

Asset Sales and the Role of Buyers: Strategic Buyers versus Private Equity*

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Abstract

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KEYWORDS: ASSET SALES, PRIVATE EQUITY, RESTRUCTURING, CORPORATE AUCTIONS.

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Abstract

We model the interaction of private equity and strategic buyer bids in corporate asset sales. We endogenize private equity's contribution to asset liquidity by incorporating the link between private equity bids and time-varying exit values. Private equity bids are increasing in private equity's ability to enhance the asset's value, and can only exceed strategic bids if this ability is important. Our empirical results for asset sales show that excess returns to sellers are greater for sales to private equity than strategic buyers. Increases in enterprise value during private equity ownership significantly exceed those of benchmark firms. Seller gains in private equity deals are related to subsequent increases in asset values and type of exit.

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1. Introduction

Since the early 1990s, private equity firms have become frequent bidders in corporate asset sales, a market previously dominated by strategic buyers (operating firms).¹ In this paper, we analyze how the bidding behaviors of private equity and strategic buyers interact, focusing on the following questions: Why can private equity firms generate higher bids than strategic bidders given that they lack the synergistic gains available to strategic acquirers? And, given that private equity is a transitional form of ownership, how do private equity bids reflect expectations about exit, that is, the expected value in a future sale to a strategic buyer or another private equity firm, or in an IPO?

We present an auction model of bidder competition that addresses these questions and we provide empirical work related to the predictions of our model. Corporate asset sales are an appropriate venue for this auction-based analysis, because unlike mergers, they are invariably non-hostile, typically seller-initiated and highly competitive. There are three main results. One, in a corporate asset sale a private equity buyer can generate larger seller gains than strategic buyers if and only if there are large potential gains from restructuring the asset. Our empirical tests using a sample of large asset sales are consistent with this conclusion, which provides an interesting contrast to studies of mergers that find higher seller gains for stand-alone firms that are sold to public buyers rather than to private equity. Our theoretical analysis allows us to resolve this contrast in results based on differences in private equity's potential to create value from divested assets versus stand-alone firms. Two, during the period of private equity ownership, divested assets outperform comparable benchmark entities.

¹Eckbo and Thorburn (2008) report that on average asset sales make up 38% of all merger and acquisition transactions over the period 1970 to 2006. Kaplan and Stromberg (2009) report that in deal value corporate divestitures are on par with stand-alone targets in terms of the acquisition flow of private equity firms from 1995 to 2004.

Three, there is a close link between wealth gains to parent seller firms at announcements of private equity deals and the ensuing growth in the asset's value, confirming that high private equity bids reflect expectations of improvements in value under private equity ownership.

A central difference between asset sales and mergers is that there is a change in business organizational form when private equity acquires a divested asset but not when it acquires a stand-alone firm, a difference highlighted in our theory. Of course, there are other material differences between asset sales and mergers. Unlike mergers and tender offers, which are governed by a complex body of case law and disclosure regulation designed to protect shareholders, asset sales are governed by the business judgment rule that gives managers full latitude to identify assets for sale and to set the rules for an auction to foster competition among potential bidders.² There is no shareholder involvement in asset sales nor any concern about judicial second guessing as to the merits of a transaction.³ Unlike mergers, asset sales leave the selling firm's managers in place, and there is no need for a buyer to calibrate bid premiums to take into account the potential for target resistance. In short, asset sales are a well-suited laboratory for studying the outcomes of bidding behavior since the institutional environment closely corresponds to an auction framework.

Our model applies the usual assumption that strategic bids reflect the (exogenous) value of synergies between a bidder's assets and the asset for sale. Our theory endogenizes private equity's decision to enter the bidding, with the aggressiveness of its bidding reflective of its ability to enhance the asset's value and exit successfully. Despite an absence of the synergies intrinsic to strategic bidders,

²For example, confidentiality is a standard characteristic of corporate asset sale auctions and participants seldom provide the public with any information (except for minimal disclosure of outcomes) with respect to the processes the various parties pursued or any indications of the interest (or even the identities) of non-successful bidders.

³The business judgment rule not only gives managers broad discretion about the conduct of the sale, but it insulates the transaction from shareholder voting and shareholder litigation. This laissez-faire approach of corporate law to asset sales has been justified on the basis that both seller and buyer managers continue to operate subject to the discipline and monitoring of financial markets (Gilson, 1981).

we allow for the possibility that private equity may be able to improve an operating asset in ways not feasible for strategic firms or the parent seller. For example, managers of less well-performing subsidiaries within a parent organizational structure have an incentive to lobby parents to secure additional resources to protect their unit, costly activities - referred to as influence costs - that harm parent firm value (Meyer, Milgrom, and Roberts 1992). After acquiring control, private equity can eliminate these costs, implement restructuring plans, and enforce managerial discipline. We show that the existence of such restructuring capabilities are a salient factor in the auction. Our analysis suggests that when the restructuring gains are expected to be large, private equity is more likely to enter the auction and bid aggressively, while assets with less potential for restructuring gains are more likely to go to strategic buyers. Our model implies that revenue to sellers is higher for asset sales to private equity relative to sales to strategic buyers only if private equity has the relevant restructuring capabilities. In the absence of restructuring capabilities of private equity, the model implies that there is greater seller revenue from strategic deals. In an extension of the model, we discuss why this bid ranking condition still holds even if private equity has an edge in identifying undervalued assets. We also examine how the equilibrium is affected when we alter various other assumptions.

A central element of our model is that private equity's bidding behavior is endogenously determined by the asset's expected value at exit, which in turn takes account of (1) the restructuring potential and (2) the future (i.e., at exit) bidding competition for the asset that will apply between synergistic bidders (trade sales) and private equity bidders (SBOs). In other words, we fully endogenize private equity's contribution to asset liquidity. As a result, gains to parent firms at news of asset sales to private equity should be correlated with (1) the asset's expected subsequent performance relative to that of benchmark firms, and (2) the type of transaction by which private equity exits

(IPO, sale to a strategic buyer, secondary buyout or bankruptcy procedure).

We examine large asset sales from 1994 through 2004, and in the case of private equity deals, determine the exit outcomes. In practice, a strategic buyer may be either a public or a private operating firm since both can bid based on synergistic potential. Inasmuch as private firms are exempt from public reporting and often have equity-based links between managers and owners, they can be viewed as having some commonalities with private equity. Thus, we analyze the effects on seller gains for each type of buyer. We generate several major findings that can be interpreted within the framework of our theory. One, at asset sales to private equity, sellers earn large positive excess returns, 3.78%, that are significantly greater than at sales to public operating firms, 1.25%, or private operating firms, 0.95%. Within the context of our model, this difference in returns suggests that private equity expects to be able to improve the performance of an operating asset in ways not feasible for strategic firms or the parent seller. Public strategic buyers obtain positive excess returns, 0.48%, suggesting some extraction of rents for their private information about expected synergies. However, in deals with public buyers, the combined wealth gains, and thus expected synergies, are low, consistent with prior empirical studies that report modest share price effects (and thus weak synergistic gains) at asset sales to strategic buyers. For the large asset sales we examine, there is no evidence of the overbidding by public buyers that Barger, Schlingemann, Stulz, and Zutter (2008) find in their study of mergers.

As of year end 2011, 83% of the assets acquired by private equity have an exit. We confirm the type of exit and calculate the annualized change in enterprise value over the period the asset is owned by the original private equity buyer. We find this gain to be significantly greater than that of public benchmark firms (matched by SIC code and enterprise value). Although these gains are not

a direct measure of profitability for investors in private equity funds, they provide a useful metric of the business success of the entity while it is owned by private equity. We find that parent seller gains at the original sale are related to the subsequent gains in the asset's enterprise value measured as of the exit transaction. This evidence suggests that sellers to private equity obtain significantly greater gains from sales of assets that later prove to be a rich source of value, with exits that are typically in the form of an IPO or trade sale (rather than a SBO or Chapter 11 filing). These links support the view that corporate asset sales can be modeled as auctions, and that private equity bids reflect expected gains from owning and preparing an asset for exit.

Our work contributes to the asset sale literature by analyzing the role of an informed buyer and differentiating private equity versus strategic buyers, a departure from prior studies that do not provide an analytical treatment of type of buyer and instead focus on the effects on sellers (Jain, 1985; Hite, Owers, and Rogers, 1987; John and Ofek, 1995; Sicherman and Pettway, 1992; Maksimovic and Phillips, 2001). These studies are generally based on synergistic-type hypotheses that provide a useful framework for explaining intercorporate asset sales but little basis for explaining the participation of private equity as buyers in corporate asset sales. The few papers that compare financial buyers and strategic buyers study only acquisitions of listed firms, not subsidiaries, with Barger et al. (2008) reporting greater gains to shareholders of targets taken over by public acquirers, a finding they attribute to agency problems at listed acquirers. Gorbenko and Malenko (2010) also find that winning strategic bids have a higher mean than private equity bids. Rhodes-Kropf and Martos-Vila (2011) develop a theoretical model of differences in the merger waves of private equity and strategic acquirers that is due to debt misvaluation.

