms for each UK company acquired in a buyout.

The second complication concerns the time-period covered when a newly registered company submits its accounts for the first time. These accounts often covers a different period than the normal fiscal year, as the date of incorporation happens outside the fiscal year end date. The time period covered by the annual report is clearly specified in annual reports, and picked up by FAME. However, the period over which economic activity is generated, the firm's trading period, tend to not correspond to the period since incorporation. This is because private equity firms often set up shell companies specifically to facilitate the acquisition, and hence the date of incorporation pre-dates the date at which any economic activity takes place. This difference range from a couple of days up to a year or more. Any such differences in trading period versus reporting period is collected manually from the annual report of newly set up firm which is consolidating group accounts.¹³

The last part of the data collection concerns an observation that BvD does not always pick up impairment charges to goodwill. As goodwill arises as an accounting item to capture the difference in the price paid at a transaction compared to the book value, this item is much more prevalent, and larger, following a private equity transaction compared to other firms. Not incorporating goodwill impairments will therefore introduce additional noise in firms acquired in buyouts, and make them seem relatively more unprofitable if one examines a pre-amortisation item like EBITDA. To resolve this, cases where big drops in intangible asset are observed have been manually inspected by comparing the FAME database numbers

¹²This information is normally included in one of the final notes of the annual report, where the ultimate controlling party and any consolidating entities are listed. Occasionally this information is instead displayed elsewhere in the annual report.

¹³Note that studies on operational improvements do not include the year of acquisition in their analysis and hence do not suffer from this problem. As noted earlier, the consolidating firm sometimes shift multiple times during holding period in which case it is relevant to account for this problem. The annual report always includes the date the acquisition took place, either in the business review or in a note reviewing acquisitions over the period.

with those in the annual reports, and any discrepancies have been amended.¹⁴

4 Results

This section develops the empirical approach taken and presents the main findings of the paper.

4.1 Cross-sectional variation in ownership

We wish to examine how managerial ownership is related to firm performance. Ideally, this would entail comparing otherwise identical firms in which the managerial ownership stake is randomly decided. That is not the nature of the data however, and determinants of managerial ownership are likely related to both current characteristics of the firm and potentially its future prospects. Thus, the ideal comparison is not feasible. However, alternative explanations for any relationships differ in their predictions. This study utilizes the institutional setting provided by private equity to examine which of the interpretations are most likely to hold.

To set the scene, we begin by documenting how the cross-sectional variation in ownership stakes post-buyout is related to improvements in the acquired firms' performance. As the focus is on improvements in firms operations, it is natural to compare a pre- and a post-buyout period, allowing for a differential change dependent on the ownership stake given to the CEO following the buyout. Thus, the following model is estimated:

$$Y_{i,t,j} = \alpha_i + \alpha_t \times \alpha_j + \beta_1 \text{CEO Ownership}_i * \text{Post}_{i,t} + \beta_2 \text{Post}_{i,t} + \theta X_i * \text{Post}_{i,t} + \epsilon_{i,j,t}, \quad (1)$$

Where $Y_{i,j,t}$ is a measure of firm outcome for firm i operating in industry j in year t ; α_i , α_j , and α_t are firm, industry, and year fixed effects, respectively; CEO Ownership_i measures the fraction of ordinary shares held by the CEO; $\text{Post}_{i,t}$ is an indicator variable which takes the value of 1 if a firm-year is in the period after the buyout, and zero if it is years before; X_i contains firm controls measured at the year prior to the buyout.

The inclusion of firm fixed effects and a post period ensures a comparison of changes within the firm, and interacting the CEO Ownership variable with the post period allows

¹⁴In the next section a matched sample construction is described. For consistent treatment of the data, the same exercise is undertaken for the control sample. However, due to Goodwill being much less prevalent in firms that were not set up for the purpose of acquiring another firm, the issue is much smaller.

for a differential impact in firms based on the ownership stake held by the CEO. Time fixed effects and industry-year fixed effects will be included in some specifications to take out the impact of economy-wide and industry-specific shocks.

Firm controls are included for two reasons. First, it is conceivable that firms of certain characteristics are more likely to improve in specific dimensions. For example, [Boucly et al. \(2011\)](#) show that smaller firms may benefit from private equity ownership as financial constraints are relaxed. It could also be the case that, say, firms with an initial low profitability might have more room for improvements. Second, firm characteristics are likely to be related to the CEO ownership stake, and will indeed be shown to be so in section 4.4. For example, CEO risk aversion suggests that lower stakes should be held in larger firms, to limit the CEO's wealth at risk. Similarly, firms with low profitability may require restructuring which may be a risky undertaking. This could either result in lower stakes held due to risk aversion, or larger stakes because more compensation is required to entice the CEO to take the job in the first place. The bottom line is that we expect firm characteristics to be related to both outcome variables and ownership, and it is hence important to include them as controls.

The set of firm controls included are: log revenue, EBITDA margin, revenue growth, and deal leverage. These firm controls are measured in the year prior to the buyout, with the exception of deal leverage which is measured at the time of the buyout.

Private equity firms focuses on EBITDA as the measure of firm profit, and indeed even write compensation-based contracts on the measure ([Cronqvist and Fahlenbrach \(2013\)](#)). If a private equity firm wish to focus on improving EBITDA, there are essentially two ways to achieve this: growing the firm with a constant profit margin, or improving profitability. Revenue growth and EBITDA margin, defined as EBITDA/Revenue, are therefore the main dependent variables in the study.

Table 3 presents the estimates of (1), clustering standard errors at the transaction level. Columns 1-3 document results with log revenue as the dependent variable, while columns 4-6 display results using EBITDA margin as the dependent variable. Both dependent variables are estimated using three models, varying in the set of fixed effects included. The first model (columns 1 and 4) includes only firm fixed effects. The second (columns 2 and 5) adds year fixed effects. The third (columns 3 and 6) replaces the year fixed effects with industry-year fixed effects.

