Sources of value creation in private equity buyouts of private firms✧

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ABSTRACT

Despite the prevalence of private equity (PE) buyouts of private firms, little is known about how these transactions create value. We provide evidence that PE acquirers disproportionately target private firms with weak operating profitability and those that have growth potential but are highly levered and dependent on external financing. Target firms grow rapidly post-buyout, especially those undertaking add-on acquisitions, and profitability increases for both profitable and unprofitable targets. Our evidence suggests that PE acquirers create value by relaxing financing constraints for firms with strong investment opportunities and improving the performance of weak firms, while financial engineering plays a limited role.

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1. Introduction

Although private equity (PE) buyouts of publicly-traded firms have received headline attention for many years, the market for buyouts of already-private firms has grown rapidly. Over the past decade, "private firm buyouts" outnumber PE buyouts of publicly-traded firms in the U.S. by more than 30 to one.[1] Yet, our understanding of how these buyouts create value remains limited, especially in the U.S., which represents the world's largest buyout market. Given substantial differences between public and private firms in size, ownership structure, and access to capital, as well as the specialization of different PE firms in the markets for public and private targets, the potential sources of value creation in private firm buyouts may differ significantly from those involving public buyout targets.

This study investigates sources of value creation in private firm buyouts. We analyze a sample of 288 private firms acquired by PE sponsors between 1995 and 2009 using firm-level financial data obtained from U.S. corporate tax returns.[2] We assess the importance of three potential sources of value in private firm buyouts: improvements in profitability, financial engineering, and relaxation of financial constraints to unlock profitable growth opportunities. The third source is uniquely important for buyouts of private firms, which are often constrained in their ability to raise capital to fund growth. The IRS dataset allows us to overcome data limitations that make it challenging to study private firms in the U.S. in general.

We begin our analysis by identifying firm-level characteristics that predict which private firms PE acquirers target in buyouts. We find a non-monotonic relationship between profitability and the likelihood that a private firm is a buyout target, with PE acquirers disproportionately

[1] This figure is based on buyouts of U.S. public and private firms as reported in Capital IQ.

[2] The dataset, obtained from the Internal Revenue Service (IRS), includes all U.S. C corporations with at least $10 million in assets. It does not include companies organized as pass-through entities (e.g., S corporations, partnerships, and limited liability companies).

targeting firms in the highest and lowest quintiles of profitability in the overall sample of private firms. Firms in the lowest quintile of profitability plausibly represent turnaround opportunities; firms in the highest quintile could serve as growth platforms if high average profitability indicates high potential marginal returns to investment. Among private firms with high profitability, PE acquirers are more likely to target firms with high leverage that operate in external capital-dependent industries. Arguably, these firms disproportionately have profitable growth options but lack the financial capacity to pursue them.

Next, we analyze changes in financial performance after private firm buyouts. We find a moderate increase in profitability, both in absolute terms and relative to industry peers and to a control sample of propensity-score matched private firms not acquired in buyouts. The median increase in pre-interest return on sales from the year before a buyout to the second year after the buyout relative to the industry median change is 1.9 percentage points.[3] We observe an increase in profitability among both low and high pre-buyout profitability target firms. The increase is sizeable for the least profitable firms, consistent with turnaround opportunities representing an important source of value creation in private firm buyouts. The post-buyout increase for low-profitability firms remains positive but shrinks somewhat once we account for the level and trend in pre-buyout profitability, suggesting that a portion of the post-buyout increase for poor performers could reflect mean reversion in profitability.

Most strikingly, we find consistent evidence of a large and rapid increase in sales growth after private firm buyouts. The median increase in sales growth from the pre-buyout year to the second post-buyout year is 61.7 percentage points greater than the industry median change in sales

[3] We focus on return on sales rather than return on assets to assess post-buyout profitability because firms often write up or write down asset values at the time of an acquisition, making it difficult to compare pre- and post-buyout return on assets. See Guo, Hotchkiss, and Song (2011) and Cohn, Mills, and Towery (2014) for detailed discussions of write-ups and write-downs for buyouts.

growth over the same period. This increase likely reflects both organic and acquisition-driven growth. While we lack the data to disaggregate sales growth into these two components, we are able to identify add-on acquisitions post-buyout for 41.3% of the buyouts in our sample. Nearly every add-on acquisition is in the same industry as the related buyout firm, and many occur within a year of completion of the buyout, consistent with the initial buyout target serving as a platform for subsequent acquisitions of related firms. Buyouts with identifiable subsequent add-on acquisitions grow faster than those without add-on acquisitions. Together, the targeting by PE acquirers of private firms likely to have untapped growth potential and the rapid growth in private firms post-buyout – especially those undertaking add-on acquisitions – suggest that relaxing financing constraints and facilitating growth is an important source of value creation in private firm buyouts.

Finally, we examine changes in financial structure after private firm buyouts. The median firm in our sample increases its debt-to-assets ratio by 11.2 percentage points from the pre-buyout year to the first post-buyout year. This increase is meaningful in absolute terms but small relative to the increase in leverage after buyouts of *public* U.S. firms (Cohn, Mills, and Towery, 2014). However, private buyout targets tend to be highly-levered pre-buyout, with a 59% mean debt-to-assets ratio, and may therefore lack the capacity to increase leverage substantially. The fraction of firms paying corporate income tax remains unchanged after buyouts for our sample, suggesting increases in profitability offset any increase in interest tax shields due to an increased debt load. We also find that PE acquirers frequently inject equity capital into the target firm at the time of the buyout (66% of the buyouts in our sample) and over the first three years post-buyout (78%). Overall, our evidence suggests that financial engineering is not a first-order source of value creation in private firm buyouts.

Our paper contributes to the literature on the role of acquisitions, including buyouts, in relaxing financing constraints and promoting growth, which is limited primarily to studies of European firms. Erel, Jang, and Weisbach (2015) find significant increases in growth after acquisitions by operating companies in Europe. Similarly, Bergström, Grubb, and Jonsson (2007) and Boucly, Sraer, and Thesmar (2011) find increases in sales after PE buyouts of mostly private firms in Sweden and France, respectively. In contrast, Cohn, Mills, and Towery (2014) find little evidence of increased sales growth after PE buyouts of public firms in the U.S. Our estimates of the mean sales growth following U.S. private firm buyouts, which range from 115% to 221%, are an order of magnitude larger than the 12% growth rates following Swedish and French buyouts documented by Bergström, Grubb, and Jonsson (2007) and Boucly, Sraer, and Thesmar (2011), respectively. This difference likely reflects the relatively liquid market for acquisitions of U.S. private firms, which enables PE acquirers to use a portfolio company as a platform to acquire other small firms. We further contribute to this literature by demonstrating that PE acquirers systematically target firms that likely have substantial untapped growth potential. In contrast, prior work finds a *negative* relationship between growth opportunities and buyout likelihood for *public* firms (Opler and Titman, 1993; Cohn, Mills, and Towery, 2014), which is generally interpreted as reflecting agency conflicts in public firms that incentivize overinvestment.

We also contribute to the literature examining the effects of PE buyouts on operating performance. Due to data availability, studies have historically focused on public-to-private buyouts. The conclusions of these studies may not be informative about private-to-private buyouts because there are substantial differences in the nature of public and private firms as well as in the identities of PE buyers active in the two markets.[4] Bergström, Grubb, and Jonsson (2007) and

[4] The evidence for public firm PE buyouts in the U.S. is mixed, with earlier papers finding evidence of significant increases in profitability (Kaplan, 1989; Smith, 1990; Smart and Waldfogel, 1994), but more recent work finding little

Boucly, Sraer, and Thesmar (2011) analyze the effects of private-to-private buyouts on operating performance in Sweden and France, respectively, with evidence supporting significant increases in profitability and growth. In addition to the small number of countries studied (two), results for Swedish and French buyouts need not translate to the U.S., where private firms and the market for private firms differ on important dimensions, including the nature of pre-buyout ownership. Another recent strand of the literature analyzes the effects of private-to-private buyouts on non-financial metrics of performance relevant to non-financial stakeholders such as customers and employees, which may not be informative about value creation for investors given the costs of generating such improvements.[5] Our paper adds to the literature by examining measures of performance that should correlate with value creation for investors in U.S. private-to-private buyouts.

Finally, our paper is also the first, to our knowledge, to examine the financing of private firm buyouts. Increases in interest tax shields generate a significant portion of the gains to investors in public firm buyouts (Guo, Hotchkiss, and Song, 2011; Jenkinson and Stucke, 2011; Cohn, Mills, and Towery, 2014). Our results suggest that such financial engineering plays a much smaller role in creating value in private firm buyouts. Our findings also complement prior work documenting the extent to which PE acquirers inject equity into formerly public portfolio firms (Cohn, Mills,

evidence of improvements (Guo, Hotchkiss, and Song, 2011; Cohn, Mills, and Towery, 2014). Acharya et al. (2013) present evidence of increases in profitability after public firm buyouts in Western Europe. Davis et al. (2014) measure significant increases in total factor productivity after PE buyouts but do not distinguish between buyouts of public and private targets in their analysis.

[5] Bernstein and Sheen (2016) find evidence of reductions in health code violations after buyouts of restaurants in the U.S. Eaton, Howell, and Yannelis (2020) find increases in student enrollment after buyouts of for-profit colleges. Fracassi, Privitero, and Sheen (2020) find limited increases in pricing after grocery store buyouts. Gupta et al. (2021) find increases in mortality rates after U.S. nursing home buyouts, though it is unclear what fraction of these acquisitions involve private firms. Cohn, Nestoriak, and Wardlaw (2021) find evidence of improvements in workplace safety records only after *public* firm buyouts.

and Towery, 2014) and financially distressed portfolio firms (Hotchkiss, Smith, and Strömberg, 2021).

2. Sources of Value Creation in PE Buyouts of Private Firms

In this section, we outline three potential sources of value creation in PE buyouts of private firms: improvements in operating performance, relaxation of financing constraints that limit growth, and increased debt tax shields (i.e., financial engineering). We then describe the empirical implications of each source of value creation.

2.1 Sources of Value Creation

We first consider operational improvements as a source of value creation in private firm buyouts. The potential for operational improvements in PE buyouts of public firms may arise from agency frictions in public firms due to the separation of ownership and control (Jensen, 1989). Agency conflicts are generally less of a concern in private firms, where owners typically exert direct control over their firms. Further, private firm targets do not suffer from the potential effects of short-termism due to scrutiny by public market investors or market-based management incentives (Edmans, Fang, and Lewellen, 2017). On the other hand, private firms may be held back by a lack of professional expertise which PE firms might provide. Opportunities for operational improvements are likely to be especially large among poorly performing private firms.

The second source of value creation we consider in private firm buyouts is the relaxation of financing constraints that limit the realization of growth opportunities. Financing constraints are particularly acute for private firms, which typically rely on debt financing to fund growth and have limited access to capital markets. A highly levered private firm could be forced to forgo positive NPV investments because of debt overhang (Myers, 1977). Erel, Jang, and Weisbach (2015) find

that acquisitions by operating companies relax target firms' financing constraints. Injections of capital into portfolio firms at the time of the PE buyout and/or after the buyout may similarly relax financing constraints and allow firms to pursue previously untapped growth opportunities. In addition, improvements in cash management as part of overall operational improvements could free up internal resources to finance growth.

The third potential source of value creation in private firm buyouts that we consider is financial engineering. Guo, Hotchkiss, and Song (2011) find that a significant fraction of value creation in *public* firm buyouts is attributable to an increase in interest tax shields, and Cohn, Mills, and Towery (2014) report that additional interest tax shields generated in PE buyouts of public firms result in target firms paying no corporate taxes for several years post-buyout. Tax shields may also be an important source of value creation in private firm buyouts. However, as mentioned above, because most private firms lack access to large amounts of equity, they typically meet their external capital needs through debt financing from banks. As a result, many private buyout targets already have highly leveraged balance sheets, limiting the scope for financial engineering. Further, private firms are typically smaller than public firms, and smaller firms face larger bankruptcy costs as a proportion of assets (Altman, Hotchkiss, and Wang, 2019), which may discourage PE acquirers from heavily increasing the leverage of these firms.

2.2 Empirical Implications

Each of the three sources of value creation we consider has different empirical implications for both the types of private firms PE acquirers should target and for expected outcomes post-buyout. If operational improvements are an important source of value creation in private firm buyouts, then we should observe PE acquirers targeting less profitable private firms, where the scope for improving operations is large. We should also subsequently observe increases in

profitability, especially among firms that are less profitable pre-buyout.