Our analysis of how subsequent changes in asset value (measured at the exit of private equity)

are related to parent firm gains contributes to the literature in a manner that differs from prior private equity work. Studies on the operational performance of firms controlled by private equity or on adjusted returns to fund investors, which are susceptible to issues of risk adjustment and selection bias in the data, tend to report ambiguous findings. Some studies show firms controlled by private equity improve operating performance, reduce employment, and 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, R&D investment is greater, and employment tends to increase (Cornelli and Karakas, 2011; Lerner, Sorensen and Stromberg, 2011; Leslie and Oyer, 2009; Guo, Hotchkiss, and Song, 2011). The evidence on returns to limited partners net of fees is mixed (Kaplan and Schoar, 2005; Phalippou and Gottschalg, 2009; Robinson and Sensoy, 2011).

The paper is organized as follows. In Section 2, our theoretical model is presented. Section 3 describes sample construction. Section 4 contains empirical results for the valuation effects of asset sales, detailing the differential effects of alternative buyer types. Conclusions are in Section 5.

2. Theoretical analysis

2.1. The model set-up

The model is in discrete time with an infinite horizon. At time $t = 0$, a parent firm sells an asset with a potential value of $v_1 = \frac{\delta}{1-\delta}c_1$, where c_1 is a constant perpetual cash flow and δ is the discount factor. As a division of the parent, however, the asset has a present value of only $v_0 = \frac{\delta}{1-\delta}c_0$, where $c_0 < c_1$, due to inefficiencies in the current organizational form.⁴ We denote by $Z = v_1 - v_0 > 0$ the loss in value due to these inefficiencies. The asset is sold in an ascending bid auction where two

⁴These inefficiencies can encompass influence costs that are generated by a subsidiary that undertakes non-productive activities, such as lobbying the parent for resources to benefit the unit, that do not contribute to the value of the firm as a whole.

populations of potential buyers participate: m private equity firms, henceforth PEs, and n operating firms (strategic bidders), henceforth SBs. Within each population category, the composition of the buyer pool may vary over time.

In every period $t = 0, 1, \dots$, there is random draw of $n > 1$ potential strategic buyers from a constant population, so the distribution of potential buyer characteristics is i.i.d. across time, capturing the idea of a time-varying set of SBs with synergies between their assets and the asset for sale. For a given present value of cash flows $v \in \{v_0, v_1\}$, the valuation of the asset to SB i is equal to $v + \tilde{x}_i$, where \tilde{x}_i denotes the idiosyncratic operating synergies between the assets of SB i and the asset for sale. We assume the synergies, $\tilde{x}_i \in [x_L, x_H]$, with $x_L \leq 0 < x_H$, are exogenous and private information to SB i and that synergies are i.i.d. among the SBs with c.d.f. F in the initial auction or any subsequent contest for the asset. We denote by $\tilde{x}^{(1)}$ and $\tilde{x}^{(2)}$ the first and second highest synergies among n SBs, respectively. Let $F^{(\tau)}$ be the c.d.f. of $\tilde{x}^{(\tau)}$, for $\tau = 1, 2$. We assume $E[\tilde{x}_i] > 0$, implying that the expected synergies of SBs are positive. We allow for $F(0) \geq 0$, so there is a positive probability that in a given period t there are no SB bids for the asset.

PEs do not have operating synergies but they may have a comparative advantage at implementing a reorganization of the asset. PE ownership is transitional, so a PE that buys an asset will first restructure and then divest it to interested parties via an *exit auction*. We denote by $v_0 + x_{PE}$ the asset's value to a PE bidder, where x_{PE} is endogenous and depends on the asset's potential operating performance after restructuring and expectations about the asset's value at exit.

PEs can enhance the asset's value by eliminating inefficiencies and improving the asset's operations. This restructuring increases per-period expected cash flows from c_0 to c_1 . Once v_1 is attained no further improvement is possible. It is during the initial round of PE ownership that the asset un-

dergoes the reorganization of being transformed from a subsidiary into an independent firm, unlocking the potential value v_1 . A PE incurs a one-off cost of $e < Z$ for the initial restructuring. Although subsequent rounds may also generate positive benefits, they involve lesser degrees of organizational improvement and we normalize to zero the net benefit of subsequent restructuring.

To keep the theory more tractable we assume that the restructuring abilities of different PEs are identical; that is, the parameters c_0 , c_1 and e do not depend on the identity of the PE.

Before bidding in the initial auction at $t = 0$, a PE must first spend $\alpha \geq 0$ to identify and evaluate the asset and its potential for restructuring and value improvement. Each PE simultaneously decides whether to invest α and participate in the auction, or to abstain from bidding. Strategic buyers know their operating synergies and can participate without cost. If the asset is sold to SB i , it becomes part of the buyer's operating structure and generates cash flows with a present value of $v_0 + \tilde{x}_i$. If the asset is sold to PE j , it will be reorganized and then sold via an *exit auction* with an ascending bid format, where potential buyers are SBs and PEs. At the exit stage, the first PE's reorganization has already increased the asset's value to v_1 .

2.2. *Equilibrium and exit decision*

We solve the game by backward induction. To proceed, we first determine the revenue that PE j expects to receive if it owns an asset with performance v_1 . Second, we deduce $v_0 + x_{PE}$, i.e., PE j 's valuation of the asset in the initial auction. Third, we compute the PE's expected equilibrium profit in the initial auction. Fourth, we compute the equilibrium PE entry decision. Thus, we can analyze the parent seller's expected revenue in the initial auction, conditional on the winning bidder being a PE or a SB. We focus on symmetric equilibria.

Let V_{PE} denote the expected cash flow to PE j from owning an asset whose current performance is

v_1 , and that proceeds to sell it in one time period. This value is computed at the beginning of a given period t and just after the asset has paid that period's cash flow. Note that V_{PE} also represents PE j 's expected continuation payoff just after having acquired the asset from the initial seller, invested e and received c_1 . Then V_{PE} must satisfy the following equation:

$$V_{PE} = \delta \left(c_1 + \int_{x_L}^{\min\{x_H, V_{PE}-v_1\}} V_{PE} dF^{(2)}(x) + \int_{\min\{x_H, V_{PE}-v_1\}}^{x_H} (v_1 + x) dF^{(2)}(x) \right). \quad (1)$$

This equation says that the PE receives c_1 and then sells the asset via an (ascending bid) exit auction, where the potential bidders include PEs and SBs. The maximum amount a PE participating in the exit auction, i.e., PE k , is willing to pay is V_{PE} . If in fact, PE k wins the auction (i.e., there is a SBO), then it will be in exactly the same situation as PE j currently is. Note that PE j prefers to retain the asset rather than selling it for strictly less than V_{PE} . Thus, the exit auction will be won by the SB with the highest synergies, provided that its synergies \tilde{x}_i lead it to value the asset at more than V_{PE} ; i.e., $v_1 + \tilde{x}_i \geq V_{PE}$. Otherwise, the asset will remain in the hands of a PE (either PE j or another PE buyer, PE k). Thus, the auction proceeds of PE j will correspond to the maximum of the second highest SB bid and V_{PE} . Let x denote the second highest synergy among the n SBs. Recall that its c.d.f. is $F^{(2)}$. The payoff to PE j is $v_1 + x > V_{PE}$ if the second highest SB values the asset more than PE bidders; otherwise, it is V_{PE} . This reasoning suggests that in equilibrium in an exit auction a SB winner pays more than a PE winner. Thus, when a PE-owned asset (a stand-alone entity) is auctioned off, the return to the (PE) seller will be greater on average when the asset is sold to a SB (trade sale) rather than to another PE (secondary buyout).

There are two separate sources that lead a PE to value the asset at V_{PE} . One source is the PE's ability to reorganize the asset so as to achieve v_1 ; this *restructuring potential* is measured by $v_0 - v_1$.

The other is the potential profit a PE can obtain from auctioning an asset to SBs that have synergies with the asset at the exit.

Proposition 1 *a) The unique solution of Equation (1) in V_{PE} satisfies $v_1 < V_{PE} < v_1 + x_H$. V_{PE} increases in the asset's restructured value v_1 , and in its resale potential that improves with δ , n and SBs' expected synergies.*

b) At exit, the PE's expected revenue is higher when the asset is sold to a SB compared to the value when it is sold to another PE.

An asset with performance v_1 is worth exactly v_1 to a bidder with no synergies that plans to hold the asset indefinitely. A PE has no synergies and hence it will value the asset at least at v_1 ; however it values the asset at more than v_1 because it expects additional profits from its option to sell to future SBs with positive synergies. The value of the asset to a PE increases with each source of value: v_1 and the resale potential. As a PE is indifferent between retaining the asset and selling to another PE, a SBO provides the lowest exit auction revenue to PE.