The results show that firms with higher post-buyout CEO ownership are associated with improved profitability, while the coefficient on revenue suggests an economically small and statistically insignificant positive association to CEO ownership. In terms of economic mag-

nitude, the point estimates suggests that firms with 10 percentage points higher CEO ownership is related to improvements in the profit margin of 40-50 basis points. This corresponds to a 2.45%-3.07% increase from the unconditional mean margin prior to the buyout. In comparison, the statistically insignificant coefficients for revenue would suggest an increase in revenue of 1.24%-1.77%.

The post dummy indicates that, controlling for the ownership stake given to the CEO, companies acquired in buyouts experience large growth in revenue following the acquisition, while profitability is reduced after the acquisition for companies with low post-buyout CEO ownership stakes.

4.1.1 Controlling for industry effects

The results presented so far compares cross-sectional variation among companies acquired in a buyout. There is a natural concern that companies with varying levels of managerial ownership vary significantly in other characteristics. In particular, if managerial ownership differs between industries, we wish to filter out any variation in performance between industries from the impact of managerial ownership. This study follows the methodology of [Boucly et al. \(2011\)](#) and compare changes in operational performance with that of matched peers. This allows the utilization of including industry-year fixed effects to account for industry-wide shocks as suggested by [Gormley and Matsa \(2013\)](#).¹⁵

The matching procedure utilized follows [Boucly et al. \(2011\)](#) and [Bernstein et al. \(2019\)](#), matching a portfolio company with up to five companies that i) belong to the same 2-digit SIC industry; ii) are not owned by another private equity firm; iii) are within a $\pm 15\%$ revenue band of the acquired company in the year prior to the buyout; and iv) have an EBITDA profitability within a ± 5 percentage points of the target acquired company in the year prior to the buyout.¹⁶ In the event that more than five potential matches are found, the closest five in a squared distance sense are used, with revenue and profitability given equal weight. The results presented are qualitatively similar for alternative bands, as well as the inclusion of number of employees as a matching variable, and results are available from the author upon request.¹⁷

¹⁵While industry-year fixed effects were included in the previous specification, there are multiple industry-year which would only have a single observation in the sample and thus are fully explained by those dummies. Including matched control firms allow these firms to also inform the results.

¹⁶As the entity reporting consolidated accounts is normally a holding company while under PE ownership, the reporting entity's SIC code is usually starting with 67, corresponding to a holding company of investment office. This classification is not informative of the activity of the portfolio company, and instead the SIC classification of the portfolio company is used in the matching process.

¹⁷As pointed out by [Boucly et al. \(2011\)](#), while tighter bands may be preferable it will lead to more firms

When including matched control companies, we augment the main specification (1) to account for variation between companies acquired by private equity and controls companies. Thus, the model to be estimated is now,

$$Y_{i,t,j} = \alpha_i + \alpha_t \times \alpha_j + \beta_1 \text{CEO Ownership}_i * \text{Post}_{i,t} * \text{PE}_i \quad (2) \\ + \beta_2 \text{Post}_{i,t} * \text{PE}_i + \beta_3 \text{Post}_{i,t} + \theta X_i * \text{Post}_{i,t} + \epsilon_{i,j,t},$$

Where, as previously, $Y_{i,j,t}$ is a measure of firm outcome for firm i operating in industry j in year t ; α_i , α_j , and α_t are firm, industry, and year fixed effects, respectively; CEO Ownership_i measures the fraction of ordinary shares held by the CEO; $\text{Post}_{i,t}$ is an indicator variable which takes the value of 1 if a firm-year is in the period after the buyout, and zero if it is years before; X_i contains firm controls measured at the year prior to the buyout. The newly added term PE_i takes the value of 1 if company i was acquired by private equity, and 0 otherwise.

By including a matched control set, the estimation now examines an increase in the dependent variables post-buyout of the private equity target company, relative to that of its matched control set. With matched peers, one can include industry-time fixed effect for all observations, ensuring that overall industry trends are not driving the results. It is useful to filter out these industry trends since private equity may be able to time the market as suggested in [Jenkinson, Morkoetter, and Wetzer \(2018\)](#).

Table 4 reports the estimates of (2). The table replicates Table 3 Columns 1-3 document results using log revenue as the dependent variable, while columns 4-6 instead uses the firm's EBITDA margin as the dependent variable. For each dependent variable, three models are presented. The first model (columns 1 and 4) includes only firm fixed effects. The second model (columns 2 and 5) adds year fixed effects. The third model (columns 3 and 6) replaces the year fixed effects with industry-year fixed effects. Standard errors are clustered at the firm level.

The results again suggests that firms with higher post-buyout CEO ownership are associated with better profitability in the post-transaction period, while not generating higher revenues. In terms of economic magnitude, the point estimate suggests that the profit margin is 52-63 basis points higher for firms in which CEO ownership is 10 percentage points higher. This corresponds to a 3.19%-3.87% increase from the unconditional mean profit margin prior

ending up with fewer, or no, matched controls. The alternative bands that have been attempted are revenue within $\pm 5\%$ and $\pm 30\%$, and profitability margins of either ± 3 percentage points or ± 10 percentage points. When number of employees are included, a similar band as for revenue is utilized.

to the buyout. The point estimates for revenue suggests a decrease of 0.60%-3.04% for a firm with 10 percentage points higher CEO ownership, but all estimates are statistically insignificant.

The dummies for the post period and whether a firm was acquired by a PE firm indicates a sharp difference in revenue for those acquired in buyouts compared to their peers. Buyout targets have revenue that are 30%-40% larger than their peers, but insignificantly lower profitability margins. It is worth noting that profitability margins are lower in the post-period for both PE targets and the matched peers, except for those firms with very high levels of CEO ownership.

4.2 Interpretation of the results

Tables 3 and 4 establish the main correlation of the paper: the profitability improves more for companies acquired in a buyout when the CEO receives a higher ownership stake. There are however multiple explanations as to what may cause this correlation. Three possible explanations are examined here, and the private equity setting is utilized to attempt to tease out which of these appear to be plausibly supported by the data.