If relaxing financing constraints is an important source of value creation in private firm buyouts, then we should observe PE acquirers targeting private firms with valuable growth opportunities that they are unable to finance themselves. Specifically, we expect PE acquirers to target profitable firms, which presumably have better growth opportunities, that rely heavily on external financing and already have high debt loads pre-buyout. If relaxing financing constraints is an important source of value creation, we should also observe slow sales growth before buyouts followed by increased growth post-buyout, which can take the form of organic growth, acquisitions, or both. In addition, we should observe capital injections at both the time of the buyout and in subsequent years to support this growth. We note that if both improving profitability and relaxing financing constraints are important sources of value creation, we may observe PE firms targeting private companies at both the low and high ends of the profitability distribution.

Finally, if financial engineering is an important source of value creation in private firm buyouts, we should observe PE acquirers targeting low-leverage firms with the greatest scope for increasing interest tax shields. We should also observe large increases in debt loads in the year of the buyout that persist post-buyout. More directly, we should observe a decrease in the fraction of firms paying corporate income tax after buyouts, as the objective of increasing interest tax shields is to minimize corporate tax payments.

3. Data and Sample

In this section, we describe our data sources, the construction of our sample, the variables we use in our analyses, and characteristics of sample deals. Appendix A provides definitions for each of our variables.

3.1 Data Sources

We identify PE buyouts of private firms using data from Thomson Financial's Securities Data Corporation (SDC) Platinum Mergers database and Capital IQ (CIQ). We obtain financial information from confidential corporate tax return data in the IRS Business Return Transaction File (BRTF) for all C corporations with at least $10 million of total assets. Given this data source, our analysis is informative about buyouts of private C corporations involving firms with at least $10 million of assets and may not generalize to other private firm buyouts. However, we note that the buyouts in our sample are likely to disproportionately represent the largest and hence most economically important private firm buyouts. Our dataset includes select line items from U.S. Corporation Income Tax Return Form 1120, including income and expense data (Form 1120 Page 1) and balance sheet data (Form 1120 Schedule L). The advantage of these data relative to traditional sources of financial information is that all corporations, both publicly-traded and private, are required to file tax returns, which enables us to examine firms that are private both before and after a PE buyout.

3.2 Sample

Table I Panel A summarizes the construction of our sample. We first identify buyouts of private U.S. firms between 1995 and 2009 that appear in both SDC and Capital IQ. For each potential buyout, we use news sources to verify the transaction. We exclude transactions that were not completed and those for which we are unable to verify completion. While this approach likely excludes some valid private firm buyouts, the excluded buyouts likely involve firms too small to meet the $10 million minimum total assets threshold for inclusion in the BRTF dataset. Using CIQ and news sources, we are able to verify 1,504 valid transactions. We then remove misclassified

buyouts, buyouts of bankrupt firms, partial buyouts, and REIT buyouts.[6] Because the BRTF dataset only includes C corporations, we also remove firms that are not organized as C corporations (partnerships, LLCs, and S corporations). Appendix B.1 provides deal characteristics for comparison to our sample of C corporation buyouts. These filters yield an initial sample of 639 verified PE buyouts of private, non-bankrupt C corporations. From this initial sample, we also remove: (i) 87 buyouts where the target firm has less than $10 million in assets pre-buyout, and (ii) 110 buyouts where the acquired firm is merged with another operating entity in the PE acquirer's portfolio concurrently with the buyout. We exclude the latter because we cannot perform valid pre- to post-buyout comparisons for such firms. This process leaves us with a sample of 442 buyouts that we attempt to match to the BRTF.

--- Insert Table I about here ---

Of the 442 remaining buyout firms, we are able to identify 403 firms present in the BRTF in at least one year based on the name of the target firm. We manually search for each target firm in the BRTF data using the target firm's name. Of these 403 firms, 288 are present in the BRTF in year *t-1*, which is necessary for measuring pre-buyout characteristics. We use this sample of 288 private buyout targets in our tests of buyout determinants.

We also analyze the evolution of private buyout firms from before to after PE acquisitions. For this part of our analysis, we further require data for at least years *t+1* and *t+2* post-transaction. Two complications arise here. First, the name of the acquired firm sometimes changes at the time of the buyout. For example, the PE acquirer in some cases creates a holding company that acquires

[6] We rely primarily on SDC for our sample of buyouts for comparability to Cohn, Mills, and Towery (2014), who also use BRTF data. CIQ reports significantly more private firm buyouts, with 12,567 reported during our sample period. However, a majority of the additional buyouts appear to be small firms. For example, only 2,047 of the buyouts report transaction values exceeding $10 million, and even those with more than a $10 million transaction value may involve firms with less than $10 million of total assets – the minimum size for inclusion in the BRTF. In addition, many small firms are organized as S corporations and partnerships, and are thus excluded from the BRTF dataset.

the target firm and is the surviving legal entity. We use information from CIQ and news sources to identify as many of these name changes as possible. Second, in some cases, the acquired firm is converted from a C corporation to a flow-through entity at the time of the acquisition and therefore disappears from the BRTF data. We see no obvious reason why the loss of these firms from the post-buyout sample should induce any biases in our analysis.[7] The post-buyout data requirement leaves us with a sample of 240 buyouts for which we can compare pre- and post-buyout firm characteristics.

Table I Panel B presents the number of transactions by year. The number of private firm buyouts grows substantially from 2003 to 2008, before decreasing during the height of the financial crisis in 2009. Of the 288 buyouts in our determinants sample, 214 (74.3%) are completed between 2003 and 2009. Though increased market coverage by SDC and CIQ likely explains some of the increase over time, the increase is also consistent with the tremendous growth in U.S. PE buyouts in the mid-2000s (Kaplan and Strömberg, 2009). Table I Panel B also presents the distribution of buyouts over the sample period for subgroups based on the availability of post-buyout data. As noted above, 48 firms used in our buyout determinants analysis are no longer in the BRTF data in years *t+1* and *t+2*. The sample size falls more significantly by year *t+4*. We address potential survivorship bias in Section 5.5.

We present the number of transactions by Fama-French 12 industry in Table I Panel C. The most common industries represented in our sample are Manufacturing (21.9% of PE buyout transactions) and Wholesale, Retail, and Some Services (23.6% of PE buyout transactions). Still, Panel C shows that a broad range of industries are included in our sample.

[7] Based on discussions with PE sponsors, the two primary reasons for a post-buyout change in organizational form are: (i) limitations in the possible form based on the pre-buyout ownership structure, and (ii) limitations on the type of income that can be allocated to certain tax exempt limited partners of the purchasing fund.

3.3 Variable Construction

We construct several of our variables using the BRTF data. We define *ln(TotalAssets)* as the natural logarithm of total assets (*TotalAssets*) reported on Form 1120 Schedule L Line 15. We construct two measures of operating performance. First, we define pre-interest return on assets (*PreInterestROA*) as *PreInterestInc* divided by total assets. *PreInterestInc* equals taxable income (*TaxableInc* from Form 1120 Page 1 Line 28) plus the interest deduction (*IntDeduction* from Form 1120 Page 1 Line 18). We focus on pre-interest income because we are interested in studying operating profitability, without regard to financing. *PreInterestInc* is the tax return-based analog of earnings before interest and taxes (EBIT) as computed from financial statements. Second, we define pre-interest return on sales (*PreInterestROS*) as *PreInterestInc* divided by *Sales* (Gross Receipts or Sales from Form 1120 Page 1 Line 1). We focus on *PreInterestROS* rather than *PreInterestROA* when we study changes in operating performance post-buyout because write-ups and write-downs of reported asset values at the time of a buyout cause changes in the denominator of *PreInterestROA* that are unrelated to actual changes in profitability.

We define *SalesGrowth* as the one-year percentage growth in *Sales*. Our leverage measure (*DebtToAssets*) equals interest-bearing liabilities (*IntBearingLiab*) divided by *TotalAssets*, where *IntBearingLiab* equals short-term and long-term mortgages, notes, and bonds payable (Form 1120 Schedule L Lines 17 and 20).[8] The indicator variable *PosTaxPdInd* is equal to one if a firm's taxes paid in a given year (total tax reported on Form 1120 Page 1 Line 31) are positive and zero otherwise. Finally, we define *Contributions* as the one-year change in paid-in capital from Form

[8] We provide two caveats with respect to our leverage measure. First, some of a private firm's debt may be owed to the owners of the firm, likely in the form of subordinated debentures. To the extent that this debt closely resembles equity, our leverage measure will overstate a firm's true leverage. Second, some have argued that operating leases should be treated as debt for purposes of calculating leverage ratios, but we do not observe operating leases because they are not included in debt.

1120 Schedule L Line 23. Our analysis of contributions is based on a smaller number of observations because we only observe paid-in capital beginning with the 2005 tax year.

We construct two additional variables using Compustat data. *IndustryQ* is defined as the median value of Tobin's Q for all publicly-traded firms in a firm's 3-digit NAICS code industry. We define Tobin's Q as market value of assets divided by book value of assets, where the market value of assets equals the market value of equity plus the book value of debt. As is common in the literature, we treat Tobin's Q as a proxy for growth opportunities. We use an industry-level measure rather than a firm-level measure because equity market values are not available for private firms. *ExtFinDep* captures the extent to which a firm is likely to depend on external financing to fund growth. We follow Rajan and Zingales (1998) and define *ExtFinDep* as industry-level capital expenditures less industry-level net cash flow from operating activities plus industry-level change in net working capital, divided by industry-level capital expenditures. We winsorize all continuous variables at the 2.5th and 97.5th percentiles to limit the influence of potential outliers.

3.4 Private Firm Sample Characteristics

Table II provides descriptive statistics as of year *t-1* (pre-buyout) for the sample of 288 private PE buyout firms included in our determinants analysis. Not surprisingly, our sample firms are substantially smaller than public firms targeted in PE buyouts. The mean (median) value of *TotalAssets* for our sample is $97.5 million ($45.2 million). For comparison, the public buyout firms studied by Cohn, Mills, and Towery (2014) have mean (median) *TotalAssets* of $921 million ($253 million), calculated using the same BRTF data. Firms in our sample have a significant amount of debt pre-buyout, with median *DebtToAssets* of 58.6%, consistent with private firms relying primarily on debt financing. In contrast, Cohn, Mills, and Towery (2014) report median *DebtToAssets* of 43.2% in year *t-1* for public-to-private buyout firms. The high pre-buyout debt

levels of private targets may limit the additional leverage that PE buyers choose to add in the buyout itself, a possibility to which we return later.

--- Insert Table II about here ---

Interestingly, mean and median pre-buyout *SalesGrowth* are both negative. We observe wide variation in pre-buyout profitability. 56.9% of buyout firms have positive taxable income in the year before the buyout. Panels B and C report summary statistics for subsamples of buyout firms in the top and bottom quintiles of pre-buyout profitability, respectively, within the overall distribution of *PreInterestROA* across all firms in the BRTF data. Reporting separate descriptive statistics for buyout firms in the top and bottom quintiles of pre-buyout profitability reveals substantial differences between the highest and lowest performing target firms. Firms in the top quintile of pre-buyout profitability have mean (median) *PreInterestROA* of 0.218 (0.202), while the mean and median *PreInterestROA* for firms in the bottom quintile of pre-buyout profitability are negative. Firms in the top quintile of performance pre-buyout have median sales growth of 11.6%, while those in the bottom quintile have median sales growth of -47.0%.

PE acquirers undertaking buyouts of private firms in our sample have limited overlap with PE acquirers undertaking buyouts of publicly-traded firms studied in prior research. Specifically, of the 200 different PE acquirers for the sample of public-to-private buyouts that Cohn, Mills, and Towery (2014) analyze, only 58 are involved in any of the private-to-private buyouts in our sample. Moreover, none of the ten most active PE acquirers in their sample are among the ten most active in our sample. PE acquirers focusing on acquiring private firms typically have smaller fund sizes than those focusing on acquiring public firms (Hotchkiss, Smith, and Strömberg, 2021).

This lack of overlap is potentially important because it is unclear *a priori* that the smaller PE acquirers that specialize in acquiring private firms have the resources to provide the types of

operational engineering services to their portfolio firms that larger PE acquirers often do. Bulge-bracket PE acquirers such as Apollo, Blackstone, and KKR, which target larger firms, often maintain large operational consulting staffs that they can deploy to portfolio firms; smaller PE firms generally do not have the resources to maintain such staffs. On the other hand, even small PE firms may be able to professionalize management, a potentially important lever for improving the performance of private firms specifically.