2.3. PE entry decision, initial auction, and PE revenue

From the previous section we are able to deduce that the maximum amount the PE is willing to pay in the initial asset auction is $V_{PE} - e$ where V_{PE} is as described in Proposition 1. This amount corresponds to the present value of next period's expected cash flow and the exit revenue, net of the restructuring cost e . We define

$$x_{PE} = V_{PE} - e - v_0 > 0$$

as the extra value a PE attaches to the asset compared to the value of the asset to the parent seller.⁵

⁵Note that $V_{PE} \geq v_1$ implies that $x_{PE} = V_{PE} - e - v_0 \geq v_1 - e - v_0 = Z - e > 0$.

The value of the asset for SB i is exogenous and equal to $v_0 + \tilde{x}_i \in [v_0 + x_L, v_0 + x_H]$. Thus, in the symmetric equilibrium of the initial auction each bidder will increase its bid until it reaches its own valuation of the asset. Since all PEs value the asset the same, as long as there are at least two PEs in the initial auction they will bid up to their valuation and realize zero profit. Alternatively, a PE that does not face competition from other PEs will pay the maximum between v_0 , the starting price, and the highest SB valuation as long as the amount does not exceed $v_0 + x_{PE}$. In this case, its expected profit is strictly positive and equal to⁶

$$\pi_{PE}^* = \int_0^{x_{PE}} (v_0 + x_{PE} - (v_0 + x)) dF(x)^{(1)} + x_{PE} F^{(1)}(0) = \int_0^{x_{PE}} F(x)^{(1)} dx > 0.$$

We now consider the PE decision to invest α and bid for the asset in the initial auction. The entry decision depends on whether or not other PEs enter the auction. We show in the Appendix (Lemma 1) that in the unique symmetric equilibrium, each PE participates in the initial auction with probability $q^* = 1 - (\alpha/\pi_{PE}^*)^{\frac{1}{m-1}}$ if $\pi_{PE}^* > \alpha$, and 0 otherwise.

2.4. Empirical implications

To compare the average levels of winning SB bids and winning PE bids, we consider the comparative statics of a variation in any of the underlying parameters.

Valuation hierarchy of SB buyers and PE buyers in the initial auction. Let us first consider the benchmark where PEs have no restructuring ability but simply buy an asset today to resell it in the following period. If $Z = 0$, given that the PE has no ability to restructure the asset, it is natural to assume $e = 0$ because the PE will not invest in the restructuring of the asset. Moreover, $\alpha = 0$ because a PE will not spend resources to identify the restructuring potential of assets that are known

⁶Recall that the starting bid price is v_0 .

not to be restructurable by a PE. Still, PEs provide asset liquidity as they might make opportunistic bids to benefit from mispricing, i.e. to acquire an asset that currently receives only low-value strategic bids that fall short of the asset value V_{PE} when accounting for expected exit valuations driven by future synergistic bidders. We can formally derive the following testable implication for seller revenue:

Hypothesis 1 (No Restructuring) *If PEs have no or little restructuring ability, then the seller revenue from a winning SB bid is strictly larger than the seller revenue from a winning PE bid.*

A formal proof of the no-restructuring hypothesis is stated in the Appendix (Corollary 1).

By contrast, when a PE has some restructuring capability it is reasonable to assume $0 < e < Z$ and $\alpha > 0$. We consider changes in the parameters c_1 , δ , n and F that increase x_{PE} , variation that jointly explains the frequency of a PE outcome and the expected difference between a winning PE bid and a winning SB bid. Proposition 1 indicates that a PE's endogenous value component, x_{PE} , is increasing in the restructuring potential and the resale option value. Moreover, as we show in the Appendix (see Corollary 2), the probability of a PE winning the auction will increase in all parameters that positively affect x_{PE} . At the same time these parameters have a positive impact on the parent's expected revenue when selling to a PE. For x_{PE} large enough, this revenue is higher than the revenue obtained when selling to a SB. These analytical results (Corollary 2 in the Appendix) allow us to generate a comparison of the average levels of winning SB bids and winning PE bids.

Hypothesis 2 (Restructuring) *The average seller revenue from a winning PE bid is strictly larger than the seller revenue from a winning SB bid if and only if PEs' restructuring ability is sufficiently important.*

Hypothesis 1 and 2 provide an empirical test to better understand the source of value created by a PE: a higher parent's average revenue from selling to PEs rather than SBs must be related to PE

ability to restructure the asset. On the contrary, the reverse ranking on revenues is compatible with the absence of PE restructuring ability.

Excess performance under PE control. In the model the improvement from c_0 to c_1 is only available if an asset is PE-controlled, which by definition does not apply to a public benchmark firm. Hence we predict:

Hypothesis 3 (PE Outperformance) *If PEs have restructuring potential, the performance of the asset under PE control should exceed that of a benchmark publicly traded firm.*

This prediction and the previous one are related because it is the ability of the PE to generate excess performance from the asset that allows PEs to outbid SBs, on average.⁷

Our model implies that PE bids in the initial auction and the expected performance under PE ownership should be positively related. Specifically, the theory predicts that PE bids are increasing in x_{PE} that in turn are increasing in resale potential or the asset liquidity, i.e. the expected distribution of $\tilde{x}^{(2)}$ at exit. When the resale potential is relatively low, the PE is more likely to exit in a secondary buyout; when the resale potential is high, the PE is more likely to exit by selling to a SB. This result leads us to our last hypothesis:

Hypothesis 4 (Seller Gains, Asset Performance and PE Exit) *The seller gains generated by winning PE bids and the value creation of the asset until PE exit should be positively related. The seller gains should be higher on average when a PE exit occurs via a sale to a strategic bidder than via a secondary buyout.*

⁷Note that it is the excess performance of PE buyers and the valuation hierarchy in the initial auction that indicate that PEs have unique restructuring potential, not the fact that we observe winning PE bids. In our model, even in the absence of restructuring potential (i.e., $v_0 = v_1 = v_2$), x_{PE} is normally strictly positive because of the asset's resale option value, so PE bids will at times win auctions.

Additional predictions, such as predictions that relate to the choice between exit routes and asset performance, can be generated if we extend the model in the directions suggested in the following subsection. We will discuss such predictions in our empirical analysis below.

2.5. Discussion and extensions

In this section, we discuss several directions as to how the model can be extended and how each of these modifications affects the analysis, in particular when altering four assumptions: One, we assumed that after a PE buys the asset in the initial auction, the outcome of the restructuring is certain. Two, we assumed that a SB cannot resell the asset after acquiring it. Three, we assumed that PEs are homogeneous in their restructuring abilities. Four, we assumed that the PE advantage - the reason that PEs can win in the absence of synergies - lies in their exclusive restructuring capabilities and not in an informational advantage that simply allows them to identify undervalued assets.

First, consider the case where the outcome of the process of restructuring an asset under PE control is unknown *ex ante*. Because the asset is taken private under PE ownership, it is natural to assume that only the PE controlling the asset observes the exact restructuring outcome (unless the asset goes bankrupt triggering a Chapter 11 court filing). However, if the PE decides to exit its investment through an IPO, then it is natural to assume that the asset's true value will be fully disclosed given the extensive transparency requirements (i.e. public filings) intrinsic to the IPO process. As a consequence, we can show that under certain conditions the PE will prefer to sell the asset through an IPO only when the restructuring generates a higher value than expected. A PE will adopt a less public form of exit, such as the exit auction in our baseline model, when the restructuring leads neither to a distressed (bankruptcy) outcome nor to a very high intrinsic value. As a result, we can demonstrate that a hierarchy emerges linking the performance of the restructuring process under

PE control and the type of exit: distressed assets that perform very poorly will be liquidated through a bankruptcy procedure; assets with the most successful restructuring outcomes are sold publicly via an IPO; and those assets with intermediate outcomes are sold in an exit auction to either SBs or PEs following the same hierarchy of Proposition 1 (b). Finally, if we further assume that the expected time until completion of each of the different restructuring outcomes is uncertain, then we can show that the expected duration from purchase until exit is inversely related to the expected annualized gain in performance under each of the different exit routes: IPO, trade sale, and SBO.

Second, suppose that, like PEs, a SB that buys the asset can also later resell it either to another SB with higher synergies or to a PE. In this case, a SB with synergies $x < x_H$ would value the asset with intrinsic value v at more than $v + x$ because there is a positive probability that a SB with synergies larger than x will bid for the asset in the next period. This potential would increase the asset's market value due to the higher re-sale opportunity and it would also increase a PE's valuation for the asset. If a PE has no restructuring ability, then it will value the asset and behave exactly like a SB whose level of synergies is nil, that is $x_{PE} = 0$. Hence our result of Hypothesis 1 would still be valid. Since the main economic trade-offs remain unaltered, we conclude that only the presence of unique restructuring abilities of PEs can generate an outcome in which PEs make bids higher than of a SB with zero synergies. After the initial auction, only SBs will be able to offer synergy gains so they will outbid PEs in an exit auction, implying that no SBOs occur.

