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Divisional Buyouts by Private Equity and the Market for Divested Assets[*]

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Abstract

We study the role and performance of private equity (PE) in corporate asset sales. Corporate sellers obtain significantly positive excess returns in PE deals, gains in wealth significantly greater than for intercorporate asset sales. Based on exit valuations for 98% of PE deals, we find gains in enterprise value in buyouts are significantly greater than for benchmark firms. Corporate seller excess returns are positively correlated with subsequent gains in asset enterprise value. A parsimonious auction model suggests that only restructuring capabilities of PE (not acquisition of undervalued assets) can explain the pattern of the gains generated in these PE deals.

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Divisional Buyouts by Private Equity and the Market for Divested Assets

1. Introduction

Divisional buyouts are an important area of private equity investment activity, and aggregate data indicate that private equity has garnered a sizable share of the corporate asset sales market.[1] As transitional owners focused on creating value from portfolio assets within a contractually limited time horizon and later reselling them (often to strategic acquirers), private equity sponsors are a fundamentally different type of buyer of large corporate assets than strategic (trade) acquirers who focus on creating synergistic value from integrating such assets into their existing operations. Despite private equity's importance in this area of corporate control activity, there has not been any analytical study of its role in the market for large operating entities divested by listed parent firms, who by their nature are well-informed, highly sophisticated sellers of such businesses.[2] We fill this gap by analyzing the role and performance of private equity sponsors as acquirers of corporate subsidiaries and divisions. Much of our focus is on the large benchmark-adjusted gains in enterprise value generated by private equity ownership after these asset sales. Given this pattern of empirical results, we consider how to explain the underlying bidding behavior of private equity sponsors and their success in competing with strategic buyers in the corporate asset sales market.

Our major empirical findings are as follows. One, we find that private equity performs very well in buyouts of large operating assets. For a large proportion of these assets, private equity exits via an IPO of the entity (27% of the assets) or by a trade sale to a strategic acquirer (32% of the assets), transactions that are associated with a high mean annual increase in enterprise value over the period of private equity ownership (108.51% for IPO exits and 30.42% for exits by sales to strategic buyers). We compare annual growth rates of enterprise value of

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[1] Eckbo and Thorburn (2008) report that on average corporate asset sales comprise 38% of all merger and acquisition transactions for the period 1970 to 2006. Kaplan and Stromberg (2009) report that corporate divestitures are on par with stand-alone targets in terms of the acquisition flow of private equity groups from 1995 to 2006.

[2] As evidence of the well-informed nature of restructuring decisions by listed parent firms, Slovin, Sushka, and Ferraro (1995) find that parent firm managers tend to spin-off (to shareholders) a business they regard as undervalued and conduct an equity carve-out (IPOs) of a business when outside investors are likely to price the entity favorably relative to managers' perceived value.

these entities to benchmark listed firms, matched by size and industry over identical periods.[3] For the full sample the mean (median) difference between sample and benchmark firms in annualized growth in enterprise value is large, 23.35% (7.79%), and highly significant, suggesting that private equity ownership is associated with enhanced asset value.[4]

Two, we obtain share price responses to announcements of divisional buyouts by private equity, and find that corporate parents selling assets to private equity obtain positive, statistically significant wealth gains, with a mean two-day excess return of 3.40% (median 1.93%), gains that are large relative to the size of the assets sold. Moreover, these gains in parent seller wealth are significantly greater than gains to parent firms selling assets to strategic buyers, regardless of whether strategic acquirers are listed (1.21%) or private (1.00%) firms.[5] For listed buyers, wealth gains, and thus the level of expected synergies they obtain in these intercorporate deals, are modest, consistent with prior empirical asset sale studies.

Three, we find that wealth gains for seller parent firms at divisional buyouts are positively correlated with subsequent gains in asset enterprise value generated during the period of private equity ownership. We corroborate this correlation and show that high parent firm returns at sales of assets to private equity are associated with faster exits by sponsors and a prevalence of exits through IPOs and sales to strategic buyers. Regression analysis confirms that high bids by private equity (i.e., large wealth gains to parent firm sellers) are correlated with high rates of subsequent growth in asset enterprise value and superior performance. This evidence suggests that bidding in divisional buyouts is competitive, to the benefit of parent firm sellers, and that private equity submits bids linked to their expected valuation of the asset, confirming that bidding competition in the market for the sale of corporate operating assets is consistent with predictions implied by basic auction models.

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[3] We obtain similar results when we use other techniques of identifying matching portfolios, including propensity scores based on multiple firm characteristics.

[4] When we disaggregate the results by type of exit, we find a strong association between type of exit and value growth rate, and that IPO exits are associated with the best performance. Only the group of entities that file for bankruptcy protection underperform industry benchmarks.

[5] Public strategic buyers obtain modest but significant positive excess returns in asset sales, suggesting that there is some extraction of rents for their private information about expected synergies. Positive buyer returns also indicate that there is no evidence of overbidding by public acquirers.

Greater excess returns to corporate sellers of large operating assets (and large subsequent gains in enterprise value) when private equity sponsors are buyers, relative to sales to strategic buyers, can be viewed as puzzling given that private equity lacks access to the synergistic gains available to strategic acquirers, is arguably less affected by agency problems that could lead to overbidding by listed buyers, and in many cases eventually exits its investments by selling these businesses to strategic buyers. Our empirical findings raise the central issue of how private equity sponsors, transient owners intending to exit investments within a limited horizon, are able to produce winning bids for businesses being divested by listed parent firms so as to create, on average, significantly greater gains in seller shareholder wealth than at bids by strategic firms.

We consider two broad classes of explanations for the exemplary performance of private equity in asset sales. One, private equity might be able to identify undervalued assets (because of superior knowledge about assets or an ability to provide liquidity to the asset market); or two, it could have distinctive skills in managing and restructuring operating assets, exercised within a governance structure that fosters value maximization. To gain insights that allow us to weigh between these two explanations, we conduct an instructive theoretical exercise in the form of a parsimonious auction model of a corporate asset sale that allows for two bidder types, private equity sponsors and strategic buyers, that are characterized by two differences. One, only strategic bidders can derive synergistic value from an operating asset. Two, private equity sponsors are transitional owners focused on value in an exit auction.[6] Solving this model, we generate useful implications about winning bids by these two types of buyers.

We argue an auction-based perspective provides a useful framework for understanding the basis for the pattern of the gains generated by corporate asset sales. At the same time, our model incorporates key aspects of the institutional environment that distinguish divisional buyouts from the mechanisms that apply to mergers and takeovers of entire firms. One, corporate

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[6] Private equity partnership agreements that govern funds are relatively standard and have a fixed lifetime, typically ten years. However, general partners that conclude they need more time than that specified in the partnership agreement to extract value from portfolio companies, can seek term extensions. Such extensions, which are typically subject to a vote of the limited partners (or an advisory committee of limited partners) became relatively common during the period of the Financial Crisis. Practitioners indicate that requests for such extensions are almost universally granted, given that limited partners are highly averse to receiving in-kind distributions of private securities, the likely result of a failure to grant the general partner an extension.

asset sales are invariably seller-initiated, tightly controlled by the seller, and non-hostile. Hence, sellers invariably have a strong incentive to foster competition among potential buyers, including both strategic and private equity bidders. By contrast, only a minority of mergers and takeovers are seller-initiated, and there is a richer choice set of selling mechanisms (Boone and Mulherin, 2007; Fidrmuc et al., 2012; Masulis and Simsir, 2015).[7]

Two, unlike mergers and takeovers, in corporate asset sales there is no shareholder involvement nor any concern about shareholder litigation or judicial second guessing as to the merits of a transaction. Instead, the business judgment rule gives selling (and buying) managers broad discretion about asset sales and insulates even a large asset sale from shareholder voting and shareholder litigation (Gilson, 1981). As a result, confidentiality is a normal characteristic of asset sale auctions conducted by parent firms, so participants seldom provide the public with any information (except for minimal disclosure of outcomes) with respect to the processes the various parties pursue or any indications of interest (or even the identities) of non-successful bidders. In contrast, mergers and tender offers are governed by a complex body of corporation law that constrains the conduct of these control transactions, including the legal responsibilities of a target's board of directors to consider unsolicited bids (prior to the shareholder vote) even after an agreement with a buyer has been signed, shareholder access to appraisal rights (so the final price to the buyer cannot be assured), federal securities regulation that governs tender offers, and disclosure requirements to protect shareholders in acquisitions of public firms.[8]

Three, issues of toeholds, hostility, and target resistance that arise in takeovers and tender offers of entire firms do not arise in corporate asset sales and the type of buyer of an asset is unlikely to affect the positions of parent firm managers and directors. In practice, many divisional managers are likely to retain their jobs after the entity is acquired. In contrast, in entire-firm acquisitions and takeovers, target firm managers are likely to perceive a differential risk of job loss in comparing bids by strategic buyers with private equity buyouts, and this

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[7] Fidrmuc, Roosenboom, Paap, and Teunissen (2012) consider how in the case of mergers and takeovers, both the choice of selling mechanism (negotiation, auction or controlled sale) and of buyer type can be viewed as endogenous, and that the choice of selling mechanism is an important determinant of the buyer type.

[8] Gilson and Black (1995) provide a comprehensive treatment of the corporate law issues involved in mergers and takeovers.

difference could influence target firm resistance and bid premiums.

Our auction-based theoretical analysis implies that the revenue to a corporate parent is higher on average in asset sales to private equity only when private equity has sufficient restructuring capabilities and a sufficiently large proportion of assets in the market are restructurable. In the absence of these conditions, revenue to corporate sellers of operating assets will, on average, be greater for sales to strategic acquirers than to private equity, a pattern that business journalists (anecdotally) take to be descriptive of likely outcomes of corporate auctions.[9] Thus, we argue that the empirical results that we document for corporate asset sales suggest that private equity buyers must be able to uniquely add value to divested corporate divisions. Specifically, the model implies that the pattern of valuation effects we observe for divisional buyouts during the period we study is consistent with private equity having unique skills in adding value to corporate divisions; for example, by restructuring and efficiently managing these businesses in ways that are not easily replicated by strategic buyers. Our evidence is not consistent with the hypothesis that private equity disproportionately buys undervalued assets, either because private equity has superior information about asset value or is able to acquire assets at fire sale prices (for example, due to illiquidity in the asset sales market). Furthermore, we note that these insights are valid for a broad range of auction models beyond the simple framework we lay out in this paper.