In Table III, we further examine non-financial characteristics of the 288 private firm buyouts with pre-buyout tax return data available.[9] Almost 30% of private firm buyouts in our sample are structured as management buyouts, which is substantially greater than the percentage of management buyouts in recent studies of public firm buyouts (e.g., Cohn, Mills, and Towery, 2014). The target firm CEO remains a significant shareholder following the buyout transaction nearly half of the time (42.8%). The seller is the founder or a member of the founder's family only 14.4% of the time. This percentage is substantially lower than the percentage of founder sellers in the sample of French buyouts that Boucly, Sraer, and Thesmar (2011) study, which consists primarily of family-controlled businesses, and is too small to allow for meaningful comparisons of buyouts of founder-owned and non-founder owned firms. We also note that the mean (median) target firm in our sample is 34 (27) years old, suggesting that our sample firms are not start-up firms. The 'shakeup' from a buyout may be necessary for mature private firms to adapt to technological and marketplace changes.

--- Insert Table III about here ---

[9] Missing observations in Table III are due to a small number of buyouts for which information could not be verified from CIQ, SDC, Preqin, Factset, or news articles. These deals also do not have post-buyout tax return data available and are therefore not included in our analysis of post-buyout performance.

4. Determinants of Private Firm Buyouts by PE Acquirers

We begin our analysis by examining the empirical determinants of private firm buyouts by PE acquirers. Doing so allows us to shed light on the sources of value creation as reflected by PE firms targeting certain types of private firms. To our knowledge, ours is the first paper to examine these determinants for private PE buyout targets. To predict which private firms PE acquirers target, we estimate a linear probability regression model using 199,646 private firm-year observations included in the BRTF data. The dependent variable, *BuyoutInd*, is an indicator variable equal to one if a firm is acquired by a PE firm during the year, and zero otherwise. Table IV presents the results.

--- Insert Table IV about here ---

We present five regression specifications. We begin with a basic specification in column (1) with *ln(Assets)* and *PreInterestROA* as the explanatory variables. If PE acquirers are motivated by the opportunity to improve operating performance for poorly-performing firms, then we expect a higher buyout likelihood for firms with lower *PreInterestROA*. On the other hand, PE acquirers could target private firms with untapped growth opportunities because of financial constraints. With declining returns to scale, a financially constrained firm should exhibit both high average and marginal returns on investment. Thus, if private firm buyouts are motivated largely by the opportunity to relax financing constraints for firms with unrealized growth opportunities, then we might observe a higher buyout likelihood for firms with higher *PreInterestROA*. We observe the latter: Among private firms, PE buyers appear to target relatively profitable firms. They also target larger firms, which is not surprising. To the extent that there are fixed costs of completing buyouts and of overseeing and implementing changes in target firms post-buyout, we should observe PE acquirers disproportionately targeting larger private firms, all else equal.

While the results in column (1) appear more consistent with PE acquirers targeting firms with greater growth potential rather than greater scope for operating improvements, the two possibilities are not mutually exclusive. A simple linear specification makes it impossible to assess whether both motives affect PE acquirers' choice of buyout targets. To assess this possibility, in column (2), we replace the continuous measure of *PreInterestROA* with *PreInterestROA* quintile indicator variables. Doing so provides a simple way to test whether PE acquirers systematically target private firms at both ends of the profitability distribution. We define *PreInterestROAQn* as one if a firm is in the *nth* quintile of *PreInterestROA*, for $n = 1, \ldots, 5$, and zero otherwise, with the least profitable firms in quintile 1 and the most profitable firms in quintile 5. The coefficient on *PreInterestROAQn* represents the difference in the probability of being acquired in a PE buyout between quintile *n* and quintile 3, the omitted quintile.

The results in column (2) suggest that the positive coefficient on *PreInterestROA* reported in column (1) obscures a non-monotonic relation between PE buyout likelihood and profitability. All four of the quintile indicator coefficients are positive. However, the coefficients on *PreInterestROAQ1* and *PreInterestROAQ5* are substantially larger than the coefficients on *PreInterestROAQ2* and *PreInterestROAQ4* and are both statistically significant at the 1% level. Because these four coefficients represent estimates relative to firms in the middle quintile of profitability, the estimates indicate a U-shaped relationship between PE buyout likelihood and profitability. This non-monotonicity hints at the possibility that the opportunity to turn around struggling firms and the opportunity to unlock faster growth at better-performing firms are both motives for PE buyouts of private firms.

If unlocking growth is an important source of value creation in private firm buyouts, then we should observe PE acquirers targeting firms that, in addition to having valuable investment

opportunities, lack the financing capacity to pursue these investments. We identify firms with high debt loads and a greater reliance on external financing as being less able to finance investment opportunities. If financial engineering is an important source of value creation, then we should observe PE acquirers targeting firms with low leverage because more debt can be added to the balance sheets of these firms without inducing financial distress, all else equal.

Motivated by these arguments, we add three additional explanatory variables to the regression in column (3): *DebtToAssets*, *ExtFinDep*, and *IndustryQ*. For the sake of parsimony, we remove the second and fourth profitability quintile indicator variables from the model, leaving only the extreme profitability quintile indicator variables. The coefficients on the indicator variables for the two extreme quintiles of profitability represent the difference in the probability of being a target relative to firms in the middle three quintiles. Consistent with PE acquirers targeting more highly levered private firms with better growth opportunities, the coefficients on *DebtToAssets* and *IndustryQ* are both positive, though only the former is statistically significant. However, the coefficient on *ExtFinDep* is negative, and we acknowledge that these three variables could proxy for other firm or industry characteristics. The positive coefficient on *DebtToAssets*, indicating that more highly levered firms have a greater likelihood of a buyout, appears inconsistent with financial engineering being a primary motive for PE buyouts of private firms.

We sharpen our analysis of the role of relaxing financing constraints by examining whether firms at the intersection of favorable growth opportunities, high leverage, and external financing dependence are disproportionately represented among private firm buyout targets rather than examining the relevance of these factors separately, as in column (3). Specifically, in column (4), we add the two-way interactions between *IndustryQ*, *ExtFinDep*, and *DebtToAssets* as well as their three-way interaction. The coefficient on the triple interaction (the last variable included in column

(4)) is positive and statistically significant at the one percent level. All else equal, this finding suggests that PE acquirers target private firms with substantial growth potential that are dependent on external financing for growth but are already higher levered – firms where the ability to relax constraints and unlock untapped growth opportunities is likely to be especially valuable.

Finally, we substitute the high profitability indicator variable (*PreInterestROAQ5*) for *IndustryQ* as the measure of growth opportunities in the triple interaction term and present the results in column (5). Consistent with the results in column (4) and further supporting our interpretation, the coefficient on the triple interaction of *PreInterestROAQ5*, *ExtFinDep*, and *DebtToAssets* is positive and statistically significant at the one percent level.

Overall, our analysis of private firm buyout determinants supports two motives driving these acquisitions – (i) the opportunity to turn around struggling firms and (ii) the opportunity to unlock growth potential by alleviating the financing constraints that private firms often face. In the next section, we examine post-buyout changes in profitability, growth, and leverage after buyouts to shed further light on the sources of value creation in private firm buyouts.

5. Evolution of Profitability, Growth, and Capital Structure Around Private Firm Buyouts

In this section, we examine the evolution of profitability, sales growth, and capital structure around the PE buyouts of the 240 private firms for which we have at least the first two years of post-buyout data. We compare the changes in *PreInterestROS*, *SalesGrowth*, and *Leverage* for private PE buyout firms to three different benchmarks: (i) the median change for firms in the same 3-digit NAICS industry code over the same period of time, (ii) the change for a propensity score-matched control sample, and (iii) the change for a matched control sample based on pre-buyout profitability.

Comparing private PE buyout firms to other firms in the same industry filters out industry-wide time-series variation in business conditions and financial incentives. Propensity score matching allows us to compare buyout firms to non-buyout firms that are similar on multiple dimensions. We construct the propensity score-matched sample by matching each buyout firm with an unacquired control firm based on year *t-1* characteristics using the model shown in Table IV Column (4). Matching on pre-buyout profitability helps ensure that we compare firms with similar levels of profitability pre-buyout.[10] To construct the profitability-matched control sample, we match each buyout firm with an unacquired firm in the same industry with *PreInterestROA* within one percentage point of the buyout firm's *PreInterestROA* in each of years *t-1* and *t-2*.[11] We match on both year *t-1* and year *t-2* profitability to ensure that control firms in the performance-matched sample are similar to acquired firms not only in terms of pre-buyout profitability, but also in terms of the *trend* in pre-buyout profitability.

5.1 Changes in Profitability after Private Firm Buyouts

Figure 1 plots the trends in profitability as measured by *PreInterestROS* for years *t-2* through *t+3* relative to the buyout year *t*. The figure plots the median value of *PreInterestROS*, as well as the median values relative to each of our three benchmarks. We focus on medians rather than means in much of the remaining analysis because, even after winsoring, a few cases with particularly large reported values distort the means. The figure shows a decline in *PreInterestROS* from year *t-2* to year *t-1* but substantial increases in *PreInterestROS* post-buyout. Median *PreInterestROS* increases by more than four percentage points from year *t-1* to year *t+2* relative to the propensity score-matched control sample and by more than three percentage points relative

[10] Barber and Lyon (1996) and Lie (2001) emphasize the importance of matching on pre-event performance.
[11] We define industries using 3-digit NAICS codes. If multiple firms meet our matching criteria, we select the match firm with the closest *PreInterestROA* in year *t-1*. If there are no match firms with the same 3-digit NAICS code, we relax this criterion and look for matching firms with the same 2-digit NAICS code or 1-digit NAICS code.

to the performance-matched control sample. The recovery of unadjusted, industry-adjusted, and propensity score match-adjusted *PreInterestROS* in the post-buyout period after the decline from year *t-2* to year *t-1* might have occurred even absent the buyout due to mean reversion. However, the increase in performance match-adjusted *PreInterestROS* post-buyout helps to allay concerns about counterfactual mean reversion because matching on both year *t-1* and year *t-2* profitability ensures the absence of differential pre-buyout trends.

--- Insert Figure 1 about here ---

We more formally estimate changes in profitability after private firm buyouts by calculating the change in *PreInterestROS* from year *t-1* to years *t+1*, *t+2*, *t+3*, *t+4*, and the year of the PE acquirer's exit for each buyout firm, both in absolute terms and relative to each of its three benchmarks.[12] Table V reports the changes in *PreInterestROS* for all 240 firms (Panel A) and for firms in the top and bottom quintiles (Panels B and C) of pre-buyout profitability, respectively.

--- Insert Table V about here ---

Consistent with Figure 1, the results in Panel A of Table V show a significant increase in *PreInterestROS*, both in absolute terms and relative to each of the three benchmarks. The mean and median changes in *PreInterestROS* relative to year *t-1* are positive over all horizons and relative to all benchmarks. These changes are large in magnitude and are statistically significant in all but a few cases. Even the performance-adjusted increase in *PreInterestROS* is statistically significant in most cases, further allaying concerns about potential mean reversion in profitability.

Comparing the top pre-buyout profitability group (Panel B) with the bottom pre-buyout profitability group (Panel C), firms in the bottom pre-buyout profitability group appear to

[12] If a buyout firm is still owned by the PE acquirer or the date of exit is not identified, we use the last available year of BRTF data as the exit year.

experience larger increases in *PreInterestROS* post-buyout than firms in the top pre-buyout profitability group, both in absolute terms and relative to the industry and propensity-matched benchmarks. However, performance-adjusted changes in *PreInterestROS* appear more similar for the low pre-buyout profitability group and the high pre-buyout profitability group. The fact that the performance-adjusted increases are larger than increases relative to the other benchmarks for the top pre-buyout profitability group and smaller for the bottom pre-buyout profitability group suggests that mean reversion may explain some of the post-buyout changes. However, the fact that changes in *PreInterestROS* remain positive for both groups suggests that profitability increases after buyouts, even after accounting for the possibility of mean reversion. Overall, the results in Table V suggest that increases in profitability after private firm buyouts are larger for firms with low profitability pre-buyout, suggesting that turning around struggling firms is one mechanism through which PE acquirers create value in private firm buyouts.

5.2 Changes in Sales Growth after Private Firm Buyouts

Figure 2 plots the trends in median *SalesGrowth* for years *t-2* through *t+3* relative to the buyout year *t*, both in absolute terms and relative to each of our three benchmarks. Although *SalesGrowth* declines from year *t-2* to year *t-1* in the pre-buyout period relative to the industry and propensity score-matched benchmarks, it does not decline meaningfully relative to the performance-matched sample. The plot shows a significant increase in *SalesGrowth* after buyouts. Sales growth jumps in the first post-buyout year and remains somewhat elevated the second year post-buyout before falling to near zero in the third year post-buyout.