First, the correlation observed may reflect talented CEOs being matched to firms as in [Gabaix and Landier \(2008\)](#). The idea is that there is a distribution of ability among (potential) CEOs, and the firms that are willing to offer the highest pay will attract the best CEOs. As a higher ownership stake implies a higher payoff at a successful exit, we should observe improved operations in the firms with higher ownership stakes.

Second, the observed relationship might reflect private information held by the management team. If the existing management team stays on and have firm-specific knowledge of costly value-increasing actions, they gain bargaining power in the negotiations with the private equity acquirer. This inside information explanation would suggest that the management team obtain a higher ownership share when there is greater potential to improve operations.

Third, the higher ownership stakes may give the management team incentives to take costly actions that increases firm value. The incentive explanation has existed in the literature for a long time, but convincing empirical evidence of the causal effect of incentives are notoriously hard to come by ([Edmans, Gabaix, and Jenter \(2017\)](#)).

4.2.1 Changes in ownership stakes

The buyout setting studied here allows for a type of analysis of the data that makes some of the interpretations more plausible than others. In particular, at the time of the buyout the ownership share is often shocked.¹⁸ This allows the econometrician to work with changes in ownership, not only cross-sectional variation. This is helpful as using first differences can take out unobservable firm-specific characteristics that may affect the ownership status of the management team (Edmans et al. (2017)).

In terms of the three proposed explanations for the observed results, the attracting talented CEO explanation suggests that the post-buyout stake is what matters in attracting the best CEOs, regardless of what the pre-buyout stake was. Similarly, the bargaining story suggests that management with better information will extract a larger post-buyout share, and that this is true regardless of the pre-buyout stake. Thus, in both of these explanations the post-buyout ownership stake should be the most relevant predictor of firm improvements. By contrast, the incentive mechanism suggests that only increased ownership stakes should lead to improved performance as that is when the incentive is altered. Merely retaining the post-buyout stake at a high, pre-buyout, level does not increase incentives, and hence we would not expect an improvement of firm performance.

Table 5 presents the results from running the previous model with the post-buyout ownership level replaced by the change in ownership level for targets acquired in the buyout. As managerial ownership data is not always available both pre- and post-buyout we lose some of observations compared to previous tables. As before, the estimates suggests that firms with increased CEO ownership are associated with an increase in their profitability margin, but not revenue. In terms of economic magnitude, a 10 percentage unit increase in CEO ownership translates to a 88-106 basis point increase in the EBITDA margin, or a 5.4%-6.5% increase from the average pre-buyout levels.

Although the point estimate is higher for changes in ownership than the post-buyout level of ownership, the standard errors are large enough to be a bit cautious with the interpretation. Nonetheless, these results are more consistent with an incentive story than the other two proposed explanations.

¹⁸While the ownership stake of matched peers is not included generally, doing so here would introduce noise to the estimation as any change in ownership would arise as an active decision by the firm. In practice, there is rarely any changes in the ownership structure of firms held privately, and thus inclusion in the estimation would only add zeros.

4.2.2 Retained or replace CEO

An important feature of buyouts is that the CEO is often replaced by the acquiring PE house, a fact highlighted by [Cornelli and Karakas \(2015\)](#). Because of this, the sample naturally splits into cases when the CEO is retained and when the CEO is replaced. In this paper, the CEO is retained in 58% of the transactions, and replaced in the remaining 42%.

The act of replacing a CEO is clearly endogenously chosen by the acquirer, potentially due to a perceived inability of the current management team to perform. While this suggests that the two subsets may perform differently on average, a sample split can nonetheless be informative of the relevant interpretation of the paper’s main result.

Suppose that the main underlying mechanism for the result is that talented CEOs are matched to a firms via being offered a high ownership stake. Arguably, this explanation is more relevant when the CEO is replaced since the acquirer needs to attract a new person to the role. By contrast, the story of inside information and bargaining power assumes that the CEO is an insider, not brought in from the outside. Similarly, the incentive story is more plausible when a CEO is retained, as an ownership change then represents an change in incentives for the same manager. Thus, in this case it cannot be that a, say, higher ownership stake attracts a higher ability CEO, as the CEO remains the same person.¹⁹

Table 6 presents the result of this sample split. Panel A contains the results for the subsample in which the CEO is retained, while Panel B presents the results for the subsample in which the CEO is replaced. As is evident from the two tables, the documented relationship between improved profitability and changes in ownership is entirely driven by the subsample where the CEO is replaced. In terms of economic magnitude, a 10% increase in CEO ownership when the CEO is retained is related to a 185-200 basis points increase in profitability, or 11.3%-12.3% from the average pre-buyout levels. This is roughly twice the level when considering the full sample. By contrast, for subsample where the CEO is replaced coefficient is statistically indifferent from zero, and has a negative sign. For revenue, there is some weak evidence that revenue increase (decrease) when the CEO ownership stake increase in the subsample where the CEO is retained (replaced). The relationship is very dependent on specification however, so it should be interpreted with caution. It is also still the case that other changes that are induced by PE ownership appears to be dominating any impact of changes in CEO ownership.

Taken together, the results presented in Tables 5 and 6 are mostly consistent with the incentive story, while the matching of talented CEOs to firms does not appear to be the

¹⁹One might add that it is highly unclear what an “increase” in ownership means if a CEO is replaced

driving explanation. However, while the incentive story appears plausible, most of the results are also consistent with the explanation of private information giving management bargaining power. To give a strong claim of the incentive story we would need a plausibly exogenous instrument for changes in the ownership stake, and this paper does not claim to have such clean identification.