An additional contribution of our paper to the private equity literature arises from our selection procedure for constructing a comprehensive sample of sales of large operating assets, with our focus on being able to observe an almost complete set of private equity exits, something typically lacking in private equity research because of the ten to twelve year horizon that characterizes most private equity funds. By using the SDC Acquisition Database and a size threshold (transaction value greater than $100 million) that ensures that listed sellers disclose the transactions as material events, our approach is designed to reduce sample selection problems

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[9] For example, a New York Times article, "Leaks abound as Yahoo auction gets underway," May 18, 2016, reports as a commonly accepted belief that private equity typically loses out when strategic bidders are involved in corporate asset auctions, suggesting that there are higher returns to sellers when selling to strategic buyers. More formally, Gorbenko and Malenko (2014) consider bidding patterns in auctions for entire firms involving both strategic bidders and private equity and find that on average strategic bidders bid higher than private equity.

that are often a concern in private equity research given that available databases rely on data voluntarily reported by private equity groups or their investors (limited partners). By utilizing a well-defined window for all large sales of operating assets during a relatively stable period of economic activity (1994-2006), we are able to generate a large sample of large corporate asset sales and yet still track exit outcomes and values for almost the entire sample, thus limiting the problems of selection bias and time censoring of outcomes that often apply to studies of the performance of private equity. We are able to obtain a measure of private equity-related enterprise value generation for almost (98%) the entire set of transactions. We determine the type of outcome and the transaction price that applies to each private equity exit and relate private equity outcomes to parent firm seller gains observed at the original asset sale. We find that acquisitions of corporate divisions by private equity are fairly evenly spread over the sample period and cover a wide spectrum of industries. We also develop a sample of corporate asset sales to strategic buyers using identical sample selection criteria. Our data indicate that private equity deals represent about 30% of all large corporate asset sales during the sample period, confirming that private equity bidders have become major participants in this market. We also disaggregate strategic buyers between public and private operating firms, given that private strategic buyers may arguably have some governance commonalities with private equity.[10]

Our work contributes to the broader corporate asset sales literature by analyzing the role of an informed buyer and by differentiating between private equity buyers and strategic buyers, a departure from prior studies of asset sales that do not provide an analytical treatment by type of buyer and that focus instead on the share price effects on sellers (Jain, 1985; Hite, Owers, and Rogers, 1987; John and Ofek, 1995; Sicherman and Pettway, 1992; Maksimovic and Phillips, 2001). These prior empirical studies are generally based on synergistic-type hypotheses that offer a useful explanation for the modest effects of intercorporate asset sales but provide little basis for explaining the effectiveness of private equity in corporate asset sales.

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[10] In particular, private operating firms are exempt from public reporting and often have strong equity-based links between managers and owners. As noted later, we exclude asset sales involving private strategic buyers that are controlled by private equity funds, transactions that are sometimes referred to as private equity rollups. This filter provides assurance that a private equity bid does not entail an expectation of direct synergistic gains. Only private strategic buyers not controlled by private equity are included in the category of private strategic buyers.

Our analysis of how subsequent changes in asset enterprise value (measured at the exit of the original private equity buyer) are related to gains in wealth to selling parent firms contributes to the private equity literature in a manner that differs from prior work. Studies that focus on the operational performance of entire firms controlled by private equity or on adjusted returns to fund investors, which are susceptible to issues of the appropriate adjustment for risk and illiquidity as well as data selection bias, tend to report ambiguous findings. Some studies show firms controlled by private equity improve their operating performance, reduce employment, and have lower capital investment relative to public firms (Kaplan, 1989a, 1989b; Muscarella and Vetsuypens, 1990; Lichtenberg and Siegel, 1990; Liebeskind, Wiersema, and Hansen, 1992). Other studies find that productivity changes at such firms are little different from comparable public firms, that R&D investment is greater, and that employment tends to increase (Cornelli and Karakas, 2011; Lerner, Sorensen and Stromberg, 2011; Leslie and Oyer, 2013; Guo, Hotchkiss, and Song, 2011). The evidence on private equity returns to limited partners net of fees is mixed (Kaplan and Schoar, 2005; Phalippou and Gottschalg, 2009; Robinson and Sensoy, 2013). Harford and Kolasinski (2014) report that gains generated by private equity do not come at the expense of their counterparties, a finding that complements our central findings.

The paper is organized as follows. Section 2 describes sample construction, and analyzes seller share price responses to winning bids from private equity and strategic buyers. Section 3 explores the subsequent performance of the private equity deals and its relationship with initial valuation effects. Section 4 confirms our valuation results in multivariate regressions and addresses the potential impact of market fluctuations and reputation effects. In Section 5, we develop an auction-based framework that rationalizes the findings. Section 6 discusses possible alternative explanations of our observed valuation patterns, and Section 7 concludes the paper.

2. Sample Construction and Valuation Effects

2.1 Sample Construction

To analyze divisional buyouts conducted by private equity we first obtain a

comprehensive set of sales of assets that are wholly owned by publicly traded parent firms from the SDC Acquisition Database for the period 1994 through 2006. For each year we download the complete set of asset divestitures recorded on the database, which in a typical year encompasses several thousand corporate transactions. We eliminate all transactions in which the transaction price is not disclosed or for which there is no completion date. In a typical year there still remain one thousand or more potentially eligible transactions. To minimize reporting bias and to insure that the transaction is sufficiently material so that in the case of private equity deals there is a high probability that the operating business will be followed in the business press, trade publications, and other sources, we limit our analysis to sales of operating businesses with a transaction price of $100 million or more; we follow the outcome of the set of private equity deals through the end of 2017. We next require that the ultimate parent firm of the asset being sold have returns on the CRSP file and data on Compustat. We eliminate corporate spin-offs, some of which are included in the SDC database as asset sales to "Shareholders." Because our interest is confined to sales of operating businesses, not assets per se, we eliminate sales of residential and other physical structures, financial portfolios, asset swaps, and other types of transfers of assets that do not entail the sale of an operating businesses.

After applying these filters, in a typical year there remain several hundred potential corporate asset sales. We require that the identity of the buyer and the terms of the transaction are reported in the initial public announcement, and that the transaction transfers full ownership of the asset. We examine each remaining transaction in each year by hand, using Factiva, Lexis-Nexis, SEC filings, and internet news searches, to eliminate non-cash transactions and to determine the true economic status of the legal entity listed as the acquirer by SDC, ascertaining whether the true acquirer falls into one of the three categories we study: private equity group, publicly traded acquirer, or a private operating firm (e.g. Koch Industries).[11] For private equity deals we require that the private equity sponsor not own an operating firm into which the

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[11] By their nature, private equity funds and private operating firms do not use equity as the means of payment to acquire assets, so our sample of intercorporate asset sales does not include asset sale transactions in which sellers accept a block of equity in strategic buyers as the means of payment. Inter-corporate asset sales that entail the use of buyer equity as a means of payment are examined in Slovin, Sushka, and Poloncheck (2005) and Hege, Lovo, Slovin, and Sushka (2008).

acquired asset will be merged. This filter provides assurance that private equity transactions commonly referred to as 'rollups' are excluded, so private equity deals retained in the sample do not entail an expectation of the type of synergistic gains associated with intercorporate sales. In addition, for private operating firm buyers, we confirm that the acquirer is not controlled by private equity.

By establishing December 2006 as the endpoint for the initiation of a the asset sale (divisional buyout), it is feasible for us to observe a largely complete set of exits for eligible PE deals, given that the expected duration of a PE fund is typically about ten years. Moreover, discussions with practitioners have indicated that in recent years requests for extensions of the life of private equity funds have become more common.[12] We note that the initiation of the PE deals (and intercorporate asset sales) in our study occurred prior to the era of the financial crisis, years 2008 to 2011. By examining the twelve year period 1994 to 2006 for the initiation of transactions, we are able to analyze the relation between wealth gains to corporate sellers of operating assets and the ex post performance of the acquired business while under PE ownership for almost (98%) the entire sample of PE deals that occurred during this non-distressed period of economic activity. However, it would be premature to assume that our conclusions would apply to the years following the Financial Crisis, especially given that Alexandridis, Antypas, and Travlos (2017) find that the market reaction for mergers and acquisitions is time sensitive.

We obtain relevant data about the operating asset from SEC filings, reports in the business and trade press, and Standard and Poor's Stock Reports, Stock Guide, and Directory of Corporations, as well as internet sites of private equity sponsors. We also verify that the selling parent firm is not in bankruptcy nor divesting the asset due to a regulatory or judicial mandate. The final sample consists of 161 private equity deals, 323 deals with public strategic buyers, and 54 deals with private strategic buyers not controlled by private equity.

Descriptive statistics for the sample of asset sales are reported in Table 1 (values are in constant (2006) dollars). These data suggest that private equity has been an effective competitor

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[12] Consistent with this observation we note that about ten percent of the private equity exits in our sample occur more than nine years after the initiation of the divisional buyout.

for major deals in the corporate asset sales market. The transactions are large deals with an average (median) value of $563.70 ($298.99) million for sales to private equity, $773.43 ($301.02) million for sales to public strategic buyers, and $351.20 ($256.43) million for sales to private strategic buyers. None of the differences in means (medians) for deal size among these groups is statistically significant; median transaction values for the three groups are almost identical. Mean (median) seller firm market capitalization is $25.8 ($5.5) billion, $25.8 ($6.1) billion, and $10.8 ($3.4) billion for the respective subsamples; for public buyers it is $24.1 ($3.2) billion. The median ratios of transaction price to seller market value are similar across the three categories of buyers. A broad range of industries is represented with 113, 171, and 43 different 4-digit SIC codes for the assets in the respective subsamples.

2.2 Valuation Effects of Corporate Asset Sales

We obtain empirical results for event studies of asset sale announcements, disaggregated by type of buyer, to evaluate basic alternative hypotheses about gains to parent firm sellers. In Panel A of Table 2, we report average excess returns based on the market model for the two-day window (-1, 0), where day 0 is the announcement day, proportion of returns positive, and median returns at the initial sale announcement.[13] For sales to publicly traded strategic buyers, seller two-day average excess returns are significantly positive, 1.21%, t-statistic of 3.43 (median of 0.35%); the proportion of positive returns is 55%. These returns are similar to previously reported results for sellers in intercorporate asset sales (Jain, 1985; Hite, et al., 1987; John and Ofek, 1995; Sicherman and Pettway, 1992; Hege, Lovo, Slovin, and Sushka, 2009). We tested alternative announcement windows, all of which have similar results. Two of these windows are reported in the table; the three-day return (-1, +1) is 1.65% (t-statistic of 4.46) and the six-day return (-4, +1) is 1.47% (t-statistic of 3.70).