--- Insert Figure 2 about here ---

Like our analysis of changes in profitability, Table VI reports the changes in *SalesGrowth* from year *t-1* to years *t+1*, *t+2*, *t+3*, *t+4*, and the year of the PE acquirer's exit for each buyout

firm in absolute terms and relative to each of its three benchmarks. Panel A reports results for all PE buyouts, while Panels B and C report results for the top and bottom pre-buyout profitability quintile groups, respectively. Consistent with Figure 2, Panel A of Table VI shows a large, sustained increase in sales growth after private firm buyouts, both in absolute terms and relative to benchmarks. The mean (median) percentage increase in sales from year *t-1* to year *t+1* is 139.0% (52.5%) relative to the industry benchmark and 114.9% (37.1%) relative to the performance benchmark. The growth appears to result in permanently higher sales, with no reversal through at least year *t+4*.

--- Insert Table VI about here ---

Sales growth increases sharply after PE buyouts for firms in both the highest quintile of pre-buyout profitability (Panel B) and the lowest quintile of pre-buyout profitability (Panel C). The increases for these two groups likely have slightly different interpretations. The increase for the high-profitability group is consistent with high return on sales corresponding to large unrealized growth opportunities due to financing constraints. The increase for the low profitability group could reflect an increase in the optimal scale of the firm due to the increase in profitability documented in Table V Panel C. At a minimum, the increase in sales growth does not appear to come at the expense of profit margins given that *PreInterestROS* generally increases post-buyout for both the high and low profitability groups.

We further investigate the role of add-on acquisitions in driving sales growth. Using Capital IQ and Preqin, we identify add-on acquisitions post-buyout for 44.2% of the buyout firms in our sample. However, this figure likely understates the fraction of firms acquired in private firm buyouts that undertake add-on acquisitions because add-on acquisitions often involve buying small firms, for which data coverage is generally limited. Nevertheless, our finding that more than 40%

of the buyouts in our sample involve post-buyout add-on acquisitions suggests that a portion of the post-buyout sales growth increase documented in Table VI likely reflects growth through acquisitions.

To further assess the importance of add-on acquisitions in fueling post-buyout growth, we divide our sample of buyouts into two subsamples – those where we are able to identify post-buyout acquisitions by the target firm and those for which we can identify no such add-on acquisitions. We then re-estimate changes in sales growth for each of these two subsamples. Table VI Panels D and E report the results. The results show that sales growth is much larger for firms that undertake identifiable add-on acquisitions, though it is large even for those that do not. Although we cannot decompose total sales growth into that driven by organic versus external growth, our results suggest that add-on acquisitions play a role in explaining total sales growth after private firm buyouts.

5.3 Changes in Capital Structure after Private Firm Buyouts

Figure 3 plots the trends in *DebtToAssets* for years *t-2* through *t+3* relative to the buyout year *t*. We observe little change in *DebtToAssets* from year *t-2* to *t-1* but a significant increase in the ratio from year *t-1* to year *t*. While we do not observe the amount of debt used to finance the buyout itself, the increase likely represents the effect of buyout debt on the target firm's balance sheet. Leverage continues to increase gradually in years *t+1* through *t+3*. As the summary statistics in Table II show, private firms acquired in buyouts have relatively high leverage pre-buyout.

--- Insert Figure 3 about here ---

We formally estimate changes in leverage after private firm buyouts by calculating the change in *DebtToAssets* from year *t-1* to years *t+1*, *t+2*, *t+3*, *t+4*, and the year of the PE acquirer's exit for each buyout firm. Table VII reports the means and medians of these changes for all firms

(Panel A) and for firms in the top and bottom quintiles of pre-buyout profitability (Panels B and C), respectively.

--- Insert Table VII about here ---

The mean (median) increase in debt-to-assets from year *t-1* to year *t+1* in excess of the industry benchmark is 0.18 (0.14) and in excess of the performance benchmark is 0.15 (0.11). The increase in leverage reported by Cohn, Mills, and Towery (2014) for public-to-private PE buyouts using the same tax return data is substantially larger, with a mean (median) increase of 0.30 (0.32). However, they also document considerably lower pre-buyout leverage ratios for public-to-private PE buyout targets. The relatively high pre-buyout leverage and small leverage increase after private firm buyouts suggest that financial engineering plays a more limited role in creating value for investors in private firm buyouts.[13]

To further investigate the possible role of financial engineering as a source of value creation in private firm buyouts, we also compute the fraction of buyout firms reporting positive tax payments in the years around the buyout. Figure 4 plots this fraction for each of the years *t-1* through *t+3*. This fraction remains virtually unchanged throughout the window around the buyout, falling from 55% in year *t-1* to 53% in year *t*, before rising to 55% again in year *t+1*. While Figure 3 and Table VII show that private firms do increase leverage after buyouts, rising operating profitability appears to offset the increase in tax shields due to higher interest payments for many firms. The lack of a decline in the fraction of buyout firms paying taxes raises further doubts about the importance of financial engineering in creating value for investors in private firm buyouts.

--- Insert Figure 4 about here ---

5.4. Equity Injections into Portfolio Firms

[13] Guo, Hotchkiss, and Song (2011) show that tax benefits from increased debt explain as much as one third of the total return to PE acquirers' invested capital in buyouts of public firms.

We complete our analysis of how private PE buyout targets evolve after being acquired by a PE firm by examining equity injections that take place around the time of the buyout. Our finding that PE acquirers target firms that likely have untapped growth options, combined with our finding that target firms' sales grow rapidly post-buyout, suggests that facilitating growth by relaxing financing constraints plays an important role in creating value. One way for PE acquirers to relax financing constraints is to inject equity capital into the target firm. PE acquirers may inject capital both as part of the buyout transaction and after the transaction as needed. Table VIII reports equity contributions for the subset of sample firms with sufficient data to observe these contributions.

--- Insert Table VIII about here ---

Mean (median) equity contributions in the year of the buyout, most of which are likely tied to the buyout itself, are $22.5 million (2.3 million). We also observe mean equity contributions of $3.1 million, $4.2 million, and $7.5 million in years *t+1*, *t+2*, and *t+3*, respectively. While fewer than half of acquired firms receive a positive equity contribution in each of these three years, 78.2% of firms receive equity contributions in at least one of these three years (untabulated). The sizable equity injections both in the year of the buyout and in subsequent years provide further evidence that relaxing financing constraints is a significant source of value creation in private firm buyouts.

5.5 Identification Challenges and Additional Robustness Tests

In analyzing changes in profitability, sales growth, and capital structure around private firm PE buyouts, we account for counterfactual changes by comparing raw changes to an industry benchmark, a propensity-matched control sample, and a performance-matched control sample. However, survivorship bias is a potential concern. Our initial sample of 288 buyouts, used to examine determinants of buyouts, requires firms to have data in year *t-1*. We do not observe post-buyout data for 48 of these buyouts, and we therefore exclude them from our analysis of pre- to

post-buyout changes. Further, firms that we include in our analysis of post-buyout performance may not have data available for all post-buyout years through year *t+4*. There are three primary reasons a firm would not have post-buyout data: it converts from a C corporation to a flow-through entity, its total assets fall below the $10 million threshold for inclusion in the BRTF tax return data, or it ceases to exist or is acquired by another operating company.

Because the BRTF made available to us only includes C corporations, a buyout firm will cease to be present in the BRTF data if it converts to an S corporation, a partnership, or an LLC (i.e., a flow-through entity). The double taxation of C corporation income might motivate such a conversion. If the decision of whether to convert organizational form is based primarily on factors independent of firm characteristics, then bias in our estimates due to conversions should be limited.

Buyout firms could also leave our sample because they fall below the $10 million total assets threshold for inclusion in the BRTF tax return data in the post-buyout period. The omission of these firms from the sample would likely cause us to overestimate average sales growth post-buyout. To address this specific concern, we increase the total assets threshold for entering our sample to $20 million and re-estimate changes in profitability, sales growth, and leverage for the resulting sample as a robustness test. Increasing the threshold for entry into the sample to $20 million in total assets greatly reduces the likelihood of a firm falling out of the sample due to shrinkage because even the smallest firm's assets would need to decrease by at least 50% to fall below the $10 million tax return data threshold. We report the results from these tests in Appendix B.2. The results change little when we impose this sample restriction.

Finally, buyout firms could leave our sample because they go public via an IPO, are acquired by other companies, or fail. The first of these possibilities would bias our estimates of changes in performance for remaining firms downwards (as successful firms leave the sample),

the impact of the second is ambiguous, and most importantly the third (firm failures) would bias our estimates upwards. For the 48 firms not included in our analysis of post-buyout performance, we find only one firm that filed for bankruptcy before year *t+2* and none that go public via IPO in that window, with the remaining firms largely acquired or merged into other PE portfolio companies. This analysis suggests that survivorship bias due to firms going bankrupt before year *t+2* is small. Firms that exit the sample quickly after the buyout due to an acquisition are often merged into another portfolio company of the same PE investor.

For our reported analysis of post-buyout performance, firms often leave our sample because data is not available following the PE exit; therefore, we also report in Tables V to VII the firm level changes from year *t*-1 to the earlier of year *t+4* or the year of the PE exit. To better understand why firms depart the sample, we search Capital IQ for information about how and when each of the 240 firms in our sample exit buyout status. Appendix B.3 presents this breakdown. We find that 76.2% exit via sale to either a strategic buyer, another PE buyer, or another portfolio company, 9.2% exit via bankruptcy, and even fewer (3.8%) exit via IPO, which is not surprising given the relatively small size of most firms in our sample. Moreover, the bankruptcies we observe do not occur within the first few post-buyout years (among target firms in our sample that go bankrupt, the median time to bankruptcy is 5.5 years post-buyout). Thus, it appears unlikely that survivorship bias due to failures is likely to substantially affect our estimates.

We also consider whether the choice to operate as a private firm pre-buyout could proxy for other firm characteristics that explain the differences in changes in profitability, sales growth, and capital structure between private firm buyouts and public firm buyouts. Most importantly, private targets are much smaller than public buyout targets, and it is possible that the effects of a buyout on profitability, sales growth, and leverage are a function of firm size. We address this

possibility by constructing a subsample of PE private buyout firms from our full sample with total assets of at least $92.7 million at the time of the buyout and re-estimating changes in our outcome variables after buyouts in this subsample. We choose $92.7 million as the cutoff, as this amount represents the 25th percentile of total assets in the sample of public firm buyouts analyzed by Cohn, Mills, and Towery (2014) and thus should provide some comparability. The results are presented in Appendix B.4. We observe few differences between changes in profitability, sales growth, and leverage in this subsample in comparison to our full sample results. This analysis provides some assurance that firm size does not explain the different pattern of results for public and private firm buyouts.

6. Conclusion

This paper investigates the sources of value creation in PE buyouts of private firms in the U.S. Using financial data from U.S. corporate tax returns, our evidence suggests that unlocking growth opportunities by relaxing financing constraints is a primary source of value creation for private firm buyouts. Unlike publicly-traded firms, private firms cannot generally issue equity to raise capital needed to finance investment and may become financially constrained when they reach their debt capacities. While many have argued that PE acquirers purchase *public* firms to solve *overinvestment* problems, our results highlight the role of *private* firm buyouts in solving *underinvestment* problems.

We also provide evidence that improvements in profitability play a role in creating value in private firm buyouts and that PE acquirers are able to turn around struggling firms. We find little evidence to support financial engineering as an important source of value creation in private firm buyouts. Private firm targets tend to already be highly levered at the time of the buyout,

increases in leverage in conjunction with the buyout tend to be relatively small, and the fraction of firms paying taxes is essentially unchanged from before to after buyouts. Overall, our analysis of PE buyouts of private firms highlights important contrasts with PE buyouts of public firms and provides insight into the mechanisms by which PE sponsors add value for this large segment of the buyout market.

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Figure 1. Trend in pre-interest ROS. This figure presents trends in median *PreInterestROS* for private PE buyout firms. Year *t* represents the buyout year.