4.3 Sources of profitability improvements

A natural question is how these profitability gains are achieved. The impacts of private equity ownership is hotly debated, with proponents arguing that private equity improves operations while critics argue that they are detrimental to other stakeholders of the firm. For example, [Boucly et al. \(2011\)](#) suggests that release financial constraints of firms and [Bernstein and Sheen \(2016\)](#) show how restaurants over which private equity have control becomes cleaner and safer. In contrast, [Antoni, Maug, and Obernberger \(2019\)](#) show that private equity targets in Germany experience a reduction in employment and employee earnings. [Eaton, Howell, and Yannelis \(2019\)](#) show that buyouts lead to higher tuition and per-student debt, while there is lower graduation rates, loan repayment rates, and earnings among graduates.

In light of this debate it is interesting to examine how changes in CEO ownership are associated with the components of the profitability improvements. In principle, profitability may improve if revenue increases with costs growing at a slower rate, or if costs are cut while revenue decreases at a slower rate.

Table 7 presents results for the subsamples in which the CEO is retained (Panel A) or replaced (Panel B). This split is utilized as earlier tables illustrated that the main result in the table originates in the retained CEO subsample. The dependent variable in columns 1-3 is cost/employee, in columns 4-6 it is revenue/employee, and in columns 7-9 it is EBITDA/employee. The table shows that in the subsample where the CEO is retained, the cost per employee is significantly reduced in firms for which the CEO receives an increase ownership stake. While not statistically significant, the coefficient on revenue per employee is lower, while EBITDA/employee is higher. This suggests that the profitability improvements associated with increased CEO ownership come about primarily through additional cost cutting rather than increased revenues.

4.4 Determinants of post-buyout CEO ownership

Having established an association between CEO ownership and improvements in firm profitability, we now turn to examine which factors are relevant for determining the ownership

stake given to CEOs.

Looking at firm characteristics, we expect firm size, leverage, and profitability to play a role. Starting with firm size, a given percentage of ownership represents more wealth invested in a larger firm. If CEOs are risk averse we would therefore expect them to have lower percentage ownership stakes in larger firms. Similarly, conditional on firm size, a dollar invested provides a higher percentage equity ownership stake in more leveraged firms. Working in the opposite direction, leverage increases the risk of the firm's equity. Finally, profitability have two opposing explanations as well. A firm with low profitability may require substantial restructuring. If such actions are risky endeavours, a risk averse CEO may demand pay to be less contingent on firm performance. However, it is plausible that such restructuring events are dependent on CEO effort, and hence the acquiring private equity firm gain more from providing powerful incentives. In addition, the results presented thus far would suggest that higher ownership stakes are associated with improved profitability. All else equal, an improvement of profitability of one percentage point is worth more if the original profitability is at 1% than if it is at 10%. This would also point towards higher CEO ownership stakes being awarded in firms with lower profitability.

In addition to firm characteristics, there are multiple reasons to expect that the pre-buyout ownership stake held by the CEO is positively related to the post-buyout CEO ownership stake. First, if unobserved firm characteristics contribute to the optimal CEO ownership stake, we may suspect that firms with higher ownership stakes pre-buyout will also have high ownership stakes post buyout. This channel should operate whether the CEO is retained or replaced. Second, to the extent that the private equity acquirer is attempting to improve incentives for retained CEOs we would expect the pre-buyout ownership stake to positively correlate with the post-buyout stake. The reasoning is simple: a small stake is required to improve incentives if pre-buyout ownership level is small, while a large stake is required if the pre-buyout ownership level is high. Finally, for retained CEOs we may also expect a wealth effect to suggest a positive relationship between the pre-buyout and post-buyout ownership stakes. A CEO with a large pre-buyout stake receives a large payout from the acquisition and hence becomes wealthier, and may be wealthier to begin with. All else equal, this would suggest that CEOs with higher pre-buyout stakes have a higher willingness to invest a larger dollar amount, as it represents a smaller fraction of their wealth. Indeed, [Cronqvist and Fahlenbrach \(2013\)](#) and [Kaplan and Stein \(1993\)](#) provide evidence that while CEOs cash-out in dollar terms, the average ratio of post-LBO % ownership / pre-LBO % ownership is 2.86.

To examine the determinants of post-buyout CEO ownership, a Tobit model as well as

a OLS model is estimated. As ownership stakes are bounded between 0 and 1, the Tobit model appears appropriate. However, Tobit models may struggle with the inclusion of fixed effects and as such an OLS model is estimated for comparison. Fortunately, the two models provide very similar estimates. We wish to include transaction year effects to control for time-varying trends in ownership. We wish to include dummies for the type of deal (e.g. public-to-private, secondary LBO) as they may behave substantially different and have quite different pre-buyout ownership stakes as reported in Table 2.

The estimates of the two models are reported in Table 8. OLS estimates are presented in columns 1-3, while the Tobit estimates are presented in columns 4-6. In columns 1 and 3, only firm characteristics are included. In columns 2 and 5, acquisition type dummies are included. In columns 3 and 6, the pre-buyout CEO ownership stakes are included, as well as an interaction term indicating whether the CEO is retained or not.

Firm size is negatively related to the size of the CEO ownership stake, consistent with the idea of risk averse CEOs and potentially wealth constraints. The coefficient on leverage is positive, albeit not statistically significant. Profitability is negatively related to the ownership stake, consistent with the idea that a desire to provide incentives to improve profitability dominates. Interestingly, the CEO pre-buyout ownership stake is positively related to the post-buyout ownership stake, but solely for CEOs that are retained. This suggests that the desire to improve incentives is important for private equity acquirers. It is somewhat surprising that there is no relation to be found in firms where the CEO is replaced, as one would expect unobservable firm-specific characteristics to play a role.

5 Conclusion

This paper examines the impact of managerial ownership on firm performance of firms acquired in a buyout. Knowledge of the changes implemented by private equity firm and how it relates to firm outcomes is scarce, so this paper contributes by examining one of the salient features of private equity: changes in managerial ownership stake. The paper assembles a new, partially hand-collected, dataset of financial information and managerial ownership details for private equity portfolio firms registered in the UK.