Third, let us consider the case in which PEs differ in their restructuring capabilities. Assume for example that the net gain $v_1 - v_0 - e$ is not the same for all PEs. This modification would translate into different levels of x_{PE} for different PEs, reflecting their heterogeneous restructuring capabilities. We need to consider two subcases, depending on PEs' information. Assume first that

each PE is initially uncertain about its true restructuring capability but receives a precise signal about its capability once it invests $\alpha > 0$. If PEs across the board have very low restructuring abilities, Hypothesis 1 would apply because there would be no gain to investing α to learn x_{PE} . Even if the levels of x_{PE} are sufficiently dispersed and PEs invest α , the entry decision and the resulting entry equilibrium would not qualitatively differ from the case of homogeneous PEs. However heterogeneity of PEs does generate two noteworthy effects. One, bids of PEs in the initial auction will be more dispersed. Two, because a PE with high restructuring capability can make a profit when competing against a lesser-capable PE, the ex-ante incentive to enter the initial auction is stronger. The other subcase is the case in which PEs know their restructuring capabilities before investing α .⁸ In this case only PEs with sufficiently high restructuring capabilities would enter the auction. This effect would reinforce the result that the seller's expected revenue from winning PE bids is higher than the seller's expected revenue from winning SB bids.

Fourth, consider the case in which the PE's advantage is based on superior information about the asset - an alternative explanation as to why PEs can outbid SBs in spite of a lack of synergies - not on a PE's unique restructuring abilities. Suppose that PEs have some private information that allows them to identify undervalued assets. To be more precise, assume that PEs get a precise signal on the asset's intrinsic value, v_1 or v_0 . However, any party that gains control of the asset, whether SB or PE, achieves the same intrinsic value for the asset, augmented by synergies x_i in the case of an SB. In auction theory language, in addition to the private value format of heterogeneous SB synergies that we have considered so far, the auction then also includes a common values component, namely the true value $\tilde{v} \in \{v_0, v_1\}$ on which PEs are better informed. This assumption introduces a winner's curse element into the bidding strategies of SBs, with the effect of reducing the seller firm's

⁸In this case α can be interpreted as the cost of identifying a restructurable asset.

expected revenue.⁹ It is, therefore, in the seller's interest to adopt an auction format that reveals a maximum of information about PE bids, such as a non-anonymous ascending bid auction. This auction format eliminates PEs' informational advantage because SBs are able to update their beliefs about the common values component \tilde{v} as a function of the PE bids they observe. In equilibrium, SB i with private value x_i outbids PEs whenever $x_i > x_{PE}$. In this setup, it can be shown that it is not optimal for PEs to invest in information acquisition since they cannot profit from the information; but PEs participate in the auction and they sometimes win - whenever $x_{PE} > \tilde{x}^{(1)}$. As a result, this variant of the model robustly predicts that PEs generate *lower* winning bids than SBs, i.e. the same prediction as in Hypothesis 1. In other words, this extension allows us to conclude that within the scope of our model it is the presence of sufficiently large unique PE restructuring abilities that are a necessary model ingredient to obtain an equilibrium in which PEs generate *higher* winning bids than SBs.

3. Sample

To consider the implications of the model we obtain sales of large operating assets that are wholly owned by publicly traded parent firms from the SDC Acquisition Database for 1994 through 2004.¹⁰ We confirm that each event is a corporate asset sale, identify the initial announcement date, and obtain relevant transaction data from SEC filings, Factiva, Lexis-Nexis, the Wall Street Journal, and Standard and Poor's Stock Reports, Stock Guide, and Directory of Corporations, and web sites of private equity firms. Events are categorized by type of buyer: private equity, public operating firm, and private operating firm. We also require that the relevant fund of the private equity buyer of the asset does not own an operating firm that will be merged with the asset. We verify that the

⁹See for instance Milgrom and Weber (1982).

¹⁰The sample ends in December 2004 to allow enough time to observe sufficient private equity exits to generate useful perspective about the implications of the model.

public parent is not in bankruptcy nor divesting the asset due to a regulatory or judicial mandate. The identity of the buyer and terms of the transaction must be publicly reported and the transaction must transfer full ownership of the asset. To minimize reporting bias, the minimum transaction price is \$100 million, a condition that increases the probability that each asset is of sufficient size and stature to be material, and that for sales to private equity the business is likely to warrant sufficient interest in the business press to generate coverage of the date and type of exit transaction.

The final sample consists of 146 private equity deals, 287 deals with public strategic buyers, and 48 deals with private strategic buyers. Descriptive statistics are reported in Table 1; values are in constant (1997) dollars. The transactions are large deals with an average (median) value of \$398 (\$212) million for sales to private equity, \$644 (\$255) million for sales to public strategic buyers, and \$308 (\$222) million for sales to private strategic buyers. None of the differences in means (medians) is statistically significant. Median transaction values are almost identical, suggesting that private equity has been an effective competitor in asset sales. The mean (median) seller market capitalization is \$22 (\$4.6) billion, \$21 (\$5.2) billion, and \$8 (\$2.6) billion in the respective subsamples; for public buyers it is \$22 (\$2.7) billion. The median ratios of transaction price to seller market value are of similar magnitude. A broad range of industries is represented with 105, 156, and 38 different 4-digit SIC codes for the assets in the respective subsamples.

4. Empirical results

4.1. Valuation effects of corporate asset sales

We consider first the alternative hypotheses. In Table 2, two-day market model average excess returns, proportion of returns positive, and median returns at the initial sale announcement are reported. For asset sales to public strategic buyers, seller excess returns are significantly positive,

1.25%, t-statistic of 6.10 (median of 0.27%), and are similar to previously reported results (Jain, 1985; Hite, et al., 1987; John and Ofek, 1995; Sicherman and Pettway, 1992; Hege, Lovo, Slovin, and Sushka, 2009). The median transaction return, 2.85% ($p = 0.29$), is reported to provide a metric for the economic importance of seller gains. As in previous studies, the results show that the market views corporate asset sales as value increasing for sellers, but the typical change in seller value is small relative to the size of the asset and is well below the premiums of 25% or more observed for stand-alone targets in merger studies. For sales to private strategic buyers, seller excess returns are 0.95%, t-statistic of 2.19 (median of 0.46%), and are not significantly different from the results for public buyers. The median seller transaction return, 3.68%, is also similar to public buyer deals.

For asset sales to private equity, seller excess returns are positive and economically large, 3.78%, t-statistic of 12.42 (median is 2.06%); the proportion of returns positive is 82%.¹¹ The mean and median seller returns are each significantly greater than seller returns in deals with public buyers ($p = 0.00$) and private operating firms ($p = 0.01$). The median seller transaction return, 22.25% ($p = 0.00$), is also significantly greater than in deals with public or private strategic firms ($p = 0.00$). This pattern of higher seller returns provides a metric of the value that is generated by private equity in the asset sale market and is consistent with Hypothesis 2, that private equity has an ability to generate excess performance from the asset that allows PEs to outbid SBs, on average. Our findings contradict Hypothesis 1, that PEs are characterized by the absence of restructuring abilities. Our findings also contradict the view that PE performance in asset sales is primarily due to offering bids for undervalued assets; as discussed in Section 2.5, if PE bids were based on private signals about an

¹¹By their nature, private equity funds do not use equity as the means of payment in their transactions and thus our sample does not include deals in which sellers accept a block of equity in public strategic buyers as the means of payment. We note, however, that the large returns to sellers in private deals are of a magnitude similar to that reported for asset sales in which buyer equity is utilized as the means of payment, as reported in Slovin, Sushka, and Polonchek (2005) and Hege, Lovo, Slovin, and Sushka (2009).

asset's common value, PEs would generate *lower* winning bids than SBs. Since our model implies that unique PE restructuring abilities are the ingredient necessary to obtain a bidding hierarchy in which PEs generate higher winning bids on average relative to SBs, our event study results support the view that PEs contribute valuable restructuring capabilities to the assets they acquire from parent firms.

Our finding of greater returns to sellers when assets are sold to private equity is opposite to Bargaron, et al. (2008) who report greater gains (premiums) to mergers of stand-alone targets acquired by public firms, a result they ascribe to overbidding due to agency problems at public buyers. However, we find positive average returns to public acquirers in asset sales, 0.48%, t-statistic of 3.10 (median is 0.33%), implying that public buyers extract a modest rent for their private information about expected synergies so their behavior in the aggregate does not reflect agency problems (such as hubris or empire building) as discussed in the merger literature (Thaler, 1988; Barberis and Thaler, 2003; Baker, Ruback, and Wurgler, 2007). On the whole, modest gains in combined shareholder wealth at asset sales to strategic buyers imply there are modest synergistic gains in these transactions, consistent with findings reported in prior asset sale studies. The comparison between Hypothesis 1 and Hypothesis 2 is a possible avenue to explain the discrepancy between our findings for asset sales and those of Bargaron et al. (2008) and Gorbenko and Malenko (2010) for mergers.¹²In this view, the restructuring potential of PEs is on average larger in asset sales than in mergers of stand-alone firms, based on the potential advantages associated with changes in organizational form (e.g., elimination of influence costs) that are exclusive to asset sales.