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[13] Excess returns are obtained using the market model, where day 0 is the initial announcement, the pre-event estimation period is -240 to -121, and the CRSP value-weighted index is used as the market return. The results are robust with respect to alternative event study methods, including multi-factor models and use of various estimation periods.

As in previous studies, the empirical results indicate that the financial market views these intercorporate asset sales as value-increasing transactions for sellers. We also report in Panel B the median transaction return (two-day seller gain in wealth scaled by transaction price), 2.98%, to provide a metric for the economic importance of the gains in wealth. Thus, the typical gain in seller value in these transactions is small relative to the size of the asset, and is well below the premiums of 25% or more observed for acquisitions of stand-alone firms of similar size in studies of targets of takeovers and tender offers.

For asset sales to private strategic buyers, seller excess returns are not significant. The two-day excess return is 1.00%, t-statistic of 0.58 (median of 0.33%); the proportion of returns positive is 52%. The three-day and six-day returns are similar: 1.26% (t-statistic of 0.60) and 1.08% (t-statistic of 0.39), respectively. The two-day median seller transaction return, 2.41%, is similar to the gain for deals with public buyers but is not statistically significant. Thus, on average, sales of assets to private strategic buyers and listed strategic buyers generate similar gains in seller firm shareholder wealth and these gains are small relative to the size of assets.

For asset sales to private equity buyers, the focus of our study, seller excess returns are positive and economically large, 3.40%, t-statistic of 7.91 (median is 1.93%); the proportion of returns positive is 80. The three- and six-day excess returns are similar: 3.48% (t-statistic of 5.38) and 3.35% (t-statistic of 3.70), respectively. Difference tests indicate that these mean and median seller returns are each significantly greater than seller returns in deals with public buyers ($p \leq 0.01$) and private operating firms ($p \leq 0.01$). The median two-day seller transaction return, 18.27% ($p \leq 0.01$), is also significantly greater than in deals with public or private strategic firms ($p \leq 0.01$), and similar results apply to the other event windows. This pattern of significantly higher seller returns provides a metric of the greater value generated for selling firms when selling to private equity sponsors. In Section 4.1, we show that these findings are confirmed in a multivariate regression analysis that includes a wide array of firm characteristics.

Our finding of greater returns to parent firm sellers when divested assets are sold to a private equity buyer is opposite to Bargeron et al. (2008) who report greater gains (premiums) to targets in mergers and takeovers of stand-alone firms that are acquired by listed acquirers. They

ascribe their results to overbidding by listed acquirers that reflects agency problems (such as hubris or empire building) at publicly traded buyers that do not apply to private equity.[14] However, for intercorporate asset sales we find a positive average return to public acquirers, 0.42%, t-statistic of 1.78 (median return is 0.35%). The three- and six-day excess return to buyers are also positive, 1.29% (t of 3.57) and 1.42% (t of 3.22), respectively. The two-day median gain in buyer wealth relative to the size of the asset is 0.77%. So public strategic buyers are typically able to extract a modest positive rent for their private information about expected synergies. This positive average return indicates that the behavior of listed acquirers in the asset sales market does not reflect the type of agency problems that are discussed in the merger literature (Thaler, 1988; Barberis and Thaler, 2003; Baker, Ruback, and Wurgler, 2007). On average, we find modest gains in combined shareholder wealth for corporate asset sales when the buyers are strategic firms, implying that the limited synergistic gains to these intercorporate transactions are shared between buyers and sellers, consistent with findings reported in prior corporate asset sale studies.

3. Private Equity Divisional Buyouts and Subsequent Performance: Empirical Results

We investigate whether there is a relation between higher private equity winning bids (as measured by wealth gains to sellers) and the ex post performance of the acquired assets while under PE ownership. An auction model implies that a private equity bid is related to the sponsor's expectations about future revenues from an exit transaction, so PE exit revenue is an increasing function of the restructuring potential of the asset under PE ownership. Thus, we investigate the outcomes of these private equity divisional buyouts, and assess how the outcomes relate to the wealth gains to parent firms when selling assets to PE.

3.1 Exit Transactions and Economic Performance For Private Equity Deals

The central implication of any basic auction model (as we discuss in Section 5) is that

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[14] We further discuss this comparison in a subsequent section, and we present theoretical work in Section 5 that provides a framework for analyzing the differential pattern of the share price responses of seller firms.

selling parent firm returns should be related to private equity's expectations about its ability to generate an increase in the value of the asset and successfully exit the investment. Thus, parent firm seller returns should be correlated with the ex post change in asset enterprise value generated during the period that the asset is under private equity ownership and management.

We investigate these predictions by determining the exit status (as of year-end 2017) of each asset acquired by private equity. Because the sample includes all large eligible operating assets sold by public firms from 1994 through 2006, our findings about subsequent outcomes are not subject to the selection bias problems intrinsic to many studies of private equity (difficulties generated by the secretive nature and lack of uniform disclosure associated with private equity). Once acquired by private equity, the operating assets in our sample are not public entities so they are not required to generate the disclosures about corporate activities, operating performance, and capital structure that are mandated for listed firms. Nevertheless, because the entities involved have initial transaction values that average more than $500 million, they are often important businesses within the localities in which they operate. As such, there is considerable coverage of these firms in local newspapers, trade publications, and the business press. For example, there is regular reporting when they conduct cost cutting activities, close plants, expand production activities, appoint new executive officers, or change corporate names. In particular, we find that exit transactions of these entities attract considerable attention. In the case of an IPO, sale to a listed buyer, a Chapter 11 (or Chapter 7) filing, or subsequent litigation, considerable public disclosure occurs, often including the recent history of the enterprise and data on exit transactions, including prices of exit transactions (such as secondary buyouts) that may not have been disclosed when the exit occurred. By carefully following the business and legal reporting about these entities we are able to identify the dates and terms for 157 exit transactions (98% of the sample to date) and to confirm (by examining the internet sites of private equity groups) that the six assets without an exit are still owned by the original private equity buyers as of year-end 2017. For these six assets we have no means of ascertaining their fair value.

In Panel A of Table 3, the average time to private equity exit is 4.18 years. Nevertheless,

more than ten percent of the resolutions require more than nine years. On average, exit is most rapid for IPOs (2.2 years), longer for sales to strategic buyers (4.5 years), and longest for secondary buyouts (SBO) by private equity acquirers (5.5 years). The SBO time to exit is significantly longer than for IPOs ($p \leq 0.01$) though not significantly different from sales to strategic buyers ($p = 0.16$). In 29 cases, exit is by bankruptcy (5.04 years).

To determine the ex post (annualized) rate of increase in asset enterprise value during the period of private equity ownership for each exit, we obtain the exit transaction price (including assumption of any debt) or the market value of equity plus book value of debt, depending on the type of exit. We then compare this value to the original asset sale transaction price paid by private equity. This metric is not a direct measure of the profitability for private equity fund investors,[15] but it is a useful gauge of an entity's economic performance while under private equity ownership. The data allow us to examine whether there is a relation between the asset's subsequent gain in enterprise value and gains in wealth to the original parent firm seller, and to assess whether there is differentiation by type of exit. For example, to the extent that SBOs could be a less favorable (or last resort) form of exit, SBOs as well as bankruptcies can be viewed as less satisfactory outcomes. From this perspective, an auction-based analysis suggests that asset performance and type of exit mechanism will be related.

The mean (median) annualized growth rate in enterprise value (EV) for the 157 assets with exits is 38.88% (15.31%). To benchmark these results, the annualized growth rates in enterprise value are compared over identical periods to that of matching firms with similar characteristics. In the results reported in the tables, we utilize as matching firms the set of listed firms that have the same 4-digit SIC code as the relevant asset and that were closest (at the initial asset sale date) in terms of enterprise value to the original transaction price paid by the private equity sponsor to the corporate seller. We obtain similar results for other techniques of identifying matching portfolios, including propensity scores based on multiple firm

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[15] For a subsample of divisional buyouts there was sufficient public information available to verify manually that the pattern of the changes in enterprise value do not depend on net acquisitions (or divestitures) or substantial changes in firm boundaries during private equity ownership. A reading of documents and press reports suggests that the most common means of seeking improvement in value is through improvements in efficiency, often through the introduction in improvements in technology.

characteristics (results not reported in tables). The mean (median) annualized growth rate in enterprise value for the benchmark firms is 15.53% (3.63%) and the difference between sample and benchmark firm means (medians), Excess EV, is 23.35% (7.79%), statistically significant (p $\leq$ 0.01).

This result suggests that, while owned by private equity, acquired entities achieve considerable business success relative to benchmark firms, a finding consistent with the hypothesis that private equity sponsors have valuable restructuring skills within an effective governance structure. Changes in enterprise value at sample and benchmark entities are highly correlated, 0.74, consistent with the expectation that growth in enterprise value of an asset after being acquired by PE is related to the growth rate of the industry. However, the overall pattern of the differences in gains in enterprise value suggests that private equity skills contribute to asset value. Moreover, the returns to corporate sellers indicates that a portion of the capitalized value of these gains is received by the original parent firm seller at the initial sale.

We disaggregate the results by type of exit. Entities that file Chapter 11 retain little value, as reflected in an average (median) annualized decline in enterprise value of -25.11% (-22.86%). Given that there are 29 Chapter 11 filings, bankruptcy of private equity-owned assets acquired from parent firms is significantly more common than for benchmark firms, which sustain only eight Chapter filings over comparable periods (p =< 0.01). In principle, private equity ownership could still increase the enterprise value of an entity despite a bankruptcy filing.[16] However, in our sample, bankruptcy typically occurs after almost complete business failure, resulting in the loss of the private equity stake and large losses to unsecured creditors. Chapter 7 liquidation occurs in 13 cases, with minimal payments to unsecured creditors and the equity is cancelled (no payment to private equity). In 14 other bankruptcy cases a reorganization occurs but almost all enterprise value is lost, with unsecured creditors absorbing large losses and private equity interests cancelled. In two bankruptcy cases a reorganized entity emerges in which most of the

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[16] For example, a sustainable business that becomes over-levered, could be successfully reorganized as an ongoing concern through a negotiation between equity holders and creditors, either in the form of a prepackaged bankruptcy or under the guidance of a bankruptcy judge. On this basis, Kaplan (1989a) argues that Campeau's acquisition of Federated Department Stores added value even though it resulted in a bankruptcy filing.

private equity interest is conveyed to unsecured debtholders who absorb large losses; i.e. a less levered entity emerges with private equity retaining small minority stakes.