The paper finds that firms with higher CEO ownership stake experience improved profitability. While there are multiple potential explanations, the results are consistent with an interpretation that incentives play an important role. In particular, the results are strongest when the CEO is retained and receives an increase in the ownership stake. For retained CEO, a change in ownership stakes corresponds to altered incentives, while ability remains

the same. Determinants of the ownership stake given are also consistent with an idea that incentives are important. High ownership stakes are awarded in firms where improving profitability is valuable. Stakes are higher when the CEO ownership stake is high pre-buyout, but only when the CEO is retained, consistent with an attempt to improve incentives from their current levels. It is important to note that while the results are consistent with an incentive story, the evidence presented here is not causal. A potential avenue for future research is utilizing the private equity setting to examine plausibly exogenous variation in ownership stakes awarded.

References

- Aboudy, D. and R. Kasznik (2000). Ceo stock option awards and the timing of corporate voluntary disclosures. *Journal of Accounting and Economics* 29(1), 73 – 100.
- Abowd, J. M. (1990). Does performance-based managerial compensation affect corporate performance? *ILR Review* 43(3), 52–S–73–S.
- Acharya, V. V., O. F. Gottschalg, M. Hahn, and C. Kehoe (2013). Corporate governance and value creation: Evidence from private equity. *The Review of Financial Studies* 26(2), 368–402.
- Agrawal, A. and C. R. Knoeber (1996). Firm performance and mechanisms to control agency problems between managers and shareholders. *The Journal of Financial and Quantitative Analysis* 31(3), 377–397.
- Antoni, M., E. Maug, and S. Obernberger (2019). Private equity and human capital risk. *Journal of Financial Economics* 133(3), 634 – 657. JFE Special Issue on Labor and Finance.
- Bebchuk, L. A., J. M. Fried, and D. I. Walker (2002). Managerial power and rent extraction in the design of executive compensation. *The University of Chicago Law Review* 69(3), 751–846.
- Bernstein, S., J. Lerner, and F. Mezzanotti (2019, 04). Private Equity and Financial Fragility during the Crisis. *The Review of Financial Studies* 32(4), 1309–1373.
- Bernstein, S. and A. Sheen (2016, 09). The Operational Consequences of Private Equity Buyouts: Evidence from the Restaurant Industry. *The Review of Financial Studies* 29(9), 2387–2418.
- Blanchflower, D. G., A. J. Oswald, and P. Sanfey (1996, 02). Wages, Profits, and Rent-Sharing*. *The Quarterly Journal of Economics* 111(1), 227–251.
- Boucly, Q., D. Sraer, and D. Thesmar (2011). Growth Ibos. *Journal of Financial Economics* 102(2), 432 – 453.
- Brav, O. (2009). Access to capital, capital structure, and the funding of the firm. *The Journal of Finance* 64(1), 263–308.

- Brenner, M., R. K. Sundaram, and D. Yermack (2000). Altering the terms of executive stock options. *Journal of Financial Economics* 57(1), 103 – 128.
- Cassel, J. and L. Phalippou (2019). A closed-form formula for the expected return on an lbo. Working paper.
- Chung, J.-W., B. A. Sensoy, L. Stern, and M. S. Weisbach (2012). Pay for performance from future fund flows: The case of private equity. *The Review of Financial Studies* 25(11), 3259–3304.
- Cohn, J. B., L. F. Mills, and E. M. Towery (2014). The evolution of capital structure and operating performance after leveraged buyouts: Evidence from u.s. corporate tax returns. *Journal of Financial Economics* 111(2), 469 – 494.
- Cornelli, F. and O. Karakas (2015). Ceo turnover in lbo: The role of boards. Working paper.
- Cronqvist, H. and R. Fahlenbrach (2013). Ceo contract design: How do strong principals do it? *Journal of Financial Economics* 108(3), 659 – 674.
- Davis, S. J., J. Haltiwanger, K. Handley, R. Jarmin, J. Lerner, and J. Miranda (2014, December). Private equity, jobs, and productivity. *American Economic Review* 104(12), 3956–90.
- Davis, S. J., J. Haltiwanger, K. Handley, B. Lipsius, J. Lerner, and J. Miranda (2019). The Economic Effects of Private Equity Buyouts, Working paper No. 26371, NBER.
- Demsetz, H. and B. Villalonga (2001). Ownership structure and corporate performance. *Journal of Corporate Finance* 7(3), 209 – 233.
- Eaton, C., S. Howell, and C. Yannelis (2019). When investor incentives and consumer interests diverge: Private equity in higher education. Working paper.
- Edgerton, J. (2012). Agency problems in public firms: Evidence from corporate jets in leveraged buyouts. *The Journal of Finance* 67(6), 2187–2213.
- Edmans, A., X. Gabaix, and D. Jenter (2017). Executive compensation: A survey of theory and evidence. In B. Hermalin and M. Weisbach (Eds.), *The Handbook of the Economics of Corporate Governance*, pp. 383–539. Amsterdam: Elsevier.
- Fama, E. F. (1980). Agency problems and the theory of the firm. *Journal of Political Economy* 88(2), 288–307.