In our theoretical model the improvement in asset value from v_0 to v_1 is only available for an

¹²Gorbenko and Malenko (2010) analyze competitive auctions for firms (and not subsidiaries), and find that strategic buyers bid more than private equity, results that can be viewed as consistent with Bargaron, et al. (2008).

entity controlled by private equity. On this basis, a winning private equity bid is not expected to have information content for other (benchmark) firms in the industry - such an effect would be indicative of private equity's ability to act on private (industry common) information rather than a restructuring capability specific to the asset of a seller firm. Such an alternative hypothesis would lead us to predict the inverse hierarchy of seller gains, as discussed in Section 2.5. To assess this possibility, we evaluate the intra-industry effect by examining share price responses of public benchmark firms with activities similar to the asset sold. If a bid were to convey new industry common information, then share prices of the benchmark firms should increase at the sale announcement. We identify CRSP firms with the same 4-digit SIC code as the asset, use these firms 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 the intra-industry effects are small and not statistically significant, implying that there is little industry common information conveyed by an asset sale to private equity, or indeed any asset sale irrespective of buyer type. This finding supports the view that the gains from asset sales do not flow to other firms in the industry.

4.2. Exit transactions and economic performance for private equity deals

Our auction model indicates that private equity bids are related to expectations about future revenues from exit transactions. Based on our empirical findings so far, Hypothesis 3 implies that assets under private equity control should outperform benchmark firms. Hypothesis 4 indicates that parent firm returns should be related to private equity's expectations about its ability to generate value and successfully exit the investment. Thus, if ex post realizations and ex ante expectations are related, seller returns should be related to the ex post gains in asset enterprise value that are eventually generated by private equity's management of the asset.

We investigate these predictions by determining the exit status (through year-end 2011) of each asset acquired by private equity. Because the sample includes all large eligible operating assets sold by public firms from 1994 through 2004, our findings about subsequent outcomes are not subject to the selection bias problems in many studies of private equity (difficulties generated by the secretive nature and lack of disclosure intrinsic to private equity). Once acquired by private equity, the assets in our sample are not public entities so there is little disclosure about their operating performance or capital structure, although some information reported in the business press suggests they are highly levered. Nevertheless, we are able to identify the terms for all of the 121 exit transactions and to confirm that the 25 assets without an exit are still owned by the original private equity buyers.

In Panel A of Table 3, the average time to exit is 3.4 years. We find that exit is most rapid for IPOs (2.1 years), somewhat longer for trade sales (3.2 years), and longest for SBOs (5.0 years). SBO time to exit is significantly longer than for IPOs and strategic exits ($p = 0.01$), which suggests private equity sells an asset to another private equity firm when a timely exit by IPO or trade sale is not likely. This result suggests that SBOs may be regarded as less successful outcomes, or cases of incomplete restructuring. In 20 cases, exit is by bankruptcy (4.4 years).

To determine the ex post (annualized) rate of increase in asset enterprise value during the period of private equity ownership, we obtain the transaction price, or market value of equity plus book value of debt, depending on the type of exit, and compare it to the original sale price. This metric is not a direct measure of the profitability for fund investors, but it is a useful gauge of an entity's economic performance. To the extent that SBOs and bankruptcies can be viewed as less satisfactory outcomes for private equity, our theory suggests that asset performance and type of exit mechanism are related, with performance expected to be higher for IPOs and trade sales than for SBOs and

bankruptcy filings (where IPOs and bankruptcy are discussed in Section 2.5). The data also allow us to examine whether there is a similar pattern of the gains in wealth to the original parent firm seller and whether there is a differentiation by type of exit.

The mean (median) annualized growth rate in enterprise value (EV) for the 121 assets with exits is 48.45% (18.69%). To benchmark these results, the annualized growth rate in enterprise value over identical periods is calculated for public firms with the same 4-digit SIC code as the asset that was closest in enterprise value to the original sale price of the asset. The mean (median) annual growth rate for the benchmark firms is 20.53% (6.12%) and the difference in sample and benchmark firm means (medians), Excess EV, is statistically significant, $p = 0.00$ ($p = 0.00$). This result suggests that, while owned by private equity, the acquired entities achieve considerable business success relative to their benchmark firms, a finding that is consistent with Hypothesis 3. The changes in enterprise value at sample and benchmark entities are highly correlated, 0.74, consistent with the expectation that an asset's growth is related to the growth rate of its industry, but the overall pattern of results suggests that private equity skills contribute to asset value and that a portion of the capitalized value of these gains is received by the original parent firm sellers at the initial asset sale.

We disaggregate the results by type of exit. Entities that file Chapter 11 retain very little value, as reflected in an average (median) annual decline in enterprise value of -27.11% (-21.20%). Given 20 Chapter 11 filings, bankruptcy of private equity-owned assets is significantly ($p = 0.01$) more frequent than for benchmark firms (with seven filings). In principle, private equity ownership of an asset could still increase the enterprise value of an entity despite a bankruptcy filing. For example, a sustainable business that becomes overlevered, may be 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.¹³ 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. Liquidation of the entity occurs in ten cases, with minimal payments to unsecured creditors, and equity is cancelled (no payment to private equity). In eight other cases reorganization occurs but almost all enterprise value is lost, with unsecured creditors absorbing large losses and equity interests cancelled. In only two cases is there a reorganization in which some private equity interests are conveyed to debtholders, resulting in a less levered entity where private equity retains a minority stake.

The systematic pattern between gains in enterprise value and type of exit suggests a hierarchy with respect to business success that is consistent with other literature. The highest mean (median) annual growth rate in enterprise value occurs for IPOs, 111.52% (43.64%), consistent with the model extension discussed in Section 2.5, and is significantly greater than for benchmark firms. The next highest mean (median) growth rate is for exit by sale to strategic buyers, 36.81% (24.78%), also significantly greater than their benchmarks. This estimate of the gains in enterprise value for trade sale exits understates the overall (global) economic gains since these transactions also add to buyer value. More specifically, in 22 of the 37 trade sale exits the strategic buyers have CRSP returns, and the average excess return for this group of buyers is 4.20% ($p = 0.00$); the average transaction return is 10.50% ($p = 0.05$); the relevant median returns are 2.96% ($p = 0.00$) and 7.75% ($p = 0.00$), respectively. The positive buyer excess returns in exit deals indicates that there is no evidence of overbidding by public strategic buyers in these exit transactions, just as there is no overbidding in in the initial deals or in the previous literature on asset sales.

¹³For example, Kaplan (1989a) has argued that Campeau's acquisition of Federated Department Stores added value even though it ended in bankruptcy.

Although SBOs could be viewed as an alternative form of asset sale (where the buyer is another private equity firm rather than a strategic firm), our theoretical model predicts that in equilibrium a strategic buyer pays more than private equity at the exit auction. The intuition for this prediction is that strategic bids encompass synergies that add value to the restructured asset, together with the expectation that the greatest improvements in restructuring an asset have already been carried out by the original private equity buyer, leaving less scope for value creation by a second private equity owner, who in effect can be viewed as a buyer of last resort. Our model suggests that a private equity firm is indifferent between keeping the asset or selling it to another private equity firm. SBOs can also be viewed as a means of exit employed by private equity when the termination date of a private equity fund draws near and strategic buyers are scarce (Kaplan and Schoar, 2005).

For the 23 SBOs, the mean (median) annualized growth rate in enterprise value is 20.48% (10.38%), significantly less than for assets sold to strategic buyers, $p = 0.09$ ($p = 0.05$). This finding suggests that exit by SBO is associated with poorer performance of the asset relative to exit by IPO or strategic sale, although mean (median) performance is significantly ($p = 0.05$) more favorable than the gains in enterprise value achieved by benchmark firms. We note that the greater gains in enterprise value when assets owned by private equity (which like the target firms in a merger study are stand-alone entities) are sold to strategic buyers rather than other private equity firms, parallels results reported by Barger, et al. (2008) that there are greater gains (premiums) to merger targets acquired by public firms rather than private equity. While they attribute this result to overbidding by public buyers (due to agency problems), our theoretical model predicts this pattern of behavior for asset sale exits with no overbidding by public buyers.

Moreover, our model suggests that when a private equity firm wins the exit auction, it has less

potential to improve the asset than the initial private equity owner. This reasoning implies that the asset's performance during the second buyout period should be no better than that during the initial round of private equity ownership. To test this implication, we examine the outcomes when the subsequent SBO itself exits; as of year-end 2011, 11 of the 23 SBOs have such exits. In Panel B, performance during ownership by the second private equity firm is broadly similar to that of the initial private equity firm. The second private equity firm holds the asset for an average of four years and the mean (median) annualized growth rate in enterprise value is 15.19% (16.76%). Neither figure is statistically different from the gains for the first private equity round. Moreover, the second round gains differ little from the average (median) gains in enterprise value of their benchmark firms, 14.92% (10.00%). These results suggest that SBOs are a less favorable form of exit relative to IPOs or sales to strategic buyers.