The systematic pattern formed by the subsequent gains in enterprise value and the type of private equity exit suggests a hierarchy with respect to business success that is consistent with prior literature. The highest mean (median) annualized growth rate in enterprise value occurs for IPOs, 108.51% (43.64%), and is significantly greater than for benchmark firms. Moreover, IPO exits occur rather quickly, with a median of just under two years after the buyout. The next highest mean (median) annualized growth rate is for exit by a sale to a strategic buyer, 30.42% (18.13%), and is also significantly greater than benchmark firms. This estimate of the gains in enterprise value for strategic sale exits by PE understates the overall (global) economic gains because exit sales to strategic acquirers also contribute to buyer value. More specifically, in 27 of the 51 exits to strategic buyers the acquirers are listed firms. The two-day average excess (transaction) return at exit sale announcements for these buyers is 3.80% (10.70%), and median excess (transaction) returns are 2.90% (7.65%), all statistically significant at the 1% level. The positive excess returns to strategic buyers at PE exits indicate that there is no evidence of overbidding by public strategic buyers in private equity exit transactions, just as there is no overbidding in initial asset sales (or in the previous literature on intercorporate asset sales). This finding of positive average returns to strategic buyers in private equity exits is also consistent with evidence reported in Harford and Kosalinski (2014).

Concerning SBOs, an auction-based analysis indicates that in the absence of restructuring capabilities on the part of private equity, on average, a strategic buyer pays more than private equity in an auction, and this result should similarly apply at the exit auction (see Section 5.). The intuition is that in PE exit auctions, strategic bids reflect the value of synergies that the acquirer can contribute to the newly restructured asset. Moreover, it can be expected that the greatest improvements in the restructuring of an operating asset are likely to have already been carried out by the original private equity buyer. Thus, there should be less scope for additional value creation by a second private equity owner that participates in an exit auction. In addition, in exit auctions by PE firms the proportion of assets for sale that are restructurable should be low

relative to the initial population of corporate asset sales conducted by parent firms. This logic suggests that there should be lower gains in enterprise value for assets that exit PE ownership via SBOs rather than via sales to strategic buyers.[17]

For the 34 SBOs, the mean (median) annualized growth rate in enterprise value, 18.11% (8.12%), is less than for assets sold to strategic buyers, although the difference in means (medians) is not statistically significant ($p = 0.25$ ($p = 0.21$)). For SBOs the mean annualized excess growth rate in enterprise value while under the ownership of the PE acquirer relative to the gains achieved by benchmark firms is only 8.44% and not statistically significant. These results suggest that PE exit by means of an SBO is associated with relatively poor excess performance of the asset compared to cases of exit by IPO or sale to a strategic buyer.

We note that there are greater gains in enterprise value when assets owned by private equity (which are stand-alone entities that are in effect like target firms) are sold to strategic buyers rather than to other private equity firms. This pattern is consistent with the finding reported by Bargeron, et al. (2008) that there are greater gains (premiums) paid to merger targets acquired by listed firms rather than by private equity. Bargeron, et al. (2008) attribute this pattern of returns to overbidding by public buyers (due to agency problems), but this explanation is not consistent with the positive returns we report for listed buyers of assets. In a later section (Section 5) we present a basic auction model that shows that this pattern of behavior for average returns to sellers could apply even in the absence of overbidding by public buyers. Moreover, given that at the exit by private equity, an asset will have already been at least partly restructured by the original private equity sponsor, potential PE bidders for the asset can be expected to have less of a competitive advantage relative to strategic buyers, and hence will on average bid less than strategic buyers with potential synergies.

The pattern of the growth in enterprise value for benchmark firms shows the same hierarchy as that of the private equity assets. This evidence suggests that expectations about

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[17] SBOs have also been viewed as an opportunistic exit route for sellers in cases where the end date of a private equity fund draws near and strategic buyers are scarce, and similarly as opportune for private equity buyers when the end of the investment period is near (Kaplan and Schoar, 2005; Degeorge et al., 2015; Arcot et al., 2015).

future industry developments are a factor in planning and determining bids by private equity. Thus, private equity generates large gains in shareholder wealth for parent firms that sell businesses that subsequently prove to be a rich source of increased value under private equity ownership. Taken as a whole, our results indicate that the average (median) growth rate in enterprise value for operating assets acquired by private equity significantly exceeds that of benchmark firms, suggestive of private equity's ability to generate business improvements for the operating assets they acquire.

3.2 Further Results on Private Equity Economic Performance: Evidence from SBO Exits

Intuition suggests that when a private equity bidder wins an exit auction conducted by private equity, the new private equity owner will have less of a potential to improve the asset than the initial private equity sponsor. This reasoning implies that an asset's improvement in performance during the period of the second buyout period should be no better, and it could well be worse, than the asset's performance during the initial round of private equity ownership.

To evaluate this hypothesis, we examine outcomes when the private equity acquirer in the SBO itself later exits; as of year-end 2017, 13 of the 34 SBOs have such exits. In Panel B, we find that performance during the period of ownership by the second private equity sponsor is broadly similar to that of the initial private equity sponsor that originally acquired the asset. The second private equity group holds the asset for about four years on average, and the mean (median) annualized growth rate in enterprise value is 13.04% (16.76%) during the period of its ownership. Neither figure is statistically significant nor significantly different from the gains in enterprise value for the first private equity round. Moreover, the second round gains in enterprise value represent little improvement relative to the average (median) annualized gains in the enterprise value of benchmark firms, 1.10% (4.54%). Our finding of minimal excess gains to second round PE ownership of corporate assets is consistent with the results for a cross-section of targets acquired by PE, including stand-alone firms (Bonini, 2014). Overall, the pattern of these findings is consistent with the hypothesis that SBOs are a less favorable form of exit relative to IPOs or to sales to strategic buyers.

3.3 The Link between Winning Private Equity Bids and Subsequent Asset Performance

An auction-based approach to corporate asset sales suggests that gains to parent firms that sell operating assets to private equity should parallel the subsequent changes in asset enterprise value generated under private equity ownership. Thus, we explore whether the pattern of our results on subsequent gains in enterprise value conforms to this predicted correlation.

We first sort returns to parent firms by type of subsequent exit. We find large statistically significant gains for parent firms that sell assets to private equity sponsors where the subsequent exit is via an IPO or a strategic asset sale, with median transaction returns to parents of 45.05% ($p \leq 0.01$) and 24.72% ($p \leq 0.01$), respectively. By contrast, parent firms that sell assets that eventually sustain bankruptcy have a median transaction return of 4.16% ($p = 0.09$). This return is significantly smaller than transaction returns to sellers of assets that eventually exit private equity ownership via IPOs ($p \leq 0.01$) or sales to strategic buyers ($p \leq 0.01$), and is also smaller ($p = 0.08$) than the median seller transaction return for SBO exits, 16.62%. These results suggest that private equity submits lower bids, resulting in weaker gains in wealth to corporate sellers, when PE expects to be able to generate only modest gains in enterprise value for the asset.

An auction model predicts a relation between a private equity bid, and in turn the seller's excess return, and PE's expected future payoffs or subsequent asset performance. To test whether our data indicate such a relation, we estimate regressions that include the parent firm seller transaction return as an independent variable together with additional variables to control for other determinants of performance success using a set of measures widely used in prior studies. Estimated coefficients of these regressions are reported in Table 4.

The first dependent variable is the Excess EV (the difference between the annualized growth rates in enterprise values of the assets and benchmark firms). The coefficient of the two-day parent firm seller transaction return is positive and significant, suggesting that the seller's share price response at news of a private equity deal provides a useful metric for the future performance of private equity investments. Our second performance metric is a profitability

index, which generates similar results.[18] In these regressions, there is some evidence that deals that exited during the high tech bubble (1999-2001) generated lower gains in enterprise value.

Our third performance measure is a binary variable of relative eventual success, IPO or strategic asset sale, versus relative failure, bankruptcy or SBO, using a binomial logit model. The coefficients for the seller transaction return are highly significant, providing an estimate as to how an increase in the transaction return for the parent seller firm affects the marginal likelihood of the type of exit. A qualitative variable for exit during the high tech bubble years, while associated with lower growth rates in enterprise value, has a positive coefficient in the logit regression, suggesting that exits by IPO and strategic sales were more likely during this period. There is no evidence that success is related to the size of the transaction.

Overall, the seller transaction return variable is statistically significant in each specification. These results are consistent with a central implication of any auction-based framework for asset sales, namely, that private equity expectations about future payoffs affect their bidding for assets, and thus the gains to parent firm sellers in corporate asset sales.

4. Additional Tests

4.1 Cross-Sectional Regression Analysis

We use regression analysis to test whether other factors, including observable seller firm and asset characteristics, affect the statistically significant greater gains to parent firm sellers that are generated in deals with private equity buyers. The dependent variable is defined as either seller transaction returns or seller excess returns. Two qualitative variables for the type of buyer are specified in each regression. One variable takes on the value of unity for a private equity buyer and zero otherwise. A second variable takes on the value of unity for private strategic buyers and zero otherwise. We report a representative set of regressions in Table 5 in which the

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[18] The profitability index has been introduced in the literature to mitigate holding period biases typically present in private equity investments (e.g., Phalippou and Gottschalg, 2009).

dependent variables are seller excess returns, two-day CAR, (regressions (1) – (4)) and seller transaction returns, two-day TR, (regressions (5) – (8)), respectively. The pattern of results is similar in both cases.

The coefficients of the qualitative variable for private equity are positive and consistently large and significant, and are robust with respect to the inclusion of other variables that reflect characteristics of asset sales, including variables tested in prior studies of intercorporate asset sales. Seller variables reported in the table include the size of the transaction relative to enterprise value, seller market capitalization, prior cumulative stock price performance, operating performance (ROA), market-to-book ratio, insider holdings, and use of proceeds (equal to one for debt reduction or repurchase of equity, and zero for retention of proceeds). The effect of the variable for private equity buyer remains positive and strongly significant in each specification. We test a large array of other independent variables but find that they are not statistically significant; for economy of presentation these results are not reported in the table.[19]

Because Lewellen, Loderer, and Roenfeldt (1989) suggest that high insider ownership mitigates agency problems at buyers, and Bargeron et al. (2008) report greater returns to target firms acquired by publicly traded buyers with low insider ownership, we also specify variables for insider ownership of public strategic buyers. We find that buyer insider ownership has no effect on seller returns (results available upon request). Together with the positive average excess return to strategic buyers, this finding suggests that in asset sales, bids by public acquirers do not reflect agency problems.