- Fama, E. F. and M. C. Jensen (1983a). Agency problems and residual claims. *The Journal of Law and Economics* 26(2), 327–349.
- Fama, E. F. and M. C. Jensen (1983b). Separation of ownership and control. *The Journal of Law and Economics* 26(2), 301–325.
- Frydman, C. and D. Jenter (2010). Ceo compensation. *Annual Review of Financial Economics* 2(1), 75–102.
- Gabaix, X. and A. Landier (2008, 02). Why has CEO Pay Increased So Much?*. *The Quarterly Journal of Economics* 123(1), 49–100.
- Gompers, P., S. N. Kaplan, and V. Mukharlyamov (2016). What do private equity firms say they do? *Journal of Financial Economics* 121(3), 449 – 476.
- Gormley, T. A. and D. A. Matsa (2013, 08). Common Errors: How to (and Not to) Control for Unobserved Heterogeneity. *The Review of Financial Studies* 27(2), 617–661.
- Grossman, S. J. and O. D. Hart (1983). An analysis of the principal-agent problem. *Econometrica* 51(1), 7–45.
- Guo, S., E. S. Hotchkiss, and W. Song (2011). Do buyouts (still) create value? *The Journal of Finance* 66(2), 479–517.
- Holmström, B. (1979). Moral hazard and observability. *The Bell Journal of Economics* 10(1), 74–91.
- Humphery-Jenner, M., L. L. Lisic, V. Nanda, and S. D. Silveri (2016). Executive overconfidence and compensation structure. *Journal of Financial Economics* 119(3), 533 – 558.
- Jeng, L. and J. Lerner (2016, May). Making private data accessible in an opaque industry: The experience of the private capital research institute. *American Economic Review* 106(5), 157–160.
- Jenkinson, T., S. Morkoetter, and T. Wetzler (2018). Buy low, sell high? do private equity fund managers have market timing abilities? Working Paper.
- Jensen, M. (1989). Eclipse of the public corporation. *Harvard Business Review* 67(5), 61–74.
- Jensen, M. C. and W. H. Meckling (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics* 3(4), 305 – 360.

- Jensen, M. C. and K. J. Murphy (1990). Performance pay and top-management incentives. *Journal of Political Economy* 98(2), 225–264.
- Kaplan, S. (1989). The effects of management buyouts on operating performance and value. *Journal of Financial Economics* 24(2), 217 – 254.
- Kaplan, S. N. and J. C. Stein (1993, 05). The Evolution of Buyout Pricing and Financial Structure in the 1980s*. *The Quarterly Journal of Economics* 108(2), 313–357.
- Kaplan, S. N. and P. Strömberg (2003, 04). Financial Contracting Theory Meets the Real World: An Empirical Analysis of Venture Capital Contracts. *The Review of Economic Studies* 70(2), 281–315.
- Leslie, P. and P. Oyer (2009). Managerial incentives and value creation: Evidence from private equity. Working paper.
- Lichtenberg, F. R. and D. Siegel (1990). The effects of leveraged buyouts on productivity and related aspects of firm behavior. *Journal of Financial Economics* 27(1), 165 – 194.
- McConnell, J. J. and H. Servaes (1990). Additional evidence on equity ownership and corporate value. *Journal of Financial Economics* 27(2), 595 – 612.
- Mehran, H. (1995). Executive compensation structure, ownership, and firm performance. *Journal of Financial Economics* 38(2), 163 – 184.
- Metrick, A. and A. Yasuda (2010). The Economics of Private Equity Funds. *Review of Financial Studies* 23, 2303–2341.
- Michaely, R. and M. R. Roberts (2012, 3). Corporate Dividend Policies: Lessons from Private Firms. *The Review of Financial Studies* 25(3), 711–746.
- Otto, C. A. (2014). Ceo optimism and incentive compensation. *Journal of Financial Economics* 114(2), 366 – 404.
- Smith, A. J. (1990). Corporate ownership structure and performance: The case of management buyouts. *Journal of Financial Economics* 27(1), 143 – 164.
- Strömberg, P. (2008). The new demography of private equity. gurung a, lerner j, eds. *Globalization of Alternative Investments Working Papers Volume 1: Global Economic Impact of Private Equity 2008*, 3–26.
- Yermack, D. (1997). Good timing: Ceo stock option awards and company news announcements. *The Journal of Finance* 52(2), 449–476.

Table 1: Summary Statistics

This table presents descriptive statistics of the firms in the sample. Panel A describes characteristics of firms acquired by PE for the fiscal year prior to the buyout, referred to as year -1. Panel B describes the percentage change in these accounting measures from year -2 to year -1. Panel C presents the distribution of type of buyout. Panel D presents the distribution of exit route as of June 2019. If no exit had occurred at that point it is indicated that the company is still owned.

Panel A: Firm Characteristics in year prior to buyout

	N	Mean	Median	SD	25th pct	75th pct
Revenue (£ million)	322	115.0	57.2	184.4	23.6	129.2
EBITDA (£ million)	321	14.9	7.6	20.1	3.5	17.6
Total Assets (£ million)	322	109.6	48.6	155.7	19.0	120.7
Number of Employees	313	1353	450	2234	184	1278
EBITDA Margin	321	0.163	0.144	0.103	0.090	0.228

Panel B: Change in accounting measures in year prior to buyout

	N	Mean	Median	SD	25th pct	75th pct
Revenue Growth	302	0.178	0.120	0.265	0.038	0.254
Total Assets Growth	306	0.176	0.068	0.424	-0.011	0.245
Employee Growth	295	0.122	0.072	0.228	0.005	0.178
ΔEBITDA Margin	301	0.006	0.007	0.058	-0.011	0.027

Panel C: Type of Acquisition

	Full Sample	1998-2004	2005-2009	2010-2014	2015-2018
Public-to-Private	0.13	0.15	0.16	0.03	0.14
Private-to-Private	0.27	0.34	0.16	0.29	0.22
Divisional Buyout	0.19	0.26	0.18	0.07	-
Secondary Buyout	0.39	0.23	0.48	0.60	0.64
Distressed Buyout	0.02	0.02	0.02	-	-
N	322	150	100	58	14

Panel D: Type of Exit

	Full Sample	1998-2004	2005-2009	2010-2014	2015-2018
IPO	0.07	0.12	0.01	0.05	0.07
Trade Sale	0.28	0.35	0.27	0.17	0.07
Sale to Financial Sponsor	0.35	0.35	0.39	0.36	0.07
Still Owned	0.11	0.01	0.04	0.36	0.79
Lost Control to Creditors	0.18	0.17	0.29	0.03	-
Not Known	0.01	0.01	-	0.02	-
N	322	150	100	58	14

Table 2: Summary Statistics - Managerial Ownership

This table presents descriptive statistics of managerial ownerships of the firms in the sample. Panel A presents the percentage ownership of ordinary shares that is held by the CEO following a buyout of the firm. The statistics are presented for the full sample on the first row, and then split up by the different types of buyouts in the remainder of the rows. Panel B presents statistics for the pre-buyout CEO ownership stakes.