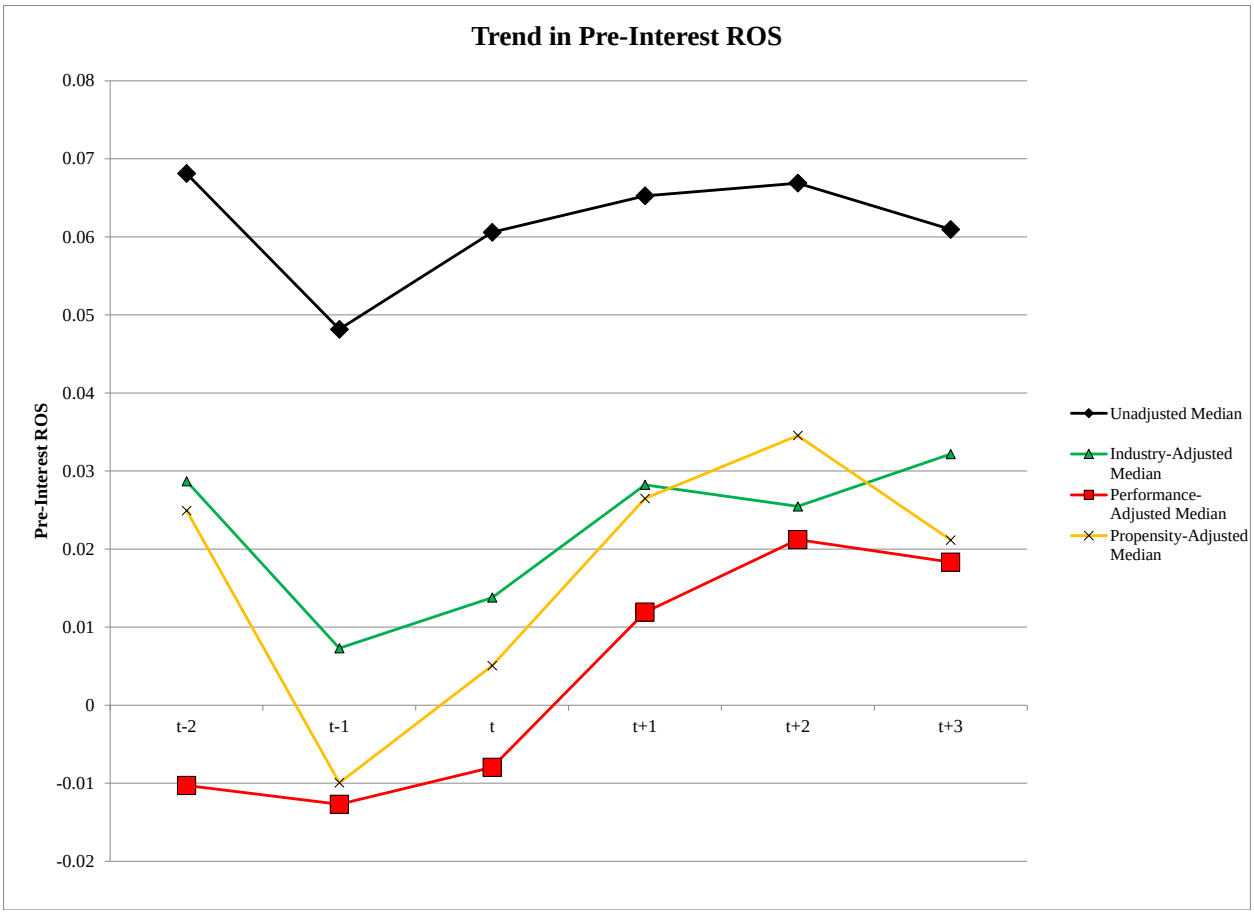

Figure 2. Trend in sales growth. This figure presents trends in median *SalesGrowth* for private PE buyout firms. Year *t* represents the buyout year.

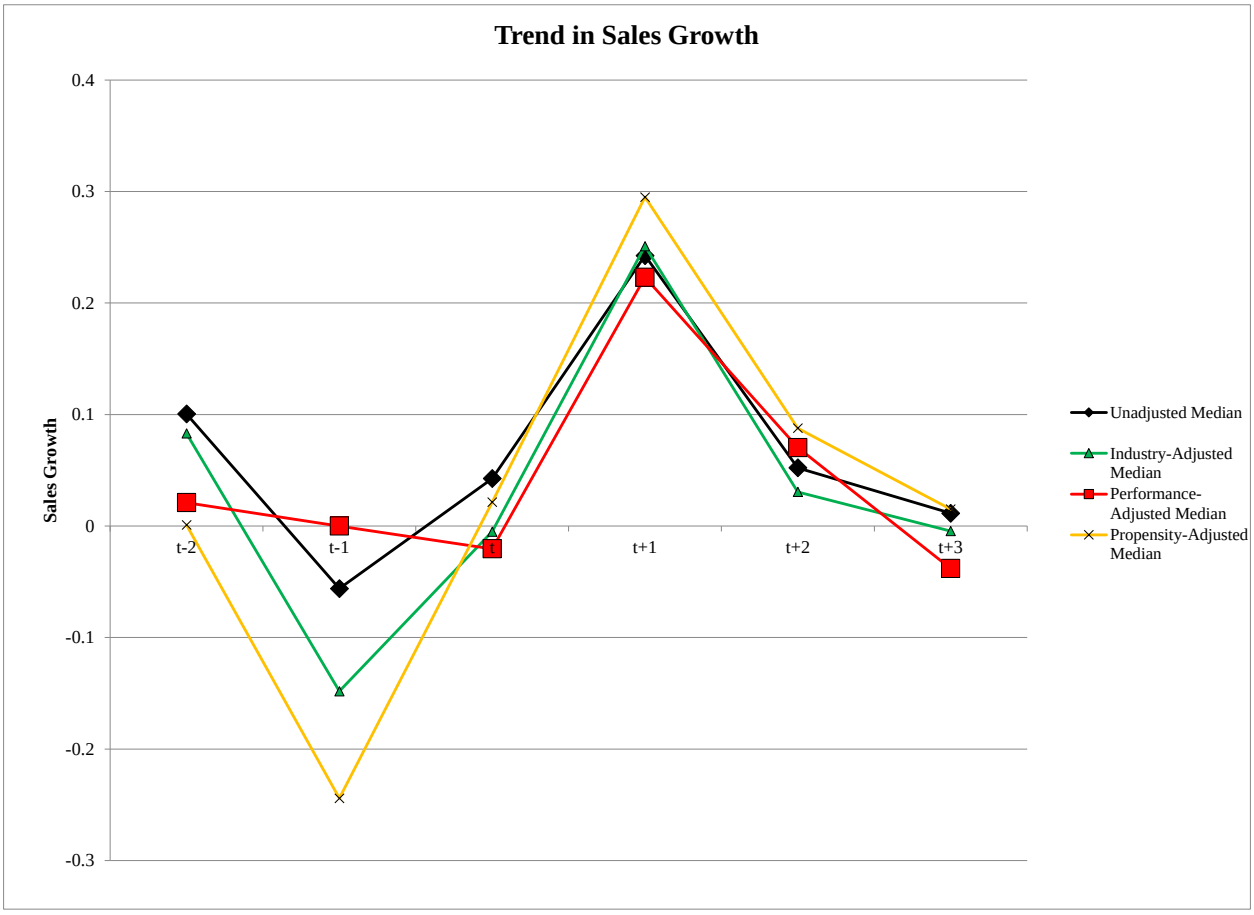

Figure 3. Trend in leverage. This figure presents trends in median *DebtToAssets* for private PE buyout firms. Year *t* represents the buyout year.

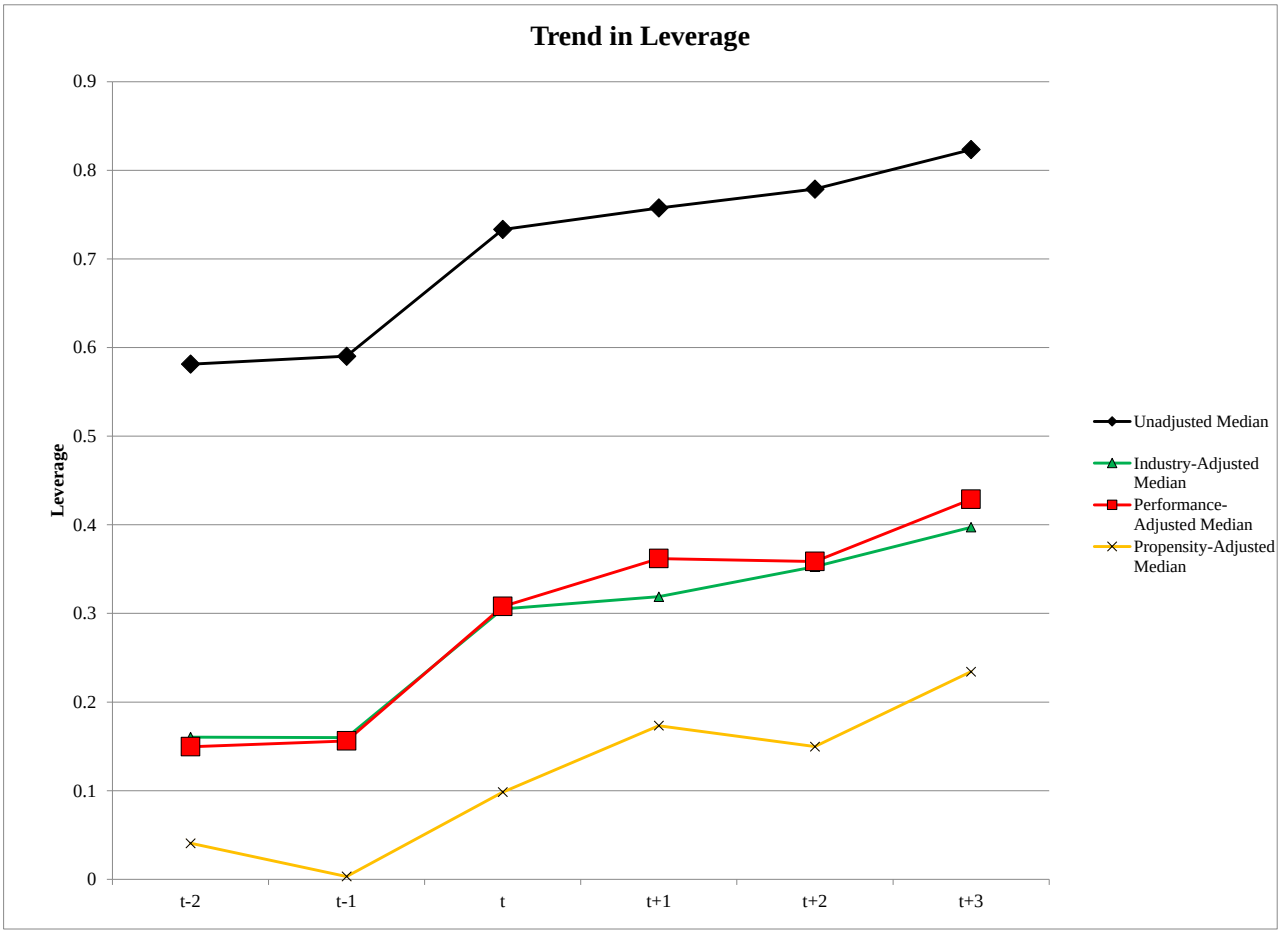

Figure 4. Percentage of buyout firms with positive tax payments. This figure presents the trend in the percentage of private PE buyout firms with positive tax payments. Year *t* represents the buyout year.