4.2 Tests for Market Timing and Private Equity Reputation

Market fluctuations and market timing considerations can play a role in private equity

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[19] The results are available upon request. Other seller variables tested but not statistically significant include leverage, dividend payout, time listed on CRSP, growth in intangible assets, and measures of R&D. Alternative measures of size and capital structure do not alter the results. Also tested were variables that gauge focus, complexity, and opacity, including whether the asset has the same SIC code as the parent (or public buyer), the number of seller business segments, the relative importance of the segment in which the asset is sold, and whether the seller is a conglomerate. Overall, there is no evidence that the greater gains to seller firms are affected by observable seller or asset characteristics.

activity and in the performance of private equity investments. Thus, we verify that our findings are not driven by private equity's exposure and reaction to fluctuating financial markets, and that our results are robust when we take account of such fluctuations. The literature emphasizes three types of market fluctuations that affect private equity: one, private equity buyouts (like PE deals in our sample) are typically highly levered, and debt market conditions – access to and cost of debt financing – affect PE activity (Axelson et al. 2013; Ljungqvist et al. 2017), and thus could affect the choice of selling an asset to PE versus SB buyers. Two, as transitional owners, private equity depends on well-functioning exit markets, and equity market conditions affect the flow and performance of PE deals (Gompers, Kovner, Lerner, and Scharfstein, 2008; Ljungqvist, Nanda, and Singh 2006). Three, private equity is a highly cyclical industry with strong variation in fundraising, at times leading to a cyclically abundant supply of capital and a deterioration of PE performance with "money chasing deals" (Gompers and Lerner, 1998).

As a test of robustness, we take account of these three types of fluctuations. We re-estimate our main regression results by adding five variables to address these fluctuations: we include two variables, the term spread and the yield spread, that are used in PE research to account for debt market conditions (Axelson et al., 2013; Giot et al. 2014; Ljungqvist et al. 2017); two variables for US equity market conditions, the 3-year lagged return of the S&P500 and a variable measuring hot or cold IPO markets (number of IPOs); and for PE capital abundance, a measure of the unused dry powder of the PE sector. In additional tables available in an online appendix, we include these five market timing variables in our main regression specifications in Table 4 and Table 5. We find that available dry powder of the PE industry and the recent stock market performance have a slight dampening effect on PE performance, but in broad terms adding any combination of market timing variables has little or no effect on our main results. We find similar robustness for the bivariate tests found in Tables 2 and 3 (not reported in the tables). We also conducted additional logit regressions to examine whether market timing variables have any predictive power for the choice between PE and SB buyers. Our tests (as reported in an online appendix) reject this idea. When we employ other possible market timing variables (unreported in tables), we again find that our main results are fully

robust to the inclusion of such variables.[20] Overall, our robustness tests confirm the importance of the type of buyer for seller returns and for performance, and are not consistent with the view that the choice of the type of buyer in divisional asset sales is affected by market conditions.

Finally, we also test variables that reflect the reputation of private equity groups, including dummy variables for deals in which buyers are the best known private equity groups. None of the coefficients is statistically significant, suggesting that the identity of the private equity sponsor does not affect returns to corporate sellers in asset sales.

5. An Auction-Based Explanation of the Empirical Results and Its Implications

How can we explain a pattern of behavior in which private equity sponsors (PE) bid more for divisional assets of corporate sellers on average than strategic bidders (SBs), and what does the pattern of seller returns tell us about the nature of PE involvement in corporate asset sales? To provide answers to these questions we propose a parsimonious auction model that incorporates two key differences between PE and strategic bidders (SB). One, only SBs enjoy industrial synergies with the asset for sale. PEs cannot create synergies but we assume that they may have unique skills to increase the asset's intrinsic value, via reorganization or restructuring.[21] Two, PEs, which by their nature are transitional owners, are focused on reselling the asset (e.g., to a future buyer) within a limited time horizon, whereas SBs acquire the assets to integrate them permanently into their ongoing operations.

Our theoretical auction model consists of two periods. At time $t = 0$, a parent firm conducts a non-anonymous ascending auction to sell an operating asset with an intrinsic value of $v_L = c_L/r$, where c_L is a constant perpetual cash flow and r is the discount rate. Two types of potential buyers participate in the auction: private equity, PE, and n operating firms, SBs. An

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[20] Additional variables tested are 1-year return of the S&P500 index and 1-year and 3-year lagged performance the Nasdaq index, S&P500 operating performance, and dividend yields; for equity markets, Fama-French book-to-market ratio, IPO first-day returns, and percentage of positive first-day returns.

[21] Our model can be viewed as normalizing the highest synergies of PE bidders to zero, since industry buyers should have the highest synergistic valuations, according to Shleifer and Vishny (1992). Martos-Vila, Rhodes-Kropf, and Harford (2014) develop a different model of bid competition between PEs and SBs that suggests that differences in bidding behavior reflect debt misvaluation and that this can explain asynchronous merger waves.

asset that is acquired by an SB will be integrated into the buyer's existing operating assets. PE bids for the asset are subject to the constraint that the asset must be resold in period $t = 1$.

PE has a potential, but uncertain, ability to restructure the asset so as to increase its intrinsic value from v_L to $v_H := c_H/r > v_L$. Specifically, there is a probability $1 > p > 0$ that the asset for sale is restructurable by PE, in which case after the acquisition PE reorganizes the asset so as to increase its value to v_H. With probability $1 - p$ the asset is not restructurable, and thus the asset's intrinsic value will remain at v_L. In either case, PE resells the asset in an exit auction in period $t = 1$. There are n SBs participating in the exit auction, and they are potentially a different set of SBs from those participating in the initial auction.[22]

An asset with intrinsic value $v \in \{v_L, v_H\}$ is worth $v + x_i$ to SB i where x_i is the SB's strategic synergies with the asset. The synergies of all SBs are i.i.d. random variables distributed over [0, 1]. Bidders are asymmetrically informed. Thus, each SB privately knows its own level of synergies with the asset, and PE privately knows whether the asset for sale is restructurable or not restructurable. After the asset is acquired by PE (and prior to the exit auction), the asset's new intrinsic value becomes common knowledge. Both the initial auction and the exit auction have an ascending bid format.[23]

We solve the model by backwards induction, starting with PE's expected revenue in the exit auction at $t = 1$. For an asset with intrinsic value $v \in \{v_L, v_H\}$, SB j will bid up to $v + x_j$. The winner of the exit auction is the SB with the highest synergies and it will pay the second highest bid. Let $\tilde{z}$ be the second highest among the synergies of the n SBs participating in the exit auction. Then, PE's expected exit revenue in $t = 1$ is equal to $v + E[\tilde{z}]$.

Let us now consider the initial auction. SB bidder i will bid up to $v_L + x_i$. PE expects to sell the asset for $v + E[\tilde{z}]$ at time $t = 1$. Thus, in the initial auction PE will bid a maximum of v_H

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[22] Some strategic bidders might be financially constrained, busy, or inattentive in one of the two auctions, and there could also be entry or exit of firms in the industry. This assumption incorporates the value of PE as a provider of liquidity in the asset sales market.

[23] We note that an alternative strategy to model the market for corporate asset sales is to apply a matching model where buyers and sellers go through a search and match process. Although a matching model would generate predictions that would be broadly similar to those of our auction model, our auction model dominates in terms of tractability. Also, an auction model better reflects the institutional structure of asset sales and a parent firm seller's incentive and ability to have a large set of different potential buyers and types of buyers compete for the asset.

+ E $[\tilde{z}]/(1+r)$ if it has private knowledge that the asset is restructurable. If it has information that the asset is non-restructurable, PE will bid $v_L + E[\tilde{z}]/(1+r)$.[24] In other words, PE behaves as if it is a SB with synergies $y_L := E[\tilde{z}]/(1+r)$ for a non-restructurable asset, and behaves as if it is an SB with synergies $y_H := v_H - v_L + E[\tilde{z}]/(1+r) > y_L$ for a restructurable asset.

This bidding behavior implies that the parent firm seller's expected revenue in the initial auction from selling the asset to an SB is $R[SB, y] = v_L + E[max\{y, \tilde{z}\}| \tilde{z}' > y]$, where $\tilde{z}'$ is the highest among the synergies of the n SBs participating in the initial auction. The variable y takes the value y_H if the asset is restructurable, and $y = y_L$ if it is non-restructurable. The seller's expected revenue when selling to PE is $R[PE, y] = v_L + E[\tilde{z}'| \tilde{z}' \leq y]$, which is smaller than $R[SB, y]$. Thus, when comparing assets with the same level of restructurability, the seller's revenue is on average higher when selling to a SB than to PE, reflecting the role of synergies available to strategic bidders. This result follows because, for a given level of $y \in \{y_L, y_H\}$, an SB wins only if it bids more than the maximum bid of PE, $v_L + y$.

Because $y_L < y_H$, when making comparisons across assets for the same type of buyer, seller average revenue is higher when the asset is restructurable than when it is not restructurable, i.e., $R[SB, y_L] < R[SB, y_H]$ and $R[PE, y_L] < R[PE, y_H]$. This result reflects the fact that the presence of PE in the auction enhances the competition for the set of restructurable assets. Note also that private equity is more likely to win the bidding for a restructurable asset than a non-restructurable one. More formally,

$$\pi_L := \Pr[PE \text{ wins } | v = v_L] = \Pr[\tilde{z}' < y_L] < \pi_H := \Pr[PE \text{ wins}| v = v_H] = \Pr[\tilde{z}' < y_H].$$

Thus, the seller's expected (i.e. average) revenue conditional on the buyer being a PE or an SB is respectively equal to

$$R[PE] := \frac{(1-p)\pi_L R[PE, y_L] + p\pi_H R[PE, y_H]}{(1-p)\pi_L + p\pi_H}$$

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[24] These values take into account that, when buying the asset at $t = 0$, PE receives the cash flow $c \in \{c_L, c_H\}$ at $t = 1$. Hence PE receives $c + v + E[\tilde{z}]/(1+r) = v + E[\tilde{z}]/(1+r)$, where $v \in \{v_L, v_H\}$ and $c \in \{c_L, c_H\}$ depending on the asset's restructurability.

and

$$R[SB] := \frac{(1-p)(1-\pi_L)R[SB, y_L] + p(1-\pi_H)R[SB, y_H]}{(1-p)(1-\pi_L) + p(1-\pi_H)}$$

Whether $R[PE]$ is larger or smaller than $R[SB]$ depends crucially on the comparison between $R[PE, y_H]$ and $R[SB, y_L]$. A necessary condition for $R[PE] > R[SB]$ is that the seller's revenue from selling a restructurable asset to a PE is larger than the seller's revenue from selling a non-restructurable asset to an SB, i.e., $R[PE, y_H] > R[SB, y_L]$. Otherwise, the seller will on average gain more when selling to SBs than to PE.