The overall pattern of the growth in enterprise value for benchmark firms shows the same hierarchy as that of the sample assets. This evidence suggests that expectations about future industry developments are a factor in determining bids by private equity. Nevertheless, taken as a whole, our results indicate that the average (median) growth rate in enterprise value for assets originally acquired by private equity exceeds that of their benchmark firms, suggestive of an ability of private equity to generate business improvements for the assets that are divested by corporate sellers.

Hypothesis 4 suggests that the pattern of gains to parent firm sellers should parallel the subsequent changes in asset enterprise value observed in exit transactions, and our empirical results conform to this prediction. Specifically, there are large statistically significant gains for parent firms that sell assets to private equity and that subsequently exit via an IPO or a strategic asset sale, with median transaction returns of 45.05% ($p = 0.00$) and 24.72% ($p = 0.00$), respectively. By contrast, parent

firms that sell assets that eventually sustain bankruptcy have a median transaction return of 7.15% ($p = 0.04$), a figure significantly smaller than returns to sellers of assets that eventually exit private equity via IPOs ($p = 0.05$) or strategic sales ($p = 0.10$). The median seller transaction return for SBO exits, 16.71% ($p = 0.00$), is smaller than exits by IPO or sale to strategic buyers, but greater than exits by Chapter 11. These results suggest that private equity submits lower bids, resulting in weaker gains to sellers, when it expects to be able to generate only modest gains from the asset.

Our theory predicts that a private equity bid, and in turn seller excess returns, conveys information about expected future payoffs and PE ability to exit the investment successfully. To test whether our data indicate a relationship between the excess return of initial parent sellers and subsequent asset performance, we estimate regressions that include the parent seller (transaction) return as an independent variable together with additional variables that control for other determinants of performance success using a set of widely used measures. The estimated coefficients of these regressions are reported in Table 4. The first dependent variable is the excess EV (i.e., the difference between the annualized growth rates in enterprise values of the asset and its benchmark). The coefficient of the seller transaction return is positive and significant, suggesting that the seller's share price reaction at a private equity deal provides a useful metric for the future success of private equity investments. Our second performance metric is a profitability index, for which we obtain similar results.¹⁴ 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 the relative eventual success, IPO or strategic asset sale, versus relative failure, bankruptcy or SBO, using a binomial logit model. The

¹⁴The 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).

coefficients for the seller transaction return are highly significant, providing an estimate as to how an increase in the transaction return for the parent firm seller affects the marginal likelihood of the type of exit. The 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 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 is significant in all three specifications. The results are consistent with a central implication of our theoretical model, namely, that private equity expectations about future payoffs affect their bidding for an asset, and the gains to selling firms.

4.3. Cross-sectional regression analysis

We use regression analysis to test whether other factors, specifically observable seller or asset characteristics, affect the statistically significant greater gains to sellers that are generated in deals with private equity buyers. The dependent variable is defined as seller transaction returns and alternatively, seller excess returns. In each regression, two qualitative variables for the type of buyer are specified. One variable takes on the value of unity for private equity 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 dependent variable is the transaction return. The pattern of results is similar when the dependent variable is seller excess returns.

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 other asset sale studies. Seller variables reported 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). The effect of the variable for private equity buyers remains positive and strongly significant, irrespective of the regression specification. We test a large array of other independent variables but find that they are not statistically significant; for economy of presentation they are not reported in the table.¹⁵

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

Given private equity funding cycles and evidence that well-established funds benefit from market fluctuations (Gompers and Lerner, 1998; Gompers, Kovner, Lerner, and Scharfstein, 2008; Ljungqvist, Nanda, and Singh 2006), we assess whether greater seller returns in private equity deals are related to financial market conditions. We include a wide array of variables that are known to affect private equity investments and to capture market timing opportunities.¹⁶ None of the variables is statistically significant and the qualitative variable for private equity deals remains consistently significant, indicating the effect of the type of buyer for seller returns. We also test variables to reflect the reputation

¹⁵The 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 are 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.

¹⁶The variables tested are 1-year and 3-year lagged performance of S&P500 and Nasdaq indexes, S&P500 operating performance, and dividend yields; for debt markets, bond term spread and corporate credit spread; for exit markets, Fama-French book-to-market ratio, number of IPOs, IPO first-day returns, and percentage of positive first-day returns; and for the relationship of capital supply and capital disbursements, capital raised but not invested by funds over the past five years.

of private equity firms by including dummy variables for deals in which buyers are the large, best known private equity firms, but the coefficients are not statistically significant, suggesting that the identity and reputation of the private equity firm does not affect seller returns.

5. Conclusions

In this paper we provide a theoretical and empirical analysis of corporate asset sales, allowing for the participation of both private equity and strategic buyers. We develop an auction model of bidding competition that integrates the behavior of private equity interests with that of strategic buyers, providing a theoretical framework that conforms to the institutional structure of the asset sales market and the business model of private equity. In our model private equity's valuation of the asset is endogenous, and is influenced by the value that can be generated by private equity before it exits the investment. Competitive bidding conveys private information held by strategic buyers as well as the value that private equity expects to generate contingent on having control of the asset. We show how gains in parent firm seller wealth are affected by the type of winning bidder, and that the difference in seller returns generated by private equity versus strategic buyers is driven by whether private equity has the ability to increase value through restructuring.

We use the model as a framework to analyze sales of large corporate operating assets from 1994 through 2004, and we follow the exit pattern of private equity buyers through year-end 2011. Increases in shareholder wealth at seller firms for sales to private equity are significantly greater than for sales to public or private strategic buyers, suggesting the importance of restructuring gains as a basis for private equity bids. We find no intra-industry gains at news of asset sales, irrespective of buyer type, suggesting that the information conveyed is asset-specific. We evaluate the change in the enterprise value of assets acquired by private equity for the period from acquisition to exit. We find that the

annualized growth rate in the asset's enterprise value is significantly greater than for public benchmark firms, suggesting the economic importance of private equity's business skills. We also determine the type of exit. The majority of exits are IPOs or strategic asset sales, with a lesser percentage of secondary buyouts and bankruptcies. We find that parent seller returns at the original asset sale announcements are directly related to the subsequent gains in enterprise value, with sellers earning significantly greater gains for assets that exit by IPOs or sales to strategic buyers rather than by secondary buyouts or bankruptcies. Thus, private equity generates large gains in wealth for selling firms in the case of assets that subsequently prove to be a rich source of value.

Appendix

Proof of Proposition 1: (a) After rearranging equation (1) we obtain:

$$V_{PE} - v_1 - \delta E \left[\max\{V_{PE} - v_1, \hat{x}^{(2)}\} \right] = 0. \quad (2)$$

Equation (2) has a solution in $(v_1, v_1 + x_H)$ because its lhs is equal to $-\delta E [\max\{0, \hat{x}^{(2)}\}] < 0$ and $(1 - \delta)x_H > 0$ for $V_{PE} = v_1$ and $V_{PE} = v_1 + x_H$, respectively. Also the derivative of the lhs of (2) with respect to V_{PE} is $1 - \delta F^{(2)}(V_{PE} - v_1) > 0$ implying the solution of (2) is unique. From the implicit function theorem applied to equation (2), it follows that V_{PE} increases in v_1 , δ , n and in a change in the cdf from F to F' where F' first order stochastically dominates F .

(b) The minimum selling price at the exit auction equals V_{PE} , and V_{PE} is also the maximum price any buying PE would pay. Hence a SB winning the exit auction must have paid at least V_{PE} . ■

Lemma 1 *In the unique symmetric equilibrium, the probability with which each PE participates in the initial auction is*

$$q^* = \max \left\{ 0, 1 - \left(\frac{\alpha}{\pi_{PE}^*} \right)^{\frac{1}{m-1}} \right\} \quad (3)$$

that is non-decreasing function of x_{PE} .