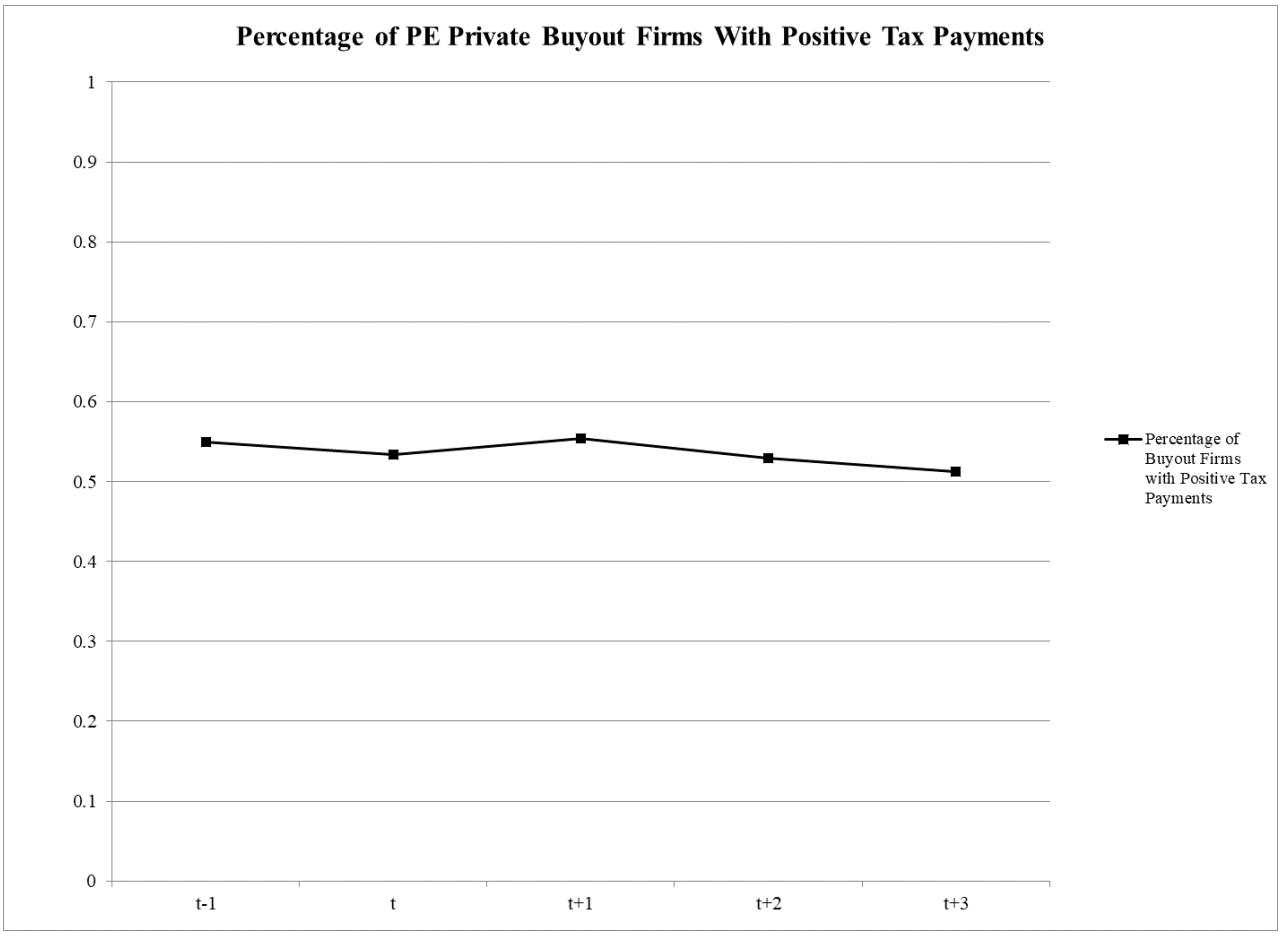

Table I. Sample derivation

This table presents the sample derivation process. Panel A provides the aggregate number of PE transactions, Panel B presents the number of PE transactions by year, and Panel C presents the number of PE transactions by Fama-French 12 industry.

Panel A: Aggregate PE transactions	
Number of PE buyouts of private non-bankrupt C corporations from 1995 to 2009	639
Less: Buyout firms with <$10 million total assets	(87)
Less: Buyout firms merged into other entities	(110)
Number of PE buyout firms to be matched with IRS data	442
Less: PE transactions not matched with IRS data in event window	(93)
Less: PE transactions not having year *t-1* IRS data	(61)
Initial sample for determinants model	288
Less: PE transactions not having year *t+1* and year *t+2* IRS data	(48)
Final sample	**240**

Panel B: PE Transactions by year

	Initial sample	*t-1* to *t+2*	*t-1* to *t+3*	*t-1* to *t+4*
1995	3	3	3	3
1996	7	4	4	3
1997	11	8	7	7
1998	7	5	4	4
1999	7	7	6	6
2000	22	17	14	14
2001	11	7	7	6
2002	6	5	5	5
2003	8	8	8	7
2004	27	20	19	18
2005	39	33	29	27
2006	42	36	32	29
2007	38	38	36	34
2008	46	40	31	13
2009	14	9	4	1
	288	240	209	177

Panel C: PE transactions by Fama-French 12 industry

	Determinants Sample	Final Sample
Business Equipment -- Computers, Software, and Electronic Equipment	30	24
Chemicals and Allied Products	<5	<5
Consumer Durables -- Cars, TV's, Furniture, Household Appliances	11	10
Consumer NonDurables -- Food, Tobacco, Textiles, Apparel, Leather, Toys	23	19
Finance	15	9
Healthcare, Medical Equipment, and Drugs	17	14
Manufacturing -- Machinery, Trucks, Planes, Off Furn, Paper, Com Printing	63	53
Oil, Gas, and Coal Extraction and Products	<5	<5
Other -- Mines, Constr, BldMt, Trans, Hotels, Bus Serv, Entertainment	49	43
Utilities & Telephone and Television Transmission	<5	<5
Wholesale, Retail, and Some Services (Laundries, Repair Shops)	68	60
	288	240

Table II. Descriptive statistics

This table presents descriptive statistics for the buyout determinants sample. Panel A provides the descriptive statistics measured at year *t-1* for all PE transactions. Panel B (C) provides the descriptive statistics measured at year *t-1* for high performance (low performance) PE transactions. Year *t* represents the PE buyout year.

Panel A: All PE transactions						
	N	Mean	SD	Q1	Median	Q3
PreInterestInc	288	7.1	34.7	0.0	2.9	7.3
IntDeduction	288	3.2	6.0	0.2	1.0	3.6
IntBearingLiab	288	54.1	83.3	9.5	25.8	52.0
TotalAssets	288	97.5	154.5	25.0	45.2	104.4
DebtToAssets	288	0.575	0.360	0.291	0.586	0.817
Sales	288	117.4	208.3	29.2	55.3	120.4
SalesGrowth	273	-0.067	0.584	-0.321	-0.023	0.144
PosTaxPdInd	288	0.569	0.496	0.000	1.000	1.000
PreInterestROA	288	0.083	0.132	-0.001	0.076	0.165
PreInterestROS	288	0.029	0.146	-0.001	0.051	0.109
Panel B: PE transactions in Top Quintile Pre-Interest ROA						
	N	Mean	SD	Q1	Median	Q3
PreInterestInc	108	17.8	50.7	3.9	6.7	11.6
IntDeduction	108	2.9	6.3	0.2	0.7	2.5
IntBearingLiab	108	39.7	69.1	6.7	20.6	42.8
TotalAssets	108	81.0	151.0	20.5	38.7	68.6
DebtToAssets	108	0.557	0.382	0.240	0.567	0.835
Sales	108	131.5	226.4	37.3	57.8	131.9
SalesGrowth	98	0.165	0.324	0.012	0.116	0.251
PosTaxPdInd	108	0.852	0.357	1.000	1.000	1.000
PreInterestROA	108	0.218	0.076	0.154	0.202	0.270
PreInterestROS	108	0.127	0.079	0.072	0.107	0.162
Panel C: PE transactions in Bottom Quintile Pre-Interest ROA						
	N	Mean	SD	Q1	Median	Q3
PreInterestInc	77	-8.2	14.3	-11.1	-3.3	-0.8
IntDeduction	77	2.9	4.9	0.1	0.6	2.7
IntBearingLiab	77	62.3	86.1	8.5	26.7	81.2
TotalAssets	77	99.4	135.7	26.0	47.3	116.5
DebtToAssets	77	0.595	0.380	0.268	0.718	0.829
Sales	77	80.2	161.7	14.6	33.6	90.6
SalesGrowth	75	-0.321	0.892	-0.751	-0.470	-0.121
PosTaxPdInd	77	0.000	0.000	0.000	0.000	0.000
PreInterestROA	77	-0.077	0.063	-0.155	-0.051	-0.020
PreInterestROS	77	-0.155	0.129	-0.300	-0.135	-0.023

Table III. Characteristics of PE buyouts of private firms

This table summarizes deal characteristics for our sample of 288 PE buyouts of private firms based on information reported by Capital IQ, Preqin, Factset, and news sources. "Pre-buyout CEO participates" indicates that the pre-buyout CEO retains an equity stake in the deal. N indicates the number of observations for which information is available.

	% of buyouts	N
Management buyout (MBO)	29.30%	283
Pre-buyout CEO participates	42.80%	278
Seller is founder or family	14.40%	278
Secondary buyout	16.30%	283
> 1 buyer (Club deal)	24.40%	283
PE acquirer is in Cohn, Mills, and Towery (2014) sample	33.20%	283
Firm age at buyout (mean)	34 years	276
Firm age at buyout (median)	27 years	276

Table IV. Buyout determinants

This table presents the results from estimating a linear probability model of the likelihood of undergoing a PE buyout. Asterisks *, **, *** denote two-tailed statistical significance at 10%, 5%, and 1%, respectively. Standard errors are clustered by firm. T-statistics are reported in parentheses. See Appendix A for variable definitions.

	Dependent Variable: *BuyoutInd*				
	(1)	(2)	(3)	(4)	(5)
Intercept	-0.0011	-0.0024 **	-0.0025 **	-0.0014	-0.0016
	(-1.14)	(-2.42)	(-2.42)	(-1.35)	(-1.61)
ln(*Assets*)	0.0001 **	0.0002 ***	0.0001 **	0.0001 **	0.0001 **
	(2.4)	(3.03)	(2.29)	(2.13)	(2.06)
PreInterestROA	0.0027 **				
	(2.2)				
PreInterestROAQ1		0.0015 ***	0.0010 ***	0.0009 ***	0.0011 ***
		(5.49)	(3.8)	(3.7)	(4.25)
PreInterestROAQ2		0.0002			
		(1.21)			
PreInterestROAQ4		0.0005 **			
		(2.43)			
PreInterestROAQ5		0.0020 ***	0.0020 ***	0.0020 ***	0.0003
		(7.23)	(7.36)	(7.22)	(0.92)
DebtToAssets			0.0018 ***	-0.0009	0.0010 ***
			(6.78)	(-0.98)	(4.25)
ExtFinDep			-0.0012 ***	-0.0023	-0.0013 ***
			(-3.58)	(-1.34)	(-3.41)
IndustryQ			0.0002	-0.0003	
			(1.22)	(-1.46)	
*DebtToAssets*ExtFinDep*				-0.0100 **	-0.0002
				(-2.46)	(-0.26)
*DebtToAssets*IndustryQ*				0.0015 ***	
				(2.91)	
DebtToAssets PreInterestROAQ5*					0.0049 ***
					(4.26)
*ExtFinDep*IndustryQ*				0.0003	
				(0.3)	
*ExtFinDep*PreInterestROAQ5*					-0.0016
					(-1.22)
*DebtToAssets*ExtFinDep* IndustryQ*				0.0066 ***	
				(2.87)	
*DebtToAssets*ExtFinDep* PreInterestROAQ5*					0.0111 **
					(2.48)
Number of buyout observations	288	288	288	288	288
Number of non-buyout observations	199,358	199,358	199,358	199,358	199,358
Adjusted R-squared	0.01%	0.04%	0.08%	0.09%	0.12%

Table V. Changes in pre-interest ROS

This table tests for changes in pre-interest ROS using t-tests and Wilcoxon rank tests. Year *t* represents the PE buyout year. Asterisks *, **, *** denote two-tailed statistical significance at 10%, 5%, and 1%, respectively. See Appendix A for variable definitions.