Figure 1 is a graph of the region of values for p and $v_H - v_L$, that lead to $R[PE] > R[SB]$, i.e., the region where the seller's expected revenue is higher when selling to PE than to an SB (for a specified set of parameters). Two conditions are necessary for having $R[PE] > R[SB]$. One, $v_H - v_L$ (the metric for PE restructuring potential) must be relatively large. Two, p must be relatively high, meaning that a sufficient proportion of the assets in the corporate asset sales marketplace are restructurable. In the absence of either of these conditions, the seller's expected revenue is lower when selling to PE than to an SB. Note that when the potential for restructuring is large (i.e., a point located above the horizontal dotted line in the graph), then $y_H > 1$, implying that a restructurable asset will certainly be bought by PE.

By adding a comparative statics analysis about variations in the metric $v_H - v_L$, we obtain the following two empirical implications:

Proposition 1: *If PE has sufficient restructuring ability ($v_H - v_L$ is relatively large) and there are sufficient restructurable assets (p is not small), then parent firm seller revenue is on average higher when selling to a PE than when selling to an SB. In contrast, if PE has limited restructuring ability (that is, v_H is close to v_L) or if there are not sufficient restructurable assets, then parent firm seller revenue is on average higher when selling to an SB than when selling to a PE.*

The result contained in Proposition 1 is driven by the auction set-up with two different types of buyers, one of which (SB) can generate a private value in the form of synergies with the asset, whereas the other type of buyer (PE) may be able to increase the asset's permanent value but will then resell the asset within a constrained time period in an exit auction. Given such a

basic structure, this formulation of the competition between PE and strategic buyers is robust to numerous variations in the set-up and can generate various extensions to the model.

This auction model implies that PE restructuring ability is a necessary ingredient for obtaining the result that asset sales to PEs generate higher winning bids on average relative to sales to SBs. Thus, viewed from the perspective of this model, our sample results that show statistically greater average excess returns when selling to PEs rather than to SBs suggest that private equity has sufficiently valuable restructuring capabilities and can identify a sufficient number of assets that benefit when PE exerts those skills. In addition, the large gains to parent firms when selling assets to PE suggest the extent to which shareholders of parent selling firms benefit from the restructuring skills of private equity bidders and from their participation in the corporate asset sales market, beyond PE's contribution of liquidity to the asset sales market.

An auction set-up such as the one presented above, has two other immediate implications that are consistent with the pattern of our empirical findings. First, if PE sponsors on average make higher winning bids (as suggested by the pattern of the seller gains reported in Section 2), then PE buyers will also have high valuations for the assets they acquire, which should ultimately be reflected in strong ex post performance of the asset. Our results about subsequent changes in enterprise value (relative to benchmark firms) are consistent with such superior performance. Second, the price paid by a PE to a parent firm seller of an asset should be positively related to the value that the PE sponsor is eventually able to generate from the asset at exit. This result follows directly from the fact that in a competitive auction, whatever the format, bids are increasing in buyers' valuation. Our empirical findings are consistent with this relation.

In our empirical analysis, about 30% of the corporate assets are bought by PEs (Table 1). Based on PE exits, approximately 70% of the assets bought by PE generate superior growth in enterprise value relative to benchmark assets (Table 3). In terms of our model, successful exits can be interpreted as the set of restructurable assets acquired by PE. To see that the empirical numbers are broadly consistent with our auction model, we denote by w the probability that a PE wins the auction for a non-restructurable asset. Let the probability of a PE winning the auction for a restructurable asset be $k \cdot w$, with $k > 1$. Then the fraction of assets acquired by PE is

$$A \coloneqq (1 - p) \cdot w + p \cdot k \cdot w$$

According to our model, the fraction of the assets bought by PE that is restructurable is

$$B \coloneqq p \cdot k \cdot w / ((1-p) \cdot w + p \cdot k \cdot w)$$

By setting $A = 0.3$ and $B = 0.7$ and varying k between 1 and 10, we obtain ranges for p and w that aree consistent with the empirical findings. These are $p = 0.7$ and $w = 0.3$ for $k = 1$, and $p = 0.189$ and $w = 0.11$ for $k = 10$. Note that this calibrated value of p is within the region depicted in Figure 1 for which the seller revenue is higher when selling to a PE rather than a SB. Thus, our auction model is consistent with the fact that SBs are the buyers in the preponderance of asset sales.

The auction model's implications also provide a means to interpret the difference between our findings for corporate asset sales and the results of Bargeron et al. (2008) for takeovers of listed firms (aside from the institutional differences in the two markets noted earlier).[25] From the perspective of the model, the empirical results suggest that the restructuring capabilities of PEs vis-a-vis the entities for sale and the proportion of the relevant population of such entities that are restructurable, are greater in corporate asset sales than in takeovers and mergers of stand-alone firms.

6. Some Alternative Explanations for the Observed Pattern of Seller Gains

Our analysis indicates that the pattern of gains in divisional buyouts is consistent with the basic implications of an auction-based framework for corporate asset sales. In this section, we also consider several alternative explanations for our results. One, PE sponsors might specialize in bidding for divisional assets whose optimal business structure entails a change of their organizational form and a transformation into a stand-alone entity; these assets could possibly substantially outperform assets acquired by PE that do not change their organizational form and remain organized as corporate subsidiaries in the long run, that is assets that are ultimately sold

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[25] Gorbenko and Malenko (2014) analyze competitive auctions for firms (not subsidiaries), and find that SBs bid on average more than private equity, results that can be viewed as consistent with Bargeron et al. (2008). They also find that SBs bid less for mature targets, and exhibit a larger bid variance, consistent with heterogeneous synergies.

to strategic acquirers in exit auctions after a period of private equity ownership. To investigate this possibility, we track the ultimate destiny of the assets purchased by PE, and sort them into two categories: the 83 assets that are ultimately acquired by operating firms (irrespective of the form of the PE exit transaction) versus 74 assets with exits that are not subsequently acquired by operating firms (i.e., they remain stand-alone entities as of year-end 2017). The mean (median) two-day excess return to parent firm sellers at the initial announcement date for the first subsample is 3.20% (1.51%) and the transaction return is 119.21% (17.5%). For the second subsample the mean (median) excess return to parent firm sellers 3.40% (2.03%) and the transaction return is 78.18% (17.64%). None of the differences in the means (medians) between the two groups of excess returns (p = 0.41 (0.25)) or between the two groups of transaction returns (p = 0.85 (0.84)) is statistically significant, and excess returns and transaction returns show opposite sign differences.[26] Thus, our results for asset sales provide no evidence that the greater gains to parent firm sellers of assets acquired by PE are driven by the set of assets that ultimately remain stand-alone entities versus the assets that are eventually integrated into the operations of strategic firms after a period of private equity ownership.

Next, we address a second alternative explanation for the pattern of our results that is based on the assumption that PE acquirers could submit higher bids because of an informational advantage. However, it is straightforward to demonstrate that within the broad framework of an auction model of the type presented above, such private information held by PE bidders about assets being sold by parent firms cannot by itself provide an explanation for higher average successful bids by PE acquirers. We present here the intuition for this result (a formal derivation of this result is available from the authors upon request). Suppose PE bidders have no restructuring ability and no industrial synergies but are merely able to privately identify high-value assets while rival SB bidders have synergies but are without the ability to identify high-value assets. The set-up is an asset auction where the common value component is privately known by PE whereas each SB privately knows its own synergies. Thus, this framework entails a private value component that is added to the common value component. Within this setting, it is

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[26] We also test this univariate finding in multivariate regressions, by including ultimate status (standalone or not) in all specifications of Table 5, but find that the coefficients are small and are far from significant.

intuitive that it is in the interest of the parent firm seller of the asset to organize a non-anonymous ascending auction. This structure will induce PE to bid up to the true common value component, thus via its bidding disclosing the effect of its private information to other bidders (including SBs). As a result, SBs will keep increasing their bids above the common value because of their synergies. Thus, SBs that possess synergies with the asset will submit higher successful bids than PE.

Finally, to the extent that restructuring capabilities exist and that these skills are private and exclusive to PE, only an entity controlled by PE should sustain an improvement in its value. Thus, a winning private equity bid for an asset should not be expected to have information content for other firms in the same industry as the asset. However, if the market believes other firms in the industry can achieve similar gains, share prices of other firms in the industry should increase in response to an asset sale announcement. Parallel reasoning can be applied to the case of synergistic gains from acquiring an asset that can be generated by a strategic buyer.

We assess this point by evaluating the intra-industry share price effect of our sample of asset sales. We identify CRSP firms with the same 4-digit SIC code as the asset, and use them to construct an industry portfolio for each event (equally weighting all rival firms per event), and obtain the average portfolio excess return over all of the events in each sample. For each of the three subsamples of asset sales, the intra-industry effects (not reported in the tables) are small and not statistically significant, implying that there is little change in industry value as a result of asset sales to private equity, or any corporate asset sales irrespective of buyer type. This finding indicates that the gains from asset sales flow to the parties involved in the deal and do not flow to other firms in the industry.

7. Conclusions

In this paper we provide an analysis of private equity buyers in corporate sales of operating assets. We analyze a comprehensive sample of sales of large operating assets by listed parent firms from 1994 through 2006, and we follow the exit pattern of the private equity buyers through year-end 2017. By the end of the period, we find that 98% of the assets acquired by

private equity have exited from ownership by the original private equity sponsors. We find that increases in shareholder wealth for selling parent firms at sales of these assets to private equity are on average significantly greater than for sales of assets to public or private strategic buyers. Our findings suggest that restructuring gains are the likely basis for bids by private equity in the corporate asset sales market.

We evaluate the change in the enterprise value of the assets acquired by private equity for the period from acquisition to private equity exit. We find that annualized growth rates in asset enterprise values are significantly greater than for benchmark firms, suggesting the economic importance of private equity's capabilities for managing divested corporate assets. About 60% of private equity exits from these investments are through IPOs or sales to strategic buyers, while 18% of businesses sustain bankruptcy filings. We find that parent firm seller returns at the original asset sale are related to the subsequent gains in enterprise value for the asset while under private equity ownership, with parent firm sellers earning significantly greater gains in private equity deals in which exit is by an IPO or sale to a strategic buyer and significantly weaker gains when exit is by bankruptcy. Thus, private equity generates large gains in shareholder wealth for selling parent firms for assets that subsequently prove to be a rich source of increased value.