Panel A: Managerial Ownership after the Buyout

	N	Mean	Median	SD	25th pct	75th pct
Full sample	322	0.140	0.105	0.117	0.069	0.172
Public-to-Private Buyout	43	0.161	0.090	0.198	0.051	0.172
Private-to-Private Buyout	85	0.178	0.141	0.122	0.086	0.242
Divisional Buyout	61	0.099	0.084	0.069	0.052	0.118
Secondary Buyout	124	0.127	0.108	0.088	0.074	0.156
Distressed Buyout	6	0.118	0.130	0.033	0.093	0.143

Panel B: Managerial Ownership prior to the Buyout

	N	Mean	Median	SD	25th pct	75th pct
Full sample	176	0.222	0.095	0.282	0.007	0.347
Public-to-Private Buyout	25	0.101	0.056	0.142	0.021	0.130
Private-to-Private Buyout	51	0.472	0.500	0.309	0.262	0.620
Divisional Buyout	45	0.065	0.000	0.209	0.000	0.008
Secondary Buyout	50	0.182	0.110	0.197	0.079	0.197
Distressed Buyout	3	0.036	0.002	0.060	0.001	0.079

Table 3: Operational Improvements and CEO Ownership

This table reports the estimates of a (continuous) difference-in-difference fixed effect model of CEO equity ownership on measures of firm performance. The dependent variable is (log) revenue in columns 1-3, and EBITDA margin in columns 4-6. The main independent variable is “CEO Ownership”, defined as the fraction of outstanding common equity that is owned by the CEO of the firm targeted in the buyout, measured just after the buyout takes place. All specifications include firm fixed effects as well as firm controls interacted with a Post dummy. The Post dummy takes the value of 1 in the post-buyout period, and is 0 otherwise. The firm controls are measured in the fiscal year prior the buyout and are: (log) revenue; revenue growth; EBITDA margin; and deal leverage. Specifications in columns 2 and 5 add year fixed effects, while columns 3 and 6 replace the year fixed effects with industry-year fixed effects. The pre-buyout period includes up to three years prior to the buyout, while the post-period includes the year in which the buyout took place, and up to three years after or until an exit occurs, whichever happens first. All continuous variables are winsorized at a 1% level. T-statistics are reported in parenthesis under each estimates, with standard errors clustered at the firm level. ***, **, and * denotes statistical significance at the 1%, 5%, and 10% levels, respectively.

	(log) Revenue			EBITDA/Revenue		
CEO Ownership \times Post	0.136 (0.889)	0.177 (1.148)	0.124 (0.92)	0.044** (2.473)	0.040** (2.169)	0.050** (2.374)
Post	0.407*** (16.372)	0.211*** (3.112)	0.343*** (12.787)	-0.007** (-2.20)	-0.002 (-0.386)	-0.008** (-1.963)
Adjusted R^2	0.938	0.943	0.944	0.757	0.758	0.767
N	2163	2163	2163	2151	2151	2151
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	No	Yes	No	No	Yes	No
Industry \times Year FE	No	No	Yes	No	No	Yes
Firm Controls	Yes	Yes	Yes	Yes	Yes	Yes

Table 4: Operational Improvements and CEO Ownership, with Matched Control Firms

This table reports the estimates of a (continuous) difference-in-difference fixed effect model of CEO equity ownership on measures of firm performance. The dependent variable is (log) revenue in columns 1-3, and EBITDA margin in columns 4-6. The main independent variable is “CEO Ownership”, defined as the fraction of outstanding common equity that is owned by the CEO of the firm targeted in the buyout, measured just after the buyout takes place. Each buyout target is matched with up to five potential peers that are included in the specification. Section 4.1.1 contains details of the matching procedure. The dummy “PE” takes the value of 1 if the target was acquired in a buyout, and 0 otherwise. All specifications include firm fixed effects as well as firm controls interacted with a Post dummy. The Post dummy takes the value of 1 in the post-buyout period, and is 0 otherwise. The firm controls are measured in the fiscal year prior the buyout and are: (log) revenue; revenue growth; EBITDA margin; and deal leverage. Specifications in columns 2 and 5 add year fixed effects, while columns 3 and 6 replace the year fixed effects with industry-year fixed effects. The pre-buyout period includes up to three years prior to the buyout, while the post-period includes the year in which the buyout took place, and up to three years after or until an exit occurs, whichever happens first. All continuous variables are winsorized at a 1% level. T-statistics are reported in parenthesis under each estimates, with standard errors clustered at the firm level. ***, **, and * denotes statistical significance at the 1%, 5%, and 10% levels, respectively.

	(log) Revenue			EBITDA/Revenue		
CEO Ownership \times Post \times PE	-0.087 (-0.39)	-0.060 (-0.279)	-0.304 (-1.468)	0.063*** (2.874)	0.062*** (2.820)	0.052* (1.763)
Post \times PE	0.314*** (3.465)	0.313*** (3.548)	0.395*** (4.418)	-0.031 (-1.502)	-0.032 (-1.535)	-0.033 (-1.285)
Post	0.107*** (3.432)	-0.024 (-0.393)	0.025 (0.705)	-0.016* (-1.952)	-0.021** (-2.513)	-0.023*** (-3.021)
Adjusted R^2	0.904	0.908	0.917	0.613	0.613	0.622
N	7279	7279	7279	7243	7243	7243
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	No	Yes	No	No	Yes	No
Industry \times Year FE	No	No	Yes	No	No	Yes