Proof of Lemma 1: Note that if PE j does not participate in the initial auction its payoff is nil either because it will never buy the asset or because it will buy it at the fair PE value V_{PE} from another PE via an exit auction. If PE j invests α to participate in the initial auction, then its payoff is $-\alpha + \pi_{PE}^*$ if it is the only PE bidder and $-\alpha$ otherwise. If $\pi_{PE}^* < \alpha$, no PE will ever invest α and the resulting q^* is nil. Consider the case $\pi_{PE}^* \geq \alpha$ and let q be the mixed strategy entry probability adopted by each of the other $m - 1$ PEs in a symmetric equilibrium. Then PE j is indifferent between entering or not, if and only if $-\alpha + (1 - q)^{m-1} \pi_{PE}^* = 0$, which is true for $q = q^*$. The fact that q^* is non-decreasing in x_{PE} follows from $\pi_{PE}^* = \int_0^{x_{PE}} F(x)^{(1)} dx$. ■

Hypothesis 1 (No restructuring) can be formally stated and proved as follows:

Corollary 1 *If Z and α are sufficiently small, then the average seller revenue from a winning SB bid is strictly larger than the average seller revenue from a winning PE bid.*

Proof of Corollary 1: Note that $\alpha \rightarrow 0$ implies $q^* \rightarrow 1$. As a consequence all the m PEs will participate in the initial auction implying the winning bid cannot be below $v_0 + x_{PE}$. Hence a SB will win only if its synergies are above x_{PE} , and it will pay at least $v_0 + x_{PE}$; on average it will pay more than $v_0 + x_{PE}$ because of competition from other SBs. However, $v_0 + x_{PE}$ is the maximum payment the seller can obtain from a PE. Note that winning SB bids can only occur if $x_{PE} < x_H$; since x_{PE} is strictly increasing in Z this condition implicitly puts an upper bound on Z . ■

To formally state Hypothesis 2 (Restructuring) let us denote by $R_{PE}(x_{PE})$ and $R_{SB}(x_{PE})$ the seller expected revenue as a function of x_{PE} , conditionally on the winner of the initial auction being a PE or a SB, respectively. In the following corollary we consider variations of x_{PE} over the interval $[x_L, x_H]$:

Corollary 2 (a) *The probability of a PE winning the initial auction is increasing in x_{PE} . (b) There exists a threshold \underline{x}_{PE} , with $0 < \underline{x}_{PE} < x_H$, such that for all $x'_{PE} > \underline{x}_{PE}$, we have $R_{SB}(x'_{PE}) < R_{PE}(x'_{PE})$.*

Proof of Corollary 2: (a) For a given x_{PE} , the probability of a PE winning the initial auction is $F^{(1)}(x_{PE})(1 - (1 - q^*)^m)$, that is the probability that the highest of the SB bidders' synergies is less than x_{PE} times the probability that at least one PE participates in the auction. This expression is increasing in x_{PE} because F is increasing and q^* is increasing in x_{PE} .

(b) Consider first $R_{PE}(x_{PE})$. The PE wins only if the highest value of synergies among SBs is less than x_{PE} . If the winning PE faces no competition from other PEs, then it will pay the highest of the SBs' valuations, for which the expectation, conditional on PE winning the auction, is $v_0 + E[\tilde{x}^{(1)} | 0 \leq \tilde{x}^{(1)} < x_{PE}]$. If there is at least one other PE bidder, then the winning PE will have to pay $v_0 + x_{PE}$. It immediately follows that $R_{PE}(x_{PE})$ can be expressed as

$$R_{PE}(x_{PE}) = v_0 + \theta(x_{PE})E[\tilde{x}^{(1)} | 0 \leq \tilde{x}^{(1)} < x_{PE}] + (1 - \theta(x_{PE}))x_{PE}$$

where $\theta(x_{PE})$ denotes the probability of no other PE participating to the auction and, to the contrary of q^* , is decreasing in x_{PE} . Clearly, $R_{PE}(x_{PE})$ is continuous, increasing in x_{PE} . Moreover, if $x_{PE} = x_L$ then $R_{PE}(x_H) = v_0 + \theta(x_L)E[\tilde{x}^{(1)} | \tilde{x}^{(1)} \leq x_L] + (1 - \theta(x_L))x_L = v_0 + x_L$; if $x_{PE} = x_H$ then $R_{PE}(x_H) = v_0 + \theta(x_H)E[\tilde{x}^{(1)} | \tilde{x}^{(1)} \geq 0] + (1 - \theta(x_H))x_H$. Consider now $R_{SB}(x_{PE})$. If a SB faces no competition from PEs, then it will pay the highest of the other SBs' valuations, which in expectation equals $v_0 + E[\tilde{x}^{(2)} | \tilde{x}^{(2)} \geq 0]$. If a SB wins in the presence of PEs, it will pay the maximum between the highest of the other SBs' valuations and x_{PE} , which in expectation is $v_0 + E[\tilde{x}^{(2)} | \tilde{x}^{(2)} \geq x_{PE}]$. Clearly $R_{SB}(x_{PE})$ is a continuous function of x_{PE} . Note, however, that when x_{PE} increases, a SB will tend to win only when facing no competition from PEs. Namely for $x_{PE} = x_H$ the probability of a SB winning in the presence of a PE is nil. Thus, $R_{SB}(x_H) = R_{SB}(x_L) = v_0 + E[\tilde{x}^{(2)}] < R_{PE}(x_H)$. The result follows from the continuity of R_{SB} and R_{PE} . ■

Thus, we have shown that $R_{PE}(x_{PE})$ is continuous and increasing in x_{PE} , and $R_{SB}(x_{PE})$ continuous in x_{PE} , and we have established that $R_{SB}(x_L) > R_{PE}(x_L)$ and that $R_{SB}(x_H) < R_{PE}(x_H)$. This defines sufficient conditions for the existence of an outcome where the average seller revenue from a winning PE bid is strictly larger than the average seller revenue from a winning SB bid.

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Table 1
Descriptive statistics

Statistics for means, and medians in parentheses, are reported for asset sales of \$100 million or more conducted by publicly traded sellers listed on NYSE/ASE/Nasdaq over the sample period 1994 through 2004, obtained from the SDC Acquisition Database. Transactions are disaggregated on the basis of the type of buyer into 146 asset sales to private equity buyers (PE), 48 asset sales to private strategic buyers (private operating firms), and 287 asset sales to publicly traded strategic buyers. The value of the transaction is reported in millions of constant (1997) dollars. Firm market value is calculated as the number of shares outstanding multiplied by stock price prior to the event announcement, and reported in millions of constant (1997) dollars.

	Private equity buyer	Strategic private buyer	Strategic public buyer	
	Seller	Seller	Seller	Buyer
	N=146	N=48	N=287	N=287
Transaction value (\$1997, m)	397.90 (211.81)	308.12 (222.25)	643.73 (255.00)	643.73 (255.00)
Market value (\$1997, m)	21,694.95 (4,614.09)	7,817.36 (2,560.66)	20,721.6 (5,228.31)	22,184.96 (2,677.25)
Asset/MV	0.26 (0.07)	0.52 (0.09)	0.31 (0.07)	0.34 (0.11)

Table 2
Empirical results for share price responses at asset sales

Empirical results are reported for excess returns at asset sales of \$100 million or more conducted by publicly traded sellers listed on NYSE/ASE/Nasdaq over the sample period 1994 through 2004, obtained from the SDC Acquisition Database. The metrics are two-day (-1, 0) announcement cumulative excess returns (CARs) for 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 value (Panel B). Excess returns and transaction returns in percent are in response to 146 asset sales to private equity firms (PE), 287 asset sales to publicly traded strategic buyers (Public SB), and 48 asset sales to private strategic buyers (Private SB). To obtain rival CARs, CRSP firms with the same 4-digit SIC code as the asset are used to form an industry portfolio for each event (equally weighting rival firms per event), and then are averaged over all events. Combined returns weight the buyer and seller returns by market capitalization. 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, $t = -160$ to -41 , 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.

	Private equity buyer	Strategic public buyer	Strategic private buyer	p-difference in means { medians }			Strategic public buyer	
	Seller	Seller	Seller	PE / Public SB	PE / Private SB	Public SB / Private SB	Buyer	Combined
	N=146	N=287	N=48				N=287	N=287
<i>Panel A: Excess Return</i>								
Two-day CAR (-1, 0)	3.78%	1.25%	0.95%	0.00	0.01	0.81	0.48%	0.31%
	(12.42)***	(6.10)***	(2.19)**				(3.10)***	(1.40)
	{2.06%}***	{0.27%}**	{0.46%}	{0.00}	{0.00}	{0.78}	{0.33%}	{0.32%}
	[0.82]	[0.54]	[0.52]				[0.55]	[0.54]
Rival CAR (-1, 0)	0.05%	0.12%	-0.52%	0.93	0.66	0.61		
	(0.47)	(0.61)	(0.91)					
<i>Panel B: Transaction Return</i>								
Two-day median TR	{22.25%}***	{2.85%}	{3.68%}	{0.00}	{0.00}	{0.57}	{0.73%}	{2.46%}

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 sellers at announcements of asset sales to private equity buyers over the period 1994 through 2004 for sellers 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. Average excess returns reported are the two-day (-1, 0) announcement average excess returns for sellers and the average two-day gain in seller value scaled by transaction size; median returns are in braces. 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, $t = -160$ to -41 , where day 0 is the date of the announcement in the Wall Street Journal. The duration of the interval from the asset sale to the date of the exit transaction is reported as of end of 2009. 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 of the relevant asset and its benchmark. Private equity exits are disaggregated into IPOs, sales to strategic buyers, secondary buyouts (SBOs), no exit, and Chapter 11 filings. Of the 23 SBOs, the second private equity firm exits the investment in 11 cases. N is the sample size and statistical significance is denoted as: *** for the 1% level, **, for the 5% level, and *, for the 10% level.