We suggest an auction-based theory of bidding competition between private equity interests and strategic buyers that conforms to the business model of private equity and to the institutional arrangements that typically apply in corporate asset sales. This approach suggests that private equity's valuation of a business being sold by a parent firm is influenced by the subsequent gain in value that the private equity sponsor can expect to generate while it owns the entity, which is consistent with the pattern of the evidence for our sample of divisional buyouts. Such an auction-based approach suggests that it is the business capabilities of private equity (and not the acquisition of undervalued assets) that can explain the pattern of gains generated by private equity divisional buyouts.

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Glossary

EV: Enterprise value of the relevant entity defined as the entity's long term debt plus the market value of equity which is share price multiplied by shares outstanding or transaction price as reported in SEC filings or news reports. (Source: SDC, CRSP and SEC filings)

EV Growth Rate: Annualized rate of change in enterprise value (EV) implied by the difference between the asset's enterprise value at exit and its value at the original asset sale

Excess EV: Annualized rate of change in enterprise value (EV) implied by the difference between the asset's enterprise value at exit and its value at the original asset sale, minus the annualized rate of change in the enterprise value of the rival firm on CRSP with the same 4-digit SIC code that is closest in enterprise value to the measured over the same period (Source: Factiva, SEC filings, and various news searches by the authors)

Exit in 1999-2001: Qualitative variable that takes on the value of one for an asset that exits private equity ownership during 1999-2001, years generally accepted as a period of a hot IPO market ("internet bubble") (Source: Factiva, SEC filings, and various news searches by the authors)

Exit Success: Dummy variable that is equal to one if private equity's exit from the asset is via an IPO or a trade sale, and 0 otherwise (Source: Factiva, SEC filings, and various news searches by the authors)

Focus: Qualitative variable that takes on the value of one when the parent firm seller and asset sold have the same 3-digit SIC code (Source: SDC)

Insiders: Percentage of shares outstanding held by members of the board of directors and senior management of parent firms ((Source: DEF14A SEC proxy filings)

Market Value: Seller market capitalization calculated as the number of shares outstanding multiplied by stock price five days prior to the event announcement, and reported in millions of constant (2006) dollars. (Source: CRSP)

M/B: Market-to-book ratio of the parent (seller) firm. (Source: Compustat and CRSP)

PE: Qualitative variable that takes on the value of one if the buyer of the asset is private equity (Source: SDC, Factiva, and various news searches by the authors)

POF: Qualitative variable that takes on the value of one if the buyer is a private operating firm not controlled by private equity (Source: SDC, Factiva, and various news searches by the authors)

Pre-return: Seller's six-month cumulative excess return for the period prior to the sale announcement date (Source: CRSP)

Proceeds: Qualitative variable that takes on the value of one when the seller pays out the proceeds of the asset sale to reduce debt or repurchase equity. (Source: SEC 8-K filings and business press reports)

Rival: For any given asset the CRSP firm with the same 4-digit SIC code as the asset that is closest in enterprise value to the transaction value of the asset (Source: Compustat and CRSP)

Rival EV growth rate: Annualized rate of change in the enterprise value (EV) of the rival of the relevant asset over the period from the date of the original buyout of the asset to the exit transaction date. (Source: Compustat and CRSP)

ROA: is the parent firm seller's return on assets, defined as net income/total assets. (Source: Compustat)

TP: Selling price in millions of dollars of the operating asset being sold by the parent firm seller (Source: SDC)

TR: The change in wealth to the seller (buyer) firm based on the two-day excess return (-1, 0) multiplied by the market value of the firm's equity, scaled by the transaction value of the asset (Source: SDC and CRSP)

Table 1 Descriptive Statistics

Descriptive statistics for means, and medians in parentheses, are reported for asset sales of operating businesses that have a transactions price of $100 million or more conducted by publicly traded parent firm sellers listed on NYSE/ASE/Nasdaq over the sample period 1994 through 2006, obtained from the SDC Acquisition Database. Transactions are disaggregated on the basis of the type of buyer into 161 asset sales to private equity buyers, 54 asset sales to private operating firm buyers, and 323 asset sales to public traded strategic buyers. The value of the transaction is reported in millions of constant (2006) dollars. Firm market value is calculated as the number of shares outstanding multiplied by stock price four weeks prior to the event announcement, and reported in millions of constant (2006) dollars.

	Private Equity Buyer	Private Strategic Buyer	Public Strategic Buyer	
	Seller	Seller	Seller	Buyer
	N=161	N=54	N=323	N=323
Transaction value ($2006, m)	563.70	351.20	773.43	773.43
	(298.99)	(256.43)	(301.02)	(301.02)
Market value ($2006, m)	25,848.01	10,850.21	25,750.05	24,057.50
	(5,490.40)	(3,367.48)	(6,064.35)	(3,190.38)
Transaction Value/MV	0.24	0.46	0.33	0.36
	(0.07)	(0.08)	(0.07)	(0.10)

Table 2 Empirical Results for Share Price Responses at Asset Sales

Empirical results are reported for excess returns at announcements of asset sales of operating businesses with a transaction price of $100 million or more conducted by publicly traded parent firm sellers listed on NYSE/ASE/Nasdaq over the sample period 1994 through 2006, obtained from the SDC Acquisition Database. The metrics are 2-day (-1, 0), 3-day (-1, +1), and 6-day (-4, +1) excess returns (CARs) for parent firm sellers and for publicly traded buyers (Panel A) and two-day median transaction returns (TR), measured as the dollar gains in value scaled by transaction size (Panel B). Excess returns and transaction returns in percent are in response to 161 asset sales to private equity, 323 asset sales to publicly traded strategic buyers, and 54 asset sales to private operating firms not controlled by private equity. Excess returns are calculated using market model methodology; t-statistics are in parentheses, proportion of returns positive is in brackets. Median returns are in braces. The statistical significance of median returns is based on the Wilcoxon signed ranks test. Statistical significance for the difference between types of buyers is obtained by the Satterthwaite test for the difference in means and by the Wilcoxon signed ranks test for the difference in medians. Market model parameters are estimated using least squares over the pre-event period, t = -240 to -121, where day 0 is the date of the first public announcement. Statistical significance is denoted as: *** for the 1% level, **, for the 5% level, and *, for the 10% level.

.	Seller Returns by Type of Buyer			p-difference in means {medians}			Returns to Strategic Public Buyers
	Private Equity Buyer	Strategic Public Buyer	Strategic Private Buyer	Private Equity/Strategic Public Buyer	Private Equity/Strategic Private Buyer	Strategic Public Buyer/Strategic Private Buyer	Buyer
	N=161	N=323	N=54				N=323
Panel A: Excess Return							
2-day CAR (-1, 0)	3.40%	1.21%	1.00%	<0.01	<0.01	0.83	0.42%
	(7.91)***	(3.43)***	(0.58)				(1.78)*
	{1.93%}***	{0.35%}**	{0.33%}	{<0.01}	{<0.01}	{0.75}	{0.35%}**
	[0.80]	[0.55]	[0.52]				[0.52]
3-day CAR (-1, +1)	3.48%	1.65%	1.26%	<0.01	<0.01	0.68	1.29%
	(5.38)***	(4.46)***	(0.60)				(3.57)***
6-day CAR (-4, +1)	3.35%	1.47%	1.08%	<0.01	<0.01	0.70	1.42%
	(4.13)***	(3.70)***	(0.39)				(3.22)***
Panel B: Transaction Return							
Two-day median TR	{18.27%}***	{2.98%}**	{2.41%}	{<0.01}	{<0.01}	{0.81}	{0.77%}**

Table 3 Excess Returns to Sellers at Asset Sales with Private Equity Buyers and Subsequent Changes in Asset Enterprise Value

Excess returns (CAR) and transaction returns (TR) to publicly traded parent firm sellers at announcements of asset sales of operating businesses to private equity buyers over the period 1994 through 2006 and the annualized rate of change in enterprise value implied by the difference between the asset's enterprise value at exit and the value at the original asset sale. The metrics are the average 2-day (-1, 0) excess returns and the average 2-day transaction returns for sellers; median returns are in braces. Transaction returns are measured as the dollar gains in seller value scaled by transaction size. Excess returns are calculated using market model methodology. The statistical significance of medians is based on the Wilcoxon signed ranks test. Market model parameters are estimated using least squares over the pre-event period, t = -240 to -121, where day 0 is the date of the first public announcement. The duration of the interval from the original asset sale to the date of the exit is reported. Annualized changes in enterprise value are reported for benchmark firms which are public (CRSP) firms with the same 4-digit SIC code as the asset sold that are closest in enterprise value to the value of the asset. Excess EV is the difference between the growth rate in enterprise value of the relevant asset and its benchmark. Private equity exits are disaggregated into IPOs, sales to strategic buyers, secondary buyouts (SBO - sales to other private equity firms), and Chapter 11 filings. As of the end of 2017, four assets have not had an exit. Of the 34 SBOs, the second private equity buyer has exited the investment in 13 cases. N is sample size and statistical significance is denoted as: *** for the 1% level, **, for the 5% level, and *, for the 10% level.