Table 7: CEO Ownership and Employee Effects

This table reports the estimates of a (continuous) difference-in-difference fixed effect model of changes in CEO equity ownership on measures of firm performance. Panel A reports estimates for the subsample in which the CEO is retained, while Panel B does it for the subsample in which the CEO is replaced. The dependent variable is (log) cost per employee in columns 1-3, (log) revenue per employee in columns 4-6. and (log) EBITDA per employee in columns 7-9. The main independent variable is “ Δ CEO Ownership”, defined as the change in fraction of outstanding common equity that is owned by the CEO of the firm targeted in the buyout. The change is measured as the change in CEO ownership from the pre-buyout level to the post-buyout level. Estimates of variables not shown but included in the model are available upon request to the author. Each buyout target is matched with up to five potential peers that are included in the specification. Section 4.1.1 contains details of the matching procedure. The specifications in the table are as in Table 5. All continuous variables are winsorized at a 1% level. T-statistics are reported in parenthesis under each estimates, with standard errors clustered at the firm level. ***, **, and * denotes statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Subsample where CEO stayed

	(log) Cost per Employee			(log) Revenue per Employee			(log) EBITDA per Employee		
Δ CEO Ownership \times Post \times PE	-0.252*** (-2.84)	-0.236*** (-3.005)	-0.256** (-2.415)	-0.352 (-1.364)	-0.339 (-1.236)	-0.114 (-0.377)	0.627 (1.081)	0.568 (0.966)	0.778 (0.984)
Adjusted R^2	0.901	0.907	0.903	0.908	0.915	0.916	0.762	0.762	0.764
N	2491	2491	2491	2455	2455	2455	2200	2200	2200

Panel B: Subsample with CEO replaced

	(log) Cost per Employee			(log) Revenue per Employee			(log) EBITDA per Employee		
Δ CEO Ownership \times Post \times PE	0.455 (1.61)	0.346 (1.149)	0.561 (1.457)	-0.153 (-0.612)	-0.280 (-1.169)	-0.032 (-0.090)	-0.457 (-0.699)	-0.565 (-0.872)	-0.023 (-0.030)
Adjusted R^2	0.875	0.881	0.882	0.937	0.943	0.943	0.801	0.800	0.809
N	1871	1871	1871	1843	1843	1843	1592	1592	1592
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	No	Yes	No	No	Yes	No	No	Yes	No
Industry \times Year FE	No	No	Yes	No	No	Yes	No	No	Yes
Firm Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 8: Determinants of CEO Ownership

This table presents estimations of the determinants of the ownership share held by the CEO of a portfolio company directly after a buyout. The CEO ownership share is defined as the fraction of ordinary shares owned by the CEO. Columns 1-3 presents estimations using OLS, while columns 4-6 presents the estimations of a Tobit model. The explanatory variables are measured at the end of the fiscal year prior to the transaction. The one exception is leverage, which is measured at the time of the transaction. "CEO Retained" is an indicator variable taking the value of 1 if the CEO is retained, and 0 otherwise. All models includes time fixed effects and a separate intercept term for the five types of acquisitions "public-to-private", "private-to-private", "divisional buyouts", "secondary buyouts", and "others". For the Tobit model, the estimates reported are marginal effects evaluated at sample averages. All continuous variables are winsorized at a 1% level. T-statistics (z-statistics for the Tobit model) are reported in parenthesis under each estimates. ***, **, and * denotes statistical significance at the 1%, 5%, or 10% levels, respectively.

	OLS			Tobit		
(Log) Revenue	-0.018*** (-2.926)	-0.018*** (-2.848)	-0.022*** (-3.047)	-0.017*** (3.153)	-0.017*** (-3.074)	-0.021*** (-3.452)
Leverage	0.048 (1.180)	0.043 (1.097)	0.024 (0.489)	0.058 (1.619)	0.055 (1.552)	0.026 (0.618)
EBITDA/Revenue	-0.094 (-1.480)	-0.112* (-1.780)	-0.151** (-2.140)	-0.101* (-1.800)	-0.117** (-2.105)	-0.151** (-2.500)
CEO pre-Ownership			0.014 (0.347)			0.015 (0.430)
CEO pre-Ownership * CEO Retained			0.195*** (3.102)			0.186*** (3.465)
CEO Retained			-0.025 (-1.203)			-0.022 (-1.234)
Adjusted (Pseudo) R^2	0.032	0.079	0.146	0.033	0.076	0.139
N	321	321	157	321	321	157
Transaction Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Acquisition type dummies	No	Yes	Yes	No	Yes	Yes

Appendix A Sample Construction

This dataset builds upon [Cassel and Phalippou \(2019\)](#). They follow [Strömberg \(2008\)](#) and use Capital IQ (CIQ) to identify transactions with private equity buyers. The following criteria were used in a “Capital IQ Transaction Screen” to generate the initial set of transactions:

- “Transaction Primary Features” set to: Merger/Acquisition – Acquisition of Equity Stake or Private Placement – PIPE or Private Placement – Growth capital/Private Equity;
- “Merger/Acquisition Features” set to: “Going Private Transaction” or “Leveraged Buy Out (LBO)” or “Management Buyout” or “Platform” or “Privatization of Government Entity” or “Management Participated” or “Secondary LBO” or “Acquisition of Majority Stake”;
- “Secondary features” set to: “Leveraged Buy Out (LBO)”, or “Management Buyout”, or “Secondary LBO”, or “Going Private Transaction”;
- “Investment Firm Type (Buyers/Investors)” is listed as “PE/VC.”
- Transaction is listed as “closed” or “effective”.

The initial screen picked up transactions that were initial toe-hold investments, purchase of remaining minor stakes, or the purchase of a minority stake. The focus here are transactions in which a private equity fund gains control of the company. Therefore, all transactions that are classified as either “Minority Stake Investment” or “Majority Shareholder Purchasing Remaining Shares”, or where the investor was classified as a “VC” were thrown out. This leaves a sample of 11,549 transactions. From this initial set, all firms that are registered in the UK are extracted, leaving 2,529 transactions. This initial set of firms is then matched by name with Fame, a Bureau van Dijk database. Of the resulting set, a random sample of 322 firms that was able to be matched with Fame has been utilized in the study.