		t-1 to t+1		t-1 to t+2		t-1 to t+3		t-1 to t+4		t-1 to exit	
Panel A: Change in Pre-Interest ROS for all PE transactions											
Unadjusted	Mean	0.066	***	0.061	***	0.062	***	0.066	***	0.048	***
	Median	0.020	***	0.012	***	0.007	**	0.007	**	0.000	
	N	240		240		207		175		240	
Industry-Adjusted	Mean	0.071	***	0.068	***	0.073	***	0.078	***	0.058	***
	Median	0.026	***	0.019	***	0.020	***	0.020	***	0.013	***
	N	240		240		207		175		240	
Propensity-Adjusted	Mean	0.124	***	0.095	***	0.124	***	0.138	***	0.121	***
	Median	0.042	***	0.027	***	0.040	***	0.057	***	0.041	***
	N	240		240		207		157		240	
Performance-Adjusted	Mean	0.014		0.059	***	0.022		0.095	***	0.078	***
	Median	0.018	**	0.035	***	0.030	**	0.018	**	0.018	**
	N	213		213		182		131		213	
Panel B: Change in Pre-Interest ROS for PE transactions in Top Pre-Interest ROA Quintile											
Unadjusted	Mean	0.044	**	0.031	*	0.023		0.006		0.001	
	Median	0.007		0.004		-0.007		-0.017		-0.012	
	N	104		104		92		80		104	
Industry-Adjusted	Mean	0.048	**	0.038	**	0.036	*	0.019		0.013	
	Median	0.015		0.013		0.010		-0.012		-0.008	
	N	104		104		92		80		104	
Propensity-Adjusted	Mean	0.055	**	0.042	*	0.052	**	0.000		0.019	
	Median	0.029		0.007		0.020		0.014		0.008	
	N	104		104		92		74		104	
Performance-Adjusted	Mean	0.031		0.052	*	0.075	*	0.061		0.055	
	Median	0.029	**	0.041	**	0.042	***	-0.005		0.009	
	N	86		86		76		56		86	
Panel C: Change in Pre-Interest ROS for PE transactions in Bottom Pre-Interest ROA Quintile											
Unadjusted	Mean	0.138	***	0.170	***	0.173	***	0.210	***	0.180	***
	Median	0.042	***	0.066	***	0.109	***	0.120	***	0.104	***
	N	48		48		41		32		48	
Industry-Adjusted	Mean	0.147	***	0.179	***	0.185	***	0.222	***	0.192	***
	Median	0.060	***	0.086	***	0.100	***	0.123	***	0.121	***
	N	48		48		41		32		48	
Propensity-Adjusted	Mean	0.195	***	0.213	***	0.217	***	0.239	**	0.249	***
	Median	0.117	***	0.116	***	0.120	***	0.198	***	0.191	***
	N	48		48		41		29		48	
Performance-Adjusted	Mean	0.014		0.129	**	0.022		0.035		0.092	
	Median	-0.001		0.054	***	0.041	*	0.020		0.050	
	N	42		42		35		24		42	

Table VI. Changes in sales growth

This table tests for changes in Sales Growth using t-tests and Wilcoxon rank tests. Year *t* represents the PE buyout year. Asterisks *, **, *** denote two-tailed statistical significance at 10%, 5%, and 1%, respectively. See Appendix A for variable definitions.

Panel A: Change in Sales Growth for all PE transactions																	
		t-1 to t+1			t-1 to t+2			t-1 to t+3			t-1 to t+4			t-1 to exit		
Unadjusted	Mean	1.328	***		1.613	***		1.776	***		1.804	***		1.657	***	
	Median	0.447	***		0.536	***		0.631	***		0.833	***		0.663	***	
	N	240			240			209			177			240		
Industry-Adjusted	Mean	1.390	***		1.673	***		1.859	***		1.851	***		1.698	***	
	Median	0.525	***		0.617	***		0.739	***		0.894	***		0.688	***	
	N	240			240			209			177			240		
Propensity-Adjusted	Mean	1.556	***		1.955	***		2.120	***		2.032	***		2.217	***	
	Median	0.598	***		0.843	***		0.890	***		0.991	***		0.749	***	
	N	240			240			209			161			240		
Performance-Adjusted	Mean	1.149	***		1.545	***		1.630	***		1.698	***		1.502	***	
	Median	0.371	***		0.532	***		0.637	***		0.715	***		0.552	***	
	N	213			213			183			136			213		
Panel B: Change in Sales Growth for PE transactions in Top Pre-Interest ROA Quintile																	
		t-1 to t+1			t-1 to t+2			t-1 to t+3			t-1 to t+4			t-1 to exit		
Unadjusted	Mean	1.105	***		1.346	***		1.547	***		1.621	***		1.457	***	
	Median	0.467	***		0.563	***		0.754	***		0.818	***		0.668	***	
	N	104			104			93			82			104		
Industry-Adjusted	Mean	1.165	***		1.412	***		1.636	***		1.674	***		1.515	***	
	Median	0.532	***		0.674	***		0.806	***		0.887	***		0.755	***	
	N	104			104			93			82			104		
Propensity-Adjusted	Mean	1.324	***		1.705	***		1.839	***		2.083	***		1.923	***	
	Median	0.588	***		0.907	***		1.051	***		1.064	***		0.841	***	
	N	104			104			93			77			104		
Performance-Adjusted	Mean	1.009	***		1.331	***		1.512	***		1.708	***		1.315	***	
	Median	0.480	***		0.657	***		0.757	***		0.841	***		0.648	***	
	N	86			86			76			59			86		
Panel C: Change in Sales Growth for PE transactions in Bottom Pre-Interest ROA Quintile																	
		t-1 to t+1			t-1 to t+2			t-1 to t+3			t-1 to t+4			t-1 to exit		
Unadjusted	Mean	2.154	***		2.501	***		2.686	***		2.547	***		2.677	***	
	Median	0.420	***		0.400	***		0.875	***		1.194	***		1.015	***	
	N	48			48			42			32			48		
Industry-Adjusted	Mean	2.238	***		2.565	***		2.758	***		2.578	***		2.708	***	
	Median	0.459	***		0.567	***		0.955	***		1.172	***		0.952	***	
	N	48			48			42			32			48		
Propensity-Adjusted	Mean	2.754	***		3.175	***		3.414	***		2.799	***		3.925	***	
	Median	0.858	***		1.146	***		1.509	***		1.527	***		1.556	***	
	N	48			48			42			29			48		
Performance-Adjusted	Mean	1.931	***		2.474	***		2.673	***		2.046	***		2.759	***	
	Median	0.251	**		0.532	***		0.888	***		1.142	***		1.104	***	
	N	42			42			36			24			42		

Table VI. Changes in sales growth (continued)

This table tests for changes in sales growth using t-tests and Wilcoxon rank tests. Year *t* represents the PE buyout year. Asterisks *, **, *** denote two-tailed statistical significance at 10%, 5%, and 1%, respectively. See Appendix A for variable definitions.

Panel D: Change in Sales Growth for PE transactions with Add-on Acquisitions															
		t-1 to t+1		t-1 to t+2		t-1 to t+3		t-1 to t+4		t-1 to exit	
Unadjusted	Mean	1.281	***	1.699	***	2.032	***	2.129	***	1.801	***
	Median	0.500	***	0.834	***	0.962	***	0.997	***	0.918	***
	N	106		106		99		86		106	
Industry-Adjusted	Mean	1.338	***	1.761	***	2.121	***	2.188	***	1.837	***
	Median	0.584	***	0.939	***	1.059	***	1.084	***	0.942	***
	N	106		106		99		86		106	
Propensity-Adjusted	Mean	1.620	***	2.189	***	2.510	***	2.387	***	2.627	***
	Median	0.757	***	1.141	***	1.342	***	1.228	***	1.094	***
	N	106		106		99		78		106	
Performance-Adjusted	Mean	1.053	***	1.641	***	1.958	***	1.910	***	1.737	***
	Median	0.478	***	0.775	***	0.979	***	0.969	***	0.945	***
	N	90		90		83		62		90	
Panel E: Change in Sales Growth for PE transactions without Add-on Acquisitions											
		t-1 to t+1		t-1 to t+2		t-1 to t+3		t-1 to t+4		t-1 to exit	
Unadjusted	Mean	1.366	***	1.545	***	1.546	***	1.497	***	1.543	***
	Median	0.373	***	0.423	***	0.379	***	0.527	***	0.281	***
	N	134		134		110		91		134	
Industry-Adjusted	Mean	1.432	***	1.604	***	1.623	***	1.533	***	1.587	***
	Median	0.419	***	0.434	***	0.467	***	0.528	***	0.316	***
	N	134		134		110		91		134	
Propensity-Adjusted	Mean	1.505	***	1.770	***	1.768	***	1.699	***	1.893	***
	Median	0.433	***	0.519	***	0.623	***	0.729	***	0.441	***
	N	134		134		110		83		134	
Performance-Adjusted	Mean	1.219	***	1.474	***	1.357	***	1.521	***	1.330	***
	Median	0.290	***	0.374	***	0.336	***	0.547	***	0.320	***
	N	123		123		100		74		123	

Table VII. Changes in leverage

This table tests for changes in leverage using t-tests and Wilcoxon rank tests. Year *t* represents the PE buyout year. Asterisks *, **, *** denote two-tailed statistical significance at 10%, 5%, and 1%, respectively. See Appendix A for variable definitions.

Panel A: Change in Leverage for all PE transactions											
		t-1 to t+1		t-1 to t+2		t-1 to t+3		t-1 to t+4		t-1 to exit	
Unadjusted	Mean	0.151	***	0.176	***	0.242	***	0.279	***	0.253	***
	Median	0.112	***	0.121	***	0.138	***	0.156	***	0.161	***
	N	240		240		209		177		240	
Industry-Adjusted	Mean	0.178	***	0.198	***	0.253	***	0.279	***	0.266	***
	Median	0.138	***	0.157	***	0.166	***	0.175	***	0.195	***
	N	240		240		209		177		240	
Propensity-Adjusted	Mean	0.178	***	0.195	***	0.264	***	0.270	***	0.261	***
	Median	0.145	***	0.154	***	0.170	***	0.178	***	0.227	***
	N	240		240		209		161		240	
Performance-Adjusted	Mean	0.151	***	0.155	***	0.269	***	0.194	***	0.188	***
	Median	0.111	***	0.126	***	0.192	***	0.164	***	0.168	***
	N	213		213		183		136		213	
Panel B: Change in Leverage for PE transactions in Top Pre-Interest ROA Quintile											
		t-1 to t+1		t-1 to t+2		t-1 to t+3		t-1 to t+4		t-1 to exit	
Unadjusted	Mean	0.149	***	0.163	***	0.222	***	0.274	***	0.260	***
	Median	0.109	***	0.106	***	0.090	***	0.135	***	0.146	***
	N	104		104		93		82		104	
Industry-Adjusted	Mean	0.169	***	0.174	***	0.219	***	0.258	***	0.259	***
	Median	0.135	***	0.112	***	0.118	***	0.179	***	0.177	***
	N	104		104		93		82		104	
Propensity-Adjusted	Mean	0.151	***	0.173	***	0.257	***	0.298	***	0.265	***
	Median	0.132	***	0.140	***	0.166	***	0.178	***	0.223	***
	N	104		104		93		77		104	
Performance-Adjusted	Mean	0.143	***	0.133	**	0.233	***	0.156	**	0.134	*
	Median	0.074	***	0.077	**	0.136	***	0.122	**	0.091	
	N	86		86		76		59		86	
Panel C: Change in Leverage for PE transactions in Bottom Pre-Interest ROA Quintile											
		t-1 to t+1		t-1 to t+2		t-1 to t+3		t-1 to t+4		t-1 to exit	
Unadjusted	Mean	0.121	*	0.173	**	0.249	***	0.249	*	0.199	**
	Median	0.056	*	0.060	**	0.101	***	0.142		0.114	*
	N	48		48		42		32		48	
Industry-Adjusted	Mean	0.153	**	0.202	***	0.276	***	0.268	*	0.224	**
	Median	0.093	**	0.087	***	0.157	***	0.164	**	0.164	**
	N	48		48		42		32		48	
Propensity-Adjusted	Mean	0.163	*	0.176	**	0.224	**	0.185		0.146	
	Median	0.123	*	0.097	*	0.033	*	0.102		0.126	
	N	48		48		42		29		48	
Performance-Adjusted	Mean	0.115		0.153	*	0.278	**	0.142		0.202	**
	Median	0.108		0.061	*	0.191	***	0.135		0.162	**
	N	42		42		36		24		42	

Table VIII. Analysis of contributions by equityholders

This table presents the trend in cash contributions made by equityholders from year *t-1* to year *t+3* for buyout firms, where year *t* is the year of the buyout.