	Full Sample (1)	All Exits (2)	IPO (3)	Strategic Buyer (4)	Secondary Buyout (5)	No Exit (6)	Chapter 11 (7)	2nd Private Equity Buyer (8)
			Panel A: By Type of Exit by 1st Private Equity Buyer					*Panel B: 2nd Private Equity Buyer*
N	161	157	43	51	34	4	29	13
%	100%	98%	27%	32%	21%	2%	18%	8%
Time in PE {years}		4.18	2.23	4.49	5.46		5.03	4.29
		{3.24}	{1.93}	{3.13}	{5.07}		{4.53}	{4.20}
Seller CAR	3.40***	3.44%***	5.02%***	2.97%***	4.15%***	1.95%	1.10% *	
	{1.93}***	{1.93}***	{2.49%}***	{1.93%}***	{2.32%}***	{1.46%}	{0.32%}	
Seller TR	131.66%***	131.26%***	223.18%***	172.80%***	59.28%***	131.64%	6.32% *	
	{18.27}***	{17.97%}***	{45.05%}***	{24.72%}***	{16.62%}**	{18.11%}	{4.16%}	
EV growth rate		38.88%***	108.51%***	30.42%***	18.11%***		-25.11%***	13.04%
		{15.31%}***	{43.64%}***	{18.13%}***	{8.12%}***		{-22.86%}***	{16.76}
Rival EV growth rate		15.53%***	35.74%**	10.98%**	9.66%		0.48%	11.94%
		{3.63%}***	{8.51%}***	{3.67%}*	{3.83%}		{-0.95}	{11.04}
Excess EV		23.35%***	72.77%***	19.44***	8.44%		-25.59%***	1.10%
		{7.79%}***	{45.88%}***	{16.60%}***	{6.40%}**		{-25.62%}***	{4.54%}

Table 4 Analysis of Private Equity Success

Regressions explain the predictive power of parent firm seller returns at asset sale announcements on the success of private equity deals. The first metric success, Excess EV Annual Growth Rate, is the difference in the annualized rate of change in enterprise value (EV) implied by the difference between the asset's enterprise value at exit and its value at the original asset sale, minus the annualized rate of change in the enterprise value of the benchmark firm over the same period. The second metric, Excess EV Profitability Index, is the profitability index of the entity's enterprise value at exit and its value at the asset sale, calculated using a discount rate of 15%, (other discount rates generate similar results) minus the annual change of the enterprise value of the benchmark firm over the same period. The third metric, Exit Success, is a dummy variable that is equal to one if private equity exits from the asset via an IPO or a trade sale, and 0 otherwise. Regressions (1) through (4) are OLS regressions using (White) heteroskedasticity-consistent standard errors; regressions (5) and (6) are logit regressions. The independent variables are defined as follows: TR is the seller transaction return generated from event studies as described in Table 3; Ln (TP) is the log of the value at the original asset sale transaction; and Year 1999-2001 is a qualitative variable that takes on the value of one for an asset that exits private equity during 1999-2001, years generally accepted as a period of hot IPO markets. Top-30 Fund is a dummy variable that takes the value 1 if the PE firm appears among the 30 PE firms with the largest number of deals over the sample period (in Thomson One Private Equity). See Glossary for all variable definitions. The sample size is the 157 exits or 161 PE events and t-statistics are in parentheses, below the coefficients. Statistical significance is denoted as: *** for the 1% level, **, for the 5% level, and *, for the 10% level.

	Excess EV Annual Growth Rate		Excess EV Profitability Index		Exit Success	
	(1)	(2)	(3)	(4)	(5)	(6)
Seller TR	0.0013	0.0012	0.0032	0.0038	0.0063	0.0066
	(2.64)***	(2.70)***	(2.51)**	(2.69)***	(2.44)**	(2.45)**
Ln (TP)		-0.0468		-0.0766		0.2530
		(-1.40)		(-0.65)		(2.19)
Exit in 1999-2001		-0.1696		-1.0183		0.9769
		(-1.67)*		(-1.85)*		(0.11)
Top-30 Fund		-0.0054		1.0206		-0.1881
		(-0.04)		(0.28)		(-0.77)
Constant	0.1301	0.4180	0.0498	0.5732	0.0772	-1.4659
	(3.87)***	(2.01)**	(0.44)	(0.76)	(0.69)	(-0.20)
N	157	157	157	157	161	161
R^2	0.051	0.079	0.026	0.081		
Pseudo R^2					0.029	0.048

## Table 5 Regressions of Seller Announcement Returns

Cross-sectional regressions explain excess returns to parent firm sellers of operating business assets from 1994 through 2006. In regressions (1) – (4), the dependent variable is the 2-day excess return, CAR, of the seller firm, and in regressions (5) – (8) the 2-day transaction return, TR. Qualitative variables, which take on the value of one for the relevant characteristic and zero otherwise, are defined as: PE is one for private equity buyers; POF is one for private operating firm buyers; Focus is one when the seller and asset sold have the same 4-digit SIC code; Proceeds is one when the seller pays out the proceeds to reduce debt or repurchase equity. Quantitative variables are defined as: Ln (TP) is the logarithm of the asset's original sales price; Pre-return is the seller six-month cumulative excess period prior to sale date; ROA is the seller's return on assets; Asset/EV is the value of the asset scaled by the seller's enterprise value; Insiders is the percentage of seller shares held by members of its Board of Directors and senior management; and M/B is the seller's market to book ratio. (See Glossary for variable definitions). N is the sample size; t-statistics are in parentheses. Statistical significance is denoted as: *** for the 1% level, **, for the 5% level, and *, for the 10% level.

	2-day CAR				2-day TR			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
PE	2.12	2.22	2.28	2.19	100.87	93.50	92.13	93.58
	(4.03)***	(3.81)***	(3.93)***	(3.75)***	(4.31)***	(3.87)***	(3.80)***	(3.87)***
POF		-0.61	-0.67	-0.76		29.50	27.74	29.59
		(-0.54)	(-0.66)	(-0.75)		(0.35)	(0.87)	(0.92)
Focus				0.26				-2.05
				(0.37)				(-0.08)
Ln (EV)				-0.41				7.42
				(-2.11)**				(0.64)
Pre-return			-2.08	-2.22			-27.19	-26.99
			(-2.66)***	(-2.68)***			(-0.99)	(-0.98)
ROA		-4.25	-4.08	-4.36		462.98	435.82	440.05
		(-0.90)	(-0.85)	(-0.90)		(2.11)**	(1.97)**	(2.01)**
Asset/EV		6.08	6.08	3.29		7.36	7.54	36.39
		(2.01)**	(1.98)**	(0.97)		(0.17)	(0.17)	(0.68)
Insiders		0.01	0.01	0.01		-0.90	-0.91	- 0.69
		(0.43)	(0.62)	(0.22)		(-1.45)	(-1.42)	(-1.05)
M/B		-0.13	-0.09	-0.04		-1.54	-0.17	-1.12
		(-1.89)*	(-1.41)	(-0.57)		(-0.35)	(-0.41)	(-0.26)
Proceeds		1.10	1.01	0.89		-10.85	-13.62	-11.29
		(1.92)*	(1.78)*	(1.56)		(-0.57)	(-0.72)	(-0.63)
Constant	1.17	0.87	0.76	4.89	-1.71	-43.91	-42.08	-116.89
	(3.73)***	(1.32)	(1.15)	(2.22)**	(0.89)	(-1.90)*	(-1.23)	(-1.08)
N	538	505	501	501	538	505	501	501

R^2	0.027	0.078	0.097	0.105	0.034	0.045	0.046	0.047
F	16.22	6.66	6.20	6.10	18.54	3.74	3.15	2.65

Figure 1 The shaded area is the region for p and v_H - v_L for which $R[PE] >$ $R[SB]$. Above the dotted line, the potential for restructuring is large and PE will outbid SB bidding for a restructurable asset. This figure uses the following values of the parameters: F is the uniform distribution, $n = 8$, $r = 20\%$.
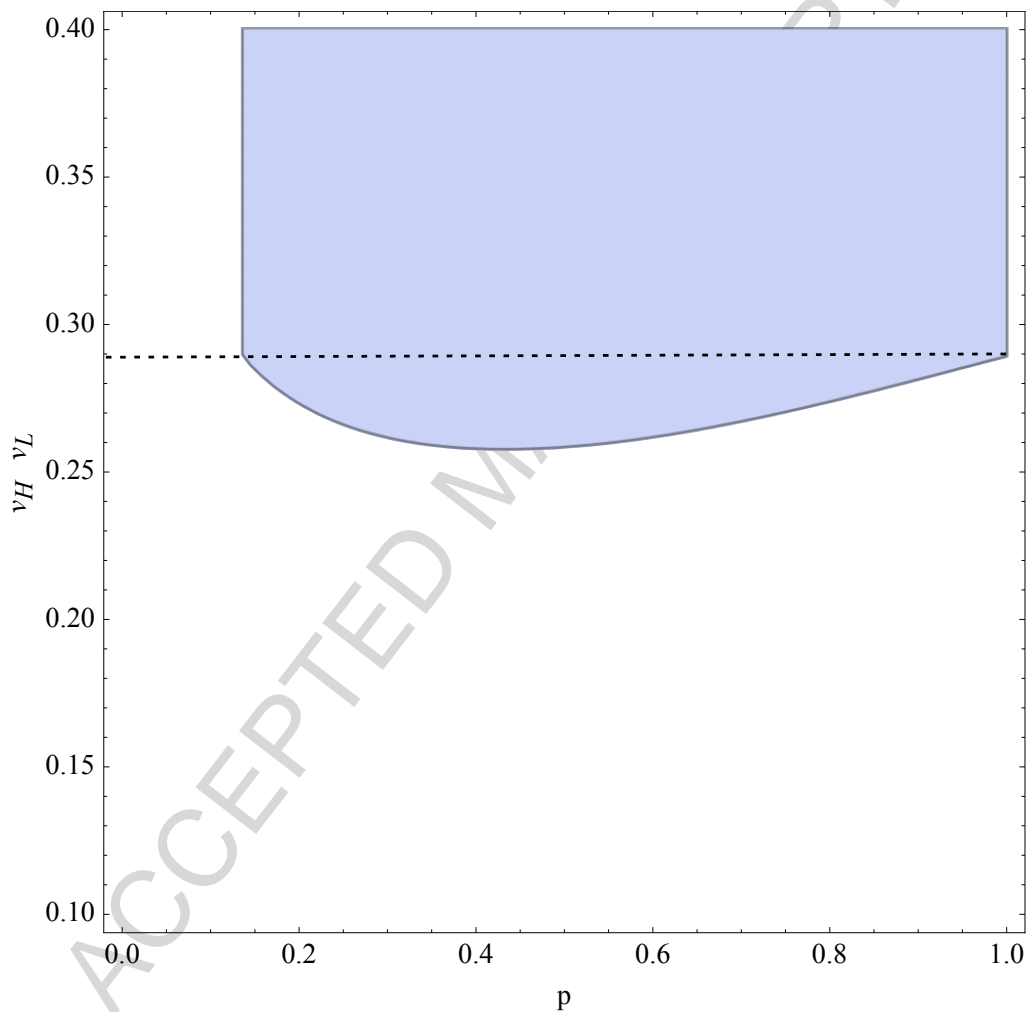
Highlights:

- We study the role and performance of private equity (PE) in corporate asset sales.
- Corporate sellers obtain significantly positive excess returns in PE deals, gains in wealth significantly greater than for intercorporate asset sales.
- Based on exit valuations for 98% of PE deals, we find gains in enterprise value in buyouts are significantly greater than for benchmark firms.
- Corporate seller excess returns are positively correlated with subsequent gains in asset enterprise value.
- Findings are consistent with an auction model where PE have superior restructuring capability.