	<i>Panel A:</i> <i>By type of exit by 1st private equity buyer</i>							<i>Panel B:</i> <i>2nd private equity buyer</i>
	Full sample	All exits	IPO	Strategic buyer	Secondary buyout	No exit	Chapter 11	2 nd private equity buyer
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
N	146	121	41	37	23	25	20	11
%		100%	34%	30%	20%		16%	9%
Time in PE {years}		3.37	2.13	3.19	4.95		4.42	4.25
		{2.84}	{1.82}	{2.77}	{5.00}		{4.20}	{4.20}
Seller CAR	3.78%***	4.04%***	5.11%***	3.49%***	4.81%***	2.51%***	1.97%**	
	{2.06%}***	{2.16%}***	{2.38%}***	{1.93%}***	{2.40%}***	{2.06%}*	{0.73%}*	
Seller TR	135.93%***	153.55%***	230.89%***	181.08%***	70.89%	50.65%*	31.76%*	
	{22.25}***	{23.87%}***	{45.05%}***	{24.72%}***	{16.71%}***	{19.27%}	{7.15%}	
EV growth rate		48.45%***	111.52%***	36.81%***	20.48%***		-27.11%***	15.19%*
		{18.69%}	{43.64%}	{24.78%}	{10.38%}		{-21.20%}	{16.76}
Rival EV growth rate		20.53%***	37.03%**	17.88%**	9.48%		4.31%	14.92%
		{6.12%}	{9.45%}	{6.21%}	{2.10%}		{3.94%}	{10.00}
Excess EV		27.93%***	74.49%***	18.93%***	11.00%		-31.42%***	00.27%
		{13.96%}***	{45.88%}***	{18.64%}***	{14.90%}*	{4.04%}	{-28.59%}***	

Table 4
Analysis of private equity success

The first metric, 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 the 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 horizon. 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 TV is the log of the value of the 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. The sample size is 121 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	0.0012 (1.93)*	0.0013 (2.21)**	0.0031 (2.10)**	0.0039 (2.38)**	0.0092 (5.30)***	0.0086 (4.61)***
Ln TV		-0.017 (-0.36)		-0.007 (-0.04)		0.165 (1.16)
Exit in 1999-2001		-0.202 (-1.79)*		-0.953 (-1.82)*		2.899 (4.81)***
Constant	0.1687 (3.64)***	0.2872 (1.07)	0.0101 (0.07)	0.1510 (0.16)	-1.9587 (-12.84)***	-3.0626 (-3.58)***
R-squared/ Pseudo R-squared	0.0361	0.0641	0.0210	0.0741	0.0669	0.1343

Table 5**Regressions of seller announcement returns**

Regressions explain excess returns to sellers of assets from 1994 through 2004. In regressions (1) – (4), the dependent variable is TR (transaction returns), and in regressions (5) – (8) seller CAR (cumulative excess returns). 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 firms; 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: Enterprise value (log) is logarithm of the asset's sales price; Pre-return is 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. 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.

	Transactions return				CAR			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
PE	112.74 (4.51)***	101.51 (3.96)***	99.30 (3.86)***	100.06 (3.89)***	2.43 (4.20)***	2.52 (3.85)***	2.52 (3.96)***	2.44 (3.86)***
POF		-0.89 (-0.04)	-3.83 (-0.17)	-3.73 (-0.17)		-0.40 (-0.36)	-0.51 (-0.47)	-0.58 (-0.55)
Focus				-10.10 (-0.41)				0.44 (0.54)
Enterprise value (log)				4.57 (0.42)				-0.83 (-3.87)***
Pre-return			-33.87 (-1.23)	-33.44 (-1.21)			-2.17 (-2.62)***	-2.23 (-2.73)***
ROA		421.96 (1.93)*	419.43 (1.87)*	412.73 (1.84)*		-8.02 (-1.62)	-7.39 (-1.49)	-6.04 (-1.25)
Asset/EV		5.62 (0.77)	4.38 (0.62)	10.17 (0.90)		-0.70 (-0.30)	-0.77 (-0.32)	-1.84 (-1.09)
Insiders		-0.90 (-1.38)	-0.90 (-1.35)	-0.66 (-0.98)		0.04 (1.32)	0.05 (1.47)	0.01 (0.37)
M/B		-0.16 (-0.54)	-0.05 (-0.13)	-0.10 (-0.30)		-0.01 (-0.78)	-0.01 (-0.56)	0.01 (0.39)
Proceeds		-8.99 (-0.42)	-13.40 (-0.62)	-10.57 (-0.54)		1.56 (2.50)***	1.42 (2.31)**	0.91 (1.53)
Constant	4.39 (0.34)	-42.14 (-1.23)	-38.33 (-1.10)	-81.43 (-0.84)	1.23 (3.50)***	1.36 (1.74)*	1.31 (1.67)*	9.41 (4.00)***
N	481	448	444	444	481	448	444	444
R-squared	0.0440	0.0534	0.0551	0.0563	0.0318	0.0653	0.0874	0.1255
F	20.31	3.78	3.09	2.58	17.67	5.74	5.53	6.70

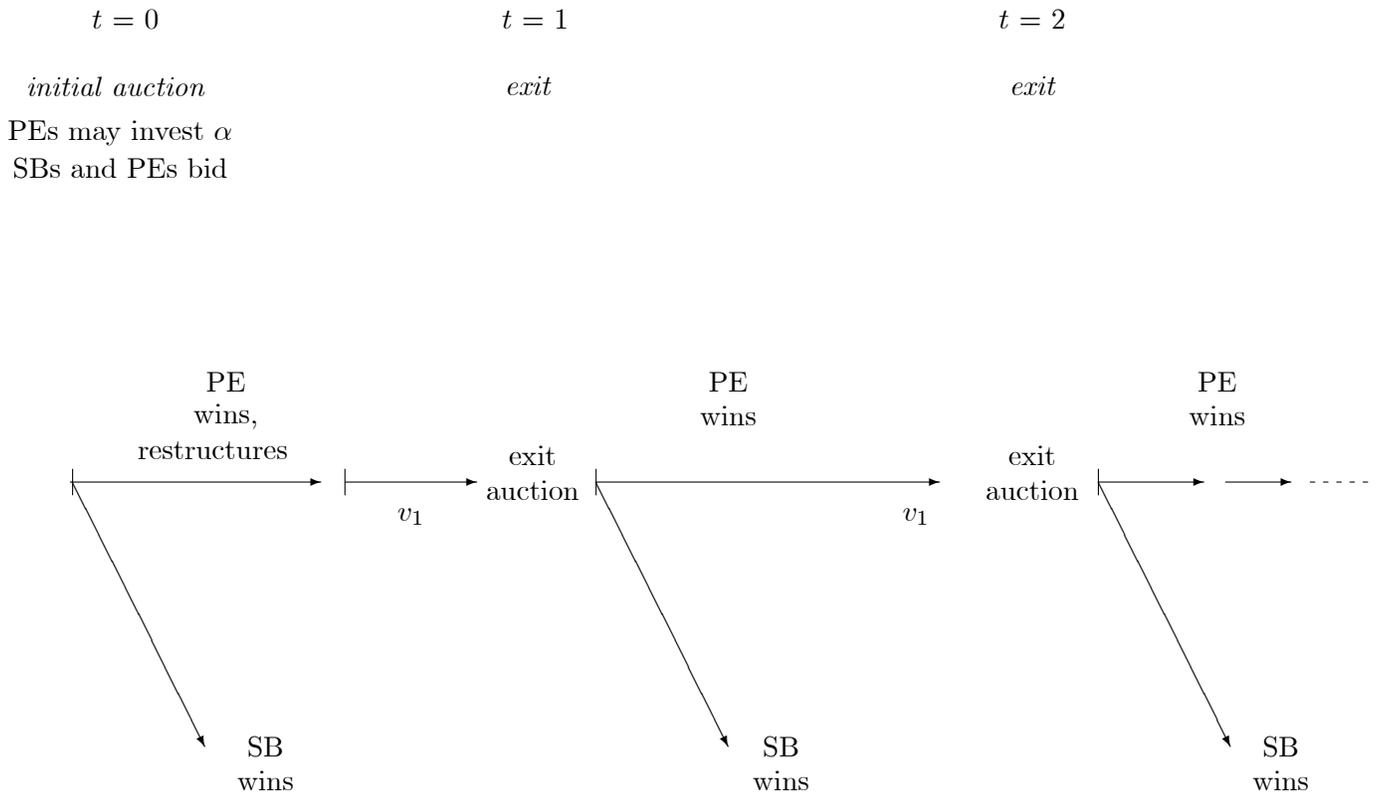


Figure 1. Time Line