	N	Mean	SD	Q1	Median	Q3
$Contributions_{t-1}$	84	-2.29	16.25	0.00	0.00	0.21
$Contributions_{t}$	120	22.46	42.48	0.00	2.31	33.63
$Contributions_{t+1}$	156	3.05	15.64	0.00	0.01	2.09
$Contributions_{t+2}$	158	4.20	22.70	0.00	0.01	1.09
$Contributions_{t+3}$	116	7.50	29.72	0.00	0.04	1.45

Appendix A: Variable Definitions

BuyoutInd	=	One if a firm is acquired by a private equity buyer during the year, and zero otherwise
Contributions	=	One-year change in paid-in-capital reported on Form 1120 Schedule L Line 23
DebtToAssets	=	*IntBearingLiab* divided by *TotalAssets*
ExtFinDep	=	Industry [capital expenditures less net cash flow from operating activities plus change in net working capital, divided by capital expenditures, where net working capital is defined as inventory plus accounts receivable less accounts payable] (adopted from Rajan and Zingales (1998))
IndustryQ	=	Median industry Tobins Q [market value of assets divided by the book value of assets (Compustat AT), where the market value of assets equals the book value of debt (Compustat LT) plus the market value of equity (Compustat PRCC_F * Compustat CSHO)]
IntBearingLiab	=	Short-term and long-term mortgages, notes, and bonds payable reported on Form 1120 Schedule L Lines 17 and 20
IntDeduction	=	Interest deduction reported on Form 1120 Page 1 Line 18
PosTaxPdInd	=	One if total tax reported on Form 1120 Page 1 Line 31 is positive, and zero otherwise
PreInterestInc	=	*TaxableInc* plus *IntDeduction*
PreInterestROA	=	*PreInterestInc* divided by lagged *TotalAssets*
PreInterestROS	=	*PreInterestInc* divided by *Sales*
Sales	=	Gross receipts or sales reported on Form 1120 Page 1 Line 1
SalesGrowth	=	One-year percentage change in *Sales*
TaxableInc	=	Taxable income before net operating loss deductions and special deductions reported on Form 1120 Page 1 Line 28
TotalAssets	=	Total assets reported on Form 1120 Schedule L Line 15

Appendix B: Supplemental Tables

Appendix B.1 Characteristics of PE Buyouts of Private Firms Organized as Flow-through Entities

This appendix summarizes deal characteristics and outcomes for 543 buyouts of private firms not included in this studypaper's sample because they are organized as flow-through entities rather than C Corporations pre-buyout. Statistics are based on information reported by Capital IQ, Preqin, and news sources. "CEO participates" indicates that the pre-buyout CEO retains an equity stake in the deal.

Management buyout (MBO)	16.8%	
Pre-buyout CEO participates	33.9%	
Seller is founder or family	19.3%	
Secondary buyout	4.8%	
> 1 buyer (Club deal)	22.1%	
PE acquirer is in Cohn, Mills, and Towery (2014) sample	23.4%	
Firm age at buyout (mean)	38 years	(N= 520)
Firm age at buyout (median)	22 years	(N= 520)

Appendix B.2 Changes in Pre-Interest ROS, Sales Growth, and Leverage & Trends in Tax Status and Equity Contributions for PE buyout firms with Assets ≥ $20 million

This appendix presents the changes in pre-Interest ROS, sales growth, and leverage and the trends in tax status and equity contributions for PE buyout firms with Assets ≥ $20 million. Year *t* represents the PE buyout year. Asterisks *, **, *** denote two-tailed statistical significance at 10%, 5%, and 1%, respectively.

Change in Pre-Interest ROS for PE transactions with Assets > $20 million

		t-1 to t+1		t-1 to t+2		t-1 to t+3		t-1 to t+4		t-1 to exit	
Unadjusted	Mean	0.070	***	0.066	***	0.071	***	0.080	***	0.058	***
	Median	0.023	***	0.012	***	0.011	***	0.008	***	0.003	*
	N	192		192		167		141		192	
Industry-Adjusted	Mean	0.075	***	0.072	***	0.082	***	0.093	***	0.069	***
	Median	0.029	***	0.018	***	0.022	***	0.028	***	0.018	***
	N	192		192		167		141		192	
Propensity-Adjusted	Mean	0.137	***	0.100	***	0.141	***	0.158	***	0.137	***
	Median	0.043	***	0.032	***	0.043	***	0.078	***	0.054	***
	N	192		192		167		125		192	
Performance-Adjusted	Mean	0.011		0.050	**	0.013		0.101	***	0.080	***
	Median	0.018	*	0.032	**	0.030	**	0.039	***	0.038	**
	N	176		176		151		107		176	

Change in Sales Growth for PE transactions with Assets > $20 million

		t-1 to t+1		t-1 to t+2		t-1 to t+3		t-1 to t+4		t-1 to exit	
Unadjusted	Mean	1.353	***	1.598	***	1.787	***	1.778	***	1.544	***
	Median	0.474	***	0.498	***	0.631	***	0.880	***	0.663	***
	N	192		192		168		142		192	
Industry-Adjusted	Mean	1.410	***	1.654	***	1.870	***	1.826	***	1.585	***
	Median	0.517	***	0.559	***	0.747	***	0.908	***	0.688	***
	N	192		192		168		142		192	
Propensity-Adjusted	Mean	1.567	***	1.896	***	2.106	***	1.915	***	2.057	***
	Median	0.598	***	0.740	***	0.890	***	0.972	***	0.757	***
	N	192		192		168		128		192	
Performance-Adjusted	Mean	1.180	***	1.504	***	1.603	***	1.579	***	1.404	***
	Median	0.372	***	0.512	***	0.661	***	0.684	***	0.528	***
	N	176		176		152		112		176	

Change in Leverage for PE transactions with Assets > $20 million

		t-1 to t+1		t-1 to t+2		t-1 to t+3		t-1 to t+4		t-1 to exit	
Unadjusted	Mean	0.147	***	0.190	***	0.265	***	0.307	***	0.281	***
	Median	0.108	***	0.125	***	0.147	***	0.167	***	0.162	***
	N	192		192		168		142		192	
Industry-Adjusted	Mean	0.175	***	0.213	***	0.280	***	0.308	***	0.292	***
	Median	0.132	***	0.157	***	0.190	***	0.186	***	0.213	***
	N	192		192		168		142		192	
Propensity-Adjusted	Mean	0.165	***	0.211	***	0.299	***	0.281	***	0.287	***
	Median	0.129	***	0.165	***	0.191	***	0.168	***	0.250	***
	N	192		192		168		128		192	
Performance-Adjusted	Mean	0.160	***	0.184	***	0.312	***	0.256	***	0.231	***
	Median	0.122	***	0.131	***	0.200	***	0.182	***	0.183	***
	N	176		176		152		112		176	

Trend in tax status for PE transactions with Assets > $20 million

	N	Mean	SD	Q1	Median	Q3
$PosTaxPdInd_{t-1}$	192	0.55	0.50	0.00	1.00	1.00
$PosTaxPdInd_{t}$	192	0.52	0.50	0.00	1.00	1.00
$PosTaxPdInd_{t+1}$	192	0.55	0.50	0.00	1.00	1.00
$PosTaxPdInd_{t+2}$	192	0.50	0.50	0.00	0.50	1.00
$PosTaxPdInd_{t+3}$	168	0.48	0.50	0.00	0.00	1.00

Trend in equity contributions for PE transactions with Assets > $20 million

	N	Mean	SD	Q1	Median	Q3
$Contributions_{t-1}$	75	-2.58	17.19	0.00	0.00	0.26
$Contributions_{t}$	99	24.07	45.00	0.00	5.34	34.09
$Contributions_{t+1}$	126	3.29	17.19	0.00	0.01	2.44
$Contributions_{t+2}$	126	3.94	23.51	0.00	0.00	1.09
$Contributions_{t+3}$	94	8.34	30.60	0.00	0.08	1.55

Appendix B.3 Post-buyout Outcomes

The appendix summarizes the outcomes of buyout transactions based on information reported by Capital IQ, Preqin, and news sources.

Outcomes:	# of Buyouts	% of Buyouts	Time until exit (years) Mean	Median
Sale to strategic buyer	80	33.30%	5.1	5.1
Sale to financial buyer (PE)	89	37.10%	5.5	5
Sale to another PE portfolio company	14	5.80%	6.1	5.1
Bankruptcy or liquidation	22	9.20%	5.9	4.8
IPO	9	3.80%	4.3	3
PE exit type not determined; firm still operates	7	2.90%	4.4	5
Still owned by PE or undetermined	19	7.90%	N/A	N/A
All buyout outcomes	240		5.5	5.1

Appendix B.4 Changes in Pre-Interest ROS, Sales Growth, and Leverage & Trends in Tax Status and Equity Contributions for PE buyout firms with Assets ≥ $92.7 million

This appendix presents the changes in pre-Interest ROS, sales growth, and leverage and the trends in tax status and equity contributions for PE buyout firms with Assets ≥ $92.7 million. Year t represents the PE buyout year. Asterisks *, **, *** denote two-tailed statistical significance at 10%, 5%, and 1%, respectively.

Change in Pre-Interest ROS for PE transactions with Assets > $92.7 million

		t-1 to t+1		t-1 to t+2		t-1 to t+3		t-1 to t+4		t-1 to exit	
Unadjusted	Mean	0.093	***	0.076	**	0.078	***	0.072	**	0.068	**
	Median	0.028	***	0.009	*	0.016	**	-0.006		0.006	
	N	65		65		55		48		65	
Industry-Adjusted	Mean	0.097	***	0.081	***	0.087	***	0.084	**	0.078	**
	Median	0.035	***	0.017	**	0.024	***	0.007		0.013	*
	N	65		65		55		48		65	
Propensity-Adjusted	Mean	0.201	***	0.092	**	0.158	***	0.173	***	0.174	***
	Median	0.034	***	0.033	*	0.046	***	0.056	**	0.057	***
	N	65		65		55		42		65	
Performance-Adjusted	Mean	0.057		0.085	*	0.032		0.134	**	0.098	*
	Median	0.018		0.036		0.019		0.001		0.018	
	N	63		63		53		38		63	

Change in Sales Growth for PE transactions with Assets > $92.7 million

		t-1 to t+1		t-1 to t+2		t-1 to t+3		t-1 to t+4		t-1 to exit	
Unadjusted	Mean	1.505	***	1.863	***	2.215	***	2.249	***	2.169	***
	Median	0.475	***	0.534	***	0.782	***	0.893	***	0.755	***
	N	65		65		56		48		65	
Industry-Adjusted	Mean	1.563	***	1.913	***	2.292	***	2.299	***	2.214	***
	Median	0.579	***	0.563	***	0.908	***	0.931	***	0.770	***
	N	65		65		56		48		65	
Propensity-Adjusted	Mean	1.607	***	2.039	***	2.443	***	2.292	***	2.575	***
	Median	0.581	***	0.843	***	1.073	***	0.970	***	0.810	***
	N	65		65		56		44		65	
Performance-Adjusted	Mean	1.283	***	1.779	***	2.099	***	1.873	***	2.004	***
	Median	0.419	***	0.532	***	0.899	***	0.707	***	0.690	***
	N	63		63		54		41		63	

Change in Leverage for PE transactions with Assets > $92.7 million

		t-1 to t+1		t-1 to t+2		t-1 to t+3		t-1 to t+4		t-1 to exit	
Unadjusted	Mean	0.187	***	0.254	***	0.280	***	0.324	***	0.333	***
	Median	0.170	***	0.199	***	0.162	***	0.180	***	0.227	***
	N	65		65		56		48		65	
Industry-Adjusted	Mean	0.218	***	0.285	***	0.314	***	0.345	***	0.347	***
	Median	0.227	***	0.276	***	0.238	***	0.239	***	0.290	***
	N	65		65		56		48		65	
Propensity-Adjusted	Mean	0.215	***	0.229	***	0.240	***	0.260	***	0.295	***
	Median	0.145	***	0.126	***	0.126	***	0.128	**	0.272	***
	N	65		65		56		44		65	
Performance-Adjusted	Mean	0.187	***	0.209	***	0.312	***	0.285	***	0.260	***
	Median	0.130	***	0.137	***	0.254	***	0.239	***	0.189	***
	N	63		63		54		41		63	

Trend in tax status for PE transactions with Assets > $92.7 million

	N	Mean	SD	Q1	Median	Q3
$PosTaxPdInd_{t-1}$	65	0.55	0.50	0.00	1.00	1.00
$PosTaxPdInd_{t}$	65	0.57	0.50	0.00	1.00	1.00
$PosTaxPdInd_{t+1}$	65	0.65	0.48	0.00	1.00	1.00
$PosTaxPdInd_{t+2}$	65	0.48	0.50	0.00	0.00	1.00
$PosTaxPdInd_{t+3}$	56	0.54	0.50	0.00	1.00	1.00

Trend in equity contributions for PE transactions with Assets > $92.7 million

	N	Mean	SD	Q1	Median	Q3
$Contributions_{t-1}$	28	-1.77	18.83	0.00	0.00	4.27
$Contributions_{t}$	33	42.01	58.61	0.00	21.25	75.32
$Contributions_{t+1}$	44	4.34	20.56	0.00	0.26	4.62
$Contributions_{t+2}$	44	2.58	30.33	-0.01	0.09	2.22
$Contributions_{t+3}$	33	16.71	44.87	0.00	0.30	4.18